

Getting there is Half the Battle: How Military Mobilization Costs Influence Crisis
Bargaining

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Abstract:

When a state in a diplomatic crisis with a rival mobilizes its military, it pays in advance some of the costs of fighting a war, since military movements are a necessary precondition to fighting. Sinking costs into war during negotiation alters the bargaining environment. This is because the set of possible negotiated outcomes mutually-preferred to war is determined by the joint costs of war, and part of the cost of war is military mobilization. Mobilization sinks some of those costs for the mobilizing state, reducing the remaining marginal costs of war, thereby reducing the set of possible negotiated settlements. A state that mobilizes its military will need a larger negotiated concession from a rival in order to induce it not to fight. With imperfect information, the cost-sinking effects of mobilization can cancel out any informational benefits that mobilization may have as a way of signaling resolve. The probability of bargaining breakdown and war can be influenced by the relative value of mobilization and fighting costs, but the direction of the effect is sensitive to different assumptions.

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States with conflicting interests know that if they fail to reach a settlement they could end up fighting a war. Naturally, then, their beliefs about what is likely to happen in case of war influence what sort of agreement would be necessary to avert the war. This goes further than their beliefs about which side is likely to “win” the war, since states incur costs when they fight wars, and their expectations about wars – and by extension the negotiations they become involved in when they seek to avert wars – include their beliefs about those costs.

Typically scholars think of the cost of war as a lump sum. I decompose the costs of war into two parts: a mobilization cost and a fighting cost. Before states actually fight a war, they engage in a costly escalation process. They may mobilize in a conscious attempt to signal their resolve, or they may mobilize because they expect that they may soon be fighting – the specific motive is unimportant. What is important is that in this process of escalation the states pay some of the costs of war: a down payment on an investment in violence.

There is a period of time after a crisis has begun but before a war starts when the parties could still avert a war through what we sometimes call “eleventh-hour diplomacy.” The process of mobilizing for war impacts the chances for eleventh-hour diplomacy in two ways. First, when a state chooses to escalate a military crisis, it provides some information about its preferences to its rival. Presumably, then, this additional information may help states in conflict to find a negotiated settlement that they prefer to war. This consequence of signaling is well-understood.

Second, however, escalation has another consequence: in the process of escalating a crisis, a state pays some part of the total costs of fighting the war – all of the costs associated with mobilization rather than the actual fighting. At this point, these war costs are sunk; this changes the remaining marginal costs of further escalation. The result is perverse: the information that escalation provides may itself be rendered obsolete by the very process (escalation) that provides it. Not only that, but since the escalating state’s marginal costs to future escalation are now reduced it will demand even more concessions from its rival. The probability of bargaining breakdown and war can be influenced by the relative value of mobilization and fighting costs, but the direction of the

effect is sensitive to different assumptions.

I proceed in three sections. First, I explain in ordinary terms, using an informal model, how the logic of sunk costs in war preparations influences crisis bargaining behavior. Second, I describe a formal treatment. Third, I discuss some of the implications and conclude.

Argument

Consider two rational and unitary states involved in a dispute that has the potential to escalate to war. Each state has a reservation price – that is, the minimum it can receive in a bargain in order to make such a bargain preferable to fighting a war. This reservation price will be based on a combination of the state's estimate of the probable outcome of fighting and the cost of the war to the state. In models of crisis bargaining based on these assumptions the key to resolving the crisis is information. That is, if the two states have similar enough estimates of the likely outcome of a potential war and similar enough estimates of their individual costs of fighting, then they will be able to agree on a negotiated settlement that averts the war (Bueno de Mesquita, Morrow, Siverson, and Smith, 1999; Bueno de Mesquita, Morrow, and Zorick, 1997; Kilgour and Zagare, 1991; Morrow, 1989).

The joint cost of war creates a window, a range of possible negotiated solutions that both of the states individually prefer to war. The costs of war determine the size of this window, so for example a war that would be highly costly for both sides creates a large window of preferred potential negotiable settlements, while if the joint cost of war is small, the range of possible negotiated settlements is smaller (Fearon, 1995; Powell, 1996).

In existing models the cost of war is a single payment that the state makes at the time that the fighting occurs. I decompose this war cost into two different costs: fighting costs and mobilization costs.

Fighting costs: These are the costs that the state pays that are immediately and necessarily related to the actual use of violence on the battlefield. For each side, these costs include the lives of its soldiers that are killed, the cost of weapons they discharge

and cannot reuse, and the cost of property that is destroyed. So, for example, a state's battle deaths or destruction to a state's cities are costs of fighting.

