

International Bargaining with Two-Sided Domestic Constraints

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Putnam revived interest in the “Schelling conjecture” that in international bargaining, a domestic ratification constraint provides a negotiator with a bargaining advantage. However, existing formal analyses of the Schelling conjecture generally allow only one side in the bargaining to be constrained. In this article, a model is analyzed in which both negotiators are constrained. A generalized version of the Schelling conjecture holds that if one negotiator’s constraint is high and the other’s is only low or medium, the former gets a better deal than if neither side were constrained, and the latter is worse off. With incomplete information, however, the complete opposite of what the Schelling conjecture predicts can occur, and there is an equilibrium in which delay in reaching an agreement results in both sides being worse off than if neither side were constrained. Incomplete information can but does not always completely eliminate the advantage of having a high constraint.

In *The Strategy of Conflict*, Thomas Schelling (1960) suggested what Helen Milner (1997, 68) has called the “Schelling conjecture”: in international negotiations, the ability of a negotiator to credibly say to his or her counterpart that “anything we sign here has to be ratified by my country’s legislature” provides a bargaining advantage that this person would not otherwise have. Schelling wrote,

Something similar occurs when the United States Government negotiates with other governments on, say, the uses to which foreign assistance will be put, or tariff reduction. If the executive branch is free to negotiate the best arrangement it can, it may be unable to make any position stick and may end by conceding controversial points because its partners know, or believe obstinately, that the United States would rather concede than terminate the negotiations. But, if the executive branch negotiates under legislative authority, with its position constrained by law . . . then the executive branch has a firm position that is visible to its negotiating partners. (Pp. 27-28)

Such a “firm position” presumably provides the executive branch with a bargaining advantage and allows it to extract concessions from the other side that it otherwise could not. Until Putnam’s (1988) article on “two-level games,” however, there has

AUTHOR’S NOTE: The complete proofs to the propositions in this study are rather lengthy and therefore not provided here. They are available from the author’s Web site at <http://troi.cc.rochester.edu/~ahmt/> or on request from the author (e-mail: ahmt@troi.cc.rochester.edu). My thanks to Christopher Butler, Randall Calvert, John Duggan, Kelly Kadera, Curtis Signorino, Branislav Slantchev, and Randall Stone for valuable comments and helpful discussions of two-level games. I remain responsible for any shortcomings.

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been little theoretical or empirical work done on the precise conditions under which a domestic constraint can be a bargaining advantage. Putnam's work revived interest in the Schelling conjecture, and a number of recent works (Iida 1993, 1996; Milner 1997; Milner and Rosendorff 1997; Mo 1994, 1995; Pahre 1997; Reinhardt 1996; Smith and Hayes 1997) have formally modeled the formation of bilateral international agreements under the backdrop of domestic politics, with at least the partial aim of examining the Schelling conjecture.

Virtually all of these models, however, make a strong simplification—namely, only one side in the bargaining has a domestic ratification constraint, and the other side is effectively treated as a dictatorship, with no domestic ratification necessary in that country.¹ If the results of these models are contingent on this simplification, as the findings of this article suggest they are, then the generality of those results is questionable, and the dynamics of international bargaining in a situation where both sides are constrained remain virtually unexplored.

Indeed, the Schelling conjecture is very intuitively plausible when only one side is constrained. However, if both sides are constrained and yet the constraints are not so severe that an agreement is impossible, what kind of bargaining outcome should we expect? Will the constraints cancel out and the outcome be the same as if neither side were constrained? Or will one side's constraint win out and carry the day? Does the actual size of the constraints affect the final bargaining outcome? I investigate these issues using a game-theoretic model.

The article proceeds as follows. In the next section, I present Iida's (1993) two-level bargaining game and the Rubinstein (1982) model on which it is based. I then generalize the complete-information version of Iida's model, allowing both sides to have domestic ratification constraints. I find that his conclusion—namely, that a domestic constraint is a bargaining advantage under complete information if and only if the negotiator is highly constrained at home—is contingent on his simplification that only one side is constrained. When both sides are constrained, sometimes a high constraint provides no advantage, and sometimes even a medium-level constraint is helpful.

I find that a generalized version of the Schelling conjecture holds that if one executive's (a country's executive is assumed to act as its negotiator) constraint is high and the other's is only low or medium, the former gets a better deal than if neither side were constrained, and the latter is worse off. The model is one of sequential bargaining, and

1. Iida (1996) presented one of the few formal two-level bargaining models that (temporarily) relaxes this simplification. However, he only considers a very specific situation—namely, an incomplete information case in which both sides are equally uncertain about both sides' constraints. That is, the executive (who acts as negotiator) of country 1 does not know his or own constraint or that of his or her counterpart (likewise for executive 2). Furthermore, executives 1 and 2 have the same (prior) probability distribution over executive 1's (and executive 2's) constraint (i.e., executive 2 has just as much knowledge about executive 1's constraint as executive 1 himself or herself does and vice versa). Therefore, no signaling occurs, and the solution is relatively straightforward. Although this is an empirically plausible scenario (indeed, even a likely one—see Evans 1993, 410), there are other cases of two-sided constraints that are worth investigating. These include the complete information case and incomplete information cases with private information and signaling. Certainly, there are situations in which each negotiator knows his or her own constraint as well as the other's with a good deal of certainty, as well as scenarios in which a negotiator knows his or her own constraint quite well but is uncertain about the ratification threshold that the other side faces. I investigate some of these cases in this article.

the rather surprising result emerges that when the executive on the receiving end of the first offer in an international bargaining situation (the one that we shall later call “executive 2”) is highly constrained, as long as the constraints are not so severe that an agreement is impossible, the constraint of the executive making the first offer (“executive 1”) is immaterial and does not improve his or her bargaining position at all. Only executive 2 benefits from the constraints. Thus, something of a “second-mover advantage” emerges. Finally, I find that whether a domestic constraint benefits an executive can depend crucially on whether the other executive is also constrained. This mutual interdependence of the effects of domestic constraints, although intuitively sensible, has not previously been noted in the formal literature on international bargaining.²

Next, I introduce uncertainty into the model. I find that when one executive knows both constraints but the other knows only his or her own constraint with certainty, the complete opposite of what the Schelling conjecture predicts can occur. In particular, there is an equilibrium in which the executive with the high constraint receives less, and the one with the low constraint receives more, than what they would respectively be receiving if neither side were constrained. Under this type of uncertainty, there is also an equilibrium in which delay in reaching an agreement results in both sides being worse off than if neither side were constrained. It turns out that incomplete information can but does not always completely eliminate the advantage of having a high constraint.

In concluding, I point out how this last implication of the model offers a plausible explanation for Evans’s (1993, 399) observation that executives often prefer not to have their “hands tied” (i.e., domestic constraints imposed on them) even when they share the preferences of the ratifying body.

