The Economic Coercion Trilemma

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June 2023

Word Count: 10,995

Abstract

States often use market access as a bargaining chip in international politics. A state that requires simultaneous compliance in multiple issue areas before granting market access maximizes incentives to comply but also makes them brittle – any targeted states that cannot comply in one issue area have no incentive to comply in any. More generally, programs of economic coercion can achieve at most two of the following three objectives: 1) secure a broad coalition of domestic political support, 2) the association of meaningful trade value with each policy issue, and 3) assurance that enforcing one political issue will not reduce the target's incentives to comply with conditionality on others. Characteristics of the program's domestic constituency, of the issues themselves, and of the international economy are key determinants of how the state prioritizes the three objectives. The trilemma explains the number and types of issues that can be linked to economic value.

1 Introduction

In 2015 the United States and Iran reached a remarkable agreement considering their fraught history and more than 35 years without formal diplomatic relations. Iran had finally agreed to verifiably end its nuclear weapons program in exchange for sanctions relief. And yet the Iran Deal still encountered strong opposition within the United States. Spurning the pleas of President Barack Obama, Republicans in the House were joined by 25 Democrats

to reject the agreement. Their primary complaint was that the deal did not address the US's problems with Iran outside of its nuclear program: support for terrorism and the abuse of human rights. They were loathe to grant Iran sanctions relief that would undercut their ability to continue pressuring the regime to change its behavior in other areas. The US was at a crossroads. On the one hand, it could divide its economic sanctions across the issues by exchanging some sanctions relief for an end to Iran's nuclear ambitions at the cost of economic leverage over Iran's other activities. Or it could continue to deny sanctions relief until Iran improved compliance in multiple issue areas, but risk the possibility of eliciting no compliance at all.

The tradeoff is not unique to the design of the Iran Deal. It applies whenever states might use commerce to simultaneously incentivize compliance in multiple issue areas. These occasions are common and include economic sanctions, trade dispute settlement, and the formation of monetary unions, among others. What limits the number and types of issues that can be connected in a program of conditionality? I find that states face an underlying *economic coercion trilemma* constraining the design of any program of conditionality. States can only achieve two of three priorities when designing a program of conditionality: 1) secure a broad coalition of political support for the program, 2) attach meaningful trade value to each policy issue, and 3) ensure that enforcement never reduces the target's incentives to comply with conditionality on other policy issues.[1]

How states choose between the three objectives depends on the degree of economic dependence, the types of issues being bundled, and domestic politics. Generally, choosing a program that divides the available commerce among multiple issues raises the chances of compliance but decreases the degree of compliance on each issue. However, there are exceptions where full compliance can be achieved without division. Targets which are highly dependent on market access would be willing to comply in two or more different areas to guarantee their economic future. Moreover, certain types of issues which are *compatible* can

[1]In this paper economic coercion is defined as the use of commercial or financial incentives as leverage in a program of conditionality.

be productively bundled even without requiring extreme dependence. If a target would be unlikely to simultaneously violate conditionality in two or more issue areas then they can be bundled without creating difficult enforcement scenarios. The analysis points to an overlooked dimension of power in the international economy: states that can more efficiently convert economic value into political influence by using the same dollar of commerce as leverage in multiple issue areas.

The logic of the trilemma can be illustrated with the example of the Iran Deal. The three rectangles in Figure 1 represent different ways of tying the value of sanctions relief to two issue areas: the nuclear program and the non-nuclear issues. Whenever multiple issue areas are involved, the key tradeoff is between maximum leverage, or the rewards to compliance, and consistent enforcement, or the possibility that rewarding compliance in one issue area undermines incentives in another. Programs that partition the economic value among the issues, as shown by the upper right rectangle, receive support from each interest group benefiting from compliance. These designs also ensure that enforcement of one condition never undermines the incentives in other issue areas. Programs of this type can be called *leverage limited* because leverage is scarce: increasing the reward for compliance in one issue area always means reducing it in another. Programs that condition the entire economic value on compliance in multiple issues, as represented by the upper left rectangle, always maximize the leverage assigned to each issue area.[2] However, these programs are *enforcement limited* because enforcing the conditionality in one issue area also reduces incentives to comply in another. The only way to achieve both the objectives of consistent enforcement and maximum leverage is to attach just one issue to the conditionality as shown in the bottom rectangle. Programs are called *support limited* if they depend on a single interest group for political support.