Mobilization costs: These are all of the costs of war that states pay, either up-front or by commitment, in the process of preparing for a war up to the instant that the war actually starts (that is, the last instant by definition in which the states could reach an agreement that averts war). These include the costs of moving soldiers and equipment to the battlefield as well as the costs of moving them back home, since regardless of whether any fighting actually occurs the military forces will have to return eventually. There are both the direct costs of military deployment but also the opportunity costs, either in forgone opportunities to deploy military forces elsewhere or the lost productivity of labor and capital in civilian activities. These costs also include all of the political costs of creating an international coalition, for example calling on allies for support and negotiating cooperative agreements on the technical aspects of deploying forces, such as overflight and basing rights. There are also potential domestic political costs and opportunity costs, if leaders have to sacrifice other political goals or make side-payments to opposition groups in order to sustain a coalition to support fighting.

In some instances, mobilization costs may be a relatively small part of overall war costs. In the extreme case, a state that fights a war entirely in its own territory and that uses a standing army without raising additional forces has quite low mobilization costs. In contrast, its fighting costs may be much higher, especially if its population and property are at risk of destruction in the fighting.

Sometimes, though, a state's mobilization costs can be a large part of the overall costs of war. Consider a great power entering a conflict against a distant and weaker state. Examples here include the United Kingdom in the Falklands/Malvinas War or the United States in the 1991 Gulf War or the 2001 war in Afghanistan. In each of these wars, the U.S. and the U.K. paid substantial mobilization costs, both in terms of moving military forces to the other side of the world and in terms of securing the acquiescence of skeptical allies. In the U.S. cases, the Americans had to make costly arrangements with countries in the region – Saudi Arabia and Pakistan – on the technical aspects of deploying forces. These arrangements were costly in terms of other American goals (see Lake, 1999, on the Gulf War) and were also costly in the sense that they risked triggering

potentially violent regime changes in these states that would bring anti-American governments into power. The technical requirements of mobilization, furthermore, required the United States essentially to pay these costs before any fighting started. In the Falklands/Malvinas and Gulf War cases, the U.S. and Britain faced reluctant domestic audiences as well.

In contrast, in each of these three instances the actual fighting produced little direct cost (relative to mobilization costs) since the fighting did not occur on the homeland territory and U.S. and British casualties were relatively low.

As an example, consider the American military involvement in Iraq beginning in March 2003. Although costs, both mobilization and fighting, are measures of subjective costs that states bear in relation to the underlying value of the issue at stake in a rivalry, *ex ante* estimates of the budgetary costs of mobilization and fighting may give an impression about the general relationship between mobilization and fighting costs. In September 2002 the Congressional Budget Office estimated that the cost of deploying a force to the Persian Gulf, above the cost of regular operations, would range between \$9 billion and \$13 billion, while the cost of returning that force back to the United States (whether it was actually used in combat or not) would range between \$5 billion and \$7 billion. This yields a total mobilization cost between \$14 and \$20 billion. Combat hostilities would cost from \$6 billion to \$9 billion per month. Assuming a three-month war, fighting costs range from \$18 to \$27 billion (CBO, 2002). These estimates suggest that mobilization costs would be in the neighborhood of 40% of the total costs of war. (Other estimates of the costs of a war against Iraq produce different results, both for budgeted military expenditures, as in House Budget Committee, Democratic Staff, 2002, and for the country as a whole, as in Leigh, Wolfers, and Zitzewitz, 2003.)

So in a crisis between two states, where the crisis has the potential to escalate to war, they negotiate in a way that is informed by their expectations of the costs and probable outcome of fighting – what Powell (1996) calls bargaining under the shadow of power. Consider a simple representation of a crisis bargaining situation taken from Powell.

[Figure 1 about here.]

Suppose the two states are in conflict over the division of some asset, such as

territory, that can be stylized as a line segment as in Figure 1. The line can be divided at any point along it, such that state A (on the left side) gets everything to the left of the point of division and state B (on the right side) gets everything to the right. Each state prefers having more territory to having less territory. The states have a common probability estimate P that represents that states' expectations about what the probable outcome of a war will be. P can represent the likely division of the line after fighting; alternatively it can represent the probability that one of the states will completely vanquish the other and take all of the territory. In either case, the states bargain with each other in an effort to prevent war knowing that war will lead to an expected payoff determined by P .

The other component of the expected payoff of war is the cost of fighting. Since the cost of war is defined in proportion to the value of the good over which the states are in conflict, war costs are subjective to the states. That is, how much does each state value its potential losses from violence relative to the issue at stake?

Typically, models such as this one use one term, C , to represent for each state its cost of fighting. I will here, however, divide this into two terms for one of the states, so that while B's cost of war is simply C I will divide A's cost of war into two components: M , the costs of military mobilization for A, and F , the costs of fighting for A.¹ So, the total cost of war for state A is $M+F$. Prior to any mobilization by A, the states both know that war will cost it the mobilization cost and the fighting cost. As Figure 1 shows, the sums of these two costs reduce A's payoff from fighting; that is, in case of a war, A gets the division of the territory that results from the war minus the mobilization and fighting costs of the war. Likewise, B gets whatever value it receives from control of the territory to the right of P , minus the costs of war for B (which I assume includes both the cost of mobilization and fighting). So, taken together, $P-F-M$ represents state A's payoff from fighting, while $P+C$ represents the inverse of state B's payoff from fighting. (In order to make the payoffs consistent with the figure, think of the line segment as a range of positive numbers from 0 on the far left to 1 on the far right, so a higher value of P means less territory for B.)

