

MEASURING THE SHADOW OF THE FUTURE: AN INTRODUCTION TO THE GAME THEORY OF CUSTOMARY INTERNATIONAL LAW

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Compliance remains one of the most contested issues in international law. In this article, Professors Norman and Trachtman present a game theoretic model to identify the circumstances under which states have a rational incentive to comply with customary international law (CIL). One common explanation for compliance is the “shadow of the future,” in which a state is understood to comply out of fear that failure to do so will prevent it from using international law at some later time. A violator, the logic goes, will eventually be in a position where it wishes to invoke international law, and having failed to comply at an earlier time, will not be able credibly to invoke international law at a later time. Professors Norman and Trachtman demonstrate how game theorists measure the magnitude of the “shadow of the future,” and how this magnitude may be modified in order to increase the likelihood of compliance. The article thus shows what facts or parameters would be relevant in a rational preference-maximizing model of a state’s decision to comply.

INTRODUCTION: WHY DO STATES COMPLY WITH CUSTOMARY INTERNATIONAL LAW?

The most enduring and important debate in international law is concerned with compliance. This article does not respond to the difficult

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empirical question of whether states actually comply with customary international law. Rather, this article presents a game theoretic model to identify the circumstances under which states have a rational incentive to comply with customary international law.¹ This article identifies facts or parameters relevant in a rational, preference-maximizing model of a state's decision to comply.

International lawyers have often invoked the "shadow of the future" as a reason to comply with international law. The idea is that a violator will eventually be in a position where it wishes to invoke international law, and, having failed to comply at an earlier time, will be unable to credibly invoke international law at a later time. According to this idea, even a powerful empire today, with the present ability to coerce action by other states without reference to international law, will eventually find that it needs international law to promote its interests. This article shows how game theorists measure the magnitude of this effect and how the magnitude of this effect may be modified in order to increase the likelihood of compliance.

I. A HYPOTHETICAL EXAMPLE: PRESCRIPTIVE JURISDICTION

In order to provide some context, we examine a possible example of the emergence of and compliance by states with customary international law (CIL). We do not engage in any methodical empiricism.

CIL includes rules regarding prescriptive jurisdiction. Each state generally is understood to hold jurisdiction over conduct within its territory. The Permanent Court of International Justice's 1927 decision in *The Case of the S.S. Lotus*² stood for the proposition that jurisdiction is in important dimensions a *res nullius*, insofar as states may exercise jurisdiction without restraint, as long as they do not interfere with other states'

1. This paper is based on an earlier paper that presents these ideas in greater formal detail. George Norman & Joel P. Trachtman, *The Customary International Law Game*, 99 AM. J. INT'L L. 541 (2005); see also Mark A. Chinen, *Afterword*, 23 MICH. J. INT'L L. 201 (2001); Mark A. Chinen, *Game Theory and Customary International Law: A Response to Professors Goldsmith and Posner*, 23 MICH. J. INT'L L. 143 (2001); Jack L. Goldsmith & Eric A. Posner, *Further Thoughts on Customary International Law*, 23 MICH. J. INT'L L. 191 (2001) [hereinafter Goldsmith & Posner, *Further Thoughts*]; Jack L. Goldsmith & Eric A. Posner, *A Theory of Customary International Law*, 66 U. CHI. L. REV. 1113 (1999) [hereinafter Goldsmith & Posner, *A Theory of CIL*]; Andrew T. Guzman, *A Compliance-Based Theory of International Law*, 90 CAL. L. REV. 1823 (2002); Edward T. Swaine, *Rational Custom*, 52 DUKE L.J. 559 (2002); Pierre-Hugues Verdier, *Cooperative States: International Relations, State Responsibility and the Problem of Custom*, 42 VA. J. INT'L L. 839 (2002); Vincy Fon & Francesco Parisi, *International Customary Law and Articulation Theories: An Economic Analysis* (George Mason Law & Econ. Working Paper Series, Paper No. 02-24, 2002), available at <http://ssrn.com/abstract=335220>; Francesco Parisi, *The Formation of Customary Law* (George Mason Law & Econ. Working Paper Series, Paper No. 01-06, 2001) [hereinafter Parisi, *Formation of CIL*], available at <http://ssrn.com/abstract=262032>.

2. S.S. "Lotus" (Fr. v. Turk.), 1927 P.C.I.J. (ser. A) No. 10 (Sept. 7).

territories or violate rules of positive law that the state exercising jurisdiction has accepted.³

However, some positive-law limits are believed to have developed under CIL. For example, there is some dispute regarding the scope of “extraterritorial” jurisdiction, specifically with regard to conduct abroad that has adverse effects within the territory of the state seeking to assert jurisdiction. According to the American Law Institute’s Restatement (Third) of Foreign Relations Law, as well as to a number of states and scholars, there are substantial limits on a state’s right to assert extraterritorial jurisdiction.⁴ These limits are provided by CIL. According to the Restatement, states may not exercise jurisdiction when it would be “unreasonable” to do so in light of the various connections and interests involved.⁵ For our purposes, the only important fact is that there is some arguable limit imposed by CIL.

It is noteworthy that while the United States has on occasion asserted the right to apply its law “extraterritorially,” it has often done so at significant diplomatic cost and has accepted some limits on its assertion. The recent debate about the application of the U.S. Sarbanes-Oxley financial reporting requirements to foreign companies is just the latest in a continuing dialog between the United States and its trading partners regarding the scope of application of U.S. law.⁶ It is reasonable to assume that each state would prefer to exercise jurisdiction without limit, in order to affect circumstances that may impose negative externalities on its citizens. However, each state is restrained by the fear of reciprocity or retaliation, resulting in a stable and efficient equilibrium.⁷ Is this balance of desire and restraint (i) formative of, and subsequently (ii) attributable to, CIL? How can we understand this balance in formal game theoretical terms?

II. THE BILATERAL SINGLE-PLAY PRISONER’S DILEMMA

States find themselves in an infinite variety of strategic settings, and we assume here that they do their best to maximize their own utility under constraint. One strategic setting that has often been used to model the situation of a state that must balance a desire to act unilaterally with

3. *Id.* at 18–19 (“Far from laying down a general prohibition to the effect that States may not extend the application of their laws and the jurisdiction of their courts to persons, property and acts outside their territory, [international law] leaves them in this respect a wide measure of discretion which is only limited in certain cases by prohibitive rules; as regards other cases, every State remains free to adopt the principles which it regards as best and most suitable.”).

4. RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW OF THE UNITED STATES §§ 402–403, 403 n.1 (1986); William S. Dodge, *Breaking the Public Law Taboo*, 43 HARV. INT’L L.J. 161, 161–62 (2002).

5. RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW OF THE UNITED STATES § 403 (1986).

6. John Paul Lucci, *Enron—The Bankruptcy Heard Around the World and the International Ricochet of Sarbanes-Oxley*, 67 ALB. L. REV. 211, 243–47 (2003).

7. See generally Norman & Trachtman, *supra* note 1.

a fear of retaliation is the prisoner's dilemma game.⁸ We begin with a bilateral example in which the states interact only once. We assume that the states cannot bind one another, as in contract or treaty. This assumption requires us to use the tools of noncooperative game theory, as opposed to cooperative game theory. While, in the real world, a treaty may well be available to allow states to bind themselves, the binding force of a treaty is itself dependent on CIL.⁹ So, at least for analytical purposes, it is useful to examine the possibility that states would be able to establish and comply with a rule of CIL. Moreover, we know that states actually do use customary international law, so it is worthwhile to ask under what conditions a rule of CIL may actually affect states' conduct.

A. *Solution to the Prisoner's Dilemma Game*

The bilateral prisoner's dilemma game makes particular assumptions with respect to the states' payoffs that seem apposite in at least some international law contexts. First, the aggregate payoff to the two states is greatest when they both cooperate in establishing and complying with the CIL rule and least when they both defect from the CIL rule. Second, for each state it is better to defect when the other state complies. Finally, for each state it is better to defect when the other state defects. The result is that in equilibrium both states get only their third-best outcome, while mutual cooperation would give each of them their second-best outcome.

To fix ideas we use a variant of a game formulated by Goldsmith and Posner and described by the following game matrix.¹⁰ Note that this game is, indeed, a prisoner's dilemma game.

