

Feigning Weakness

Branislav L. Slantchev*

Department of Political Science, University of California – San Diego

June 4, 2009

Abstract. In typical crisis bargaining models, strong actors must convince the opponent that they are not bluffing and the only way to do so is through costly signaling. However, in a war strong actors can benefit from tactical surprise when their opponent mistakenly believes that they are weak. This creates contradictory incentives during the pre-war crisis: actors want to persuade the opponent of their strength to gain a better deal but, should war break out, they would rather have the opponent believe they are weak. I present an ultimatum crisis bargaining model that incorporates this dilemma and show that a strong actor may feign weakness during the bargaining phase. This implies that (a) absence of a costly signal is not an unambiguous revelation of weakness, and (b) the problem of uncertainty is worse because the only actor with incentives to overcome it may be unwilling to do so.

*This research was supported by the National Science Foundation (grant SES-0518222). First draft: March 24, 2007. I thank Bob Powell for his extensive comments as well as Robert Walker, Kris Ramsay, Jeff Ritter, Christina Schneider, Ron Hassner, Andy Kydd, Art Stein, Shuhei Kurizaki, Barry O’Neill, Dan Posner, Ethan Bueno de Mesquita, and Rob Trager for illuminating discussions. I am grateful to the two anonymous referees whose suggestions have immensely improved the article. Presented at Washington University–St. Louis, University of California–Berkeley, University of Wisconsin–Madison, University of California–Los Angeles, University of Oxford, Yale University, University of Rochester, Princeton University, the SGIR Pan-European IR Conference (Turin, Italy), the 2007 meeting of the European Consortium for Political Research (Pisa, Italy), the Project on Polarization and Conflict (Palma de Mallorca, Spain), the 2008 meeting of the Midwest Political Science Association (Chicago), and the 2009 Workshop on Rationality and Conflict (Cowles Foundation, Yale University).

During the last days of September 1950, the U.S. administration faced a momentous decision about what to do in Korea: should American forces stop at the 38th parallel, as originally planned, or should they continue into North Korea, and turn the conflict from a war of liberation into a war of unification? The North Koreans could effect no organized resistance to the onslaught of the U.N. forces, and the only uncertainty clouding the issue had to do with the behavior of the Chinese Communists: would the People's Republic of China (PRC) intervene to forestall unification of Korea on American terms or not?

After some hesitation and an effort to ascertain Chinese intent, the U.S. administration concluded that the risk of Chinese intervention was negligible and therefore the gamble was worth taking. One crucial factor in that estimate was the lack of obvious military preparations that China would have to undertake had it seriously intended to wage war on the United States. In particular, the PRC had not sent troops in significant numbers south of the Yalu River, it had not prepared Beijing for possible aerial raids, it had not mobilized economic or manpower resources, and it had failed to move when it made best sense to do so from a military standpoint—right after General MacArthur's landing at Inchon. All the Chinese appeared to have done was issue propaganda statements in government-controlled media, send somewhat contradictory messages through a diplomatic channel known to be distrusted by the Americans, fail to make a direct statement to the United Nations, and move some token forces of "volunteers" into North Korea. Even in late November, the Far East Command estimated that there were no more than about 70,000 of these "volunteers" to face over 440,000 U.N. troops of "vastly superior firepower."¹ Confident of success, General MacArthur launched the "home by Christmas" offensive on November 24.

This U.N. offensive was shattered in a mass Chinese counter-attack. Unbeknownst to U.N. Command, the Chinese had managed to move over 300,000 crack troops into North Korea. As Appleman documents, their armies had marched in complete secrecy "over circuitous mountain roads" with defense measures that required that during the day "every man, animal, and piece of equipment were to be concealed and camouflaged. [. . .] When CCF units were compelled for any reason to march by day, they were under standing orders for every man to stop in his tracks and remain motionless if aircraft appeared overhead. Officers were empowered to shoot down immediately any man who violated this order."² This discipline had enabled the PRC to deploy vast numbers of troops in Korea without being discovered by aerial reconnaissance prior to actual contact.

But if the Chinese wanted to deter the Americans, why did they not make their mobilization public? When they knew the Americans doubted their resolve, why did they not choose an action that would reveal it? Whereas it is doubtless true that the Chinese benefitted from the tactical surprise once fighting began, they practically ensured that the Americans would not believe their threats. As Schelling puts it,

It is not easy to explain why the Chinese entered North Korea so secretly and so suddenly. Had they wanted to stop the United Nations forces at the level, say, of Pyongyang, to protect their own border and territory, a conspicuous early entry in force might have found the U.N. Command content with its accomplishment and in no mood to fight a second war, against Chinese armies, for the remainder

¹Appleman (1961, 763,768), Whiting (1960, 122).

²Appleman (1961, 65).

of North Korea. They chose instead to launch a surprise attack, with stunning tactical advantages but no prospect of deterrence.³

This behavior is indeed puzzling, especially when we consider the logic of costly signaling in crisis bargaining. When two opponents face each other with conflicting demands, the only way to extract concessions is by persuading the other that rejecting the demand would lead to highly unpleasant consequences such as war. The focus is on credible communication of one's intent to wage war should one's demands are not met. As is well known, to achieve credibility, an actor must engage in an action which he would not have taken if he were unresolved even if the act of taking it would cause the opponent to become convinced that he is resolved. In other words, the action must be sufficiently costly or risky (or both) to make bluffing unattractive. Because a weak actor would not attempt to bluff his way into concessions with such an action, the act of taking it signals strength. Conversely, the absence of such an act can be taken as *prima facie* evidence of weakness.

In this light, the American administration was justified in drawing what turned out to be a wildly incorrect assessment about Chinese intent. The Chinese had not backed up their threats with any costly or risky actions, and even their demands had been somewhat watered down. For instance, at one point they said that it would be acceptable for South Korean troops to cross the parallel as long as the American forces remained south of it. This unwillingness by the Chinese to take actions that were available to them, and that they could have expected to produce concessions from the U.S. at an acceptable cost provided they were resolved to forestall unification, eventually persuaded the Americans that the threats were not serious, causing them to embark on unification.⁴

Since the Chinese goal was to deter unification, the logic of crisis bargaining suggests that the Chinese should not have concealed their preparations, and should have made the (admittedly much riskier) public demand for U.N. forces to remain south of the parallel. The fact that concealment had significant tactical advantages cannot, by itself, explain the decision to mobilize in secret because such an argument presupposes that the Chinese preferred to fight over Korea rather than prevent unification through deterrence, which is a highly dubious assumption.

In this article, I propose a development of our crisis bargaining models that could help shed some light on the puzzling failure to signal strength. First, I show that in a war, a strong player can obtain serious tactical advantage from an opponent who mistakenly believes him to be weak. This is intuitive and unsurprising although it is not without merit to have this emerge as result of optimal behavior by both actors instead of assuming it. Second, I consider a crisis model of the type in which strong actors can obtain better negotiated outcomes when their opponent correctly infers that they are strong. I show that when bargaining in a crisis can end in war, a strong actor has contradictory incentives. On one hand, he wants to obtain a better negotiated deal, which requires him to convince his opponent that he is strong. On the other hand, should persuasion fail and war break out, he wants his opponent

³Schelling (1966, 55, fn. 11).

⁴The debate about the causes of U.S. failure to understand the seriousness of Chinese threats is quite intense. The literature on the subject is intricate and it is well beyond the scope of this article to delve in details on that issue. Many studies assert that the Chinese threat *was* credible but that the U.S. administration mistakenly dismissed it (Lebow 1981). The opposite assertion is that the Chinese were spoiling for a fight (Chen 1994, 40). AUTHOR counters both in detail.

to believe that he is weak. Somehow, this actor must simultaneously signal strength and weakness.

I show that this contradiction is resolved in equilibrium by the strong actor sometimes feigning weakness during the crisis bargaining phase itself. He pretends to be weak by mimicking the smaller demand of a weak type. Even though this puts him at a disadvantage at the negotiation table, the loss is offset by the gain of tactical surprise on the battlefield that he can achieve if war follows anyway. This explanation also provides a rationale for the Chinese decision to forego the potential benefits of deterrence in order to gain tactical advantages in case deterrence failed.

1 Signaling Strength in Crises

When two actors with conflicting interests lock horns in a crisis, the only way to secure concessions is to convince the opponent that such concessions, however painful, are preferable to the consequences of failure to comply with one's demands. In an interstate crisis, the threatened consequences are in the form of a costly and risky war. The stronger an actor is, the worse the expected war outcome for the adversary, and the more that adversary should be prepared to concede in order to avoid it. If there is one conclusion that emerges from our studies of crisis bargaining, it is that actors must signal credibly their strength if they are to obtain better deals from their opponents. Pretending to be weak does not pay.

Loosely speaking, the logic goes as follows. The minimal concessions an actor can expect to secure at the negotiation table are related to what he expects from fighting in the absence of a settlement. If an actor's expected payoff from war is high, his minimally acceptable terms would be more demanding relative to what they would have been if he were weak. Because actors are loath to concede more than is absolutely necessary, they are keenly interested in ascertaining just what the minimally acceptable terms of the opponent might be. The problem is that the opponent may have (or pretend to have) expectations that the actor considers unrealistically optimistic given what he knows about factors that affect the value of war for both. For instance, a strong actor with a qualitatively superior army may be faced with an opponent who refuses to comply with his demands because she believes that his army is not that good and that fighting him is preferable to concessions provided he is weak. The actor must then somehow disabuse the opponent of that incorrect estimate of his strength if he is ever to obtain concessions.

Clearly, a simple statement asserting that his army is good will not work. If she were to believe it and concede, then there would be no risk or cost in making the statement. The costless benefit would allow even an actor whose army is bad to make such a statement, which in turn means that the statement itself cannot be taken at face value. But if this is so, then such a statement cannot possibly cause the opponent to concede. In fact, the only thing the opponent could believe must be something that the actor would not do if his army were bad even when doing it would cause her to believe his army is good and to concede. In other words, the costs from the action must outweigh the benefit from successful persuasion for a weak actor. Only then would the action convince the opponent that the actor is strong, which would cause her to revise downward her expected payoff from war, which in turn would decrease the minimal concessions she expects at the negotiation table.

Hence, a demand can only succeed if it is accompanied by an informative signal of

strength, and a signal of strength can be informative only if it is too costly for a weak actor to imitate. Because concessions are linked to costly signaling in this way, a strong actor always searches for a costly signaling mechanism that might enable him to secure his demands. At the very basic level, taking an action that increases the risk of war can be very informative. The reason is that the better an actor expects to do in the war, the larger the risks he would be willing to run. Conversely, the larger the risk generated by his action, the smaller the likelihood that the action can be profitably taken by a weak actor, and the more convincing the opponent will find it.

We have studied many mechanisms that allow a strong actor to distinguish himself from a weak one by taking some costly or risky action. For instance, an actor could make public statements that increase the domestic political costs of backing down, allow his domestic political opponents to contradict him for political gain, put his international reputation on the line, engage both domestic and international audiences, or generate an autonomous risk of inadvertent war.⁵ As Banks has proven for a general class of models, strong types can expect to obtain better negotiated deals but only at the cost of taking actions that are too risky for the weak types to imitate.⁶

The crisis bargaining models that are central to these studies rely on a conceptualization of war as a costly lottery. Both actors must pay to participate in it but only one can win it. A strong type is one who has a high expected payoff from war (relative to another possible type, not relative to the opponent), either because the objective probability of winning favors him, or because his costs of fighting are low, or because of some combination of the two. The expected payoff from war is a fundamental primitive in these models and is usually referred to as the *distribution of power*.⁷ Regardless of the precise source of uncertainty, the distribution of power is assumed to be exogenous. This assumption is carried over to the crisis bargaining models that treat war as a process rather than a costly lottery.⁸

Why does it matter that the distribution of power is assumed to be exogenous? For one, if we maintain this assumption, we cannot study military investment decisions because these presumably change the distribution of capabilities, and as such influence the distribution of power. Powell shows that when the expected payoff from war depends on strategic decisions about how to allocate resources between consumption and arming, the necessity to spend on mutual deterrence creates a commitment problem which may lead to war when peace becomes too expensive to maintain.⁹

More directly related to crisis bargaining, this assumption excludes any actions that might alter the distribution of power. AUTHOR argues that military moves—mobilization and deployment of troops, for instance—must necessarily affect it, and as such their use as instruments of coercion may have effects that do not obtain in models that do not take that into account. He shows that strong types do not, in fact, have to run higher risks in order to obtain better deals: the costliness of increasing military capability discourages bluffing while the concomitant improvement in the distribution of power reduces the opponent's

⁵Fearon (1994); Schultz (1998); Sartori (2005); (Guisinger and Smith 2002); Schelling (1966).

