



RESEARCH ARTICLE

Weak sovereignty and interstate war

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Abstract

International agreements save the costs of war, but complying with their terms can be costly. We analyse a model of interstate crisis bargaining in which one state may be unwilling or unable to make a costly investment that guarantees its subjects' compliance. In equilibrium, peace is assured when the domestic government is militarily strong enough to demand terms that its subjects tolerate. When the domestic government is militarily weaker, peace requires that the foreign state compensate it for either the costs of enforcement or its subjects' violations, and these prospective costs of peace may also lead the foreign state to solve the enforcement problem with war because peace is relatively costly. We also show that war due to enforcement problems is more common in militarily weak states and that equilibria at which the foreign state subsidizes enforcement are more common when the costs of violation fall disproportionately on the domestic state. The American invasion of Mexico in 1916 and the Red Army's peaceful withdrawal from East Germany in 1989 demonstrate the model's usefulness.

Keywords: war; bargaining; enforcement; sovereignty; compliance

When states negotiate – over borders, exchange, transfers, or policies – they consider what bargains each accepts in lieu of war and how easily each can deliver their subjects' compliance. Models of bargaining and war typically focus on the first problem, assuming that states can implement agreements at no cost.¹ But international agreements sometimes require governments with no desire to cheat to enforce compliance on subjects that do wish to cheat. Some armies want to keep fighting for parochial or partisan interests,² like Japan's Kwantung Army in Manchuria during the 1930s³ or the French army during Algeria's war for independence.⁴ Transnational militant groups, like the Sultan of Sulu's followers who

¹See Fearon 1995 and most of the work that follows.

²Altman and Lee 2022.

³See Anderson 2022/23; Paine 2012, chs 2, 6.

⁴Horne 1977.

invaded Malaysia from the Philippines in 2013, may seek to resolve territorial disputes without government approval.⁵ Firms and traders, like those along the border between the Song and Khitan Liao Empires in 11th century northeast Asia⁶ or the merchants-turned-smugglers shut out of the East Asian maritime trade by Ming prohibitions in the 15th century,⁷ sometimes flout new restrictions on long-established patterns of exchange. Finally, rebels or irredentists may wish to continue cross-border activities that destabilize foreign governments or support friendly insurgencies, like the *Villistas* of the Mexican Civil War and Serb nationalists agitating in Austrian Bosnia before the First World War. These enforcement problems entail two kinds of cost. First, governments may need to invest in monitoring and enforcement to deter or punish those that would violate the agreement. Second, if agreements are violated, governments suffer in distributive terms and in the eyes of domestic and international audiences, who may doubt their ability to deliver on sovereign promises. How do these costs of enforcing – or failing to enforce – agreements shape interstate bargaining and the chances of war?

Most work on compliance and the credibility of commitments explores state incentives to violate agreements in response to changing circumstances, abstracting away from domestic enforcement costs and international contention over who internalizes those costs. Rising states have trouble convincing rivals that they won't revise the status quo,⁸ belligerents struggle to convince one another that they won't exploit armistices to restart hostilities,⁹ incumbent leaders can't bind their successors to inherited foreign policies,¹⁰ and monitoring problems can prevent states from reassuring one another that they won't renege on agreements once the threat of war passes.¹¹ Governments can perfectly control defection in these models; desired compliance is automatic, because defection depends solely on government preferences and actions. We consider a different class of enforcement problems in which (a) governments negotiate with foreign states but (b) compliance depends on the choices of domestic actors – civilians, armies, militants, firms etc. – that must be deterred from violating agreements via threats of punishment.¹²

In our model, a domestic government contends with both a foreign state and a domestic group able to unilaterally violate international agreements. The enforcement problem may derive from 'incomplete sovereignty'¹³ or state weakness, where governments 'have failed to consolidate political power within the territories over which they are the legally recognized authorities,'¹⁴ or from government-military factionalism.¹⁵ The domestic government may have to expend considerable effort to guarantee the compliance of subjects that are under its jurisdiction but can

⁵Poling et al. 2013; see also Samad and Bakar 1992.

⁶Tackett 2017.

⁷Von Glahn 2020; Haggard and Kang (2020).

⁸Fearon 1995, 404–8.

⁹Leventoglu and Slantchev 2007.

¹⁰Wolford 2007, 2018.

¹¹Schultz 2010.

¹²See also Bapat 2006; Kydd and Walter 2002.

¹³Lee 2018, 283.

¹⁴Lemke 2003, 117.

¹⁵Cochran 2016.

ignore its writ, and we show how the costs of these efforts can be passed on to foreign states and how they can cause interstate war. The costs of ensuring domestic compliance with international agreements are common in models of international law and institutions¹⁶ yet typically abstracted away from in models of crisis bargaining. But from *de facto* states,¹⁷ territorial contenders,¹⁸ and militants to angry traders, cross-border kin, and ambitious armies, domestic groups can violate agreements and influence whether their states go to war. We incorporate these groups into international relations theory by modelling the challenge of bringing them under sovereign control, which implicates both domestic sovereignty and bargains struck with foreign states, recognizing that war and peace depend on a diversity of actors, not just ideal-typical territorial states.¹⁹

We show that, when peace entails domestic enforcement costs, states may fight because war is relatively cheaper,²⁰ seizing territory and resources to make the other side's compliance moot or eliminating another party's noncompliant factions, even if the fighting doesn't engage government forces. When the international distribution of power allows the domestic state to demand generous terms with which its subjects comply, peace is the unique and efficient equilibrium outcome. But when the domestic government is militarily weaker, it accepts settlements its subjects may be tempted to violate, requiring that it be compensated with more generous terms than power alone would indicate, whether for investing in enforcement or tolerating relatively minor violations. However, when either the costs of subsidizing enforcement or inevitable violations are too high, the foreign state solves the enforcement problem with war. After using the model to discuss Mexican–American relations during the former's civil war and East–West relations during the collapse of Soviet authority in Eastern Europe, both of which involved challenges for governments tasked with enforcing compliance on domestic factions unhappy with international agreements, we conclude with implications for analyses of domestic politics and international relations, most of which assume effective sovereignty, and applications to war termination.

Model

Suppose that two states, foreign (F) and domestic (D), bargain in the shadow of war over a continuously-divisible, unit-valued pie representing a bundle of issues at stake between them. F is unitary and cares only about securing as much of the pie as possible at minimal cost. D is non-unitary, such that its government (G) may need to enforce compliance on some group of subjects (S) that can unilaterally violate international agreements but that does not itself bargain with F .²¹ S can

¹⁶Baccini and Urpelainen 2014; Dai 2005, 2006.

¹⁷Florea 2014.

¹⁸Lemke and Crabtree 2020.

¹⁹See also Bremer and Ghosh 2003; Henderson 2009; Lemke 2003, 2011, 2019.

²⁰Coe 2011; Wolford 2024.

²¹Governments sometimes negotiate with nonstate actors like militant groups in others' recognized territory (Bapat 2006), but we are interested in a broader class of potential violators—not only rebels or militants but also firms, smugglers, farmers, soldiers, and so on—where negotiations occur between governments. Among the class of negotiations that occur in the shadow of enforcement problems, our bet is that foreign states try to talk to the government first before using force (Carter 2015).

represent civilians, firms, bureaucrats, militants, or armies, all of which can flout borders, restrictions on exchange, or domestic policies aimed at stanching cross-border externalities. G has exclusive power to negotiate with the foreign state over war and peace,²² but S may violate agreements for private gain, creating a problem of compelling it to comply with agreements. G can make violations costly for S , but credibly committing to these measures can be difficult. The Philippines' (G) territorial dispute with Malaysia (F), of which the former's Sulu minority (S) has as recently as 2013 overtly violated the prevailing settlement, is a useful example. The Philippines would like its claim to Sabah recognized, but the government has proven less willing than its Sulu subjects to risk war with Malaysia over the issue, especially as it prioritizes dealing with insurgencies in other parts of Philippine archipelago.²³

In Figure 1, F makes a proposal that allocates $x \in [0, 1]$ to itself and $1 - x$ to G and S . Payoffs are linear in shares of the pie, such that players are risk-neutral. G can reject the proposal, resulting in a costly war that imposes a settlement on all players, or accept, after which it makes an upfront investment $y \geq 0$ in enforcement, at marginal cost $k > 0$, which imposes a penalty $y \geq 0$ on S should it violate the agreement. Marginal costs are higher when resources are tighter – e.g., if G has a small budget or faces many demands on fixed resources – and lower when there are more resources available for monitoring or redirecting the efforts of domestic security forces. For S , the penalty can be legal or extralegal, monetary or physical, and though imposing it is costly on both domestic parties, costly efforts are often optimal solutions to ensuring compliance with government policy.²⁴ S avoids punishment if it complies, allowing the agreement with F to stand.

