Chapter 2

# The International Interaction Game

The head bone's connected to the
neck bone. The neck bone's connected to the shoulder bone. The
shoulder bone's connected to the
back bone.
—Anonymous, "Dry Bones"

Make but a show of war and you
will have peace.
—Livy, *Discourses on the First Ten Books of Titus Livius*

One of the central problems in the study of international affairs is how the sequence of actions taken by states may lead to conflict or to peacefully resolved differences. To analyze the paths and pitfalls along the way to resolving disputes and to consider if indeed disputes arise at all, we describe in this chapter a set of what we believe to be fundamental interactions between nations. Decision makers assess the desirability of outcomes according to the various costs and benefits that the outcomes are anticipated to entail. Decision makers also choose their strategies with an awareness of how the countervailing actions available to their antagonists alter the course of international relations. Such problems fall within the purview of game theory. We recognize that the conduct of international politics involves a much broader array of decisions and actions than those we formalize as part of our model. Certainly, other decisions undertaken by nation-states are very important parts of international interactions. Much of the importance of these other forms of international discourse is, however, in terms of how they effect the potential for war and international conflict. Whether an action is expected to precipitate armed conflict with another state is a primary consideration, carrying with it the

essential function of the state—the protection of the populace. "The first duty of the sovereign, that of protecting the society from the violence and invasion of other independent societies, can be performed only by means of military force" (Smith 1937, 653). To disregard the use of force is to discount the importance of the survival of the state (or, in many instances, the survival of a regime). All models that incorporate the decision to use force are dealing with interstate relations at the most basic levels.

The course of events leading to or away from international conflict is always diverse and complex in its details. Thus we would not expect any two historical events to be identical, certainly not in their specifics. No account of an event, no model, no history, is complete in its representation. Learning from an understanding of general phenomena, whether for the historian or for the social scientist, requires a concentration on essential features—in this case, the structure rather than the specifics of interstate interactions. Our model is an attempt to delineate interrelated decisions around international military crises, highlighting the opportunities for peaceful relations, which are juxtaposed against the sometimes great dangers imposed by negotiating in the presence of a potential resort to arms. We incorporate a number of aspects of international disputes, ranging from concern over the military costs if an action precipitates an attack by an antagonist to concerns over domestic political opposition. In addition, once we have explored the nonobvious, unanticipated implications of our model under the assumption that both players are fully informed about the preferences and the intentions of the opponent, we turn to an analysis of the game under the condition of imperfect information.

We begin our analysis from the standpoint of an individual decision maker who makes strategic choices in the name of the state. This viewpoint is recognizable as the conventional unitary actor principle used by many scholars studying interstate relations (Morgenthau 1973; Waltz 1979; Organski and Kugler 1980; Gilpin 1981; Bueno de Mesquita 1981; Morrow 1985; Powell 1987; Zagare 1987; Lalman 1988; and many others). Although there is some controversy over this assumption, particularly when it is applied haphazardly or with little awareness of its implications and limitations, there is less difficulty when the assumption is applied to confrontations where the use of military force is an alternative. In these situations, most, if not all, modern states formally confer on a single individual the choice to invoke force.

Perhaps some of the controversy surrounding the unitary rational actor assumption can be cleared up by keeping in mind what the assumption involves and how we are to interpret the real world in light

of the analytic results. So long as decisions to negotiate or to use force are made rationally (or as if instrumental rationality were operative), it does not matter, in the context of our model, whether the decision is made by a single actor or by a group. If decisions are not made rationally, whether the source of the irrationality is the individual's mental processes or some group decision process, so much the worse for our model—and, perhaps, so much the worse for the world. Whether the assumption of a rational unitary actor is useful or trivializes the analysis of international interactions is, ultimately, an empirical question. If this and our other assumptions help make sense of historical patterns of behavior, then they are useful and do not excessively simplify and trivialize what is undoubtedly a very complex process.

What precisely is meant by a unitary actor is rarely spelled out in much detail by researchers who find this assumption convenient. Because we address two alternative views of the unitary actor, it is essential that we be explicit about the meaning of the assumption we make. At the outset of our investigation we are not committed to either a realist/unconstrained or a domestic/constrained interpretation of the unitary actor. As noted earlier, the realist assumption requires that the selection of national foreign policy objectives and the choice of actions to implement the chosen goals are both made as if by a single, rational leader. The domestically constrained interpretation assumes that goals are determined by the domestic political process in each state, tempered by interested constituencies that are attentive to the constraints of the international environment. In this view, the unitary actor assumption implies that actions and strategies, but not goals, are chosen as if by a single, rational leader.

It would be inaccurate to portray any particular researcher as believing that policy choices are made wholly as if domestic politics are irrelevant. Hans Morgenthau—the quintessential realist—acknowledged with regret that domestic politics had crept into the foreign policy process:

> If nations who are sovereign, who are supreme within their territories with no superior above them, want to preserve peace and order in their relations, they must try to persuade, negotiate, and exert pressure upon each other.
>
> The new parliamentary diplomacy is no substitute for these procedures. On the contrary, it tends to aggravate rather than mitigate international conflicts and leaves the prospect for peace dimmed rather than brightened. Three essential qualities of the new diplomacy are responsible for these

> unfortunate results: its publicity, its majority votes, and its fragmentation of international issues. (1973, 530–31)

Morgenthau characterizes an ideal world as one in which domestic factors are excluded from foreign policy choices. There are, to be sure, clear variations in the degree to which the domestic context or the international context is believed to shape national foreign policy goals.

Stephen Krasner (1978) describes the contemporary pulls and tugs between what we call the domestic/constrained point of view and the dominant view of realism or neorealism. He agrees that foreign policies emerge as part of a complex interaction by elites within their international and their domestic settings. In the end, however, Krasner, like Kenneth Waltz and other neorealists, assumes that the international domain takes precedence, thereby reasserting a state-centric view of international relations and accepting the stronger unitary actor assumption.

Shifting more toward the domestic politics end of the spectrum, Robert Putnam (1988) envisions international negotiations taking place against the backdrop of domestic affairs. He speculates that foreign policy elites use the real or alleged intransigence of their domestic constituencies as a bargaining chip in international negotiations.

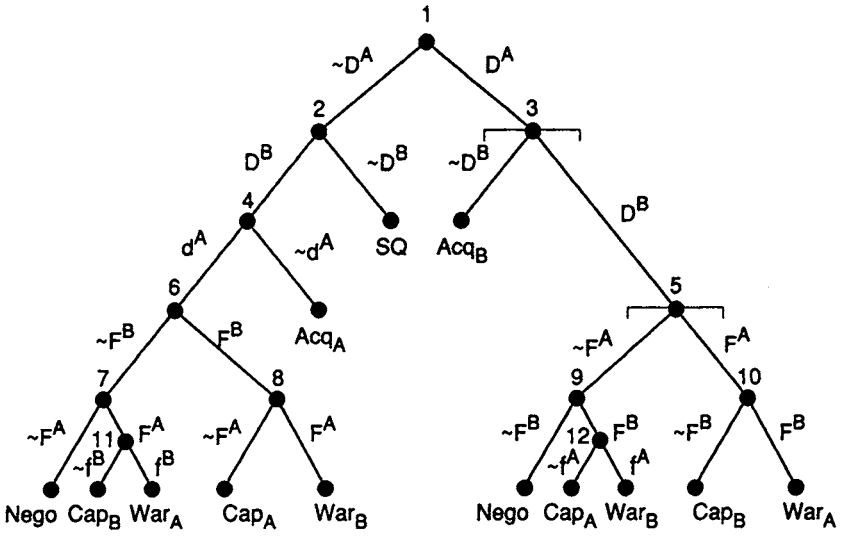
Tilting still further in the direction of conceding a fundamental role to domestic politics in shaping foreign policy, Bruce Bueno de Mesquita, David Newman, and Alvin Rabushka (1985) and Bueno de Mesquita (1990) describe the domestic bargaining setting as central to influencing what foreign policy elites can bring to the international negotiating table. In their view, the domestic process determines each actor's set of demands, and the international process determines ultimate outcomes, whether through a bargaining process or through violence.