⁶Banks (1990).

⁷Powell (1996).

⁸Wagner (2000). Powell (2004) argues that the dynamics of the interaction are similar whether we assume uncertainty arises from asymmetric information about the costs of fighting or about the distribution of power.

⁹Powell (1993).

expected war payoff and makes her more likely to concede.¹⁰

These are theoretical reasons for treating the distribution of power as endogenous. The puzzle of Chinese intervention in the Korean War suggests at least one substantive reason to do so. As the admittedly cursory sketch of that episode illustrates, the PRC concealed its military preparations so thoroughly to gain tactical surprise. It was well known at the time that the superior air power of the U.N. forces put the Chinese at a serious disadvantage, which is why they tried to hard to obtain Soviet air cover for their land action.¹¹ If they were to expose their preparations, they risked having their forces annihilated before getting a change to engage the enemy. If the U.S. administration had made up its mind on unification, the revelation of the extent of Chinese mobilization could have also caused the United States to increase its effort in the war, which would similarly have jeopardized the chances of success of the PRC offensive.¹² The upshot is that for both actors, the expected payoff from war depended on the behavior they thought their opponent might engage in. If the Chinese revealed their mobilization, they might have succeeded in deterring the U.S. but they might have also considerably reduced their payoff from war if deterrence failed. If, on the other hand, they concealed their mobilization, they might not have been able to deter the U.S. but they would have increased their payoff from war. In other words, the expected distribution of power depended on the actions taken during the crisis.

This episode not only provides a rationale for treating the distribution of power as endogenous, it also suggests a particular *timing* of decisions if one is interested in investigating analogous cases. In Powell's and AUTHOR's models, actors make their military allocation decisions that fix the distribution of power for the duration of the war *before* the actual choice to attack.¹³ The decision to fight is then taken after they observe each other's military preparations in light of the distribution of power that results from their actions. The Chinese tactic in the Korean War intervention, on the other hand, was to conceal the actual distribution of power until *after* the battle was joined. That is, they managed to lull the Americans into a false sense of security which was designed to prevent them from formulating an even more formidable offensive plan that would have attacked whatever vulnerability the Chinese revealed. In that sense, the episode suggests that we might want to think about war fighting decisions made *after* bargaining breaks down but in the light of information revealed *during* the bargaining phase.

In his classic statement of how mutually incompatible expectations might cause war, Blainey essentially makes an argument that these optimistic expectations are about wartime behavior, and are "influenced by relative assessments of each other's ability to attract allies, their ability to finance a war, their internal stability and national morale, their qualities of civilian leadership and their performance in recent wars."¹⁴ In other words, the power

¹⁰Kydd (2000) also studies armament decisions under uncertainty. The structure of the model is such that by the time these decision are made, all information is revealed, which eliminates the need to use them as signaling devices. Morrow (1994) studies a model where capability aggregation through alliances affects the distribution of power.

¹¹Stueck (2002, 89).

¹²The vulnerability to aerial attacks and inferiority of equipment and (supposedly) morale led MacArthur to assure President Truman at the Wake Island Conference that should the Chinese attempt to intervene, "there would be the greatest slaughter" (United States Department of State 1976, 953).

¹³Powell (1993); AUTHOR.

¹⁴Blainey (1988, 53-54).

distribution is at least partially endogenous to what the opponents do once fighting breaks out. To make matters more complicated, tactical imperatives of the type the Chinese faced may lead an actor to engage in behavior that *feeds* the optimism of his opponent and makes him more intransigent. In these situations, a peaceful settlement on mutually acceptable terms becomes difficult because there is no way to reconcile the conflicting expectations without an action that would negate the tactical advantage, and in turn make the signaling actor weaker.

One simple model with a structure that could address this situation would be an ultimatum crisis bargaining game in which the distribution of power is endogenously determined by actions taken after the ultimatum is rejected. This means that the expected payoff from war will depend on what the actors do when they go to war but that these decisions will be based on the information they obtain during the crisis. This structure allows us to investigate the contradictory incentives the Chinese faced in November: on one hand they wanted to signal that they are serious and the Americans should not advance to the Yalu River, but on the other hand they wanted to keep the Americans in the dark about their actual military preparations. As we shall see, this dilemma appears in the model in the following terms: should the strong actor choose a demanding ultimatum that would reveal his strength which would put him at a disadvantage if the demand is rejected, or should he choose a middling demand that is not very attractive and will cause the opponent to think he might be weak but which would give him a tactical advantage if it is rejected?

The contradictory incentives get resolved with a strategy that leads the strong actor to behavior that induces strategic uncertainty in the opponent. Sometimes he reveals his strength through the usual costly signaling mechanism but sometimes he pretends to be weak by adopting the strategy of a weak type in order to induce falsely optimistic beliefs in the opponent and then take advantage of them on the battlefield.

It is worth noting that feigning weakness is not something one sees in signaling games in general because the incentives required to induce such behavior are quite specific. However, results similar in spirit can be obtained in other settings such as jump-bidding in auctions or repeated contests.¹⁵ This provides some comfort that the finding is a more general phenomenon and not merely an artifact of the particular modeling choices I have made.

2 The Model

The model is designed as a simple setting that captures the contradictory incentives of strong players during crisis when they can benefit from misleading opponents in war. It is essentially the same as the classic ultimatum game in Fearon's article (to allow for crisis bargaining) except that the war payoffs depend on military effort the actors invest in fighting (to endogenize the distribution of power).¹⁶ These efforts may be contingent on the information obtained in the bargaining phase (to allow for signaling).

Two risk-neutral players, $i \in \{1, 2\}$ are disputing the two-way partition of a continuously divisible benefit represented by the interval $[0, 1]$. An agreement is a pair $(x, 1 - x)$, where x is player 1's share and $1 - x$ is player 2's share. The set of possible agreements is

¹⁵Hörner and Sahuguet (2007); Münster (2007).

¹⁶Fearon (1995).

$\mathcal{X} = \{(x, 1 - x) \in \mathcal{R}^2 : x \in [0, 1]\}$. The players have strictly opposed preferences with $u_1(x) = x$ and $u_2(x) = 1 - x$. Player 1 begins by making a take-it-or-leave-it demand $x \in [0, 1]$ that player 2 can either accept or reject.¹⁷ If she accepts, the game ends with the agreement $(x, 1 - x)$. If she rejects, she decides whether to mobilize additional resources, at cost $k_2 > 0$, or fight with what she already has. In any case, war occurs and each player pays costs $c_i > 0$. The winner obtains the entire benefit.

The outcome of the war depends on the distribution of power summarized by the probability that player 1 will win. This probability itself depends on player 2's arming choice: if she mobilizes additional resources, player 1's chances of victory decrease. We shall leave the precise functional form of the relationship between arming and victory unspecified. Instead, assume that player 1 can be either weak or strong. If player 2 does not arm, the weak type prevails in the war with probability w_n and the strong type prevails with probability $s_n > w_n$. If player 2 arms, the weak type prevails with probability $w_a < w_n$, and the strong type prevails with probability $s_a < s_n$ such that $s_a > w_a$ (that is, player 2's additional mobilization cannot make the strong type's chance of winning lower than the weak type's). If player 1 is weak, his expected war payoffs are $W_w^n = w_n - c_1$ if player 2 does not arm, and $W_w^a = w_a - c_1$ if she does. If player 1 is strong, his expected war payoffs are $W_s^n = s_n - c_1$ if player 2 does not arm, and $W_s^a = s_a - c_1$ if she does.

Player 2's war payoff against a weak opponent is $1 - w_n - c_2$ without arming, and $1 - w_a - c_2 - k_2$ with arming. Hence, she will not arm against a weak type when $k_2 > w_n - w_a$. Analogously, her war payoff against a strong opponent is $1 - s_n - c_2$ without arming, and $1 - s_a - c_2 - k_2$ with arming. Hence, she will arm against the strong type when $k_2 < s_n - s_a$. To make the model interesting, make the following:

ASSUMPTION 1. The marginal effect of building arms on the probability of winning can only justify its cost if the opponent is strong: $w_n - w_a < k_2 < s_n - s_a$.

To ensure that this interval exists, we require that $s_n - w_n > s_a - w_a$. Although this specifies what player 2 would do if she knew her opponent's type, she is unsure about it. Player 1 knows whether he is weak or strong, but player 2 believes that he is strong with probability p and weak with probability $1 - p$, and this belief is common knowledge.

3 Analysis

Under our assumptions, player 2 will certainly arm if she believes her opponent is strong, and will not if she believes he is weak. In between these certainties, her arming decision depends on her posterior belief that she acquires after player 1's ultimatum. Let q denote the (possibly updated) belief that player 1 is strong after his demand. Player 2's war payoffs are $W_2^n(q) = q(1 - s_n) + (1 - q)(1 - w_n) - c_2$, and $W_2^a(q) = q(1 - s_a) + (1 - q)(1 - w_a) - c_2 - k_2$, where the superscript denotes her arming choice. Since player 2 will arm when $W_2^a(q) > W_2^n(q)$, it follows that she will arm when:

$$q > \frac{k_2 - (w_n - w_a)}{(s_n - s_a) - (w_n - w_a)} \equiv q_a. \quad (1)$$

¹⁷For ease of exposition, I will refer to player 1 as "he" and player 2 as "she."

Our assumptions ensure that $q_a \in (0, 1)$. We conclude that player 2 will arm if $q > q_a$ and will not arm otherwise.

We assumed that player 2's arming will reduce player 1's expected payoff from war, and we found that her decision to do so depends on her belief that player 1 is strong. In the "tactical game" that follows the rejection of the crisis ultimatum, player 1's incentives are clear: he wants player 2 to believe that he is weak. (As we shall see in an extension of the model, these incentives also arise in exactly the same way if we model the arming decisions of both sides explicitly.)

The question that we really wish to investigate is whether these incentives extend to the crisis game itself: after all, the only way to obtain better deals through bargaining is by convincing player 2 that one is strong. I will show that this game has *feint equilibria* in which the strong player 1 foregoes some of the bargaining benefit that would arise from revealing his type in order to obtain some of the fighting benefit that would arise should negotiations fail and player 2 mistakenly believes he is weak. The strong player 1 pretends to be weak with positive probability in the crisis game. The construction of these equilibria is illustrative, and because it provides the foundation for the discussion section, I now provide some of the relevant details.

3.1 The Feint Equilibria

Let us begin by establishing certain dynamics that must hold in any equilibrium. Let \underline{x} denote the demand that both types are willing to make, and let \bar{x} denote the demand that only the strong type is willing to make. Let \underline{r} denote the probability with which player 2 rejects \underline{x} without arming, and \bar{r} denote the probability with which she rejects \bar{x} with arming. Incentive-compatibility equilibrium conditions require that \underline{x} is the low-value demand, and \underline{r} is the low risk associated with it, as the following lemma demonstrates.

LEMMA 1. *In any feint equilibrium, $\underline{x} < \bar{x}$ and $\underline{r} < \bar{r}$.*

Proof. In the proposed equilibrium, the strong type is indifferent between the low-value demand and the high-value demand, while the weak type should do at least as well with the low-value demand, so:

$$\underline{r}W_s^n + (1 - \underline{r})\underline{x} = \bar{r}W_s^a + (1 - \bar{r})\bar{x} \quad (\text{IC}_s)$$

$$\bar{r}W_w^a + (1 - \bar{r})\bar{x} \leq \underline{r}W_w^n + (1 - \underline{r})\underline{x}. \quad (\text{IC}_w)$$

Adding these inequalities gives us $\underline{r}(s_n - w_n) \leq \bar{r}(s_a - w_a)$, but from our assumptions we know that $s_n - s_a > w_n - w_a$, which implies that $s_n - w_n > s_a - w_a$, so this condition requires that $\underline{r} < \bar{r}$, as claimed. Furthermore, because $W_s^n > W_s^a$, this implies that if $\underline{x} \geq \bar{x}$, the indifference condition for the strong type cannot be satisfied. Therefore, $\underline{x} < \bar{x}$. \square

We now pin down the values for the two demands. To do so, we need to specify player 2's beliefs after any demand player 1 can make, on and off the equilibrium path. Player 2's war payoff is strictly decreasing in her posterior belief q : the more pessimistic she is about her opponent's type, the worse she expects to do in war. Because she will not arm for any $q \leq q_a$, the *best* war payoff (without arming) will be at $q = 0$, and it will be

$\overline{W}_2 = 1 - w_n - c_2$. Because she will arm for any $q > q_a$, the *worst* war payoff (with arming) will be at $q = 1$, and it will be $\underline{W}_2 = 1 - s_a - c_2 - k_2$. Player 2 will never reject demands that leave her more than her best war payoff, and she will never accept demands that leave her less than her worst war payoff. This means that *in any equilibrium*, player 2 will accept $1 - x > \overline{W}_2$, and will reject any $1 - x < \underline{W}_2$ regardless of her beliefs.