Next, an efficient outcome entails the states avoiding war by reaching an agreement with which S complies despite G making no investment in enforcement ($y = 0$). This in turn implies three different types of inefficiency. First, war destroys a share of the pie, leaving a surplus to be shared if governments can avoid war. In the canonical crisis bargaining model with costless peace, this guarantees the existence of an *ex post* bargaining range of agreements that would've left both states better off than fighting.²⁵ Second, if S violates an agreement, it imposes costs on both governments, reducing their enjoyment of their shares of the pie and, in G 's case, denting its reputation for effective sovereignty. Finally, investments in enforcement are also directly costly for the domestic government, demanding investments in monitoring and coercive capabilities that would be unnecessary or directed elsewhere if S had no incentive to violate.

Reduced-form war payoffs $w_i > 0$ represent the resolution of both the international bargaining problem and G 's enforcement problem. First, war can eliminate one side, allowing the victor to dictate the distribution of the pie and, if G wins, render compliance moot by eliminating temptations to violate, since $v_S x = 0$ when $x = 0$. Second, fighting can eliminate or degrade S 's ability to violate, whether

²²See also Kydd and Walter 2002, 266, who let a majority of moderates serve as the interlocutor with the other side, while an extremist faction may attempt to spoil pre-game peace deals.

²³Poling et al. 2013.

²⁴Padró i Miquel and Yared 2012. This is also an important scope condition: if S could be compensated with a transfer and if such a transfer were costless (cf. Davis 2023), enforcement wouldn't be a problem.

²⁵Fearon 1995.

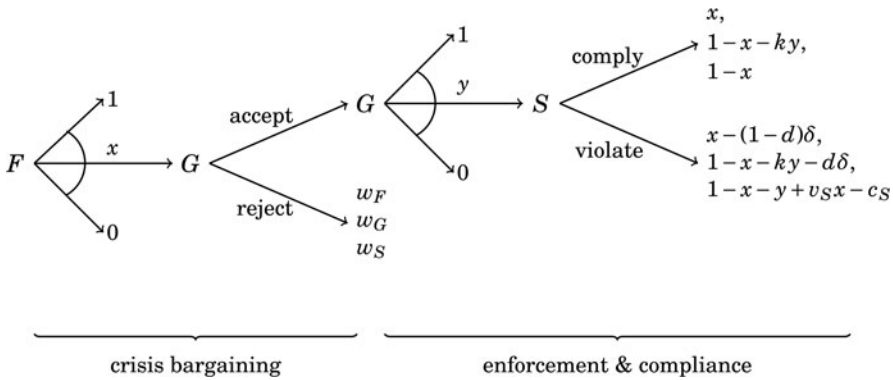


Figure 1. Crisis bargaining and domestic enforcement problems.

(a) the foreign state attacks *S* on *G*'s territory, like American-led coalition operations against the Islamic State in Syria during the latter's civil war, or (b) a government uses war to eliminate or undermine its own troublesome faction.²⁶ War is costly for the states involved,²⁷ so we assume that

$$w_F + w_G < 1. \tag{1}$$

We make no assumption about *S*'s war payoff (w_S), but this is without loss of generality, since (a) our definition of war renders *S*'s incentives irrelevant and (b) our solution concept rules out non-credible threats on *S*'s part that might influence whether war occurs.

Violations produce private benefits for *S* that range from the material to the ideological, but they entail upfront and, if $y > 0$, *ex post* costs. Disgruntled armies may continue fighting, like English formations in France near the end of the Hundred Years' War,²⁸ or begin a war of conquest without authorization from the centre, like Japan's Kwantung Army garrisoning Manchuria in the 1930s.²⁹ For firms and pirates, smuggling proscribed goods and other forms of tax non-compliance require investments in concealment and subterfuge that can boost profits above what's possible under the law. Finally, locals may harass foreign citizens, firms, and officials over outsized influence, like the Boxers whose violent rejection of foreigners in China prompted intervention against the Qing Empire in 1900.³⁰ Next, the harsher the terms for the domestic state – the more the government concedes, the more extensive the limits on trade, the more sovereignty conceded to foreign powers – the greater the benefits *S* receives from violating. Had the Qing yielded less in agreements with the other imperial powers, for example, the

²⁶Chiozza and Goemans 2011, ch. 2; Powell 2006, 189–92.

²⁷That *G* could gain things from war to which it might not have access otherwise, like political power or rents Lujala et al. 2005 is plausible, but it represents a distinct mechanism for war (Davis 2023; Powell 2006, 189–92; Wolford 2014).

²⁸Cochran 2016, 1.

²⁹Anderson 2022/23; Paine 2012, chs 2, 6.

³⁰Xiang 2003.

Boxers would've gained less from violating those agreements. Formally, S pays $c_S > 0$ upfront to violate, on the assumption that compliance requires fewer (net) resources than violation, in addition to whatever penalty the government sets, in return for a private benefit $v_S > 0$, whose size we scale to the harshness of the settlement ($v_S x$).³¹ To isolate the causal mechanism of interest, however, we assume that v_S is small enough to ensure that violation can never produce a payoff for S greater than complying with the most favourable possible agreement ($x = 0$).

States suffer when settlements are violated, including direct reductions in the value of the agreement and political costs for failing to deliver compliance.³² Both F and G lose some of the gains from cooperation, but G may also pay a sovereignty cost when its subjects flout agreements, undermining other countries' faith in its reliability, its subjects' confidence in its ability to maintain order, deter criminality, or control disasters, disease outbreaks, or insurgencies.³³ Violations impose a total cost $\delta > 0$ on the states, but it can fall unevenly across them, such that G internalizes a share $d \in (0, 1)$, paying $d\delta$, while F pays $(1 - d)\delta$. In the 11th century, for example, imperial officials of the Northern Song Dynasty encouraged traders to violate the border with the Khitan Liao Empire.³⁴ Smuggling lined the pockets of both traders and local officials, but it denied tax revenues to both imperial centres. In this case, the costs of violation are shared roughly equally, and d approaches $1/2$. But in 1914, elements of the Serbian government materially supported the plot to assassinate Archduke Franz Ferdinand in Sarajevo.³⁵ Arming transnational militants trying to undermine a foreign government violated international borders, i.e. the foundational agreements of the interstate system, and while it imposed some costs on G – Prime Minister Nikola Pašić's ability to control his security apparatus was publicly compromised – the costs fell disproportionately on the Hapsburgs trying to consolidate rule over a newly-annexed province. Unlike cross-border smuggling, d in this case would be relatively low.

In contrast to models in which peace enjoys automatic compliance, settlements in our story can pose a costly political problem for the domestic state and, depending on the outcome of interstate bargaining, for the foreign state as well. We share a focus on the costs of peace with studies of deterrence,³⁶ war finance,³⁷ and containment,³⁸ though we endogenize the inefficiency of peace by highlighting attempts (or failures) to shape the choices of a domestic group dissatisfied with the settlement. In contrast to Padró i Miquel and Yared, whose principal (for us, F) uses force occasionally to discipline the behaviour of an agent (G) whose effort is

³¹We tie v_S to x to represent disagreements between S and G over the attractiveness of the settlement, which is distinct from other motives S might have to defy the government, like securing domestic spoils from a favourable agreement. In our model, S is happy to comply if the agreement is favourable enough. And as shown in Propositions 2–4, the product $v_S x$ also ensures that the attractiveness of violating is related endogenously to G 's military power.