8. In the classic prisoner's dilemma, the prosecutor presents each of two prisoners an opportunity to confess. If neither of them confesses, both will be convicted of lesser offenses and receive comparatively light sentences of, say, three years. If either of them confesses and provides evidence against the other, while the other does not confess, the one who confesses is allowed to go free, whereas the other is given a much heavier sentence of, say, ten years. If both of them confess, they each receive seven year sentences. The prisoners cannot communicate with one another or enter into a binding agreement. From the prisoners' perspective, the best collective outcome—a total of six years' imprisonment—results when neither prisoner confesses. The dilemma, however, is that when each prisoner looks only at his own utility, he finds that he is better off confessing no matter what the other prisoner does. Each reasons as follows. If the other prisoner confesses, I have two options: I can confess and serve seven years, or I can *not* confess and serve ten years. Therefore, I confess. Likewise, I have two options if the other prisoner does not confess: I can confess and serve no time at all, or I can *not* confess and serve three years. Therefore, I confess. The outcome either way is that each of the prisoners confesses and each receives a longer sentence than if neither confessed. In this case, rational behavior leads to an inefficient outcome.

9. See ANTHONY AUST, *MODERN TREATY LAW AND PRACTICE* 17 (2000).

10. ERIC A. POSNER & JACK L. GOLDSMITH, *THE LIMITS OF INTERNATIONAL LAW* 30 tbl.1.2 (2005).

TABLE 1

		<i>State B</i>	
		Comply	Defect
<i>State A</i>	Comply	<i>A</i> : 3/ <i>B</i> : 3 [sum: 6]	<i>A</i> :1/ <i>B</i> : 4 [sum: 5]
	Defect	<i>A</i> : 4/ <i>B</i> : 1 [sum: 5]	<i>A</i> : 2/ <i>B</i> : 2 [sum: 4]

In our prescriptive jurisdiction example, the assumptions that define a prisoner's dilemma game imply that a state that refrains from exercising extraterritorial jurisdiction may be harmed the most in circumstances where other states do not refrain from doing so. Consider the example of export cartels, where behavior takes place in the home state, and adverse effects are felt in a foreign state. State *A* is hurt the most when it absorbs the adverse effects imposed by State *B*, without applying State *A*'s laws extraterritorially to cartels based in State *B*. On the other hand, State *B* is benefited the most by applying its laws extraterritorially to export cartels based in State *A*, while export cartels based in State *B* go unpunished. If State *A* defects, State *B* is better off if it also defects. However, both states would be best off in the aggregate if they cooperated. In other words, mutual cooperation is efficient in that it puts the two states on the Pareto frontier.

The solution to our sample game (and all prisoner's dilemma games) is straightforward. We look for a "Nash equilibrium" to this game—a set of "strategies such that each player's strategy is an optimal response to the other players' strategies."¹¹ Consider State *A*. *A* reasons as follows: "If I expect State *B* to comply with the proposed CIL, I should defect: my payoff is 4 rather than 3. If I expect State *B* to defect on the proposed CIL, I should defect: my payoff is 2 rather than 1. Thus, no matter what I expect State *B* to do, I should defect." In the language of game theory, "Defect" is a *dominant strategy* for State *A*. Exactly the same reasoning applies to State *B*: its dominant strategy is also Defect. So the only equilibrium to this game is that both states defect on the pro-

11. DREW FUDENBERG & JEAN TIROLE, GAME THEORY 11 (1991).

posed CIL. It is a Nash equilibrium since neither state wishes to switch to Comply given that the other state is playing Defect. No amount of preplay communication or preplay promises to comply can avoid this because, by assumption, such promises cannot be made binding.

1. *Inefficient Equilibrium*

The solution to the prisoner's dilemma game is an inefficient equilibrium. Since, under the game's payoff structure, each state is better off defecting no matter what the other state does, the outcome gives each state a payoff that is smaller than the payoff it would have received if both states had complied. Moreover, and by construction of the game, the aggregate payoff from bilateral defection is even smaller than the aggregate payoff if one state defects while another state complies.

2. *A Normative Perspective*

To summarize, given the assumptions of the prisoner's dilemma, the dominant solution is the inefficient equilibrium of defection. States conscious of this are naturally interested in making changes to avoid this outcome. In formal terms, the unmodified prisoner's dilemma always has the same result of mutual defection, so the only way to avoid this inefficient equilibrium is to change the game.

Of course, there are many circumstances in the real world that do not conform to the prisoner's dilemma or involve costs of resolving the prisoner's dilemma which outweigh the benefits of resolution. Under these circumstances, no implicit agreement is necessarily needed and reaching one would therefore be inefficient. Our goal, however, is to examine strategic barriers to implicit agreement. Reducing these barriers would generally increase efficiency, just as reducing the general barriers to contracts between private parties would generally increase efficiency without requiring that parties contract in every circumstance.¹²

There are several ways to change the game. In the next section, we will modify the game in only one important dimension: we will assume that the game is repeated. We will thus reflect formally the intuition that the shadow of the future—of repetition—has consequences for state behavior and can resolve (or, more accurately, modify) the prisoner's dilemma.

B. *Bilateral Repetition*

In this section, we begin to measure the shadow of the future. It is generally understood that a mutually beneficial outcome can exist as a

12. See generally ROBERT COOTER & THOMAS ULEN, *LAW AND ECONOMICS* 196–200 (4th ed. 2004).

credible equilibrium of the prisoner's dilemma where the game is repeated, subject to additional conditions relating to the players' patience and the time horizon.¹³ The reason is simple to see. With repeated play, current actions can be conditioned on past actions, introducing the possibility of rewarding compliance with continued compliance and punishing defection with defection.

Repetition of itself is, however, not enough. Suppose that each state knows that the above game is going to be repeated a finite number of times, known to each state in advance. Then, it remains the case that the only equilibrium is defection by both states in every period. To see why, note that both players have an incentive to defect in the final period. The game unravels from there to immediate defection.¹⁴ This is the game theory insight known as the "chain store paradox."¹⁵ The chain store paradox recognizes that each state can predict that in the last period, its counterparty's dominant solution is to defect. Anticipating that the counterparty will defect, the first party is rational to defect also (see the payoff structure in the table above). Both parties will therefore defect in the final period. But once this is understood, the penultimate period becomes the new final period prior to the period of defection. As this domino-like process continues, we reach a rationale for defection in every play of the game. Therefore, if the parties know that the repetition is finite, and when it will end, repetition will not support cooperation.

The immediate implication is that for repetition to have any bite it is important that the parties do not know when the game will end. Suppose, then, that the game detailed above is repeated indefinitely, by which we mean that in each period each state believes that there is a nonzero, nontrivial probability that the game will be played again. "All players defect every period" remains a credible equilibrium. However, if the states are sufficiently patient—in a manner that we make clear below—it may be possible for the states to formulate strategies such that it is in the self-interest of each state to comply with the proposed CIL.

1. *A Digression: The Folk Theorem*

In the simple game we have specified the states have only two strategies, Comply or Defect, which limits the number of potential equilibria that can be supported when the game is indefinitely repeated. Suppose, instead, that there is a range of strategies. For example, states might adopt CIL with varying degrees of strictness or extensiveness. This increased complexity might result in additional credible equilibria, depending on the parties' patience.¹⁶ Fudenberg and Tirole conclude:

13. See ROGER B. MYERSON, *GAME THEORY: ANALYSIS OF CONFLICT* 308–69 (1991).

14. FUDENBERG & TIROLE, *supra* note 11, at 111.

15. *Id.* at 369–74.

16. *Id.* at 111–12.

Thus, repeated play with patient players not only makes “cooperation”—meaning efficient payoffs—possible, it also leads to a large set of other equilibrium outcomes. Several methods have been proposed to reduce this multiplicity of equilibria; however, none of them has yet been widely accepted, and the problem remains a topic of research.¹⁷

In other words, in circumstances of multiple equilibria, “anything that tends to focus the players’ attention on one particular equilibrium, in a way that is commonly recognized, tends to make this the equilibrium that the players will expect and thus actually implement.”¹⁸ Although no formal solution to this problem has yet appeared in the literature on game theory, it is reasonable that states may coordinate through diplomacy, through other communication, or through their actions advancing particular customary rules.