Letting $x_1 = 1 - \overline{W}_2 = w_n + c_2$ and $x_2 = 1 - \underline{W}_2$, we conclude that if player 1 ever demands $x < x_1$, it will certainly be accepted, and if he ever demands $x > x_2$, it will certainly be rejected. The range of demands for which player 2's response depends on her posterior beliefs is $[x_1, x_2]$. Within this range, we are particularly interested in beliefs that leave player 2 indifferent between accepting player 1's demand, and rejecting it. Let q solve $x = 1 - W_2^n(q)$ if $q \leq q_a$, and solve $x = 1 - W_2^a(q)$ otherwise. This yields the cut-point demand $x_a = x_1 + q_a(s_n - w_n)$ where $x_a = 1 - W_2^n(q_a) = 1 - W_2^a(q_a)$. That is, player 2 will not arm after rejecting $x \leq x_a$ but will arm after rejecting $x > x_a$. We can define the posterior beliefs as follows:

$$q(x) = \begin{cases} 0 & \text{if } x < x_1 \\ \frac{x - w_n - c_2}{s_n - w_n} & \text{if } x_1 \leq x \leq x_a \\ \frac{x - w_a - c_2 - k_2}{s_a - w_a} & \text{if } x_a < x \leq x_2 \\ 1 & \text{if } x > x_2. \end{cases} \quad (2)$$

In words, after a demand less than x_1 (which player 2 accepts regardless of her belief), she updates to think that player 1 is weak. For a demand greater than x_2 (which player 2 rejects regardless of her belief), she updates to think that player 1 is strong. For any demand in $[x_1, x_2]$, her belief is such that she is indifferent between accepting x and rejecting it for war, with her arming dependent on whether $x \leq x_a$ or not. It is immediately clear from inspection that $q(x)$ is continuous because $W_2^n(q_a) = W_2^a(q_a)$, and strictly increasing (which implies the belief is unique). These beliefs are intuitively appealing: the more player 1 demands, the higher the probability that player 2 will assign to him being strong.

Define the low-value demand as the highest demand at which player 2 is indifferent between accepting and rejecting without arming. Because $q(x)$ is increasing in x , it follows that this is the demand where $q(x) = q_a$, so $\underline{x} = x_a$. Define the high-value demand as the highest demand at which player 2 is indifferent between accepting and rejecting with arming, which we know occurs at $q(x) = 1$, so $\bar{x} = x_2$. If player 1 is weak, he always demands \underline{x} but if he is strong, he sometimes demands \bar{x} (revealing that he is strong) and sometimes demands \underline{x} (feigning that he is weak). The probability of the feint, f , must induce the posterior q_a after the low-value demand. Bayes rule gives us $f = (1 - p)q_a / [p(1 - q_a)]$, which can only be a valid probability if $p > q_a$.

Deriving the risks associated with the two demands (and demands that do not occur with positive probability in equilibrium) is a bit more involved because there are two distinct situations under which feints might occur. Both of these have to do with the incentives of the strong type because the weak type strictly prefers player 2 to accept even the low-value demand: $\underline{x} - W_w^n = C + q_a(s_n - w_n) > 0$, where $C = c_1 + c_2$.

One possibility is that the low-value demand is so attractive that the strong type's expected war payoff is worse than having it accepted even though he would enter the war with a significant advantage because player 2 fails to arm. In this case, the incentives of the weak

and the strong types are aligned: both prefer the risk of war associated with the low-value demand to be as small as possible. The other possibility is that the low-value demand is not sufficiently attractive to the strong type: his expected war payoff against an opponent who fails to arm is higher than the peace terms demanded. In this case, the incentives of the weak and the strong types diverge: whereas the weak still wants the ultimatum accepted, the strong actually prefers it rejected, provided in the war that follows player 2 does not arm.

At first glance the last statement might seem puzzling: if the strong type's war payoff is higher than the deal he would get peacefully if player 2 accepts, why should this type ever agree to live with such a peace? The answer is that this question neglects the type of war that this type finds so advantageous: a war in which player 2 believes him to be weak with sufficiently high probability. The weak type is quite happy with these peace terms, so he would not attack to upset them. Should the strong type attack at this point, he would reveal that he is not weak, and player 2 would respond by mobilizing for a much more destructive conflict. This war is certainly worse than the peace terms even for the strong type, which explains why he might agree to an outcome which seems to offer less than fighting. The comparison that prompted the question is, in a sense, misleading because it contrasts the peace terms with a kind of war that cannot happen if the strong type chooses to wage it.

To distinguish between these two scenarios, note that the strong type would prefer the low-value demand rejected in favor of a war in which player 2 mistakenly believes he is weak when $\underline{x} < W_s^n$, or when:

$$q_a < \frac{s_n - w_n - C}{s_n - w_n}. \quad (3)$$

Thus, when condition (3) is not satisfied, both types of player 1 prefer to minimize the risk of war after the low-value demand. If, however, (3) is satisfied, the weak type wants to minimize the risk but the strong type wants to maximize it. There are feint equilibria in both situations and they differ in the risk associated with the low-value demand. It is possible to construct feint equilibria where this risk is positive even when the incentives are aligned. However, in this case it is also always possible to construct a feint equilibrium in which this risk is zero. This feint equilibrium can be shown to be Pareto superior to the equilibria with risky low-value demands, which means that when incentives are aligned one would not expect them to be selected.

When incentives diverge, however, there is a condition that requires the low-value demand to be risky. To establish this condition, suppose that (3) is satisfied, so the preferences of the strong and the weak types about the risk of the low-value demand diverge. Observe that (IC_s) gives us the risk of the high-value demand:

$$\bar{r} = \frac{\bar{x} - \underline{x} - \underline{r} (W_s^n - \underline{x})}{\bar{x} - W_s^a}. \quad (4)$$

Since it must be the case that $\bar{r} < 1$, the fact that (3) is satisfied implies that: $\underline{r} > (W_s^a - \underline{x}) / (W_s^n - \underline{x})$. We are interested in conditions such that $\underline{r} > 0$, which will be so if the lower bound we just identified is non-negative; that is, if $W_s^a - \underline{x} \geq 0$, which reduces to:

$$q_a \leq \frac{s_a - w_n - C}{s_n - w_n} \equiv q_d. \quad (D)$$

It is easily verified that if (D) is satisfied, then (3) is satisfied as well. This is precisely the situation in which the strong type is practicing deception in the hope of misleading player 2 into incorrectly rejecting the low-value demand and entering the war unprepared. This is also why the risk associated with that demand must be strictly positive.

The final requirement is that this risk should not be too large or else the weak type would not be willing to run it. In particular, since x_1 is the largest demand that player 2 will accept regardless of her beliefs, the weak type can always guarantee himself this payoff by making that demand. In equilibrium, he should have no incentive to deviate from \underline{x} , which means that $\underline{r}W_w^n + (1 - \underline{r})\underline{x} \geq x_1$ must hold. This places an upper bound on the risk associated with the low-value demand: $\underline{r} \leq (x_1 - \underline{x}) / (x_1 - W_w^n)$. It will be possible to find \underline{r} that satisfies the lower and upper bound restrictions only when the upper bound is at least as large as the lower bound, or when:

$$q_a \geq \frac{q_d C}{C + s_n - s_a} \equiv \underline{q}. \quad (5)$$

It is worth emphasizing that \underline{q} is not binding unless (D) is satisfied (because q_d is negative). In these cases, the low-value demand can be riskless. The following proposition formally states the result. The proof is in the appendix.

PROPOSITION 1. *If $p > q_a \geq \underline{q}$, there are perfect Bayesian equilibria in which the weak player 1 demands $\underline{x} = x_a$, and the strong player 1 demands \underline{x} with probability $f = (1 - p)q_a / [p(1 - q_a)]$ and $\bar{x} = x_2$ with probability $1 - f$. Player 2 accepts any $x \leq x_1$, rejects any $x \in (x_1, \underline{x}]$ with probability \underline{r} , rejects any $x \in (\underline{x}, \bar{x}]$ with probability \bar{r} , and rejects any $x > \bar{x}$ for sure. The rejection probabilities are $\underline{r} = 0$ if (D) is not satisfied, and $\underline{r} \in \left(1 - \frac{s_n - s_a}{W_w^n - \underline{x}}, \frac{x_1 - x_1}{x_1 - W_w^n}\right)$ otherwise, and \bar{r} is as defined in (4). On and off the path, beliefs are defined in (2).*

The intuition for this result is as follows. If player 1 is strong he can always credibly reveal this provided he is willing to run higher risks of war in which the opponent will be armed. This is because player 2 interprets higher demands as more likely to have come from the strong type of player 1, and because she is more likely to reject these demands and arm for the war. Player 1 can always choose to make high demands which, if accepted, yield an attractive negotiated outcome. Because these demands come with a high risk of a very unpleasant war against an armed player 2, the weak type is deterred from making them. This, in turn, justifies player 2's inferences and makes information revelation credible.

This mechanism is essentially what we have in our standard costly signaling models. To prevent bluffing from weak types, the strong types must incur costs and risks that the weak ones would not be willing to incur even if doing so would convince the opponent they are strong. The difference here is that the strong type may opt not to reveal this information. Bluffing is not the issue here, sandbagging is. Player 2 reacts to the low-value demand by accepting it with a higher probability. On one hand, this is unattractive to the strong type: when accepted, this demand yields less than his separating high-value demand, and there is a good chance that it will be accepted. On the other hand, this is attractive: the risk of war is lower, and even then, when player 2 rejects the low-value demand, she will not arm for the fight because she still believes there is a good chance her opponent is weak. This is a boon

to the strong player 1 who ends up with a war payoff which is much higher than the one he would have gotten if he had to fight the fully armed opponent when his high-value demand gets rejected. In equilibrium, the strong type balances these trade-offs and sometimes feigns weakness.

Proposition 1 shows that there are conditions under which the low-value demand can be riskless. When (3) is not satisfied, even the strong type prefers an accepted low-value demand to war against an unprepared opponent. Although it is possible to sustain strictly positive risk for the low-value demand in these situations, social welfare arguments would select the equilibrium with lowest overall risk of war. Because the payoff to both types from \underline{x} is increasing as the risk goes down (which also implies that the strong type's risk of the high-value demand must go down as well in order to maintain (IC_s) satisfied), the equilibrium risk of war is minimized at $\underline{r} = 0$, and this equilibrium is clearly Pareto-superior to every other feint equilibrium. This is why Proposition 1 specifies $\underline{r} = 0$ for these situations.

When (3) is satisfied, the strong type's payoff from an accepted low-value demand is less than his payoff from war against an unprepared opponent. This may or may not mean that he actually wants the low-value demand rejected. If (D) is not satisfied, then the low-value demand is sufficiently close to his war payoff against an unprepared opponent, and he could be indifferent between a riskless low-value demand and his risky high-value one. If, however, (D) is satisfied, then the low-value demand is too unattractive and the strong type would only make it if there is a chance that player 2 would reject it. He will only be willing to feign weakness if there is a positive probability that he would get to exploit that advantage (i.e., a positive risk of the low-value demand getting rejected).

In this situation it is not clear that welfare arguments would lead to minimization of \underline{r} because doing so increases \bar{r} . Hence, minimizing the risk of the low-value demand maximizes the risk of the high-value demand, and the overall effect on the equilibrium probability of war is ambiguous. It is for this reason that Proposition 1 specifies the range of low-value demand risks that can be supported in equilibrium.

3.2 Selection of a Signaling Equilibrium

Now that we know the conditions for the feint equilibria to exist, it is useful to ask whether there are other equilibria in this game. Of particular interest are other signaling equilibria in which the strong type either fully or partially reveals his type. The claim of Lemma 1 holds for any fully or partially separating equilibrium where the weak type demands some \underline{x} and the strong type demands some \bar{x} , with player 2 rejecting the former with probability \underline{r} and the latter with probability \bar{r} .¹⁸

SEPARATING EQUILIBRIA. In a separating equilibrium, $q(\underline{x}) = 0$ and $q(\bar{x}) = 1$, which immediately implies that the high-value demand will be exactly the same as in the feint equilibria, or $\bar{x} = x_2$. The low-value demand is the highest demand the weak player 1 can make provided that making it leads player 2 to infer that he is weak, or $\underline{x} = x_1$. Because preventing deviations would require positive probabilities of rejection of demands in $[\underline{x}, \bar{x}]$,

¹⁸The result can be immediately obtained by replacing (IC_s) with a weak inequality such that the high-value demand is weakly preferable for the strong type. If $\underline{x} \geq \bar{x}$, the payoff from demanding \underline{x} will always be strictly greater than the payoff from \bar{x} , which means that the strong type would not want to demand \bar{x} , a contradiction.

it follows that the equilibrium beliefs over that range would have to be exactly the same as in the feint equilibria as well. Thus, one substantive difference between the separating and feint equilibria is that in the former the weak type gets a strictly lower payoff because the low-value demand is smaller.