THE RUBINSTEIN (1982) MODEL

Iida (1993) presented a model of international bargaining that is a modification of the Rubinstein (1982) bargaining model. In the Rubinstein model, two players take turns proposing a two-way division of a “pie” of size 1. The two players take turns making proposals until the other player accepts a proposal, at which point the game ends. In the first period, $t = 0$, player 1 can make any proposal $x = (x_1, x_2) \in \mathfrak{R}^2$, with the restrictions that $x_1 + x_2 = 1$ and $x_1, x_2 \geq 0$ (these imply the additional restrictions that $x_1, x_2 \leq 1$). If player 2 accepts this proposal, player i ($i = 1, 2$) receives utility x_i , and the game ends. If player 2 rejects the proposal, the game moves to the next period ($t = 1$), wherein player 2 can make any proposal $y = (y_1, y_2)$ such that $y_1 + y_2 = 1$ and $y_1, y_2 \geq 0$. Time is valuable, and each player discounts future payoffs with discount factor $0 < \delta_i < 1$ ($i = 1, 2$). Therefore, if player 1 accepts this proposal, player i gets utility $\delta_i y_i$. If he or she rejects the proposal, the game moves to the next period, $t = 2$, wherein player 1

2. Iida (1996, Tables 1 and 2) presented some comparisons of the players’ payoffs when (1) neither side is constrained, (2) only one side is constrained, and (3) both sides are constrained. However, his analysis is limited to the case in which there is extensive incomplete information (see note 1) and the discount factors are low, and he does not indicate how the other side’s constraint helps determine whether one’s own constraint is a bargaining advantage (as I do later).

makes some proposal $x' = (x'_1, x'_2)$, which can be completely different from his or her previous proposal but must satisfy the usual requirements that $x'_1 + x'_2 = 1$ and $x'_1, x'_2 \geq 0$. In this way, the two players take turns making proposals until the other player accepts a proposal, at which point the game ends. In general, the value of an agreement $x = (x_1, x_2)$ reached in period t ($t = 0, 1, 2, 3, \dots$) to player i is $\delta_t^i x_i$ ($i = 1, 2$). If an agreement is never reached, the game goes on forever, in which case both players receive utility 0.

Rubinstein (1982) showed that there is a unique subgame-perfect equilibrium to this game, in which agreement is reached in the first period on the following proposal:³

$$x = \left(\frac{1 - \delta_2}{1 - \delta_1 \delta_2}, \frac{\delta_2 (1 - \delta_1)}{1 - \delta_1 \delta_2} \right). \tag{1}$$

Notice that if $\delta_1 = \delta_2$ (i.e., the two players are equally “patient”), player 1 gets a larger share of the pie. Hence, there is an advantage to moving first.⁴ Moreover, $x_i \rightarrow 1$ as $\delta_i \rightarrow 1$ (holding δ_j fixed). Hence, it pays to be patient, even though the game ends in the first period no matter how patient the players are. Finally, notice that if $\delta_1 = \delta_2 = \delta$, $x_i \rightarrow 1/2$ as $\delta \rightarrow 1$ ($i = 1, 2$). That is, if the two players are equally patient, their payoffs tend toward equality as this level of patience increases (Osborne and Rubinstein 1990; Sutton 1986).

IIDA’S (1993) MODEL

Iida (1993) considered a variant of this model in which the two players are considered to be the executives of two countries, and whenever an agreement $x = (x_1, x_2)$ is reached between them, it must be submitted to the legislature of country 1 for ratification. Ratification in country 2 is not necessary. One interpretation of this is that country 2 is a dictatorship⁵ or a democracy in which ratification is not necessary. Iida, how-

3. To the reader who is unfamiliar with the Rubinstein (1982) model, here is a simple and intuitive way to derive this expression (although this is not a proof of anything): assume that player 1 always proposes some $x = (x_1, x_2)$, and player 2 always proposes some $y = (y_1, y_2)$. Assume that both players make proposals that are accepted by the other. For player 2 to accept player 1’s proposal, player 1 should offer player 2 (at least) his or her discounted continuation value for rejecting the offer (i.e., the discounted value of what the player expects to get if he or she rejects the offer)—that is, we require that $x_2 = \delta_2 y_2$ (actually, to ensure acceptance, player 1 should offer $x_2 > \delta_2 y_2$ —but if we assume that player 2 always accepts an offer if he or she is indifferent between accepting and rejecting, then it is enough to offer this person just his or her discounted continuation value and no more). Similarly, player 2 should offer player 1 his or her discounted continuation value for rejecting the offer—that is, we require that $y_1 = \delta_1 x_1$. These two equations, along with $x_1 + x_2 = 1$ and $y_1 + y_2 = 1$, give us four equations in four unknowns—solving for x_1 and x_2 , we obtain expression 1 above.

4. However, the “first-mover advantage” is not absolute—if $\delta_1 \neq \delta_2$ and δ_2 is large enough relative to δ_1 (i.e., player 2 is much more patient than player 1), player 2 gets a larger share of the pie.

5. However, one could argue that although ratification is not necessary in dictatorships (or, if necessary, is merely a formality), informal “ratification” by those with the power to remove the existing leader (e.g., the military) is. If that is the case, then a model in which both executives are constrained might be more appropriate for analyzing bargaining even between a democracy and a dictatorship or among dictatorships. Indeed, the model presented here is readily applicable to settings in which the constraints on the executives are nonlegislative (more on this later).

ever, does not adopt this interpretation and ignores ratification in country 2 “for the sake of simplicity.” As we shall see, however, his substantive conclusions are highly contingent on this simplification. If the agreement is ratified, the executive and legislators of country 1 obtain utility x_1 , and the executive of country 2 receives payoff x_2 (all payoffs are appropriately discounted, depending on the time period in which the agreement is reached). If the agreement is not ratified, both executives obtain utility 0, and the legislators of country 1 receive their (exogenous) status quo payoffs (appropriately discounted).

More specifically, the game is as follows. As in the Rubinstein (1982) model, the two executives take turns proposing a two-way division of a pie of size 1. The bargaining goes on until one executive accepts the other’s proposal. Suppose this occurs in period t ($t = 0, 1, 2, \dots$), on the agreement $x = (x_1, x_2)$. The agreement is then sent to the legislature of country 1 for ratification. If it is ratified, the game ends with executive i receiving utility $\delta_i^t x_i$ ($i = 1, 2$). If it is not ratified, the game ends with both executives obtaining payoff 0. (Essentially, then, this models a situation in which for the executives, any agreement is better than no agreement—in other words, both executives are desperate for an agreement. In work in progress, I relax this simplification.) If the executives bargain between themselves forever and never send an agreement to the legislature for ratification, they both receive utility 0.

The legislature of country 1 consists of N_1 (odd) legislators. When an agreement $x = (x_1, x_2)$ reached by the two executives in period t is submitted to the legislature for ratification, each legislator votes either yes or no, with no abstentions allowed. If at least a simple majority ($(N_1 + 1)/2$) votes yes, the agreement is ratified. Otherwise, it is not. In either case, the game ends immediately (Iida 1996 allowed the executives to have one more chance to negotiate a ratifiable agreement if the first agreement is not ratified). Each legislator has some (exogenous) status quo utility $z_{1,j} \in (-\infty, \infty)$ and discount factor $0 < \delta_{1,j} \leq 1$ ($j = 1, 2, \dots, N_1$).⁶ If the agreement is ratified, legislator j (in country 1) receives utility $\delta_{1,j}^t x_1$. If it is not ratified, he or she obtains payoff $\delta_{1,j}^t z_{1,j}$. Assume, then, that in any period t , legislator j votes yes if and only if $x_1 \geq z_{1,j}$. That is, a legislator in country 1 votes yes if and only if country 1’s share of the pie is at least as great as his or her status quo utility. Because the voting rule is majority rule, an agreement $x = (x_1, x_2)$ will be ratified (in any period) if and only if x_1 is greater than or equal to the status quo payoff of the median legislator (i.e., the legislator with the median status quo payoff). Call the median legislator’s status quo payoff C_1 (i.e., $C_1 = \text{median} \{z_{1,1}, z_{1,2}, \dots, z_{1,N_1}\}$)—then, agreement $x = (x_1, x_2)$ will be ratified if and only if $x_1 \geq C_1$. Because of the restriction that $x_1 \leq 1$, a ratifiable agreement is possible only if $C_1 \leq 1$.⁷ (Thus, the model captures the intuitively sensible idea that if the constraint is too high, no agreement is possible. Note that if $C_1 \leq 0$, then every agreement is ratified.)