³²Bapat 2006, 2012; Kydd and Walter 2002; Schultz 2010.

³³See also Lee 2018.

³⁴Tackett 2017, 125.

³⁵See Clark 2012, ch. 1.

³⁶Powell 2006, 192–4.

³⁷Slantchev 2012.

³⁸Coe 2018.

unobservable, enforcement is perfectly observable in our model; we also allow for bargaining between F and G to shape the resources available for ensuring compliance, where transfers in their model work as *ex post* rewards for desired effort. Other work explores international negotiations in the shadow of domestic groups whose actions are harmful to both host and foreign states,³⁹ but we explicitly model the distribution of those costs across the governments in question. Kydd and Walter⁴⁰ assume that an agreement has already been struck, but we model the international bargaining process explicitly, identifying how potential violations cause war and shape the terms of peace. Schultz⁴¹ studies a model in which one state can unilaterally and covertly change policy, abstracting away from S 's strategic calculus and government efforts to enforce local compliance.⁴² Finally, Carter⁴³ shows how a foreign state that would like to induce the domestic state to crack down on its subjects faces a dilemma, in that force undermines the effectiveness of future local crackdowns, but unlike our model there's no opportunity for interstate transfers to subsidize crackdowns – i.e., enforcement.

Analysis

Our solution concept is Subgame Perfect Equilibrium (SPE), which rules out non-credible threats by requiring that strategy profiles constitute Nash Equilibria in every proper subgame. S can't promise to honour agreements it dislikes, nor can G promise to deliver S 's compliance when enforcement is too costly. After describing how S and G respond to proposals in equilibrium, we discuss SPE when the domestic state is effectively unitary – i.e., when S complies with all settlements even if G makes no enforcement effort – to establish a baseline for comparison against cases in which compliance depends on both the terms of agreement (x) and G 's enforcement effort (y). We show that compliance problems can lead to war through two different paths, both of which see the costs of peace swamping the costs of war. We also describe two types of settlement in which F offers more generous terms than it does when G is unitary, one with concessions made to subsidize enforcement and another with tolerated violations.

Enforcement and compliance

Begin at the final move, which follows G 's choice of enforcement effort ($y \geq 0$). S 's choice depends on two exogenous quantities – the direct costs (c_S) and benefits (v_S) of violations – and two endogenous quantities – both the terms of agreement (x) and G 's enforcement effort (y). Focusing first on enforcement efforts, S complies when

$$y \geq \max\{v_S x - c_S, 0\} \quad (2)$$

³⁹Bapat 2006, 2012; Kydd and Walter 2002.

⁴⁰Kydd and Walter 2002.

⁴¹Schultz 2010.

⁴²See also Bednar 2006.

⁴³Carter 2015.

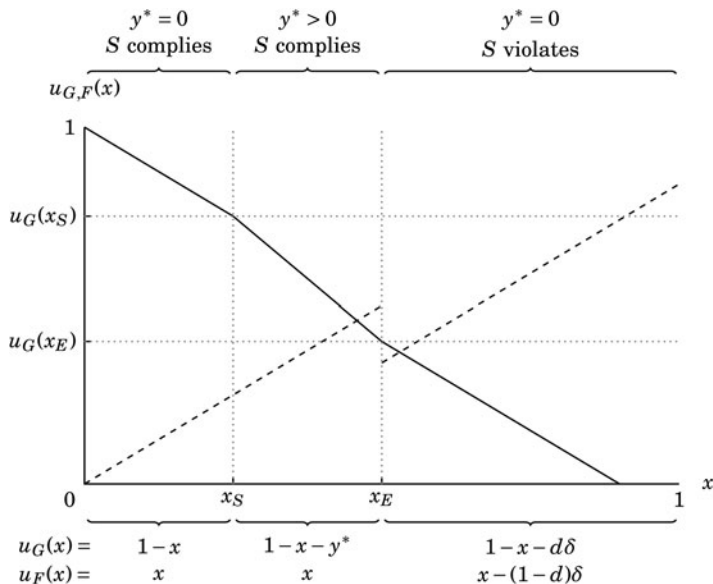


Figure 2. Payoffs $u_{G,F}(x)$ and equilibrium enforcement and compliance strategies when $v_S > c_S$, where $v_S = 0.4$, $c_S = 0.1$, $k = 1$, $d = 0.4$, and $\delta = 0.25$.

Note that when $c_S \geq v_S$, D is effectively unitary, because the right side of Line (2) simplifies to 0 for any x . Proposition 1 below states that war never occurs when D is unitary.

Next, when $c_S < v_S$ such that the upfront costs of violation aren't prohibitive, S 's compliance depends on the agreement (x) and enforcement (y). Figure 2 plots state payoffs, solid for $u_G(x)$ and dashed for $u_F(x)$, for agreement $x \in [0, 1]$, as well as subsequent enforcement and compliance decisions. Like standard crisis bargaining models, G does worse as x increases, but the rate at which payoffs fall increases as harsher settlements encourage violations that G either pays to deter or, as x increases farther, G simply allows. S 's payoff for compliance also falls in x , and it may comply for two reasons, distinguished by whether G or F internalizes the costs of enforcement. First, if F offers sufficient terms, or

$$x < \frac{c_S}{v_S} \equiv x_S,$$

S complies even when G makes no effort ($y^* = 0$), because the gains from violation don't cover the costs given the agreement's generosity. We call $x < x_S$ the *compliance constraint*: when satisfied, S has no incentive to violate. But when the settlement isn't so generous ($x \geq x_S$), G must make a sufficient investment,

$$y \geq v_S x - c_S,$$

to deter violation. As shown in Figure 2, when x crosses x_S , G 's payoffs for an agreement fall faster, because it sets $y = v_S x - c_S$ to ensure compliance. F 's payoffs still increase linearly in this range, as it pays no direct costs, until x passes the *enforcement constraint*, or

$$x < \frac{c_S}{v_S} + \frac{d\delta}{v_S k} \equiv x_E,$$

above which G retains too little of the pie to make enforcement affordable. Accordingly, it sets $y = 0$ and S violates, imposing costs $d\delta$ on G and $(1 - d)\delta$ on F , whose payoffs fall discontinuously at $x = x_E$ as it begins to suffer direct violation costs. When $x \geq x_E$, peace is directly costly for both states. We show next how the costs of peace, both their magnitude and distribution, shape the terms of agreement and the occurrence of war.

Crisis bargaining

With S 's strategy defined, calculating SPE for the full game entails defining (a) G 's acceptance rule and (b) whether F makes a proposal that meets G 's demands. Proposition 1 establishes a unitary-state baseline where war doesn't occur. Moving to the non-unitary case, Figure 2 shows that G 's peace payoffs depend on where F 's proposal falls relative to the compliance (x_S) and enforcement (x_E) constraints, implying three distinct pairings of peace payoffs and acceptance rules. Proposition 2 covers $w_G \geq u_G(x_S)$, where G can threaten war over offers that don't satisfy the compliance constraint. Proposition 3 covers the middling range $u_G(x_E) \leq w_G < u_G(x_S)$, where G accepts some proposals for which it's willing to ensure compliance by setting $y^* = v_S x - c_S$. And Proposition 4 covers $w_G < u_G(x_E)$, where G 's war payoff is so low that it accepts even proposals that it can't credibly promise to enforce.

Proposition 1 describes equilibrium when S 's costs for violating even the most favourable agreements ($x = 0$) are larger than the benefits ($c_S \geq v_S$), rendering the domestic state effectively unitary and ensuring a settlement with which S complies.

Proposition 1. *Let $c_S \geq v_S$, such that G accepts iff $x \leq 1 - w_G$ and sets $y^* = 0$, and S complies for all $x \in [0, 1]$. At the unique SPE, F proposes $x^* = 1 - w_G$.*

At this equilibrium, S complies with any agreement, allowing G to make no enforcement effort ($y^* = 0$). Like the canonical ultimatum crisis bargaining model under complete information and stable power, the costs of war ensure that states avoid it, and F 's proposal power allows it to capture the entire bargaining surplus, $1 - w_G - w_F$. This establishes the importance of enforcement: if either war or a different division of the surplus occurs, it must be when S can credibly threaten to violate at least some agreements.