The intuition is that because player 2 would conclude that the opponent is weak after seeing this demand in the separating equilibrium, her expected payoff from rejecting it and fighting without arming will be much higher than the corresponding payoff in a feint equilibrium where she believes there might be a chance that her opponent is strong. This implies that her expected payoff from rejection is strictly larger in the separating equilibrium, so the acceptable low-value demand will be correspondingly smaller. This is particularly evident in the case where the low-value demand is riskless in the feint equilibria as well. Observe that in a separating equilibrium, the low-value demand would reflect the most player 2 would be willing to concede when she is certain that her opponent is weak. In a feint equilibrium, on the other hand, the corresponding low-value demand reflects what she would be willing to concede when she suspects her opponent might actually be strong.

Recall that the high-value demand is the same in both types of equilibrium. The fact that the a riskless low-value demand is strictly better in a feint equilibrium where the strong type is indifferent between the two demands implies that the risk of the high-value demand must be lower in the feint equilibrium. This is so because the strong type's expected payoff from the high-value demand is strictly decreasing in the risk of war, so if the low-value demand increases, the risk of the high-value demand must decrease if he is to remain indifferent. This implies that the expected payoff for player 1 is *strictly higher in the feint equilibria*, which gives one possible reason for selecting them in situations where both equilibrium types exist.

When the conditions stated in Proposition 1 are not satisfied, feint equilibria will not exist. In particular, when $q_a < \underline{q}$, the weak type would want to make the highest possible riskless demand x_1 that would reveal his weakness. In other words, this is where the separating equilibrium would still exist. In fact, separating equilibria can be supported with the assessment used in the proof of Proposition 1 with appropriate minor adjustments.

SEMI-SEPARATING (BLUFFING) EQUILIBRIA. In a semi-separating equilibrium, the weak type sometimes demands \underline{x} but occasionally bluffs by demanding \bar{x} , and the strong type demands \bar{x} for sure. Because the weak type is the only one demanding \underline{x} with positive probability, it follows that in such equilibria, $\underline{x} = x_1$. The high-value demand has to be such that the strong type would be unwilling to separate by making a larger demand. The most straightforward way to accomplish that is to use the same belief system as in the feint equilibria, but require that player 2 certainly reject any $x > \bar{x}$. (Since player 2 is indifferent for any $x \in [x_1, x_2]$ and rejects any $x > x_2$ regardless of beliefs, this is clearly possible.)

For instance, we can support $\bar{x} = x_a$ in a bluffing equilibrium as follows. Let $\bar{r} > \underline{r} = 0$ be such that the weak type is indifferent between \bar{x} and $\underline{x} = x_1$, or $\bar{r} = (x_a - x_1)/(x_a - W_w^n)$. Consider a strategy for player 2 such that she accepts any $x \leq x_1$, rejects any $x \in (x_1, \bar{x}]$ with probability \bar{r} , and rejects any $x > \bar{x}$ with certainty. This strategy is sequentially rational with the assessment in (2). As in the feint equilibrium, deviation to $x \in (x_1, \bar{x})$ merely produces peace terms that are worse than \bar{x} with the same risks and same type of war (without player 2 arming), so it cannot be profitable. Any deviation to $x > \bar{x}$ results in a certain war. The strong type cannot profit if $\bar{r}W_s^n + (1 - \bar{r})x_a \geq W_s^a$.

Since $W_s^n > W_s^a$, the sufficient condition for this is $x_a \geq W_s^a$, or (D) not being satisfied. Recall that this means that the peace terms are at least as good for the strong type as fighting an armed opponent. When this is not the case, the peace terms are so bad that the strong type's only incentive to demand them is in the possibility that player 2 might reject them and fight a war unprepared. This means the risk of war should be sufficiently high, or $\bar{r} \geq (W_s^a - x_a)/(W_s^n - x_a)$. There are ranges for the parameters that satisfy this requirement.

It is always possible to satisfy the weak type's indifference condition for a sufficiently low risk for \bar{x} . This risk will also deter deviations that cause certain war when (D) is not satisfied, and for some parameter configurations even when (D) is satisfied. In either case, the binding condition for the existence of bluffing equilibria is in the high risk associated with making large demands. This risk dampens the strong type's ability to separate and keeps him locked into making a demand so low that even the weak type is willing to mimic it. If we are willing to preserve the substantively more appealing monotonicity exhibited by the rejection probability in the feint equilibria, then this artificial constraint will disappear, and so will the bluffing equilibria. In other words, there are strong substantive reasons to select the feint equilibria over the fully revealing or bluffing equilibria when these types coexist.

4 The Likelihood of Feints

What is the equilibrium probability of feints? As we have seen, it is simply a function of the prior, p , and the cut-off value of the posterior, q_a , with

$$\frac{\partial f}{\partial p} = \frac{-q_a}{p^2(1-q_a)} < 0, \quad \text{and} \quad \frac{\partial f}{\partial q_a} = \frac{1-p}{p(1-q_a)^2} > 0.$$

The first comparative static shows that the more pessimistic player 2 is (the stronger her belief that player 1 is strong), the more likely is player 1 to feign weakness. The second comparative static is more interesting: since the feint probability is strictly increasing in the critical belief q_a , we can conduct additional comparative statics on this belief as defined in (1). It is immediate that the higher the marginal cost of arming to player 2, the more likely is player 1 to feign weakness (this is so because even relatively low probabilities of him being weak can discourage her from arming when doing so is costly).

THE BENEFIT OF ARMING. Player 2's marginal benefit from arming depends on player 1's type and the technology of fighting implicit in the definition of the various probabilities of winning. Let $b_w = w_n - w_a < k_2$ be her benefit from arming against a weak opponent, and $b_s = s_n - s_a > k_2$ be the benefit from arming against a strong opponent. Since $q_a = (k_2 - b_w)/(b_s - b_w)$, we now obtain:

$$\frac{\partial q_a}{\partial b_w} = \frac{k_2 - b_s}{(b_s - b_w)^2} < 0 \quad \text{and} \quad \frac{\partial q_a}{\partial b_s} = \frac{b_w - k_2}{(b_s - b_w)^2} < 0.$$

This means that f is decreasing in b_s and b_w . In words, as player 1's benefit from player 2's failure to arm (e.g., b_s) goes up, the probability of a feint goes down. This is surprising because it says that as the benefit of successful deception *increases*, the likelihood that player 1 will attempt to deceive player 2 *decreases*.

At first glance, it would appear that the converse should be true: after all, the strong type can benefit from deception most when his war payoff against an unprepared opponent is much higher than his payoff from an armed one. This logic, however, does not consider player 2's response. Recall that q_a is the critical threshold above which player 2 will arm. If the marginal benefit from arming increases (whether against a weak or a strong opponent), then player 2 would arm even if she is less convinced that the opponent is strong. In other words, when player 2 expects to get a significantly worse payoff if she fails to arm and can mitigate this disaster by arming, she will arm as a precaution even though she might not assign a great probability to her opponent being strong. Because larger demands cause her to revise her beliefs upwards, this implies that the largest demand player 1 can make without provoking arming upon rejection decreases. This reduces the strong type's incentives to feign weakness.

RELATIVE POWER. We can think of $s_n - w_n$ as the strong type's power relative to the weak type's when player 2 is unprepared, and $s_a - w_a$ as the analogous relative power when she is prepared. We now have:

$$\frac{\partial q_a}{\partial s_n} = \frac{b_w - k_2}{(b_s - b_w)^2} < 0, \quad \frac{\partial^2 q_a}{\partial s_n \partial w_n} = \frac{b_s + b_w - 2k_2}{(b_s - b_w)^3} \geq 0 \Leftrightarrow b_s - k_2 \geq k_2 - b_w.$$

The interpretation of the partial derivative is straightforward: an increase in the strong type's probability of winning against a disarmed opponent increases the risks from rejecting the low-value offer, and increases player 2's propensity to arm. This reduces the value of the feint to the strong type, and he feints less often. The cross-partial shows that the magnitude of this effect depends on the expected war-time performance of the weak type as mediated by the marginal cost of arming for player 2. The cross-partial is positive when the marginal cost of arming is relatively small ($b_s - k_2 > k_2 - b_w$). In that case, an increase in relative power of the strong type due to a drop in w_n magnifies the detrimental effect of s_n and leads to a sharp decline in the desirability of the low-value offer. In other words, because player 2 finds it cheaper to arm, she counters this increase in the strong type's relative power more readily. If, on the other hand, the cross-partial is positive because her marginal costs of arming are high, then an increase in relative power due to a drop in w_n , although unpleasant, does not lead to very drastic revisions of player 2's arming propensity. Even though she still arms more readily in response to an increase in relative power, the effect is muted because of the high costs of doing so.

Turning now to the effect of relative power against an armed opponent, we have:

$$\frac{\partial q_a}{\partial s_a} = \frac{k_2 - b_w}{(b_s - b_w)^2} > 0, \quad \frac{\partial^2 q_a}{\partial s_a \partial w_a} = \frac{b_s + b_w - 2k_2}{(b_s - b_w)^3} \geq 0 \Leftrightarrow b_s - k_2 \geq k_2 - b_w.$$

The direct effect of an increase in the strong type's probability of winning against a prepared opponent is perhaps surprising: the better this type expects to do in such a war, the *more* likely is he to feign weakness! To understand this, we must consider how player 2 responds to such an increase. Her benefit from war, even when fully prepared, decreases, which means that the terms she is prepared to concede in the high-value demand become more attractive to player 1. The strong type will thus be willing to feign weakness either because the risk of making this demand increases or because the terms of the low-value offer improve considerably. Because player 2 expects to do rather poorly in a war against the

strong type, the relative value of arming in effect declines and she becomes more willing to make concessions. The improvement in the terms of the low-value demand make it more attractive to the strong type, and makes him more likely to attempt a feint.

The cross-partial is the same as for the relative power against an unarmed opponent but because the effect of s_a is different, so is the overall interpretation. The cross-partial is positive when player 2's marginal cost of arming is small. With such costs, player 2 tends to arm even while relatively optimistic; that is, while she still believes with a relatively high probability that her opponent is weak. Thus, a decline in her expected war payoff due to an increase in the weak type's strength, w_a , affects her propensity to arm and she becomes less willing to do so. This increases the threshold belief for arming and magnifies the effect of increase in the strong type's relative power. In other words, even though the strong type's power relative to the weak type is not that pronounced when the latter is only moderately weak, the increase in his relative strength has a disproportionately large effect on player 2's incentive to arm when her costs are low. Conversely, when her cost of arming is high (and the cross-partial is negative), player 2 only arms when relatively pessimistic. This means that increases in the weak type's strength have a smaller marginal impact on her expected war payoff, and so her incentive to arm does not increase nearly as dramatically. This dampens the overall effect of an increase in the strong type's relative power.

LURING INTO WAR. When (D) is satisfied, the strong type prefers fighting an unprepared opponent to the peace terms from the low-value demand. The feint under these conditions can be interpreted as an attempt to lure the opponent into fighting by lulling him into a false sense of optimism. Not surprisingly, decreasing the costs of war makes this condition easier to satisfy. Somewhat less predictably, a decrease in player 2's marginal cost of arming does so as well. To see why this should be so, observe that lowering k_2 effectively lowers the barrier to preventive arming, which in turn makes player 2 less willing to make concessions. This reduces the peace benefit from the low-value demand, and if the decline is sufficiently large, makes fighting an unprepared opponent more attractive to the strong type. Gauging the effect of s_n in this context is slightly more involved because q_a , q_d , and \underline{q} are all decreasing in s_n . However, it can be shown that q_a decreases at a faster rate than \underline{q} , which means that for high enough values of s_n that satisfy (D), the necessary condition for the existence of the feint equilibria, $q_a \geq \underline{q}$, will be violated. The logic is as follows. As we have seen, increasing s_n lowers the arming threshold for player 2, which in turn lowers the terms of the low-value demand. If the strong type is to feign weakness, the risk associated with this demand must increase (so he can reap the benefits of war against an unprepared opponent). However, this makes the demand less attractive to the weak type, and when the risk is sufficiently high, (5) will fail, and he will not be willing to make the low-value demand, opting instead for a riskless x_1 . In other words, as the advantages of deceiving player 2 increase for the strong type, he becomes less able to mislead her successfully.