¹ To simplify the discussion and picture, and later the model, I will only disaggregate the war costs into mobilization and fighting for one of the two sides in the dispute.

The range between $P-F-M$ and $P+C$ is therefore the bargaining range. Between these two points lie all of the possible negotiated settlements that both states would prefer to agree to instead of fighting. One of the states would rather fight than agree to any point outside of this range.

Suppose the states have some mechanism of making offers to each other, in an attempt to reach a negotiated settlement over the division of the territory. A might make an offer which B can either accept or reject, and *vice versa*. If the states hit upon a proposal they mutually prefer to war, then they can live in peace under the settlement. If they do not reach an agreement, they fight.

Note that neither state wants to make too generous of an offer to the other, since each values owning territory. Powell (1996) shows that if the states have poor information about each other's cost of fighting, then they can fail to reach a bargain.

In order to illustrate, let me be specific: suppose that B has the chance to make a proposal to A. Suppose that B knows the value of C, its own cost of fighting, and P, the likely outcome of a war. Suppose, however, that it does not know A's subjective valuation of A's own costs of fighting – its resolve. B may have guesses or beliefs about these costs, but it is unsure. In this situation, B, in trying to get the best possible deal for itself, may offer A less than A would be willing to accept.

[Figure 2 about here.]

Suppose that that is, in fact, what happens at first. That is, suppose that B makes a proposal to A that A finds unacceptable, since A would prefer fighting to accepting a bad (from its perspective) bargain. In the top picture in Figure 2, I show just this.

As a result, the states are unable at this point to reach an agreement. So, the first round of negotiations ends in failure. The states prepare for war. That is, A mobilizes its military and thereby pays its mobilization cost of war. At the same time, the states enter a new phase of crisis diplomacy: last-minute negotiations to try to avert fighting.

The bottom picture shows the consequences of mobilization on the bargaining environment. There are two effects of mobilization, which I will call a signaling effect and a cost-sinking effect.

Signaling effect: When a state mobilizes, its adversary learns something about it. That is, B knows that A rejected its proposal, and it therefore learns that the proposal was

outside of the bargaining range made up by the joint costs of war around the expected outcome P (the area enclosed by the bracket in the picture on top). Specifically, B now may begin to think that in order to make a proposal to which A will agree it will have to, at a minimum, make an offer than was more generous than the one it had made in the first round. (I address the possibility of bluffing in the next section.) So, consistent with existing models of signaling in crisis bargaining, a state can use mobilization to cause an adversary to make a more generous offer than it would otherwise by showing it that the state is not a pushover. Note that signaling can help states avoid negotiation breakdowns and war. The more information states can credibly reveal to each other about the types of settlements they would prefer to fighting, the more able they will be to coordinate on a negotiated settlement.

Cost-sinking effect: The second consequence of mobilization is to reduce A's marginal costs of war. Since the cost of military mobilization is now sunk, A does not consider those costs of war when it returns to the bargaining table for one final attempt at a settlement. So, the bargaining space around P is now smaller than it was initially. Although B has learned about places that the win-set – the set of agreements mutually-preferred to fighting – is *not* located as a result of the signaling effect, in the process the target has become smaller as a result of the cost-sinking effect.

Fearon (1997) distinguishes between two types of costly signals that states can send. One type creates audience costs and punishes political leaders if they do not carry out a threat. Another type sinks costs; this type of signal is the one that I describe here. In his model, though, the good over which the states are in dispute is not divisible. His analysis therefore does not consider the dynamic that I explore, which is that as a state sinks its war costs by mobilizing its military, the minimum concession it will accept as an alternative to war increases; this is only meaningful given a divisible good. In my terms, Fearon's model isolates only the signaling consequence of mobilization and not the cost-sinking consequence.

Other existing models of signaling (Schultz, 1998; Smith 1998a) use what Fearon calls signals that generate audience costs and do not consider signals that, like the ones I consider, sink costs into war through mobilization. This focus on audience-cost signaling is reasonable, given Fearon's (1997) conclusion that states may be better off choosing to

send signals involving audience costs than signals involving sinking costs.

My question, though, on the effects of mobilization on crisis bargaining is still relevant. Even if states *never* use military mobilization solely as a signal, it is still worthwhile to study the consequences of mobilization since states mobilize when they expect to fight (Lai, 2001). Mobilization comes before the fighting starts, so in principle states always have the potential to reach a negotiated settlement after they mobilize but before they fight. Even states that choose to send a signal of the audience-cost variety may still find themselves mobilizing at some point in the crisis.²

In this respect, although I frame the story in a limited way about mobilization, my argument is as much about the conduct of negotiations in war as it is about bargaining before a war. As several authors have noted recently, bargaining continues after war states, and war processes influence international bargaining (Gartner, 1998). Wagner (2000) notes that bargaining continues after war starts in a way that can change the terms of settlement. Smith (1998b) models state behavior during wars, but his focus is on the domestic electoral process. He also combines the issue at stake with power resources, so that if a state gains more territory it gets more of a military advantage. Once states fight the initial stages of a war, they can still negotiate over a settlement. To the extent that early fighting sinks costs, the negotiating environment will have been changed by the act of fighting.