We now turn to cases where $c_S < v_S$, at which the domestic state is non-unitary. Formally, S finds some agreements profitable to violate. Unless G is strong enough to secure deals with which S automatically complies, it requires more from F in lieu of war than military power alone would indicate, securing more of the bargaining surplus than it does without enforcement problems. Propositions 2–4 describe

Subgame Perfect Equilibria in three ranges of w_G , where F weighs whether to (a) induce war with an unacceptable proposal; (b) meet G 's acceptance constraint at equality, taking as much as possible in an agreement but risking violations; or (c) offer more than necessary to win acceptance – e.g., a proposal generous enough ($x^* = x_E$) to ensure that G enforces compliance.

Proposition 2. *Let $c_S < v_S$ and $w_G \geq u_G(x_S)$, such that G accepts iff $x \leq 1 - w_G \equiv x_l$ and sets $y^* = 0$, and S complies iff $y \geq \max\{v_S x - c_S, 0\}$. At the unique SPE, F proposes $x^* = x_l$.*

Proposition 2 describes cases in which the international distribution of power favours G . At the unique SPE, F 's proposal ($x^* = x_l$) ensures that (a) G accepts and makes no effort at enforcement ($y^* = 0$), (b) S complies, and (c) F captures the entire surplus. Thanks to the generosity of the proposal, both G and S are satisfied, and the settlement is efficient. Enforcement problems don't plague the militarily strong G at this equilibrium. The path of play superficially resembles Proposition 1's unitary case, but only because G can demand terms sufficient to keep S happy. When G is militarily weaker, it accepts settlements that S is tempted to violate. Then peace, like war, becomes costly.

Proposition 3. *Let $c_S < v_S$ and $u_G(x_E) \leq w_G < u_G(x_S)$, such that G accepts iff*

$$x \leq \frac{1 - w_G + c_S k}{1 + v_S k} \equiv x_m$$

and sets $y^ = v_S x_m - c_S$, and S complies iff $y \geq \max\{v_S x - c_S, 0\}$. When*

$$v_S > \frac{c_S}{w_F} \quad \text{and} \quad k > \frac{1 - w_G - w_F}{v_S w_F - c_S}, \tag{3}$$

F proposes $x^ > x_m$, and if any condition in Line (3) isn't satisfied, F proposes $x^* = x_m$.*

Proposition 3 covers middling values of G 's war payoffs, where G accepts settlements that S is tempted to violate but G still retains enough of the pie to afford enforcement. War payoffs enter Figure 3 as horizontal lines, where G prefers all proposals to the left of $u_G(x) = w_G$ to war and F prefers all proposals to the right of $u_F(x) = w_F$ to war. The grey space represents those proposals that both G and F prefer *ex ante* to war, given both the costs of war and the prospective costs of peace.⁴⁴ When players' minimum demands overlap, as they do in Figure 3, F sets the largest x that secures acceptance, capturing as much of the surplus as possible. When minimum demands don't overlap, F makes a harsh proposal ($x^* > x_m$ in Proposition 3) that G rejects in favour of war.

Figure 3 shows that if F makes a sufficiently generous proposal, G sets $y^* > 0$ and guarantees compliance. Ensuring compliance requires F to make an offer that

⁴⁴ Fearon 1995 calls this the 'de facto bargaining range' (403), in contrast to the *ex post* bargaining range, which defines the *ex post* regret with which most of his article is concerned.

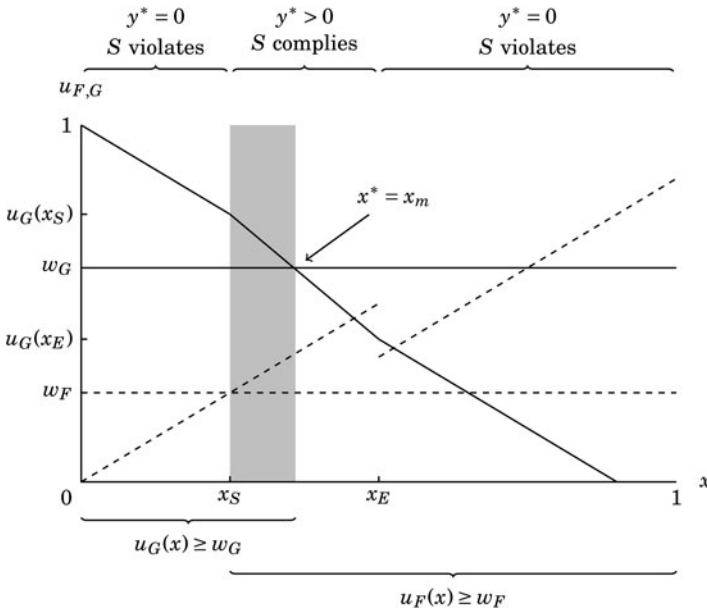


Figure 3. The subsidized peace SPE when $v_S > c_S$ and $u_G(x_E) \leq w_G < u_G(x_S)$, where $v_S = 0.4$, $c_S = 0.1$, $k = 1$, $d = 0.4$, $\delta = 0.25$, $w_G = 0.6$, and $w_F = 0.25$.

allows G to keep some of the bargaining surplus, as indicated by the steeper slope of $u_G(x)$ once x rises above the compliance constraint. F 's options in equilibrium are to meet G 's minimum demands by proposing $x = x_m$, which is more generous than military power alone would indicate,⁴⁵ or induce war by setting $x > x_m$. When S 's temptation to violate (v_S) isn't too small or G 's enforcement costs (k) aren't too large, F need not be excessively generous to secure compliance. As indicated by the grey area in Figure 3, a range of agreements exists that both accept in lieu of war, and F proposes $x^* = x_m$ at the rightmost edge. We show below that this subsidized enforcement equilibrium helps explain why NATO members went to great lengths to secure the Red Army's withdrawal from Germany at the end of the Cold War.

When S 's temptation to violate (v_S) and G 's marginal costs of enforcement (k) are both sufficiently high, as described in Line (3), the required concessions are too great, and F prefers war to subsidizing enforcement. We can look at these results another way by focusing on the constraint over k , where the numerator is the total cost of war ($1 - w_G - w_F$), and the denominator is $y^*(w_F) = v_S w_F - c_S$, the enforcement investment that G would make if it accepted an offer in which F yielded the entire bargaining surplus – that is, the largest enforcement costs G can pay that also leave F better off than fighting. G will enforce the agreement if only F makes a sufficiently generous proposal, but when the required proposal is too generous – when peace is too costly – F prefers war to subsidizing enforcement.

⁴⁵To see this, note that $x_m < 1 - w_G$ when $v_S > c_S / (1 - w_G)$, which is sure to be true given $v_S > c_S / w_F$ in Line (3).

