

In Paul C. Stern, Robert Axelrod, Robert Jervis, and Roy Radner, eds. *PERSPECTIVES ON DETERRENCE*. New York: Oxford University Press, 1989. Pp.98-133. (National Research Council/Committee on Contributions of Behavioral and Social Science to the Prevention of Nuclear War)

6

Quantitative Studies of Deterrence Success and Failure

NOTICE

This material may be protected by
Copyright Law (Title 17 U.S. code)

JACK S. LEVY

This chapter reviews some of the more important quantitative empirical literature on the effectiveness of deterrence threats. The central theoretical question concerns the conditions under which a deterrence threat is successful in persuading a potentially hostile adversary not to take certain actions that would be contrary to one's own interests and the conditions under which the deterrence threat fails to dissuade the adversary from taking the undesired action or actually provokes him into taking those actions. It is admittedly somewhat artificial to focus primarily on quantitative empirical studies of deterrence, while giving only minimal attention to the formal or nonformal theoretical literature from which hypotheses on deterrence are derived or to empirical analyses of these hypotheses through case study methodologies.¹ Much of this other literature, however, is covered elsewhere in this volume, and I will attempt to evaluate the assumptions and findings of quantitative empirical studies in terms of this broader theoretical and empirical literature.

In spite of its importance, the question of the conditions for deterrence has not received extensive treatment in the quantitative literature on international relations. The research most directly related to this question is that of Huth and Russett on extended deterrence, following up on Russett's influential piece on "The Calculus of Deterrence" in 1963, and their studies will be examined in detail. There has also been some interesting research on military threats and crisis behavior that does not focus specifically on deterrence but that has important implications for the question of the effectiveness of deterrent threats. This includes some of the work by North and his colleagues on the 1914 project; by Singer, Maoz, Leng, and others on recent

extensions of the Correlates of War project; and by Karsten, Howell, and Allen in their historical study of military threats. I will examine these studies here and attempt to draw out their implications for the effectiveness of deterrence threats. It should be recognized, however, that because many of these studies were not designed specifically and solely to answer the theoretical question of the conditions affecting the success or failure of deterrence, my analysis of the bearing of these studies on that question should not be interpreted as a judgment of their overall merit.

The empirical findings from the quantitative empirical literature on deterrence cannot be easily summarized. They are sensitive to the empirical domain of the analysis, the selection of cases, the operational indicators of the independent and dependent variables, and to other aspects of the research design. Consequently, a meaningful analysis requires the specification of the theoretical questions toward which each study is directed and a discussion of the methodology by which it is carried out. For this reason I will examine a few important studies in some detail rather than present a laundry list of the empirical results of every study having something to do with deterrence.

One important theme in the literature concerns the relative importance of the dyadic balance of military capabilities in deterrence crises, and I will begin with that question. I will then examine in more detail the attempts of Karsten, Howell, and Allen and Huth and Russett to test a variety of hypotheses dealing with deterrence. Other empirical literature will be discussed where it has an important bearing on these other studies.

Before we begin it is necessary to make an important theoretical distinction between "general deterrence" and "immediate deterrence." Immediate deterrence refers to the relationship between opposing states "where at least one side is seriously considering an attack while the other is mounting a threat of retaliation in order to prevent it," whereas general deterrence refers to adversaries who "maintain armed forces to regulate their relationship even though neither is anywhere near mounting an attack" (Morgan, 1977: ch. 2). Immediate deterrence assumes the existence of a crisis or dispute in which military threats have been made and hence assumes the existence of the underlying conditions generating the crisis. General deterrence makes no assumption that there exists a crisis or serious dispute, that one state is seriously considering an attack on the other, or that a specific deterrent threat has been issued. Whereas general deterrence is concerned with the sources of crises as well as the conditions for crisis stability (stability within a crisis), immediate deterrence is concerned only with crisis stability. This study, and in fact most of the empirical literature on deterrence, is concerned with immediate deterrence rather than general deterrence, because the very question of the conditions under which deterrent threats are effective assumes the

prior existence of a threat. As we will see, however, this distinction between general and immediate deterrence raises a difficult analytical problem.

The Role of Capabilities

Deterrence can be defined as "the persuasion of one's opponent that the costs and/or risks of a given course of action he might take outweigh its benefits" (George and Smoke, 1974:11). Although there exists some disagreement regarding the precise requirements for effective deterrence, there is a consensus regarding some minimum conditions. A state must clearly define its commitment to defend a particular interest, communicate that commitment to the potential aggressor, possess a sufficiently potent military capability to impose costs on the adversary that exceed his expected gains, and demonstrate its resolve to implement the threat in spite of short-term costs to itself (Kaufmann, 1954; George and Smoke, 1974:ch.3; Lebow, 1981:84-85).

In spite of the numerous preconditions for successful deterrence, there are some proponents of a "power politics" model who focus primarily on military capabilities alone as the central element of deterrence. They assume that a state will not initiate a war that it expects to lose, so that the defender's possession of superior military capabilities (along with the adversary's recognition of that superiority) is a sufficient condition for deterrence. Although this is an ad hoc hypothesis that cannot technically be derived from any formal theory of deterrence, it has been accepted by some theorists as well as by statesmen and has also generated some interesting empirical research. This proposition is reflected in the old adage *si vis pacem para bellum* (if you want peace prepare for war, presumably by building up one's military capabilities), which has for centuries been used by statesmen to justify the expansion of their armaments programs. This proposition technically refers to sufficient rather than necessary conditions for deterrence: it does not say that the strong will always attack the weak, but only that the weak will never attack the strong in a situation isolated from the likely intervention of third states. Some adopt a stronger version of the hypothesis, however, and suggest that superior capabilities are a necessary as well as sufficient condition for deterrence, that the strong will attack the weak if there is nothing to prevent them from doing so. This is implied by the Athenians' argument to the Melians that "the strong do what they have the power to do and the weak accept what they have to accept" (Thucydides, 1954:V/89).

There are enough situations in which the strong do not attack the weak in spite of their ability to do so, as well as logical flaws in the argument, to cast serious doubt on the stronger version of the peace-through-strength hypoth-

esis. Even the weaker version of the hypothesis, however, is flawed by serious logical problems in addition to some important contradictory cases. One problem is that it fails to incorporate the interests of the actors involved in the conflict. It is reasonable to assume that states consider the likely costs and benefits from war as well as the probability of victory based on the balance of dyadic capabilities, so that actions involving a low probability of success can be rationally undertaken if their potential benefits are sufficiently great and if there are some limits on the costs of defeat.² In addition, the costs and benefits of war should be compared to those of other alternatives, including the alternative of doing nothing. Consequently, weaker states may rationally initiate war if they believe that the existing status quo is so unacceptable that they have nothing to lose or that an attack by the adversary is imminent and that there are advantages in striking first.

In spite of these theoretical problems, the power politics hypothesis of deterrence has numerous advocates. The popularity of the hypothesis is suggested, perhaps, by the number of empirical studies designed to test it.³

The North 1914 Studies

A fairly early study that has some bearing on the question of the importance of capabilities for the effectiveness of deterrent threats, though it was not designed to answer that specific theoretical question, is the 1961 article by Zinnes, North, and Koch, "Capability, Threat, and the Outbreak of War." Part of North's 1914 Project, this study uses content analysis of a fairly complete set of official diplomatic documents to examine the hypothesis that a state will not initiate a war if it perceives its (or its coalition's) military capabilities to be "significantly" inferior to those of its adversary. They offer an alternative hypothesis: "if a state's perception of injury (or frustration, dissatisfaction, hostility, or threat) to itself is 'sufficiently' great, this perception will offset perceptions of insufficient capability, . . . (and) under such circumstances, a state may go to war even though it perceives its power as relatively weak" (p. 470).⁴ Here the independent variable is the perception of relative capabilities rather than an objective measure of capabilities.

The authors argue, with support from well-selected statements from high-ranking German or Austro-Hungarian political and military decision makers, that "both Austria and Germany possessed evidence of their own inadequate capabilities—yet they were not deterred" (p. 473). They report that their content analysis of approximately 3,000 documents demonstrates little German or Austrian concern with the balance of military capabilities until the last moment. Frequency counts of key indicators reveal that perceptions of

(and, the authors imply, concern with) the adversary's hostility far exceeded perceptions of relative capabilities. The authors therefore reject the hypothesis that a state's military inferiority is sufficient to deter its initiation of a war and accept instead their alternative hypothesis. These results are supported by North's (1967) subsequent study, which uses events data on military actions ($N=354$) as well as perceptual data from the documents.

Space does not permit the exploration of alternative theoretical explanations of the findings of the 1914 studies with respect to the capabilities hypothesis or a review of some of the methodological limitations of these studies (Jervis, 1969; Hilton, 1970). One point should be mentioned, however, and that is the question of the validity of the use of frequency counts as a measure of the relative importance of perceptions of relative capabilities and adversary hostility. Jervis (1969) explains the greater frequency of perceptions of hostility by arguing that they change more rapidly than perceptions of capabilities and are in more need of constant updating, whereas capabilities are more constant and therefore less likely to be the focus of constant attention. Questions could also be raised about the validity of statements in official documents as measures of perceptions and intentions, given the multiple audiences toward which many of these statements are directed, and about the generalizability of the findings to other cases. In spite of its limitations, however, this study is still important. It was one of the first systematic empirical analyses to contradict the common assumption that perceptions of one's inferior capabilities will preclude one from initiating a war, that superior capabilities are always sufficient to deter an adversary from attacking. Its findings gain additional support from other studies that employ radically different methodologies to investigate similar theoretical questions.