6. Note that we allow for the possibility that the legislators do not discount future payoffs—that is, we allow $\delta_{1,j} = 1$. For the executives, however, we require that $0 < \delta_i < 1$ ($i = 1, 2$).

7. Note that I have not specified the legislators’ utilities for the outcome where the executives bargain between themselves forever and never send an agreement to the legislature for ratification (Iida does not either). That is because those utilities are completely inconsequential as far as the solution of the game is concerned. If $\delta_{1,j} < 1$, it probably makes sense to assign utility 0 to this outcome (for legislator j). If $\delta_{1,j} = 1$, it may make more sense to assign payoff $z_{1,j}$. In any case, the solution of the game is the same no matter what utilities (for the legislators) we assign to this outcome.

Iida (1993) analyzed this model (pointing out that it leads to the same subgame-perfect equilibrium partitioning of the pie as does a Rubinstein model in which player 1 has an “outside option,” a model well studied in the economics literature—see, for instance, Binmore, Shaked, and Sutton 1989) and concluded that under complete information, a domestic constraint (C_1) is a bargaining advantage if and only if it is very high.⁸ If executive 1 has a domestic constraint but it is not very high, the payoffs are the same as in the regular Rubinstein model with no constraints. Therefore, the constraint provides no advantage (but it does not hurt executive 1 either). If the constraint is high enough, however, executive 1 gets more than in the baseline Rubinstein model. (I describe his results more formally later.)

TWO-SIDED CONSTRAINTS

I now consider a simple variant of this model in which both sides have legislatures that must ratify any agreement before it can be implemented.⁹ Denote the status quo payoff of country 2’s median legislator by C_2 . When the executives of the two countries reach an agreement $x = (x_1, x_2)$ in period t ($t = 0, 1, 2, \dots$), it is submitted to the two legislatures for ratification. It is ratified in both countries if and only if $x_1 \geq C_1$ and $x_2 \geq C_2$. In this case, the game ends with the executive and legislators of country i receiving $\delta_i^t x_i$ and $\delta_{i,j}^t x_i$, respectively ($i = 1, 2; j = 1, 2, \dots, N_i$).¹⁰ If the agreement fails to be ratified in either country, the game ends with the two executives obtaining 0, and the legislators in country i receiving $\delta_{i,j}^t z_{i,j}$ ($i = 1, 2; j = 1, 2, \dots, N_i$). Because of the restrictions that $x_1, x_2 \leq 1$ and $x_1 + x_2 = 1$, a ratifiable agreement is possible if and only if $C_1 + C_2 \leq 1$ and $C_1, C_2 \leq 1$.¹¹ (Again, this captures the intuitively sensible idea that if the constraints are too high, no agreement is possible.¹² Note that if $C_i \leq 0$ ($i = 1, 2$), then every agreement is ratified by legislature i .) Assume that $C_1, C_2 < 1$, and $C_1 + C_2 \leq 1$. Then the following five propositions describe the subgame-perfect equilibria of the model, depending on the sizes of the constraints C_1 and C_2 .¹³ (The reader need not go through

8. But not so high that a ratifiable agreement is impossible—that is, not so high that $C_1 > 1$.

9. In a subsequent article, Iida (1996) considered a very specific incomplete-information version of the two-sided constraint model (see note 1); his analysis, however, does not allow one to infer the solution to the complete-information case or incomplete-information cases with private information and signaling, which is what I am considering.

10. In Putnam’s (1988) framework, this corresponds to a situation in which all groups in one country have relatively homogeneous preferences (in particular, they all receive about the same utility from any given agreement) and differ only in their evaluation of the status quo. The case in which the domestic groups have heterogeneous preferences is better captured by Milner (1997), Mo (1994), and Pahre (1997) (all of whom, however, make the simplification that ratification is necessary in only one country).

11. In Putnam’s (1988) terminology, the two sides’ “win-sets” overlap if and only if $C_1 + C_2 \leq 1$ and $C_1, C_2 \leq 1$.

12. At a more nuanced level, the model captures the intuitively appealing notion that if the two sides’ win-sets do not overlap, it is because either (1) one side’s constraint is unilaterally too high ($C_1 > 1$ or $C_2 > 1$, or both), or (2) individually, each side’s constraint is reasonable, but jointly they are too high ($C_1, C_2 \leq 1$, but $C_1 + C_2 > 1$).

13. Note that in each of the following five propositions, both executives are making proposals that are accepted by the other, and therefore the game ends in the first period. Also, all of the proposals made are acceptable to both legislatures and are therefore ratified. Finally, note that these subgame-perfect equilibria differ from those in the Rubinstein model and the Rubinstein model with “outside options” in that to ensure

the propositions to understand their substantive implications; simply go to the next section, titled “Discussion of the Results.” Nevertheless, I have provided short comments after each proposition describing its substantive interpretation and providing some intuition for the result.)

Proposition 1: If

$$C_1 \leq \frac{\delta_1(1-\delta_2)}{1-\delta_1\delta_2}, \quad (2)$$

$$C_2 \leq \frac{\delta_2(1-\delta_1)}{1-\delta_1\delta_2}, \quad (3)$$

then the following is a subgame-perfect equilibrium (SPE):

- (a) Executive 1 always proposes $\left[\frac{1-\delta_2}{1-\delta_1\delta_2}, \frac{\delta_2(1-\delta_1)}{1-\delta_1\delta_2} \right]$ and always accepts any proposal y such that $1-C_2 \geq y_1 \geq \frac{\delta_1(1-\delta_2)}{1-\delta_1\delta_2}$.
- (b) Executive 2 always proposes $\left[\frac{\delta_1(1-\delta_2)}{1-\delta_1\delta_2}, \frac{1-\delta_1}{1-\delta_1\delta_2} \right]$ and always accepts any proposal x such that $1-C_1 \geq x_2 \geq \frac{\delta_2(1-\delta_1)}{1-\delta_1\delta_2}$.

This SPE leads to the same division of the pie as does the unique SPE of the regular Rubinstein model with no constraints. In this case, in which neither side’s constraint is very high¹⁴ (in particular, what executive 2 normally offers executive 1 in the unique SPE of the regular Rubinstein model is enough to satisfy 1’s domestic constraint and vice versa), the constraints have no effect on the payoffs, which are the same as if there were no constraints. In this case, the constraints are not providing either executive an advantage.

Proposition 2: If

$$C_1 > \frac{\delta_1(1-\delta_2)}{1-\delta_1\delta_2}, \quad (4)$$

$$C_2 \leq \delta_2(1-C_1), \quad (5)$$

ratification by the other side’s legislature, there is an upper bound to the share of the pie that an executive is willing to accept, a point that Iida fails to notice (more on this later). Contrary to Iida’s (1993, 410) claim, then, this model is not “isomorphic” to a Rubinstein model in which the executives have “outside options,” although the subgame-perfect equilibrium partitioning of the pie is the same.