Although the folk theorem suggests that the repeated game might offer an embarrassment of riches in terms of multiple potential equilibria, the fundamental point remains: indefinite repetition offers states a way out of the prisoner’s dilemma. When players are patient, the short-term gain from defection in one play may be outweighed by losses in future periods. Fudenberg and Maskin show that relatively frequent transactions with the same partner—regardless of the number of players, the number of strategies available, or the size of the payoffs—make it possible to reach an equilibrium with efficient trading.¹⁹ We shall illustrate this point in the context of our simple game.

In order to derive an efficient equilibrium in a repeated CIL game, or in any repeated prisoner’s dilemma game, two additional components are needed. First, it is necessary to make some assumptions about the strategies of the players. Second, it is important to know how to evaluate payoffs that are going to arise in the future rather than in the present.

2. *Strategies to Support Compliance in the Repeated Game*

Individuals, or states, may respond in a variety of ways to compliance or defection. Of course, if states decide not to retaliate in response to deviation, other states will not have rational incentives to comply under the prisoner’s dilemma payoff structure in any event. So, we assume a retaliatory strategy. We mention three such strategies derived from the literature of game theory: tit-for-tat, grim trigger, and penance.²⁰ These strategies are stylized assumptions about state behavior that are necessary in order to complete the model. The reader will see, however, that

17. *Id.* at 112.

18. MYERSON, *supra* note 13, at 371.

19. Drew Fudenberg & Eric Maskin, *The Folk Theorem in Repeated Games with Discounting or with Incomplete Information*, 54 *ECONOMETRICA* 533, 533 (1986).

20. *See generally* Norman & Trachtman, *supra* note 1, at 541.

these strategies are plausible conjectures regarding state responses to defection by others in particular circumstances.

a. Tit-for-Tat

This strategy can be stated very simply: I shall do in the current period whatever you did in the previous period. Under this strategy a state responds to defection with a single defection. Tit-for-tat is one of the most frequently discussed strategies in connection with repeated prisoner's dilemmas. However, while tit-for-tat may win evolutionary games,²¹ it is not credible: after a defection, the wronged state has an incentive to accept an assurance from the defecting state that it will cooperate in the future.²² Even more devastating to tit-for-tat is that once one state defects, the game cycles endlessly between defection and compliance.²³ Given the implausibility of tit-for-tat, we reject it and do not evaluate the implications of its use.

b. Grim Trigger

With the grim trigger strategy, a state responds to a single defection by itself defecting forever. In this case, the game results in reversion to the one-shot Nash equilibrium in which both states play Defect. Essentially, grim trigger assumes that in the event of deviation, the states revert to the strategies that they would have adopted if no CIL rule had developed in the first place. The grim trigger strategy is credible, as it calls for a reversion to the dominant strategy of defection in response to an initial defection. It is also credible that the wronged state would respond with grim trigger because grim trigger is individually rational for the wronged state.

The grim trigger strategy is nevertheless unappealing. In his work on treaties relating to environmental commons problems, Scott Barrett rejects the grim trigger strategy because it fails to satisfy the criterion of collective rationality.²⁴ This criterion is a formal articulation of the intuitive concern that it would be extraordinarily wasteful to abandon an efficient multilateral agreement because of a single defection. While as stated above it would be *individually* rational to respond with defection

21. See ROBERT AXELROD, *THE EVOLUTION OF COOPERATION* 96 (1984). Evolutionary games are designed to compare the success of different strategies when played by a population of individuals in repeated play against other strategies.

22. In the language of game theory, it is not "subgame perfect"; a game is subgame perfect if, at every stage of a repeated game, no player has an incentive to deviate from the equilibrium strategy, even when others deviate. Tit-for-tat is not subgame perfect because the wronged state will have incentives to deviate from the equilibrium strategy. See MARTIN J. OSBORNE, *AN INTRODUCTION TO GAME THEORY* 444–46 (2004).

23. *Id.* at 444.

24. SCOTT BARRETT, *ENVIRONMENT AND STATECRAFT: THE STRATEGY OF ENVIRONMENTAL TREATY-MAKING* 279 (2003); Scott Barrett, *A Theory of Full International Cooperation*, 11 J. THEORETICAL POL. 519, 529–30 (1999).

forever—it simply calls for reversion to the Nash equilibrium—that strategy is *collectively* irrational insofar as rational negotiators have incentives to renegotiate a cooperative arrangement even after defection.

This renewed effort at cooperation renders the “defection forever,” or grim trigger, strategy not credible because it is not “renegotiation-proof.”²⁵ Stated differently, after a defection, a nondefecting state has an incentive to renegotiate with the defector, depriving the grim trigger of credibility and, therefore, effectiveness. The defector can make an appealing “let bygones be bygones” argument.²⁶ An obvious counterargument, however, is that renegotiation unravels if states perceive that the defector’s argument may be made repeatedly. Stated differently, once the players understand that defection and promises of future compliance will go on indefinitely, they might decline to renegotiate the first time. Moreover, in the CIL context we are operating on the assumption that states do not have the possibility of forming binding agreements through renegotiation, thus preventing this indefinite defection.

Nevertheless, there may be circumstances in which such renegotiation is possible and the offer to renegotiate *and abide by the results* is credible. If so, states will have incentives to defect, and an alternative, “renegotiation-proof” strategy is needed in order to induce compliance. We offer the penance strategy described below as a “weakly renegotiation-proof” alternative.

Is a grim trigger strategy ever actually used by states? That is, do states ever respond to defection by other states with defection forever? If we think not about CIL rules that exist but about the CIL rules that do not exist, it is clear that states do follow the grim trigger strategy, at least in some contexts. In fact, one might argue that the grim trigger is the existing default strategy in CIL. That is, where a CIL rule exists or is proposed for formation, and one state deviates, that may be sufficient provocation to cause others to deviate forever in response: to kill the rule multilaterally.

c. Penance

So, tit-for-tat is not individually rational and is therefore not credible, while grim trigger is not collectively rational and is therefore not credible. Either of these strategies could make defection attractive, given that retaliation is not credible and renegotiation after defection is likely. If defection is attractive, a CIL rule is unlikely to emerge. How-

25. See, e.g., FUDENBERG & TIROLE, *supra* note 11, at 174–75; Joseph Farrell & Eric Maskin, *Renegotiation in Repeated Games*, 1 GAMES & ECON. BEHAV. 327, 330 (1989).

26. Indeed, this argument is not uncommon in international law discourse. See, e.g., Scott M. Sullivan, *Changing the Premise of International Legal Remedies: The Unfounded Adoption of Assurances and Guarantees of Non-repetition*, 7 UCLA J. INT’L L. & FOREIGN AFF. 265, 270–71 (2002).

ever, the strategy known as “penance”²⁷ is both individually rational in that states will individually find it attractive to play and collectively rational in the sense that it is likely to be more attractive than renegotiation.²⁸ It is therefore credible.

Fudenberg and Tirole show that the following “penance” strategy profile is “weakly renegotiation-proof.”²⁹ Begin in the cooperative phase where both states choose compliance; if State *A* then defects, the other State *B* immediately switches to defect for all subsequent periods until and including the first period that State *A* reverts to compliance. After that period, State *B* also reverts to compliance.³⁰ The logic of this strategy in the CIL context is that a state having defected from a rule for a specified number of periods can have the rule reinstated only by accepting a period of punishment, in which it complies while the other state defects against it.

A form of penance seems to be endorsed by the International Law Commission as the CIL rule to be applied in international law generally. Articles 49 to 54 of the Articles on State Responsibility provide that countermeasures may be used only to induce a state to cease a wrongful act *and to make reparations*.³¹ Countermeasures must also be commensurate with the injury.³²

3. *Discounting and the Shadow of the Future*

At the heart of either the grim trigger or the penance strategy is a very simple trade-off. A state considering deviation from a CIL rule must balance the short-term benefits of defection while its partner continues to comply with the longer-term losses imposed by the partner’s retaliation. This requires that the state has the means to compare current and future payoffs in common terms. The techniques for doing so are

27. See FUDENBERG & TIROLE, *supra* note 11, at 179–82. “Penance” is sometimes referred to as “getting even.”

28. That is, it is both subgame perfect and weakly renegotiation proof. *Id.* at 180 (citing Farrell & Maskin, *supra* note 25); Eric van Damme, *Renegotiation-Proof Equilibria in Repeated Prisoners’ Dilemma*, 47 J. ECON. THEORY 206, 207–08 (1989).