5 Endogenous Tactical Incentives

The simple model we analyzed reflects a trade-off. On one hand, it is tractable, which makes the exposition easier to follow and the results more transparent, and generic because it leaves the functional form of the technology of war unspecified. On the other hand, the assumption about the marginal cost of arming for player 2 gives her an incentive to arm

only against the strong type. Whereas this introduces the tactical dynamic that leads to feints in the crisis game, it would be more persuasive if the tactical incentive itself arose endogenously. Furthermore, player 1 does not have an opportunity to react to player 2's expected behavior once fighting begins. It is unclear how his ability to offset her unilateral arming with additional preparations on his own would affect the incentives to mislead her. Addressing these issues is somewhat limiting because it forces us to model the technology of war explicitly. Still, the questions seem sufficiently important to justify the cost.

5.1 The Extended Model

In this section I extend the model to allow for endogenous tactical incentives. The crisis game is the same as in the simple model, the difference is what happens when players go to war. As before, player 1 makes an ultimatum demand x . If player 2 accepts, players receive $(x, 1 - x)$, if she rejects a costly contest (war) occurs. The contest is a simultaneous-move game in which each player chooses a level of effort $m_i \geq 0$ at cost $c_i > 0$. The probability of winning is determined probabilistically by the ratio contest-success function $\pi_i(m_1, m_2) = m_i / (m_1 + m_2)$ if $m_1 + m_2 > 0$ and $\pi_i = 1/2$ otherwise.¹⁹ The winner obtains the entire benefit, so player i 's expected payoff from a contest is $\pi_i(m_1, m_2) - m_i / c_i$.

The game has one-sided incomplete information.²⁰ Player 2 knows her own cost of effort, c_2 , but is unsure about the player 1's cost. Specifically, player 2 believes that player 1 is strong, \bar{c}_1 with probability p and weak, $\underline{c}_1 < \bar{c}_1$, with probability $1 - p$. These beliefs are common knowledge. If the costs of effort are too high even for the strong type (that is, if \bar{c}_1 is too small), then war is prohibitively costly and the game will carry no risk of bargaining breakdown. Therefore, assume that the strong type's costs are at least somewhat lower than the costs of his weak opponent.

ASSUMPTION 2. The uninformed player's costs are not too high: $c_2 > \sqrt{\underline{c}_1 \bar{c}_1}$.

Since the strategies for the crisis bargaining game would have to form an equilibrium in the contest continuation game, I analyze that first.

5.2 The Contest Endgame

There are only two possibilities in the continuation game following player 1's demand: either player 2 will infer his type or not. If she infers the type, the contest is one of complete information. Otherwise, the contest is one of asymmetric information where her posterior belief that player 1 is strong will be some q .

¹⁹This one is the classic contest success function from economics (Hirshleifer 1989). In the economics literature, surveyed by Garfinkel and Skaperdas (2007), the interest in the rent dissipation and the inability to create a contract that would avoid it, not so much in the signaling properties of arming or taking advantage of informational asymmetries.

²⁰In a previous version of this article, I derived the results for the two-sided incomplete information case. Aside from making the algebra more involved, the analysis adds nothing of significance.

5.2.1 Complete Information

In this case, the costs of effort are common knowledge. Players optimize

$$\max_{m_i} \left\{ \frac{m_i}{m_i + m_j} - \frac{m_i}{c_i} \right\},$$

which yield the best responses $m_1^*(m_2) = \sqrt{c_1 m_2} - m_2$ and $m_2^*(m_1) = \sqrt{c_2 m_1} - m_1$ in an interior equilibrium. Solving the system of equations then gives us the equilibrium effort levels: $m_1^* = c_2 \left(\frac{c_1}{c_1 + c_2} \right)^2$ and $m_2^* = c_1 \left(\frac{c_2}{c_1 + c_2} \right)^2$. The equilibrium expected payoffs are:

$$W_1 = \left(\frac{c_1}{c_1 + c_2} \right)^2 \quad \text{and} \quad W_2 = \left(\frac{c_2}{c_1 + c_2} \right)^2. \quad (6)$$

Observe now that fighting is still inefficient: $W_1 + W_2 < 1 \Leftrightarrow 0 < 2c_1 c_2$. Hence, players always have an incentive to negotiate a division of the good instead of fighting to win it all. Moreover, a mutually-acceptable peaceful division always exists. The rationalist puzzle that arises from war's inefficiency remains intact.²¹

5.2.2 One-Sided Asymmetric Information

Player 2, whose cost c_2 is common knowledge, believes that player 1 is strong with probability q and weak with probability $1 - q$, where q is the posterior belief that player 2 would form after seeing the player 1's ultimatum. Since he knows his own cost, player 1 solves $\max_{m_1} \left\{ \frac{m_1}{m_1 + m_2} - \frac{m_1}{c_1} \right\}$, which yields:

$$m_1(m_2; c_1) = \max(\sqrt{c_1 m_2} - m_2, 0). \quad (7)$$

This best response function is sufficient to eliminate some possible contests from consideration as equilibria.

LEMMA 2. *In equilibrium, either both types of the informed player exert positive effort in the contest, or only the strong type does.*

This result means that there are only two possibilities to consider: either both types of player 1 spend strictly positive effort (skirmish), or only the strong type does (war). The fanciful names are meant as reminders that contests in which the weak type participates are lower in intensity than conflicts in which only the strong type participates.

THE SKIRMISH EQUILIBRIUM. Let $m_1(\underline{c}_1)$ denote the weak type's effort, and $m_1(\bar{c}_1)$ denote the strong type's. Because player 2 is unsure about player 1's type, her optimization problem is $\max_{m_2} \left\{ \frac{q m_2}{m_1(\bar{c}_1) + m_2} + \frac{(1-q)m_2}{m_1(\underline{c}_1) + m_2} - \frac{m_2}{c_2} \right\}$. Let $\underline{m}_1 = m_1^*(m_2^*; \underline{c}_1)$ denote the equilibrium effort level of the weak type, and $\bar{m}_1 = m_1^*(m_2^*; \bar{c}_1)$ denote the equilibrium effort levels of the strong type from (7). Solving player 2's program yields:

$$m_2^* = \underline{c}_1 \bar{c}_1 \left[\frac{f(q)}{g(q)} \right]^2, \quad (8)$$

²¹Fearon (1995).

where $f(q) = q\sqrt{\underline{c}_1} + (1-q)\sqrt{\bar{c}_1} > 0$ and $g(q) = \underline{c}_1\bar{c}_1/c_2 + q\underline{c}_1 + (1-q)\bar{c}_1 > 0$. We can then write the type-contingent expected payoff for player 1 as $W_1(q; c_1) = \left(1 - \sqrt{\frac{m_2^*}{c_1}}\right)^2 = \left(1 - \frac{f(q)}{g(q)}\sqrt{\frac{\underline{c}_1\bar{c}_1}{c_1}}\right)^2$, and the expected payoff for player 2 as $W_2(q) = \left(q\underline{c}_1 + (1-q)\bar{c}_1\right)\left[\frac{f(q)}{g(q)}\right]^2$. In the skirmishing equilibrium, $\underline{m}_1 > 0$, which means that $m_2^* < \underline{c}_1$ is necessary for this equilibrium to exist. Using (8) then yields the necessary condition for the skirmish equilibrium in terms of the posterior beliefs:

$$q < \frac{\bar{c}_1\sqrt{\underline{c}_1}}{c_2(\sqrt{\bar{c}_1} - \sqrt{\underline{c}_1})} \equiv q_s. \quad (9)$$

THE WAR EQUILIBRIUM. In this case, the weak type does not exert any effort in equilibrium, so $\underline{m}_1 = 0$. The strong type's optimal effort is still defined by (7). Player 2's maximization problem, $\max_{m_2} \left\{ \frac{qm_2}{m_1(\bar{c}_1) + m_2} + (1-q) - \frac{m_2}{c_2} \right\}$, is simpler because whatever positive effort she expends, she will win outright if her opponent happens to be the weak type. The solution is:

$$m_2^* = \bar{c}_1 \left(\frac{qc_2}{\bar{c}_1 + qc_2} \right)^2. \quad (10)$$

Since the weak type must be willing to exert no effort, it follows that a necessary condition for this equilibrium is $m_2^* \geq \underline{c}_1$, which we obtain by setting $\underline{m}_1 \leq 0$ in (7). Solving this yields $q \geq q_s$, the converse of (9). This means that these two cases characterize the complete solution to the one-sided incomplete information problem for all values of q : if $q < q_s$, then the skirmish equilibrium obtains; otherwise, the war equilibrium does.

We can now write the expected payoff for the strong type of player 1 (the weak type does not participate, so his payoff is 0) as:

$$W_1(q; \bar{c}_1) = \left(\frac{\bar{c}_1}{\bar{c}_1 + qc_2} \right)^2, \quad (11)$$

and the expected payoff for player 2 as $W_2(q) = 1 - q + q \left(\frac{qc_2}{\bar{c}_1 + qc_2} \right)^2$.

5.3 The Sun Tzu Principle of Feigning Weakness

The first result is that a player who is unsure about the type of opponent she is fighting will fight harder if she believes her opponent is more likely to be strong.

LEMMA 3. *Player 2's equilibrium effort is increasing in her belief that her opponent is strong provided her costs of effort satisfy Assumption 2.*

The finding that player 2's arming level is higher when she is more pessimistic provides microfoundations for Assumption 1 in the simple model. The difference, of course, is that here this arises endogenously as part of equilibrium behavior.

The last question we need to address before analyzing crisis behavior is whether player 1's ability to offset player 2's increased effort with his own preparation would preserve the

incentive to mislead her in the tactical game. Because player 2 reacts to more pessimistic beliefs by devoting more effort to fighting, her opponent can do better in the fighting if she thinks he is weak.

LEMMA 4 (Sun Tzu). *The expected equilibrium payoff of player 1 who exerts positive effort in the contest decreases in player 2's belief that he is strong.*

The logic behind the principle is straightforward. Player 2's equilibrium effort level is increasing in q : the more pessimistic she is, the higher the effort she will exert. This leads player 1 to compensate by increasing his own effort, leading to an overall decrease in his expected payoff because of the higher costs he incurs in the process. This parallels Sun Tzu's principle of feigning weakness which he stated as follows: "If your opponent is of choleric temper, seek to irritate him. Pretend to be weak, that he may grow arrogant" (6). It is worth noting that Sun Tzu's principle is here derived as the result of optimal rational behavior in a contest under uncertainty. The upshot of this analysis is that the strong type's incentive to mislead player 2 in the strategic game arises in this model as well.

5.4 The Crisis Ultimatum

As it turns out, the method for constructing feint equilibria in this model is analogous to what we did in the simple one. I will only sketch the steps here.

EQUILIBRIUM BELIEFS. The belief-contingent responses are limited by the best and worst war payoffs that player 2 can expect.

LEMMA 5. *Let $x_1 = 1 - \bar{W}_2$ and $x_2 = 1 - \underline{W}_2$, where $\underline{W}_2 = W_2(\bar{c}_1, c_2)$ is player 2's expected payoff from a full information contest against a strong opponent and $\bar{W}_2 = W_2(c_1, c_2)$ is her analogous payoff against a weak opponent. In any equilibrium, player 2 will accept any $x \leq x_1$ and reject any $x > x_2$ regardless of her beliefs.*

Since only the strong type ever demands \bar{x} in equilibrium, rejection leads to a complete-information war against a strong opponent. With such a belief, she accepts any x such that $1 - x \geq \underline{W}_2$, and because player 1 has no incentive to demand less than what she is willing to accept, it follows that in equilibrium,

$$\bar{x} = 1 - \underline{W}_2 = x_2, \tag{12}$$

which is exactly the same as in the simple model.

Since both types make the low-value demand with positive probability, rejection leads to war with incomplete information with a posterior belief $q(\underline{x})$. Player 2's optimal effort is then given by (8) if the contest admits the skirmish equilibrium and by (10) otherwise. I shall use $W_2(q(x))$ to denote the expected payoff with the understanding that this notation refers to the appropriate payoff.²² With such a belief, player 2 will accept any demand such that $1 - x \geq W_2(q(x))$. Because player 1 has no incentive to offer more than the absolute minimum necessary to obtain acceptance, it follows that in equilibrium,

$$\underline{x} = 1 - W_2(q(\underline{x})). \tag{13}$$

²²When it is necessary to be explicit about which equilibrium I am referring to, I shall use $W_2^s(q(x))$ for the skirmish equilibrium, and $W_2^w(q(x))$ for the war equilibrium.