Rearranging terms, F makes an unacceptable proposal when

$$k(v_S w_F - c_S) > 1 - w_F - w_G$$

such that the maximum enforcement costs G might pay (at left) are greater than the total costs of war (at right). If war eliminates the need for these enforcement costs, then $y^*(w_F)$ is a direct benefit of fighting. Rearranging yet again, war payoffs sum to more than the value of the pie, or

$$w_G + w_F + k y^*(w_F) > 1,$$

in contrast to models of costless peace, where the costs of war guarantee the existence of an *ex post* bargaining range of efficient, Pareto-superior proposals that belligerents regret not striking.⁴⁶ But when enforcing compliance is sufficiently expensive, an agreement leaves too little surplus to compensate both players for the costs of peace. F therefore opts for a war that it won't regret *ex post*, because fighting saves a substantial peacetime burden.⁴⁷

Proposition 4. *Let $c_S < v_S$, $d \leq (1 - w_G)/\delta$, and $w_G < u_G(x_E)$, such that G accepts iff $x \leq 1 - w_G - d\delta \equiv x_h$ and sets $y^* = v_S x_E - c_S$, and S complies iff $y \geq \max\{v_S x - c_S, 0\}$. There are two cases to consider. First, let $\delta \leq 1 - w_G - w_F$. F proposes $x^* = x_E$ when*

$$v_S > \frac{c_S}{1 - w_G - \delta} \quad \text{and} \quad k \leq \frac{d\delta}{v_S(1 - w_G - \delta) - c_S} \equiv k_h \tag{4}$$

and proposes $x^ > x_h$ otherwise. Second, let $\delta > 1 - w_G - w_F$. F proposes $x^* = x_E$ when*

$$v_S > \frac{c_S}{w_F} \quad \text{and} \quad k \leq \frac{d\delta}{v_S w_F - c_S} \equiv k_{war} \tag{5}$$

and proposes $x^ > x_E$ otherwise.*

Proposition 4 describes equilibrium when G is relatively weak, or $w_G < u_G(x_E)$. When G 's military prospects are this poor, it accepts even agreements that fail the enforcement constraint, presenting F with three options: (a) meeting G 's acceptance constraint at equality ($x = x_h$), which wins acceptance but guarantees that S violates; (b) proposing the more generous $x = x_E$, which subsidizes G 's enforcement; and (c) inducing war by proposing $x > x_h$. Proposition 4 describes two peaceful equilibria. First, Lines (4) and (5) show that F subsidizes enforcement by proposing $x^* = x_E$ when G 's marginal costs of enforcement are small enough to dissuade F from either war ($k \leq k_{war}$) or tolerated violations ($k \leq k_h$). We show this in Figure 4, where the discontinuous drop in payoffs for agreements at $x = x_E$ gives F two distinct ranges of proposals it prefers to war. Yet only subsidized enforcement proposals are also acceptable to G , whose non-credible commitment to enforcing harsher agreements ($x > x_E$) allows it to extract more favourable terms. Next,

⁴⁶ Fearon 1995.

⁴⁷ Coe 2011; Wolford 2024.

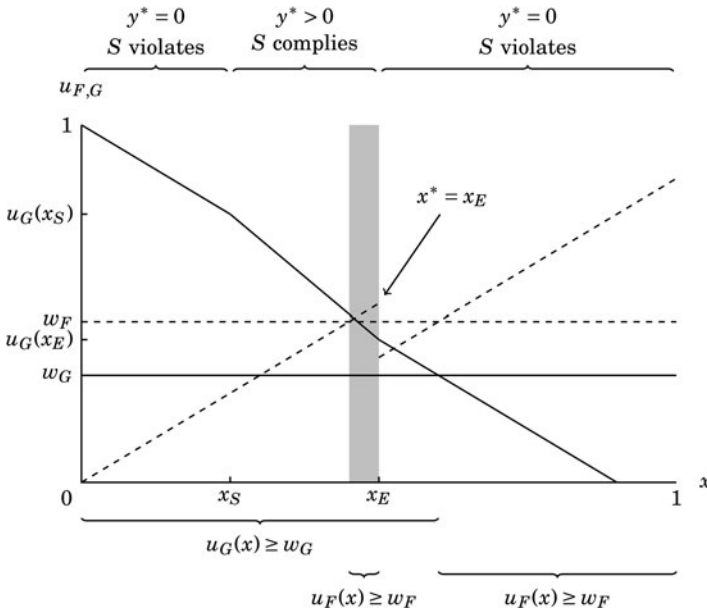


Figure 4. The subsidized peace SPE when $v_S > c_S$ and $w_G < u_G(x_E)$, where $v_S = 0.4$, $c_S = 0.1$, $k = 1$, $d = 0.4$, $\delta = 0.25$, $w_G = 0.3$, and $w_F = 0.45$.

when the total costs of violation are low ($\delta \leq 1 - w_G - w_F$) but enforcement remains expensive ($k > k_h$), F simply meets G 's acceptance constraint at $x^* = x_h$ and leaves the enforcement problem unsolved, followed by an inevitable but minor violation. Peace is costly but tolerable for both states, and Figure 5 shows that F chooses from a narrow range of proposals that both prefer to war. Given F 's relative military strength, tolerating violations of a favourable agreement is more attractive than subsidizing enforcement of a less favourable agreement, as shown by $u_F(x_E)$'s position below $u_F(x_h)$ in Figure 5.

Finally, F opts for war when neither tolerated violations nor subsidized enforcement is attractive, i.e. when the total costs of violations (δ) and G 's marginal enforcement costs (k) are both sufficiently high. If F secures as much as it can at peace, setting $x = x_h$, G won't enforce, and F must both compensate G for its losses and pay $(1 - d)\delta$ when S violates. Making a more modest proposal at $x = x_E$ that subsidizes enforcement requires that F compensate G for an intolerably expensive enforcement effort, as described by $k \geq k_{war}$, which we can rewrite as

$$ky^*(w_F) > d\delta,$$

where the costs of subsidizing enforcement are greater than the compensation G requires for tolerating violations in lieu of war. And as before, we can rearrange $\delta > 1 - w_G - w_F$ to yield

$$w_G + w_F + \delta > 1,$$

which shows that F pursues war when the total costs of peace are greater than the

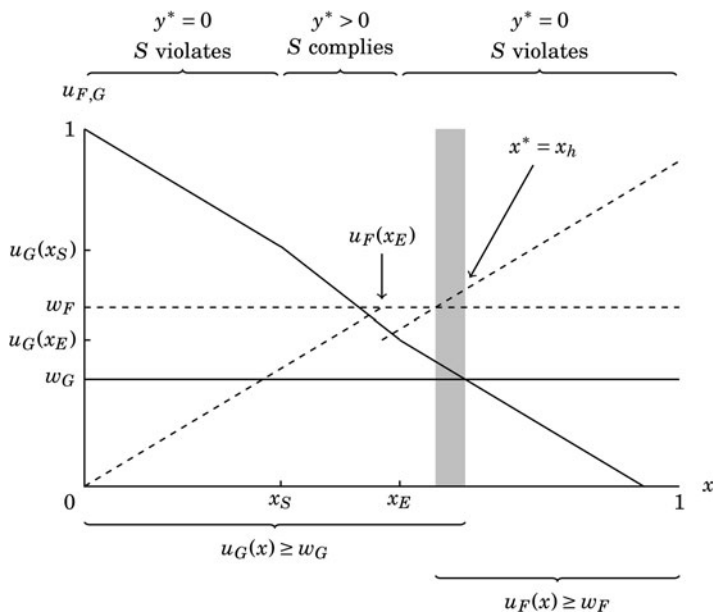


Figure 5. The tolerated violations SPE when $v_S > c_S$ and $w_G < u_G(x_E)$, where $v_S = 0.3$, $c_S = 0.1$, $k = 1$, $d = 0.4$, $\delta = 0.15$, $w_G = 0.3$, and $w_F = 0.5$.

costs of war, ensuring that war again entails no *ex post* regret. This is our second ‘costly peace’⁴⁸ path to war, and we use it below to describe the United States’ Mexican Expedition of 1916–1917, where a domestic government’s inability to enforce an agreement on its subjects leads the foreign state to impose a settlement through war rather than (a) subsidize enforcement or (b) compensate *G* for the costs of what’s sure to be a flouted agreement.

The cost of violations

Propositions 3 and 4 show that the total cost of violations (δ) shapes both the credibility of *G*’s commitments to enforce agreements and, when *G* is sufficiently weak militarily, what it accepts in lieu of war. How these costs fall across *G* and *F* influences the credibility of *G*’s commitments to enforce and, as a result, the prevalence of subsidized peace equilibria.

Proposition 5. *Let $c_S < v_S$. The conditions supporting subsidized peace in Proposition 4 become easier to satisfy as d increases, because*

$$\frac{\partial k_{war}}{\partial d} = \frac{\delta}{v_S w_F - c_S} \quad \text{and} \quad \frac{\partial k_h}{\partial d} = \frac{1}{v_S(1 - w_G - \delta) - c_S}$$

⁴⁸Coe 2011; Wolford 2024.

are positive when $v_S > c_S/w_F$ and $v_S > c_S/(1 - w_G - \delta)$, respectively, which are required for $k_{war} > 0$ and $k_h > 0$.

