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Economic Rewards versus Economic Sanctions in International Relations*

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Abstract

I use game-theoretical models to compare a sender's expected payoff under two methods of wielding influence under incomplete information: offering rewards or threatening punishments. Attempts to influence another's behaviour can have the perverse effect of actually encouraging the behaviour that one is trying to discourage by creating, albeit different, incentives to bluff. Under a reward regime, targets can bluff in order to extort larger inducements. Under a sanction regime, targets can bluff in order to deter coercion attempts. I find that while sanctions are a weakly dominant tool of influence under complete information, rewards can be preferable under incomplete information. The sender often could do better by committing to a certain course of action for the entire duration of interaction. Moreover, using rewards and sanctions in combination can mitigate their adverse effects on targets' bluffing incentives when deploying only one instrument of influence separately.

Keywords: Economic Statecraft, Rewards, Sanctions, International Relations, International Organisations, Incomplete Information, Uncertainty, Game Theory

JEL Classification No.: C72, D81, F35, F51, F53

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1 Introduction

Beginning in 2015, the biggest influx of immigrants into Europe since World War II has caused tensions over their distribution between member states of the European Union (EU). The refusal of several states to take in the amount of asylum seekers stipulated by EU law provides a negative externality for those adhering to the quota. Broadly speaking, two main mechanisms are put forward in order to induce EU countries to accommodate refugees: Offering economic rewards (Khan et al., 2018) or threatening economic sanctions (BBC, 2016). What is the sender's expected utility of using either technique of *economic statecraft*?

Economic statecraft refers to an attempt by a sender to persuade or compel a target¹ either to forgo an action that he² would otherwise engage in or do something he would not ordinarily do by manipulating markets in a manner that provides *economic rewards* and/or imposes *economic sanctions* (Baldwin, 1985). An economic reward (or compensation, inducement, positive incentive) is a promise of future economic benefits in return for policy concessions. Inducements include foreign aid, technical assistance, preferential trade pacts or concessional loans. An economic sanction (or coercion, punishment, negative incentive) involves a threat to partially or completely disrupt existing economic exchange if a target does not sufficiently modify the measure deemed harmful. Examples of sanctions are punitive tariffs, embargoes or restrictions on capital movement (Wagner, 1988; Dorussen and Mo, 2001).³

I assume that actors deploy or resist instruments of influence with the objective to achieve or prevent *success*, respectively. Success is defined in terms of inducing a target into changing his policies according to the sender's demands. Its achievement depends on actors' relative *strength*, which captures their relative *capability* and *resolve*. Capability reflects the amount of resources available to an actor that can be used to impose or withstand economic costs (Knorr, 1975; Baldwin, 1979; Kirshner, 1997). Resolve indicates an actor's valuation of stakes, i. e. how committed state leaders are to achieve their goals (Wagner, 1988; Crumm, 1995).⁴

The sender's favourable treatment of more *resistant* targets, for which the net utility of noncompliance (relative to compliance) is greater than for *complaisant* targets, provides complaisant targets with incentives to *bluff*, i. e. take an action to mislead the sender about its true

¹I adopt the standard terminology whereby the country exercising economic statecraft is called *sender* and the country whose behaviour the sender seeks to influence is called *target*.

²I assign a gender to each actor, treating the sender as feminine and the target as masculine.

³In order to distinguish rewards from sanctions, one must establish a target's baseline of expectations in terms of his future value position at the moment the sender's influence attempt begins. Then, sanctions are threatened or actual deprivations and rewards are promised or actual improvements relative to his baseline of expectations.

⁴Therefore, a state's strength is relational and issue-specific (see Keohane and Nye's (1989) conceptualisation of vulnerability and sensitivity). An external economic stimulus can be modified by a states' domestic political and economic system into politically tangible benefits and costs (Blanchard and Ripsman, 2013).

value. In order to increase the success probability of her influence attempt, the sender prefers to promise resistant targets larger inducements or direct sanctions on complaisant states. Hence, a complaisant target has an incentive to exaggerate his net value of noncompliance in order to pass himself off as resistant.

I analyse the factors affecting targets' incentives to bluff under a reward and sanction regime and compare their consequences for the sender's expected utility. For this purpose, I formally model a repeated interaction between sender and target. The sender suffers from an externality generated by a target whose valuation of pursuing this externality-generating activity is his private information. The sender can exert influence by promising rewards or threatening sanctions in order to dissuade the target from implementing objectionable policy. I find that while threats are weakly dominant in terms of the senders' expected utility under complete information, promises are more beneficial under incomplete information for some parameter constellations. The sender often could do better by committing to a certain course of action for the entire duration of interaction. In some cases, the sender faces the dilemma that her influence attempt leads to a worse outcome for her than if she could commit to refrain from exercising influence at all. By creating incentives to deceive⁵, attempts to influence another's action can have the perverse effect of actually encouraging the undesired behaviour that one is trying to discourage. Most importantly, my results suggest a complementarity of rewards and sanctions regarding targets' bluffing behaviour. Under conditions that enhance incentives to bluff when using one foreign policy tool, the other becomes relatively immune to deception.

Under a reward regime, a complaisant target might engage in undesired actions in order to qualify for larger inducements. For example, Libya's former leader Gaddafi used migration control as a bargaining chip against Europeans. By strategically manipulating population movements, he claimed compensations in return for promising to prevent a "black Europe" by repressing illegal immigration from Africa (Vandvik, 2010). His extortion strategy proved effective in eliciting financial support from the EU and its member states (Greenhill, 2010). Under a sanction regime, a complaisant target might pursue misconduct in order to thwart future coercion attempts. For example, Pelc (2010) reports that resisting a US sanction threat reduces a country's probability to be targeted again by US coercion attempts in the following years. Resistance, even at considerable immediate costs, leads the sender to update her expectations of obtaining concessions downwards. This results in a reputational gain for the target, thereby decreasing the sender's expected value from further sanction threats against this target. As "aggressors disproportionately challenge those they expect will back down" (Press, 2005, p. 15), the EU, which is least likely to be swayed by threats, is rarely targeted by US sanction measures.

This paper's contribution is twofold: Most of the game-theoretical literature on economic

⁵The terms bluff and deceive are used interchangeably.

statecraft either does not address actors' incentives to misrepresent their strength (e.g. Tsebelis, 1990; Bergeijk and Marrewijk, 1995; Smith, 1996; Lacy and Niou, 2004; Hovi et al., 2005; Krustev, 2010; Whang et al., 2013) or evaluate only one bluffing effect in isolation⁶. The extortion effect under a reward regime is studied by Sorokin (1996) and Chang (1997) while the deterrence effect under a sanction regime is analysed by Eaton and Engers (1999) and, more in passing, Spaniel and Smith (2015). This paper is the first to comparatively evaluate bluffing effects across reward and sanction regimes.

The tendency to examine informational drawbacks of a particular policy tool in isolation, which is also prevalent in informal studies of economic statecraft, has led reward and sanction scholars to favour one over the other. On the one hand, as punishments are costly and often unsuccessful under conditions of uncertainty, many authors are sceptical in their policy recommendations regarding their use (Wagner, 1988; Tsebelis, 1990; Bergeijk and Marrewijk, 1995; Smith, 1996; Morgan and Schwebach, 1997) and consider rewards to be a superior instrument of influence (e. g. Sislin, 1994; Cortright, 1997). For example, Davis (2000, p. 19f.) states that whereas "[t]hreats promote deceptive behavior [...], promises can promote open and honest action on the part of targets".

On the other hand, many scholars caution against the use of rewards because of their vulnerability to extortion (Galtung, 1967; Baldwin, 1971, Bernauer et al., 1999; Drezner, 1999a; Davidson and Shambaugh, 2000; Haass and O'Sullivan, 2000). Chang (1997) concludes that "[i]f countries that value the environment can use 'sticks' rather than 'carrots', then they can avoid these perverse [bluffing] incentives. [...] With 'sticks', a country that signals an inclination to harm the environment can bring greater penalties upon itself; with carrots, the same signal can yield greater rewards." However, sanction regimes do provide targets' with incentives to engage in an excessive amount of undesired activity⁷. Because the use of threats is correlated with their success probability, sanctions are applied inconsistently. As both promises and threats suffer from targets' incentives to bluff, helpful policy guidance must inform leaders' decisions to use a certain policy tool not merely on the basis of its expected utility but by comparing it to alternative policy instruments (Most and Starr, 1984; Baldwin, 2000).⁸

This paper proceeds as follows: Section 2 introduces both models. Section 3 presents the models' equilibrium outcomes under complete information as a benchmark case. I derive

⁶See Eaton and Engers (1994) for an exception, although their framework does not allow for comparison across different techniques of statecraft.

⁷The terms objectionable and undesired are used interchangeably.

⁸Formal studies that compare different instruments of statecraft are rare. Previous contributions analyse the utility of rewards and sanctions in terms of the conflict expectations between sender and target (Drezner, 1999b), amount of trade between sender and target (Dorussen and Mo, 2000) or domestic politics of the target state (Verdier and Woo, 2011). Sorokin (1996) assesses the utility of offering rewards with that of waging war.

the models' equilibrium results under incomplete information in Sections 4 and 5. Section 6 evaluates the models' results and Section 7 discusses their implications. Section 8 concludes and provides possible avenues for future research.

2 Model

The following section introduces two different models of wielding influence: The Reward Game and the Sanction Game. I model a sender S 's attempt to influence a target T 's behaviour as a two-period reputation game (Kreps and Wilson, 1982) with one-sided incomplete information. Player T can violate a law or norm that is of material or normative importance to player S , imposing disutility $-U$ on her each period. $U > 0$ indicates player S 's resolve. A target can be one of three types, which is his private information: low type T_L , medium type T_M or high type T_H . His benefit from violating a norm indicates his resolve and increases for higher types:

$$V_L < V_M < V_H \quad (1)$$

A target's probability to be type $i \in \{L, M, H\}$ is given by $\gamma_i > 0$, with $\sum_i \gamma_i = 1$.

In an attempt to deter a target's engagement in undesired activity, player S can either promise a *reward* $R_t \in \{0, \bar{R}\}$ or threaten a *punishment* $P_t \in \{0, \bar{P}\}$ each period $t = \{1, 2\}$. If $R_t, P_t = 0$, player S refrains from wielding influence in period t . She can use only one policy tool throughout the entire game, which is correspondingly referred to as either *Reward* or *Sanction Game*. Issuing promises or threats imposes no direct costs on both players⁹ but player S is committed to actually pay out the promised reward conditional on a target's compliance and carry out the threatened punishment conditional on his resistance.¹⁰

In case of compliance in the Reward Game, player S incurs disutility $-aR_t$ from paying

⁹In fact, initiating a dispute entails costs for both players. For example, threatening tariffs alters the expectations of economic actors, pushing them away from some presumably desirable equilibrium. Nonetheless, including a cost for issuing a threat decreases the sender's expected utility of using punishments but does not substantively alter the model's results.

¹⁰I abstract from senders' incentives to deceive or genuine commitment problems because they are different under a reward and sanction regime due to their different cost structure (Knorr, 1977). While inducements can prove effective only if the sender can assure that the promised reward will be transferred upon compliance (Baldwin, 1971), punishments can elicit target concessions only when the sender can make carrying out unsuccessful threats credible (Eaton and Engers, 1992; Krustev, 2010). As Baldwin (1985, p.107) points out, the willingness to incur costs is "widely regarded as a standard indicator of one's resolve" (see also Spence, 1973). Consequently, I present my model in the context of international regimes, which can incentivise the sender to maintain a reputation for delivering on her promises and threats if she has to interact with targets repeatedly (Kreps, 1990) or deal with multiple targets over time (Kreps and Wilson, 1982) and generate *audience costs* that the sender bears in form of a reputational loss towards member states for renegeing on her institutional commitments (Martin, 1993).

the promised reward, which raises the target's payoff by R_t . Parameter $\alpha \in (0, 1]$ denotes the effectiveness of rewards. In case of noncompliance in the Sanction Game, player S incurs payoff loss $-\beta P_t$ from enforcing the threatened punishment, which impairs the target's welfare by $-P_t$. Parameter $\beta \in (0, 1]$ denotes the effectiveness of sanctions. The lower α or β , the greater player S 's relative capability. The players' payoffs and γ_i are common knowledge.