Others before us have taken seriously the possibility that some features of international affairs are best explained by looking outward at the international system, whereas other aspects are best understood by looking inward at the organizational, bureaucratic, and interest group politics of the state in question. Waltz (1959, 1979), Graham Allison (1971), Barry Posen (1984), and Alan Lamborn (1990) provide four such examples. Waltz, for instance, addresses foreign policy as arising in part from the ambitions and aspirations of the individual, from the pressures and competing interests within the state, and, finally, from the structure and circumstances of the international system. In his later explorations of international affairs, he seems increas-

ingly to place greatest emphasis on the role of the international system, rather than on man or the state, perhaps because he envisions all states as having a common core goal—the maximization of national security. Conversely, Allison emphasizes the pivotal importance of bureaucratic, organizational factors within states in foreign policy, although he, too, addresses carefully the role of external structures and pressures. Unlike the approach taken here, Allison associates rational action exclusively with the realist, structural perspective, viewing internal, bureaucratic, or organizational politics as driven by heuristics or standard operating procedures. Although we now recognize that such heuristics and standard operating procedures are elements of rational calculations in situations in which information is costly, at the time Allison wrote his seminal work, it was generally believed that rationality required a comprehensive assessment of all possible alternative courses of action.

Still more recently, Posen has investigated military doctrines in the context of two competing theoretical positions, an organizational process point of view and a neorealist, balance-of-power perspective. Although he finds some support for each outlook within his three detailed case studies, he concludes that there is somewhat more reason to rely on a neorealist, balance-of-power perspective than on the domestic-oriented, organizational point of view. Lamborn presents one of the first significant efforts to integrate theories of domestic politics and theories of statecraft into a coherent view of foreign policy. He provides several important steps toward assessing the trade-off between the foreign policy risks faced by decision makers and the domestic political risks associated with their choices.

Here we construct variants of a single theory that take into account the two alternative views of the unitary actor: the unitary actor as the chooser of foreign policy goals and strategies versus the unitary actor as the chooser of strategies alone. Like Waltz, Allison, Posen, and Lamborn before us, we begin without a predisposition toward either alternative. We depart from them in utilizing a more formalized approach to exploring the implications of each perspective. We end up favoring the constrained, domestic perspective as a better portrayal of international affairs—not that we disagree with Morgenthau and other realists when they note the international miseries that can arise in the name of domestic politics. Indeed, our deductions and evidence offer some support for their fears. But we are engaged in a positive process of trying to understand how international politics works, not a normative process. One surely cannot hope to make a better world without first understanding it better as it is.




2.1: The international interaction game.

Most common analytic objections to the unitary actor assumption are aimed at the stronger, realist variant. Kenneth Arrow's (1951) general impossibility theorem is often cited as a criticism of this version of the unitary actor assumption. Arrow shows us that even if rational individuals aggregate their preferences according to rules meeting certain conditions of fairness, there can be no guarantee that group decisions will be coherent. This result is very strong in the sense that all the conditions are required in order to obtain it; weakening the conditions allows the possibility of aggregate rationality. Beyond our previously mentioned belief that decisions about the use of force are not group decisions, we would also claim that the decision processes concerning the use of force do not meet the fairness conditions required by Arrow's theorem. That is not to say that the process by which *goals* are chosen does not meet the conditions of the theorem.

Another aspect we should bear in mind when moving back and forth between the abstract world of game theory and the world we perceive through our senses is that some of the results we obtain are disconcerting in spite of assuming rationality. If we assumed that decisions are anything less than rational, these results would be even more disturbing because we cannot hope to escape unpleasant results by somehow improving the rationality of the participants.

Our full game of sequential decisions is depicted in figure 2.1. The purpose of this game is to represent the skeletal features of the conduct

of international affairs. The game highlights the consequences of countervailing actions by rivals. The analogues in the world of policymaking are the standard operating procedures of contingency planning and the assessments of scenarios of potential responses by an opponent. Tensions between states in the form of conflicting interests can be resolved through numerous events, ranging from the peaceful acceptance of the status quo to the resolutions of conflicting interests that follow from military contests.

Quite often states allow tensions to go uncontested and hence unresolved by their tacit acceptance of the status quo. This acceptance of the status quo could be for reasons as prosaic as that the differences between the states are negligibly small. But more interesting from a theoretical standpoint are choices to let policies go unchallenged because the challenge might have unpleasant, undesired consequences.

The game in figure 2.1 is capable of separating for analysis our concerns regarding the conduct of international affairs. For example, the structure is capable of separating the peace that is due to an insufficient tension between states from the peace that is due to deterrence. "Normal diplomacy" is at once distinguished from extraordinary or crisis diplomacy. The complexity and the danger of international affairs is suggested by the paths that lead to the conflictual subgames below nodes 5 and 6. We refer to these subgames as crisis subgames, the possibility of military conflict being imminent. We wish to emphasize that the larger game captures a great deal of international relations and extends well beyond the field of conflict studies. Interacting nations need not be belligerent antagonists, but including the crisis subgame as part of the overall structure reflects one of the distinguishing aspects of international politics: international affairs are conducted against a background of potential conflict. After perusing the game, we are left with some sympathy and respect for the skills of national leaders and diplomats who must play it. Our investigations deepen our appreciation of the difficulties faced by the players, for the consequences of their actions can, though they do not always, involve very high stakes, and the conduct of international affairs hazards unintended consequences. The crisis subgame beginning at node 5, which focuses directly on conflictual consequences, will be analyzed once we have developed and analyzed the larger game, which addresses the broader conduct of international relations.

The game begins with a "move by nature" that furnishes one state or the other an opportunity to take the initiative in an effort to govern the development of events. This move by nature may be thought of as the circumstances under which the game begins, and it is not

dissimilar to the selection of the player to move first in a chess game. The main difference is that the selection mechanism for chess games is presumed fair and does not advantage one player over the other; circumstances, however, may well be biased in favor of one of the states. Such bias and any advantage attributable to having the initiative may be due to geographic considerations, a recently realized technological advantage, or any of a host of other factors.

The state that is favored by circumstances has a choice of two initial moves: to make a demand (D) of the other state or to forgo making a demand ($\tilde{D}$). In the realpolitik variant of the game, the magnitude of any demand that is made is chosen to maximize the actor's expected utility at the end of the game. In the domestic variant, the magnitude of any demand that is made is determined primarily by domestic political factors that are exogenous to the international setting. Given the demands, actions are selected to maximize the actor's expected utility at the end of the game. Demands are accompanied by the threat to use force if they are not complied with, and the demands may be about anything so long as the two players can attach a value to them. We are not concerned here with the specific contents of prospective disputes. We do care that objectives vary in magnitude, and we care about how such variation affects the process by which international interactions evolve.