The "Correlates of War" Studies

Some of the work by Singer and his colleagues on the Militarized Interstate Dispute (MID) project (an extension of Singer's Correlates of War project) is relevant to the question of whether military superiority is sufficient for deterrence in international disputes, although they do not focus directly on deterrence per se. Maoz (1983) attempts to test a "capability model" versus a "resolve model" for all interstate disputes since the Congress of Vienna using the dispute data he collected with Gochman.⁵ The capability/threat model predicts that the probability of victory for an initiator of a dispute (defined as "that state which has first committed a military confrontation action against another state") varies positively with the ratio of the initiator's capabilities to the target's capabilities, where capabilities are measured

using the military expenditure and military personnel indicators from Singer's COW capability data.⁶ The resolve model predicts that the outcome of the dispute is determined primarily by the resolve of the two parties, as measured by their relative levels of "hostility" reached during the dispute and by the extent to which one side undertakes "incidents" to maintain the initiative during the dispute (Maoz, 1983).

Maoz confirms the findings of others (Buono de Mesquita, 1981) that initiators are disproportionately likely to emerge victorious in militarized disputes. His central empirical result is that the initiator's success is unrelated to the balance of military capabilities between initiator and target (or between the initiator's coalition and the target's coalition), thus disconfirming the predictions of the capability/threat model. The various resolve indicators, on the other hand, are significantly associated with dispute outcomes: Initiators tend to win when they display higher levels of hostility than their adversary or when they maintain control over the escalatory sequence of the dispute, lose when targets are more hostile or maintain the initiative, and tie when the two are matched on these indicators of resolve. Perhaps even more surprising, the resolve indicators have a greater impact on the outcome of disputes that escalate into wars than do the capability indicators. Maoz (1983:221) concludes that "initiators of serious interstate disputes tend to disproportionately emerge as victors not because they are stronger than targets but because they are able to demonstrate that the stakes of the dispute are more important to them than to their opponents."⁷ He cautions, however, that whether this imbalance of resolve is real or whether it derives from the deceptive manipulation of risks by initiators needs to be analyzed. It should be emphasized that Maoz's findings suggest that the motivations and actions of the initiator of the dispute are more important than those of the defender in determining the outcome. This runs against the standard focus in classical deterrence theory on the importance of commitment, resolve, and signaling on the part of the defender. It is more consistent with the emphasis of George and Smoke (1974) on initiation theory and with a similar emphasis in the work of Lebow (1981) and Jervis, Lebow, and Stein (1985).⁸

Although this is not the place for a thorough critique of the Maoz (1983) article, it is important to point out some limitations of the study's relevance for the question of immediate deterrence (which, to repeat, was not its primary purpose). First, although all of the MID cases do involve situations in which at least one side has made a military threat against the other, they do not necessarily involve any specific attempt by the defender to deter the initiator from taking a specific action, so we could not necessarily conclude that any success by an initiator is a failure of deterrence. Second, Maoz does not differentiate between deterrence and compellence, which refers to the

use of threats to induce an adversary to do something or to stop doing something rather than to refrain from doing something he has not yet done. Compellence is harder to implement than deterrence (Schelling, 1966:ch.2), so that the failure of compellence does not necessarily imply the failure of deterrence. Third, Maoz's operational indicators of resolve are highly questionable and fail to tap the importance of the stakes involved or the intensity of actors' commitments. Finally, Maoz's definition of success and failure is probably not appropriate for the analysis of the success or failure of deterrent threats. A dispute that escalates to war is coded as a success for the side that wins the war militarily (Maoz, 1982: appendix II). This may be useful for the theoretical questions he is asking, but from the perspective of deterrence such an outcome should be treated as a failure.

Wayman, Singer, and Goertz (1983) look at the impact of capabilities on the outcome of disputes from a slightly different perspective. They also use the MID data for the 1816–1976 period, but examine only disputes between the major powers ($N=101$). Their independent variables include both overall capability ratios, defined in terms of the COW project's six indicators of the demographic, economic/industrial, and military dimensions of national strength, and also the allocation of resources between the industrial and military sectors. Although the direct relevance of their findings for deterrence is limited by the same factors mentioned earlier with respect to Maoz's (1983) study—including the coding of a favorable war outcome as a success in the dispute for that actor (p. 501), the findings are nonetheless interesting. Overall superiority in military capabilities is advantageous in fighting a war, but industrial capabilities are more important than military preparedness (operationalized in terms of military expenditures and number of armed forces personnel). Moreover, initiators who overallocate in terms of expenditures vis-à-vis the industrial base have been defeated in war more often than they have been victorious. The value of military superiority in war (as long as it does not come at the expense of industrial might) disappears for disputes that do not escalate to war: The weaker party in terms of both personnel and expenditures tends to be more successful (pp. 504–10). The authors conclude (p. 513) by questioning the accuracy (at least for the post-Vienna period) of the statement by Frederick the Great that "God is always with the strongest battalions." (This theme is developed at length by Kennedy (1988) in his important study of the relationship between economic change and military power for the great powers over the last five centuries.)

In another study that uses the MID data but that is not part of the Correlates of War project, Bueno de Mesquita (1981:140–45) compares the relative predictive power of a power politics model with that of his

expected utility model, which attempts to incorporate the interests of states (as measured by their alliance commitments) as well as their military capabilities. He examines the proportion of war initiators having superior military capabilities and the proportion having positive expected utility for the 1816 to 1974 period. Although the predictions of these models often overlap, under certain conditions they diverge, and consequently the percentage of correct predictions can be compared. Although war initiators tend disproportionately to be the stronger of two states, Bueno de Mesquita finds that the relationship between war initiation and states' expected utility for war is stronger than that between war initiation and relative capabilities. Moreover, the expected utility model is stable over time, whereas the predictive power of the power politics model is considerably weaker in the twentieth century than in the nineteenth century. Though Bueno de Mesquita's cases aren't restricted to situations involving deterrent threats, and though some might quarrel with his measurement of utilities solely in terms of alliance patterns, his findings provide further evidence against the proposition that one's military superiority is the primary determinant of the absence of aggression by the adversary. These and other findings suggest that deterrence practitioners should be at least as sensitive to the motivations of the potential aggressor as to the dyadic balance of military capabilities.⁹

The Karsten, Howell, and Allen Study

In *Military Threats: A Systematic Historical Analysis of the Determinants of Success*, Karsten, Howell, and Allen (1984) make an explicit and comprehensive attempt to analyze the conditions contributing to the successful use of military threats and to determine whether these conditions have changed in the nuclear age. They include over 100 independent variables, grouped into categories of interests, objectives, capabilities, situational factors, clarity and accuracy of the threat, tactical variables, perceptions of the adversary, and others. A threat is defined to occur "only if leaders of one or more powers signaled clearly (either in public or in private) a willingness to use military force against one or more other nations in order to deter them from doing something or to compel them to do something" (p. 30).¹⁰ A success (for either deterrence or compellence) occurs "only if the threatener's objectives are at least partially attained without recourse to fighting," and the seven-point scale for the dependent variable includes categories for total, substantial, and partial success. War is classified as a failure of deterrence, though the authors also include a category for wheth-

er or not the war results in the achievement of the threatener's political objectives. The empirical domain of the study includes 77 cases, from the beginning of the Peloponnesian War to the present. Cases involving threats that are a pretext for war (Lebow's [1981] "justification of hostility crises" are excluded). Regression analysis is used (after some needed justification) to determine the relationship between the predominantly ordinal independent and dependent variables.

The numerous findings are not all fully consistent, though some are particularly interesting. The balance of objective capabilities does not significantly affect the outcome of the crisis, and weaker or smaller states are no more likely to yield to threats than are stronger or larger states (pp. 54, 70). If the target perceives that the threatener has the capability to inflict serious damage, however, threats tend to succeed (pp. 69-70). On the other hand, the *threatener's* perceptions of the target's capabilities tend to be far less important (although this has changed in the nuclear age). In fact, there is a modest tendency, at least in the pre-1945 period, for threats to fail when the threatener perceived itself as superior and to succeed when it perceived itself as inferior (p. 83). This is explained in terms of the enormous importance of resolve and the threatener's perception of the extent to which the target's interests are at stake, although the target's perception of the extent to which the threatener's interests are at stake does not have a significant impact (p. 67). The authors conclude that neither the clarity of threats nor attempts to fine-tune threats have much impact on the outcome of the dispute.¹¹ They also argue that shows of force in support of a military threat are largely irrelevant to the outcome of the threat (pp. 73, 110). They criticize the common emphasis on the credibility, resolve, and signaling of the threatener and the common failure to recognize the importance of target goals and interests.

The validity of many of these findings is limited by some rather serious flaws in the research design. There is no clear theoretical framework guiding the study, and it is not obvious which of the 100 independent variables are most important or how they relate to one another. As a result, it is very difficult to interpret the findings or to determine the extent to which they are consistent. The 100 variables and 77 cases create serious problems of model specification and make it impossible to conduct a controlled empirical inquiry. The cases are not systematically selected from any well-defined population, so that it is difficult to generalize beyond the specific cases included in the study. Moreover, the criteria for the selection of the cases are not made explicit, so that it is difficult to estimate the biases that might affect the findings. It is also difficult to determine the

extent to which the operational indicators are valid measures of the theoretical concepts, for the authors do not make many of their coding rules explicit (though they do recognize that "it is incumbent upon us to provide some illustrations of how we used evidence . . ." [p. 43]). Thus the book is quite uneven. The authors provide a reasonably sophisticated discussion of *some* of the conceptual and methodological issues involved in the empirical study of deterrence, and the more qualitative historical analysis in the study is impressive in breadth and quality, yet many aspects of the research design for their large-N empirical analysis do not inspire much confidence. For a more sophisticated large-N study of the efficacy of military threats, and one that focuses explicitly on deterrent threats, it would be useful to examine the Russett-Huth research program on extended deterrence.