A formal model

In the game, two states, A and B, bargain over the distribution of some good. If they reach a settlement they live with whatever deal they have struck, if not they fight a

² I could complicate the model I use here two further assumptions that might make it more realistic. One is that mobilizing could by itself create domestic audience costs for a leader, and the other is that mobilization sooner rather than later could give a state a military advantage that would either make the outcome of fighting more favorable to the state or reduce its fighting costs. These two are, essentially, equivalent. However, they blur the distinction between cost-sinking and audience costs, but I hope to show the independent effects of cost-sinking.

war. For simplicity, I make the game one-sided, with state A choosing whether or not to mobilize its military and state B choosing how much of a concession to make to A.

Structure of the game

At the first node, Nature makes a move, choosing some parameters. In the complete information version of the game, this move is trivial since I assume that the parameters are known to both states; in different incomplete information versions Nature draws different parameters and reveals these to state A but not state B. I describe these different versions later.

[Figure 3 about here.]

At node 2, state B offers A a deal. This deal, D_2 , can be any real number. A positive value for the deal means that B offers A something, while a negative value means that B demands something; in the logic that follows the distinction is unimportant (although the story is more intuitive when the deal is a positive number – a concession).

At node 3, A decides whether or not to accept the deal that B has offered. If A rejects the deal, it mobilizes its military and the states proceed to node 4. If A accepts the deal, then the two states live under its terms.

At node 4, state B has a chance to make A another offer. Here, B offers D_4 , which can be any real number.

Finally, at node 5 A can either fight or, by not fighting, accept B's new offer. Fighting results in a transfer of P from B to A; as with D , P is any real number, so that if P is negative it represents a transfer from A to B.

If the states end up fighting, A's payoff is $P-M-F$. That is, A gets a division of the good P . In fighting, A pays both a mobilization cost M and a fighting cost F . B's cost from fighting is $-P-C$, since it loses P to A and C represents the cost of fighting to B. Assume that M , F , and C are all greater than 0.

If A accepts B's offer D_2 , then A's payoff is D_2 and B's payoff is $-D_2$. If A accepts B's offer D_4 , after A has already mobilized, then A's payoff is D_4-M and B's payoff is $-D_4$.

Game with complete information

Since the players have no uncertainty, the game can be solved with backwards induction. At node 5 A chooses to accept B's offer if $D_4 - M > P - M - F$, which reduces to $D_4 > P - F$.

At node 4, B wants to make the smallest offer to A that it can get away with – the smallest offer that A will take rather than fight. B's choice will be to set D_4 to be a trivial amount greater than $P - F$, a deal that is, for A, a trivial amount better than what it can get from fighting. This gives B a better payoff than fighting (since B gets the equivalent of $-P + F$ from this deal instead of $-P - C$ from fighting, and by construction F is greater than $-C$).

At node 3, A knows that if it chooses to mobilize it will get a payoff of $D_4 - M$, where $D_4 = P - F$. Its net payoff will therefore be equal to $P - M - F$. So, A will choose to take the deal D_2 as long as D_2 is even trivially better than $P - M - F$. (More precisely, an amount trivially better than an amount trivially better than $P - M - F$, a distinction that is unimportant for substantive interpretation.)

At node 2, B wants to make an offer D_2 that A will accept. Why? State A will accept D_4 if it is at least $P - F$. State A will accept D_2 , however, if it is at least $P - F - M$. That is, the minimum acceptable (to A) offer D_2 is M less than the minimum acceptable offer D_4 .

So, in equilibrium, state B at node 2 offers A a deal D_2 that is trivially better than $P - F - M$. Not only do the states never fight in this complete information game, but also state A never even mobilizes its military in the first place.

Two straightforward implications merit further discussion.

First, $D_4 > D_2$. As a state mobilizes its military for war, its demand increases. This is a simple consequence of the fact that mobilization irretrievably sinks some of the costs of fighting, so that, once mobilized, a state is harder to buy off than it was before. If nothing else, then, this argument shows that military preparations for war influence the outcomes of interstate bargaining.

Second, with complete information states never prepare for war. If states all know what the costs of military mobilization would be, then they would never mobilize. For all of the same reasons that states that are fully informed, rational, and unitary never

fight wars (Fearon 1995), such states will also never prepare for war. That is, they can anticipate exactly what effect that costly military preparations will have on the outcome of bargaining, and so they would jointly choose to avoid those costly preparations by choosing a settlement informed by their common knowledge of what the bargaining outcome would be, were they to arm themselves.