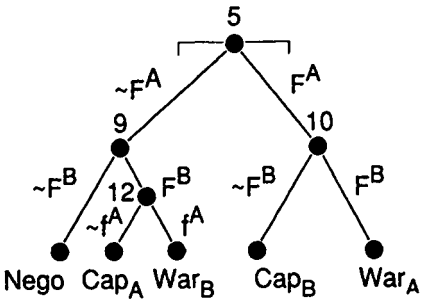
The actor designated by nature as the first to move is named state *A*. Moving second, state *B* has a choice between making a demand and not making a demand of *A*. An initial sequence in which each player chooses not to make a demand leads to a noncontentious continuation of the status quo. This condition is described by $\tilde{D}^A$, $\tilde{D}^B$, with the actors indicated by the superscript. The sequence $D^A$, $\tilde{D}^B$ represents an acquiescence by *B* to *A*'s demand. An acquiescence could also be made by *A* if *A* forgoes its option to initiate only to be confronted by a demand from *B* to which *A* then yields, $\tilde{D}^A$, $D^B$, $\tilde{d}^A$. The paths to these outcomes are peaceful. Either the two parties find the status quo mutually agreeable, or the adjustments to the status quo are made before any recourse to arms.

The other paths lead to subgames where strategy choices include the use of force as an option. These are the subgames we refer to as crisis games. Players involved in crisis games must face decisions of whether to carry out their (implicit or explicit) threats to use force. At this juncture, decision makers directly confront the potential for military conflict. In the next chapter we explore the necessary and sufficient conditions to arrive at these crisis games within the overall

structure of the international interaction game under the realpolitik and the domestic variants.

The crisis subgames arise at nodes 5 and 6 of figure 2.1. Within our model these nodes are reached by distinct paths. If *A* makes a demand and *B* counters with a demand of its own, $D^A$, $D^B$, the countries reach a military crisis at node 5. If *A* does not initiate the dispute and hence allows *B* the option of initiating, *A* can then issue a counterdemand, $\bar{D}^A$, $D^B$, $d^A$. A counterdemand can range from a refusal to stand down, to an insistence that *B* cease engaging in some behavior or begin engaging in some other behavior, to an insistence that *B* transfer some tangible benefit to *A*. A counterdemand does not terminate the game but carries it forward to a crisis: once a demand has been brought forward, a failure by either nation to acquiesce and satisfy the other results in what we call a military crisis.

Our notion of a military crisis deserves some discussion at this point. We have characterized a crisis as beginning at that moment when states *A* and *B* have each tabled demands and neither has conceded to the other. Up until the crisis stage, the use of force in the dispute has not been imminent. That is, the leaders' strategic choices have not yet involved military options. They have maneuvered back and forth, giving and taking, bargaining over the issues that separate them. A military crisis occurs when the parties are unwilling to accept the current state of affairs (or the current arrangement of policies) and have not found a mutually acceptable rearrangement without the threat of force (Lalman 1988). They may choose to seek a new arrangement through negotiation ($\bar{F}$), or they may choose to resolve their differences by resorting to the force of arms (F). This notion of a crisis is different from and yet essentially consistent with the notions used by several others (Brecher and Wilkenfeld 1989; James 1988; Snyder and Diesing 1977; Weiner and Kahn 1962; Hermann 1972; Young 1968). Core interests in terms of the physical security of the state are at risk. Information on the interests and the intentions of the antagonist are at a premium, and decision makers are likely to perceive a constraint in the time needed to gather or confirm the desired information. Our game structure highlights the importance of information. When we analyze the game in the next chapter under the condition of perfect information and then again under the condition of imperfect information, we will elaborate on the information properties of the game. Here we wish to point out only that when playing the game, or when making interactive decisions in foreign policy, information and beliefs about the preferences and opportunities available to the opponent are critical to the choices made. If the situation evolves to the point of a military




2.2: The crisis subgame.

crisis, it is difficult to turn back. Only one opportunity to avoid the costs of violence remains. If a leader believes that the opponent's preferences have foreclosed the option of negotiating, that leader will have to choose whether to initiate a conflict or to enter one initiated by the opponent.

The crisis subgames at nodes 5 and 6 are mirror images of each other, differing only in which actor has the first move. After making allowances for this difference, our discussion of the subgame starting at node 5 and depicted in figure 2.2 holds for the subgame starting at node 6 as well. The crisis at node 5 is precipitated by *B*'s refusing to grant *A*'s demand. *A* may choose to negotiate ($\tilde{F}^A$) or to escalate the dispute, driving the situation further down the tree by initiating the use of force ($F^A$) and ensuring that the outcome will be violent. If *A* elects not to fight and offers to negotiate and *B* responds by also negotiating, then the outcome is that negotiation continues—violence has been averted (for the time being).

However, if *A* chooses to escalate the dispute by using force, *B* may choose to capitulate to *A*'s first strike, $F^A$, $\tilde{F}^B$, or *B* may choose to strike back, $F^A$, $F^B$. The full description of the strategy required to arrive at this outcome from the larger game is $D^A$, $D^B$, $F^A$, $F^B$. Both nations have elected to fight, nation *A* being the first to resort to arms. The war has been initiated by *A*. Following David Lalman (1988), we distinguish war from other forms of violence according to strategic choice. Both parties must choose the fight option to arrive at an outcome of war. A decision by *B* to yield after the initial escalation by *A*—$D^A$, $D^B$, $F^A$, $\tilde{F}^B$—results in an unreciprocated use of force, what we call a capitulation by *B* ($Cap_B$). The Japanese, for example, apparently hoped, by attacking Pearl Harbor, that a crippling blow to the American Pacific Fleet would lead to a U.S. capitulation rather than war (Prange 1981; Russett 1972).

**Table 2.1**
Outcomes of the Crisis Subgame

| Nonviolent | Violent |
|---|---|
| Status quo | *Capitulation by A* |
| Acquiescence to *A*'s demand | *Capitulation by B* |
| Acquiescence to *B*'s demand | *War initiated by A* |
| *Negotiation* | *War initiated by B* |

Should *A* forgo its opportunity to initiate, there is still the possibility for armed conflict. *A* could find itself either capitulating to the use of force by *B*—$D^A$, $D^B$, $\tilde{F}^A$, $F^B$, $\tilde{f}^A$—or fighting a war initiated by *B*—$D^A$, $D^B$, $\tilde{F}^A$, $F^B$, $f^A$. Allowing for this range of outcomes is important not just theoretically but substantively as well. There are many situations where decision makers are concerned about the potential for a preemptive use of force by an antagonist. Their considerations differ significantly from the considerations that prevail when the concern is war. As we will see when we develop the payoff structure of the game, having a capitulation to the use of force as a target of a military intervention entails different benefits and costs than does a war and hence must be explicitly accounted for in the model. Taking the possibility into account is important in the conduct of international affairs even if such events occur only rarely. The anticipation of an attack may provoke a "revolt upon the expectation of evil intended" (Thucydides 1959, 10–12). The fear of having to capitulate may itself precipitate the preemptive use of force, thereby averting the need to capitulate.