Proposition 5 states that the conditions supporting subsidized peace, $k \leq \min\{k_{war}, k_h\}$, become easier to satisfy as G 's share of violation costs rises. As d increases, both war and tolerated violations become less likely, leaving subsidized peace to become more likely. As the share of violation costs falls more heavily on F , however, G 's promise to enforce even with a subsidy becomes less credible, and both war and tolerated violations take up more of the equilibrium space. Therefore, the existence of SPE with different motivations for war – the costs of subsidizing enforcement versus the costs of tolerating violations – depends on how the costs of peace fall across the states involved. The more the domestic state suffers, e.g. by the loss of customs revenue due to smuggling, the more willing it is to invest in enforcement, and the more likely are peaceful outcomes to involve subsidies from the foreign state. But when violations cause relatively more harm to the foreign state – like the Serb nationalists that crossed the border with Austrian Bosnia-Herzegovina in June 1914 – the domestic government is less inclined to invest in enforcement, opening up an equilibrium space in which foreign states are less inclined to subsidize solutions to a shared problem. Rather, they either tolerate minor violations or, when both violations and subsidized enforcement are costly enough, solve G 's enforcement problem with war.

Examples

In this section, we use the model to shed light on two important historical cases, one drawn from a state beset by civil war and another from a superpower engaged in substantial – and potentially unpopular – retrenchment. We describe each case in terms of its values on key parameters, then show that it corresponds to the strategic reasoning and outcomes of the associated equilibrium.⁴⁹ First, we describe the United States' Mexican Expedition of 1916–1917, prompted by the latter's inability to prevent armed groups from violating the international border, as an example of war driven by unconditionally non-credible commitments to enforce agreements. Second, we explain negotiations between NATO countries and the Soviet Union over Red Army units stationed in East Germany as an attempt to subsidize Soviet control over its own military and ensure the peaceful reunification of Germany. These examples show that the model can help explain some important historical events, linking two cases typically considered distinct in analyses of international conflict.⁵⁰

The Mexican expedition, 1916–1917

The United States' Mexican Expedition of 1916–1917 during the Mexican Civil War is a useful example of war resulting from one government's inability to enforce a domestic faction's compliance with an international agreement. In this case, the agreement entails respecting restrictions imposed by the Mexican-American border, which gives each side exclusive access to territory, populations, rights, and

⁴⁹See Gailmard 2021; Goemans and Spaniel 2016.

⁵⁰Cunningham and Lemke 2013.

privileges on its side of the line. With his Constitutionalist government fighting multiple rebel groups, Mexican President Venustiano Carranza (G) was unable to prevent Pancho Villa's (S) raid on Columbus, New Mexico, in March 1916. Carranza's hold over most of the territory he claimed proved tenuous because of the decentralized, almost federal structure of his army,⁵¹ which engaged *Zapatistas* in the south and *Villistas* in the north. Resources were difficult to direct and hard to spare, rendering the marginal cost of enforcement (k) high. The Constitutionalist army was also questionably loyal, with contradictory orders not uncommon, insubordination frequent, supply lines unreliable, and pay inconsistent.⁵² Carranza couldn't credibly promise to contain the *Villistas*, who were sufficiently powerful to unilaterally violate the US-Mexico border. Cross-border raids were also costly for Carranza's reputation, especially as the Columbus raid boosted Villa's popularity and forced Carranza, who benefited from American recognition and material support, into the awkward position of protesting American plans to pursue Villa.⁵³ The raid also dented the American government's reputation for controlling the border, so it's reasonable to describe δ as high and d as middling, with significant violation costs falling on both governments. Finally, from the American perspective, the costs of violations were high relative to the total costs of war, especially as any invasion would entail simply pursuing Pancho Villa, making $\delta > 1 - w_G - w_F$ easy to satisfy, where war is the preferred response to G 's enforcement problem. Further, any concessions made to subsidize enforcement would've been enormously costly, ensuring $k > k_{war}$ and prompting an American incursion.

Five days after Villa's raid, American troops went about scattering and disbanding *Villista* formations in northern Mexico, diminishing their ability to cross the border in force yet pointedly failing to capture Villa himself. Acknowledging the extent of the problem, President Woodrow Wilson (F) even considered a declaration of war should conditions deteriorate further.⁵⁴ Secretary of War Newton Baker's assessment illustrates the problem behind the American decision to intervene:

Its real purpose was an extension of the power of the United States into a country disturbed beyond control of the constituted authorities of the Republic of Mexico, as a means of controlling lawless aggregations of bandits and preventing attacks by them across the international frontier.⁵⁵

By early September 1916, the United States and Constitutionalist representatives had established a Joint Commission to negotiate an end to the expedition. Mexico's representatives were keen to assert progress in 'consolidating authority,' but they were met with American scepticism, captured (again) by Secretary Baker, who 'candidly asserted that 'past experience does not permit us to rely

⁵¹Sandos 1981, 296–7.

⁵²Stout 1999, 38.

⁵³Clendenen 1961, 265.

⁵⁴Sandos 1981, 307.

⁵⁵Quoted in Sandos 1981, 310.

upon the cooperation of the authorities of the de facto [Mexican] government'.⁵⁶ The Commission met fruitlessly for four months while American forces remained in Mexico, but by December, when neutrality in the First World War began to look untenable, Wilson questioned the value of maintaining forces across the border.⁵⁷ Wilson ultimately decided in early January 1917 to withdraw American troops after verification that cross-border attacks had stopped and that Carranza's forces had demonstrated an ability to engage, if not defeat, *Villistas* near the border.⁵⁸

Our model provides an explanation of the beginning and the end of the Mexican Expedition, which corresponds to the path to war described in Proposition 4. It began as the result of the Mexican government's inability to ensure compliance with the restrictions defined by an international border while it battled twin insurgencies. It ended, if not in victory for the United States, then in sufficient disruption of the *Villistas* and a relative strengthening of the Constitutionalists, who proved they 'could now effectively cope with Villa'.⁵⁹ Unable to afford crushing the *Villistas* given the ongoing revolution, the Carranza government saw its territory invaded by the United States. The American incursion degraded the *Villistas*' capacity to cross the border by scattering their military formations and rendering them more vulnerable to Constitutionalist troops, preventing subsequent cross-border incursions. Once Carranza's enforcement problem was solved – even if imperfectly – American forces withdrew and relied on Mexico's own efforts to contain the rebels. Thus, the war began when the threat posed by a domestic faction in Mexico prompted an American invasion, and the virtual collapse of *Villista* formations moved the governments back to an equilibrium at which violations became small and rare enough to tolerate.

The Soviet withdrawal from Germany, 1989

Negotiations over the reunification of Germany, NATO expansion, and the status of the Red Army in East Germany at the end of the Cold War provide an example of attempts to structure a peace with subsidized enforcement, where F ensures that an agreement leaves G with sufficient resources to ensure its subjects' compliance. German reunification entailed thorny domestic issues, but international concerns like the status of a reunified Germany in NATO, the withdrawal of Soviet troops from East Germany and, finally, the presence of NATO troops in former Warsaw Pact territory were at the forefront of negotiations. The first step was striking a deal acceptable to the Soviet leadership, accomplished through West German loan guarantees to an economically struggling Soviet Union⁶⁰ and promises to reform NATO to reduce its potential threat to the remains of the Russian imperium.⁶¹ Convincing the Soviet leadership (G) to support the reunification plan, however, was not enough: there was also the issue of the Red Army in East Germany (S).

⁵⁶Quoted in Gilderhus 1977, 49.

⁵⁷Ibid., 50–1.

⁵⁸Sandos 1981, 309.

⁵⁹Ibid., 309.

⁶⁰Waever 1990, 487.

⁶¹Sew Newnham 1999, 428, for a discussion of how, according to international law, no significant changes could be made to the status of Germany without securing the approval of the Soviet Union.