This paper contributes a new mechanism to the long tradition of literature describing how states use asymmetric dependence to exert political influence (Hirschman 1980; Baldwin

[2]Leverage is maximized in the sense that the rewards to compliance cannot be increased any further.

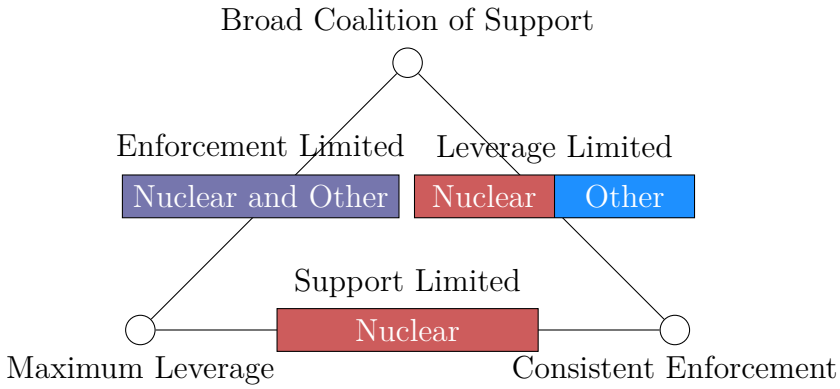

Figure 1: The economic coercion trilemma. Each rectangle represents a different possible assignment of issues to economic value. The two issues in the example are labeled "Nuclear", referring to Iran's pursuit of a nuclear weapon, and "Other", referring to its support for terrorism and abuses of human rights. The available economic value, which is the value of sanctions relief, is represented by the width of the rectangle. Either the entire value can be conditioned on compliance in multiple issues (enforcement limited), part of the value can be conditioned on each issue (leverage limited), or the entire value can be conditioned on a single issue (support limited). In leverage limited programs the domestic interest groups must bargain over the division of the economic value among the issues. In enforcement limited programs the interest groups must bargain over the right to enforce the conditionality.

1985; Eaton and Engers 1992; Martin 1993; Smith 1995; Drezner 2003; Carnegie 2014). The standard logic is that whichever state values trade more highly would potentially be willing to offer political concessions to ensure its continuation.[3] The theory has been productively applied to the study of economic sanctions (Hufbauer, Schott, and Elliott 1990; Pape 1997; Krustev and Morgan 2011; Morgan, Bapat, and Kobayashi 2014; Early 2015), aid conditionality (Svensson 2000; Carnegie and Marinov 2017), conditional lending from the World Bank and the International Monetary Fund (Vreeland 2006; Dreher, Sturm, and Vreeland 2009), and more. Recent work has studied asymmetric dependence induced by the position of states in networks (Farrell and Newman 2019; Drezner, Farrell, and Newman 2021). The literature has typically investigated whether asymmetric dependence was sufficient to extract concessions on a particular issue without analyzing how multiple political demands can interact. In particular, the question of whether asymmetric dependence can create linkages between

[3]See also Wagner (1988), who concedes this point even while disputing its characterization as economic coercion.

economic and non-economic issues remains unanswered. The economic coercion trilemma explains how the number and types of issues relates to the required degree of dependence needed to exert influence.