Because the low-value demand results in a belief-contingent response, $\underline{x} \in [x_1, x_2]$ with $q(\underline{x})$ satisfying (13). The following lemma proves that it is always possible to find such a belief.

LEMMA 6. *For any $x \in [x_1, x_2]$, there exists a unique $q(x) \in [0, 1]$ that satisfies (13). Moreover, $q(x)$ is strictly increasing in x .*

We conclude that in any equilibrium, player 2 will accept any $x < x_1$, will reject any $x > x_2$, and can randomize between accepting and rejecting any $x \in [x_1, x_2]$ when her posterior beliefs are defined by Lemma 6. This is the exact analogue to the (on and off the path) beliefs we constructed in the simple model.

THE FEINT EQUILIBRIA. It is not difficult to verify that the analogue to the incentive-compatibility conditions in Lemma 1 obtains in this model as well. Letting \underline{r} and \bar{r} be the probabilities with which player 2 rejects \underline{x} and \bar{x} , respectively, we know that $\underline{r} < \bar{r}$ and $\underline{x} < \bar{x}$ in any feint equilibrium.

As before, there are conditions that permit $\underline{r} = 0$. The low-value demand can be riskless only when the incentives of the weak and the strong types are aligned given these peace terms; that is, if $W_1(q(\underline{x}); \bar{c}_1) \leq \underline{x}$. If this were not the case, then for a small enough $\varepsilon > 0$, a deviation to $\underline{x} + \varepsilon$ cannot be prevented: $\underline{x} + \varepsilon > \underline{x}$ and $W_1(q(\underline{x}); \bar{c}_1) > \underline{x} \Rightarrow W_1(q(\underline{x} + \varepsilon); \bar{c}_1) > \underline{x} + \varepsilon$ for small enough ε , so any linear combination of these will be strictly better than \underline{x} . This implies that the low-value demand cannot be smaller than $\tilde{x} = W_1(q(\tilde{x}); \bar{c}_1)$. Hence, the lower bound on the low-value demand is $x^* = \max[\tilde{x}, x_1]$.

Finally, because Bayes rule requires that the feint probability, $f = q(\underline{x})(1 - p)/[p(1 - q(\underline{x}))]$, induces $q(\underline{x})$, it follows that $p > q(\underline{x})$ is a necessary condition for the existence of these equilibria. Because $q(x)$ is increasing and $q(\bar{x}) = 1 > p$, this puts an upper bound on the low-value demand. In particular, there exists $x^{**} < \bar{x}$ such that $q(x^{**}) = p$, so that only $x < x^{**}$ can be supported as a low-value demand in a feint equilibrium. Observe in particular that $x^* = x_1$ ensures that $x^{**} > x^*$.

PROPOSITION 2. *Any $\underline{x} \in [x^*, x^{**}]$ can be supported in a feint equilibrium with a riskless low-value demand and $\bar{x} = x_2$. Player 2 accepts any $x \leq \underline{x}$, rejects any $x \in (\underline{x}; \bar{x}]$ with probability $r(x) = \frac{x - \underline{x}}{x - W_1(q(\bar{x}); \bar{c}_1)}$, and rejects any $x > \bar{x}$ with certainty. On and off the path, her beliefs are defined in Lemma 6.*

Although it is possible to construct feint equilibria with $\underline{r} > 0$ when the low-value demand can be riskless, a social welfare argument would select the Pareto-optimal equilibrium with $\underline{r} = 0$. There is, however, a major difference between this model and the simple one. When the conditions that permit $\underline{r} = 0$ are not met (e.g., (D) is satisfied), the original model admits feint equilibria with a risky low-value demand. This is not the case here: with this particular technology of war it is not possible to induce the weak type to run a risk of war under conditions that make fighting more beneficial than the peace terms for the strong type. (The proof of this is a bit involved and is omitted.) I conjecture that this is an artifact of the particular functional form chosen for the technology of conflict. This is why Proposition 2 restricts attention to feint equilibria with a riskless low-value demand. Substantively, these equilibria are equivalent to the ones in the simpler model.

6 Discussion

Although the framing of the model might make it look like the feint mechanism applies only narrowly to situations where a player might derive a tactical fighting advantage, the substance of the claim is more general. At the most abstract level, the mechanism applies to any setting where an attempt to influence a player's behavior with a threat might trigger a counter-response that would diminish the effectiveness of executing the threat if the attempt fails. As described, this is a very generic phenomenon and it is somewhat surprising that the formal study of coercion has neglected it. If I were to venture a guess as to the reason, it would have to be that we have only recently begun to study the distribution of power as an endogenous variable rather than something fixed by observable capabilities. As a result, we have only recently become aware that some of our general conclusions depend on the assumption of a fixed distribution of power.²³

One possible application of this mechanism could be to the puzzle of secret defensive alliances.²⁴ One prominent vein in the alliance literature explains them as valuable signalling and commitment devices (Morrow 2000). A defensive alliance, by its very nature, is supposed to enhance state A's capability against state C by adding the capabilities of state B. This should then enhance A's defensive posture against C, and deter C from attacking. Abstracting away from how credible B's commitment to A is, concluding such an alliance in secret cannot increase A's deterrent threat for the simple reason that C is unaware of B's promise to aid A in war. So what is the point of concluding such an alliance?

The feint mechanism offers one possible answer: since a defensive alliance increases A's strength, making such an alliance public would alert C that she would have to be better prepared if she wants to coerce A. This would trigger an attempt to increase C's capabilities, either by arming or by searching for allies of her own. If C succeeds, the overall benefit of the alliance might actually decrease. Hence, A might take its chances with a secret alliance: although C is less likely to agree to terms beneficial to A, if war occurs A will fight with B's help against an opponent who did not have the time to increase her own strength.

6.1 The Disadvantages of Democracy in Crisis Bargaining

There is an ongoing debate about the advantages democracies enjoy over other political systems when it comes to crisis bargaining or war fighting. One especially prominent argument is that democracies are better able to signal the resolve of their leaders in crises, perhaps because of audience costs, the interaction of opposition and incumbent parties, or other institutional features. The (somewhat simplified) core of these arguments is that democracies constrain the leaders' ability to bluff because open public debate and reselection incentives force them to issue threats only when they are resolved to follow through on them. In other words, it might be much more difficult for a democratic leader to conceal his resolve than

²³Even non-formal studies that highlight the importance of resolve asymmetry and the desirability of being non-provocative tend to treat the distribution of power as fixed (George and Simons 1994).

²⁴I thank Jeff Ritter for suggesting this. See his dissertation for an extended study of secret alliances (Ritter 2004).

for an autocrat. This makes threats more credible, which is held to be a good thing.²⁵

The problem with the exclusive focus on credibility is that it neglects the consequences a believable threat might have for the threatener if the target fails to comply anyway. The tactical game here shows one possible reaction a target might have to a threat that is more credible: she might start preparing for a fight. In other words, enhancing credibility might actually diminish capability. The trade-off between communicating one's resolve without provoking a countervailing response is a difficult one. As such, even if one grants the argument that democracies can communicate resolve better than non-democracies, it is not at all clear that this will enable them to obtain better peace terms or enjoy lower risks of war. In fact, the present model suggests that the opposite might well be true.

It is generally the case that military capabilities are much more readily observable than the will to use them. This means that a country with a well-trained and well-supplied army that it is unwilling to commit to a fight is "weaker" than an opponent whose objective capabilities are not as great but who is ready to use them all in that fight. This is why indicators based on observable capabilities might not be very good predictors of how a crisis will end: the driving force behind the outcome is the contest of will rather than of brute numerical strength.

Consider now a democracy whose leader cannot feign weakness because the interaction of domestic political groups reveals the political will to use the observable capabilities. In the context of our model, this leader will either make the high-value demand when he is resolved or the low-value demand when he is not. This means that a democratic leader is more likely to be forced into a separating equilibrium than a non-democratic leader who can conceal his resolve. As we have seen, in a separating equilibrium the weak type's peace terms are worse than the peace terms he can obtain in a feint equilibrium with a riskless low-value demand. And while the terms of the high-value demand are the same for the resolved type in both cases, the risks he has to run to obtain them is strictly greater in the separating equilibrium. In other words, an unresolved democratic leader will obtain worse peace terms than an unresolved nondemocratic leader, and a resolved democratic leader must run higher risks of war to obtain the same peace terms as a resolved nondemocratic leader. This suggests that the openness of democracies might put them at a disadvantage in crisis bargaining precisely because it communicates resolve better.

6.2 Shows of Strength and the Fostering of False Optimism

One of the most prominent causal mechanisms that explains war as the result of bargaining failure due to asymmetric information is the *risk-return trade-off* (Fearon 1995, Powell 1999). The essence of the mechanism is a screening logic: a player who is uncertain about his opponent's expected payoff from war makes a demand which balances the risk of rejection should its terms prove unacceptable to the opponent with the extra gain from peace these terms represent should they prove acceptable. Although one can always ensure peace by making a demand that even the strongest type of opponent would accept, this strategy is generally suboptimal because it involves large concessions that might well be unnecessary

²⁵Fearon (1994); Schultz (2001); Bueno de Mesquita, Morrow, Siverson and Smith (2003). AUTHOR provides a dissenting view on the audience cost mechanism.

if the opponent is actually weak. The optimal strategy trades the gain from making a demand that is slightly less favorable to the opponent against the slightly higher risk that such a demand entails. The risk of war therefore arises from not knowing precisely what kind of demand that opponent would find agreeable.

The mechanism that explains war in the present model is different even though the basic ultimatum game is the same. In contrast to the traditional screening setting in which player 1 is uncertain about player 2's expected payoff from war, our crisis is a signaling setting in which it is player 1 who has private information. In fact, we did not need to assume any sort of uncertainty about player 2's type at all. The interaction is dominated by the informed player's attempt to signal his type in a credible manner: when the strong type succeeds in separating from the weak type, player 2 becomes much more amenable to concessions. The risk of war is a necessary feature of a separating strategy that aims to achieve credible communication.

The feint equilibria exhibit this costly signaling dynamics common to crisis bargaining behavior. The strong player 1 can only obtain the high-value demand \bar{x} at the cost of a high risk of a costly war with a fully prepared strong player 2. This discourages the weak type from attempting to bluff with the same demand. Endogenizing the war contest does not alter the basic logic of costly signaling. The only way a strong player can obtain a better deal is by revealing credibly that he is strong, which requires him to engage in behavior that the weak type would not want to mimic.

The interesting new feature of the feint equilibria is that the strong type of player 1 might mimic the behavior of the weak instead. One reason for this comes from the incentives the strong player 1 has to keep private his information about his own strength in the event of war. In the exogenous specification of the distribution of power, a player's expected war payoff may depend on his opponent's private information but not on her *beliefs* about the information that he knows but she does not. This means that with exogenous war payoffs, it does not matter to the player whether he fights an adversary that is fully informed or one that is uncertain about his strength. There is no reason for the player to manipulate the belief with which his opponent would enter the war, only the belief she has when deciding what to do about his demands. In these cases, the strong player is better off whenever his opponent knows that he is strong.

With endogenous war payoffs, the player does care about the beliefs with which his opponent begins the war. The informed strong type's expected payoff under uncertainty is strictly better than his payoff when his opponent is fully informed. (As $q \rightarrow 1$ the payoff under uncertainty converges to the complete-information payoff but by Lemma 4, it is strictly decreasing in q .)

This gives the strong type a potent reason not to reveal his strength during the crisis itself. He may deliberately leave his opponent in a state of *false optimism* in order to exploit the advantages of surprise in case war breaks out. Unlike the usual scenario in which strong types always attempt to overcome the optimism of the opponent with costly or risky shows of strength, the feint equilibrium dynamic suggests that they may not be willing to do so even if such actions are potentially available to them. This creates a serious problem for peaceful crisis resolution because mutual optimism is regularly blamed as a major cause of

war.²⁶

In the classic formulation of the mutual optimism argument, “war is usually the outcome of a diplomatic crisis which cannot be solved because both sides have conflicting estimates of their bargaining power.”²⁷ One problem is overconfidence about the likely development of the war: its duration (short), outcome (victory), and costs (low). In the model with endogenous war effort, the expected outcome depends on how hard the actors fight. Their joint efforts determine the probability of victory, and their uncertainty about the behavior of the opponent induces uncertainty in these estimates.