Soviet Premier Mikhail Gorbachev was likely to agree, if reluctantly, to a phased withdrawal of the Red Army from East German territory, but it wasn't clear that the military would follow orders. Economic conditions in East Germany deteriorated after the fall of the Berlin Wall, and the East German Mark fell dramatically in value. Red Army soldiers were concerned that they would lose millions in savings if the government didn't agree to exchange East German Marks for more valuable Western Deutschmarks (DM).

Soviet soldiers in East Germany were demoralized, living in deteriorating barracks, badly fed, and selling equipment for personal gain. Locals complained that they seemed hungry, helpless, and potentially dangerous. It was not clear whether they would continue to obey remote political leaders in Moscow. It was not clear that Soviet troops would engage in violence if not satisfied but 'since this issue involved hundreds of thousands of armed soldiers, their desires could not be neglected'... If they suddenly became penniless once a hard currency was introduced, the consequences could be unpleasant.⁶²

Thus, the problem was not only getting the Soviet political leadership to agree to a withdrawal but also 'preventing the military from taking matters into its own hands, both in Germany and at home in Moscow.'⁶³ To make matters worse, there were also fears that Soviet troops ordered out of Poland and Czechoslovakia might balk at returning home, joining the troops in East Germany and exacerbating the problem of ensuring the Red Army's compliance.⁶⁴ In our model's terms, we can say that v_S , the Red Army's potential gains from taking up arms to demand a preservation of their living standards, were quite high and that Moscow's costs of bringing recalcitrant soldiers to heel (k) would've also been high. And both factors might've been sufficient to violate Line (3)'s conditions for war instead of subsidized peace. Further, Soviet payoffs for a war over the issue were middling, or $u_G(x_E) \leq w_G < u_G(x_S)$, neither so high that they could demand compensation for all the costs of withdrawing from East Germany nor so low that they wouldn't enforce a deal even with help, which is consistent with the conditions supporting subsidized peace in Proposition 3.

Western negotiators (F) searched for an agreement acceptable to both the Soviet leadership and the Red Army. Negotiations over reunification might break down otherwise, and concerns remained about Gorbachev's ability to remain in power,⁶⁵ which the West viewed as critical to ensuring a peaceful resolution. Ultimately, the terms of reunification included a package of concessions aimed at satisfying the Red Army, consistent with the West yielding some of the bargaining surplus, making a more generous offer than ostensibly necessary given the realities of the military balance. Included in this agreement was, first, a commitment to

⁶²Sarotte 2009, 159, 169–70.

⁶³Ibid., 170

⁶⁴Ibid., 217

⁶⁵Newnham 1999, 425.

allow soldiers stationed in East Germany to exchange their now worthless savings for DM at a ratio of 2 to 1.⁶⁶ Second, West Germany committed just over one billion DM to help with the costs of housing Soviet troops in the latter half of 1990, in addition 12 billion DM for the cost of new housing in the Soviet Union for returning Red Army soldiers.⁶⁷ With a domestic faction made powerful by both military capabilities and distance from home, to say nothing of the Soviet Union's domestic crisis of legitimacy, and with the measures needed to satisfy them relatively cheap and effective per dollar spent, we observe peace with subsidized enforcement, as described in Proposition 3. Threats of enforcement are never called in on the equilibrium path at the subsidized enforcement equilibrium, making it difficult to observe whether resources were directly devoted to enforcement. However, these concessions left resources free to enforce the agreement if necessary, which ensures that the logic of subsidized enforcement is a plausible description of the case.⁶⁸

Conclusion

Domestic factions often must be coerced to comply with international agreements, which requires costly government effort. Yet the standard approach to crisis bargaining abstracts away from these enforcement problems. We show that costly enforcement may incentivize foreign states to choose war for two reasons. First, peace may be possible if a foreign state will make offers generous enough to subsidize the domestic government's enforcement, but the foreign state may choose war when the required concessions are too great. Second, a foreign state may go to war when its options are to either tolerate violations or make oversized concessions that appease not just the domestic government but also its troublesome domestic faction. We show further that (a) enforcement problems don't plague the governments of militarily strong states, because they can demand terms sufficient to keep restive subjects happy, and (b) how the costs of violations fall across state parties determines which type of settlement we observe, with subsidized enforcement more common when the costs of violations fall mostly on the domestic state. Two examples, the Mexican Expedition and the Soviet withdrawal from East Germany, demonstrate the model's usefulness in two important cases on which both unitary-state and regime-type models are silent.

Our results complement insights from the state-building literature, particularly with respect to rebel governance.⁶⁹ The hallmark of sovereignty is a government's claim to exclusive territorial control.⁷⁰ But rebel groups often engage in activities typically associated with national governments, using collective force within a defined territorial space, collecting taxes, trading, building infrastructure, and creating political institutions and legal systems. Indeed, rebels are incentivized to build governance structures that challenge the national government to increase their own

⁶⁶Sarotte 2009, 170.

⁶⁷Ibid., 134, 170.

⁶⁸Gorbachev ultimately did lose power with the dissolution of the Soviet Union two years later, but he didn't lose power because the Red Army refused to comply with orders to withdraw from Germany in 1989. We are grateful to an anonymous reviewer for raising this issue.

⁶⁹Albert 2022, 2023; Jo 2015.

⁷⁰Lemke and Crabtree 2020.

legitimacy internally⁷¹ and externally,⁷² which in turn further erodes the state's sovereignty and legitimacy. Armed rebellion is most likely to emerge in weak states – and there is evidence that internal rivalry may increase war-making capacity for some states⁷³ – but their presence will also likely cause 'state fragility to worsen because of the loss of both capacity and legitimacy the sovereign state suffers.'⁷⁴ This loss of sovereignty erodes the government's ability to make peace if it's unable to commit to enforce terms on domestic competitors. Not just the presence of rebels but their level of institutionalization may inform foreign and domestic governments about the prospects for war and peace, as well as the likely terms of potential settlements.

Our results also implicate processes of war termination, especially when continued fighting may undermine a belligerent's ability to implement settlement terms. Carter's 'compellence dilemma' shows that belligerents may limit their aims, e.g. choosing not to disarm an opponent for fear of compromising its ability to control its subjects,⁷⁵ if they don't choose forcible regime change.⁷⁶ We show that these limited aims may also entail concessions nominally unwarranted by a state's battlefield performance, which is more tightly connected to beliefs about relative power in unitary-actor models of war termination.⁷⁷ In addition to dividing up scarce goods, wartime negotiations may also entail specific attempts to bring those who might undermine the agreement under control, like armies slated for demobilization, dislocated subjects, war-economy labourers facing unemployment, or political factions opposed to peace. Demobilized soldiers in Central and Eastern Europe, for example, posed problems for the successor states of both the Russian and German Empires after the First World War.⁷⁸ Scholars recognize demobilization as a major obstacle to the settlement of civil war,⁷⁹ yet it remains absent from theoretical models of interstate war termination.⁸⁰

Finally, problematizing government control over local factions links domestic and international politics independently of distinctions between regime types.⁸¹ We show that domestic politics can eliminate the *ex post* bargaining range between unitary states, just as it does in models of audience costs,⁸² but our mechanism relies on weak sovereign control over domestic factions, which manifests as necessary yet costly investments in enforcement, and not any particular set of domestic political institutions,⁸³ most of whose effects depend on effective state sovereignty.⁸⁴ Not all states wield perfect control over their territory and subjects, and such weakly

⁷¹Florea 2020.

⁷²Stewart 2020.

⁷³Lu and Thies 2012.

⁷⁴Lemke and Crabtree 2020, 296–7.

⁷⁵Carter 2015.

⁷⁶Lo et al. 2008; Werner 1999. See also Wagner 2004.

⁷⁷Filson and Werner 2002. But see Goemans 2000.

⁷⁸Balkelis 2015.

⁷⁹See Walter 1999.

⁸⁰But see Landry 2023.

⁸¹See Anderson 2022/2023.

⁸²Debs and Weiss 2016; Kydd and McManus 2017; Tarar and Leventoglu 2009, 2013.