The theory of the economic coercion trilemma explains how issues are credibly linked in the context of coercion. The literature emphasizes how issue linkage facilitates cooperation by expanding the set of potential gains in bargaining (Sebenius 1983; Eichengreen and Frieden 1993; Huelshoff 1994; Lohmann 1997; Davis 2004, 2012; Dobbin, Simmons, and Garrett 2007; McKibben 2010; Dür and Elsig 2015; Lee 2021).[4] While one scholarly perspective suggests that linkage politics enhance credibility, another argues the opposite. Issue linkage is most often studied as a palliative treatment for bargaining failure – Poast (2012) even defined issue linkage as a special case of "side-payments." But other authors have expressed skepticism. Morrow (1992) argued that linkages signal a lack of resolve and Moravcsik (1998) believed distributional consequences would render linkages impotent and merely symbolic. Tinbergen (1952) argued that distinct policy goals should be targeted by a dedicated policy instrument. Applied to the context of economic coercion, the Tinbergen Rule would imply that each program target only a single political issue. The economic coercion trilemma explains that, generally, tying multiple issues to a single trade volume creates conflicting enforcement incentives. This result echoes the concerns of Moravcsik (1998). But the theory also reveals cases where a foreign state can be simultaneously influenced in multiple issue areas, showing how the conventional wisdom about successful issue linkage extends to coercive contexts. If the trade volume is sufficiently valuable to the target, or if issues are compatible in the sense that the target is unlikely to be noncompliant in more than one area at a time, then influence in multiple areas is possible.

Finally, the trilemma reveals the scope of economic coercion as a dimension of power in the theory of international bargaining. In doing so, it explains when domestic interest

[4]See also Fearon (1995) on issue indivisibility. Davis (2004) studied credible linkage politics in trade negotiations. Policy convergence across states could be driven by linked policies in trade agreements (Dobbin, Simmons, and Garrett 2007; Dür, Baccini, and Elsig 2014; Jinnah and Lindsay 2016). The topic is studied by security scholars as a commitment device (Wiegand 2009; Poast 2012, 2013a, 2013b).

groups are a strategic asset or liability for coercive programs. Traditionally the literature has explained bargaining outcomes as a function of relative resolve, or the willingness of a state to endure the costs of negotiation (Schelling 1980; Mo 1995; Fearon 1998; Powell 2002; Tarar 2005; Leventoglu and Tarar 2005; McKibben 2013, 2015; Kertzer 2016). The literature has put special emphasis on the role of international institutions in enhancing the credibility of linkages by creating structures that "tie the hands" of the state, ensuring the linkage is enforced regardless of any future temptations to neglect it (Putnam 1988). The economic coercion trilemma shows how domestic interest groups can overstretch the state's influence by competing for the right to link their issues to commerce and for the right to enforce those linkages. States that divide the trade value across issues to avoid conflicting enforcement incentives are undercutting the value of the linkage for their domestic interest groups. A state that can "double dip" by using the same trade to exert influence in multiple issue areas is extracting influence from dependence more efficiently. States whose strategic circumstances facilitate multiple linkages can use economic coercion effectively even if they do not have large markets.

2 A Theory of Economic Coercion Program Design

The theory is divided into two sections. The first section explores the "technology" of economic coercion: the policies states can use to transform value from economic relationships into political influence. It establishes that the economic coercion trilemma is a tradeoff between program designs having different properties. States might prioritize different properties depending on their circumstances and preferences, but no program can have all properties simultaneously. The results of the first section are therefore independent of preferences. This section can be thought of as an exploration of the sender state's action space, which is formally introduced in Section 2.1.4. It discusses the tradeoff between three design properties that states face when designing programs of conditionality.

The second section, which introduces a strategic setting, studies how states choose which design properties to prioritize. While the sender has free choice over how to design their program, it is still possible to study factors that would affect their decision. The model in this section shows how the strategic interaction of the sender's and target's preferences shape the sender's incentives when designing a program of conditionality. The results of the second section are useful for making predictions about how states choose between support limited, enforcement limited, and leverage limited designs.