29. While a precise definition of “renegotiation-proof” has not yet been agreed upon in game theory literature, the treatment by Farrell and Maskin is worth considering. They define a “weakly renegotiation-proof” equilibrium for an infinitely repeated game to be a subgame-perfect equilibrium strategy profile that is not Pareto-dominated by any other subgame-perfect strategy profile. Using this definition, the grim-trigger strategy profile described above is not weakly renegotiation-proof, since after defection the payoffs to cooperation Pareto-dominate those of punishment. See Farrell & Maskin, *supra* note 25, at 330–31.

30. FUDENBERG & TIROLE, *supra* note 11, at 180.

31. INT’L LAW COMM’N [ILC], *Report of the International Law Commission, Fifty-Third Session: Articles on Responsibility of States for Internationally Wrongful Acts*, ¶ 76, U.N. Doc. A/56/10 (2001), available at <http://untreaty.un.org/ilc/reports/2001/2001report.htm> [hereinafter *Articles on State Responsibility*]. Rather than expressing international law per se, these articles are an attempt to codify existing custom. See *Chorzow Factory Case (Pol. v. Ger.)*, 1928 P.C.I.J. (ser. A) No. 9, at 21 (July 26) (indemnities) (concerning obligation to make reparations).

32. See David J. Bederman, *Counterintuiting Countermeasures*, 96 AM J. INT’L L. 817 (2002).

well developed in accounting and finance, requiring that future payoffs be *discounted* to their present values—their values today.³³

We refer to the extent to which a particular state values future payoffs as a discount factor—a factor used to reflect the present value to a particular player of future payoffs. The discount factor reflects the player's preference for payoffs now versus payoffs in the future. It is a central variable that interacts with other variables such as the magnitude of future payoffs, the relative payoffs from defection versus cooperation, the horizon or number of periods predicted, the frequency of repetition, the number of other players (under multilateral agreements), and the degree of linkage to other relationships.

The “discount factor” is a mathematical factor structured to reflect a player's degree of patience. A discount factor of 1 means that future payoffs are valued equally to present payoffs. A discount factor of 0.75 means that a payoff of, say, 10 received one period in the future has a present value of 7.5. A high discount factor indicates patience—relatively high valuation of future payoffs—while a low discount factor indicates impatience.

To see how discounting works, consider our simple game. If State *A* expects that indefinite repetition will lead to continued compliance, then State *A* expects to receive a payoff of 3 in every period. Suppose that State *A* has a discount factor of d and that State *A* expects in each period that the game will be continued with probability p . The present value of the payoff of 3 received today is, of course, 3. The present value of the payoff of 3 received in the next period, by contrast, is only $3dp$, in the second period from now is $3(dp)^2$, in the third period is $3(dp)^3$, and so on.

Denote dp as δ (where δ can be referred to as a *probability-adjusted discount factor*). Then the expected present value of 3 received one period in the future is 3δ . Clearly, the smaller the probability adjusted discount factor, the less is the present value of this future payoff. In other words, the power of the shadow of the future lies in the weight that states give to future as against current payoffs. Placing a high value on future payoffs is equivalent to having a low discount rate and a greater confidence that the game will continue. Being concerned with the present derives from applying a high discount rate or placing a low probability on continuance of the game.

C. Resolution of the Prisoner's Dilemma

Now consider the indefinitely repeated prisoner's dilemma game on the assumption that both states are playing the penance strategy. Denote by G the return to Defect when the other state plays Comply, by C the

33. E.g., Joseph H. Haslag et al., *Are Net Discount Ratios Stationary?: The Implications for Present Value Calculations*, 58 J. RISK & INS. 505 (1991).

return to each state when both Comply, by L the return to a state playing Comply when the other state Defects, and by D the return to each state when both Defect. In our sample game, repeated here for convenience, $G = 4$, $C = 3$, $L = 1$ and $D = 2$.

We need only consider the following question: should State A Comply in every period or Defect today, accepting a punishment by playing Comply in the next period while State B plays Defect, at which time the game returns to both playing Comply?³⁴

TABLE 2

		<i>State B</i>	
		Comply	Defect
<i>State A</i>	Comply	$A: 3/ B: 3$ [sum: 6]	$A:1/ B: 4$ [sum: 5]
	Defect	$A: 4/ B: 1$ [sum: 5]	$A: 2/ B: 2$ [sum: 4]

The return to continued compliance is $S_c = C + C\delta + C\delta^2 + \dots$. By contrast, the return to Defect followed by penance is $S_d = G + L\delta + C\delta^2 + \dots$. Compliance is preferred by State A (and State B) provided that S_c is greater than S_d , which requires that $C + C\delta > G + L\delta$. Reorganizing this equation gives us the *Patience Condition*: it is in the self-interest of State A (and State B) to comply with the CIL provided that

$$\delta > \frac{G-C}{C-L}.$$

In our example, compliance is self-sustaining provided that $\delta > (4-3)/(3-1) = 0.5$.

Recall that $\delta < 1$. The Patience Condition then indicates that a necessary but not sufficient condition for a CIL rule to be self-sustaining under a penance strategy is that for each state the return to mutual compliance exceeds the average of the single-period return to deviation and the return while being punished. More generally, compliance is self-

34. Standard analysis indicates that it is not rational to Defect for more than one period.

sustaining provided that the returns to compliance are “large enough” compared to the net return to defection and penance, and provided that the shadow of the future is “strong enough.” Compliance, therefore, is self-sustaining so long as the states involved are sufficiently patient.

III. OTHER FACTORS AFFECTING STATE DECISIONS TO COMPLY

A. *Number and Variation of Players*

There are many variants of the prisoner’s dilemma game. As a result, it is impossible to determine whether compliance is more or less likely as we increase the number of players (states) without knowing the precise context. Some circumstances will be more like a commons problem or a cartel, in which the greater the number of players that comply, the greater the incentives to defect. This can easily be seen in connection with a commons problem, where if other possible users engage in conservation, defectors can reap greater harvests. Other circumstances will be the opposite, based on network effects, public goods, or economies of scale: the more players that comply, the greater the incentives to comply. In still other cases, the payoffs from defection may not vary with the number of players.

Different players may be affected differently by defection or compliance. In the CIL field there are notable cases of asymmetry. For example, a state with an extensive diplomatic service will have more at stake in connection with a rule of diplomatic immunity. A landlocked state may have a different perspective on the territorial sea than a state with extensive coastlines. Asymmetry affects each state’s incentives to comply. Linkage among varying issues may either increase or decrease asymmetry.³⁵

Prior work has been skeptical that cooperative multilateral outcomes can be achieved in contexts that do not allow for formally binding agreements. However, the industrial organization literature recognizes important possibilities for cooperative outcomes in multilateral set-

35. While our model deals with games in which information is available to all, Parisi develops the Harsanyian concept of stochastic symmetry and role reversibility: the longer the shadow of the future, the less any one state can be certain of the way in which it will be affected by a particular rule. He argues that “[a]rticulations that are made prior to the unveiling of conflicting contingencies can be analogized to rules chosen under a Harsanyian veil of uncertainty.” Parisi, *Formation of CIL*, *supra* note 1, at 19; see also Robert O. Keohane, *The Demand for International Regimes*, 36 INT’L ORG. 325 (1982). Harsanyi’s classic article, *Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility*, was published in the 1955 *Journal of Political Economy*. Harsanyi’s concept of stochastic symmetry refers to the idea that parties may enter into an agreement where they are unsure—under a veil of uncertainty—as to precisely how the agreement will affect their particular interests. They can see that the agreement is an overall improvement and are assumed to be willing to take a chance as to how that welfare improvement is distributed. John C. Harsanyi, *Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility*, 63 J. POL. ECON. 309 (1955).

tings—even with a large number of players—and these results would appear to apply to the CIL game.³⁶

The number of players in any particular instance of the CIL game will vary. The maximum number of players is the total number of states in the world, although even this assumption may be an oversimplification. There are other players besides states, including substate government entities, international government entities, nongovernmental organizations (NGOs), and individuals. So, we have a potentially much larger universe of indeterminate size. In this connection, we will make the simplifying assumption that we are dealing with “billiard ball” states—that is, that states are unified actors with no internal dissent. Although we lose nuance by doing this, this allows us to work with a simple model that assumes that states have unitary preferences. Nonetheless, the structure of domestic government is worth taking into account in order to determine both the degree of patience of states and the degree to which state decision makers are concerned with the possibility of retaliation in areas outside their own functional responsibility.