⁸³See Fearon 1994; Weeks 2008.

⁸⁴Henderson 2009; Lee 2018; Wagner 2005.

sovereign states often fall prey to civil conflict and foreign depredation.⁸⁵ They rarely fight one another in interstate wars,⁸⁶ but they engage often in crises and disputes with more effectively sovereign states. The First Congo War, for example, had its roots in Zaire's inability to ensure that groups on its own territory – many of them refugees from the Rwandan Civil War – wouldn't threaten neighbouring states.⁸⁷ Our model shows the value of relaxing the unitary actor assumption along a dimension focused not on the link between foreign policy and political survival⁸⁸ but on the costs governments pay to ensure their subjects' compliance with international agreements. We show how enforcement costs influence crisis bargaining, allowing us to (a) describe a rationalist 'costly peace' mechanism for war that relies on neither private information with incentives to lie nor commitment problems due to shifting power⁸⁹ and (b) account for patterns of war and peace – e.g., the Mexican Expedition and Red Army's withdrawal from East Germany – that don't fit squarely into either unitary or prevalent non-unitary actor models.

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⁸⁵Lee 2018.

⁸⁶Henderson 2009; Lemke 2002.

⁸⁷See Prunier 2010.

⁸⁸cf. Hyde and Saunders 2020.

⁸⁹Coe 2011; Wolford 2024.

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Appendix

Proof of Proposition 1. We proceed via backward induction. Begin with *S*'s terminal choice, were it complies with agreement *x* when

$$1 - x \geq 1 - x + v_S x - c_S - y \Leftrightarrow y \geq \max\{v_S x - c_S, 0\}$$

Next, $c_S \geq v_S$ ensures that $v_S x - c_S \leq 0$, which leads *G* to set $y^* = 0$ (rather than some $y > 0$) and guarantee compliance for all $x \in [0, 1]$. Moving back up the tree, *G* accepts iff

$$1 - x \geq w_G \Leftrightarrow x \leq 1 - w_G.$$

F is sure to meet this constraint at equality if it wishes to induce acceptance, because proposing $x < 1 - w_G$ secures acceptance but leaves *F* strictly worse off. And finally, *F* sets $x^* = 1 - w_G$ rather than some $x > 1 - w_G$ because $1 - w_G \geq w_F$ is sure to be true given $w_G + w_F < 1$.

Proof of Proposition 2. We proceed via backward induction. As established in Proposition 1, *S* complies when $y \geq \max\{v_S x - c_S, 0\}$, and $c_S < v_S$ ensures that the required level of enforcement depends on *x*. First, $v_S x - c_S < 0$ when $x \leq c_S/v_S \equiv x_S$, allowing *G* to ensure compliance with $y = 0$. Second, $v_S x - c_S > 0$ when $x > x_S$, such that *G* must set $y > v_S x - c_S$ to ensure compliance.

Moving back up the tree, suppose that $v_S x - c_S > 0$ such that *G* must set $y > 0$ to ensure compliance. *G* sets $y^* = v_S x - c_S$ rather than $y = 0$, which is the optimal deviation if enforcement won't induce compliance, when

$$1 - x - k(v_S x - c_S) \geq 1 - x - d\delta \Leftrightarrow x \leq \frac{c_S}{v_S} + \frac{d\delta}{v_S k} \equiv x_E$$

and sets $y = 0$ otherwise. Next,

$$x_E > x_S \Leftrightarrow \frac{c_S}{v_S} + \frac{d\delta}{v_S k} > \frac{c_S}{v_S}$$

defines the three ranges of *F*'s offers described in Figure 2, $x < x_S$, $x \in [x_S, x_E]$, and $x \geq x_E$. First, when $x < x_S$, *S* is sure to comply for $y^* = 0$, so by Proposition 1 *G* sets $y^* = 0$. Second, when $x \in [x_S, x_E]$, *G* sets $y^* = v_S x - c_S$. And when $x \geq x_E$, *G* sets $y^* = 0$.

Now suppose that $c_S < v_S$ and

$$w_G \geq u_G(x_S) \Leftrightarrow w_G \geq 1 - \frac{c_S}{v_S}$$

such that *G* sets $y^* = 0$ at its acceptance constraint. Therefore, *G* accepts proposal *x* iff

$$1 - x \geq w_G \Leftrightarrow x \leq 1 - w_G.$$

F is sure to meet this constraint at equality if it wishes to induce acceptance, because $x < 1 - w_G$ secures acceptance but leaves F strictly worse off. Finally, F sets $x^* = 1 - w_G$ rather than induce rejection with some $x > 1 - w_G$ because $1 - w_G \geq w_F$ is sure to be true given $w_G + w_F < 1$.

Proof of Proposition 3. We proceed via backward induction. The proof of Proposition 2 establishes that when $c_S < v_S$ and

$$u_G(x_E) \leq w_G < u_G(x_S) \Leftrightarrow 1 - \frac{c_S k + d\delta}{v_S k} \leq w_G < 1 - \frac{c_S}{v_S},$$

G ensures compliance with $y^* = v_S x - c_S$ at its acceptance constraint. Therefore, G accepts proposal x iff

$$1 - x - k(v_S x - c_S) \geq w_G \Leftrightarrow x \leq \frac{1 - w_G + c_S k}{1 + v_S k} \equiv x_m.$$

Next, F meets this constraint at equality if it wishes to induce acceptance, because any $x < x_m$, including some $x < x_S$ that satisfies the compliance constraint, secures compliance but leaves F strictly worse off. And finally, F induces rejection with $x > x_m$ rather than induce acceptance when $w_F > x_m$, or when

$$v_S > \frac{c_S}{v_S} \quad \text{and} \quad k > \frac{1 - w_G - w_F}{v_S w_G - c_S}$$

as stated in Line (3). Otherwise, F proposes $x^* = x_m$, which G accepts before setting $y^* = v_S x_m - c_S$ and securing S 's compliance on the path of play.

Proof of Proposition 4. We proceed via backward induction. The proof of Proposition 2 establishes that when $c_S < v_S$ and

$$w_G < u_G(x_E) \Leftrightarrow w_G \leq 1 - \frac{c_S k + d\delta}{v_S k},$$

G sets $y^* = 0$ at its acceptance constraint, which ensures S 's violation on the path of play unless F 's proposal satisfies the enforcement constraint $x \leq x_E$. To establish G 's acceptance constraint, note first that G is sure to accept any $x < x_E$, because $w_G < u_G(x_E)$. Next, G accepts some $x > x_E$ iff

$$1 - x - d\delta \geq w_G \Leftrightarrow x \leq 1 - w_G - d\delta \equiv x_h,$$

where we assume $\delta \leq (1 - w_G)/d$ to ensure that G 's minimal demands can feasibly be met, or $x_h \geq 0$. Given that F never induces acceptance by proposing a smaller x than necessary, it has three options. First, it can propose $x = x_h$, which G accepts but which S violates, yielding $u_F(x_h) = x_h - d\delta$; second, $x = x_E$ secures acceptance, enforcement, and compliance, yielding $u_F(x_E) = x_E$; and third, it can induce rejection with $x > x_h$, yielding $u_F(x > x_h) = w_F$. Therefore, F 's equilibrium proposal satisfies

$$\max_{x^*} \{u_F(x_h), u_F(x_E), u_F(x > x_h)\},$$

such that F proposes $x^* = x_E$ when either (a) $k \leq k_h$ and $v_S > c_S/(1 - w_G - \delta)$ when $\delta < 1 - w_G - w_F$ as defined in Line (4) or (b) $k \leq k_{war}$ and $v_S > c_S/w_F$ when $\delta > 1 - w_G - w_F$ as defined in Line (5). Next, F proposes $x^* = x_h$ when $\delta \leq 1 - w_G - w_F$ and either $k \geq k_h$ or $v_S > c_S/(1 - w_G - \delta)$ fails. Finally, G proposes $x^* > x_h$ when $\delta > 1 - w_G - w_F$ and either $k \geq k_{war}$ or $v_S > c_S/w_F$ fails.

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