I assume three parameter restrictions. First, player T_L receives no direct payoff gain from implementing objectionable policy:

$$V_L = 0. \quad (2)$$

Player T_L would refrain from pursuing undesired actions in the absence of any inducement offers. Assumption (2) simplifies the subsequent analyses without loss of generality.

Second, in contrast to player T_M , T_H 's utility gain from misconduct exceeds his valuation of any positive or negative incentive in a given period:

$$V_M < \bar{R}_t < V_H \quad \text{and} \quad V_M < \bar{P}_t < V_H. \quad (3)$$

Player T_H is stronger than S , which is why assumption (3) implies that he always resists. For example, compliance might be deemed to threaten his regime stability.

Third, player T_M 's payoff gain from engaging in undesired activities over both periods outweighs his valuation of any positive or negative incentive in a single period:

$$\bar{R}_t < 2V_M \quad \text{and} \quad \bar{P}_t < 2V_M. \quad (4)$$

Assumption (4) ensures the comparability between reward and sanction regimes because their different cost structures have an asymmetric relationship to the success probability of an influence attempt. Promises tend to cost more when they succeed while threats tend to cost more when they fail (Schelling, 1980). Increasing the size of an incentive raises its success probability, thereby increasing the probability of having to transfer rewards while decreasing the probability of having to enforce sanctions. Hence, larger promises become increasingly expensive whereas bigger threats become increasingly cheap (Baldwin, 1971). Disregarding any upper bound on incentive size would privilege sanctions over rewards in my model.

Moreover, assumption (4) is motivated by two considerations: First, proportionality is commonly considered as a prerequisite for credibility. Promises or threats that appear unrealistically large will most likely be regarded as incredible (Zartman and Berman, 1982). Second, the size of punishments might be restricted in intergovernmental regimes where rule supervision is executed by the states themselves. For example, the WTO can authorise plaintiffs to enact the suspension of trade concessions but the size of these retaliatory measures is limited to the

amount that offsets the damage suffered by the plaintiff (Tallberg, 2002). When unproportionally large threats are ruled out, even relatively strong senders cannot guarantee success of their influence attempts. This success uncertainty is exactly the environment in which targets' bluffing incentives are expected to prevail. Thus, inequality (4) implies that player T_M cannot be compelled into compliance for sure in period 1, allowing him to bluff in the Sanction Game.

My framework differs from existing models capturing targets' incentives to feign strength in that it involves more than two distinct target types, thereby being able to compare the sender's expected payoff of using positive and negative incentives. Demonstrating the bluffing behaviour associated with one particular technique of statecraft requires the inclusion of only two target types. In order to show extortion effects in the Reward Game, one has to model a weak target (player T_L) who can mimic the behaviour of a moderate one (player T_M). Here, a moderate target's strength must be limited in order to allow influence attempts to succeed. If $\bar{R}_t < V_M$, the problem with rewards is trivial: Player S would withhold any inducement offers, T_L would have no prospect of eliciting rewards and, consequently, no deception would occur.

In order to demonstrate deterrence effects in the Sanction Game, one has to model a moderate target (player T_M) who can masquerade as a strong one (player T_H). Here, a strong target's strength must be sufficiently large in order to render influence attempts prohibitively costly. If $\bar{P}_t > V_H$, the problem with punishments is trivial: Player S would always threaten sanctions, which would compel desired action on the part of all target types. Thus, players T_L and T_H serve as dummies in the Sanction and Reward Game, respectively. The necessity to include them in both models come to bear only when comparing player S 's equilibrium payoffs in the separate games with each other. The timing and payoffs in both the Reward and Sanction Game are summarised in the following:

Period 1:

1. Nature draws the target's type i with probability γ_i , where $i \in \{L, M, H\}$ and $\sum_i \gamma_i = 1$. The target privately observes his type while player S only knows its probability distribution.
2. Player S chooses the size of reward $R_1 \in \{0, \bar{R}\}$ she promises and amount of punishment $P_1 \in \{0, \bar{P}\}$ she threatens in the Reward and Sanction Game, respectively, to dissuade a target from engaging in undesired actions.
3. Having observed the player S 's promise or threat, the target chooses to resist or comply.

Period 2:

Instead of Nature's draw, at the beginning of period 2, player S updates her beliefs about the target's type, yielding posterior beliefs μ_i . Then, steps 2 and 3 are repeated. There is no

discounting.¹¹

Players' payoffs in period $t \in \{1, 2\}$ in the Reward Game

- If player T_i complies, he obtains payoff R_t and player S receives payoff $-\alpha R_t$.
- If player T_i resists, his payoff is V_i and player S gets payoff $-U$.

Players' payoffs in period $t \in \{1, 2\}$ in the Sanction Game

- If player T_i complies, he and player S receive a normalised payoff of zero.
- If player T_i resists, his payoff is $V_i - P_t$ and player S obtains payoff $-U - \beta P_t$.

In order to understand the implications of incomplete information for wielding influence, the next section characterises the benchmark case under complete information by analysing the subgame perfect Nash equilibria (SPNEs) of the Reward and Sanction Game, which are described in Proposition 1. In a SPNE, the players' moves are optimal whatever the history of the game. In order to derive the SPNEs, I drop step 1 in the sequence of moves of the original game. Proofs are provided in the Appendix in Section 9.

3 SPNEs of the Reward and Sanction Game under complete information

Proposition 1 (a) In case $V_i = V_L$, player S chooses $R_1 = R_2 = 0$ in the Reward Game. In the Sanction Game, any move $P_1, P_2 \in \{0, \bar{P}\}$ is optimal for her. Player T_L complies each period. Player S 's overall payoff is zero in both games.

(b) In case $V_i = V_M$, player S offers $R_1 = R_2 = \bar{R}$ in the Reward Game. She threatens $P_1 = P_2 = \bar{P}$ in the Sanction Game. Player T_M complies each period. Player S 's overall payoff is $-2\alpha\bar{R}$ in the Reward and zero in the Sanction Game.

(c) In case $V_i = V_H$, any move $R_1, R_2 \in \{0, \bar{R}\}$ is optimal for player S in the Reward Game. She chooses $P_1 = P_2 = 0$ in the Sanction Game. Player T_H resists each period. Player S 's overall payoff is $-2U$ in both games.

Under conditions of complete information, sanctions are a weakly dominant technique of statecraft as compared to rewards. Both Reward and Sanction Game yield the sender the same

¹¹Including a discount factor for second-period payoffs does not alter the model's results substantively. However, targets' incentives to bluff vanish if the discount factor becomes sufficiently low.

payoff in case a target's type is either low or high. However, in case a target's type is medium, she receives a lower payoff in the Reward than in the Sanction Game. Conditioned on successful exertion of influence, using negative incentives less costly for the sender than positive ones. The lack of private information prevents a target from bluffing.

Game-theoretical models of economic sanctions agree that under conditions of complete information, punishments are never imposed. Economic coercion either succeeds at the threat stage (against relatively weak targets) or is not threatened at all (against relatively strong targets). Enforcing sanctions represents a deadweight loss of utility in form of disrupted economic exchange for both sender and target. Thus, either the sender knows that sanctions will not succeed and refrains from their deployment or a target yields at the mere threat of sanctions if anticipating that he will have to concede at the imposition stage anyway (Eaton and Engers, 1992, 1999; Smith, 1996; Lacy and Niou, 2004; Hovi et al., 2005).

The imposition of sanctions is commonly explained by conditions of incomplete information, in which both sender and target believe that her and his expected utility of challenging and maintaining the status quo, respectively, is positive. Thus, sanction imposition means that one of the conflicting parties has misperceived the other side's strength: "the very imposition of [coercive] measures means that something went awry: either the sender underestimated the target's cost of compliance (and sanctions eventually fail), or the target underestimated the sender's resolve (and sanctions ultimately succeed)" (Eaton and Engers, 1999, p. 410). While these miscalculations are usually ascribed to state leaders' fallacies or psychological biases, my paper sheds light on targets' strategic exploitation of their private information.

Indeed, positive expected utility by itself does not constitute a coherent or compelling explanation for the imposition of punishments. Provided that there exists a set of negotiated agreements that Pareto-dominates the costly enforcement of sanctions,¹² the associated ex post welfare loss opens up an ex ante bargaining range. In principle, states can communicate with each other in order to avoid a costly miscalculation of relative capability or resolve. The cause for the imposition of sanctions cannot be simply a lack of information, but whatever it is that prevents its disclosure. Its explanation must combine private information with incentives to misrepresent these. While states prefer to avoid the costs of sanctions, they also wish to obtain a favourable conflict resolution, giving rise to incentives to exaggerate one's true strength.

Having established the benchmark case under complete information, the following section and Section 5 describe the players' optimal strategies under incomplete information and derive the perfect Bayesian equilibria (PBEs) of the Reward and Sanction Game, respectively.

¹²This is the case if actors are rational, risk-averse or -neutral over the issues in dispute, which are sufficiently divisible or where side-payments are possible (Fearon, 1995).

4 Reward Game

4.1 Optimal Strategies

4.1.1 Period 2

I start the analysis of the players' optimal strategies in period 2. As this is the last period of interaction, a target has no incentive to affect player S 's future beliefs. Compliance is optimal for a target if his payoff from accepting a compensation exceeds his utility from implementing objectionable policy: Player T_i complies if $R_2 \geq V_i$ and resists otherwise.

First, consider player T_L . He always complies because $R_2 \geq V_L = 0$ by assumptions (1) – (3). Thus, if $\mu_L = 1$, player S optimally chooses $R_2 = 0$. Second, consider player T_H . He always resists since $R_2 < V_H$ by inequality (3). Hence, if $\mu_H = 1$, any $R_2 \in \{0, \bar{R}\}$ is optimal for player S . Third, consider player T_M . He resists if $R_2 = 0$ as $0 < V_M$ by assumptions (1) and (2) and complies if $R_2 = \bar{R}$ because $\bar{R} > V_M$ by inequality (3). Consequently, if $\mu_M = 1$, player S optimally offers reward $R_2 = \bar{R}$.

Let $\mu_i > 0$. In case player S offers $R_2 = 0$, her expected payoff is

$$-(\mu_M + \mu_H)U \quad (5)$$

because both player T_M and T_H resist. In case player S offers $R_2 = \bar{R}$, her expected payoff is

$$-(\mu_L + \mu_M)\alpha\bar{R} - \mu_H U \quad (6)$$

since only player T_H resists while both player T_L and T_M comply. Define

$$\bar{\mu}_R \equiv \frac{\alpha\bar{R}}{U - \alpha\bar{R}} \quad \text{for } \alpha\bar{R} < U \quad (7)$$

so that player S is indifferent between offering $R_2 = 0$ and $R_2 = \bar{R}$ if her beliefs satisfy $\mu_M/\mu_L = \bar{\mu}_R$. She finds offering rewards worthwhile only if her cost of providing them is offset by her gain of securing a target's compliance: $\alpha\bar{R} < U$.

Now, consider $\mu_L = 0$. It is optimal for player S to offer $R_2 = \bar{R}$. Her optimal behaviour in period 2, which is summarised in Lemma 1, follows from expressions (5) to (7) in case $\mu_i > 0$ and the special cases where $\mu_L = 0$ and $\mu_H = 1$. Figure 1 illustrates Lemma 1 for the parameter values $U = 2$ and $V_M = \bar{R} = \alpha = 1$. The sender chooses $R_2 = 0$ for sufficiently low values of μ_M/μ_L whereas she chooses $R_2 = \bar{R}$ for sufficiently high values of μ_M/μ_L .

Lemma 1 – Player S 's decision in period 2

(a) If $\mu_M/\mu_L < \bar{\mu}_R$, player S chooses $R_2 = 0$.