This has a further implication for the study of international politics generally. Erik Gartzke (1998) demonstrates that to the extent that states are rational unitary actors for whom war is costly, scholars will never be able to precisely specify in advance the conditions under which states will fight wars. Since wars are accidents, the best we can do is show instances in which accidents are unlikely; any indicators that a given war is inevitable would cause rational leaders to adjust their behavior to avert it. The same logic, as my argument shows, applies to military mobilization. By extension, of course, it applies to all sorts of military preparations. In a world of states that are perfectly informed about what their military capabilities would be if they choose to develop them, no states would ever build militaries, and so no theory could ever completely account for militarization. In Gartzke's terms, not only is war in the error term, so are all armies as well.

In the following three subsections I engage in some speculation about the potential effects of military mobilization when states are imperfectly informed. These models are speculative, since the potentially interesting results – those having to do with the relationship between the costs of military mobilization and the probability of war – are sensitive to particular assumptions about the states' prior beliefs and the information they have initially. In three variations, I assume that A is perfectly informed throughout. B, however, can be poorly informed about M, about F, or about both.

B is poorly informed about M

Suppose that state B knows how costly A expects fighting to be but does not know how costly mobilization is for A.³ That is, B knows F but it can only make a guess

³ This situation, where B knows F but not M, seems intuitively implausible since costs over fighting are likely to be more uncertain than costs over mobilization. There may be some situations, however, that come close. Consider the 2001 crisis between the United

about M . Formally, in the first move of the game Nature draws M from a uniform distribution ranging from M_{low} to M_{high} and reveals that choice to A but not to B. Even after state A mobilizes at node 3, B still does not observe how costly it was. At node 5, A still chooses to accept B's offer if $D_4 > P-F$. So, even in a situation where A mobilizes, B can (and will) always be able to avoid war by giving A enough of a concession at the last minute to make A choose to not fight.

The question of when A will mobilize in the first place has a straightforward answer. At node 3, A knows that if it mobilizes it will get a payoff of $P-F-M$ – that is, the offer it gets from B at node 4 minus the costs of having mobilized. So, it mobilizes if $D_2 < P-F-M$, otherwise it accepts the offer D_2 . B knows that if it offers A a deal $D_2 = P-F-M_{low}$ then A is certain to accept. If B makes an offer that is, say, halfway between $P-F-M_{low}$ and $P-F-M_{high}$, then there is a .5 chance that A will accept and a .5 chance it will reject. Since there is no updating in this model, B maximizes its payoff by setting D_2 somewhere between $P-F-M_{low}$ and $P-F-M_{high}$ to maximize its payoff function, which is simply the probability that A will accept the offer D_2 times the payoff to B of the offer plus the probably that A will reject the offer times the payoff to B of the final offer D_4 :

$$\left(\frac{D_2}{M_{high} - M_{low}} \right) (-D_2) + \left(1 - \frac{D_2}{M_{high} - M_{low}} \right) (-P + F)$$

The point of this version of an incomplete information crisis bargaining game is to show that, even when the costs of ultimately fighting are known, there is some chance that states will still mobilize their militaries if there is uncertainty about the costs of mobilizing. Interestingly, then, even if the cost of war is known, rational states may still prepare for war if there is incomplete information about states' capabilities earlier in the chain of military preparations.

States and the Taliban regime in Afghanistan, where most of the uncertainty over the costliness to Americans of the war revolved around the costs of securing basing and overflight rights from Pakistan and the Central Asian Soviet successor states.

B is poorly informed about F

A more realistic assumption, perhaps, is that B knows what cost A pays for mobilizing but does not know what cost A pays for fighting. Formally, in the first move of the game Nature draws F from a uniform distribution ranging from F_{low} to F_{high} and reveals that choice to A but not to B. In this version, there is the potential for state B to update its beliefs about A's fighting costs by observing how A responds to B's initial proposal D_2 .

In this version, because B continues to be uncertain about the value of F at node 4 when B makes its final offer, there is the potential for the states to fight a war. As before, A accepts D_4 if $D_4 > P-F$. At least under some payoff conditions, B will not necessarily tailor its offer so that A would prefer it to war for *any* possible value of F . Rather, B will choose value a D_4 to optimize between two goals of give smaller concessions to A and keeping the risk of war low. Call the deal that B offers A in equilibrium at node 4 D_4^* .

At node 2, B wants to keep its concession low, but it would also ideally like to have at least some chance that A will accept its offer. As in the case with complete information, B is better off having A agree to a deal before A mobilizes, since A will demand less before mobilizing than after mobilizing. Call the deal that B offers A in equilibrium at node 2 D_2^* .