2.1 The Technology of Economic Coercion

Like all tradeoffs, the economic coercion trilemma is driven by scarcity. No state can withdraw more than 100% of possible trade. It is simply impossible to withdraw trade that never would have occurred even in a world without trade barriers. The limited commercial volume creates a scarcity of political influence which ultimately must be divided among the interest groups vying to link their issues to trade. The state can choose whether this constraint will manifest as a competition for leverage or a competition for enforcement, but there is no way to escape the tradeoff completely.

Of course, not all trade is always available for coercive use. For example, trade preference programs only affect a subset of products. Sometimes states have capacity to reach beyond their own trade by restricting or discouraging commerce with third parties. Different trade volumes could be available for coercive use at different times and contexts. What is important is that there is always a limit on the total amount of trade that can be tied to conditionality. This "budget constraint" applies to even the richest states and is the source of the trilemma's broad applicability. Like any budget, it can be expanded or contracted via the policies a state chooses to implement. But ultimately the sender state must decide how to allocate its leverage across issues.

2.1.1 Broad Coalition of Support

A program of economic coercion is supported by a broad coalition if multiple groups sustain the policy's political support. Interest groups support economic coercion through conditionality when it advances their agenda. These interest groups could be organized lobbies in a democratic society or simply a group of elites using conditionality to enrich themselves in a non-democracy.[5] Policies supported by a broad coalition comprising multiple groups are more stable. Some programs can survive with the support of just one group if that group is politically powerful, such as a large and well organized lobby in a democracy or an autocrat in a consolidated dictatorship.

Programs of conditionality have few natural allies. The distributional consequences of international commerce, especially trade policy, guarantee that conditionality always displeases at least one group. Importers will generally wish for conditionality to be replaced with free trade while import competers will generally wish to replace it with autarky.[6] One efficient way of forming a coalition that sustains trade conditionality is to offer interest groups the opportunity to link their issues to it. For example, if trade is made conditional on the protection of labor rights then representatives of the labor movement (especially the unions) have an interest in defending the policy despite its economic disadvantages.

A broad coalition of support raises the chances that trade conditionality will survive as policy. Conditionality is politically vulnerable when interest groups that previously supported the policy evolve new priorities. For example, a policy of promoting labor rights through trade conditionality might be more attractive to labor rights activists when the labor share of traded goods and services is relatively high. If the support of labor rights activists for conditionality weakens then the program will come under pressure unless support

[5]Different regime types would have different policy priorities and would assign different importance to the public interest (Bueno de Mesquita et al. 2005).

[6]For example, firms that depend on imports may prefer free trade even if human rights violations continue unabated. The distributional and political consequences of trade policy are extensively analyzed (Stolper and Samuelson 1941; Dixit and Norman 1980; Rodrik 1995; Rogowski 1989; Hiscox 2001; Broz, Frieden, and Weymouth 2019).

can be buttressed with resources from another interest group. A diversified coalition has a better chance of withstanding these fluctuations. Programs of conditionality are more likely to endure when their coalition of support is broad because the policy's continuation is not predicated on the support of any one group.

The breadth of the coalition is relatively less important to the program's longevity when support is stable over time. The "depth" of support means the political weight of the interest groups, measured both in the number of people they represent and the intensity of their interests. These criteria are more likely to be met for issues that affect the interests of the entire society such as national security. Most issues require the support of multiple interest groups to be sustained in a program of conditionality. A strategy of keeping all tariffs high unless a trading partner lowers tariffs on fertilizer would benefit farmers but few others. Even if there there is enough support from farmers to sustain the strategy in the short run, it will likely be discarded in the future unless the issues of other interest groups are incorporated into the program.

Although coalitions of support might expand to increase support for the program, there are also reasons why they may contract. An interest group might be incentivized to remove its conditionality through side payments as part of a negotiation with the state or another interest group. Attempts to "buy off" an interest group could be motivated by a desire to increase leverage without compromising on consistent enforcement. Side payments and negotiations among the interest groups can affect the size of the coalition supporting conditionality.