14. In the following discussion of the results, I refer to executive 1’s (2’s) constraint as being high when inequality 4 (8) is satisfied, medium when inequality 4 (8) is not satisfied but inequality 11 (7) is, and low when inequality 9 (5) is satisfied. That is, executive 1’s constraint is high if $C_1 > \delta_1(1-\delta_2)/(1-\delta_1\delta_2)$, medium if $\delta_1(1-C_2) < C_1 \leq \delta_1(1-\delta_2)/(1-\delta_1\delta_2)$, and low if $C_1 \leq \delta_1(1-C_2)$. Similarly, executive 2’s constraint is high if $C_2 > \delta_2(1-\delta_1)/(1-\delta_1\delta_2)$, medium if $\delta_2(1-C_1) < C_2 \leq \delta_2(1-\delta_1)/(1-\delta_1\delta_2)$, and low if $C_2 \leq \delta_2(1-C_1)$.

then the following is an SPE:

- (a) Executive 1 always proposes $[1 - \delta_2(1 - C_1), \delta_2(1 - C_1)]$ and always accepts any proposal y such that $1 - C_2 \geq y_1 \geq C_1$.
- (b) Executive 2 always proposes $(C_1, 1 - C_1)$ and always accepts any proposal x such that $1 - C_1 \geq x_2 \geq \delta_2(1 - C_1)$.

In this case, in which executive 1 has a high constraint and executive 2's constraint is low, executive 1 gets more than in the Rubinstein model, and executive 2 receives less.¹⁵ Because 1's constraint is higher than the amount that he or she would normally be offered by 2 (in the unique SPE of the Rubinstein model), 2 offers 1 a higher-than-usual amount whenever it is 2's turn to make a proposal. This, in turn, lowers the continuation value for executive 2 of rejecting a proposal by 1 (as executive 2 will keep a smaller-than-usual amount of the pie for himself or herself in the next period, when it is his or her turn to make a proposal). This, in turn, allows 1 to keep a bigger (than usual) share of the pie for himself or herself whenever it is executive 1's turn to make a proposal (2's constraint is so small that 1 can keep a larger-than-usual share of the pie for himself or herself and still satisfy that constraint). This includes the first period, in which the agreement is actually reached.

Proposition 3: If

$$C_1 > \frac{\delta_1(1 - \delta_2)}{1 - \delta_1\delta_2}, \tag{6}$$

$$C_2 > \delta_2(1 - C_1), \tag{7}$$

then the following is an SPE:

- (a) Executive 1 always proposes $(1 - C_2, C_2)$ and always accepts any proposal y such that $1 - C_2 \geq y_1 \geq C_1$.
- (b) Executive 2 always proposes $(C_1, 1 - C_1)$ and always accepts any proposal x such that $1 - C_1 \geq x_2 \geq C_2$.

In this case, in which executive 1 has a high constraint and executive 2's constraint is either medium [$C_2 \leq \delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$] or high [$C_2 > \delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$], executive 2 gets more than in the Rubinstein model if and only if $C_2 > \delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ (i.e., his or her constraint is high) and less if and only if $C_2 < \delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ (i.e., his or her constraint is medium). For the latter case, the intuition is essentially the same as in the previous proposition (the difference being that in this case, executive 2's constraint is medium rather than low—it is still small enough that 1 can keep a larger-than-usual amount for himself or herself and still satisfy 2's constraint). For the reason the advantage goes to executive 2 when both sides are highly constrained, see the discussion after proposition 5 below.

15. In this equilibrium, executive 2 receives $\delta_2(1 - C_1)$, compared with $\delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ in the Rubinstein model. Note that $\delta_2(1 - C_1) < \delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ is equivalent to $C_1 > \delta_1(1 - \delta_2)/(1 - \delta_1\delta_2)$ (just rearrange the former inequality to get the latter), which we have assumed to be true in this proposition.

Proposition 4: If

$$C_2 > \frac{\delta_2(1-\delta_1)}{1-\delta_1\delta_2}, \quad (8)$$

$$C_1 \leq \delta_1(1-C_2), \quad (9)$$

then the following is an SPE:

- (a) Executive 1 always proposes $(1 - C_2, C_2)$ and always accepts any proposal y such that $1 - C_2 \geq y_1 \geq \delta_1(1 - C_2)$.
- (b) Executive 2 always proposes $[\delta_1(1 - C_2), 1 - \delta_1(1 - C_2)]$ and always accepts any proposal x such that $1 - C_1 \geq x_2 \geq C_2$.

In this case, in which executive 2's constraint is high and executive 1's is low, 2 gets more than in the Rubinstein model, and 1 receives less. Executive 2's constraint is higher than the amount that executive 1 would normally offer him or her (in the unique SPE of the Rubinstein model). Therefore, to get 2 to accept 1's proposal, 1 has to offer him or her a higher amount than usual (in particular, an amount at least as large as 2's constraint) whenever it is 1's turn to make a proposal. This includes the first period, in which the agreement is actually reached.

Proposition 5: If

$$C_2 > \frac{\delta_2(1-\delta_1)}{1-\delta_1\delta_2}, \quad (10)$$

$$C_1 > \delta_1(1-C_2), \quad (11)$$

then the following is an SPE:

- (a) Executive 1 always proposes $(1 - C_2, C_2)$ and always accepts any proposal y such that $1 - C_2 \geq y_1 \geq C_1$.
- (b) Executive 2 always proposes $(C_1, 1 - C_1)$ and always accepts any proposal x such that $1 - C_1 \geq x_2 \geq C_2$.

In this case,¹⁶ in which executive 2's constraint is high and executive 1's is either medium [$C_1 \leq \delta_1(1 - \delta_2)/(1 - \delta_1\delta_2)$] or high [$C_1 > \delta_1(1 - \delta_2)/(1 - \delta_1\delta_2)$], 2 gets more than in the Rubinstein model, and 1 receives less. The intuition is essentially the same as in the previous proposition: 2's constraint is higher than the amount that executive 1 would normally offer him or her—thus, to get executive 2 to accept his or her proposal, 1 has to offer a higher amount than usual whenever it is 1's turn to make a proposal. If executive 1's constraint is also high, then, whenever it is 2's turn to make an offer, he or she too has to provide 1 a higher amount than usual. However, because it is executive 1 who makes the first offer, the advantage goes to executive 2. It is important to note here that because 1's constraint is high, he or she is still getting a substantial piece of the pie

16. Notice that propositions 3 and 5 overlap a little in the sense that they both include the case in which both sides' constraints are high.

(in particular, an amount large enough to satisfy that constraint). However, it happens to be less than what he or she would be receiving if neither side were constrained (i.e., in the Rubinstein model).

DISCUSSION OF THE RESULTS

The overall results are summarized in Figure 1. When both sides' constraints are low or medium, neither has a bargaining advantage in the sense that the outcome is the same as it would have been if neither side had a constraint (the first-mover advantage of the Rubinstein model remains, however). When one side has a high constraint and the other side's constraint is low or medium, the former receives more than if neither side were constrained, and the latter obtains less.¹⁷ When both sides are highly constrained, the advantage goes to executive 2.

A careful reading of the results shows that a medium-level constraint can help executive 2 but not executive 1. When executive 1 is highly constrained and executive 2 has only a low constraint, the latter receives $\delta_2(1 - C_1)$ (proposition 2). If executive 2 has a medium constraint, on the other hand, he or she receives C_2 (proposition 3), which is strictly higher than $\delta_2(1 - C_1)$. Therefore, when executive 1 is highly constrained, executive 2 is better off having a medium rather than a low constraint (although he or she is still worse off than if neither side were constrained). When executive 2 is highly constrained, on the other hand, it does not matter to executive 1 what his or her own constraint is. Regardless of the executive's own constraint (assuming, of course, that $C_1 + C_2 \leq 1$; i.e., a ratifiable agreement is possible), he or she receives $1 - C_2$ (propositions 4 and 5), which is less than what the executive would be receiving if neither side were constrained.