Note that each outcome to the crisis game is an empirically observable event for which data are currently available. Nearly all of our theoretical conclusions can be tested against the historical record of international conflict and peace. The model encompasses eight different outcomes. Five of the eight represent outcomes to the crisis subgames; three of the eight avert the crisis. The eight outcomes, with crisis outcomes in italics, are listed in table 2.1.

## ASSUMPTIONS

The players select strategies as a function of both the values they attach to alternative outcomes and their beliefs about how their ad-

versary will respond to their strategic decisions. Decision makers are assumed to respond to the circumstances they find themselves in by making the choice they believe maximizes their expected utility from that stage of the game onward. They cannot precommit themselves to one or another course of action, but they can act in anticipation of their opponent's actions. The inability to make precommitments springs from the realization that in international affairs there is no binding authority to enforce agreements between states. It is akin to the common realist assumption that the international system is anarchic. Some theorists believe that this assumption must be relaxed to account for the incidence of cooperation among self-interested actors. We retain the assumption that binding commitments are not possible in both our realpolitik/unconstrained and our domestic/constrained versions of the international interaction game. This condition does not preclude cooperation among self-interested actors in either interpretation of the game. Furthermore, abandoning it seems to us to introduce unrealistic inducements to cooperation and unrealistic impediments to conflict in the study of international affairs.

Nations persist or desist in a course of action—whether it be honoring, ignoring, reinterpreting, or breaking some previous promise or threatening some unpleasant action—because the leadership believes that such action is the best way to pursue the national interest. Where no courts and no police exist to enforce agreements, only beliefs about future consequences of current actions can mediate between short-term current interests and long-term prospects. Therefore, we assume a non-cooperative game, which we solve in accordance with subgame perfection (Selten 1975).

A subgame perfect equilibrium for a game is an equilibrium for every part of the game from that node forward. Subgame perfection requires that decision makers be forward-looking rather than myopic (Brams and Wittman 1981), anticipating the consequences of their actions in selecting from alternative paths. Choices are not made solely in terms of local, short-term benefits but also in terms of the subsequent effects and anticipated reactions of others to the chosen course of action. In the realpolitik variant, the forward-looking aspect of decision making extends to the selection of demands, as well as to the choice of actions. The realpolitik version treats demands as endogenous to the international interaction game. In the domestic variant, demands are presumed to be endogenous to some domestic political process, not spelled out here, which likely varies from state to state and which precedes the actions we investigate. In this variation of the

game, then, the magnitude of any demand is taken as given, rather than treated as endogenous to the international interaction.

Here we limit decision makers to looking down the paths of a single confrontation, a single play of the international interaction game, which we call the medium term. We conceptualize short-term maximization as behavior that focuses only on the very next available foreign policy choice—the next move. The medium term is the completion of a sequence of moves that constitutes a single play of the international interaction game. The long term may be thought of as the indefinite repetition of interactions.

Myopic "fire fighting" is a form of limited rationality in which the costs of looking for information even one step ahead of the current situation are assumed to be too high to incur. In the perspective we take toward international affairs, we do not give much attention to fire-fighting behavior. It is hard to imagine such shortsightedness as a significant component of, for instance, crisis management. It can produce disastrous foreseeable and avoidable consequences. Although we do not rule out disaster—a concern with understanding the causes of disaster represents part of our motivation for undertaking this investigation—we do assert that national leaders do not blindly plunge forward without regard to the precipice before them. We recognize in our model that leaders do make mistakes, but we assume that they do not choose knowingly to act contrary to the medium- or longer-term interests of their nation.[1]

Neither do we focus much of our analysis on repeated play. There are three reasons for our primary—but not exclusive—attention to medium-term maximization. First, the so-called folk theorem of game theory informs us that in indefinitely repeated play virtually anything can be supported as a possible equilibrium. If decision makers can look down an indefinitely repeating sequence of choices and if they are fully rational, with no information costs for looking ahead, then there is likely to be a strategic path to just about anywhere. This possibility is not helpful in devising clear conditions of falsifiability unless we could climb into the head of each decision maker or unless we impose strong assumptions about the expected frequency distribution of particular mixed-strategy equilibria. What is more, even if interactions between states are repeated indefinitely, it does not follow that the game is repeated, as we make clear below.

1. One might apply such a myopic view to our game as a means of thinking about evidence that crises lead to panicked decision making. Some psychological research on reactions to stress might support such a view.

Second, Jeffrey Banks and Rangarajan Sundaram (1990) show that repeated games in which rationality is bounded by concerns about information costs revert to the single-stage equilibria of the game. That is, if decision makers are constrained by the costs associated with the complexity of their choices—complexity in terms of the number of stages and number of transition states from one strategy pair to another in the long-term, repeated game—then the Nash equilibria supported in the playing out of a single sequence of the game are the Nash equilibria for the repeated game.[2] Thus, if we assume that repeated play involves such information costs, then behavior that maximizes one's welfare over the medium term is behavior that is expected to maximize welfare over the long term. In international affairs, nations spend considerable sums of labor and money in the quest for information. It is clear that information costs are not inconsequential in the formation of national strategies in structuring relations between states. This observation bolsters our confidence that medium-term maximization—bounded rationality in the context of the playing out of a single sequence of moves—is the appropriate focus of our research. Such a focus properly takes into account the real limitations on information that must be confronted by policymakers.

The third and most important reason for focusing on the medium-term is that the outcomes of such critical international interactions as war or national capitulation change the game between nations. War, for instance, rarely leaves the belligerents with the status quo ante. Indeed, in all likelihood, the purpose of war is to restructure relations between adversaries. War serves to remove uncertainties about capabilities, expectations, and the like, reshaping beliefs and future prospects (Blainey 1973). International interactions change the fundamental circumstances in which national choices are made, so subsequent interactions do not repeat previous ones. Even though the structure of moves remains unaltered, the payoffs characterizing alternative moves are precisely what change as a result of previous experiences in foreign affairs. In the future, decision makers confront a revised set of expected payoffs, thereby diminishing the relevance of the repeated game concept for the international interactions of interest here.

The medium-term orientation of our research does not preclude the prospect that national actions are chosen with an eye toward reputa-

2. A set of strategies constitutes a Nash equilibrium if no player's welfare can be improved by a unilateral change of strategy by that player. We use the concept of equilibrium throughout this work in this sense and not to mean balance or stability, as is sometimes the case among international relations researchers.

tion building. Because our game is sequential and contains many subgames, the actors within our proposed structure have opportunities to build reputations by, for instance, enforcing or backing down from their initial demands. The beliefs and subsequent actions of rivals take such choices into account. Furthermore, the payoff structure we propose explicitly includes cost terms that are linked to reputation. As we explain below, nations that capitulate bear a cost in terms of lost face, just as nations that utilize force bear costs in terms of the magnitude of domestic constraints on forceful behavior. Beliefs about the size of these constraints can create an expectation that a nation is hawkish or dovish.

Our primary focus, then, is on subgame perfect equilibria within a single playing out of the international interaction game. We assume that beliefs about actions further down the international interaction sequence, rather than expectations of indefinitely repeated play or any prospect of making binding commitments, help shape choices of action.

We assume that national leaders prefer certain outcomes at the terminal nodes of the game. Their preferences in strategies are formed in accordance with the costs and benefits associated with each outcome. For example, the outright capitulation to a demand may entail some loss in welfare, and yet a capitulation does avoid additional marginal costs in terms of the spent human and material resources of fighting. Thus the preference rankings at the terminal nodes show the basic predilections of the decision makers with regard to the demands in dispute, together with their expectations of obtaining the various costs and benefits. To continue our example, it is possible that in some circumstances capitulation is preferable to standing firm, because the cost of standing firm outweighs the benefits.