The model will focus on either one or two issues and it will take the number as given. Each issue represents a different interest group having an interest in the conditionality. The role of a broad coalition in the economic coercion trilemma can be demonstrated by comparing programs with one issue to programs with two. The version of the model in Appendix E contains a more general framework that can accommodate an arbitrary number of issues.

2.1.2 Maximum Leverage

Interest groups can maximize their leverage by linking as much trade as possible to the compliance of foreign states. Although the behavior of the interest groups occurs outside the model, it is still useful to discuss their incentives and explain why they might consider maximum leverage to be desirable. The objective behind seeking leverage is clear: better compliance can be achieved with better incentives. Demanding too much can cause the target to decide that the costs of compliance exceed the costs of lost commerce. Interest groups might not demand maximum leverage if they believe that doing so would cause the target to balk. However, there are also cases where the target's compliance is strictly increasing in the leverage applied. In these cases, the amount of leverage determines both demand for issue linkage and the compliance of the target. Multiple interest groups must compete for the right to link their issue to any given dollar of trade if the program of economic coercion is leverage limited.

Interest groups wish to increase the commercial volume linked to their issue right until the target would balk at any additional compliance. Conditional on compliance from the target, having stronger incentives always results in higher utility for the interest group. Even when additional leverage would cause the target to balk, it is not clear which interest group should be required to reduce their demands. Why should one interest group surrender leverage, and not some other interest group whose issues are also tied to conditionality? No group wants to be the one that must reduce their demands to elicit the target's compliance. Thus, groups have reason to maximize their leverage as long as the target's compliance increases with the amount of value linked to their issue alone.

Competition among interest groups for leverage is a core characteristic of any leverage limited program. In these programs no dollar of commercial value can be tied to more than one issue. Therefore, interest groups compete to add additional value to their conditionality. Competition for leverage generally occurs at the moment of the program's design when the punishments for noncompliance are being specified. In the case of international trade, inter-

est groups are often competing for the right to withdraw market access for specific products as punishment for noncompliance. Interest groups succeed by influencing the policymakers who decide how products and issues will be paired. Thus, competition occurs in the legislative institutions governing program design. Interest groups with influence in the legislative process would favor this form of competition.

2.1.3 Consistent Enforcement

The property of consistent enforcement describes the cross-issue spillovers from decreases in compliance. Enforcement is consistent unless reducing compliance in some issue area also reduces the leverage applied to some other issue area. The property is desirable in two circumstances. First, if economic coercion is consistently enforceable then a target's inability to satisfy one condition will not undermine their incentives to comply in other issue areas. Second, consistent enforcement removes the sender's incentives to selectively enforce the conditionality. For example, the sender might hesitate to enforce conditionality on an issue if doing so would remove the target's incentives to comply in some other more important issue area.[7]

Consistent enforcement and the sender state's reputation for credibility are intricately linked. All programs of economic coercion represent a double commitment – a promise to reward compliant behavior and a threat to punish noncompliant behavior. Enforcement limited programs create temptations to selectively enforce these commitments because states can sometimes preserve influence on one issue by refusing to enforce conditionality on another. States that succumb to the temptation of selective enforcement are violating a prior commitment and potentially damaging their reputation for following through on commitments. The importance of credibility to relative power in international bargaining is well established in the literature (Powell 2002; Kertzer 2016). Bargaining is only possible when

[7]Inconsistent enforcement only becomes a problem when the conditionality needs to be enforced. Even when facing inconsistent enforcement, targets may choose to comply in both issue areas depending on their preferences.

commitments are believable, so states that can more easily make believable commitments are negotiating from a stronger position (Putnam 1988; Fearon 1994, 1995).