The Russett and Huth Studies

Of all the empirical studies of deterrence, those by Russett and Huth are in many respects the most relevant for our purposes. They focus explicitly on deterrence rather than on military threats in general, though they restrict themselves to the question of extended deterrence (deterrence of an attack against an ally) and do not examine the deterrence of a direct attack. Although their focus is on situational rather than decision-making variables, their most recent studies have begun to incorporate indicators of bargaining behavior, and by supplementing their quantitative analyses with case studies they have begun to examine some intervening perceptual variables. Their ongoing research program includes Russett's "The Calculus of Deterrence" (1963) and "Pearl Harbor: Deterrence Theory and Decision Theory" (1967); Huth and Russett's "What Makes Deterrence Work? Cases from 1900 to 1980" (1984), "After Deterrence Fails: Escalation to War?" (forthcoming), and "Deterrence Failure and Crisis Escalation" (1988); and Huth's *Extended Deterrence and the Prevention of War* (1989) and "Extended Deterrence and the Outbreak of War" (1988). Although each study builds on the previous one it would be useful to consider each separately for several reasons. The evolution of this research program demonstrates the sensitivity of some empirical findings to the particular research design employed and also raises some important conceptual and methodological issues in the empirical study of deterrence. It also demonstrates the positive learning experience of the research program over time.¹²

Russett, "The Calculus of Deterrence" (1963)

In his initial study of deterrence a quarter of a century ago, Russett frames his question of extended deterrence as follows: "How can a major power make credible an intent to defend a smaller ally from attack by another major power?" (p. 97). His objective is to identify the variables accounting for the success or failure of deterrent threats, and his method is a comparative study of "all the cases during the last three decades where a major power 'attacker' overtly threatened a pawn with military force, and where the defender either had given, prior to the crisis, some indication of an intent to protect the pawn or made a commitment in time to prevent the threatened attack." Russett generates 17 such cases from 1935 to 1961. He then measures several independent variables, including the importance of the pawn (pawn/defender ratio of both population and GNP); the presence or absence of a prior formal commitment by the defender; the dyadic balance of both overall strategic and local military power; the nature of the defender's political system (democratic or "totalitarian"); the extent of formal military cooperation between defender and pawn (arms transfers or military advisers); political interdependence between defender and pawn (defined generally in terms of a current or recent alliance, recent occupation, close ideological ties, etc.); and economic interdependence between defender and pawn (relative proportion of imports and exports). The dependent variable is deterrence success or failure, with success defined as "an instance when an attack on the pawn is prevented or repulsed without conflict between the attacking forces and regular combat units of the major power defender" (p. 98).

The comparative analysis is conducted without the use of formal statistical methods. It is found that the effectiveness of deterrent threats is unaffected by the size of the pawn, the existence of a formal commitment by the defender, or the strategic or local balance of military capabilities, though equality on at least one military dimension is a necessary (but not sufficient) condition for a deterrence success. Deterrent threats by democratic regimes are slightly less credible than those of nondemocratic regimes. Some level of military cooperation between defender and pawn appears to be a necessary condition for successful deterrence, but it is not sufficient. The existence of political ties is "helpful if not essential," and economic interdependence is "virtually essential" to successful deterrence (pp. 100–105). Russett then attempts to identify the factors associated with the defender's decision whether or not to go to war to defend the pawn once it has been attacked. Neither the size of the pawn, the military balance, nor the nature of the defender's regime has much of an impact on

the defender's response, but bonds of economic, political, and military interdependence are quite important (as they were for the attacker's actions (pp. 105–106). Russett gives great emphasis to these bonds between defender and pawn and suggests that strengthening these ties is a means for the defender to increase the credibility of his deterrent threats. He fails to acknowledge, however, that increasing ties between defender and pawn to reinforce commitment and credibility may involve substantial costs.

Russett (1963:105–107) also presents a simple expected utility model (though he doesn't refer to it in those terms) to explain the actions of both attacker and defender, though this model appears in footnotes and is not fully integrated into the analysis as a whole. The defender will pursue a "firm" policy and attempt to deter the adversary if his prospective gains from successful deterrence, weighted by the probability of success and discounted by the cost and probability of war, exceed the losses of retreat (the failure to issue a deterrent threat). The adversary will attack in spite of the deterrent threat if the expected value of attacking (as determined by the value and expected probability of an attack that is not resisted by the deterrer and the cost and probability of war resulting from an attack that is resisted) exceeds the value of the status quo.¹³

There is little space here for an extended critique of Russett's article, but a few brief comments are in order, if only to demonstrate how some of the deficiencies are overcome in his subsequent studies. First, Russett's theoretical discussion is weakened by framing the question in terms of the credibility of the threat. Credibility is an intervening perceptual variable that may help explain, along with other variables, the effectiveness of the threat, but credibility is not equivalent to effectiveness. In fact, since Russett's expected-utility model includes the value of a successful (i.e., uncountered) attack, it implies that if the value of the target is important enough to the attacker, the existence of a credible threat by the defender will not be sufficient to deter. But Russett's analysis is not closely guided by the model he presents. He never directly tests whether or not the threat is believed (a perceptual variable), but only whether or not it leads to a successful outcome (a behavioral variable). It should be noted that this emphasis on the credibility of the threat affects the theoretical interpretation of the findings but not the validity of the observed empirical associations.¹⁴

A more serious problem from the perspective of the validity and generalizability of the empirical findings is the definition of deterrence success to include cases in which an attack on the pawn is repulsed without violent military conflict between the two major powers (p. 98). As a result, several cases that might normally be regarded as partial failures of deterrence are

instead coded as instances of successful deterrence, including the Berlin Blockade (successful deterrence by the United States), Anglo-French attack on Egypt in 1956 (Soviet success), Chinese Communist artillery blockade of Quemoy in 1958, and Bay of Pigs (Soviet success) [George and Smoke, 1974:517]. To the extent that the 1948 Berlin crisis was a U.S. success, for example, it was a success of compellence after a partial failure of deterrence. Similarly, the successful U.S. threat against the Soviet Union in 1946 might be better classified as compellence than deterrence. The more general theoretical problem is the treatment of the dispute outcome (success-failure) as a dichotomous variable, whereas George and Smoke (1974) argue persuasively that deterrence can fail in a variety of different ways and that the initiator can often "design around" a deterrence threat. Though George and Smoke are undoubtedly correct on the theoretical level, I believe that for the purposes of a large-*N* correlational study the dichotomous classification of the dependent variable is a reasonable first approximation, but one which ought to be refined in subsequent research.

Perhaps an even more serious problem with defining deterrence success is that the very concept implies a *causal* relationship, that the potential aggressor does not attack the pawn *because* of the defender's threat. The mere observation of nonattack is necessary but not sufficient to demonstrate this. One must also show that in the absence of such a threat the adversary would have attacked the pawn, and that the adversary was dissuaded by the defender's threat rather than something else (such as his domestic public opinion, anticipated diplomatic reaction, ability of the pawn to mount a successful or at least costly defense, etc.). This counterfactual hypothesis regarding what the adversary would have done in the absence of the deterrent threat involves a difficult analytical problem and substantial data requirements. Russett (and later Huth and Russett) attempts to deal with this problem by including the adversary's prior threat against the pawn as a definitional requirement for all cases, assuming such a threat to be a sufficient indicator of the adversary's intent to attack. Admittedly, this assumption is not always valid. An adversary may threaten a weaker ally not because it intends to attack but instead as a means to some other end: to win a concession on some other issue, to distract the defender's attention, or to induce him to divert vital military resources to the defense of the pawn (Fink, 1965). Such a threat may also be a product of the domestic or bureaucratic politics within the adversary's regime. A case study methodology can devote more attention to the motivations and intent of the potential attacker as a means of verifying the counterfactual, but even it can rarely be conclusive.¹⁵ In any case, such intensive analysis is not feasible for a large-*N* study of this kind.¹⁶ My own view is that

Russett's assumption is reasonable as a first approximation but that additional work to confirm the validity of this indicator of the adversary's intent would be very valuable.

Thus in spite of its limitations Russett's 1963 study marks the initiation of an important research program. This program is particularly impressive because of Russett's recognition of the costs of excluding perceptual variables and the limitations of correlational analysis for making causal inferences. In a 1970 article he discusses the need to use both correlational and case study methods to complement each other for the purposes of the development of theory, and his case study of Pearl Harbor is consistent with this conception of theory building and cumulation in international research.

Russett, "Pearl Harbor: Deterrence Theory and Decision Theory" (1967)

One of the main purposes of the Pearl Harbor study was to explore and validate some of the empirical associations uncovered in the earlier correlational analysis. Russett's (1963:106-7) earlier expected-utility model is used as a framework for the theoretical interpretation of Japan's decision for war. In spite of the absence of an explicit American deterrent threat, Russett (1967:94-96) argues, Japanese decision makers were fully convinced that the United States would respond militarily to a Japanese attack on Malaya and especially the Dutch East Indies because of the strategic and economic value of those colonies (pp. 94-96). This is consistent with Russett's (1963) argument that military, political, and economic ties reinforce commitment in a way that formal threats do not.¹⁷ The fact that the Japanese perceived the U.S. threat to be highly credible but attacked anyway demonstrates the fallacy (in Russett's 1963 study) of equating the credibility of the threat with its effectiveness. Russett shows that the Japanese in fact perceived the military superiority of the United States and that the Japanese expected to lose a prolonged war *if* the United States chose to fight such a war (pp. 98-99). This is consistent with the findings of other studies surveyed above that the military superiority of the defender, even if accurately perceived, is not sufficient for deterrence. This is explained in part by the very low assessment of the value of the status quo, which was reinforced by domestic and bureaucratic political as well as strategic and economic considerations (pp. 96-98).