We will return to these assumptions from time to time in the course of our analysis to investigate the ramifications of dropping various conditions in turn. We adopt this method in the hope of gaining a better understanding of the costs and benefits of certain assumptions adopted by us and by other students of international relations. Later we will see that dropping some assumptions simply leads to stronger conclusions, and hence those assumptions are superfluous for certain results. Other conclusions hang critically upon a single assumption. Such dependence is not inherently a bad thing, for it refocuses our attention on the importance of that assumption and on how it could be considered controversial. Our assumptions, like any others, are restrictions on the domain of applicability for our results. A failure of a case to meet a set of assumptions does not falsify the results of the

analysis; it makes the results nonapplicable to that case. There still remains a responsibility to go beyond a mere claim that some particular case or set of cases does not meet the assumptions. Some explanation should be given for why such cases do not qualify according to the assumptions.

The range of values associated with the outcomes by national leaders is established according to our assumptions. Seven assumptions establish the set of admissible preference orderings and the play of the game.

ASSUMPTION 1. *The players choose the strategy with the greatest expected utility, given that they are playing subgame perfect strategies.*

ASSUMPTION 2. *The ultimate change in welfare resulting from a war or from negotiation is not known with certainty. Hence, arriving at a war node or at negotiation yields an expected value, assessed according to the subjective probabilities of gaining welfare and the subjective probabilities of losing welfare. We restrict the probabilities in such lotteries: $0 < P < 1.0$. All probabilities are treated as subjective unless stated otherwise.*

ASSUMPTION 3. *In contrast to assumption 2, capitulations result in changes in welfare that are certain rather than probabilistic. The probability that the capitulating state loses is 1.0, as is the probability that the challenging state wins its demand.*

ASSUMPTION 4. *All nations prefer to resolve their differences through negotiation rather than war.*

ASSUMPTION 5. *Measured from the status quo (SQ) are $U^i(\Delta_i)$, the utility one expects to gain by obtaining one's demands, and $U^i(\Delta_j)$, the utility one expects to lose by acceding to the adversary's demands. The value of these terms is restricted such that $U^i(\Delta_j) < U^i(SQ) < U^i(\Delta_i)$.*

ASSUMPTION 6. *Each outcome has a set of potential benefits and/or costs appropriately associated with it. We make restrictions on the various costs such that $\alpha, \tau, \gamma, \phi > 0$; and $\tau > \alpha$.*[3] *The term $\alpha_i(1 - P^i)$ is the expected cost in lost life and property for nation i associated*

3. A mnemonic for the cost terms may help: $\alpha$ is the cost borne by the *a*ttacker for fighting *a*way from home in a war; $\tau$ is the cost borne by the *t*arget in a war; $\gamma$ is the cost borne by a state that *g*ives in after being attacked; and $\phi$ is the domestic political cost associated with the use of *f*orce.

*with fighting away from i's home territory; $\tau_i(1 - P^i)$ is the cost in lost life and property that i expects if it fights at home as the target of an attack; $\gamma_i(1 - P^i)$ is the cost in life, property, and lost face or credibility from absorbing a first strike to which the attacked party gives in; and $\phi_i(P^i)$ is the domestic political cost (apart from life and property) associated with using force rather than diplomacy to try to resolve differences.*

ASSUMPTION 7A: THE REALPOLITIK VARIANT. *The magnitude of actor i's demand $[U^i(\Delta_i)]$, if any, is determined by i to maximize i's expected utility within the international context, without regard for the wishes or objectives of domestic political constituencies.*

ASSUMPTION 7B: THE DOMESTIC VARIANT. *The magnitude of actor i's demand $[U^i(\Delta_i)]$, if any, is determined by the domestic political process in nation i. That process is determined by internal political rules, procedures, norms, and considerations and may or may not be attuned to foreign policy considerations.*

Assumption 1 stipulates that we are dealing with national decisions made in a rational (expected-utility-maximizing) and forward-looking manner. As we commented earlier, decisions need not be made by a single decision maker who formulates foreign policy. Regardless of the internal political processes involved, foreign policy decisions carrying with them the threat of force are made according to coherent, well-ordered preferences.

Assumptions 2 and 3 concern the probability of a nation's being ultimately successful in gaining its goals, given alternative combinations of strategic choices by *A* and *B*. In our game structure, if either party initiates the use of force, the adversary has the option to defend itself. We assume that a decision not to defend oneself with force in the face of a forceful challenge is a decision to accept defeat (assumption 3). A nation choosing not to fight back forfeits the full demand of the challenging state. The crucial feature of such a capitulation is not the lack of retaliation—some minimal use of force could, in principle, be permissible within this category of event—but rather the full surrender to the adversary's demands and the assurance of defeat. In events other than capitulations, gains and losses are probabilistic, not determinate. Before going into negotiations or wars, the other terminal events in the crisis game structure, real-world decision makers do not know with certainty the payoffs associated with these processes; they can base their decisions only on estimates of how negotiations or wars

will ultimately be resolved. We are reminded of an aphorism that was a favorite with Dwight Eisenhower: "Rely on planning, but never trust plans" (Greenstein 1982, 133).

We cast negotiations and wars as risky prospects. The adversaries may win, or they may lose. That is, they may gain their demands ($\Delta_i$) or they may lose and yield to the demands of the adversary ($\Delta_j$). The expected value of the risk is evaluated as the value gained if one's demands are won [$U^i(\Delta_i)$], weighted by the subjective probability of winning ($P^i$) summed with the value of the opponent's demands [$U^i(\Delta_j)$], which is weighted by the subjective probability of losing ($1 - P^i$). Thus nations *A* and *B* evaluate the risky components of outcomes as lotteries. For example, negotiations are thought of as risky events, where one can expect to obtain something between one's own demands and the demands made by the opponent. For *A*,

$$\text{Nego}_A = P^A[U^A(\Delta_A)] + (1 - P^A)[U^A(\Delta_B)].$$

For *B*,

$$\text{Nego}_B = P^B[U^B(\Delta_B)] + (1 - P^B)[U^B(\Delta_A)].$$

Our theoretical results do not depend on how the decision makers arrive at the probabilities in these lotteries (soothsayers included). Consistent with their being subjective, the probabilities are allowed to vary across decision makers. Later, when we turn to the empirical testing of the theory, we introduce and operationalize (in appendix 1) a particular conception of how decision makers might estimate probabilities: the probability of succeeding is the relative share of the capabilities the adversaries expect to have available.

In negotiation, as in war, the outcome is expected to be partially dependent on the relative capabilities of the antagonists, together with the contributions of their respective supporters (Bueno de Mesquita and Lalman 1986; Banks 1990). We assume that the anticipated compromise outcome of negotiation is akin to the weighted version of "split the difference" (Rubinstein 1982), so that in negotiation neither participant anticipates satisfying his or her full initial demand. The value of the negotiation lottery is, then, the expected compromise outcome in a negotiation. The anticipated distribution of gains and losses at the end of a negotiation is assumed by each player to equal its expected value for the negotiation. In the case of war, we assume that the same lottery is operative because the main lever in negotiations is the tacit threat of force if the issues are not suitably resolved. In war it is likely, however, that the actual distribution of gains or

losses at the end is not equal to the value of the lottery. Rather, the winner is likely to gain all or most of what was demanded, whereas the loser is likely to have to cede all or most of what the victor desires. But the expected value, as distinct from the actual outcome, of the ultimate resolution of the dispute is the same as the expected value of a negotiation, less the transaction costs of the war. In the case of the war lottery, the probability terms serve as probabilities of achieving the desired objective. In the negotiation lottery, the probability terms serve as weights that effect the compromise settlement.