State B uses its offer at node 2 to try to buy off A before it mobilizes. If that attempt fails, B has one more chance to make an offer at node 4. Consider a strategy where B sets $D_4^* > D_2^*$. That is, if B makes an offer to A and then A rejects it and mobilizes, B makes another offer to A that is more favorable to A than the one B originally offered. This strategy seems reasonable for two reasons. First, state A will always need a greater concession to avert war after it has mobilized, regardless of its cost of fighting, because mobilization costs will then be sunk. Second, state A is more likely (or at least never less likely) to mobilize if its costs of fighting are lower.

In equilibrium, $D_4^* = D_2^* + M$. To see why, begin by considering the conditions under which state A will bluff. At node 2, B may make an offer that is more than enough to make A prefer taking the offer to mobilizing and fighting. But, A may mobilize anyway, hoping that the later offer D_4 may be even better for A even net of the costs of mobilizing. That is, if $D_2^* > P-M-F$, A would rather take that deal than end up at the

node where it fights a war. But if D_4^* is bigger than D_2^* by more than A's cost of mobilizing, or $D_4^* > D_2^* + M$, A will reject D_2^* anyway. Bluffing by mobilizing will eventually get A a better deal.

However, if $D_4^* > D_2^* + M$, then A will always reject the initial offer and hold out for more. So, this value for D_2^* does not do anything useful for state B, since it does not help it separate out a type of A with high fighting costs that can be easily bought off. Therefore, $D_4^* > D_2^* + M$ is not an equilibrium.

What about an equilibrium where $D_2^* + M > D_4^* > D_2^*$? That is, B's later offer is still bigger than its earlier offer, but it is bigger by less than the value of M. This equilibrium would discourage A from bluffing, since A will always be worse off taking the deal after mobilizing than taking the deal before mobilizing. For this reason, state A would never accept the second offer D_4 if it rejected the first offer D_2 . So, $D_2^* + M > D_4^*$ cannot be an equilibrium, since B would be better off offering a greater concession at D_4 or a smaller initial offer at D_2 .

So, in this situation, the only equilibrium values of the deals B offers are such that $D_4^* = D_2^* + M$. Here, state B sets D_4^* to maximize its payoff given, for D_4 , the probability that A will fight multiplied by B's payoff to fighting, plus the probability that A will accept the deal multiplied by B's payoff to the deal, or:

$$\left(\frac{D_4}{F_{high} - F_{low}} \right) (-D_4) + \left(1 - \frac{D_4}{F_{high} - F_{low}} \right) (-P - C)$$

In this case, the probability of a breakdown and war is not in any way influenced by either the size of the cost of mobilization or the uncertainty around it. That is, the effect of sinking costs precisely offsets any effect of signaling; any information that is transmitted by the act of mobilization is rendered useless by the act itself.

B is poorly informed about both M and F

Finally, consider a game where B does not know with certainty either the cost A pays for mobilizing or the cost A pays for fighting. Formally, in the first move of the game Nature draws F from a uniform distribution ranging from F_{low} to F_{high} , draws M

from a uniform distribution ranging from M_{low} to M_{high} , and reveals both of these choices to A but not to B. Assume that F and M are drawn independently (that is, they are uncorrelated).⁴

It remains the case that $D_4^* > D_2^*$ for all the same reasons as before. However, now that B does not know M, it cannot set $D_4^* = D_2^* + M$ with certainty. Therefore, there is the possibility that A might bluff, especially if it draws a low mobilization cost but a high war cost, since B might increase its offer from D_2 to D_4 by more than the cost of mobilization. There is also the possibility that, as a hedge against bluffing, B might increase its offer by less than the cost of mobilization, meaning that the states could be essentially doomed to fight from the instant A rejects B's first offer and mobilizes.

Consider B's choice at node 4. As in the previous version, state B sets D_4^* to maximize its payoff. It optimizes between the two goals of making an offer that is better for itself (by making less of a concession) and making an offer that will keep the risk of war low (by making more of a concession). Its optimization problem here different from the one in the previous section, however, because the first several moves – its earlier offer that A can accept or reject – may change B's expectations about A's likely costs of fighting. That is, B wants to maximize its payoff by choosing an offer D_4 that maximizes the probability that A will accept the deal given that it has chosen to mobilize multiplied by B's payoff to the deal, plus the probability that A will reject the deal given that it has chosen to mobilize multiplied by B's payoff to fighting, or:

$$pr[(D_4 \geq P - F) | M](-D_4) + pr[(D_4 < P - F) | M](-P - C)$$

To what extent can B's initial offer, D_2 , act as a screening mechanism to help it calibrate its final offer D_4 ? If B makes a very low offer at node 2, then A will always reject it and B will be no better off, while if B makes a high offer at node 2 then A will always accept it and B will also be no better off.

⁴ In another possible variation, M and F could be correlated with each other. This might be realistic if both M and F are themselves partly functions of some other common variable such as the extent to which state A subjectively values the good the states are bargaining over.