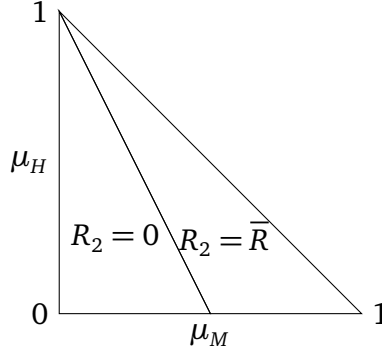


Figure 1: Illustration of Lemma 1

- (b) If $\mu_M/\mu_L > \bar{\mu}_R$ or $\mu_L = 0$, player S chooses $R_2 = \bar{R}$.
(c) If $\mu_M/\mu_L = \bar{\mu}_R$ or $\mu_H = 1$, player S chooses any $R_2 \in \{0, \bar{R}\}$.

4.1.2 Period 1

Now, I turn the analysis to period 1. First, consider players T_M and T_H . They behave as in period 2 by the arguments above. Second, consider player T_L . His optimal strategy depends on R_1 and R_2 . In case $R_1 = \bar{R}$, he optimally acquiesces. Not only does compliance yield him a larger payoff than resistance, i. e. $\bar{R} > V_L = 0$ by assumptions (1) – (3), but it also does not diminish his prospect of extorting $R_2 = \bar{R}$ in the following period. Player T_L 's acceptance of $R_1 = \bar{R}$ would not affect μ_M as this behaviour would be indistinguishable from what T_M 's would do.

In case $R_1 = 0$, player T_L 's optimal strategy hinges on the implications of his first-period move for player S 's subsequent choice of R_2 . On the one hand, compliance would reveal his identity, i. e. $\mu_L = 1$. Because player S would choose $R_2 = 0$ by Lemma 1 (a), he would acquiesce again. Thus, compliance would yield him an overall payoff of zero. On the other hand, resistance might induce the beliefs $\mu_M/\mu_L > \bar{\mu}_R$ for player S . She would consider it sufficiently likely that she deals with player T_M to offer $R_2 = \bar{R}$ by Lemma 1 (b), which would be accepted by player T_L . Hence, resistance would result in his overall payoff of $\bar{R} > 0$. Consequently, player T_L has an incentive to bluff if $R_2 = \bar{R}$. He is indifferent between complying and resisting if $R_2 = 0$. Lemma 2 summarises player T_L 's decision problem in period 1:

Lemma 2 – Player T_L 's decision in period 1

Let ρ denote the probability that player T_L resists in period 1. With probability $1 - \rho$, he complies. Let τ denote the probability that player S offers $R_2 = \bar{R}$ following resistance to $R_1 = 0$. With probability $1 - \tau$, she chooses $R_2 = 0$.

- (a) If $R_1 = \bar{R}$, player T_L chooses $\rho = 0$.

- (b) If $R_1 = 0$ and $\tau = 1$, player T_L chooses $\rho = 1$.
(c) If $R_1 = 0$ and $\tau = 0$, player T_L chooses $\rho \in [0, 1]$.

4.2 PBEs of the Reward Game

In the following, I characterise the PBEs of the Reward Game and provide an intuition of the results. A PBE is a set of strategies R_1 and τ for player S and ρ for T_i , with $i \in \{L, M, H\}$, such that no player can gain by deviating from his or her equilibrium strategy, and a set of beliefs μ_i for S about T 's type consistent by Bayes' rule. Proofs are provided in the Appendix in Section 9.

In order to derive the equilibria of the Reward and Sanction Game, consider swapping step 1 and 2 in the sequence of moves. Thereafter, the games continue as described before. Although being strategically equivalent to the original games, in the modified Reward or Sanction Game a subgame starts after player S 's choice of R_1 or P_1 , respectively. This allows one to identify the PBE of each subgame for a given R_1 or P_1 . Afterwards, I derive the PBE of the entire Reward or Sanction Game by comparing player S 's equilibrium payoffs in the corresponding subgames.

Proposition 2 *If $\gamma_M/\gamma_L \geq \bar{\mu}_R$, the equilibrium satisfies $R_1 = R_2 = \bar{R}$ and $\rho = 0$. In case of compliance in $t = 1$, player S 's beliefs satisfy $\mu_M/\mu_L = \gamma_M/\gamma_L$ and $\mu_H = 0$. In case of resistance in $t = 1$, player S 's belief satisfies $\mu_H = 1$. In any case, player S chooses $R_2 = \bar{R}$. Both player T_L and T_M comply while T_H resists each period. Player S 's overall expected payoff is $-(\gamma_L + \gamma_M)[2\alpha\bar{R}] - \gamma_H 2U$.*

The sender is sufficiently sure that she faces a medium target to offer reward $R_1 = \bar{R}$, even knowing that a low target would always extort this inducement. Both a low and medium target accept while a high target turns down this offer. In any case, the sender renews her promise in period 2, which induces the same response by all target types as in the previous period. In case of compliance in period 1, she excludes the presence of a high target but remains sufficiently sure that the target's type is medium to renew her inducement offer in period 2 by Lemma 1 (b). In case of resistance in period 1, the sender believes that she deals with a high target, rendering any move optimal for her by Lemma 1 (c).¹³ As a result, a low target successfully exploits the sender's ignorance each period.

Proposition 3 *(a) If $\gamma_M/\gamma_L < \check{\mu}_R \equiv (\alpha\bar{R})^2/[U^2 - (\alpha\bar{R})^2]$, the equilibrium satisfies $R_1 = R_2 = 0$ and $\rho = \gamma_M/\gamma_L \bar{\mu}_R \in (0, 1)$. In case of compliance in $t = 1$, player S 's belief satisfies $\mu_L = 1$. In case of resistance in $t = 1$, player S 's beliefs satisfy $\mu_M/\mu_L = \gamma_M/(\gamma_L \rho)$. In any case, player S chooses $R_2 = 0$. Player T_L resists in $t = 1$ with probability ρ and complies in $t = 2$. Both player T_M and*

¹³Although the sender is actually indifferent between $R_2 = 0$ and $R_2 = \bar{R}$ after having observed resistance in period 1, I assume her to choose the latter.

T_H resist each period. Player S 's overall expected payoff is $-(\gamma_M[2 + 1/\bar{\mu}_R] + 2\gamma_H)U$.

(b) If $\check{\mu}_R \leq \gamma_M/\gamma_L < \bar{\mu}_R$, the equilibrium satisfies $R_1 = \bar{R}$ and $R_2 = \rho = 0$. In case of compliance in $t = 1$, player S 's beliefs satisfy $\mu_M/\mu_L = \gamma_M/\gamma_L$ and $\mu_H = 0$. In case of resistance in $t = 1$, player S 's belief satisfies $\mu_H = 1$. In any case, player S chooses $R_2 = 0$. In $t = 1$, both player T_L and T_M comply while T_H resists. In $t = 2$, player T_L complies while both T_M and T_H resist. Player S 's overall expected payoff is $-\gamma_L\alpha\bar{R} - \gamma_M[\alpha\bar{R} + U] - \gamma_H2U$.

Consider the equilibrium characterised in Proposition 3 (a). The sender is sufficiently sure that she deals with a low target to withhold any reward offer in period 1. While both a medium and high target resist, a low target sometimes bluffs in order to raise the sender's expectation of dealing with a medium target and elicit a compensation. The only equilibrium outcome is in mixed strategies because if a low target would always deceive, the sender would be sufficiently sure that she deals with a bluffing low target after having observed resistance in period 1 to retain any reward in period 2 by Lemma 1 (a). Then, a low target would have no reason to bluff in the first place. But if he would never deceive, the sender would anticipate that subsequent to resistance an inducement offer would not be extorted and promise reward $R_2 = \bar{R}$ by Lemma 1 (b). In this case, a low target would always want to resist in period 1 again. However, he fails to grab any informational rent in this equilibrium because the sender uses a pure strategy of always refraining from offering any rewards¹⁴, which leads only a low target to comply in period 2 while both a medium and high target resist again.

I now turn to the parameter constellation in Proposition 3 (b). Instead of withholding any reward offer, the sender brings a promise to forward to period 1 in order to forestall bluffing by a low target. This inducement offer is accepted for sure by a low or medium target, in which case the sender becomes sufficiently sure that she faces a low target to refrain from subsequent reward offers by Lemma 1 (a). Only a high target turns down $R_1 = \bar{R}$, in which case the sender refrains from further inducement attempts as well by Lemma 1 (c).¹⁵ The state of uncertainty the sender finds herself in forces her to be more generous than if she knew the identity of a target. As a result, a low target cashes the informational rent the sender pays but in contrast to the equilibrium described in Proposition 2, only for one period rather than two. Figure 2 summarises my findings in Propositions 2 and 3.

Figure 3 illustrates which equilibrium is obtained in the Reward Game depending on γ_i in a numerical example. Figure 3 contains three charts: chart (a) shows the baseline case where $U = 2$ and $\bar{R} = V_M = \alpha = 1$, chart (b) and (c) illustrate the effect of a ceteris paribus decrease and

¹⁴Although the sender is actually indifferent between $R_2 = 0$ and $R_2 = \bar{R}$ after having observed resistance in period 1, I assume her to choose the former.

¹⁵Although the sender is actually indifferent between $R_2 = 0$ and $R_2 = \bar{R}$ after having observed resistance in period 1, I assume her to choose the former.

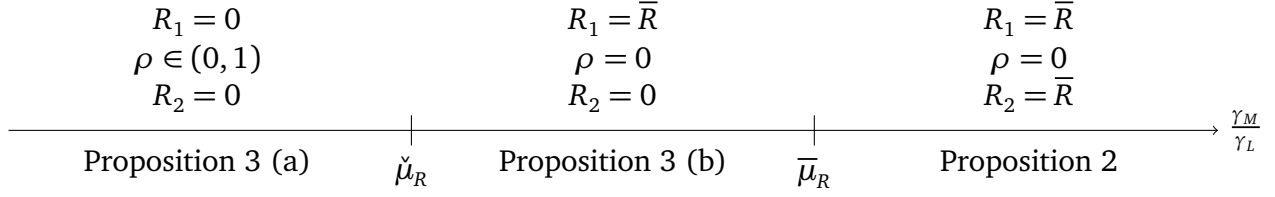


Figure 2: Equilibria of the Reward Game

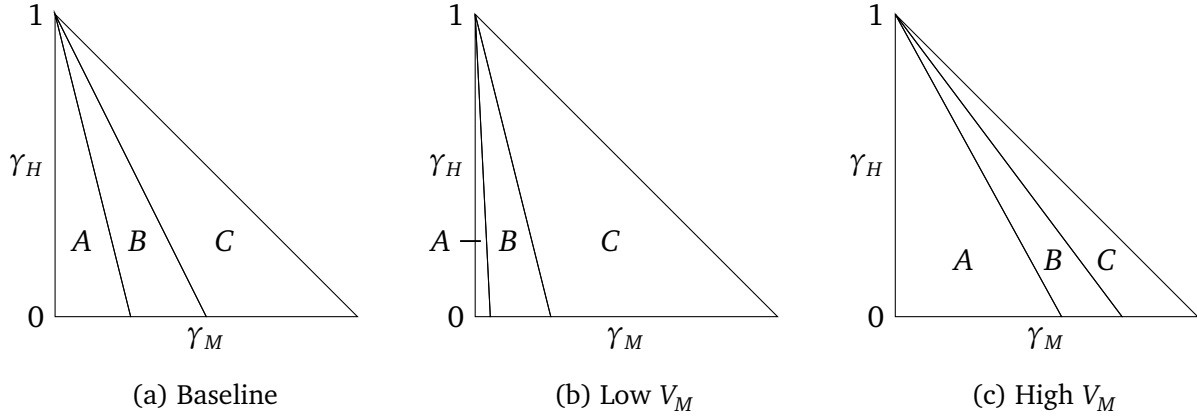


Figure 3: Existence of equilibria in the Reward Game dependent on γ_i

(A: Equilibrium described in Proposition 3 (a), B: Proposition 3 (b), C: Proposition 2)

increase of V_M by 50 % on the existence of equilibria, respectively. Consider Figure 3 (b). The equilibria that entail wielding of influence become more prevalent compared to the baseline case in Figure 3 (a) because the expected cost of exercising influence (in the equilibrium described in Proposition 2) reduces relative to refraining from an influence attempt (in the equilibrium described in Proposition 3 (a)). The equilibrium described in Proposition 3 (b) falls somewhere in between as it entails only partial exertion of influence. The outcomes are reversed if V_M is increased by 50 %, which is illustrated in Figure 3 (c).¹⁶

4.3 Causes and consequences of bluffing

I analyse the factors determining targets' bluffing behaviour and their effects on senders' expected payoffs in the Reward Game. In the equilibrium described in Proposition 3 (a), we have that

$$\frac{\partial \rho}{\partial U} > 0, \quad \frac{\partial \rho}{\partial \bar{R}} < 0, \quad \frac{\partial \rho}{\partial \alpha} < 0, \quad \frac{\partial \rho}{\partial \gamma_L} < 0, \quad \frac{\partial \rho}{\partial \gamma_M} > 0 \quad \text{and} \quad \frac{\partial \rho}{\partial \gamma_H} = 0. \quad (8)$$

¹⁶The outcomes remain identical in case α is ceteris paribus changed by 50 %.