The resulting expectations about the war may well be incompatible. In the skirmish equilibrium, the strong type expects to win with probability $\pi_1(q; \bar{c}_1) = 1 - f(q) \sqrt{\bar{c}_1} / g(q; c_2)$, and player 2 expects to win with probability $\pi_2(q) = f(q)^2 / g(q; c_2)$. These players are too optimistic because $\pi_1(q; \bar{c}_1) + \pi_2(q) > 1$. Similarly, in the war equilibrium the strong type expects to win with probability $\pi_1(q; \bar{c}_1) = \bar{c}_1 / (\bar{c}_1 + qc_2)$, whereas player 2 expects to win with probability $\pi_2(q) = [(1 - q)\bar{c}_1 + qc_2] / (\bar{c}_1 + qc_2)$. As in the skirmish equilibrium, these expectations are incompatible: it is easily verified that $\pi_1(q; \bar{c}_1) + \pi_2(q) > 1$. These optimistic expectations about victory translate into optimistic estimates about the expected payoffs from war.

It is crucial to understand that these disagreements are not about some fundamental underlying “true” probability of winning. Instead, they are disagreements about how war will “play out,” and this, of course, depends to a large extent on the opponent’s likely behavior. That behavior in turn depends on what the opponent expects the player to do, and these expectations are profoundly influenced by the opponent’s belief about some aspect that is privately known by the player. This is where deliberate falsification enters the picture.

When mutual optimism is a possible cause of war, credible signaling might be some sort of imperfect cure. When players have exaggeratedly optimistic expectations about their chances in war because they are not aware of private information the opponents possess, the only way to arrive at a peaceful settlement is to reduce this mutual optimism. As we know from our crisis bargaining studies, the only way to do so is through costly signaling. The cure is imperfect because the attempt to impart credibility to one’s message forces the actor to behave in ways that increase the probability of war. Scholars are well aware of this paradox inherent in crisis bargaining, and it is perhaps best summarized by Schelling: “Flexing of muscles is probably unimpressive unless it is costly or risky. [...] Impressive demonstrations are probably the dangerous ones. We cannot have it both ways.”²⁸

The results here suggest that the difficulty with settling peacefully may go beyond the risk generated by signaling efforts. When unwarranted optimism arises from lack of information to which the opponent has access, it can be dispelled only when the opponent chooses to reveal it. Unfortunately, the logic of feigning weakness suggests that an actor may choose instead of obfuscate inferences in order to gain advantage in the war that follows. In other words, the actor *may deliberately foster false optimism* even though this may make it very unlikely that his opponent would concede enough to make that actor willing

²⁶Blainey (1988, 53). Wittman (1979) offers the first rationalist account. Fey and Ramsay (2007) attempt to show that the mutual optimism explanation cannot be sustained as a result of rational behavior. AUTHOR rebut their argument.

²⁷Blainey (1988, 114).

²⁸Schelling (1966, 238–39). See also Fearon (1995, 397); Schultz (1998, 829).

to forego fighting.²⁹

Private information can remain private not for lack of means to reveal it but because the only type who can afford to send the credible signal may have no incentive to do so. It is this intentional and strategic concealment of information that is so troubling for resolving crises peacefully. To see how matters can come to a head, consider a crisis in which side A has deliberately fostered optimism in side B. Because side B (incorrectly) believes herself strong, she engages in very risky actions designed to cause side A to revise his war expectation downward. Unfortunately, side A cannot use side B's willingness to run risks as evidence that side B is strong, not when he misled B into believing that she is strong. In other words, when you have gone to great lengths to convince the opponent to be optimistic, you cannot very well use that optimism as evidence that your own assessment is faulty. Side B's signaling behavior then will be more likely to cause war because A is essentially dismissing it, because B is unwilling to offer the necessary concessions, and because B's exaggerated optimism is prompting her to take very large risks. In this situation, mutually incompatible crisis expectations cannot be reconciled without the actual resort to arms. As Blainey puts it, "The start of war is... marked by conflicting expectations of what that war will be like. War itself then provides the stinging ice of reality."³⁰

7 Conclusion

Consider the Chinese options in the fall of 1950. On one hand, they could openly threaten with intervention and demand that the U.N. forces remain south of the 38th parallel. If this works, the outcome is excellent. However, making this high demand is also very risky: if the U.S. happens to be resolved to unify Korea, this demand would simply alert it to prepare better for fighting the PRC. The resulting war would be of very high intensity and the Chinese would certainly lose the tactical advantage that would secure a first morale-boosting victory. On the other hand, the Chinese could demur and ask that only U.S. troops desist from crossing the parallel. Although permitting the occupation of North Korea by South Korean troops is not as good as keeping it free of U.N. forces, there is some chance that the U.S. would agree to this and war would be averted. Should the U.S. prove to be bent on unification, the absence of a credible signal can be expected to increase American confidence and possibly cause the U.S. to march into a war without the type of preparation it would have engaged in knowing the Chinese were going to intervene in strength. These are unpalatable choices, certainly, and no wonder Mao vacillated for so long before making up his mind on the strategy to pursue.

²⁹Misleading the opponent is not the only reason a strong type might not wish to separate himself from the weak type. Kurizaki (2007) analyzes a model in which player 1 can decide whether to make his threat public (so whoever backs down incurs audience costs) or keep it private (so backing down is costless). In the private threat equilibrium, the strong player 1 is indifferent between going public and staying private, whereas the weak type always threatens in private. The strong type is indifferent because he always fights when resisted and player 2 resists with the same probability after private and public threats. She does so because capitulation is costlier after a public threat, in which case she needs to be fairly certain her opponent is strong. In private, the costs of capitulation are much lower, so she can concede even if she thinks player 1 might be bluffing. There is no benefit to the strong player 1 in getting player 2 to think that he is weak.

³⁰Blainey (1988, 56).

This stylized description of the situation seriously abstracts from the complex domestic dynamics in both countries, and it may well have been the case that by the time Mao resolved to intervene, the United States had become undeterrable by the Chinese without open Soviet support. In November, war may have been already unavoidable (AUTHOR). However, the logic of feigning weakness developed in this article can help explain why the Chinese did not pursue more vigorous signaling actions when they were resolved not to permit unification.

The crisis bargaining literature quite appropriately focuses on how strong actors can signal their strength and reduce the possibility of bluffing. When weak types can mimic their actions, messages will not be believed, and when threats are not credible, they are unlikely to influence the behavior of the opponent. This basic mechanism also obtains in the model presented here. This article, however, also points out some perverse incentives that strong types may face that may make them unwilling to send costly signals even when they could have done so.

One implication of this result is that it is not safe to infer that one's opponent is weak when he fails to engage in some costly action that is available to him and that could persuade one that he is strong. One should carefully consider the incentive to feign weakness for tactical purposes. This, of course, may be harder than it sounds because, after all, it could be the case that the opponent is not signaling because he really is weak.

The logic of the feint also suggests that overcoming mutual optimism in crises may be very difficult for two reasons. First, when a strong opponent who could reveal his strength to reduce an actor's optimism decides to feign weakness, then that actor may persist in her incorrect beliefs and blunder into disaster. Second, the possibilities for peaceful resolution of the crisis may diminish because the feigning opponent himself may be unable to correct his optimistic beliefs. Because he has purposefully misled the other actor, he cannot take her costly signals as evidence that he should revise his expectations: after all, she is signaling precisely because she believes that she is strong, which is the false belief he has taken great care to induce. In this rather unfortunate scenario, war may be the only way to inject a dose of reality into these beliefs.

A Proofs

Proof of Proposition 1. Since the strong type is mixing, $\underline{r}W_s^n + (1 - \underline{r})\underline{x} = \bar{r}W_s^a + (1 - \bar{r})\bar{x}$, which gives \bar{r} in (4). If (3) is not satisfied, $\bar{r} \in (0, 1)$ regardless of the value of \underline{r} , so we can take $\underline{r} = 0$. Suppose now that (3) is satisfied. Then $\bar{r} < 1$ yields $\underline{r} > 1 - (s_n - s_a) / (W_s^n - \underline{x}) \equiv \underline{r}'$. Taking $\underline{r}' \geq 0$ yields (D), which ensures that the low-value demand must be risky, otherwise $\underline{r} = 0$ can work. Also, $\bar{r} > 0$ yields $\underline{r} < 1 - (s_n - s_a - k_2 - C) / (W_s^n - \underline{x}) \equiv \underline{r}''$. Since $\underline{r}'' - \underline{r}' > 0 \Leftrightarrow k_2 + C > 0$, such \underline{r} exist.

Since the weak type should not have an incentive to demand \bar{x} , it follows that $\underline{r}W_w^n + (1 - \underline{r})\underline{x} \geq \bar{r}W_w^a + (1 - \bar{r})\bar{x}$, which simplifies to:

$$\bar{r} \geq \frac{\underline{r}(\underline{x} - W_w^n) + \bar{x} - \underline{x}}{\bar{x} - W_w^a}. \quad (14)$$

It is readily verifiable that $\bar{r} \in (0, 1)$ regardless of \underline{r} . Since both (4) and (14) must hold, we

require that:

$$\frac{\underline{r}(\underline{x} - W_s^n) + \bar{x} - \underline{x}}{\bar{x} - W_s^a} \geq \frac{\underline{r}(\underline{x} - W_w^n) + \bar{x} - \underline{x}}{\bar{x} - W_w^a}.$$

At $\underline{r} = 0$, the inequality reduces to $s_a \geq w_a$, which holds. Recall that if (D) is not satisfied, there are no lower-bound restrictions on \underline{r} to guarantee valid \bar{r} values, which means that in this case we may use $\underline{r} = 0$.

We now derive the range of low risks that can be supported in equilibrium when (D) is satisfied. Since the strong type actually likes this risk, the upper bound depends on the weak type being willing to accept it. Player 2's strategy is to reject all $x \in (x_1, \underline{x}]$ with the same probability and to reject $x \in (\underline{x}, \bar{x}]$ with high probability that makes these demands unattractive to the weak type. The best possible deviation is to the highest possible no-risk demand, which is x_1 , so we require that $\underline{r}W_w^n + (1 - \underline{r})\underline{x} \geq x_1$. This yields $\underline{r} \leq (\underline{x} - x_1)/(\underline{x} - W_w^n) \equiv \hat{r} < \underline{r}''$, where the second inequality is readily verified. This makes \hat{r} the binding upper bound, which necessitates a check on the lower bound: $\underline{r}' \leq \hat{r}$ reduces to (5). We conclude that if (D) is not satisfied, $\underline{r} = 0$, and if (D) is satisfied, then $\underline{r} \in (\underline{r}', \hat{r})$, which is the range for \underline{r} stated in the proposition.

We now check that deviations are unprofitable. Let $r(x)$ denote the probability with which player 2 rejects demand x . Take some $x \leq x_1$ and note that $r(x) = 0$. If $\underline{r} = 0$, then player 1 cannot profit from such deviation regardless of type. If $\underline{r} > 0$, the derivation of the low-value demand risk above ensures that the weak type cannot profit by deviating to x_1 , the most attractive such demand. Because the strong type cannot utilize the advantage of deceit when there is no risk, he cannot profit from deviating to such riskless demands either. Take some $x \in (x_1, \underline{x})$. Player 2 rejects such demands with the same probability as the low-value demand (and does not arm), or $r(x) = \underline{r}$. This means that these demands result in worse peace terms. Hence, such deviation cannot be profitable for player 1 regardless of type. Take some $x \in (\underline{x}, \bar{x})$. Player 2 arms when rejecting any such demand because $q(x) > q_a$ for any $x > \underline{x} = x_a$. The risk, $r(x) = \bar{r}$, is the same as for the high-value demand. Clearly, the strong type has no incentive to deviate: his payoff from peace is strictly worse than \bar{x} , and his payoff from war is the same. The weak type's best deviation is to \bar{x} , but our construction of rejection probabilities for this type ensures that he would not want to demand it. Take some $x > \bar{x} = x_2$. Player 2 rejects all such demands and arms for the fight, so $r(x) = 1$. Even the strong type cannot profit from this deviation because $W_s^a < \bar{x}$, and this means that weak type cannot profit either because $W_w^a < W_w^n < \underline{x}$. \square

Proof of Lemma 2. Let $m_2^* \geq 0$ denote player 2's equilibrium effort, and $m_1^*(c_1) = m_1(m_2^*; c_1)$ player 1's effort. There can be no equilibrium in which player 1 makes no effort regardless of type. Suppose, to the contrary, that $m_1^*(\bar{c}_1) = m_1^*(\underline{c}_1) = 0$ in some equilibrium. Since $m_1(c_1) > 0$ whenever $c_1 > m_2^*$, this implies that $m_2^* \geq \bar{c}_1 > 0$. This cannot be optimal because she can deviate to a lower effort and still win for sure. Therefore, in any equilibrium at least one type of player 1 must be exerting a strictly positive effort. This cannot be the weak type by himself. Suppose, to the contrary, that $m_1^*(\underline{c}_1) > 0$ and $m_1^*(\bar{c}_1) = 0$ in some equilibrium. Since $m_1^*(\underline{c}_1) > 0$ implies that $m_2^* < \underline{c}_1$, it follows from $\underline{c}_1 < \bar{c}_1$ that $m_2^* < \bar{c}_1$, and so $m_1^*(\bar{c}_1) > 0$ as well, a contradiction. \square

Proof of Lemma 3. In the skirmish equilibrium, $\text{sign } \frac{\partial m_2^*}{\partial q} = \text{sign}(c_2 - \sqrt{\underline{c}_1 \bar{c}_1}) >$

0, where the inequality follows from Assumption 2. In the war equilibrium, $\frac{\partial m_2^*}{\partial q} = \frac{2q\bar{c}_1^2 c_2^2}{(\bar{c}_1 + qc_2)^3} > 0$. \square

Proof of Lemma 4. In the skirmish equilibrium, $\frac{\partial W_1(c_1)}{\partial q} = -\left(\frac{\sqrt{c_1} - \sqrt{m_2^*}}{c_1 \sqrt{m_2^*}}\right) \frac{\partial m_2^*}{\partial q} < 0$, because the bracketed term is positive by (9) and because m_2^* is increasing in q by Lemma 3. Since only the strong type participates in the war equilibrium, inspection of his payoff in (11) is sufficient to establish the claim. \square

LEMMA 7. $W_2(q)$ is continuous and strictly decreasing.