In at least two ways, then, these results show that Iida's (1993) propositions are contingent on his simplification that only one side is constrained. Iida's conclusion was that under complete information, a domestic constraint is a bargaining advantage if and only if the negotiator is highly constrained at home (notice that this statement avoids entirely the question, "What if the other side is also constrained?").¹⁸ The results here indicate that when both sides can be constrained, a high domestic constraint is not necessarily a bargaining advantage (the case of executive 1 when executive 2 is highly constrained—even if executive 1's constraint is also high, it does not

17. It is important to note here that I am not saying that executive i (the one with the low or medium constraint) receives a smaller share of the pie than executive j (the one with the high constraint)—rather, executive i (j) receives less (more) than what he or she would be receiving if neither side were constrained (i.e., in the Rubinstein model). Whether this is more or less than what executive j receives depends on the values of δ_1 and δ_2 (as well as on C_1 and C_2). In this study, I am merely examining whether a domestic constraint helps an executive and not trying to determine which side receives more or less than the other (i.e., which side "wins").

18. Iida's (1993) propositions 1(a) and 1(b), which are the basis of this conclusion, are special cases of my propositions 2 and 1, respectively. However, his propositions are incorrect (although they predict the correct equilibrium outcome; i.e., the correct equilibrium partitioning of the pie) in that they do not recognize that to ensure ratification by country 1's legislature, there is an upper bound to the share of the pie that executive 2 is willing to accept. His propositions 1(a) and 1(b) should be modified to read (the part that I have added is italicized), "player 2 accepts any offer x less than or equal to . . . and greater than or equal to s_m " (he

	high	2 benefits		
C_2	medium	no effect		1 benefits
	low			
		low	medium	high
		C_1		

Figure 1: Effect of Constraints on the Bargaining Outcome, Relative to the Case in Which Neither Side Is Constrained

NOTE: If both sides' constraints are low or medium, the constraints have no effect. If only one side's constraint is high, that side obtains an advantage. If both sides' constraints are high, executive 2 has the advantage.

help him or her; in fact, the executive would be better off if neither side were constrained). Moreover, a constraint need not be high to help an executive—sometimes, even a medium-level constraint can be helpful (the case of executive 2 when executive 1 is highly constrained; although executive 2 is getting less than if neither side were constrained, he or she would be even worse off if his or her constraint were low rather than medium).

The fact that Iida's substantive conclusions are contingent on his simplification that only one side is constrained suggests that the same may be true of other models of international bargaining (see especially those cited earlier), in which case those would at best be models of bargaining between a constrained and an unconstrained executive. The results here suggest that domestic constraints have no effect on international bargaining outcomes unless at least one side's constraint is very high (i.e., it is necessary that at least one executive's constraint be high enough that the offer of the other executive would normally make him or her [in the absence of constraints] be insufficient to satisfy that constraint). When one side is highly constrained and the other has only a low or medium constraint, the former receives more than if neither side were constrained, and the latter obtains less. This result is in the spirit of the Schelling conjecture and can be thought of as a generalized version of the Schelling conjecture when both sides face constraints.

The results here also suggest that whether a domestic constraint benefits an executive can depend crucially on whether the other executive is also constrained (and on the sizes of the constraints). This finding, although intuitively sensible, has not been commented on by other formal models of international bargaining, which, because of their simplifying assumptions, are not suited for investigating this issue.

uses s_m for C_1 , and x is executive 1's share of the pie). (His propositions 2(a) and 2(b), as given in Tables 1 and 2, also need to be corrected to recognize that there is an upper bound to the share of the pie that executive 2 is willing to accept.) In my propositions 2 and 1, simply set $C_2 \leq 0$ (i.e., executive 2 effectively has no domestic constraint in that his or her legislature will ratify any agreement) to obtain (the corrected versions of) Iida's propositions 1(a) and 1(b), respectively. When $C_2 \leq 0$, as is effectively the case in Iida's model, executive 1 has a bargaining advantage if and only if C_1 is large enough to satisfy inequality 4. Hence Iida's conclusion.

Finally, it should be noted that the model presented here is not limited to settings in which the constraints on the executives are legislative in nature. Although the constraints in the model were motivated by reference to legislatures, C_i ($i = 1, 2$) can be thought of as simply the share of the pie that needs to go to country i for its relevant domestic groups to not block implementation of the agreement reached between the two executives. Thus, the “ratifying body” that generates the constraint C_i can be a military hierarchy that threatens to topple the existing leader if the executive signs an unfavorable agreement or a labor union that threatens strikes and unrest if he or she does so. Nondemocratic leaders also face domestic constraints, and the model presented here is readily applicable to authoritarian leaders operating under domestic constraints, as well as democratic leaders facing nonlegislative constraints.

UNCERTAINTY ABOUT EXECUTIVE 2’S CONSTRAINT

Until now, we have assumed that the constraints C_1 and C_2 are known with certainty by both executives. However, it may be more realistic to suppose that although an executive knows his or her own constraint quite well, this person is uncertain of the ratification threshold that the other side faces.

Suppose that executive 1 has a high constraint, $C_{1s} > \delta_1(1 - \delta_2) / (1 - \delta_1\delta_2)$ (the s denotes the strong type of executive 1, the type with a high constraint—strong in the sense that he or she is in a powerful bargaining position vis-à-vis executive 2, as this person can credibly claim that a large share of the pie is needed to satisfy his or her legislature), and executive 2 has either a high [$C_{2s} > \delta_2(1 - \delta_1) / (1 - \delta_1\delta_2)$] or a low [$C_{2w} \leq \delta_2(1 - C_{1s})$] constraint (the w denotes the weak type of executive 2, the type with a low constraint, who cannot credibly demand a large share of the pie). When the game begins, executive 1 believes that with probability $0 < p < 1$, executive 2 is of type 2_s , with high constraint $C_{2s} > \delta_2(1 - \delta_1) / (1 - \delta_1\delta_2)$, and that with probability $1 - p$, he or she is of type 2_w , with low constraint $C_{2w} \leq \delta_2(1 - C_{1s})$. In the first move of the game, which executive 1 does not observe, the nonstrategic player “chance” chooses the type of executive 2 with these probabilities.¹⁹ Both executives know their own types, and executive 2 knows with certainty that executive 1 is of type 1_s .²⁰ We shall assume that $C_{1s}, C_{2s} < 1$, and $C_{1s} + C_{2s} \leq 1$. That is, a ratifiable agreement is possible even between the two highly constrained types.

Executive 1’s belief is common knowledge, and this person updates his or her belief according to Bayes’s rule whenever possible. Let p_1 denote the probability that executive 1 assigns at any given point in the game to executive 2 being of type 2_s (so that at the start of the game, $p_1 = p$). We supplement Bayes’s rule with the following off-the-equilibrium path belief: if executive 2 takes an action inconsistent with the equilibrium

19. Technically, then, this is a game of imperfect information. However, I will abuse terminology and continue to refer to it as a game of “incomplete” information.

20. Therefore, this is a one-sided incomplete-information model. An interesting subject for future work is the case in which both sides are uncertain about the other side’s constraint, where this constraint can be either high or low.

strategies of 2_s and 2_w , then executive 1's belief p_1 about the type of his or her opponent remains unchanged.²¹

Depending on the size of the initial belief p , there are two belief-stationary sequential equilibria²² in this model:²³

Proposition 6: "Pooling" equilibrium. If $p \geq p_{critical}$, where $p_{critical} = (C_{2s} + \delta_2 C_{1s} - \delta_2) / (1 - \delta_2 + \delta_2 C_{1s} - \delta_1 C_{1s})$,²⁴ then in the first period ($t = 0$), executive 1 offers executive 2 the high amount of $x_2 = C_{2s}$, which executive 2 (both types) accepts. The legislatures of country 1 and country 2 (both types) ratify this agreement.