Thus Russett rejects the common argument that the Japanese attack on Pearl Harbor was an irrational action and argues that given Japanese preferences, expectations, and constraints, their behavior was consistent with a

rational expected-utility calculus.¹⁸ He acknowledges, however, that some departure from a rational model may be necessary to explain both Japan's assumption that the United States would prefer to reach a negotiated settlement recognizing Japanese hegemony in Southeast Asia than to fight a prolonged war, and their failure to explore the validity of that assumption. Finally, on the basis of this case Russett argues that a theory of extended deterrence must include in the set of possible outcomes a direct attack against the defender as well as inaction and an attack against the pawn.¹⁹

Huth and Russett, "What Makes Deterrence Work?" (1984)

This article develops the expected-utility model from Russett (1963) and tests the model on cases of extended, immediate deterrence from 1900 to 1980. It makes a number of improvements on Russett's first study. It recognizes the problem of inferring the success of deterrence and argues that by explicitly focusing on immediate deterrence the problem is reduced though not eliminated (p. 497). By extending the temporal domain of the study back to 1900 and forward to 1980, it significantly increases the number of cases to 54. This permits the use of more formal statistical methods, which were not used in Russett's 1963 study. Deterrence failure occurs if there is an attack against the protégé, operationally defined as "a government-sanctioned engagement of its regular armed forces in combat with the regular armed forces of the protégé and/or its defender, resulting in more than 250 fatalities." Cases in which the attacker gains its principal goals or occupies the territory of the protégé in spite of minimal fatalities are also classified as failures of deterrence. All other cases are classified as deterrence successes, which include 57 percent of the total number of cases (Huth and Russett, 1984:505).

This study also introduces some new independent variables and refines some of the operational indicators for variables used in earlier studies. Hypotheses based on five different dimensions of relative military capabilities are now tested: overall military and economic capabilities, or military potential; overall existing military capabilities; potential local capabilities proximate to the protégé (in a semantic change, the authors refer to the "protégé" rather than the "pawn"); existing local capabilities; and defender's possession or nonpossession of nuclear weapons. (There is no indicator tapping whether or not the initiator has nuclear weapons, and thus whether the crisis involves a confrontation between two nuclear powers.) Economic and military capabilities are measured using the Correlates of War capability data (Singer, Bremer, and Stuckey, 1972), with a

loss-of-strength gradient introduced for local capabilities (p. 510). The effect of the defender's previous behavior is introduced through dummy variables tapping whether or not the defender had fought on behalf of the protégé in the previous deterrent situation (against any adversary). The presence or absence of a formal military alliance between defender and protégé is also included. Economic ties are measured by the protégé's share of the defender's total merchandise exports and imports, and political-military ties are measured by a four-point scale of the percentage share of major weapons systems imported by the protégé from the defender. The strategic importance of the protégé to the defender is measured (as before) by the ratio of the protégé's capabilities (on the various dimensions) to those of the defender, and whether or not they shared a common border. Although the Pearl Harbor study demonstrated the critical importance of the expected utility of peace to the attacker, this variable is very difficult to measure and is not incorporated into the model, which is a serious limitation and one acknowledged by the authors (p. 514). Each of the just-named factors is an independent variable in a linear model predicting the success or failure of deterrence. The relationships are analyzed by the technique of probit analysis, which is similar to regression analysis but more appropriate in the case of a dichotomous dependent variable.

The model predicts 78 percent of all cases correctly. The variables having a significant ($p < .10$) impact on deterrence success or failure include economic and political ties (trade and arms transfers) and the local military balance. The existence of a formal military alliance (formed *prior* to the aggressor's initial threat) between defender and protégé is moderately important but tends to *reduce* the likelihood of successful deterrence.²⁰ The overall strategic balance and the defender's behavior in previous crises, however, appear to have little impact on the effectiveness of deterrence. Moreover, the defender's possession of nuclear weapons has only a "marginal" impact on outcomes. This leads Huth and Russett (1984:516-18) to conclude that "local military capabilities (of the defender and protégé combined) seem to have more to do with successful deterrence than do strategic capabilities, and both may be less important than having a dense network of political and economic bonds between defender and protégé." This is consistent with the findings of other studies previously surveyed that the balance of military capabilities is not the primary determinant of deterrence.²¹

After examining the sources of deterrence success and failure, Huth and Russett (1984:520-23) analyze the factors determining whether the defender will fight to defend its protégé, which happened in 15 of their 23 cases. The defender is more likely to fight if the protégé is important in

terms of its relative military capability, and particularly if there exists a military alliance between defender and protégé. However, the dyadic military balance between defender and attacker, geographical contiguity, and the defender's past behavior are not associated with the occurrence or nonoccurrence of war.

It is important to note that the variables associated with deterrence success and those associated with the defender's decision to fight if deterrence fails are not the same. The only factor important in both decisions is the existence of a military alliance between defender and protégé, the effect of which reverses direction in the second decision. This is a particularly dangerous combination and leads Huth and Russett (1984:522) to conclude, again emphasizing the importance of economic and political ties between defender and protégé, that "a military alliance not backed up by more tangible linkages . . . may increase the danger that a defender will be drawn into war." The tendency for alliances to encourage the adversary to attack the protégé and then to lead the defender to intervene would appear to imply a mismatch between the calculations of the attacker and the defender, but Huth and Russett (1984:522-23) suggest an alternative interpretation in which economic and political ties are the primary influence on the attacker's decision and alliances are more important for the defender's decision.²²

Huth and Russett, "After Deterrence Fails: Escalation to War?" (1988)²³

This paper, like the previous one, deals with both the determinants of the success of immediate extended deterrence and with the determinants of escalation to war in the event that deterrence fails. It goes beyond the previous study by suggesting additional hypotheses, introducing new variables and conceptualizing others, modifying some definitional criteria and empirical indicators, extending the temporal domain, and by making the corresponding changes in the data base. As a result, there are some new empirical findings.

More specifically, the temporal domain of the study is extended back until 1885. This, plus further additions and deletions based on the examination of previously unused sources, results in an increase in the number of cases from 54 to 58.²⁴ In one particularly significant change from the 1984 study, the measure of the past behavior of the defender (whether or not it came to the defense of the protégé) is altered to tap its behavior in the last deterrent situation with the *same* adversary rather than with any adversary. The concept of relative military capabilities (and hypotheses related

to them) is also modified and improved and now includes immediate, short-term, and long-term dimensions, plus the defender's possession/nonpossession of nuclear weapons. The immediate balance, measured by forces currently and proximately available to attack or defend the protégé, are hypothesized to be the most important for both deterrence success and for the defender's decision whether to intervene in the case of deterrence failure. The short-term balance consists of all active-duty forces and readily available reserves. The long-term military balance is defined as all existing military forces and national mobilization capabilities (economic, industrial, demographic) for fighting a protracted war.²⁵ It is hypothesized that the attacker does not usually expect a long war of attrition and therefore discounts the importance of the long-term balance of capabilities and that he may attack in spite of his inferiority in long-term forces as long as he has superiority in immediate or even short-term forces. The long-term balance is hypothesized to be important only for the defender's decision regarding whether to intervene to save the protégé after the failure of deterrence, but even that is qualified.

The most significant theoretical change from the earlier Russett-Huth studies is the inclusion of the bargaining behavior of the adversaries into the model. The basic hypothesis is that the effectiveness of diplomatic and military techniques used by the adversaries to influence each other is a nonlinear function of the firmness of one's bargaining behavior, with threats of moderate firmness being the most effective. Excessively conciliatory bargaining behavior undermines credibility and therefore deterrence, and excessively hostile threats provoke equally hostile responses and trigger an upward spiral of escalation. Drawing on some of Leng's early work on the Behavioral Correlates of War project, Huth and Russett have compiled chronological summaries of the diplomatic and military actions of both defender and attacker for each case of attempted deterrence.²⁶ The diplomatic responses of the defender are coded according to the degree of cooperation and flexibility, and the military actions of attacker and defender are coded by a six-point scale of escalation. The military responses of the defender are then classified as to whether they matched, exceeded, or failed to match the attacker's level of escalation at each stage in the crisis. These many pairs of actions over the course of the crisis are then aggregated into a single measure reflecting the "predominant influence strategy" (Leng and Wheeler, 1979) of a state on both diplomatic and military dimensions. Diplomatic strategies are classified as bullying, conciliatory, or firm-but-fair, and military actions are classified as either policies of strength, weakness, or tit-for-tat.