In assumption 6 we assume that the costs of conflict differ between initiators and target nations in terms of expected losses in life and property ($\tau_i > \alpha_i$). Our justification for this assumption is that initiators can have greater control over the venue of fighting. The expected costs to a nation of being engaged in combat on its own territory are greater than the expected costs to that same nation of conducting warfare on someone else's territory. The rationale for this interpretation is that the number of combatants and the amount of material and productive capacity exposed to destruction are more at the discretion of the nation's leaders when fighting is abroad than when fighting is at home. The loss of civilian lives and nonmilitary property is not so easily controlled when the fighting takes place on one's own territory unless one capitulates. Even in the grisly discussions of strategic nuclear war, cost advantages are frequently attributed to initiation because of the hotly debated potential of a first strike to reduce the retaliatory ability of the adversary. Hardened sites and mobile missile systems are designed to remove this advantage. The heat of the debate, in our view, is due to the importance to strategic choice of removing the inequalities in these cost terms.

We further assume that anticipated losses in life and property vary with the military advantage of the contending sides. We assume in particular that one's anticipated losses increase as the relative probability of success of the adversary rises, so that the expected costs are partially a function of the subjective belief one has in the prospects of defeat. We assume that the expected losses in life and property from fighting away from home and as the target are, respectively, $\alpha_i(1 - P^i)$ and $\tau_i(1 - P^i)$, so that weak states facing strong rivals expect larger losses in life and property than larger states do, all else being equal. In keeping with the logic of relating costs to the prospects for success, we assume that the expected cost of capitulating after absorbing a first-strike blow is larger, the greater the power of the rival: $\gamma_i(1 - P^i)$.

We recognize that the assumption that $\tau_i > \alpha_i$ can give rise to some confusion, especially along two dimensions. The first likely source of

confusion concerns a comparison between initiators and targets of attack. Our assumption does not state that initiators of aggression suffer or expect to suffer smaller losses in life and property than do their targets. It makes no comparison at all between initiators and targets. That is, we do not assume anything about the expected magnitudes of $\tau_i$ compared to $\alpha_j$. Doing so would require an interpersonal comparison of utilities, which is unacceptable. Rather, the assumption states only that for any given nation *i*, the losses it expects are larger if it is attacked than if it attacks. The assumption stipulates a condition about a counterfactual, unobservable alternative state of the world. The condition we have assumed stipulates that a first-strike advantage exists.

A second possible source of misunderstanding arises from the observation that in war, defense is generally easier than offense. This may be true, but it is unrelated to the assumption we have made. Such arguments are about the ease of projecting capabilities and not about the costs incurred, given particular capabilities. Still, one might argue that $\alpha_i > \tau_i$ because, for instance, the incentive to fight effectively and efficiently is greater when defending one's home territory than when fighting in some far-off place. Fighting away from home also involves less familiarity with the terrain, the climate, and the like, which also raises the costs of combat. In any case, in assumption 6 we assume the existence of a first-strike advantage in terms of the anticipated costs (not in terms of the probability of success), but we do not assume that the first-strike advantage must be particularly large or small. Indeed, it is entirely possible for the difference in the costs to be close to zero or for it to be very large. Generally, the equilibrium results from our theory do not depend on the size of the first-strike advantage, although several significant results do hinge on its existence. For a further discussion of this issue, we suggest seeing Machiavelli (1950, chap. 12).

An additional word should be said about the parameter $\gamma_i$. We have not restricted the magnitude of this term relative to the other cost parameters. The term $\gamma_i$ reflects the costs of absorbing an unanswered blow. It includes such psychological effects as loss of face and loss of credibility and reputation, as well as such tangible losses as are involved in the destruction of life and property. Although the tangible costs are almost surely smaller in the event of a capitulation than in the event of war, we cannot say that the overall value of $\gamma_i$ is necessarily larger or smaller once the psychological dimension is factored in. Hence, we do not restrict the magnitude of this term.

Assumption 6 also attributes a direct cost to the decision to initiate

the use of force. We view this cost as primarily political in nature. It entails the domestic political opposition to using force to accomplish political goals. The failure to achieve policy goals through negotiation and diplomacy is a failure of the leadership to obtain the goals while avoiding the costs of military conflict. Immanuel Kant addressed this set of costs specifically:

> If . . . the consent of the citizens is required in order to decide whether there should be war or not, nothing is more natural than that those who would have to decide to undergo all deprivations of war will very much hesitate to start such an evil game. For the deprivations are many, such as fighting oneself, paying for the cost of war out of one's own possessions, and repairing the devastation which it costs, and to top all the evils there remains a burden of debts which embitters the peace and can never be paid off on account of approaching new wars. (Kant 1977, 438)

Costs arising from domestic opposition include demonstrations in the streets, electoral defeat, coups d'état, and difficulties in obtaining the funds with which to wage war. For example, congressional resistance to appropriating funds imposed direct political costs on U.S. policymakers associated with the Vietnam War during the late 1960s and early 1970s. Politicians must take such costs into account just as surely as they must be attentive to the expenditure of lives and national wealth. The very need to resort to force suggests a failure of diplomacy, a political failure of the national leadership, and it opens opportunities for opposition factions. Recall that the cases of interest in our analysis, in accord with assumption 4, are those in which both parties prefer negotiation to war—negotiating is Pareto superior to waging war. Settling international disputes at the negotiation table is less costly than settling them on the battlefield, and the failure to do so reflects poorly on the leaders' conduct of foreign affairs. A major interest of our work is to develop a fuller understanding of how domestic political costs shape crisis decision making. With some exceptions (for instance, Brito and Intriligator 1980), domestic political concerns in game-theoretic investigations of international relations have been given short shrift. We exercise what Barry O'Neill calls the modeler's discretion to determine "whether 'national interests' or any other motive are the players' goals" (1989, 6). Our model certainly does not presume "rational decision-makers who are impervious to the need to placate their domestic opponents or, indeed, to any influences other than the strategic requirements of responding to adversaries abroad" (Rosenau 1971, 101)—quite the contrary. We further

assume that domestic costs rise with the subjective probability of success in a dispute, so that the domestic cost term is $\phi_i P^i$. The notion here is that the more powerful participant in a dyadic relationship bears a greater burden for finding a peaceful resolution of differences. Domestic populations are assumed to dislike bullying and to punish those who employ violence if their power should have made them persuasive enough to resolve their disputes without it.[4]

Assumption 7a is the fundamental restriction required for the realpolitik variant of the game. It stipulates that domestic choice processes do not influence foreign policy goals or the determination of the national interest. Assumption 7b, in contrast, captures the fundamental quality of the domestic variant of the game. It attributes the selection of foreign policy objectives to the vagaries of domestic affairs, rather than to the preferences of a single foreign policy leader. Assumption 7b allows us to evaluate anticipated actions for any feasible array of demands, whereas assumption 7a significantly restricts that array as a function of the structure of the international situation. Neither assumption implies a specific model of domestic political processes. Rather, assumption 7a says any such process is irrelevant, and assumption 7b says that we can treat as a given the demands that emanate from a domestic process, without necessarily knowing what that process is. Assumption 7a—the realpolitik variant—suggests that there is no reason to work back to an evaluation of domestic processes, for we can predict foreign policy demands just by knowing the structural imperatives of the international context. In contrast, assumption 7b—the domestic variant—suggests that a next step in research is to link a model like the one we propose here to appropriate models of domestic political processes in order to predict the specific demands likely to arise within particular domestic political contexts.