Proof. (Continuity.) Since $W_2(q)$ is continuous for each equilibrium, it is enough to show that it is continuous at q_s where the equilibrium switch occurs: $W_2^s(q_s) = 1 - \frac{c_1 + \sqrt{c_1 \bar{c}_1}}{c_2} = W_2^w(q_s)$.

(Monotonicity.) In the war equilibrium, $\frac{dW_2^w(q)}{dq} = -\frac{\bar{c}_1^2(\bar{c}_1 + 3qc_2)}{(\bar{c}_1 + qc_2)^3} < 0$. In the skirmish equilibrium, $\frac{dW_2^s(q)}{dq} = \frac{g'f^2}{g^2} + \frac{2f(qc_1 + (1-q)\bar{c}_1)}{g^3}(f'g - g'f) < 0$. To see this, note that $f > 0$, $g > 0$, $f' < 0$, $g' < 0$, and $f'g - g'f = \sqrt{c_1 \bar{c}_1}(\sqrt{\bar{c}_1} - \sqrt{c_1})\left(1 - \frac{\sqrt{c_1 \bar{c}_1}}{c_2}\right) > 0$ by Assumption 2. The last requirement is that $gg'f + 2(qc_1 + (1-q)\bar{c}_1)(f'g - g'f) < 0$, which can be shown but it takes three pages of algebra. \square

Proof of Lemma 5. Lemma 7 implies that to get the best and worst payoffs for player 2, we only need to consider $q = 0$ and $q = 1$. So, $\lim_{q \rightarrow 0} W_2^s(q) = \left(\frac{c_2}{c_1 + c_2}\right)^2 = \bar{W}_2$, and $\lim_{q \rightarrow 1} W_2^s(q) = \lim_{q \rightarrow 1} W_2^w(q) = \left(\frac{c_2}{\bar{c}_1 + c_2}\right)^2 = \underline{W}_2$, with $\underline{W}_2 < \bar{W}_2$. \square

Proof of Lemma 6. By Lemma 7, $W_2(q)$ is continuous, and the intermediate value theorem implies that for any $y \in [\underline{W}_2, \bar{W}_2]$, there exists q such that $W_2(q) = y$. By Lemma 7, $W_2(q)$ is strictly decreasing, so $q(y) = W_2^{-1}(y)$ is unique and strictly decreasing in y . Letting $x = 1 - y$ establishes the claim. \square

Proof of Proposition 2. Let $\underline{W}_1 = W_1(1; \bar{c}_1) = W_1(\bar{c}_1, c_2)$. Since the strong player 1 is willing to mix, $U_1(\underline{x}; \bar{c}_1) = U_1(\bar{x}; \bar{c}_1)$, or

$$\underline{r}W_1(q(\underline{x}); \bar{c}_1) + (1 - \underline{r})\underline{x} = \bar{r}\underline{W}_1 + (1 - \bar{r})\bar{x}. \quad (15)$$

Using the definitions of \underline{x} and \bar{x} , we can rewrite this as:

$$\bar{r} = \frac{\underline{r}[1 - W_1(q(\underline{x}); \bar{c}_1) - W_2(q(\underline{x}))] - \underline{W}_2 + W_2(q(\underline{x}))}{1 - \underline{W}_1 - \underline{W}_2} \quad (16)$$

Since $\bar{r} > 0$ and $1 > \underline{W}_1 + \underline{W}_2$, it follows that:

$$\underline{r}[1 - W_1(q(\underline{x}); \bar{c}_1) - W_2(q(\underline{x}))] > \underline{W}_2 - W_2(q(\underline{x}))$$

must hold. Since $W_2(q(x)) > \underline{W}_2$ for any $q(x) < 1$, the right-hand side is negative, so $\underline{r} = 0$ certainly satisfies this condition. Since $\bar{r} < 1$ as well,

$$\underline{r}[1 - W_1(q(\underline{x}); \bar{c}_1) - W_2(q(\underline{x}))] < 1 - \underline{W}_1 - W_2(q(\underline{x})) \quad (17)$$

must hold. There are two cases to consider. First, suppose

$$1 - \underline{W}_1 - W_2(q(\underline{x})) \geq 0. \quad (Z)$$

Since $W_1(q(x); \bar{c}) > \underline{W}_1$ for any $q(x) < 1$, it follows that (17) is satisfied for any \underline{r} , so for $\underline{r} = 0$ in particular. Now suppose that (Z) is not satisfied. Both sides of (17) are negative, which implies that only $\underline{r} > 0$ can possibly satisfy it. Thus, if (Z) is not satisfied, the low-value demand cannot be riskless. Because we are looking for equilibria with such a demand, assume that (Z) holds for the rest of the proof. I labeled this condition to indicate the zero-risk associated with the low-value demand, and it is the analogue to the converse of (D) in the simple models.

Consider now the rejection probability specified in the proposition. For any $x \in (\underline{x}, \bar{x}]$, $r(x) = (x - \underline{x}) / [x - W_1(q(x); \bar{c}_1)]$ solves $U_1(x; \bar{c}_1) = \underline{x}$. That is, player 2's rejection probability leaves the strong type indifferent between any demand in that range and the equilibrium *riskless* low-value demand. Note in particular that $x > \underline{x} \geq \tilde{x}$ implies that $r(x)$ is a valid probability. Moreover, $r(\bar{x}) = \bar{r}$ from (16) because $\underline{r} = 0$ and $q(\bar{x}) = 1$. Since $\underline{x} \geq x_1$, taking $x^* = \max(\tilde{x}, x_1)$ yields the lower bound on the riskless demand that can be supported in equilibrium. The upper bound x^{**} follows from Bayes rule and is derived in the text.

We now check that deviations are unprofitable. Since player 2 accepts any $x < \underline{x}$, such deviation from \underline{x} is not profitable. Any $x \in (\underline{x}, \bar{x}]$ is rejected with probability that leaves the strong type indifferent between x and \underline{x} . But since \underline{x} is also the weak type's payoff and the weak type's payoff from war is strictly worse than the strong type's, this deviation is strictly worse for the weak type. Finally, any $x > \bar{x}$ is rejected for sure, and the resulting war is one in which player believes she is facing the strong type. This is clearly worse for the strong type (at \bar{x} he fights such a war with positive probability but also obtains $\bar{x} > \underline{W}_1$ with positive probability), and this implies it is also worse for the weak type. \square

References

- Appleman, Roy E. 1961. *South to the Naktong, North to the Yalu*. Washington, DC: U.S. Government Printing Office.
- Banks, Jeffrey S. 1990. "Equilibrium Behavior in Crisis Bargaining Games." *American Journal of Political Science* 34 (August): 599–614.
- Blainey, Geoffrey. 1988. *The Causes of War*. 3rd ed. New York: The Free Press.
- Bueno de Mesquita, Bruce, James Morrow, Randolph Siverson, and Alastair Smith. 2003. *The Logic of Political Survival*. Cambridge: The M.I.T. Press.
- Chen, Jian. 1994. *China's Road to the Korean War: The Making of the Sino-American Confrontation*. New York: Columbia University Press.

- Fearon, James D. 1994. "Domestic Political Audiences and the Escalation of International Disputes." *American Political Science Review* 88 (September): 577–92.
- Fearon, James D. 1995. "Rationalist Explanations for War." *International Organization* 49 (Summer): 379–414.
- Fey, Mark, and Kristopher W. Ramsay. 2007. "Mutual Optimism and War." *American Journal of Political Science* 51 (October): 738–754.
- Garfinkel, Michelle R., and Stergios Skaperdas. 2007. Economics of Conflict: An Overview. In *Handbook of Defense Economics, Volume 2: Defense in a Globalized World*, ed. Todd Sandler, and Keith Hartley. Amsterdam: North Holland pp. 649–710.
- George, Alexander L., and William E. Simons, eds. 1994. *The Limits of Coercive Diplomacy*. 2nd ed. Boulder: Westview Press.
- Guisinger, Alexandra, and Alastair Smith. 2002. "Honest Threats: The Interaction of Reputation and Political Institutions in International Crises." *Journal of Conflict Resolution* 46 (April): 175–200.
- Hirshleifer, Jack. 1989. "Conflict and rent-seeking success functions: Ratio vs. difference models of relative success." *Public Choice* 63: 101–112.
- Hörner, Johannes, and Nicholas Sahuguet. 2007. "Costly Signalling in Auctions." *The Review of Economic Studies* 74 (1): 173–206.
- Kurizaki, Shuhei. 2007. "Efficient Secrecy: Public versus Private Threats in Crisis Diplomacy." *American Political Science Review* 101 (August): 543–558.
- Kydd, Andrew H. 2000. "Arms Races and Arms Control: Modeling the Hawk Perspective." *American Journal of Political Science* 44 (April): 222–238.
- Lebow, Richard Ned. 1981. *Between Peace and War: The Nature of International Crisis*. Baltimore: The Johns Hopkins University Press.
- Morrow, James D. 1994. "Alliances, Credibility, and Peacetime Costs." *Journal of Conflict Resolution* 38 (2): 270–297.
- Morrow, James D. 2000. "Alliances: Why Write Them Down?" *Annual Reviews of Political Science* 3: 63–83.
- Münster, Johannes. 2007. "Repeated Contests with Asymmetric Information." Manuscript, Free University, Berlin.
- Powell, Robert. 1993. "Guns, Butter, and Anarchy." *American Political Science Review* 87 (March): 115–32.
- Powell, Robert. 1996. "Stability and the Distribution of Power." *World Politics* 48 (January): 239–67.
- Powell, Robert. 1999. *In the Shadow of Power*. Princeton: Princeton University Press.

- Powell, Robert. 2004. "Bargaining and Learning While Fighting." *American Journal of Political Science* 48 (April): 344–361.
- Ritter, Jeffrey M. 2004. *Silent Partners and Other Essays on Alliance Politics*. Cambridge: Harvard University. Doctoral dissertation.
- Sartori, Anne E. 2005. *Deterrence by Diplomacy*. Princeton: Princeton University Press.
- Schelling, Thomas C. 1966. *Arms and Influence*. New Haven: Yale University Press.
- Schultz, Kenneth A. 1998. "Domestic Opposition and Signaling in International Crises." *American Political Science Review* 92 (December): 829–44.
- Schultz, Kenneth A. 2001. *Democracy and Coercive Diplomacy*. Cambridge: Cambridge University Press.
- Stueck, William. 2002. *Rethinking the Korean War*. Princeton: Princeton University Press.
- Sun Tzu. 2005. *The Art of War*. El Paso Norte Press. Tr. Lionel Giles.
- United States Department of State. 1976. *Foreign Relations of the United States, 1950. Volume VII: Korea*. Washington, DC: Government Printing Office.
- Wagner, R. Harrison. 2000. "Bargaining and War." *American Journal of Political Science* 44 (July): 469–84.
- Whiting, Allen S. 1960. *China Crosses the Yalu: The Decision to Enter the Korean War*. New York: The Macmillan Company.
- Wittman, Donald. 1979. "How a War Ends: A Rational Model Approach." *The Journal of Conflict Resolution* 23 (December): 743–63.