The definition of deterrence success or failure is the same as for the 1984

study. Failure is defined as "an attack on the protégé by regular military forces resulting in more than 250 fatalities, where the attacker gained its principal political or territorial goals even though fatalities were minimal, or where the attacker occupied territory of the protégé for several years" (Huth and Russett, forthcoming). Success is the absence of such an attack. This implies that an attack that is repulsed with minimal casualties by the protégé or the deterrer is defined as a deterrent success. Thus the 1948 Berlin case is still classified as a deterrent success for the United States, which illustrates the problem of failing to include a category for the partial failure of deterrence. Another limitation of the 1984 study that is not corrected here is the failure to incorporate the attacker's evaluation of the acceptability of the status quo, the importance of which was demonstrated by Russett's (1967) case study on Pearl Harbor.²⁷

Applying probit analysis to the data, Huth and Russett (forthcoming) find that successful deterrence is associated with an immediate or short-term balance of forces favoring the defender ($p < .05$), with the long-term balance being only weakly associated with the outcome.²⁸ The defender's possession of nuclear weapons, or an overt threat to use them, has no impact on the outcome of the crisis.²⁹ In the most surprising finding, and one contrary to the central result of the 1963 and 1984 studies, economic and political-military ties between defender and protégé are found to be unrelated to the success or failure of deterrence. Unfortunately, the authors make little effort to explain this dramatic change from their previous studies, though they do assert that it derives from the introduction of crisis-bargaining variables into the analysis.³⁰ These bargaining variables are found to be significantly correlated with the success or failure of deterrence. As hypothesized, reciprocal strategies are found to be associated with successful outcomes. Deterrence is likely to succeed if the defender follows a firm-but-fair diplomatic strategy, and likely to fail for defenders following conciliatory or bullying strategies ($p < .01$). Similarly, tit-for-tat policies of military actions are usually successful, whereas excessively firm or cautious policies are not ($p < .025$).³¹

Another finding that runs contrary to the results of the 1984 study is that the reputation of the defender, defined here as its behavior in the last crisis against the same adversary,³² is correlated with the outcome of a crisis.³³ Both backing down and prevailing in the last crisis against the same adversary are associated with the failure of deterrence, leading Huth and Russett (forthcoming) to conclude that "a stalemate is a safer outcome." This conclusion, however, must be regarded with a certain amount of skepticism in the absence of further research. The sensitivity of many of these empirical findings to relatively minor changes in the operationalizations of

certain variables or to the addition of new variables is one ground for caution. In addition, the failure to examine alternative explanations for the selection of different bargaining strategies raises the possibility of spurious inferences regarding the causal impact of these strategies.³⁴ Huth and Russett (forthcoming) conclude that the attacker's decision appears to be based primarily on short-term considerations, particularly military ones, and that long-term military power avails little. What is important is the defender's ability to prevent a quick seizure of territory or to roll back that seizure relatively promptly, not the threat of future retaliation. They infer from this that deterrence by denial is more critical than deterrence by punishment (Snyder, 1961) for immediate extended deterrence.

Now let us consider the conditions affecting the defender's decision to go to war in the event that deterrence fails. The model correctly postdicts 83 percent of these cases ($n = 24$). The short-term balance of military forces in being is statistically significant, and the long-term balance is nearly significant. The defender's ties with the protégé are also important, particularly formal alliances and geographic proximity. Crisis-bargaining behavior is statistically significant ($p = .10$).

Thus several factors that appear to be important in the attacker's decision whether or not to defy a deterrent threat are relatively unimportant or less important in the defender's decision whether to fight in the event that deterrence fails. The immediate balance of military forces and the past behavior of the defender are no longer important, and the crisis-bargaining behavior of the defender is slightly less important than that of the initiator. The less-immediate dimensions of military power are more significant, as are the nature and strength of linkages between defender and protégé. The fact that the decisions of the attacker and defender are influenced by such different criteria increases their insensitivity to the cost-benefit calculations made by the other. States are particularly likely to underestimate the adversary's perceived costs of retreat, and the attacker is likely to underestimate the importance of defender-protégé bonds to the defender. This increases the likelihood of serious misperceptions of adversary intentions and consequently increases the likelihood of war (Levy, 1983).

Back to Capabilities: The Problem of Selection Bias

One of the themes emerging from most of the studies surveyed above is that the possession of military superiority by the defender is no guarantee that deterrence will work. The overall (long-term) balance of military capabilities between two states does not have a significant impact on the

success or failure of immediate deterrence (and perhaps on the effectiveness of military threats in general). Moreover, although strategic deterrence may be effective in regulating the behavior of nuclear states toward each other, there is little evidence that nuclear weapons (in the hands of the defender) affect the success or failure of extended deterrence of attacks on allies.³⁵ Several studies suggest, however, that the balance of conventional capabilities in proximity to the target does play an important role in extended deterrence. Taken together, these findings are consistent with a more general theme emphasized by George and Smoke (1974) and by George (1984) in his work on crisis management: The utility of military threats, whether deterrent or compellent in nature, depends on the threatener's possession of a spectrum of military capabilities and options appropriate to the level of the threat and the behavior it is attempting to influence.

It is essential to recognize, however, that there is a serious but perhaps unavoidable flaw in these research designs regarding the role of military capabilities in immediate deterrence, and that it is difficult to assess the extent to which this biases the empirical findings. In order to lend plausibility to the inference that the absence of a military attack constitutes an indicator of successful deterrence, there needs to be some evidence that the potential attacker would have attacked in the absence of a deterrent threat, that he was seriously considering military action. Several studies fail to provide such evidence, and this limits the relevance of their results for the question of immediate deterrence. The Huth and Russett studies attempt to deal with this problem by requiring the existence of the aggressor's prior threat against the protégé as a definitional requirement for a deterrence situation and assume such a threat implies that the attacker intended to act militarily. Although some assumption of this kind may be necessary, it may result in a *biased selection of cases* included in the study and consequently an *underestimation of the importance of military capabilities in immediate deterrence*.

The problem is that a research design incorporating the assumption of a prior threat permits an analysis of the conditions for the success or failure of immediate deterrence but not of the conditions under which the attacker makes the threat that initiates the crisis and thus qualifies the case for inclusion.³⁶ If the attacker makes threats only in those instances in which its expected probability of success (as determined by the balance of military capabilities) is sufficiently high, then because of selection bias the importance of capabilities may not be reflected in an analysis of the attacker's later decision whether or not to defy the deterrence threat and attack. There are different dimensions of military capabilities, of course.

The problem of selection bias occurs whenever the same dimension or combination of dimensions of military strength (whether it be long-term, immediate, or local) affects both the initiator's original threat (which determines case selection) and his decision regarding whether or not to implement the threat.³⁷ If threats are made and carried out primarily by the strong on the basis of their military strength (however they define it), that might not be detected by Huth and Russett or by others studying disputes involving a prior threat.³⁸

A similar problem would arise in an analysis of the importance of the protégé to the attacker in immediate deterrence,³⁹ because to the extent that the initial threat is made only against important targets, selection bias will result in an underestimation of the impact of this variable in immediate deterrence. Combining the capability (which affects expected probability of success) and value variables, we see that the problem of selection bias precludes a straightforward analysis of the role of the initiator's expected utility of attack in immediate deterrence.

The potential seriousness of the problem of selection bias is demonstrated by the finding that deterrence is significantly more likely to fail if the protégé has a preexisting military alliance with its major power defender.⁴⁰ As Huth and Russett (1984:17) recognize, the very fact that the aggressor makes a threat under such conditions suggests its determination to carry out the threat regardless of any attempt by the protégé's major defender to deter that action. This suggests that the critical variables affecting both the decision to issue the initial threat and the decision to attack are the interests and motivations of the aggressor rather than the presence or absence of alliances and that the failure to incorporate these variables into the analysis may result in spurious inferences.⁴¹

Both the Karsten, Howell, and Allen (1984:31-32) and Huth and Russett (1984:524) studies acknowledge this general problem. The latter caution that "these findings apply only to cases of immediate deterrence . . . in which an overt military threat from a potential attacker has already become manifest. Perhaps this kind of case understates the value of military strength in general deterrence. If military power were overwhelming, possibly no aggressor would ever rise to the level of making the overt challenge that characterizes these cases" (p. 524). I would argue, however, that this selection bias affects not only the analysis of general deterrence but also the interpretation of the results in cases of immediate deterrence, because spurious inferences from observed correlations cannot be ruled out. This problem concerns any variable that affects both the criteria upon which the case selection is based and the success or failure of immediate deterrence. We are caught in a difficult dilemma. If we make the distinc-

tion between general and immediate deterrence and examine only those cases in which there is some indication of a prior intention to attack, we risk introducing serious selection biases into the analysis. If, on the other hand, we make no distinction between general and immediate deterrence, we seriously diminish our ability to make the causal inference that the absence of an attack is due to successful deterrence.

Although Huth and Russett not only acknowledge this dilemma but also deal with it in a reasonable manner, there may be alternative methodologies for dealing with the problem of selection bias, and the exploration of these constitutes an important avenue for further research. One potentially fruitful approach would be the application of some sophisticated new statistical methods developed for quasi-experimental research designs utilizing nonrandom samples (Achen, 1986). Another possibility would be to supplement the analysis of immediate deterrence with a separate analysis of the conditions under which military threats are initially made or, more generally, of the conditions under which one state seriously considers an attack against another.⁴²

Conclusions

The quantitative empirical studies surveyed above deal with different aspects of the question of when deterrence works and identify different independent variables. They also utilize different operational indicators, temporal domains, types of data, and methods of analysis. Yet several general themes do emerge. One concerns the role of military capabilities in deterrence. We have seen that the overall (long-term) balance of military capabilities between two states has at most a secondary impact on the success or failure of immediate deterrence (and on the effectiveness of military threats in general), though this finding must be regarded as tentative until the magnitude of selection biases can be assessed. Several studies suggest, however, that the balance of conventional capabilities in proximity to the target does play an important role in extending deterrence. Taken together, these findings are consistent with a more general theme emphasized by George and Smoke (1974) and by George (1984) in his work on crisis management: The utility of military threats, whether deterrent or compellent in nature, depends on the threatener's possession of a spectrum of military capabilities and options appropriate to the level of the threat and the behavior it is attempting to influence.

The finding that superior military capabilities alone are not necessarily sufficient for deterrence can be explained in part by the tremendous impor-

tance of the interests and resolve of the initiator of the crisis, which is another theme emerging from several of these studies. Bueno de Mesquita (1981) demonstrates the superiority of an expected utility model incorporating the initiator's utility for war as well as its expected probability of success. Maoz (1983) and Karsten, Howell, and Allen (1984) go further and give greater emphasis to the motivations and behavior of the initiator than to the capabilities, commitment, and signaling of the defender. These factors are difficult to operationalize in large-N studies, however, for their measurement often requires a fairly intensive examination of individual cases. For this reason, the quantitative empirical literature on deterrence has generally been less successful than the case study literature (George and Smoke, 1974:Chapter 17; Lebow, 1981; Jervis, Lebow, and Stein, 1985; Betts, 1987; Russett, 1967) in dealing with the motivations and perceptions of the initiator. The quantitative literature has also given far too little attention to the domestic incentives that often lead states to take military action in spite of a credible deterrent threat by the defender (Lebow, 1981; Levy, 1988a, 1989).