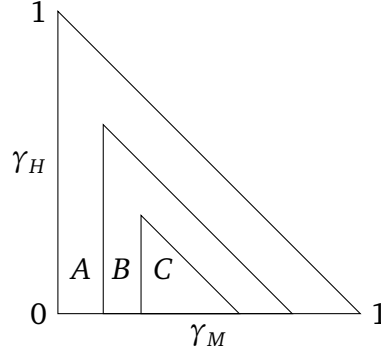


Figure 4: Amount of senders' expected payoff loss due to private information in the Reward Game increases from region A (no or low) to C (high)

First, the greater γ_M/γ_L , the larger the sender's expectation to persuade player T_M to comply without risking that this inducement offer gets extorted by player T_L . Second, the smaller $\alpha\bar{R}/U$, the lower the sender's cost of promising rewards compared to her disutility stemming from the status quo. Both effects raise the sender's eagerness to offer $R_2 = \bar{R}$ instead of $R_2 = 0$, inducing player T_L to increase ρ in the hope of extorting inducements. In effect, a target's compliance sends the sender the signal that his resolve (V_i) is not high. A target might be able to improve his payoff by resisting, sending a signal that his resolve is higher than it actually is, hoping to elicit a reward from the sender that she otherwise would not offer. However, a target's decision to bluff depends on the probability that the sender alters her move in response to the signal, which is more likely if her willingness to offer rewards is great.

Anticipating that the equilibrium described in Proposition 3 (a) becomes more costly with ρ , the sender countervails increased bluffing incentives by making it less likely to end up in this mixed equilibrium. Raising ρ raises her willingness to offer $R_1 = \bar{R}$ instead of $R_1 = 0$, implying a greater probability to obtain the equilibria described in Propositions 2 and 3 (b).

4.4 Comparing the complete with the incomplete information case

I analyse the sender's expected payoff loss resulting from incomplete information in the Reward Game by comparing Proposition 1 with 2 – 3, which is illustrated by Figure 4 for different values of γ_i in a numerical example where $U = 2$, $V_M = \alpha = 1$. The introduction of uncertainty results in the sender's expected payoff loss approaching zero only in the limit $\gamma_i \rightarrow 1$. A target's private information hurts the sender most for jointly large values of γ_L and γ_M . On the one hand, if rewards are promised in this case, they entail a considerable risk of being extorted by a low target. On the other hand, withholding inducements would provide a low target with great bluffing incentives by equation 8 while a medium target would engage in objectionable policy.

5 Sanction Game

5.1 Optimal Strategies

5.1.1 Period 2

I begin my analysis of the players' optimal strategies in period 2. Since this is the last period of interaction, a target has no incentive to affect player S 's future beliefs. Compliance is optimal for a target if his disutility from being sanctioned exceeds his value of pursuing misconduct. Hence, player T_i acquiesces if $P_2 \geq V_i$ and resists otherwise.

First, consider player T_L . He always complies because $P_2 \geq V_L = 0$ by assumptions (1) – (3). Thus, if $\mu_L = 1$, any choice of $P_2 \in \{0, \bar{P}\}$ is optimal for player S . Second, consider player T_H . He always resists since $P_2 < V_H$ by inequality (3). Hence, if $\mu_H = 1$, player S optimally chooses $P_2 = 0$. Third, consider player T_M . He resists if $P_2 = 0$ as $0 < V_M$ by assumptions (1) – (2) and complies if $P_2 = \bar{P}$ because $\bar{P} > V_M$ by inequality (3). Consequently, if $\mu_M = 1$, player S optimally threatens punishment $P_2 = \bar{P}$.

Let $\mu_i > 0$. If player S threatens $P_2 = 0$, her expected payoff is

$$-(\mu_M + \mu_H)U \quad (9)$$

because both player T_M and T_H resist. If player S threatens $P_2 = \bar{P}$, her expected payoff is

$$-\mu_H[U + \beta\bar{P}] \quad (10)$$

since only player T_H resists while both player T_L and T_M comply. Define

$$\bar{\mu}_P \equiv \frac{\beta\bar{P}}{U} \quad (11)$$

so that player S is indifferent between threatening $P_2 = 0$ and $P_2 = \bar{P}$ if her beliefs satisfy $\mu_M/\mu_H = \bar{\mu}_P$.

Now, consider $\mu_H = 0$. It is optimal for player S to threaten $P_2 = \bar{P}$. Her optimal behaviour in period 2, which is summarised in Lemma 3, follows from expressions (9) to (11) in case $\mu_i > 0$ and the special case where $\mu_H = 0$. Figure 5 illustrates Lemma 3 for the parameter values $U = 2$ and $V_M = \bar{R} = \beta = 1$. The sender chooses $\lambda = 0$ for sufficiently low values of μ_M/μ_H whereas she chooses $\lambda = 1$ for sufficiently high values of μ_M/μ_H .

Lemma 3 – Player S 's decision in period 2

Let λ denote the probability that player S threatens $P_2 = \bar{P}$ after having observed resistance in period 1. With probability $1 - \lambda$, she chooses $P_2 = 0$.

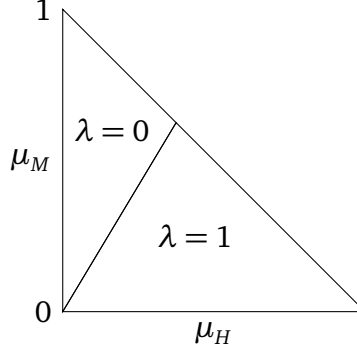


Figure 5: Illustration of Lemma 3

- (a) If $\mu_M/\mu_H < \bar{\mu}_p$, player S chooses $\lambda = 0$.
- (b) If $\mu_M/\mu_H > \bar{\mu}_p$ or $\mu_H = 0$, player S chooses $\lambda = 1$.
- (c) If $\mu_M/\mu_H = \bar{\mu}_p$, player S chooses $\lambda \in [0, 1]$.

5.1.2 Period 1

I now turn to period 1. First, consider players T_L and T_H . They behave as in period 2 by the arguments made above. Second, consider player T_M . If he complies, his overall payoff is zero: Succumbing to a threat yields him payoff zero in period 1 and induces player S 's belief $\mu_H = 0$. Consequently, she threatens $P_2 = \bar{P}$ by Lemma 3 (b), which compels player T_M into compliance in period 2. Player T_M 's overall expected payoff from resistance is

$$V_M - P_1 + (1 - \lambda)V_M \quad (12)$$

because he would get payoff $V_M - P_1$ in period 1 and $(1 - \lambda)V_M$ in period 2. Resistance might induce the beliefs $\mu_M/\mu_H < \bar{\mu}_p$ for player S . She would consider it sufficiently likely that she faces player T_H to choose $P_2 = 0$ by Lemma 3 (a), allowing player T_M to engage in objectionable behaviour unpunished. His move in period 1 depends on the comparison of his overall expected payoff from resistance given by expression (12) with his overall payoff of zero from compliance. If expression (12) = 0, player T_M is indifferent between resisting and complying in period 1.

Player T_M 's optimal strategy hinges on P_1 and λ . If $P_1 = 0$, he optimally resists because expression (12) $> 0 \forall \lambda \in [0, 1]$. If $P_1 = \bar{P}$, he optimally resists if $\lambda = 0$ since expression (12) > 0 by inequality (4) and complies if $\lambda = 1$ as expression (12) < 0 by inequality (3). Lemma 4 summarises player T_M 's decision problem in period 1:

Lemma 4 – Player T_M 's decision in period 1

Let δ denote the probability that player T_M resists in period 1. With probability $1 - \delta$, he complies.

- (a) If $P_1 = 0$, player T_M chooses $\delta = 1$.
- (b) If $P_1 = \bar{P}$ and $\lambda = 0$, player T_M chooses $\delta = 1$.
- (c) If $P_1 = \bar{P}$ and $\lambda = 1$, player T_M chooses $\delta = 0$.
- (d) If $V_M - P_1 + (1 - \lambda)V_M = 0$, player T_M chooses $\delta \in [0, 1]$.

5.2 PBEs of the Sanction Game

In the following, I characterise the PBEs of the Sanction Game and provide an intuition of the results. A PBE is a set of strategies P_1 and λ for player S and δ for T_i , with $i \in \{L, M, H\}$, such that no player can gain by deviating from his or her equilibrium strategy, and a set of beliefs μ_i for S about T 's type consistent by Bayes' rule. Proofs are provided in the Appendix in Section 9. The following lemma narrows down possible equilibria in the Sanction Game:

Lemma 5 – Narrowing down possible equilibria in the Sanction Game

The Sanction Game does not have an equilibrium such that $\delta = 0$.

Always acquiescing in period 1 cannot be a dominant strategy for a medium target. On the one hand, compliance in period 1 triggers a sanction threat in the following period. Hence, this strategy would yield a medium target an overall payoff of zero. On the other hand, observing resistance in the first period would induce the sender's belief that she deals with a high target. Because she would optimally refrain from threatening any punishments in the subsequent period, a medium target could receive a positive payoff by resisting in the first and engage in objectionable activities unpunished in the second period. Therefore, any equilibrium of the Sanction Game must entail $\delta > 0$. I now turn to the PBEs of the Sanction Game.

Proposition 4 *If $\gamma_M/\gamma_H \leq \bar{\mu}_p$, the equilibrium satisfies $P_1 = \lambda = 0$ and $\delta = 1$. In case of compliance in $t = 1$, player S 's belief satisfies $\mu_L = 1$ and she chooses $P_2 = \bar{P}$. In case of resistance in $t = 1$, player S 's beliefs satisfy $\mu_L = 0$ and $\mu_M/\mu_H = \gamma_M/\gamma_H$ and she chooses $P_2 = 0$. Player T_L complies while both T_M and T_H resist each period. Player S 's overall expected payoff is $-(\gamma_M + \gamma_H)2U$.*

The sender is sufficiently sure that she faces a high target to refrain from threatening any punishments in period 1, even knowing that a medium target would always bluff. A low target complies while both a medium and high player resist. In any case, the sender subsequently refrains from threatening any punishments, triggering the same response by all target types as in the previous period. In case of compliance in period 1, the sender expects to be up against a low target who always acquiesces anyway, in which case any response is optimal for her. In case of resistance in period 1, the sender merely learns that the target's type is not low but holds on

to her belief of dealing with a high target with sufficient likelihood to refrain from threatening any sanctions in period 2 as well by Lemma 3 (a). As a result, a medium target exploits the sender's ignorance each period.