Proposition 7: "Separating" equilibrium. If $p \leq p_{critical}$, then in the first period ($t = 0$), executive 1 offers executive 2 the low amount of $x_2 = \delta_2(1 - C_{1s})$, which only type 2_w accepts. Type 2_s rejects the proposal (which is too small to be ratified by his or her legislature) and counterproposes $y_1 = C_{1s}$, which executive 1 accepts. These agreements are ratified by the relevant legislatures.

In the pooling equilibrium of proposition 6, which occurs when executive 1 is very confident at the start of the game that he or she is facing a highly constrained executive 2 (i.e., p is high), executive 1 takes no chances and offers executive 2 a high amount that would satisfy the highly constrained type. When p is high enough, it is optimal for executive 1 to offer executive 2 a high amount from the very beginning even though there is a small probability that executive 2 is in fact the low-constraint type that would accept a lower offer. If executive 2 is indeed highly constrained, he or she gets the same (high) payoff that he or she would get under complete information (which, of course, is more than the $\delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ that this person would receive if neither side were constrained). However, if he or she in fact has only a low constraint, this person gets more than the (low) $\delta_2(1 - C_{1s})$ that he or she would obtain under complete information (i.e., if it were known with certainty that the executive's constraint is in fact low). Therefore, a weakly constrained executive 2 can benefit from having a (false) reputation for having a hawkish legislature (i.e., a high p).

An interesting aspect of the latter result is that the weakly constrained type of executive 2 is also getting more than the $\delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ that this person would receive if neither side were constrained, and executive 1 is receiving less, despite the fact that executive 2's constraint is low and executive 1's is high—under incomplete information, the complete opposite of what the Schelling conjecture predicts can occur!²⁵

In the separating equilibrium of proposition 7, which occurs when executive 1 is confident at the start of the game that executive 2 has only a low constraint (i.e., p is low), executive 1 gambles on the chance that executive 2 is in fact the low-constraint

21. In general, executive 1 is allowed to hold any belief in such an eventuality because Bayes's rule is not applicable.

22. That is, I am restricting attention to sequential equilibria in which the executives' strategies are stationary for any given value of the belief p_1 .

23. In the following two propositions, I only specify the equilibrium outcomes. The full set of equilibrium strategies and beliefs is given in Tables 1 and 2 in the appendix.

24. It is easy to show that $0 < p_{critical} < 1$ for all acceptable values of the parameters δ_1 , δ_2 , C_{1s} , and C_{2s} , so that both types of equilibria are always possible.

type and offers him or her a low amount that would only satisfy the low-constraint type. If executive 2 is in fact the low-constraint type, he or she accepts this (low) offer, which is the same $\delta_2(1 - C_{1s})$ that this person would receive under complete information (which, of course, is less than the $\delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ that this person would have obtained if neither side were constrained—this is a case of the Schelling conjecture holding under incomplete information). If executive 2 is in fact the highly constrained type, on the other hand, he or she rejects this offer (which is too small to be ratified by his or her legislature) and makes a counteroffer that executive 1 accepts. Due to this one-period delay, in this equilibrium, the highly constrained type of executive 2 receives a discounted payoff of $\delta_2(1 - C_{1s})$, which is strictly lower than the payoff C_{2s} that this person would have received under complete information (i.e., if it were known with certainty that his or her constraint is high). Therefore, the delay (due to incomplete information) hurts him or her. Moreover, $\delta_2(1 - C_{1s})$ is also strictly less than the $\delta_2(1 - \delta_1)/(1 - \delta_1\delta_2)$ that executive 2 would have received if neither side were constrained—the delay is so costly that executive 2 would rather have the constraints (of both sides) be gotten rid of altogether, even though they benefit him or her under complete information! Therefore, in this equilibrium, the bargaining advantage that the highly constrained type of executive 2 obtains under complete information completely disappears.²⁶

However, this loss of a bargaining advantage for the highly constrained type of executive 2 is not translated into a gain in bargaining power for executive 1. In the separating equilibrium of proposition 7, if executive 2 is in fact highly constrained, executive 1 receives a discounted payoff of $\delta_1 C_{1s}$, which is strictly less than the $1 - C_{2s}$ that this person would have obtained had he or she known from the beginning that executive 2 was highly constrained (i.e., under complete information), which of course is strictly less than the $(1 - \delta_2)/(1 - \delta_1\delta_2)$ that this person would have received if neither side had a constraint. Therefore, the delay (due to incomplete information) is also costly to executive 1. Hence, in this equilibrium, both “strong” types (1_s and 2_s) lose and would be better off if neither side were constrained (they would also both be better off under complete information about executive 2’s constraint). The result of uncertainty about executive 2’s constraint is not a transfer of bargaining power from executive 2 to executive 1—rather, it is an overall loss of efficiency due to the valuable time wasted while executive 1 learns executive 2’s true type (i.e., his or her true constraint). In this equilibrium, the inefficiency arising from incomplete information is so severe that both highly constrained types would rather have the constraints be gotten rid of altogether (even executive 2, who normally prefers the constraints).

The final question to be asked in this section is whether the executives prefer that there be complete or incomplete information about executive 2’s constraint.

25. Note the strength of this result: by a “low” constraint, we include the case in which there is no constraint (i.e., $C_{2w} \leq 0$).

26. Reinhardt (1996) found a similar result in a model in which only one side is constrained. In real-life bargaining situations, it may be unreasonable to suppose that a one-period delay could be so costly. However, it may also be unreasonable to suppose in real-life bargaining situations that the delay to resolve the uncertainty would take only one period.

In the (pooling) equilibrium of proposition 6, the highly constrained type of executive 2 receives the same (high) payoff that he or she would have obtained under complete information. In the other equilibrium (proposition 7), the executive gets a discounted payoff that is strictly less. Therefore, the highly constrained type of executive 2 prefers that there be no uncertainty regarding the size of his or her constraint. The executive is best off if it is known with certainty that his or her constraint is severe.

The low-constraint type of executive 2, on the other hand, is never worse off under incomplete information. In one equilibrium, the executive receives the same payoff that he or she would under complete information (proposition 7). In the other equilibrium, the executive obtains a payoff that is strictly higher (proposition 6). Therefore, the “weak” type of executive 2 prefers that there be uncertainty regarding his or her true constraint. The executive can benefit from having a (false) reputation for having a hawkish legislature.

Finally, executive 1 prefers that he or she knows with certainty executive 2’s true constraint. In some cases, being uncertain is harmless and results in the same payoff as under complete information (proposition 6, if executive 2 in fact has a high constraint, and proposition 7, if executive 2 in fact has a low constraint). In one case, however, executive 1 offers executive 2 (much) more than is necessary to satisfy his or her domestic constraint (proposition 6, type 2_w) and, in another case, offers him or her less (proposition 7, type 2_s). In both cases, executive 1 receives payoffs that are less than what he or she would have obtained under complete information.