Another important theme emerging from several of these studies concerns the stabilizing effects of reciprocity in the interaction between adversaries. These are important findings, particularly since they are reinforced by other social scientific research on reciprocity (Axelrod, 1984). Although these studies are reasonably rigorous and systematic, the operationalization of reciprocity in large-N studies is a difficult task, and this is a sufficiently important theoretical question to require further research from several different theoretical and methodological perspectives. Another aspect of deterrence theory requiring further research is the role of reputation, or the impact of the past behavior of the adversaries. This variable has received little attention in the quantitative empirical literature on deterrence, not only because of the difficulty of constructing an operational indicator for a large-N study but also because of the limited development of this variable in the theoretical literature. One particularly interesting but highly tentative finding emerging from the Huth and Russett (1984, forthcoming) studies is that the success or failure of deterrence is associated with the defender's response in the previous deterrence situation with the same adversary but not with its behavior against another adversary. If confirmed, this finding would suggest that reputation must be treated as a multidimensional concept.

This review of quantitative empirical studies of deterrence has demonstrated that this is not an isolated body of literature, but instead has substantial intellectual interconnections with both rational deterrence theory and with the case study literature on deterrence. Many of the hypotheses

that it has systematically tested were derived from these other bodies of literature, and the quantitative empirical literature has in turn contributed to the development of theoretical generalizations regarding when deterrence works. New developments in both the formal and nonformal theoretical literature on deterrence provide a rich source of important hypotheses that should now be tested empirically by systematic quantitative analysis as well as by case study methods. In addition, some of the findings from quantitative empirical studies represent interesting theoretical anomalies and ought to stimulate additional theoretical analysis. The broader literature on deterrence provides a useful model of how formal theoretical, quantitative empirical, and case study methodologies can supplement each other to enhance our understanding of important theoretical questions that also have undeniable implications for contemporary international security.

NOTES

This research has been supported by the Stanford Center for International Security and Arms Control, the Carnegie Corporation, and by a Social Science Research Council/MacArthur Foundation Fellowship in International Peace and Security. The views expressed here do not necessarily represent those of the Center, Council, or either Foundation. This study has benefited from the comments and criticisms of Christopher Achen, Robert Jervis, Kimberly Marten, John Mearns, Paul Stern, Steven Weber, and especially Alexander George.

1. For a classification of the literature addressing the general theoretical question of when deterrence works, and a brief comparison of classical deterrence theory, the case study literature on deterrence, and the quantitative empirical literature, see Levy (1988c). See also Chapter 1 of this volume.

2. The importance of the balance of interests at stake in a conflict is emphasized by George and Smoke (1974) in their concept of asymmetry of motivation and by Jervis (1979:314-17) in his concept of "intrinsic interests." Both the probability of victory or defeat and the value of those outcomes have been integrated into an expected utility theory of war by Bueno de Mesquita (1981).

3. Dyadic-level studies of the "parity hypothesis" and the "power preponderance hypothesis," which concern the relationship between the distribution of capabilities between pairs of states and the frequency of war between them, are more relevant to the question of general deterrence than immediate deterrence, because they are not concerned with the question of whether one state is even considering aggression against another. Consequently, these studies will not be examined here. It should be noted, however, that although some of these studies do support the dyadic preponderance hypothesis (Garnham, 1976; Organski and

Kugler, 1980), the bulk of the evidence runs against it. See Ferris (1973), Siverson and Sullivan (1983), and (in the anthropological literature) Naroll, Bullough, and Naroll (1974).

4. Note that unless the qualifier "sufficiently" is operationally defined, its inclusion seriously reduces the explanatory and predictive power of the hypothesis by making it nearly nonfalsifiable.

5. The Militarized Interstate Dispute project (MID) was designed to help answer the question of why some interstate disputes escalate to war while others do not. The project and the data set it has generated are summarized in Gochman and Maoz (1984) and in Maoz (1982). This is probably the most widely used data set in quantitative international conflict studies today. A militarized interstate dispute is defined as "a set of interactions between or among states involving threats to use military force, displays of military force, or actual uses of military force. . . . [they are] explicit, overt, nonaccidental, and government sanctioned." Gochman and Maoz define 14 types of military acts, classified as threats, displays, and uses of force, and identify 960 militarized disputes from 1816 to 1976. These studies focus on objective military capabilities rather than on decision makers' perceptions of those capabilities. Note that not all disputes reach a level of intensity sufficient to qualify as a crisis; crises are subsets of disputes.

6. I use "capability/threat model" to refer to Maoz's "threat model," because the former is more descriptively accurate. Maoz also suggests another capability model, the power transition model, for which the key independent variable is change in relative military capabilities. This may be an important variable in the process leading to war (Levy, 1987), but is not normally included in the theoretical or empirical literature on deterrence and will not be examined here.

7. An important exception is that capability ratios do have a significant impact on the outcome of disputes and wars between major powers, though it is not indicated in the article whether the resolve indicators have an even greater impact.

8. Maoz's results are consistent with those of Blechman and Kaplan (1978) in their study of 12 cases since World War II in which the United States threatened the use of force against the Soviet Union. They find that demonstrating resolve is more important for a successful outcome than regional or global military superiority.

9. The argument that overall military capabilities have only a secondary impact on immediate deterrence would seem to be strengthened by the fact that most empirical studies of the relationship between the dyadic balance of military capabilities and war support the "parity hypothesis" rather than the "power preponderance" hypothesis (see footnote 3). The relationship between these studies and our ability to make inferences is complicated by the fact that they focus on slightly different sets of cases. The latter set of studies focus on the direct relationship between pairs of states, whereas the Russett-Huth analyses focus on a more restricted set of cases involving the existence of (1) a prior threat and (2) one that is directed against a third party. Further research is clearly needed on the relationship between these different dimensions of deterrence.

10. The authors are explicit in focusing on "direct" as opposed to "indirect" threats. The former are linked to clearly stated objectives and are temporally limited, whereas the latter are designed to "deter certain types of issues from being raised" (Karsten, Howell, and Allen, 1984:4). This is similar to Morgan's (1977) distinction between immediate and general deterrence.

11. Whether clear and specific threats are more effective than more ambiguous and general threats is an important question. Leng's data-based studies of interstate crisis behavior (see my summary of his Behavioral Correlates of War project in Note 26) are consistent with the Karsten, Howell, and Allen findings. He finds, in a study of a stratified random sample of 14 crises since 1850 (Leng, 1980) as well as in a more specific study of recent U.S.-Soviet behavior (Leng, 1984), that the more specific the threat the greater the likelihood of a defiant response. Presumably, some degree of vagueness facilitates the target's compliance with the threat by avoiding the appearance of being bullied. Leng agrees with Snyder and Diesing (1977) and others that face-saving is a critical dimension in the resolution of any dispute, even where one party is militarily dominant. George and Smoke (1974: ch. 17) suggest another reason precise threats may fail: The target is frequently able to "design around" a deterrent threat, particularly if that state has multiple options by which to achieve its objectives.

12. I will make some references to Huth's recent article and book (1988, 1989) but will not examine them in detail, because at the time of this writing they have not yet been published. I will not focus on the third Huth and Russett (1988) article because it does not go significantly beyond the second one (forthcoming).

13. Formally, the defender will pursue a firm policy and attempt to deter a possible attack only if, in his calculation,

$$V_f * s + V_w * (1 - s) > V_r$$

where

- V_f = the value of successful firmness (deterrence without war)
- V_w = the value (usually negative) of the failure of firmness (war)
- V_r = the value (usually negative) of retreat (no attempt to deter an attack)
- s = the probability that firmness will be successful.

The initiator will attack only if

$$V_a * t + V_c * (1 - t) > V_o$$

where

- V_a = the value of a successful attack (defender does not intervene)
- V_c = the value (usually negative) of an attack that is countered (war)
- V_o = the value of doing nothing (i.e., the status quo)
- t = the probability of a successful (uncountered) attack.

14. For further discussion of this problem, and a simple derivation from the expected utility model of the conditions under which a credible threat will be a necessary and sufficient condition for deterrence, see the critique by Fink (1965).

15. This problem of identifying genuine deterrence success led George and Smoke (1974) to restrict their study to cases of deterrence failure. This was reasonable for the purposes of their study, which is concerned with constructing a typological theory of deterrence failure. Ultimately, however, the success or failure of deterrence cannot be fully explained without a fully controlled study that includes cases of deterrence success as well as failure.

16. Admittedly, Russett's N of 17 cases is too small to capture all of the advantages of a large- N correlational analysis (and probably too large to permit a very intensive analysis of individual cases), but the number of cases is increased in his later studies.

17. This is reminiscent of Jervis's (1970) distinction between signals and indices.

18. Russett's classification of this case as a deterrent failure gives insufficient attention to the fact that U.S. threats involved compellence as well as deterrence. The United States attempted not only to deter the Japanese from moving into Southeast Asia but also to compel them to withdraw from China and used a highly coercive oil embargo to enforce this policy. This case involved the backfiring of a strategy of compellence as much as the failure of deterrence.

19. In the nuclear age a direct attack against a major power defender rather than its pawn is unlikely to be a viable option.

20. Huth and Russett (1984:517) explain this by arguing that if an adversary threatens a protégé that is formally allied to the defender, that adversary has already decided to stand firm and carry out the threat.