Proposition 5 (a) *If $\gamma_M/\gamma_H > \hat{\mu}_p \equiv \bar{\mu}_p^2 + 2\bar{\mu}_p$, the equilibrium satisfies $P_1 = \bar{P}$, $\delta = \gamma_H\bar{\mu}_p/\gamma_M \in (0, 1)$ and $\lambda = 2 - \bar{P}/V_M \in (0, 1)$. In case of compliance in $t = 1$, player S's belief satisfies $\mu_H = 0$ and she chooses $P_2 = \bar{P}$. In case of resistance in $t = 1$, player S's beliefs satisfy $\mu_L = 0$ and $\mu_M/\mu_H = \gamma_M\delta/\gamma_H$, which induces her to choose $P_2 = \bar{P}$ with probability λ and $P_2 = 0$ with probability $1 - \lambda$. Player T_L complies and T_H resists both periods while T_M resists with probability δ in $t = 1$. In $t = 2$, he complies in case $P_2 = \bar{P}$ and resists in case $P_2 = 0$. Player S's overall expected payoff is $-\gamma_H[2U + 3\beta\bar{P} + (\beta\bar{P})^2/U]$.*

(b) *If $\bar{\mu}_p < \gamma_M/\gamma_H \leq \hat{\mu}_p$, the equilibrium satisfies $P_1 = 0$ and $\delta = \lambda = 1$. In case of compliance in $t = 1$, player S's belief satisfies $\mu_L = 1$. In case of resistance in $t = 1$, player S's beliefs satisfy $\mu_L = 0$ and $\mu_M/\mu_H = \gamma_M/\gamma_H$. In any case, player S chooses $P_2 = \bar{P}$. Player T_L complies and T_H resists both periods while T_M resists only in $t = 1$. Player S's overall expected payoff is $-\gamma_M U - \gamma_H[2U + \beta\bar{P}]$.*

Consider the equilibrium characterised in Proposition 5 (a). The sender is sufficiently sure that she deals with a medium target to threatens sanctions in period 1. While a low target complies and a high target resists, a medium target sometimes bluffs in order to raise the senders expectation of dealing with a high target. Hoping to thwart future coercion attempts, a medium target bluffs even when his complete information-expected utility for compliance is greater than his expected utility for resisting. The only equilibrium outcome is in mixed strategies because if a medium target would always bluff, the sender would be sufficiently sure that she faces a deceiving medium target to renew her sanction threat in period 2 by Lemma 3 (b). Then, a medium target would have no reason to bluff in the first place. But if he would never deceive, the sender would expect to deal with a high target following first-period resistance. As she would drop any subsequent sanction threat in response by Lemma 3 (a), a medium target would have an incentive to deceive again. The sender's influence attempt causes a medium target to deceive, which is costly. After compliance in period 1, the sender renews her threat with certainty, which leads a low and medium target to comply again. Following first-period resistance, the sender still threatens punishments with positive probability, inducing a medium target to comply while a high target resists again.

I now turn to the parameter constellation in Proposition 5 (b). The possibility of bluffing leads the sender to eschew sanction threats in period 1. Only a low target complies, in which case any response is optimal for the sender as he will comply anyway in period 2. The lack of any sanction threat leads to resistance by both a medium and high target, in which case the

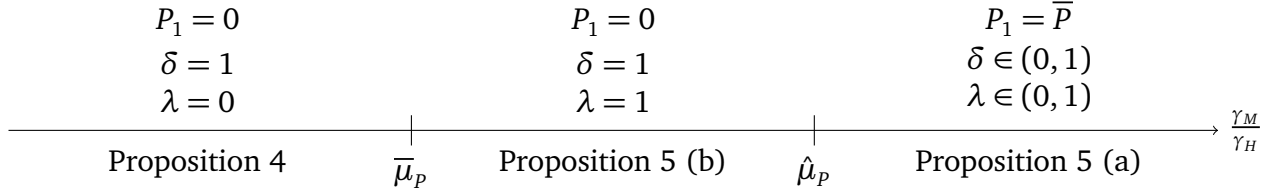


Figure 6: Equilibria of the Sanction Game

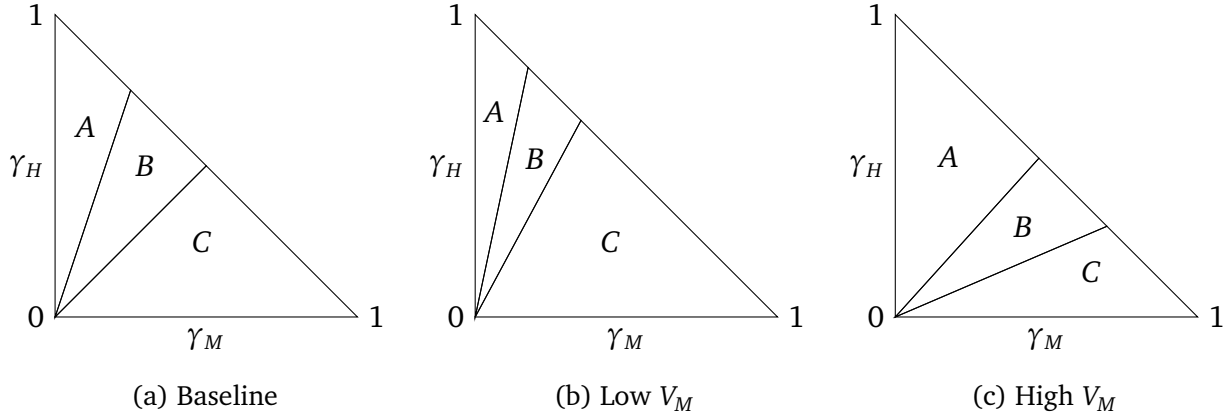


Figure 7: Existence of equilibria in the Sanction Game dependent on γ_i
(A: Equilibrium described in Proposition 4, B: Proposition 5 (b), C: Proposition 5 (a))

sender subsequently threatens delayed punishments by Lemma 3 (b). As a result, a medium target exploits her ignorance but, in contrast to the equilibrium described in Proposition 4, only for one period rather than two. Figure 6 summarises my findings in Propositions 4 and 5.

Figure 7 illustrates which equilibrium is obtained in the Sanction Game depending on γ_i in a numerical example. Figure 7 contains three charts: chart (a) shows the baseline case where $U = 2$ and $\bar{P} = V_M = \beta = 1$, chart (b) and (c) illustrate the effect of a ceteris paribus decrease and increase of V_M by 50 % on the existence of equilibria, respectively. Consider Figure 7 (b). The equilibria that entail wielding of influence become more prevalent compared to the baseline case in Figure 7 (a) because the expected cost of exercising influence (in the equilibrium described in Proposition 5 (a)) reduces relative to refraining from an influence attempt (in the equilibrium described in Proposition 4). The equilibrium described in Proposition 5 (b) falls somewhere in between as it entails only partial exertion of influence. The outcomes are reversed if V_M is increased by 50 %, which is illustrated in Figure 7 (c).¹⁷

¹⁷The outcomes remain identical in case β is ceteris paribus changed by 50 %.

5.3 Causes and consequences of bluffing

I analyse the factors determining targets' bluffing behaviour and their effects on senders' expected payoffs in the Sanction Game. In the equilibrium described in Proposition 4 (b), we have that

$$\frac{\partial \delta}{\partial U} < 0, \quad \frac{\partial \delta}{\partial \bar{P}} > 0, \quad \frac{\partial \delta}{\partial \alpha} > 0, \quad \frac{\partial \delta}{\partial \gamma_L} = 0, \quad \frac{\partial \delta}{\partial \gamma_M} < 0 \quad \text{and} \quad \frac{\partial \delta}{\partial \gamma_H} > 0. \quad (13)$$

First, the smaller γ_M/γ_H , the greater the sender's expectation that a sanction threat will lead to costly enforcement against player T_H instead of containing player T_M . Second, the larger $\beta\bar{P}/U$, the greater the sender's cost of threatening punishments compared to her disutility borne from the status quo. Both effects raise the sender's hesitancy to threaten $P_2 = \bar{P}$ instead of $P_2 = 0$, inducing player T_M to increase δ in the hope of averting sanctions.

Anticipating that the equilibrium described in Proposition 5 (a) becomes more costly with δ , the sender countervails increased bluffing incentives by making it less likely to end up in this mixed equilibrium. Raising δ lowers her willingness to threaten $P_1 = \bar{P}$ instead of $P_1 = 0$, implying a greater probability to obtain the equilibria described in Propositions 4 and 5 (b).

Equations 8 and 13 show that, conditional on the existence of the mixed equilibria, the same factors responsible for an increased bluffing probability in one model lead to a decreased probability in the other. By the countervailing logic, the same factors giving rise to a greater probability to obtain the mixed equilibrium in one model lead to a smaller probability in the other. This is because promises (threats) provide medium (low) targets no incentives to bluff.

5.4 Comparing the complete with the incomplete information case

I analyse the sender's expected payoff loss resulting from incomplete information in the Sanction Game by comparing Proposition 1 with 4 – 5, which is illustrated by Figure 8 for different values of γ_i in a numerical example where $U = 2$, $V_M = \beta = 1$. The introduction of uncertainty results in the sender's expected payoff loss approaching zero only in the limit $\gamma_i \rightarrow 1$. A target's private information hurts the sender most for jointly large values of γ_M and γ_H . On the one hand, if sanctions are threatened in this case, they provide great bluffing incentives for a medium target by equation 13 and imply a large risk of costly enforcement against a high target. On the other hand, a medium target would pursue undesired actions in the absence of any threat.

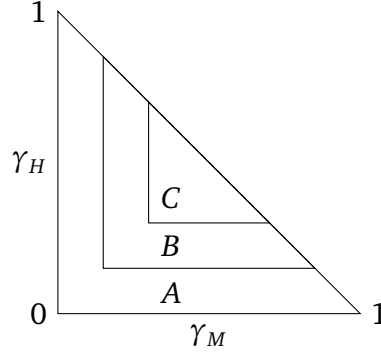


Figure 8: Amount of senders' expected payoff loss due to private information in the Sanction Game increases from region A (no or low) to C (high) for $U = 2$, $V_M = \beta = 1$

6 Results – Comparing rewards and sanctions in the incomplete information case

I compare the sender's optimal choice between positive and negative incentives under incomplete information by comparing her expected payoff in the Reward and Sanction Game for $\bar{R} = \bar{P}$ and $\alpha = \beta$. Contrary to the complete information case, the sender favours rewards over sanctions for some parameter constellations under incomplete information. Proposition 6 states the conditions necessary for promises being preferred to threats and is proved in the Appendix in Section 9.

Proposition 6 *The sender's expected payoff of offering rewards is larger than her expected payoff of threatening sanctions if following three conditions are satisfied:*

- (a) $\gamma_M/\gamma_L > \bar{R}$.
- (b) $\gamma_M U + \gamma_H 3R > 2R$.
- (c) $\gamma_H/(1 - \gamma_H) > (3U + R)/(2U)$.

Proposition 6 (a) states that rewards can only be more beneficial than sanctions for sufficiently large values of γ_M/γ_L . In this case, promises might persuade a medium target into compliance without posing a great risk to be extorted by a low target. Note that this condition corresponds to the parameter constellation leading to the equilibrium described in Proposition 2 where the sender offers rewards every period. Whereas this implies that a reward regime can only be worthwhile as long it prevents low targets from bluffing, the reverse is not true: A sanction regime can be more beneficial even if it allows for deception by a medium target.

Proposition 6 (b) (Proposition 6 (c)) implies that rewards (sanctions) are preferred for sufficiently large values of γ_M and γ_H (γ_L and γ_M) by the arguments in Section 4.4 (5.4). Note

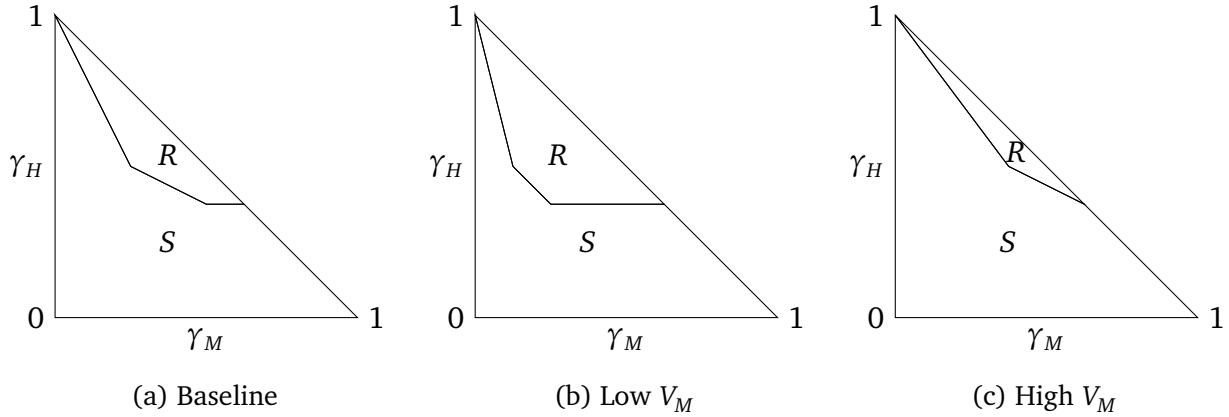


Figure 9: Comparing the sender's expected utility of rewards and sanctions
(R: Rewards preferable, S: Sanctions preferable)

that sanctions are unambiguously preferable to promises for sufficiently small values of γ_H . Negative incentives become increasingly beneficial as compared to positive ones the higher their success probability. First, a low γ_H implies only a small risk of unsuccessful implementation of punishments against a high target. Second, smaller values of γ_H also decrease a medium target's frequency of bluffing, if he bluffs at all, thereby further increasing the sender's probability to achieve success. Finally, threats are always successful against a low target.