UNCERTAINTY ABOUT EXECUTIVE 1’S CONSTRAINT

Now consider the completely opposite case in which it is known with certainty that executive 2’s constraint is high, and executive 1 has either a high or a low constraint.²⁷ Let executive 2 initially believe that with probability $0 < q < 1$, executive 1’s constraint is high, and with probability $1 - q$, it is low. Using the same type of off-the-equilibrium path belief as in the previous section, there are again two different belief-stationary sequential equilibria, depending on whether q is large or small. Although I do not fully specify the equilibrium strategies here (they are given in Tables 3 and 4 in the appendix), it turns out that unlike in the previous case, the outcomes of the two equilibria are identical: in the first period of the game, executive 1 (both types) offers executive 2 the high amount of $x_2 = C_{2s}$, which executive 2 accepts. Regardless of the value of q , both types of executive 1 know that executive 2 is highly constrained, and so they offer him or her a high amount that satisfies his or her constraint. When there is uncertainty only about executive 1’s constraint, the bargaining advantage that the highly con-

27. The case in which executive 2 has no constraint and executive 1’s constraint is either high or low (executive 1 knows his or her own constraint) is analyzed in Iida (1993), as is the situation in which executive 2 has no constraint and both executives are (equally) uncertain about executive 1’s constraint. Iida (1996) analyzed the scenario in which both sides are constrained, but neither executive knows either constraint, and they are equally uncertain (see note 1).

strained type of executive 2 obtains under complete information is unmitigated. (This result makes sense given our previous finding that under complete information, if executive 2 is highly constrained, the payoffs are the same no matter what executive 1's constraint is.)

CONCLUSION

In this article, I have examined the dynamics of international bargaining between two executives, each of whom faces a domestic constraint in that his or her legislature will not ratify all agreements. The question to be investigated was whether such a domestic constraint allows an executive to obtain a more favorable agreement than he or she otherwise could. Previous formal analyses of this question generally simplify away half of the issue by allowing only one side to be constrained. It has been shown here that this simplification is not a harmless one, and the generality of the findings of other two-level bargaining models therefore also needs to be questioned.

The main findings of the model are as follows. Under complete information, a domestic constraint is a bargaining advantage to the extent that if one executive's constraint is high and the other's is only low or medium, the former gets a better deal than if neither side were constrained, and the latter is worse off. This can be thought of as a generalized version of the Schelling conjecture, when both sides face constraints (notice that empirically testing this proposition would be tricky because it involves a counterfactual—we cannot know what the bargaining outcome would have been if neither side were constrained if in fact both sides were constrained).²⁸ When both sides face high constraints, but the constraints are not so severe that a ratifiable agreement is impossible, the advantage goes to the side on the receiving end of the first offer (i.e., executive 2). Finally, we found that whether a domestic constraint benefits an executive can depend crucially on whether the other executive is also constrained. This mutual interdependence of the effects of domestic constraints has not previously been noted in the formal literature on international bargaining.

Under one-sided incomplete information about the sizes of the constraints, however, the Schelling conjecture need not hold—in fact, there is an equilibrium in which the executive with the high constraint receives less and the one with the low constraint receives more than what they would respectively be receiving if neither side were constrained. This is not merely a situation in which the Schelling conjecture fails to hold—the complete opposite of what it predicts occurs. Moreover, there is an equilibrium in which delay in reaching an agreement results in both highly constrained types receiving discounted payoffs that are less than what they would respectively be receiving if neither side were constrained. In other words, incomplete information can (but does not always) completely eliminate the advantage of having a high constraint. Incomplete information can (but does not always) make it worthwhile for the con-

28. However, if we have a measure of each side's discount factor, we can at least predict what the outcome would have been if neither side were constrained (based on the unique subgame-perfect equilibrium of the Rubinstein model).

straints to be done away with altogether, even from the perspective of the executive who normally (i.e., under complete information) benefits from them.²⁹

This last equilibrium offers a plausible explanation for Evans's (1993, 399) observation that

the strategy of "tying hands"—deliberately shrinking the win-set in pursuit of an agreement closer to the COG's [chief of government's] preferred outcome—is infrequently attempted and usually not effective. The "tying hands" strategy, suggested by Thomas Schelling's work, is logically plausible but lacks efficacy in practice. Perhaps because they are aware of its limited efficacy, statesmen prefer not to have their "hands tied" by constituents, *even when they share the constituent's preferences.* [italics added]

There are at least two previous explanations for why an executive would choose not to have his or her "hands tied." The first, formally analyzed by Mo (1994, 1995), is based on the executive and his or her legislature (or whatever entity has to "ratify" the agreement) having divergent preferences. This is sensible enough. However, Evans (1993) suggested that executives often prefer not to have their hands tied even when they share the preferences of the legislature. The second explanation, formally analyzed by Iida (1993, 1996), is based on the idea of "involuntary defection"—even if the executive and his or her legislature have similar preferences over international agreements (as in Iida's model and in the model of this article), if the executive is uncertain about his or her median legislator's status quo payoff (i.e., the executive is uncertain about his or her own domestic constraint), an agreement submitted to the legislature may unexpectedly (from the perspective of the executive) fail to be ratified. To avoid this possibility, an executive may prefer not to have his or her hands tied. As Iida (1993) pointed out, a necessary condition for involuntary defection (unexpected ratification failure) is that one of the two executives be uncertain about his or her own median legislator's status quo utility (if an executive knows his or her median legislator's status quo payoff, a "defection" will never be "involuntary," for if the legislature is going to reject an agreement, the executive will at least know that beforehand).

The last equilibrium discussed above offers an explanation for why an executive might prefer not to have his or her hands tied even when the executive shares the preferences of his or her legislature³⁰ and knows the median legislator's status quo utility (so that involuntary defection is not an issue). When there is international asymmetric

29. I conjecture that similar equilibria would emerge in a two-sided incomplete-information model. In particular, if p (the prior probability that executive 2 has a high constraint) is high, then regardless of the value of q (the prior probability that executive 1 has a high constraint), it seems reasonable that executive 1 (both types) would find it worthwhile from the very beginning to offer 2 a high amount. If 2 is in fact the low-constraint type and 1 the high-constraint type, this would be a violation of the Schelling conjecture. If p and q are both low but 1 and 2 are both in fact the high-constraint types, then one can imagine a two-period delay (in the first period, 1 offers 2 a low amount, which 2 rejects; 2 then offers 1 a low amount, which 1 rejects; agreement is then reached in the third period) in which both are worse off than if neither side were constrained. I leave the (challenging!) formalization of this situation (and corroboration of whether this intuition is in fact correct) for future work.

30. In the model of this article, the executive and legislators of a given country get the same utility from any given agreement (although they may discount future payoffs differently)—they differ only in their evaluation of the status quo (lack of an agreement). They therefore have quite similar preferences.

information, in which an executive knows his or her own constraint but the other executive does not and future payoffs are discounted, the valuable time wasted while the home executive convinces his or her foreign counterpart that the constraint is in fact higher than the latter believes it to be (cheap talk would seem to be ineffective in a situation like this, for an executive has an incentive to convince his or her counterpart that the constraint is high) may make it worthwhile for the constraints to be done away with altogether, even when the home executive would prefer them under complete information. Iida's (1993, 1996) analysis of involuntary defection suggests that symmetric incomplete information on the part of the executives (in which both executives are uncertain about one side or the other's [or both sides'] domestic constraint) can lead to an incentive on the part of the executives not to have their hands tied, even when they share the preferences of their respective legislatures. The analysis here suggests that asymmetric incomplete information can also be the culprit.

According to the involuntary defection explanation, fear of unexpected ratification failure leads to an incentive on the part of executives not to have their hands tied. According to the argument offered here, which might be called the "fear of delay" explanation, even when the final agreement is sure to be ratified (because each executive knows his or her own domestic constraint and will not submit an agreement to his or her legislature that the executive knows will not be ratified), the delay caused by the need to credibly convince one's counterpart of the severity of one's constraint can lead to an incentive on the part of the executives not to have their hands tied, even when one executive would prefer the constraints under complete information.