Even limiting our universe to states, there would seem to be—with approximately two hundred states in the world—a significant problem in obtaining information about positions and practices, as well as in coordinating their actions. However, while states may possess formal sovereign equality, they are not substantively equal, and their participation in the CIL formation process is not homogeneous.³⁷ It may therefore be necessary to observe the behavior of only the more important states.

Oscar Schachter wrote that

[a]s a historical fact, the great body of customary international law was made by remarkably few States. Only the States with navies—perhaps 3 or 4 made most of the law of the sea. Military power, exercised on land and sea, shaped the customary law of war and, to a large degree, the customary rules on territorial rights and principles of State responsibility.³⁸

While historical circumstances have changed, of course, Schachter’s remark is suggestive of a game in which the number of players varies, depending on the degree to which their interests are implicated and also on their ability to affect outcomes. In this game, players are heterogeneous

36. David Hirschleifer & Eric Rasmusen, *Cooperation in a Repeated Prisoners’ Dilemma with Ostracism*, 12 J. ECON. BEHAV. & ORG. 87 (1989).

37. See Lisa L. Martin, *The Rational State Choice of Multilateralism*, in MULTILATERALISM MATTERS: THE THEORY AND PRAXIS OF AN INSTITUTIONAL FORM 91, 99 (John Gerard Ruggie ed., 1993) (suggesting techniques, including delegation as in the Security Council, for reducing the effective number of players).

38. Oscar Schachter, *New Custom: Power, Opinio Juris, and Contrary Practice*, in THEORY OF INTERNATIONAL LAW AT THE THRESHOLD OF THE 21ST CENTURY: ESSAYS IN HONOUR OF KRZYSZTOF SKUBISZEWSKI 531, 536–37 (Jerzy Makarczyk ed., 1996); see also Maurice H. Mendelson, *The Formation of Customary International Law*, in 272 REC. DES COURS 155, 194, 215, 225 (1998) (explaining how, in the past, “civilized” states were considered sufficient, and the applicable group of states did not need to be geographically constrained).

across a number of parameters, including interests, power, and degree of patience. In this sense, we may think of powerful states engaging in the CIL formation-and-maintenance game as exerting power through the articulation, formation, and maintenance of CIL rules. Schachter wrote of general CIL, but it is also possible to have regional or other plurilateral CIL.³⁹

Some of the leading authors developing rationalist analyses of customary international law are skeptical that multilateral customary processes can result in stable, efficient strategic equilibria under circumstances other than pure self-interest or coercion. For example, Goldsmith and Posner see little possibility for efficient resolution of prisoner's dilemma games in multilateral settings.⁴⁰ Although they see the possibility for efficient equilibria in certain bilateral settings, they assume that "the bilateral prisoner's dilemma cannot in any event be generalized to the situation of multilateral cooperation, which is such an important part of the traditional account."⁴¹ This position follows an established tradition, first articulated by Mancur Olson in 1965: "[U]nless the number of individuals in a group is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self-interested individuals will not act to achieve their common or group interests."⁴²

Olson based his view on the assumptions that (1) the benefit of cooperation declines with the number of players, (2) the costs of monitoring increase with the number of players, and (3) the costs of organizing retaliation increase with the number of players.⁴³ It is obvious, however, that these assumptions are general conjectures about the world and are not necessarily true in any particular circumstances.⁴⁴ Moreover, these assumptions are only a subset of the parameters worth considering. Finally, technological and social change has made it easier in some circumstances to monitor and to organize retaliation.⁴⁵ Our model provides a broader context in which to consider these, and other, parameters.

39. See *Right of Passage over Indian Territory* (Port. v. India), 1960 I.C.J. 6 (Apr. 12); *Asylum* (Colom. v. Peru), 1950 I.C.J. 266 (Nov. 20); MALCOLM N. SHAW, *INTERNATIONAL LAW* 72–73 (4th ed. 1997); cf. Edward T. Swaine, *The Local Law of Global Antitrust*, 43 WM. & MARY L. REV. 627, 706–25 (2001). ICJ Reports are available at <http://www.icj-cij.org>.

40. Goldsmith & Posner, *A Theory of CIL*, *supra* note 1, at 1132–33.

41. *Id.* at 1132.

42. MANCUR OLSON, JR., *THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS* 2 (1965) (emphasis omitted); see also Kenneth A. Oye, *Explaining Cooperation Under Anarchy: Hypotheses and Strategies*, in *COOPERATION UNDER ANARCHY* 1, 19–20 (Kenneth A. Oye ed., 1986).

43. OLSON, *supra* note 42, at 48.

44. RUSSELL HARDIN, *COLLECTIVE ACTION* 43 (1982).

45. See Arthur Lupia & Gisela Sin, *Which Public Goods Are Endangered?: How Evolving Communication Technologies Affect the Logic of Collective Action*, 117 PUB. CHOICE 315 (2003); Ronald B. Mitchell, *Sources of Transparency: Information Systems in International Regimes*, 42 INT'L STUD. Q. 109 (1998).

Kenneth Oye identifies three slightly different ways in which increasing the number of players reduces the likelihood of cooperation: (1) increased transaction costs; (2) decreased credibility of retaliation by third parties, suggesting that players would not retaliate against a defector; and (3) increased heterogeneity of relative patience.⁴⁶ That transaction costs would increase (compared to transaction benefits) is merely a conjecture and, in any event, could readily be counterbalanced by the possibility of economies of scale and scope. As discussed above, the credibility issue may vary with the strategy assumed. Furthermore, it is entirely possible that merely bilateral retaliation could support an efficient equilibrium. With respect to heterogeneous degrees of patience, as discussed in more detail below, we agree with Oye that the ability to achieve cooperation depends on the degree of patience of the least patient state involved in the game. This follows immediately from applying the Patience Condition to each state. The implication of this constraint is that patient states may find it useful to exclude impatient states from certain cooperative arrangements. They may also be interested in increasing the patience of impatient states.

B. Information and Bilateral Versus Multilateral Retaliation

The relative scale of information costs in the international system is somewhat different from that in a municipal setting. That is, the cost of producing and distributing information regarding state behavior may be a much smaller fraction of the utility of cooperation in the international setting than in municipal, interfirm contexts. Furthermore, there are significant asymmetries among states in terms of the relative cost and value of producing information. Epistemic communities among government officials may play an important role in information transmission.

There are significant differences between bilateral and multilateral games, and between a multilateral game with bilateral retaliation and one with multilateral retaliation. Under bilateral retaliation, information problems are significantly reduced, although not eliminated. Our model assumes bilateral retaliation, but multilateral retaliation is possible under some information conditions and would sustain cooperation in a wider range of circumstances.

Thus, given that the strategies available to a state are “Comply” or “Defect,” there are at least two possibilities that we need to consider in connection with a multilateral game:

1. *Bilateral retaliation*: Defection by State *A* against State *B* leads to punishment of *A* only by *B*: bilateral defection leads to bilateral punishment; or

46. Oye, *supra* note 42, at 18–20.

2. *Multilateral retaliation*: Defection by State *A* against State *B* leads to punishment of *A* by all states: bilateral defection leads to multilateral punishment.

We focus our analysis on bilateral retaliation for three reasons. First, it makes the analysis simpler without changing any of the qualitative conclusions. Second, multilateral retaliation simply increases the incentives to comply compared to bilateral retaliation. Since bilateral retaliation involves milder punishment of defection than multilateral retaliation, the conditions that support cooperation under bilateral retaliation will certainly support cooperation under multilateral retaliation. In other words, where multilateral retaliation is possible, the conditions that we identify below are sufficient, but not necessary, to support a multilateral rule. Third, there is some force to the argument that bilateral retaliation is a more plausible scenario than multilateral retaliation in most of the situations in which the formulation of CIL is likely to be considered.

Articles 42, 48, and 54 of the Articles on State Responsibility generally exclude retaliation by or against third states for a truly bilateral injury.⁴⁷ These rules seem to limit the formal possibility for multilateral retaliation against bilateral defection, at least *within* a particular CIL rule. But where a CIL rule is not formed, or falls into desuetude, we might understand that there would be multilateral retaliation, as well as retaliation against noninjuring states by virtue of the refusal of states to comply with the erstwhile rule.