21. Blechman and Kaplan (1978:527) reach similar conclusions regarding the outcomes of cases involving the threat or use of force short of war since World War II. They find, both from their aggregate analysis and from their case studies, no evidence that crisis decisions are strongly influenced by aggregate strategic capabilities and argue that the local balance of conventional power tends to be more important. Organski and Kugler (1980:ch. 4) reach similar conclusions from their examination of 14 cases of deterrence since 1945. They find that nuclear powers have prevailed in only about half of these but that conventional superiority does make a difference. Kugler (1984) presents comparable results and finds that even a nuclear monopoly has brought a favorable outcome only about half the time. Weede (1983), however, finds that mutual nuclear deterrence has reduced the risk of war not only between superpowers but also between allies in opposing blocs.

22. They hypothesize, in the ellipses in the quoted passage, that these linkages "perhaps give the defender some control to prevent adventurism by a protégé." Alternative explanations would have to be considered, however, including selection bias, a point to which I will return. I should note that the statement quoted in the text is not technically supported by their analysis. It implies an interaction effect between military alliances and tangible (i.e., economic or political) linkages, but no such term is formally incorporated into their model.

23. Since this study has not yet been published, I have not referred to specific page numbers. The quoted passages are taken from the authors' May 1986 confer-

ence paper (University of British Columbia, Vancouver) and from several revised versions of it. The authors have been kind enough to point out aspects of earlier versions of my review that have been affected by their revisions, and I have made changes where appropriate.

24. Some cases were deleted because of the ambiguity regarding whether a prior threat of attack actually existed (and thus whether this was actually a case of immediate deterrence). Other cases were deleted because the intervention of the defender occurred after hostilities (between attacker and protégé) had already escalated to the level of large-scale armed conflict, leading to the classification of the case as compellence rather than deterrence (Huth, 1989).

25. The immediate balance corresponds to the "existing local" balance in the 1984 study; the short-term balance to the "existing overall" balance; and the long-term balance to the "potential overall" balance.

26. The Behavioral Correlates of War project (BCOW) is not restricted to cases of deterrence and does not deal directly enough (for our purposes) with the central hypotheses in the theoretical and empirical literature on deterrence to be thoroughly analyzed here, given space constraints. It is, however, a very important ongoing research program on crisis-bargaining behavior, in part because it demonstrates the potential utility of a large-N quantitative analysis of the role of behavioral variables in the bargaining process. Consequently, it would be useful to summarize the project briefly here and subsequently make a few references to some of its major findings where appropriate in the remainder of this study.

BCOW is the most recent extension (along with the Militarized Interstate Dispute project) of Singer's Correlates of War project. It was developed to facilitate the testing of a wide range of hypotheses dealing with bargaining in interstate crises and particularly the propensity of certain kinds of bargaining behavior to result in war. A typology of state actions was constructed and utilized for the generation of events data on a set of interstate crises. Unlike most events data sets, BCOW includes secondary historical sources as well as newspaper accounts. The data base currently (1988) consists of a stratified random sample of 38 militarized interstate disputes from the period 1816-1975, designed to include sufficient war and non-war cases and sufficient cases from the periods 1816-1919, 1920-1945, and 1946-1975. The sampling is done from the nearly 1,000 disputes identified by the Military Interstate Dispute project (see Note 5). The project is summarized in Leng and Singer (1988), and a selected list of BCOW studies of crisis bargaining can be found under Leng in the reference section.

27. Huth and Russett would argue that some aspects of the initiator's evaluation of the status quo are incorporated into the analysis indirectly through bargaining behavior and reputation. One reason why bullying strategies are hypothesized to be ineffective is the high diplomatic and domestic political costs of retreating from the status quo. The costs of retreat are particularly serious for a state that had been forced to back down in a previous crisis, for a prior humiliation produces a strong disinclination to back down again.

Although a prospective loss from a *retreat* from the status quo is weighed heavily by decision makers, it is analytically distinct from the *value* of the status quo itself. A retreat involves reputational and perhaps domestic political costs regardless of the utility or desirability of the original status quo. The fact of making the initial threat in itself changes the status quo by creating additional reputational interests. In this sense the value of the original status quo has *not* been incorporated into the analysis by Huth and Russett.

This raises two very interesting and important theoretical questions. One is whether states evaluate prospective gains and losses in terms of the utility of the outcome or final asset position, as classical microeconomic-utility theory assumes, or whether calculations are based on the magnitude and direction of the *change* in utility. (The truth, of course, is probably more complex, and the more appropriate and also more difficult question would be the relative weights given to final asset or utility positions and to changes in utilities.) A related question concerns the definition of the status quo by the initiator. Does the initiator, having made the threat, conceive of a prospective retreat as a retreat *from* the (new) status quo or a retreat *to* the old status quo. That is, would a retreat be seen as a loss or the absence of a gain? (Note that because of its focus on absolute utilities, expected-utility theory denies the significance of this question.) There is good reason to believe that this makes a difference in international politics: States appear to go to greater efforts to maintain an existing status quo than to change the status quo in their favor. Thus the question of how the decision is *framed* may be critical. There is substantial evidence in social psychology that this is true for individual behavior. It is found that individuals weigh losses more heavily than gains, that they are risk-acceptant when faced with losses and risk-averse when faced with gains, and that framing is critical (Tversky and Kahneman, 1986). These behavioral findings constitute the assumptions of prospect theory (Kahneman and Tversky, 1979), which is an axiomatically based alternative to expected-utility theory.

These considerations take us back to Russett's original expected-utility equations (see Note 13), which suggest that the initiator will attack only if the expected utility of attacking exceeds the expected utility of the status quo. This appears straightforward enough. But what is the status quo? Although Huth and Russett (and earlier Russett) do not address this question, the implication is that the status quo is what exists prior to the initiator's initial threat. If my argument is correct, however, the fact of making the threat changes the status quo, so that an analysis of the decision to implement the threat requires that the status quo be defined in terms of the situation existing after the initial threat is made. Thus Huth and Russett are correct in emphasizing the bargaining variables and the reputational and domestic political concerns that underlie them, not because they reflect the value of the old status quo but instead because they capture one important component of the *new* status quo. (Note that Huth and Russett are precluded from measuring the status quo existing prior to the initial threat, because that threat is a definitional requirement for case selection.)

28. Only the statistically significant (at $p = .10$) probit coefficients are reported, so I must rely on the authors' interpretation of the results.

29. The authors acknowledge that the generalizability of this finding is restricted by the limited number of cases involved (18 with nuclear defenders, four with overt nuclear threats).

30. If the defender's bargaining strategy were a function of the extent of defender-protégé bonds (i.e., the stronger the ties the more coercive the bargaining), the resulting multicollinearity would account for the drop in significance of those ties. Huth (1989:ch. 4) reports, however, that the correlations between these two sets of variables are very low and suggests an alternative explanation for the decline in significance of the ties between a protégé and its protector.

31. This finding of the effectiveness of reciprocal strategies is consistent with a growing body of theoretical and experimental work by social scientists (Axelrod, 1984; Gouldner, 1960). It is also consistent with empirical findings from Leng's BCOW project. Leng and Wheeler (1979) define four predominant influence strategies: bullying, reciprocating, appeasing, and trial-and-error. Reciprocating strategies combine positive initiatives with firm responses (including counterthreats) to the coercive actions of the adversary, whereas bullying strategies are primarily coercive. Leng and Wheeler (1979) find, in their data-based analysis of 20 crises since 1900, that reciprocating strategies are the most successful, particularly against an adversary employing a bullying strategy. Bullying strategies, on the other hand, are the most likely of the four to result in war. The tendency of bullying strategies to generate coercive counterthreats rather than compliance also emerges in Leng's (1984) subsequent study of U.S.-Soviet interaction patterns in the Berlin crises of 1948 and 1961 and the Cuban Missile Crisis of 1962. Leng notes that his data-based findings regarding crisis-bargaining behavior are similar to those of Snyder and Diesing (1977) in their qualitative studies of many of the same cases.

32. In their 1984 study, Huth and Russett defined the defender's reputation in terms of its behavior in the previous crisis with *any* adversary and found that it has no significant impact on the outcome of a current crisis.

33. The effect of behavior in one crisis on behavior in the following crisis between the same two adversaries is also analyzed by Leng (1983). He examines 18 crises since 1900, selected to include three successive crises between six pairs of states of relatively equal strength (a useful restriction for our purposes). The six sets of cases are important and include France-Germany (1905-1914), Austria-Russia (1908-1914), Britain-Germany (1936-1939), India-Pakistan (1948-1971), Egypt-Israel (1947-1967), and Soviet Union-United States (1948-1962). He finds that the diplomatic victor in one dispute tends to utilize the same (successful) influence strategy in the next crisis, unless the adversary adopts a more coercive strategy, in which case (and only under such conditions) the previous winner would also adopt a more coercive strategy. The loser, assuming that its diplomatic defeat was due to the failure to demonstrate resolve, tends to adopt a more coercive

strategy in the next crisis. A diplomatic compromise also tends to result in more coercive influence strategies by both parties in the next crisis. Crises ending in war tend to result in more coercive strategies in the next crisis *unless* a state perceives that the war had been "unwanted" (i.e., one's behavior was overly coercive, leading the adversary to preempt), in which case a more accommodative strategy is adopted. To the extent that states learn from their past experience, therefore, they have a general tendency to adopt more coercive bargaining the next time.

34. This finding raises another question. If "stalemate" is defined as a possible outcome of previous crises, utilized in the statistical analysis, and found to be associated with successful deterrence in a current crisis, that is not made explicit in this study. And if outcomes can be adequately measured trichotomously for use as an independent variable predicting the behavior and outcomes in the next crisis, this new measure should be utilized as the dependent variable in all crises, replacing the problematic success-failure dichotomy. A technical methodological point is also in order. Statistical inference generally requires the independence of cases. If the outcome of one case is affected by the outcome of the previous case, the assumption of independence is violated, and more sophisticated statistical procedures are normally required.

35. We would have more confidence in this result if there were a control for whether or not the initiator also possesses nuclear weapons.