Consider a strategy where B sets $D_4^* = D_2^* + M_{\text{mid}}$, where M_{mid} is the midpoint between M_{low} to M_{high} (that is, the *ex ante* expected value of M). There are two different motives for A to mobilize under in this situation. First, state A will choose to mobilize whenever its actual cost of mobilizing is less than M_{mid} . This is because A will always get an offer at node 4 that is better for it by more than the cost of mobilizing, so mobilizing pays off even if A has no interest in actually fighting. So, A's interest in mobilizing in this situation is completely independent of its cost of fighting.

The second motive, however, does depend on the relative costs of mobilizing and fighting. Suppose that the range of possible fighting costs, from F_{low} to F_{high} , is much higher than the range of possible mobilization costs, from M_{low} to M_{high} , and that A draws a relatively high value of mobilization costs but a low value of fighting costs. That is, while $M < F$, M is still more than B might initially expect and F is less than B might initially expect. If the states are in a situation where B optimizes at node 5 by choosing a final offer that is less than what A would prefer to war, and since A will be able to anticipate B's equilibrium strategy in advance, A may know from the beginning that it will mobilize and then fight because B's offer will not be big enough.

This motive is most likely to be present when the possible range of M is low relative to the possible range of F. The larger the range of possible mobilization costs, the more mobilization costs play a role in deterring A from fighting, since mobilization in the first place is more expensive. Higher possible ranges of M mean that a bad draw on M provides more of a disincentive for A to fight.

So, when B sees A mobilize, it knows there is some chance that A mobilized because its mobilization costs were low. The higher the range of possible mobilization costs is relative to the range of possible fighting costs, though, the more there is the possibility (from B's perspective) that A mobilized because it actually plans to fight, despite its high mobilization costs, because A has a lower cost of fighting.

So, all else equal, it might seem that the more fighting costs are greater than mobilization costs, the more B would be better off by increasing its final offer D_4 to be greater than D_2 by more than M_{mid} . That is, when fighting costs are greater than mobilization costs, B lowers its estimate of state A's fighting costs given that A has chosen to mobilize. Furthermore, the greater the difference between fighting and

mobilization costs, the more B will lower its guess about A's fighting costs. So, all else equal, B would be better off raising its offer D_4 to be greater than $D_2^* + M_{\text{mid}}$ when fighting costs are greater than mobilization costs, and the additional increase in D_4 should be greater the greater the difference in fighting and mobilization costs. This, after all, would make B better off since it would make use of information it learns from the rejection of its initial offer. So, low mobilization costs relative to fighting costs could *reduce* the probability of war eventually breaking out by helping B better to tailor its final offer.

Unfortunately for B, not all else is equal. The greater the difference between D_2 and D_4 , the more likely it is that state A will mobilize because it has a low (or now even an intermediate) mobilization cost and just wants to take advantage of the possibilities of bluffing. That would, in turn, reduce the informative effects of mobilization as a signal, which would cause B to bring D_4 back down again. So, low mobilization costs relative to fighting costs could instead actually *increase* the probability of war eventually breaking out by hopelessly muddying the informative signal that mobilization sends, reducing B's ability to tailor its final offer.

Because of the players' uncertainties around mobilization and fighting costs, there is no guarantee that the signaling and cost-sinking effects of mobilization will exactly cancel each other out, as they did in the version where B is only uncertain about F but not M. The size of the difference between fighting and mobilization costs can therefore change the probability of a bargaining breakdown and war.

On balance, do higher mobilization costs relative to fighting costs increase or decrease the chances of war? Without further assumptions, the answer is unclear. At a minimum, the answer would depend on how wide the range of uncertainty B has about A's costs, the extent to which B values getting a better deal for itself versus avoiding the costs of fighting, and A's willingness to risk war in order to get a better deal for itself. Each additional assumption required to get a clearer answer reduces the extent to which the model can usefully be applied to the general problem of bargaining, which is why I see this result as speculative. On some level, though, it seems that with imperfect information the relative size of mobilization and fighting costs could influence the probability of war, even if it is unclear how.

Discussion and Conclusion

The argument I propose in this paper is that when costly military mobilization reduces the marginal costs of war a state faces if it later has to fight, mobilization changes the nature of the last-minute bargaining that states might engage in as they try to avert war. Specifically, as a country mobilizes, its demands increase. Even though mobilization might provide information to an opponent about a state's resolve, and can thereby help states resolve a crisis with a mutually-preferred settlement, a cost-sinking effect might sometimes outweigh the signaling effect and cancel out any useful information that is transmitted. In a speculative discussion of bargaining when there is uncertainty about these two costs, I suggested that the overall size of mobilization costs relative to fighting costs might influence the probability that the states end up in war, although the direction of causality is not clear without further assumptions.

Given changes in the distribution of capabilities in the world, many crises the U.S. is likely to face will be with states in which the actual costs of fighting are likely to be low relative to mobilization costs. Thus, questions about the cost sinking effect of military mobilization are probably worth asking. My argument suggests some possible reasons why the structure of mobilization could influence the onset of wars, a relationship that might be profitably explored with future empirical work.

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Figure 1: Pre-crisis situation.