Within our game, nations *A* and *B* realize gains and losses according to the strategies available. As we discussed above, except for combinations of strategies that lead to a capitulation, an acquiescence, or the maintenance of the status quo, the gains and losses are cast as probabilistic payoffs. Table 2.2 gives the values associated with the event at each of the terminal nodes in the full game in figure 2.1.

4. We recognize that this assumption can be controversial. "Rally round the flag" effects and other phenomena may suggest that decision makers receive a political reward for strong actions, including the use of force. But there are always some who oppose the use of force. We do not assume that such a group is necessarily large or small, but rather that such opponents always exist.

Table 2.2
Outcomes and Expected Utilities for Nation *i*

| | |
|---|---|
| SQ | $U^i(SQ)$ |
| $Acq_j$ | $U^i(\Delta_i)$ |
| $Acq_i$ | $U^i(\Delta_j)$ |
| Nego | $P^i[U^i(\Delta_i)] + (1 - P^i)\,[U^i(\Delta_j)]$ |
| $Cap_j$ | $U^i[\Delta_i - \phi_i(P^i)]$ |
| $War_i$ | $P^i(U^i[\Delta_i - \phi_i P^i - \alpha_i(1 - P^i)]) + (1 - P^i)(U^i[\Delta_j - \phi_i P^i - \alpha_i(1 - P^i)])$ |
| $Cap_i$ | $U^i[\Delta_j - \gamma_i(1 - P^i)]$ |
| $War_j$ | $P^i(U^i[\Delta_i - \phi_i P^i - \tau_i(1 - P^i)]) + (1 - P^i)(U^i[\Delta_j - \phi_i P^i - \tau_i(1 - P^i)])$ |

Table 2.3
Nation *i*'s Preferences for Outcomes

| Outcome | Ordinal restriction on ordering | Possible preference rank |
|---|---|---|
| SQ | $>$ $Acq_i$, $Cap_i$ | 7 to 3 |
| $Acq_j$ | $>$ all other outcomes | 8 |
| $Acq_i$ | $>$ $Cap_i$ | 5 to 2 |
| Nego | $>$ $Acq_i$, $Cap_i$, $War_i$, $War_j$ | 7 to 5 |
| $Cap_j$ | $>$ $War_i$, $War_j$ | 7 to 3 |
| $War_i$ | $>$ $War_j$ | 5 to 2 |
| $Cap_i$ | — | 4 to 1 |
| $War_j$ | — | 4 to 1 |

Note: Eight is the highest ranking, and one is the lowest.

## RESTRICTIONS ON PREFERENCES

Our assumptions imply restrictions on the eight outcomes in terms of the order of preferences that leaders are allowed to hold. Displayed in table 2.3 are the rankings for the outcomes for any nation *i* that can be assigned under the restrictions imposed through our assumptions.

We discuss each of the restrictions in turn and note here that the restrictions themselves are interesting in the context of international relations. These restrictions are operative regardless of the version of the game being analyzed, although in practice some prove more salient in one variant of the game than in another.

In the first row, *i* finds the status quo superior to an acquiescence to *j*'s demand ($Acq_i$) and superior to a capitulation to the use of force

($Cap_i$). By assumption, $U^i(SQ) > U^i(\Delta_j) \rightarrow SQ > Acq_i$; even the smallest demand made by the antagonist *j* is a change in the status quo detrimental to *i*. The utility to *i* of a capitulation to the antagonist ($Cap_i$) is less than the utility of acquiescing to *j*'s demands ($Acq_i$), entailing as it does the additional costs in lost face, life, and property: $U^i(SQ) > U^i(Acq_i) > U^i(Cap_i)$.

A peaceful acquiescence by the opponent ($Acq_j$) to the demands made by *i* is superior for *i* to all other outcomes. This outcome is superior to the status quo and to $Acq_i$, for $U^i(\Delta_j) < U^i(SQ) < U^i(\Delta_i)$. Comparing $Acq_j$ to the expectations from negotiating, recall that we have assumed negotiations are evaluated as the expectations from a lottery over the demands made by both parties. Negotiated outcomes are never obtained with certainty, hence we assume that the probability of gaining a demand is never equal to zero or one: $0 < P < 1.0$. We show that as $P^i$ approaches arbitrarily close to 1.0, nation *i* prefers acquiescence by *j* to negotiation. $Acq_j > Nego$:

$$U^i(\Delta_i) > P^i[U^i(\Delta_i)] + (1 - P^i)[U^i(\Delta_j)].$$

For arbitrarily small $\epsilon$ and positive utilities for the demands,

$$U^i(\Delta_i) > (1 - \epsilon)[U^i(\Delta_i)] + \epsilon[U^i(\Delta_j)],$$

which means that

$$0 > -\epsilon[U^i(\Delta_i) - U^i(\Delta_j)].$$

Gaining one's demands with certainty when the other party acquiesces is preferable to negotiating and obtaining them with something less than certainty or obtaining something less than the initial demand. The remaining outcomes are inferior to $Acq_j$ and are violent. An acquiescence by *j* means that *i* certainly receives all of its demands ($\Delta_i$) without suffering any costs. $Acq_j > Cap_j$:

$$U^i(\Delta_i) > U^i[\Delta_i - \varphi_i P^i].$$

Compared to $War_i$, an acquiescence by *j* is preferred because the risk of losing the war is removed and the costs of a war that *i* initiates, $-[\phi_i P^i + \alpha_i(1 - P^i)]$, are avoided. $Acq_j > War_i$:

$$U^i[\Delta_i - \phi_i P^i - \alpha_i(1 - P^i)] > U^i[\Delta_j - \phi_i P^i - \alpha_i(1 - P^i)],\ U^i(\Delta_i) > U^i(\Delta_j).$$

$$U^i[\Delta_i - \phi_i P^j - \alpha_i(1 - P^j)] > P^j(U^i[\Delta_i - \phi_i P^j - \alpha_i(1 - P^j)]) + (1 - P^j)(U^i[\Delta_j - \phi_i P^j - \alpha_i(1 - P^j)]),\ P^j \neq 1.0.$$

$$U^i(\Delta_i) > U^i[\Delta_i - \phi_i P^j - \alpha_i(1 - P^j)],\ 0 > -[\phi_i P^j + \alpha_i(1 - P^j)].$$

$$U^i(\Delta_i) > P^j(U^i[\Delta_i - \phi_i P^j - \alpha_i(1 - P^j)]) + (1 - P^j)(U^i[\Delta_j - \phi_i P^j - \alpha_i(1 - P^j)]).$$