Figure 9 illustrates the sender's optimal choice between positive and negative incentives depending on γ_i in a numerical example. Figure 9 contains three charts: chart (a) shows the baseline case where $U = 2$ and $\bar{R} = \bar{P} = V_M = \alpha = \beta = 1$, chart (b) and (c) illustrate the effect of a ceteris paribus decrease and increase of V_M by 50 %, respectively. By Proposition 6, a decrease of V_M improves the sender's net utility of promises (relative to threats), which is illustrated in Figure 9 (b). This outcome is reversed if V_M is increased, which is illustrated in Figure 9 (c).¹⁸

7 Discussion

My analysis yields four main results, which will be discussed in this section.

7.1 Sanction size

Due to the asymmetric relationship between the costs of using positive and negative incentives and their success probability, my assumption in inequality (4) proved important in making

¹⁸The outcomes remain identical in case α and β are ceteris paribus changed by 50 %.

both comparable. In contrast to promises, "too big a threat is likely to be superfluous rather than costly" (Baldwin, 1971, p. 28). Allowing sanction threats of unrestricted size, i.e. $\bar{P} > 2V_M$, would have deterred any possibility for medium targets to bluff. Besides senders' reluctance to threaten sanctions of deterrent magnitude due to their costliness and, relatedly, credibility problems, their use might be precluded by the institutional design of an enforcement system. Thus, institutional choice can have a considerable effect on compliance records.

For example, the WTO's enforcement system is compensatory rather than deterrent. Therefore, non-compliant parties are factually free to choose between adhering to WTO law and accepting the limited consequences of the cancellation of proportionate concessions (Zürn and Neyer, 2001). The nature of this tit-for-tat sanction mechanism increases the risk of non-compliance deadlocks.¹⁹ In contrast, the European Commission (EC) has coercive measures at its disposal that are explicitly designed as instruments of deterrence against member states found to be in breach of EU law. Given penalty payments at punitive levels, EU "member states have been quick to back down in the face of the sanctioning threat" (Tallberg, 2002, p. 619).

7.2 Commitment

7.2.1 Punishments

Above the size of sanctions, the effectiveness of a compliance system is determined by the credibility of enforcement. For threats to be believable, the procedure for enforcement should be automatic rather than discretionary (Dixit, 1987). Otherwise, by retaining the right to decide on using punishments each period, the sender creates incentives for medium targets to bluff. Consequently, the exercise of influence can have the perverse effect of actually encouraging the objectionable behaviour that one is trying to discourage. The sender's ability to commit to threaten (and carry out upon resistance) sanctions every period regardless of targets' first-period response would prevent bluffing.²⁰ Her expected payoff would amount to

$$-2\gamma_H[U + \beta\bar{P}], \quad (14)$$

which is larger than her expected payoff in both equilibria described in Proposition 5.

Supranational forms of rule supervision like in the EU are much less prone to bluffing incentives. Instead of deciding on a case-by-case basis, the EC pursues a "semi-automatic initiation of infringement proceedings" (Tallberg, 2002, p. 619). In contrast, the strategic interaction

¹⁹This is illustrated by the dispute over the EU's decision to ban the import of certain hormone-treated beef from the US. Although accepting the validity of an unfavourable ruling stemming from the WTO's dispute settlement procedure, the EU showed no intention to remove its unlawful trade embargo (Zürn and Neyer, 2001).

²⁰However, Dorussen and Mo (2001) demonstrate that commitment strategies that help states improve their bargaining positions can make conflict resolution more difficult and increase the duration of sanction episodes.

inherent in interstate compliance systems like the WTO's provides an ideal environment for deception. This could also help explain why decentralised treaty enforcement functions executed by the signatories themselves are used rarely. While earlier studies have listed fear of retaliation, litigation cost, diplomatic inconvenience and greater legitimacy of proceedings initiated by a neutral institution as reasons for the hesitancy of states to raise cases against each other (Tallberg, 2002), this contribution adds the risk of bluffing as another possible explanation.

Coming back to my motivating example, it can be argued that the likelihood that the Czech Republic, Hungary and Poland are high target types rises after they have been sued by the EC for rejecting to fulfill their legal obligations stemming from EU quotas on refugee redistribution (Deutsche Welle, 2017). As the EC is not expected to drop its punitive sanction threat by targets' defiance, their resistance might not reflect incentives to deceive. However, although Slovakia initially fiercely refused to accept its prescribed share of asylum seekers (Cuprik, 2015; Rankin, 2017), it was not taken to court by the EC. Despite having issued oaths of allegiance with the other resistant member states, Slovakia's enhanced compliance with the EU's mandatory relocation scheme (The Slovak Spectator, 2017) might point to the fact that it is no high target. It could be conjectured that Slovakia's initial resistance would have been even stronger, i. e. it would have had more incentives to bluff, if the EC would lack commitment to enforce EU law.

How would a sender's ability to renege on her promises and threats affect the model's results? Audience and threat costs would gain importance in order to signal her resolve. Additionally, a target's incentive to bluff would decrease in the Reward and increase in the Sanction Game because the possibility that the sender break her word lowers a target's prospect to extort inducements in the former and raises his expectations to avoid punishments in the latter case.

7.2.2 Rewards

In order to induce perpetrators of an asymmetric externality to comply, Mitchell and Keilbach (2001, p. 903) claim that even "[s]trong states may turn to rewards [... and] institutionalizing an exchange offers advantages that do not exist with coercion. Formalizing the terms of exchange enhances the credibility of the exchange to both sides by clarifying what was promised and defining iterative bargains that reduce both sides' fear of being suckered." However, my analysis demonstrates that attaining a reputation for buying off norm-violaters can provide relatively weak targets perverse incentives to feign strength. In contrast to the Sanction Game, the sender can reduce the amount of objectionable policy that would otherwise occur precisely if she could *commit to refrain* from offering any inducements over the period of interaction in the Reward Game. This strategy would eliminate low targets' incentives to bluff, yielding the sender expected payoff

$$-(\gamma_M + \gamma_H)2U, \tag{15}$$

which is larger than her expected payoff in both equilibria described in Proposition 3.

7.3 Bluffing and duration of the bargaining process

Targets' incentives to feign strength could lead to prolonged haggling until agreement is reached. In the mixed equilibria of both Reward and Sanction Game, deceiving targets turn down incentives that they in fact consider more valuable than their engagement in undesired action. By holding out for a more favourable conflict resolution, they extend the time during which excessively high levels of undesired activities persist. Since my models include only two time periods and disregard discounting, analysing the factor of duration of the bargaining process on the sender's expected utility of promises and threats is beyond the reach of this study.²¹

However, bluffing as such may pose a lesser problem than initially expected because rational actors strategically countervail each other. When targets' incentives to deceive rise, the probability to end up in an increasingly costly mixed equilibrium drops. Nevertheless, senders' efforts to avoid mixed equilibria is not without costs of its own. These avoidance reactions lead them to either bring an inducement offer forward (in the equilibrium described in 3 (b)) or eschew punishment threats (in the equilibrium described in 5 (b)). Thus, the harm borne by senders due to targets' incentives to feign strength also manifests itself in their deployment of costly avoidance strategies. For example, senders' avoidance reactions might help explain why Gaddafi was able to extract financial compensations from the EU and its member states although he was suspected to purposefully cause migrant departures from Libya in order to exert leverage on wealthy Europeans (The Economist, 2006), i. e. γ_L was large. European sender countries might have considered it necessary to preempt the credible threat to bluff by this presumably low target by bringing forward a reward offer.

7.4 Sender's expected utility of using rewards and punishments

Mitchell and Keilbach (2001) state that whether institutional compliance systems resort to persuasion or coercion hinges on actors' relative strength. Relatively weak (strong) senders will most likely design regimes that rely on positive (negative) incentives. This observation is consistent with the results of my models. The sender's relative strength determines her success probability and, conditioned on success, threats are less costly than promises. My complete information model demonstrates the superiority of threats in dealing with a medium target,

²¹Given informational asymmetries, sequential bargaining models suggest that reaching an agreement may well entail a significant and costly delay (Fudenberg and Tirole, 1983).

who is classified as weak by my parameter assumptions since the sender achieves success with certainty. Moreover, my incomplete information model shows that offering rewards (threatening sanctions) tends to be preferable if a target is expected to be strong (weak).

However, private information renders success uncertain, thereby increasing a target's relative strength. Under conditions of uncertainty, the variation of the players' relative strengths has counterintuitive effects on the sender's value of using promises and threats. Decreasing a medium target's resolve increases the sender's expected payoff from using positive relative to negative incentives. As the sender's cost of exerting influence decreases for smaller V_M , she becomes more willing to offer rewards or threaten sanctions. Whereas promises prevent a low target from bluffing, threats provide a medium target incentives to bluff.²²

My results provide an alternative explanation for Greenhill's (2010, p. 263) finding that "coercive engineered migration tends to be most often attempted (and most often successful) against generally more powerful" senders. In the Reward Game, low targets' deceiving behaviour in a mixed equilibrium results in a relatively large expected payoff loss for a strong sender. Consequently, she countervails bluffing incentives by making it less likely to end up in the mixed equilibrium in the first place. Her greater eagerness to forestall deception by bringing a reward offer forward, however, creates opportunities for low targets to establish credible threats to engage in "coercive engineered migration" in case no compensation is offered.²³

Low targets' incentives to feign strength emerge only in the Reward Game where the sender attains a reputation for buying off norm-violators. While offering rewards can persuade medium targets to comply, the simultaneous resort to sanctions can forestall low targets' engagement in misconduct. This is why the comparison of both models reveals their complementary character as tools of statecraft regarding targets' incentives to bluff. The same factors exacerbating deception behaviour in one model curtail it in the other. Employing promises in combination with threats could remedy the drawbacks that arise by using only one tool of influence separately.

8 Conclusion

Most existing formal analyses of economic statecraft have neglected the problem of bluffing. Although some contributions address actors' incentives to misrepresent their strength, most of these studies focus on either rewards or sanctions in isolation. Pointing to informational

²²Mitchell and Keilbach (2001, p. 903) note that "[s]trong states may turn to rewards because making threats credible and potent can be difficult", begging the question why this would be the case. Strong states can impose potent sanctions by definition and, relatedly, afford to sink some costs in order to signal their resolve. my analysis provides a more compelling explanation for the authors' observation.

²³Greenhill (2010) employs a norm- and domestic politics-approach to explain her observation. In contrast, I can make sense of her finding based on a rationalist and international politics-argument.

drawbacks of one particular policy tool, some authors claim its ostensible inferiority as an instrument of statecraft. However, any study that purports to be relevant to the question of whether certain policy tools should be used must compare their net value for policy makers with that of their alternatives. This paper departs from most prior research in that it compares the bluffing effects in both reward and sanction episodes. My results suggest that no single practice of statecraft under consideration dominates the other in terms of senders' utility, what is most beneficial depends on specific circumstances.

I find that the the availability of punitive rather than compensatory sanctions is important in preventing bluffing. The sender often could do better by committing to a certain course of action for the entire duration of interaction rather than discretionarily choosing whether to exercise influence. In some cases, the sender faces the dilemma that her attempt to wield influence leads to a worse outcome for her than if she could commit to refrain from exerting influence at all. The harm borne by the sender due to targets' incentives to feign strength also manifests itself in her deployment of costly avoidance strategies, by either bringing inducement offers forward or eschewing sanction threats. Most importantly, my results point to a complementarity of rewards and sanctions under conditions of asymmetric information since the resulting informational drawbacks might be mitigated when using both practices of statecraft in combination.