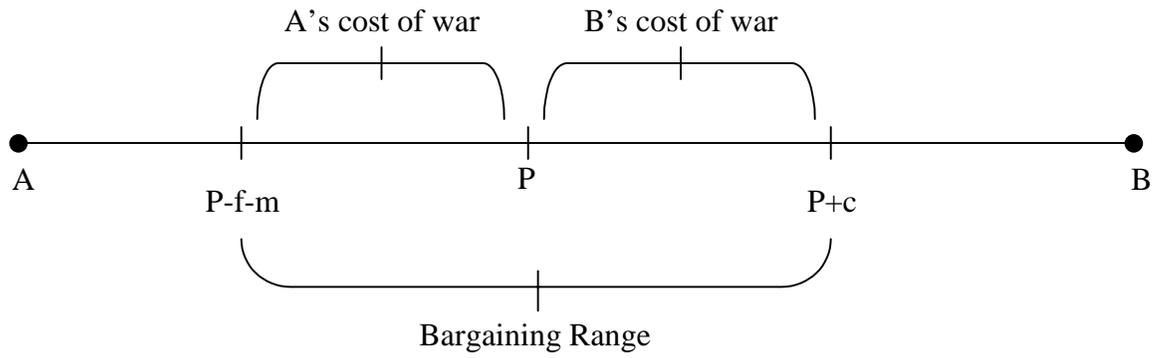
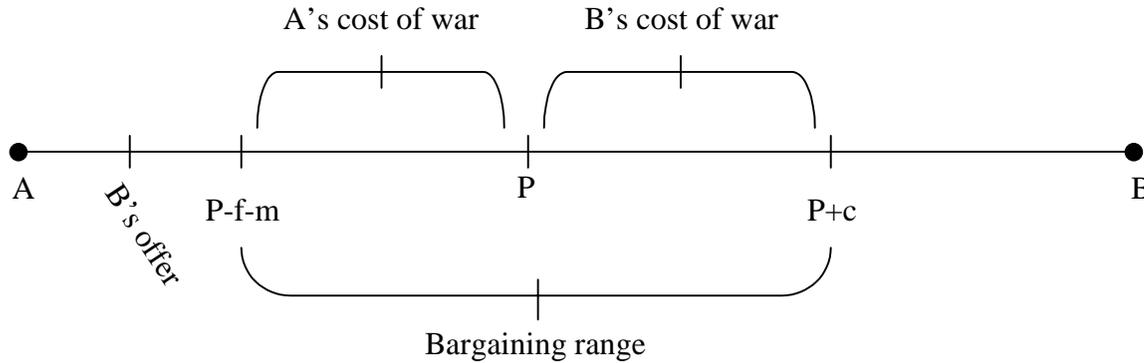


Figure 2: The effects of mobilization on bargaining.

Suppose B (mistakenly) makes a take-it-or-leave-it offer that A finds unacceptable:



A rejects B's offer by escalating. B learns something about the boundaries of the minimal deal A will accept. Since A also pays the mobilization costs of war, the remaining cost of war for A shrinks and the bargaining range contracts.

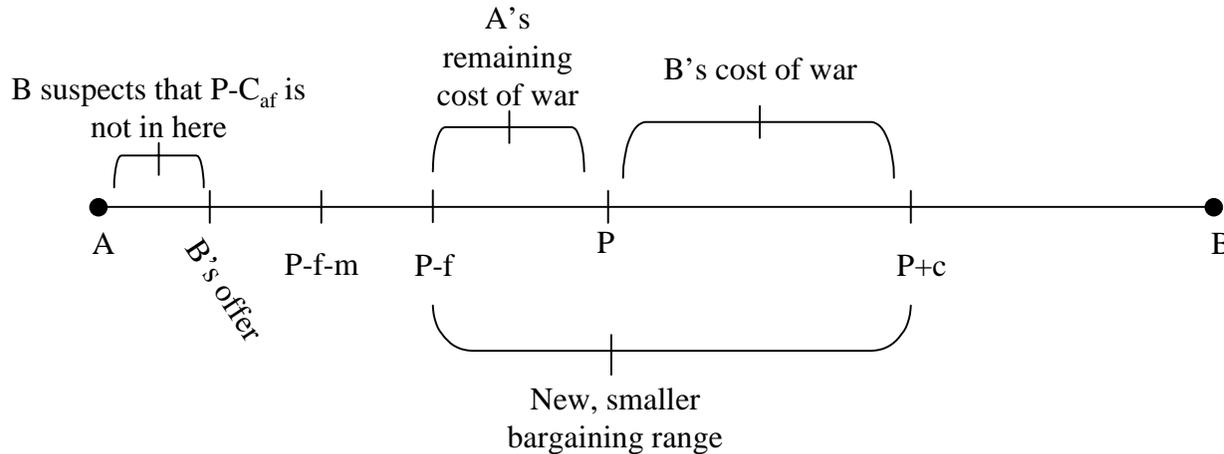


Figure 3: Extensive Form