In any event, in our model, we assume that retaliation is applied bilaterally—that if State *A* defects vis-à-vis State *B*, only State *B* will respond, and only against State *A*. If multiple states responded against State *A*, it would simply make cooperation more likely by increasing the punishment for defection. Thus, assuming bilateral retaliation, we can represent a multilateral prisoner's dilemma game as a set of bilateral games—which is not the same as assuming a bilateral game. Rather, it is a multilateral game with bilateral retaliation.

Although we assume bilateral retaliation, it is worth discussing the possibility and implications of multilateral retaliation. Multilateral retaliation depends on the ability of players to find out about other players' characteristics or their compliance or defection history. On the one hand, it may be costly for an individual player to find out for itself the history of many other players. On the other hand, the potential responses of many other players may add to the disincentives for defection. There are economies of scale and scope in this type of system that may counterbalance increased information costs that exist in an *n*-player setting.⁴⁸

47. *Articles on State Responsibility*, *supra* note 31, at 54, 56, 58.

48. See Samuel Bowles & Herbert Gintis, *The Moral Economy of Communities: Structured Populations and the Evolution of Pro-Social Norms*, 19 *EVOLUTION & HUM. BEHAV.* 3, 11–14 (1998).

Along these lines, Michihiro Kandori examines circumstances in which social norms enforced by multilateral retaliation work to support efficient outcomes in infrequent transactions—absent, that is, repetition that can allow bilateral retaliation to be effective.⁴⁹ Kandori suggests that where members of a community can observe each other's behavior, multilateral enforcement works in much the same way as bilateral enforcement.⁵⁰ Kandori suggests that this is precisely what occurs in small communities. In this context, we might suggest that the global community can also be understood as a small community. CIL rules often address matters that are public knowledge and are reported in the press. Imagine a municipal community where each individual's behavior is subject to journalistic and intelligence investigation.

Kandori assumes that private information is not shared among community members. When observability is not perfect, obtaining private information regarding compliance with a norm, as well as the distribution of the private information, will be more complicated and costly. Cooperation may be difficult to sustain because the community may not have defined adequately the social norm, making it difficult to share information or identify defectors. Kandori shows, in theoretical terms, that even where an individual does not have any direct information of other individuals' behavior vis-à-vis other community members, cooperative behavior can sometimes be sustained.⁵¹ In the CIL game, with seemingly greater ability (relative to private society) to observe the treatment of third parties, we would expect a greater basis for cooperation.

Of course, multilateral sanctions are dependent on information regarding defection and on a judgment that the subject has violated the relevant norm. Information may be a trivial problem in certain areas of CIL but a difficult problem in others. Various institutional responses are possible to provide greater certainty in judging violations. As Paul Milgrom, Douglass North, and Barry Weingast argue with respect to the nonstate institutions that enforced compliance among early medieval merchants, “[i]t is the costliness of generating and communicating information—rather than the infrequency of trade in any particular bilateral relationship—that, we argue, is the problem that the system of private enforcement was designed to overcome.”⁵²

In developing this view, the authors argue that third-party dispute settlement can assist in developing cooperation. They argue, in particular, that third-party dispute settlement can solve the following information problem: if two parties have a dispute in which one accuses the other

49. Michihiro Kandori, *Social Norms and Community Enforcement*, 59 REV. ECON. STUD. 63 (1992).

50. *Id.* at 66–67.

51. *Id.* at 68–71.

52. Paul R. Milgrom et al., *The Role of Institutions in the Revival of Trade: The Law Merchant, Private Judges and the Champagne Fairs*, 2 ECON. & POL. 1, 3 (1990). Note that these authors are suggesting that information may compensate for infrequency of bilateral interaction.

of defection, how can other members of the community determine whether the accusation is true?⁵³ Under Milgrom, North, and Weingast's proposal, the players accept the third-party, informational role of the law merchant in order to develop an efficient equilibrium. Milgrom, North, and Weingast conclude that within the municipal context, given the lack of empirical evidence about the costs of running different kinds of institutions, it is not possible to develop a formal model to show that their proposal for third-party dispute settlement (with the equivalent of a law merchant) minimizes information costs.⁵⁴ They opine, however, that such a system seems to incur only the kinds of costs that are inevitable, and that it seems well designed to minimize those costs.⁵⁵

We might consider the extent to which formal international institutions function in this way. Institutions such as the ICJ, the WTO's dispute settlement process, or its Trade Policy Review Mechanism, can fill a similar role in connection with states. Similarly, NGOs, such as Amnesty International or the World Wildlife Fund, or informal international institutions, such as the Basle Committee (bank regulation) or the Wassenaar Arrangement (export controls on dual-use commodities), can do so in particular niches. Of course, entities such as the WTO, Basle Committee, and Wassenaar Arrangement do not generally deal with CIL.⁵⁶ The point is that they may serve an information function that promotes compliance with the treaties or with the informal rules that concern them.

C. *Patience/Discount Factors, Horizon, and the Shadow of the Future*

When international lawyers discuss incentives for compliance, they often refer to the possibility of role reversal in the future—of reciprocity and retaliation. From a rationalist standpoint, however, a critical question to ask is the following: how powerful is the shadow of the future? In repeated prisoner's dilemma games, we have shown above that the degree to which players value future payoffs has an effect on players' incentives to comply with a norm. All things being equal, the extent to which a state values future payoffs will determine the extent to which these future payoffs affect the state's behavior.⁵⁷

The power of the shadow of the future depends not only on patience, but also on the length of horizon that decision makers consider. Governments come and go. The relationship between state and govern-

53. *Id.* at 9–11.

54. *Id.* at 15.

55. *Id.*

56. See generally Benedict Kingsbury et al., *The Emergence of Global Administrative Law* 17 (Inst. Int'l Law & Justice, Working Paper No. 2004/1, 2004), available at <http://www.iilj.org/papers/2004/documents/2004.1KingsburyKrischStewart.pdf>.

57. Of course, to the extent that players may exchange future payoffs for present payoffs, the patience variable becomes less important or less diverse; where efficient capital markets allow for the exchange of future payoffs for current payoffs, we would expect the patience variable to be constant across players.

ment horizons is to some extent determined by the degree of accountability of the government—the degree to which it represents the interests of its constituents. A democracy may have a shorter horizon than a dictatorship. Some states may have more frequent or more imminent elections at particular moments. Independent of questions concerning the frequency or imminence of elections, we would want to take into account the relative stability of the ruling party or coalition. Much depends on the prospects for reelection or, in a dictatorship, on its stability or the stability of its policies, including their susceptibility to variation due to corruption. Furthermore, it may be useful to examine whether the real actor is neither the state nor the government, but a more entrenched bureaucracy. Transnational networks, composed of networks of entrenched bureaucrats, may have greater durability than international networks, composed of transient governments.

D. Multisector Contact

The power of the shadow of the future is also affected by the degree of linkage among issues. Repetition may be accelerated—and its power thereby magnified—by expanding the scope of issues that are linked to one another. Thus, if the game is not the narrower game of prescriptive jurisdiction in antitrust, but the broader game of prescriptive jurisdiction more generally, or the even broader game of CIL compliance, the play is repeated more frequently, allowing greater opportunities for retaliation and greater incentives for compliance.

One of the assumptions underlying the prisoner's dilemma is that the game is self-contained. Casual observation of international society suggests that there are many linkages,⁵⁸ however, with the result that few issues can be isolated.⁵⁹ As with firms in a commercial context, state-players in this game can bind one another in a variety of ways, including by linking the present game to other games in a “supergame.”

Firms—and states—operate in multiple markets and encounter other firms, or states, in multiple contexts: as competitor here, as supplier there, as coconspirator elsewhere. Industrial organization economists studying the effect of multimarket contact have found that this cross-

58. See ROBERT O. KEOHANE, *AFTER HEGEMONY: COOPERATION AND DISCORD IN THE WORLD POLITICAL ECONOMY* 89–92 (1984); Ernst B. Haas, *Why Collaborate? Issue-Linkage and International Regimes*, 32 *WORLD POL.* 357, 370–73 (1980); Michael D. McGinnis, *Issue Linkage and the Evolution of International Cooperation*, 30 *J. CONFLICT RESOL.* 141, 141–43 (1986); Robert D. Tollison & Thomas D. Willett, *An Economic Theory of Mutually Advantageous Issue Linkage in International Negotiations*, 33 *INT'L ORG.* 425, 425–26 (1979). McGinnis shows formally that in a prisoner's dilemma “multisupergame,” players may adopt strategies that create linkages across time and games, providing opportunities for cooperation, whereas cooperation would not be possible for isolated games.