Thus, the EC's resort to sanctions towards EU member states unwilling to cooperate on the question of refugee allocation might be explained by its ability to credibly threaten deterrent punishments, which certainly played a role in enforcing compliance by Slovakia. However, as some member states' resistance to these credible and punitive threats increase the likelihood of them being high target types, offering rewards is expected to be the preferred way to exercise influence. By contrast, interstate enforcement systems lacking the ability to make credible and deterrent threats like the WTO's might benefit from an ability to implement inducements alongside punishments. Their simultaneous deployment might deter low targets from deception while bribing medium targets into compliance. In summary, this paper demonstrates the analytical advantages of studying promises and threats not in isolation of each other.

9 Appendix

9.1 Proof of Proposition 1

In the following, I characterise the SPNEs of the Reward and Sanction Game under complete information described in Proposition 1. First, consider the case $V_i = V_L$. In the Reward Game, player S optimally chooses $R_1 = \tau = 0$ because it leaves T_L indifferent between complying and resisting in $t = 1$ by Lemma 2 (c). I assume him to acquiesce since player S can force it by

offering a slightly larger reward in $t = 1$. In the Sanction Game, player T_L always complies, rendering any move $P_1, P_2 \in \{0, \bar{P}\}$ optimal for S . Her overall payoff is zero in both games.

Second, consider the case $V_i = V_M$. In the Reward Game, player S optimally chooses $R_1 = R_2 = \bar{R}$ as it induces compliance both periods. Her overall payoff is $-2\alpha\bar{R}$. In the Sanction Game, it is optimal for player S to choose $P_1 = \bar{P}$ and $\lambda = 1$ because it induces compliance both periods by Lemma 4 (c). Her overall payoff is zero since threats never have to be carried out.

Finally, consider the case $V_i = V_H$. Player T_H always resists in both games. Hence, in the Reward Game, any choice $R_1, R_2 \in \{0, \bar{R}\}$ is optimal for player S . In the Sanction Game, she optimally chooses $P_1 = P_2 = 0$. Her overall payoff is $-2U$ in both games. Q.E.D.

9.2 Reward Game

Note that in the Reward Game, player T_H resists each period. Following compliance to $R_1 = 0$, player S updates her belief to $\mu_L = 1$ by Bayes' rule. By Lemma 1 (a), she chooses $R_2 = 0$, inducing player T_L 's compliance again. Player T_L 's payoff from complying in $t = 1$ is zero.

9.2.1 Proof of Proposition 2: The case $\gamma_M/\gamma_L > \bar{\mu}_R$

9.2.1.1 PBE in the subgame after $R_1 = 0$

Lemma 6 – PBE in the subgame after $R_1 = 0$ in case $\gamma_M/\gamma_L > \bar{\mu}_R$

If $\gamma_M/\gamma_L > \bar{\mu}_R$ in the subgame after $R_1 = 0$, all players resist in $t = 1$, rendering $\rho = 1$. Player S chooses $R_2 = \bar{R}$, inducing both player T_L and T_M to comply while T_H resists in $t = 2$. Player S 's overall expected payoff is $-(\gamma_L + \gamma_M)[U + \alpha\bar{R}] - \gamma_H 2U$.

Proof of Lemma 6

I show that $R_2 = \bar{R}$ and $\rho = 1$ in the subgame after $R_1 = 0$ if $\gamma_M/\gamma_L > \bar{\mu}_R$. First, following resistance in $t = 1$, player S updates her beliefs satisfying $\gamma_M/\gamma_L \rho = \mu_M/\mu_L > \bar{\mu}_R \forall \rho \in (0, 1]$ by Bayes' rule. She optimally chooses $R_2 = \bar{R}$ by Lemma 1 (b). Second, since $\tau = 1$, choosing $\rho = 1$ is optimal for player T_L by Lemma 2 (b). Player S 's overall expected payoff from choosing $R_1 = 0$ and $R_2 = \bar{R}$ is

$$-(\gamma_L + \gamma_M)[U + \alpha\bar{R}] - \gamma_H 2U \tag{16}$$

because player T_H resists both periods while players T_L and T_M resist only in $t = 1$. Q.E.D.

9.2.1.2 PBE in the subgame after $R_1 = \bar{R}$

Lemma 7 – PBE in the subgame after $R_1 = \bar{R}$ in case $\gamma_M/\gamma_L > \bar{\mu}_R$

If $\gamma_M/\gamma_L > \bar{\mu}_R$, in the subgame after $R_1 = \bar{R}$, both player T_L and T_M comply while T_H resists in $t = 1$, rendering $\rho = 0$. In any case, player S chooses $R_2 = \bar{R}$, inducing compliance by both player T_L and T_M while T_H resists in $t = 2$. Player S 's overall expected payoff is $-(\gamma_L + \gamma_M)[2\alpha\bar{R}] - \gamma_H 2U$.

Proof of Lemma 7

I show that $\rho = 0$ and $R_2 = \bar{R}$ in the subgame after $R_1 = \bar{R}$ if $\gamma_M/\gamma_L > \bar{\mu}_R$. First, player T_L optimally chooses $\rho = 0$ by Lemma 2 (a). Second, in case of compliance in $t = 1$, player S updates her beliefs satisfying $\gamma_M/\gamma_L = \mu_M/\mu_L > \bar{\mu}_R$ by Bayes' rule. She optimally chooses $R_2 = \bar{R}$ by Lemma 1 (b). Resistance in $t = 1$ induces player S 's belief $\mu_H = 1$ by Bayes' rule. Because choosing any $R_2 = \{0, \bar{R}\}$ is optimal for her by Lemma 1 (c), I assume her to choose $R_2 = \bar{R}$. Player S 's overall expected payoff from choosing $R_1 = R_2 = \bar{R}$ is

$$-(\gamma_L + \gamma_M)[2\alpha\bar{R}] - \gamma_H 2U \quad (17)$$

since both player T_L and T_M comply while T_H resists each period.

It follows from Lemmas 6 and 7 that player S optimally sets $R_1 = \bar{R}$ if $\gamma_M/\gamma_L \geq \bar{\mu}_R$. Q.E.D.

9.2.2 Proof of Proposition 3: The case $\gamma_M/\gamma_L < \bar{\mu}_R$

9.2.2.1 PBE in the subgame after $R_1 = 0$

Lemma 8 – PBE in the subgame after $R_1 = 0$ in case $\gamma_M/\gamma_L < \bar{\mu}_R$

If $\gamma_M/\gamma_L < \bar{\mu}_R$, in the subgame after $R_1 = 0$, both player T_M and T_H resist while T_L resists with probability $\rho = \gamma_M/\gamma_L \bar{\mu}_R \in (0, 1)$ in $t = 1$. In any case, player S chooses $R_2 = 0$, inducing player T_L to comply while both T_M and T_H resist in $t = 2$. Her overall expected payoff is $-\gamma_M(2 + 1/\bar{\mu}_R) + 2\gamma_H U$.

Proof of Lemma 8

I show that $\rho = \gamma_M/\gamma_L \bar{\mu}_R \in (0, 1)$ and $R_2 = 0$ in the subgame after $R_1 = 0$ in case $\gamma_M/\gamma_L < \bar{\mu}_R$. First, I characterise the equilibrium. Because $\rho \in (0, 1)$ implies that player T_L deploys a mixed strategy, his choice of ρ must leave player S indifferent between choosing $\tau = 0$ and $\tau = 1$. This is the case if $\mu_M/\mu_L = \bar{\mu}_R$ by Lemma 1 (c). Thus, ρ is uniquely determined by Bayes' rule:

$$\frac{\gamma_M}{\gamma_L \rho} = \frac{\mu_M}{\mu_L} = \bar{\mu}_R \quad \Rightarrow \quad \rho = \frac{\gamma_M}{\gamma_L \bar{\mu}_R}. \quad (18)$$

Note that $\rho \in (0, 1)$ because $\gamma_M/\gamma_L < \bar{\mu}_R$ in this subgame. Let player S choose $\tau = 0$, yielding T_L an overall payoff of zero from resisting in $t = 1$. Player S 's pure strategy $R_1 = R_2 = 0$ leaves player T_L indifferent between complying and resisting in $t = 1$ by Lemma 2 (c).

Second, I show that $\rho = \gamma_M/\gamma_L\bar{\mu}_R$ and $R_2 = 0$ indeed constitute an equilibrium. If player T_L would choose $\rho < \gamma_M/\gamma_L\bar{\mu}_R$, Bayes' rule implies that resistance in $t = 1$ would induce player S 's belief $\mu_M/\mu_L > \bar{\mu}_R$. By Lemma 1 (b), she would optimally choose $R_2 = \bar{R}$. But since $\tau = 1$, player T_L would optimally choose $\rho = 1$ by 2 (b), obtaining an overall payoff of $\bar{R} > 0$ from resisting in $t = 1$. However, if he would choose $\rho > \gamma_M/\gamma_L\bar{\mu}_R$, Bayes' rule implies that resistance in $t = 1$ would induce player S 's belief $\mu_M/\mu_L < \bar{\mu}_R$. By Lemma 1 (a), she would optimally choose $R_2 = 0$, resulting in player T_L 's overall payoff of zero from resisting in $t = 1$.

There is a continuum of equilibria in which player T_L 's probability to resist in $t = 1$ varies between $\rho \in [\gamma_M/\gamma_L\bar{\mu}_R, 1]$. I focus on the former, which is the best for player S . This involves no loss of generality since player T_L is indifferent among all these and player S could force $\rho = \gamma_M/\gamma_L\bar{\mu}_R$ by offering a reward in $t = 1$ slightly larger than $R_1 = 0$.

Finally, I calculate player S 's overall expected payoff. Her expected payoff in $t = 1$ from choosing $R_1 = 0$ is $-(\gamma_L\rho + \gamma_M + \gamma_H)U$ as both player T_M and T_H resist while T_L resists with probability ρ . Player S 's expected payoff in $t = 2$ from choosing $R_2 = 0$ is $-(\gamma_M + \gamma_H)U$ because both player T_M and T_H resist while T_L complies. Thus, player S 's overall expected payoff from choosing $R_1 = R_2 = 0$ is

$$-(\gamma_L\rho + 2\gamma_M + 2\gamma_H)U. \quad (19)$$

Inserting ρ from equation (18) into expression (19) yields

$$-\left[\gamma_M\left(2 + \frac{1}{\bar{\mu}_R}\right) + 2\gamma_H\right]U. \quad (20)$$

9.2.2.2 PBE in the subgame after $R_1 = \bar{R}$

Lemma 9 – PBE in the subgame after $R_1 = \bar{R}$ in case $\gamma_M/\gamma_L < \bar{\mu}_R$

If $\gamma_M/\gamma_L < \bar{\mu}_R$ in the subgame after $R_1 = \bar{R}$, both player T_L and T_M comply while T_H resists in $t = 1$. In any case, player S chooses $R_2 = 0$, inducing player T_L to comply while both T_M and T_H resist in $t = 2$. Player S 's overall expected payoff is $-\gamma_L\alpha\bar{R} - \gamma_M[\alpha\bar{R} + U] - \gamma_H2U$.

Proof of Lemma 9

I show that $\rho = R_2 = 0$ in the subgame after $R_1 = \bar{R}$ in case $\gamma_M/\gamma_L < \bar{\mu}_R$. First, player T_L optimally chooses $\rho = 0$ by Lemma 2 (a). Second, in case of compliance in $t = 1$, player S

updates her beliefs satisfying $\gamma_M/\gamma_L = \mu_M/\mu_L < \bar{\mu}_R$ by Bayes' rule. She optimally chooses $R_2 = 0$ by Lemma 1 (a). Resistance in $t = 1$ induces player S 's belief $\mu_H = 1$ by Bayes' rule. Because any choice $R_2 = \{0, \bar{R}\}$ is optimal for her by Lemma 1 (c), I assume player S to set $R_2 = 0$. Her overall expected payoff from choosing $R_1 = \bar{R}$ and $R_2 = 0$ is

$$-\gamma_L \alpha \bar{R} - \gamma_M [\alpha \bar{R} + U] - \gamma_H 2U \quad (21)$$

since player T_L complies and T_H resists each period while T_M resists only in $t = 2$.