36. Because these studies deal only with those cases in which threats of force have already been made, general deterrence has already failed, but that failure does not necessarily imply the failure of immediate deterrence. Thus, the conditions for the success of immediate deterrence are not necessarily the same as those for the success of general deterrence, and vice versa. Overall military capabilities may be more important for general deterrence than for immediate deterrence.

37. Selection bias would not arise, for example, if the initial threat were made on the basis of one's overall military strength and if the actual attack were made on the basis of the initiator's expectation of a *fait accompli* based on immediate available military forces, or vice versa.

38. For this reason, the Huth-Russett finding that the short-term military balance is important probably *underestimates* its true impact.

39. As noted, Huth and Russett (1984, forthcoming) do *not* include this variable.

40. Another clear example of likely selection bias is the Karsten, Howell, and Allen (1984:83) finding that threats fail when the threatener sees itself as stronger and succeed when it perceives itself as the weaker party.

41. One possible way to circumvent this problem would be to analyze those cases in which alliances are formed *after* the initial threat but before an attack. This would not fully deal with the problem of selection bias, however, because the alliance formation would probably be the causal result of the protégé's (or defender's) anticipation of an attack (based on the initiator's prior threat). For a more general discussion of the causal relationship between alliances and war, see Levy (1981:603-13).

42. The potential utility of case studies for this purpose should not be underestimated (George and McKeown, 1985). Intensive analyses of individual cases may be particularly useful in determining the presumed aggressor's prior motivations and intent regarding the possible use of force and thus serve as a validity check on the operational indicators used in the Huth and Russett or other aggregate studies. On the limitations of case studies, see Achen and Snidal (1989).

REFERENCES

- Achen, C. H., 1986. *The Statistical Analysis of Quasi-Experiments*. Berkeley: University of California Press.
- Achen, C. H., and Snidal, D., 1989. Rational deterrence theory and comparative case studies. *World Politics*.
- Axelrod, R. A., 1984. *The Evolution of Cooperation*. New York: Basic Books.
- Betts, R. K., 1987. *Nuclear Blackmail and Nuclear Balance*. Washington, D.C.: Brookings.
- Blechman, B. M., and Kaplan, S. S., 1978. *Force Without War: U.S. Armed Forces as a Political Instrument*. Washington, D.C.: Brookings.
- Bueno de Mesquita, B., 1981. *The War Trap*. New Haven, Conn.: Yale University Press.
- Ferris, W., 1973. *The Power Capabilities of Nation States*. Lexington, Mass.: Lexington Books.
- Fink, C. F., 1965. More calculations about deterrence. *Journal of Conflict Resolution* 9 (March):54-65.
- Garnham, D., 1976. Dyadic international war, 1816-1965. *Western Political Quarterly* 29:231-42.
- George, A. L., 1984. Crisis management: The interaction of political and military considerations. *Survival* (September-October):323-34.
- George, A. L., and McKeown, T. J., 1985. Case studies and theories of organizational decision making. *Advances in Information Processes in Organizations* 2:21-58.
- George, A. L., and Smoke, R., 1974. *Deterrence in American Foreign Policy*. New York: Columbia University Press.
- Gochman, C. S., and Maoz, Z., 1984. Militarized interstate disputes, 1816-1976. *Journal of Conflict Resolution* 28(December):585-616.
- Gouldner, A. W., 1960. The norm of reciprocity: A preliminary statement. *American Sociological Review* 25:161-78.
- Hilton, G., 1970. The 1914 studies: A reassessment of the evidence and some further thoughts. *Peace Research Society (International) Papers* 13:117-41.
- Huth, P. K., 1989. *Extended Deterrence and the Prevention of War*. New Haven, Conn.: Yale University Press.
- 1988. Extended deterrence and the outbreak of war. *American Political Science Review* 82(June).
- Huth, P., and Russett, B., 1984. What makes deterrence work? Cases from 1900 to 1980. *World Politics* 36(July):496-526.
- 1988. Deterrence failure and crisis escalation. *International Studies Quarterly* 32(March):29-46.
- forthcoming. After deterrence fails: Escalation to war? In M. Wallace, ed., *Accidental Nuclear War: A Growing Risk?* London: Butterworth.
- Jervis, R., 1969. The costs of the quantitative study of international relations. In K. Knorr and J. N. Rosenau, eds., *Contending Approaches to International Politics*. Princeton, N.J.: Princeton University Press, pp. 177-217.
- 1970. *The Logic of Images in International Relations*. Princeton, N.J.: Princeton University Press.
- 1979. Deterrence theory revisited. *World Politics* 31(January):289-324.
- Jervis, R., Lebow, R. N., and Stein, J., 1985. *The Psychology of Deterrence*. Baltimore: Johns Hopkins University Press.
- Karsten, P., Howell, P. D., and Allen, A. F., 1984. *Military Threats: A Systematic Historical Analysis of the Determinants of Success*. Westport, Conn.: Greenwood Press.
- Kahneman, D., and Tversky, A., 1979. Prospect theory: An analysis of decisions under risk. *Econometrica* 47(March):273-91.
- Kaufmann, W. W., 1954. *The Requirements of Deterrence*. Princeton, N.J.: Center of International Studies.
- Kennedy, P., 1988. *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000*. New York: Random House.
- Kugler, J., 1984. Terror without deterrence: Reassessing the role of nuclear deterrence. *Journal of Conflict Resolution* 28(September):470-506.
- Lebow, R. N., 1981. *Between Peace and War: The Nature of International Crises*. Baltimore: Johns Hopkins University Press.
- Leng, R. J., 1980. Influence strategies and interstate conflict. In J. D. Singer, ed., *The Correlates of War: II*. New York: Free Press, pp. 124-57.
- 1983. When will they ever learn? Coercive bargaining in recurrent crises. *Journal of Conflict Resolution* 27(September):379-419.
- 1984. Reagan and the Russians: Crisis-bargaining beliefs and the historical record. *American Political Science Review* 78(June):338-55.
- Leng, R. J., and Singer, J. D., 1988. Militarized interstate crises: The BCOW typology and its applications. *International Studies Quarterly* 32(June):155-73.
- Leng, R. J., and Wheeler, H. G., 1979. Influence strategies, success, and war. *Journal of Conflict Resolution* 23(December):655-84.
- Levy, J. S., 1981. Alliance formation and war behavior: An analysis of the great powers, 1495-1975. *Journal of Conflict Resolution* 25(December):581-614.

- . 1983. Misperception and the causes of war. *World Politics* 35(October): 76-99.
- . 1987. Declining power and the preventive motivation for war. *World Politics* 40(October):82-107.
- . 1988a. Domestic politics and war. *Journal of Interdisciplinary History* 18 (Spring):653-73.
- . 1988b. When do deterrent threats work? *British Journal of Political Science* 18(October):433-60.
- . 1989. The diversionary theory of war. In M. I. Midlarsky, ed., *Handbook of War Studies*. Winchester, Mass.: Allen and Unwin. Forthcoming.
- Maoz, Z., 1982. *Paths to Conflict: International Dispute Initiation, 1816-1976*. Boulder, Colo.: Westview.
- . 1983. Resolve, capabilities, and the outcomes of interstate disputes, 1816-1976. *Journal of Conflict Resolution* 27(June):195-229.
- Morgan, P. M., 1977. *Deterrence: A Conceptual Analysis*. Beverly Hills, Calif.: Sage.
- Naroll, R., Bullough, V. L., and Naroll, F., 1974. *Military Deterrence in History: A Pilot Cross-Historical Survey*. Albany, N.Y.: State University of New York Press.
- North, R. C., 1967. Perception and action in the 1914 crisis. *Journal of International Affairs* 21:103-22.
- Organski, A. F. K., and Kugler, J., 1980. *The War Ledger*. Chicago: University of Chicago Press.
- Russett, B. M., 1963. The calculus of deterrence. *Journal of Conflict Resolution* 7 (June):97-109.
- . 1967. Pearl Harbor: Deterrence theory and decision theory. *Journal of Peace Research* 4:89-105.
- . 1970. International behavior research: Case studies and cumulation. In M. Haas and H. S. Kariel, eds., *Approaches to the Study of Political Science*. Scranton, Penn.: Chandler, pp. 425-43.
- Schelling, T. C., 1966. *Arms and Influence*. New Haven, Conn.: Yale University Press.
- Singer, J. D., Bremer, S., and Stuckey, J., 1972. Capability distribution, uncertainty, and major power war, 1820-1965. In B. Russett, ed., *War, Peace, and Numbers*. Beverly Hills, Calif.: Sage, pp. 19-48.
- Siverson, R. M., and Sullivan, M. P., 1983. The distribution of power and the onset of war. *Journal of Conflict Resolution* 27(September):473-94.
- Snyder, G. H., 1961. *Deterrence and Defense*. Princeton, N.J.: Princeton University Press.
- Snyder, G. H., and Diesing, P., 1977. *Conflict Among Nations*. Princeton, N.J.: Princeton University Press.
- Thucydides, 1954. *History of the Peloponnesian War*, trans. by R. Warner. New York: Penguin.
- Tversky, A., and Kahneman, D., 1986. The framing of decisions and the psychol-

- ogy of choice. In J. Elster, ed., *Rational Choice*. New York: New York University Press.
- Wayman, F. J., and Singer, J. D., and Goertz, G., 1983. Capabilities, military allocations, and success in militarized disputes. *International Studies Quarterly* 27(December):497-515.
- Weede, E., 1983. Extended deterrence by superpower alliance. *Journal of Conflict Resolution* 27(June):231-54.
- Zinnes, D. A., North, R. C., and Koch, H. E., Jr., 1961. Capability, threat, and the outbreak of war. In J. N. Rosenau, ed., *International Politics and Foreign Policy*. New York: Free Press, pp. 469-82.