Capitulating to an opponent is, of course, inferior to having the opponent yield to one's demands. $Acq_j > Cap_i$:

$$U^i(\Delta_i) > U^i(\Delta_j - \phi_i P^j),\ U^i(\Delta_i) > U^i(\Delta_j),$$

and

$$0 > -\phi_i P^j.$$

Finally, $Acq_j$ is preferred over $War_j$ just as it was over $War_i$, except in this instance the costs saved are even greater. $Acq_j > War_j$:

$$U^i[\Delta_i - \phi_i P^j - \tau_i(1 - P^j)] > U^i[\Delta_j - \phi_i P^j - \tau_i(1 - P^j)],\ U^i(\Delta_i) > U^i(\Delta_j).$$

$$U^i[\Delta_i - \phi_i P^j - \tau_i(1 - P^j)] > P^j(U^i[\Delta_i - \phi_i P^j - \tau_i(1 - P^j)]) + (1 - P^j)(U^i[\Delta_j - \phi_i P^j - \tau_i(1 - P^j)]),\ P^j < 1.0.$$

$$U^i(\Delta_i) > U^i[\Delta_i - \phi_i P^j - \tau_i(1 - P^j)],\ 0 > -[\phi_i P^j + \tau_i(1 - P^j)].$$

$$U^i(\Delta_i) > P^j(U^i[\Delta_i - \phi_i P^j - \tau_i(1 - P^j)]) + (1 - P^j)(U^i[\Delta_j - \phi_i P^j - \tau_i(1 - P^j)]).$$

Acquiescing is preferable to capitulating ($Acq_i > Cap_i$) because the amount of utility lost from the conceded change in policy is the same in both circumstances, but the costs expected from absorbing a first strike, $\gamma_i(1 - P^j)$, are saved when one acquiesces: $U^i(\Delta_j) > U^i[\Delta_j - \gamma_i(1 - P^j)]$.

Negotiating is preferred to $Acq_i$, $Cap_i$, $War_i$, and $War_j$. Assumption 4 postulates the preference to resolve differences through negotiation rather than through war ($Nego > War_i, War_j$). We need not have made this assumption; it operates to restrict our attention to the more interesting cases (and it is implied by assumptions 2 and 5). Negotiating is preferred to acquiescing because it affords at least some expectation of gains. It is likewise preferred to capitulating, not to mention the avoidance of the costs incurred as the target of a violent attack.

$Cap_j$, a capitulation by the opponent, is preferred to either war

outcome. Here, all of one's own demands are obtained (no lottery over the demands of the opponent), and war costs are avoided.

Initiating a war ($War_i$) is preferred to having the other state initiate the war ($War_j$). Recalling that $U^i(\Delta_i) > U^i(\Delta_j)$ and that $\tau_i > \alpha_i$, $War_i > War_j$:

$$P^i(U^i[\Delta_i - \phi_i P^i - \alpha_i(1 - P^i)]) > P^i(U^i[\Delta_i - \phi_i P^i - \tau_i(1 - P^i)]),$$

and

$$(1 - P^i)(U^i[\Delta_j - \phi_i P^i - \alpha_i(1 - P^i)]) > (1 - P^i)(U^i[\Delta_j - \phi_i P^i - \tau_i(1 - P^i)]).$$

Therefore,

$$P^i(U^i[\Delta_i - \phi_i P^i - \alpha_i(1 - P^i)]) + (1 - P^i)(U^i[\Delta_j - \phi_i P^i - \alpha_i(1 - P^i)]) > P^i(U^i[\Delta_i - \phi_i P^i - \tau_i(1 - P^i)]) + (1 - P^i)(U^i[\Delta_j - \phi_i P^i - \tau_i(1 - P^i)]).$$

In other words, the $War_i$ lottery involves lower costs than the $War_j$ lottery, making initiation by *i* more attractive than initiation by *j*.

Capitulating to the opponent ($Cap_i$) and fighting a war initiated by the opponent ($War_j$) are not necessarily preferred to any of the outcomes, although we see from the table that a number of other outcomes are preferred to them.

The possible ordinal positions the outcomes can occupy when these restrictions are simultaneously taken into account are described in the last column of table 2.3. Here one is the least preferred position and eight the most preferred. Either player is allowed to hold a preference order admissible under these restrictions. Clearly, in spite of the restrictions we have imposed, a very large number of pairings of preference orders ($52 \times 52 = 2{,}704$) are possible in principle.[5] Although the number of still-admissible pairings makes for a great deal of complexity, as do the strategy choices we have described, the number of pairings also makes for a rich game structure. Within this framework we intend to explore the interactions of nations as they pursue their interests. The framework allows us to go beyond the analysis of conflict to investigate the cooperative, nonconflictual interactions that account for so much of international affairs.

5. All these orderings can arise under any information conditions in the domestic account of the international interaction game. In practice, the endogeneity of demands in the realpolitik version will serve to eliminate many of these orderings under full information conditions.

Table 2.4
Distribution of Outcomes with Complete Information and Uniformly Distributed Preferences

| Outcome | Frequency | Percentage |
|---|---|---|
| SQ | 232 | 8.6 |
| $Acq_B$ | 824 | 30.5 |
| $Acq_A$ | 180 | 6.7 |
| Nego | 1428 | 52.8 |
| $Cap_B$ | 0 | 0 |
| $War_A$ | 40 | 1.5 |
| $Cap_A$ | 0 | 0 |
| $War_B$ | 0 | 0 |

In this regard it is important to recall that even though the game we propose is noncooperative, the outcomes that can arise in equilibrium can be and often are cooperative. That the game structure is noncooperative does not imply that the decision maker's actions within the game cannot be cooperative. Rather, it merely restates what we have already indicated: decision makers in international relations cannot and do not make binding, strictly enforceable commitments. That states cooperate with one another is quite a natural possibility in this as in other noncooperative games. Indeed, if one assumes that each of the 2,704 admissible combinations of preferences over outcomes is equally likely, that assumption 7b—the domestic variant—is operative and that information is complete, then a negotiated, cooperative settlement of disputes is the maximum likelihood equilibrium outcome in the international interaction game (Rummel 1979, 1981). If one substitutes assumption 7a—the realpolitik variant—then the only possible full information outcomes of the game are negotiation or the status quo. This claim is made more precise and proved in chapter 3. The self-interest of the actors, maximizing their welfare across the play of the game, dictates, in either case, that they try to avoid violent interactions. The distribution of outcomes under the assumption of uniformly distributed preferences, domestically determined goals, and full information is summarized in table 2.4.

Looking at table 2.4, which is based solely on the structure of the game, assumption 7b, and the auxiliary assumptions of full information and uniformly distributed preferences, we can make some interesting observations. A crisis that ends in a capitulation without reciprocated

violence must necessarily have involved some misperception of relevant information by at least one key decision maker. The dispute would otherwise have been settled at the precrisis stage. Similarly, if a war is initiated by the state that was not the initiator of the dispute, then some uncertainty about crucial information must have existed, otherwise a different outcome would have arisen. Yet war can be the equilibrium outcome of the game even if everyone preferred to negotiate and even if everyone was fully informed.

International relations are unlikely to occur under circumstances of uniformly distributed preferences. Consequently, table 2.4 is not intended to convey empirical expectations so much as reveal the feasible set of equilibria under full information. In the next chapter, we develop an array of theorems and corollaries regarding the necessary and sufficient conditions for each event of the international interaction game to be a possible equilibrium outcome and explore some perhaps surprising implications of the game under full information.