By Lemmas 8 and 9, player S optimally sets $R_1 = \bar{R}$ if equation (20) \leq (21), i. e.

$$\frac{\gamma_M}{\gamma_L} \geq \frac{(\alpha \bar{R})^2}{U^2 - (\alpha \bar{R})^2} \equiv \check{\mu}_R \quad (22)$$

and $R_1 = 0$ otherwise.²⁴

Q.E.D.

9.3 Sanction Game

Note that in the Sanction Game, player T_L complies and T_H resists each period. Following compliance in $t = 1$, player S updates her belief to $\mu_H = 0$ by Bayes' rule and chooses $P_2 = \bar{P}$ by Lemma 3 (b). Player T_M complies again and obtains payoff zero from complying in $t = 1$.

9.3.1 Proof of Lemma 5

I prove that $\delta \neq 0$ in any equilibrium of the Sanction Game. Suppose otherwise, i. e. $\delta = 0$. By the argument above, player T_M 's overall payoff from complying in $t = 1$ is zero. Yet, Bayes' rule implies that resistance in $t = 1$ would induce player S 's belief $\mu_H = 1$. By Lemma 3 (a), she would optimally choose $\lambda = 0$, leading to player T_M 's resistance in $t = 2$. His overall payoff from resisting in $t = 1$ would be $2V_M - P_1 > 0$ by equations (4) and (11). Q.E.D.

9.3.2 Proof of Proposition 4: The case $\gamma_M/\gamma_H < \bar{\mu}_P$

9.3.2.1 PBE in the subgame after $P_1 = 0$

Lemma 10 – PBE in the subgame after $P_1 = 0$ in case $\gamma_M/\gamma_H < \bar{\mu}_P$

If $\gamma_M/\gamma_H < \bar{\mu}_P$, in the subgame after $P_1 = 0$, player T_L complies while both T_M and T_H resist in $t = 1$, rendering $\delta = 1$. In case of resistance in $t = 1$, player S chooses $\lambda = 0$, inducing player T_L to comply while both T_M and T_H resist in $t = 2$. Player S 's overall expected payoff is $-(\gamma_M + \gamma_H)2U$.

²⁴Although the beliefs $\gamma_M/\gamma_L = \check{\mu}_R$ actually make player S indifferent between reward offer $R_1 = 0$ and $R_1 = \bar{R}$, I assume her to choose the latter in this border case.

Proof of Lemma 10

I show that $\delta = 1$ and $\lambda = 0$ in the subgame following $P_1 = 0$ if $\gamma_M/\gamma_H < \bar{\mu}_p$. First, in $t = 1$, player T_M optimally chooses $\delta = 1$ by Lemma 4 (a). Second, in case of resistance in $t = 1$, player S updates her beliefs satisfying $\gamma_M/\gamma_H = \mu_M/\mu_H < \bar{\mu}_p$ by Bayes' rule. She optimally chooses $\lambda = 0$ by Lemma 3 (a). Her overall expected payoff from choosing $P_1 = 0$ and $\lambda = 0$ is

$$-(\gamma_M + \gamma_H)2U \quad (23)$$

because player T_L complies and both T_M and T_H resist each period.

Q.E.D.

9.3.2.2 PBE in the subgame after $P_1 = \bar{P}$

Lemma 11 – PBE in the subgame after $P_1 = \bar{P}$ in case $\gamma_M/\gamma_H < \bar{\mu}_p$

If $\gamma_M/\gamma_H < \bar{\mu}_p$, in the subgame after $P_1 = \bar{P}$, player T_L complies while both T_M and T_H resist in $t = 1$, rendering $\delta = 1$. In case of resistance in $t = 1$, player S chooses $\lambda = 0$, inducing player T_L to comply while both T_M and T_H resist in $t = 2$. Player S overall expected payoff is $-(\gamma_M + \gamma_H)[2U + \beta\bar{P}]$.

Proof of Lemma 11

I show that $\lambda = 0$ and $\delta = 1$ in the subgame following $P_1 = \bar{P}$ if $\gamma_M/\gamma_H < \bar{\mu}_p$. In case of resistance in $t = 1$, player S updates her beliefs satisfying $\gamma_M\delta/\gamma_H = \mu_M/\mu_H < \bar{\mu}_p \forall \delta \in [0, 1]$ by Bayes' rule. She optimally chooses $\lambda = 0$ by Lemma 3 (a). Player T_M 's optimally chooses $\delta = 1$ by Lemma 4 (b). Player S 's overall expected payoff from choosing $P_1 = \bar{P}$ and $\lambda = 0$ is

$$-(\gamma_M + \gamma_H)[2U + \beta\bar{P}] \quad (24)$$

since player T_L complies while both T_M and T_H resist each period.

By Lemmas 10 and 11, player S optimally sets $P_1 = 0$ if $\gamma_M/\gamma_H \leq \bar{\mu}_p$.

Q.E.D.

9.3.3 Proof of Proposition 5: The case $\gamma_M/\gamma_H > \bar{\mu}_p$

9.3.3.1 PBE in the subgame after $P_1 = 0$

Lemma 12 – PBE in the subgame after $P_1 = 0$ in case $\gamma_M/\gamma_H > \bar{\mu}_p$

If $\gamma_M/\gamma_H > \bar{\mu}_p$, in the subgame after $P_1 = 0$, player T_L complies while both T_M and T_H resist in $t = 1$, rendering $\delta = 1$. In case of resistance in $t = 1$, player S chooses $\lambda = 1$, inducing both player T_L and T_M to comply while T_H resists in $t = 2$. Player S 's overall expected payoff is $-\gamma_M U - \gamma_H[2U + \beta\bar{P}]$.

Proof of Lemma 12

I show that $\delta = \lambda = 1$ in the subgame following $P_1 = 0$ in case $\gamma_M/\gamma_H > \bar{\mu}_p$. First, player T_M optimally chooses $\delta = 1$ by Lemma 4 (a). Second, in case of resistance in $t = 1$, player S updates her beliefs satisfying $\gamma_M/\gamma_H = \mu_M/\mu_H > \bar{\mu}_p$ by Bayes' rule. She optimally chooses $\lambda = 1$ by Lemma 3 (b). Her overall expected payoff from choosing $P_1 = 0$ and $\lambda = 1$ is

$$-\gamma_M U - \gamma_H [2U + \beta \bar{P}] \quad (25)$$

because player T_L complies and T_H resists each period while T_M resists only in $t = 1$. Q.E.D.

9.3.3.2 PBE in the subgame after $P_1 = \bar{P}$

Lemma 13 – PBE in the subgame after $P_1 = \bar{P}$ in case $\gamma_M/\gamma_H > \bar{\mu}_p$

If $\gamma_M/\gamma_H > \bar{\mu}_p$, in the subgame after $P_1 = \bar{P}$, player T_L complies, T_H resists while T_M resists with probability $\delta = \gamma_H \bar{\mu}_p / \gamma_M \in (0, 1)$ in $t = 1$. In case of resistance in $t = 1$, player S chooses $\lambda = 2 - \bar{P}/V_M \in (0, 1)$. In $t = 2$, player T_L complies and T_H resists while Player T_M complies if $P_2 = \bar{P}$ and resists if $P_2 = 0$. Player S 's overall expected payoff is $-\gamma_H [2U + 3\beta \bar{P} + (\beta \bar{P})^2 / U]$.

Proof of Lemma 13

I show that $\lambda = 2 - \bar{P}/V_M \in (0, 1)$ and $\delta = \gamma_H \bar{\mu}_p / \gamma_M \in (0, 1)$ in the subgame after $P_1 = \bar{P}$ in case $\gamma_M/\gamma_H > \bar{\mu}_p$. First, suppose otherwise, i. e. $\delta = 1$. In case of resistance in $t = 1$, player S updates her belief satisfying $\gamma_M/\gamma_H = \mu_M/\mu_H > \bar{\mu}_p$ by Bayes' rule. She optimally chooses $\lambda = 1$ by Lemma 3 (b), inducing player T_M to optimally choose $\delta = 0$ by Lemma 4 (c). However, $\delta \neq 0$ in equilibrium by Lemma 5. This shows that $\delta \in (0, 1)$ in this subgame. Hence, player T_M has to be indifferent between complying and resisting in $t = 1$, implying that the equality in Lemma 4 (d) is satisfied. This yields

$$\lambda = \frac{2V_M - \bar{P}}{V_M} \in (0, 1). \quad (26)$$

Second, because $\lambda \in (0, 1)$, Lemma 3 (c) implies $\mu_M/\mu_H = \bar{\mu}_p$ since player S is indifferent between choosing $P_2 = 0$ and $P_2 = \bar{P}$. Thus, δ is uniquely determined by Bayes' rule:

$$\frac{\gamma_M \delta}{\gamma_H} = \frac{\mu_M}{\mu_H} = \bar{\mu}_p \quad \Rightarrow \quad \delta = \frac{\gamma_H \bar{\mu}_p}{\gamma_M}. \quad (27)$$

Note that $\delta \in (0, 1)$ because $\gamma_M/\gamma_H > \bar{\mu}_p$ in this subgame.

Finally, I calculate player S 's overall expected payoff. Her expected payoff in $t = 1$ from choosing $P_1 = \bar{P}$ is $-(\gamma_M \delta + \gamma_H)[U + \beta \bar{P}]$ because player T_L complies, T_H resists and T_M

resists with probability δ . Player S 's expected payoff in $t = 2$ from choosing $\lambda \in (0, 1)$ is $-\gamma_M \delta (1 - \lambda)U - \gamma_H [U + \lambda \beta \bar{P}]$ since player T_L complies, T_H resists and T_M complies if $P_2 = \bar{P}$ while resisting if $P_2 = 0$. Hence, player S 's overall expected payoff from choosing $P_1 = \bar{P}$ and $\lambda \in (0, 1)$ is

$$-\gamma_M \delta [U + \beta \bar{P} + (1 - \lambda)U] - \gamma_H [2U + (1 + \lambda)\beta \bar{P}] \quad (28)$$

Inserting λ from equation (26) and δ from (27) into expression (28) yields

$$-\gamma_H [2U + 3\beta \bar{P} + \frac{(\beta \bar{P})^2}{U}]. \quad (29)$$

By Lemma 12 and 13, player S optimally sets $P_1 = 0$ if equation (25) \geq (29), i. e.

$$\frac{\gamma_M}{\gamma_H} \leq \bar{\mu}_p^2 + 2\bar{\mu}_p \equiv \hat{\mu}_p \quad (30)$$

and $P_1 = \bar{P}$ otherwise.²⁵

Q.E.D.

9.3.4 Proof of Proposition 6

In order to determine the sender's optimal foreign policy choice, we compare her expected payoff across different equilibria in the Reward and Sanction game for $\bar{R} = \bar{P}$ and $\alpha = \beta$. First, comparing the sender's expected payoff in both the equilibrium described in Proposition 2 and 3 (b) with her expected payoff in the equilibrium described in Proposition 4, we obtain the condition in Proposition 6 (a) in either case. This means that while the equilibrium described in Proposition 2 dominates the equilibrium described in Proposition 4, the latter dominates the equilibrium described in Proposition 3 (b). Therefore, rewards can only be more beneficial than sanctions for the parameter constellation provided by Proposition 2.

Second, comparing the sender's expected payoff in the equilibrium described in Proposition 2 with her expected payoff in both the equilibrium described in Proposition 5 (b) and (a), we obtain the conditions in Proposition 6 (b) and (c), respectively. This means that the equilibrium described in Proposition 2 is preferable to the equilibria described in Proposition 5 (a) and (b) for some parameter constellations.

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²⁵Although the beliefs $\gamma_M/\gamma_H = \hat{\mu}_p$ actually make player S indifferent between choosing $P_1 = 0$ and $P_1 = \bar{P}$, I assume that she chooses the former in this border case.

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