APPENDIX

The proofs to the propositions in this article are rather lengthy and are therefore not provided here. They are available from the author’s Web site at <http://troi.cc.rochester.edu/~ahmt/> or on request from the author (e-mail: ahmt@troi.cc.rochester.edu). Below, I provide complete descriptions of the incomplete-information equilibria.

Proposition 6: If $p \geq p_{critical}$, where $p_{critical} = (C_{2s} + \delta_2 C_{1s} - \delta_2) / (1 - \delta_2 + \delta_2 C_{1s} - \delta_1 C_{1s})$, then the strategies in Table 1 compose a sequential equilibrium.

TABLE 1
“Pooling” Equilibrium with Uncertainty about Executive 2’s Constraint

State (1_s 's belief)	$p_I = p$ ($0 < p < 1$)	$p_I = 1$
1_s proposes	$x_2 = C_{2s}$	$x_2 = C_{2s}$
1_s accepts	(a) $1 - C_{2s} \geq y_1 \geq C_{1s}$ (b) If $1 - C_{2w} \geq y_1 > 1 - C_{2s}$, then accept if $(1 - p)y_1 \geq \delta_1(1 - C_{2s})$, reject otherwise.	$1 - C_{2s} \geq y_1 \geq C_{1s}$
2_s proposes	$y_1 = C_{1s}$	$y_1 = C_{1s}$
2_s accepts	$1 - C_{1s} \geq x_2 \geq C_{2s}$	$1 - C_{1s} \geq x_2 \geq C_{2s}$
2_w proposes	$y_1 = C_{1s}$	$y_1 = C_{1s}$
2_w accepts	$1 - C_{1s} \geq x_2 \geq \delta_2(1 - C_{1s})$	$1 - C_{1s} \geq x_2 \geq \delta_2(1 - C_{1s})$
Transitions	(a) Go to $p_I = 1$ if executive 2 rejects x where $\delta_2(1 - C_{1s}) \leq x_2 < C_{2s}$ and counterproposes $y_1 = C_{1s}$. (b) Stay at $p_I = p$ if executive 2 takes an action inconsistent with the equilibrium strategies of 2_s and 2_w .	Stay at $p_I = 1$ if executive 2 takes an action inconsistent with the equilibrium strategies of 2_s and 2_w .

Proposition 7: If $p \leq p_{critical}$, then the strategies in Table 2 compose a sequential equilibrium.

TABLE 2
“Separating” Equilibrium with Uncertainty about Executive 2’s Constraint

State (1_s 's belief)	$p_I = p$ ($0 < p < 1$)	$p_I = 1$
1_s proposes	$x_2 = \delta_2(1 - C_{1s})$	$x_2 = C_{2s}$
1_s accepts	(a) $1 - C_{2s} \geq y_1 \geq C_{1s}$ (b) If $1 - C_{2w} \geq y_1 > 1 - C_{2s}$, then accept if $(1 - p)y_1 \geq \delta_1 V_1$, reject otherwise.	$1 - C_{2s} \geq y_1 \geq C_{1s}$
2_s proposes	$y_1 = C_{1s}$	$y_1 = C_{1s}$
2_s accepts	$1 - C_{1s} \geq x_2 \geq C_{2s}$	$1 - C_{1s} \geq x_2 \geq C_{2s}$
2_w proposes	$y_1 = C_{1s}$	$y_1 = C_{1s}$
2_w accepts	$1 - C_{1s} \geq x_2 \geq \delta_2(1 - C_{1s})$	$1 - C_{1s} \geq x_2 \geq \delta_2(1 - C_{1s})$
Transitions	(a) Go to $p_I = 1$ if executive 2 rejects x where $\delta_2(1 - C_{1s}) \leq x_2 < C_{2s}$ and counterproposes $y_1 = C_{1s}$. (b) Stay at $p_I = p$ if executive 2 takes an action inconsistent with the equilibrium strategies of 2_s and 2_w .	Stay at $p_I = 1$ if executive 2 takes an action inconsistent with the equilibrium strategies of 2_s and 2_w .

Proposition 8: If $q \geq q_{critical}$, where $q_{critical} = (C_{1s} + \delta_1 C_{2s} - \delta_1) / (1 - \delta_1 + \delta_1 C_{2s} - \delta_2 C_{2s})$, then the strategies in Table 3 comprise a sequential equilibrium.

TABLE 3
 “Pooling” Equilibrium with Uncertainty about Executive 1’s Constraint

State (2_s 's belief)	$p_2 = q$ ($0 < q < 1$)	$p_2 = 1$
1_s proposes	$x_2 = C_{2s}$	$x_2 = C_{2s}$
1_s accepts	$1 - C_{2s} \geq y_1 \geq C_{1s}$	$1 - C_{2s} \geq y_1 \geq C_{1s}$
1_w proposes	$x_2 = C_{2s}$	$x_2 = C_{2s}$
1_w accepts	$1 - C_{2s} \geq y_1 \geq \delta_1(1 - C_{2s})$	$1 - C_{2s} \geq y_1 \geq \delta_1(1 - C_{2s})$
2_s proposes	$y_1 = C_{1s}$	$y_1 = C_{1s}$
2_s accepts	(a) $1 - C_{1s} \geq x_2 \geq C_{2s}$ (b) If $1 - C_{1w} \geq x_2 > 1 - C_{1s}$, then accept if $(1 - q)x_2 \geq \delta_2(1 - C_{1s})$, reject otherwise.	$1 - C_{1s} \geq x_2 \geq C_{2s}$
Transitions	(a) Go to $p_2 = 1$ if executive 1 rejects y where $\delta_1(1 - C_{2s}) \leq y_1 < C_{1s}$ and counterproposes $x_2 = C_{2s}$. (b) Stay at $p_2 = q$ if executive 1 takes an action inconsistent with the equilibrium strategies of 1_s and 1_w .	Stay at $p_2 = 1$ if executive 1 takes an action inconsistent with the equilibrium strategies of 1_s and 1_w .

Proposition 9: If $q \leq q_{critical}$, then the strategies in Table 4 comprise a sequential equilibrium.

TABLE 4
 “Separating” Equilibrium with Uncertainty about Executive 1’s Constraint

State (2_s 's belief)	$p_2 = q$ ($0 < q < 1$)	$p_2 = 1$
1_s proposes	$x_2 = C_{2s}$	$x_2 = C_{2s}$
1_s accepts	$1 - C_{2s} \geq y_1 \geq C_{1s}$	$1 - C_{2s} \geq y_1 \geq C_{1s}$
1_w proposes	$x_2 = C_{2s}$	$x_2 = C_{2s}$
1_w accepts	$1 - C_{2s} \geq y_1 \geq \delta_1(1 - C_{2s})$	$1 - C_{2s} \geq y_1 \geq \delta_1(1 - C_{2s})$
2_s proposes	$y_1 = \delta_1(1 - C_{2s})$	$y_1 = C_{1s}$
2_s accepts	(a) $1 - C_{1s} \geq x_2 \geq C_{2s}$ (b) If $1 - C_{1w} \geq x_2 > 1 - C_{1s}$, then accept if $(1 - q)x_2 \geq \delta_2 V_2$, reject otherwise.	$1 - C_{1s} \geq x_2 \geq C_{2s}$
Transitions	(a) Go to $p_2 = 1$ if executive 1 rejects y where $\delta_1(1 - C_{2s}) \leq y_1 < C_{1s}$ and counterproposes $x_2 = C_{2s}$. (b) Stay at $p_2 = q$ if executive 1 takes an action inconsistent with the equilibrium strategies of 1_s and 1_w .	Stay at $p_2 = 1$ if executive 1 takes an action inconsistent with the equilibrium strategies of 1_s and 1_w .

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