59. See Giancarlo Spagnolo, *Issue Linkage, Credible Delegation, and Policy Cooperation* (Centre for Econ. Policy Research, Discussion Paper No. 2778, 2001), available at <http://ssrn.com/abstract=269364>.

sectoral activity may support cooperation.⁶⁰ For example, Giancarlo Spagnolo has noted that, in the case of multimarket contact, cooperation “can be viable in a set of markets even when in the absence of multimarket contact it could not be supported in *any* of these markets.”⁶¹

One important difference between the commercial context and the international relations context is that state relations in the international context almost always cross a number of sectors.⁶² States relate to one another in a variety of contexts, with varying roles in each context. In one context, a particular state may be concerned about the scope of its prescriptive jurisdiction, whereas in another context it may be concerned about the scope of its responsibilities to protect foreign diplomats. As a result, while there may be a “prescriptive jurisdiction game” that is separate from the “diplomatic immunity game,” these games can be linked. In fact, states regularly link issues in international relations, with the result that it is not possible to establish precise boundaries for any particular game.⁶³

Defection in one area may therefore have consequences in another, with the possibility of cross-sectoral punishment. It is not enough to examine whether states have sufficient incentives for compliance within a particular sector or arrangement; one must also analyze the effect of activity in other sectors. Matsushima argues that multimarket contact can take the place of perfect information as a basis for a stable equilibrium of implicit cooperation. He shows that with multimarket contact, cooperation can take place even under circumstances of relatively high discount factors.⁶⁴ In their study of the behavior of medieval merchants, Milgrom, North, and Weingast, explain that “if the relationship itself is a valuable asset that a party could lose by dishonest behavior, then the relationship serves as a *bond*.”⁶⁵ Thus, the shadow of the future effect is intensified by multimarket contact and perfect information. The broader this effect, the greater the likelihood that individual states will respect particular rules.

We can illustrate this by extending our simple prisoner’s dilemma game. Suppose that States *A* and *B* can link two issues: the first with the payoffs given above and the second with the payoffs below. The only

60. See, e.g., B. Douglas Bernheim & Michael D. Whinston, *Multimarket Contact and Collusive Behavior*, 21 RAND J. ECON. 1, 14 (1990); Corwin D. Edwards, *Conglomerate Bigness as a Source of Power*, in BUSINESS CONCENTRATION AND PRICE POLICY 331, 342–44 (1955); Hitoshi Matsushima, *Multimarket Contact, Imperfect Monitoring, and Implicit Collusion*, 98 J. ECON. THEORY 158, 159 (2001); Giancarlo Spagnolo, *On Interdependent Supergames: Multimarket Contact, Concavity and Collusion*, 89 J. ECON. THEORY 127, 127–28 (1999).

61. Spagnolo, *supra* note 60, at 128.

62. See Guzman, *supra* note 1, at 1869–70; Duncan Snidal, *Coordination Versus Prisoners’ Dilemma: Implications for International Cooperation and Regimes*, 79 AM. POL. SCI. REV. 923, 939 (1985).

63. See, e.g., McGinnis, *supra* note 58, at 142.

64. Matsushima, *supra* note 60, at 164–65.

65. Milgrom et al., *supra* note 52, at 1.

change is that we have increased the payoff to Defect when the other state Complies.

TABLE 3

		<i>State B</i>	
		Comply	Defect
<i>State A</i>	Comply	<i>A: 3/ B: 3</i> [sum: 6]	<i>A:1/ B: 5</i> [sum: 6]
	Defect	<i>A: 5/ B: 1</i> [sum: 6]	<i>A: 2/ B: 2</i> [sum: 4]

Given that the two states employ the penance strategy, the Patience Condition indicates that the probability-adjusted discount factor necessary to secure compliance in this second issue is $\delta > (5 - 3)/(3 - 1) = 1$, which is impossible. When taken on its own, no self-sustaining CIL rule can be formulated for this second issue. Suppose, however, that the two issues are linked, with the result that defection on one leads to retaliation on both. In these circumstances, of course, a state considering defection will defect on both issues. So we actually have a game that consists of the sum of the two games. Mutual compliance gives a payoff of $C = 3 + 3 = 6$. Defect when the other state complies gives a payoff of $G = 5 + 4 = 9$. Paying penance gives a payoff of $L = 1 + 1 = 2$. The Patience Condition then tells us that CIL on these two linked issues is self-sustaining provided that the probability-adjusted discount factor is greater than $(9 - 6)/(6 - 2) = 0.75$. In other words, issue linkage means that states can use slack enforcement power with respect to one set of issues to sustain a CIL rule on other issues.

CONCLUSION

This paper, and our earlier work, formalizes the central intuition of international lawyers that states, at least in part, are motivated to comply with CIL in anticipation of retaliation by other states if they fail to comply. We have shown that it is plausible that for this rationalist reason states would comply with particular rules of international law. We have shown that there are a number of parameters in each particular setting

that would determine the magnitude of incentives to comply. So it is perfectly natural, and to be expected, that we would see variations in compliance across different rules and across different states. We would not expect states to comply fully with every rule of international law, just as we know that individuals breach municipal law. This does not mean that municipal law is not law. Rather, it is a call for assessment of the social effects of particular legal rules in particular contexts. Once we know more about the parameters that cause states to comply, it may be possible to engage in action to modify these parameters. For example, it may be possible to make states more patient, or to extend their horizon, or to accentuate linkage.

Since we cannot here assess the actual value of cooperation to states, their discount rates, or many of the other factors included in the model, it is impossible to say with certainty how often, or by how much, CIL affects behavior. But it is equally impossible to say that it does not affect behavior, that it seldom does so, or even that it has only marginal effects. We therefore believe that CIL is plausible. CIL seems no less plausible than social norms in the domestic context.

This conclusion suggests that international cooperation in different sectors may be mutually supportive and that there may be a kind of network effect that makes each additional instance of cooperation more attractive than it would be absent existing instances.⁶⁶ This game-theoretic perspective provides support for the early neofunctionalist hypotheses regarding international economic integration.⁶⁷ It suggests that there is potential value in cooperation “for its own sake” or in order to facilitate further cooperation. It also provides theoretical support for strategies of “constructive engagement” outside the CIL context. Network effects may be enhanced in regional or other plurilateral contexts by concentrating and intensifying relationships.

By disseminating information regarding compliance with particular norms, NGOs or international organizations may play a critical role in improving the availability of information, thereby facilitating the development of CIL. In cases of complex rules or facts—and where, under a regime of autointerpretation, states may argue over compliance—courts or other “independent” third parties may resolve this information problem more definitively.

CIL may arise in the international system in just the way that social norms arise in the domestic setting, with the same possible beneficial effects in terms of cooperation and coordination. The social norms anal-

66. See Barbara Koremenos, Charles Lipson & Duncan Snidal, *The Rational Design of International Institutions*, 55 INT'L ORG. 761, 764–65 (2001).

67. See, e.g., ERNST B. HAAS, *BEYOND THE NATION-STATE: FUNCTIONALISM AND INTERNATIONAL ORGANIZATION* (1964); Jeppe Tranholm-Mikkelsen, *Neofunctionalism: Obsolete or Obsolete? A Reappraisal in the Light of the New Dynamism of EC*, 20 MILLENNIUM: J. INT'L STUD. 1, 4–6 (1991). Neofunctionalism hypothesized that increasing cooperation would accelerate, as cooperation would create the conditions for its own extension.

ogy suggests—with Myres McDougal, Maurice Mendelson, Edward Swaine, and Hugh Thirlway⁶⁸—that we may understand the initial act of “compliance” not necessarily as an error, as no binding customary law has yet been formed, but as an offer or as an act of leadership. The offer and acceptance must generally take the form of practice, although our model does not require us to take a position on the amount of practice that will be necessary to constitute either an offer or an acceptance.

Thus, custom must be understood not as mere action, but as an initial or continuing proposal for collective action over time, with acceptance evidenced by compliance. A state may test a proposed rule of collective action informally—as, in effect, a trial balloon—without the domestic or international costs that otherwise might attend the proposal.⁶⁹ Supporting this approach, a recent report of the International Law Association explained that *opinio juris* requires practice “in circumstances which give rise to a legitimate expectation of similar conduct in the future.”⁷⁰ This understanding also offers a plausible explanation of changing rules of CIL. In fact, there is no real difference between initiation and change: initiation of a rule is a change from a *laissez-faire* rule.

This suggests a rationale for the *opinio juris* requirement in terms of general state intent: mere regularity of action, or mere action based on motives that do not include the formation of a legal rule, cannot form a rule of CIL.⁷¹ Accordingly, Article 38 of the ICJ Statute specifies “inter-

68. “[A]t the initial stage of the development of the custom, it is sufficient that the States concerned regard the practice as what the Court . . . referred to as ‘potentially norm-creating,’ as conforming to a rule which either already exists or is a useful and desirable rule which should exist.” Hugh Thirlway, *The Law and Procedure of the International Court of Justice 1960–1989 (Part Two)*, 1990 BRIT. Y.B. INT’L L. 1, 43 (citing *North Sea Continental Shelf (F.R.G./Den.; F.R.G./Neth.)*, 1969 I.C.J. REP. 3, 42 (Feb. 20)); see MYRES S. MCDUGAL ET AL., *STUDIES IN WORLD PUBLIC ORDER* 773–74 (1960); Mendelson, *supra* note 38, at 155 (suggesting that states that initiate a custom might be analogized to offerors in a contractual setting, and that this conditional obligation is consistent with *opinio juris*); Swaine, *supra* note 1.

69. See Parisi, *Formation of CIL*, *supra* note 1, at 18 (describing “articulation theories” of CIL in these terms). Parisi suggests special deference to rules chosen prior to conflict: “Articulations that are made prior to the unveiling of conflicting contingencies can be analogized to rules chosen under a Harsanyian veil of uncertainty.” *Id.* at 19. This condition is referred to as “stochastic uncertainty.” One might ask, however, why there would be an incentive to produce new rules in the absence of conflict. Perhaps the answer is that the formation of custom is a process occurring over time, and states may participate before they know what their individual positions and interests will be. One might also argue that the veil of uncertainty continues to operate even after conflict arises, at least to the extent that states may not know their position with respect to future conflicts.

70. COMM. ON FORMATION OF CUSTOMARY (GEN.) INT’L LAW, INT’L LAW ASS’N, FINAL REPORT: STATEMENT OF PRINCIPLES APPLICABLE TO THE FORMATION OF GENERAL CUSTOMARY INTERNATIONAL LAW 8 (2000) (citing Mendelson, *supra* note 38, at 399), available at <http://www.ila-hq.org/pdf/CustomaryLaw.pdf>.

71. What of states that have no relevant intent, or that object to the formation of a legal rule? We will not deal with the doctrinal problem of the persistent objector. But it seems plausible that states would accept a rule of consensus legislation in international custom: a rule may be formed that binds states that do not object. For an analysis of consensus-based decision making within the GATT/WTO system, see Richard H. Steinberg, *In the Shadow of Law or Power? Consensus-Based Bargaining and Outcomes in the GATT/WTO*, 56 INT’L ORG. 339 (2002).

national custom, as evidence of a general practice accepted as law.”⁷² Goldsmith and Posner seem correct that motivation by narrow coincidence of interest (in which the “required” behavior intrinsically benefits the actor) or narrow coercion (of a more direct and unilateral type than the retaliation included in our model) is inconsistent with *opinio juris* and so does not contribute to CIL.⁷³ But even here, states are likely to act with varying and multiple motivations, and it is possible that a CIL rule could be formed even though some states adhere largely due to narrow coincidence of interest or narrow coercion. And this article has shown that states may have rational incentives to comply that go far beyond simple coincidence of interest and simple coercion. In our model, international law is supported by broader recognition of interest and broader threats of retaliation.

This article shows the plausibility of CIL pursuant to rationalist analysis. It therefore serves as a fundamental defense of the international law system. The theory presented here is based on methodological and normative individualism. It thus departs substantially from the airy idealism of natural law theory. It provides a social-scientific, theoretical foundation for both international legal positivism and a nuanced rationalism, and sees law as reflecting the actions of states (or their agents) in pursuit of their self-interest, broadly understood.⁷⁴ It shows that CIL—and with it, treaty law—is something of a feat of levitation. It rests not on a rock-solid natural law basis of divine (or other) principles, but on a fabric of rational acts, woven through a multiplicity of relations over time.

Some may ask: Is this article about law, or is it only about social order, labeled “law”? In a sense, of course, this article does not need to distinguish CIL from other forms of cooperation—and, indeed, the basic model is generic, although we make assumptions to accord with the CIL system, such as the general doctrinal rule of bilateral retaliation. In fact, our article contributes to social norms theory by showing that there may be a continuum between social norms and law—that law is different from social norms only in particular enforcement parameters.

While it is true that our basic model is one of cooperation—and one that applies to CIL, to treaties, and to other forms of international cooperation—there are some distinctive and important aspects of the CIL game that do not apply to general cooperation. First, CIL rules may serve as equilibrium-selection devices that provide a greater possibility

72. Statute of the International Court of Justice art. 38, June 26, 1945, 59 Stat. 1060. The ICJ seems to ignore the text in favor of a reverse reading, seeking to find evidence of international custom in a general practice accepted as law. ROSALYN HIGGINS, PROBLEMS & PROCESS: INTERNATIONAL LAW AND HOW WE USE IT 18–19 (1994). Of course, there are other formulations. See, e.g., IAN BROWNLIE, PRINCIPLES OF PUBLIC INTERNATIONAL LAW 4–11 (5th ed. 1998).

73. Goldsmith & Posner, *Further Thoughts*, *supra* note 1, at 194.

74. This article does not by any means challenge the theory that law can affect behavior by modifying preferences. It merely presents a theory that does not depend on modifying preferences.

for a stable equilibrium. Second, a rule's designation as CIL brings into play a substantial set of default rules within the international legal system, thereby filling in a large portion of the "incomplete contract" regarding states' obligations and expectations under that rule, including the scope of remedies for violation. Third, it may be that designation as CIL serves to link compliance/noncompliance with any particular CIL rule to other rules, thereby extending the possible scope of retaliation to fields that might not otherwise be considered "legitimate." With regard to this last point, we might say that designation as CIL increases the returns to compliance by placing the general sense of international legality at stake. That is, if State *A* can be a scofflaw in one sector, what prevents State *B* from being a scofflaw in an area that injures State *A*? In this sense, there is a possibility for implicit multilateral retaliation, even if formal CIL doctrine does not permit multilateral retaliation. We would expect states to move from non-CIL equilibrium behavior to *opinio juris*-based CIL where the latter either makes equilibrium possible that would not otherwise be possible, or enables that equilibrium to be achieved more efficiently than through other means.

This article serves as a refutation of the central claim of structural realists in political science with respect to international law: that it is epiphenomenal. This article shows that international law should best be understood as a social expression of rules that achieve real collective goals, are backed by real sanctions, and have real behavioral effects. It is a strange realism that would ignore such results.

If social norms theory in the domestic sphere finds social norms attractive as a mechanism for production and enforcement of rules, CIL may hold promise as an alternative to treaties. Perhaps the main distinguishing feature, and potential value, of CIL is systemic. That is, although we have assumed sectoral divisions for modeling purposes, international law may also be understood as a set of linked games or as one extensive game. Once a particular rule is absorbed into the CIL system or established through treaty, it may benefit from linkage to other rules of CIL and of treaties.⁷⁵ The special nature of legal rules may derive simply from their integration into this linked system. It is order and law.

Like all theories in social science, this one has normative implications. CIL has advantages and disadvantages as a process for making rules. As states identify these advantages and disadvantages in particular contexts, they may decide in some contexts to facilitate the development of CIL through institutional modifications.

75. See Swaine, *supra* note 1, at 618 ("[S]tates do not, in fact, interact solely with respect to one rule or the other, and it is also possible to understand their interaction with respect both to an individual rule and to the system of customary international law.").