It is not necessarily the case that all enforcement limited programs will threaten the state's reputation. Some states have institutional arrangements which bolster their ability to resist the temptation to abrogate their commitments. For example, Fearon (1994) discusses how audience costs in democracies can increase the credibility of their commitments because their leaders are electorally accountable for any reversals. It is possible that states endowed with legal and political institutions that facilitate credible commitments will embrace enforcement limited programs because they can commit to fully enforcing the conditionality. In that case, inconsistent enforcement does not threaten the state's credibility, but it does threaten the efficacy of the economic coercion program.

Interest groups compete for the right to enforce their conditionality when a program design is enforcement limited. By punishing a state for noncompliance on one issue, the program surrenders the opportunity to reward states for compliance on other issues. For example, consider a program that rewards states for protecting intellectual property and labor rights. Expulsion from the program due to intellectual property rights violations removes the target's incentive to comply with labor rights conditionality. In general, interest groups compete to ensure that their issue's conditionality is the one which is being enforced. This competition occurs *ex post* at the moment of enforcement rather than *ex ante* at the moment of program design. Some interest groups might have better access to the bureaucracy and may prefer this form of competition (You 2017). Competition over enforcement rights is persistent because the right to enforce must be contested whenever noncompliance is detected.

2.1.4 The Trilemma

This section introduces the setting more formally. Let there be two states: a sender and a target. The sender state wishes to influence the policy choices of a target state in each of

two issue areas indexed by j. The game occurs in a single stage in which the sender and target simultaneously announce their actions. The target chooses policies α_j which are set in the unit interval and chosen separately for each issue $j \in \{1, 2\}$.[8]

Both the target and the sender have preferences over the target's choice of policy. The ideal points for the target and the sender are $\alpha_j = 0$ and $\alpha_j = 1$ respectively for all issues j. Thus, the target is choosing its degree of compliance with the sender's wishes. To encourage the target to comply with their preferred policy choices the sender state can punish the target by interrupting commerce between them. Both states value the gains from trade – exports and imports create economic value for both the target and sender, but the two states may value the gains differently, allowing for different degrees of asymmetric dependence. The target state will always choose $\alpha_j = 0$ unless doing so would result in too much lost economic value. An example utility function would be $U_k(\alpha_1, \alpha_2; h) = K{\alpha_1}^2 + K{\alpha_2}^2 - h(\alpha_1, \alpha_2)^2$ where K is a positive constant for senders and a negative constant for targets and h is a function representing how much trade has been withdrawn by the sender.

The sender state chooses issue specific punishment functions, which represent how much economic value will be withheld as a function of the target's compliance with conditionality. Let $\phi_j(\alpha_j) : [0, 1] \to [0, 1]$ be an **issue specific punishment function** for issue $j \in \{1, 2\}$ and compliance level α_j. Issue specific punishment functions ϕ_j are chosen by the sender state and compliance levels $\alpha_j \in [0, 1]$ are chosen by the target state. They must be nonincreasing (more compliance cannot result in more punishment). The **total punishment function,** which is the amount of economic value actually withheld, is defined as

$$\phi(\alpha_1, \alpha_2) = \min\{\phi_1(\alpha_1) + \phi_2(\alpha_2), 1\}$$

which is a simple sum of the punishment for the target's choice of compliance on each issue until all commerce is withheld, at which point the function takes its maximum value of 1.

[8]While two issues is sufficient to convey most of the model's intuition, readers interested in a more general version should consult Appendix E.

The issue specific punishment function is a highly flexible representation of trade conditionality reflecting the wide variety of program designs employed by states. A brief comparison of two Generalized Systems of Preference (GSP) can illustrate how real programs can be represented in the framework. The GSP programs implemented by the United States and the European Union are trade development initiatives that reduce tariffs for beneficiary developing states protecting certain rights. The US excludes states from program eligibility which do not take sufficient measures to protect intellectual property and labor rights. The analogous EU program, however, is limited to the protection of human rights. States can also be excluded from the EU's more generous GSP+ program if they violate conditionality on either human rights or on environmental protection. The issue specific punishment functions reflecting the US conditionality program could be $\phi_j(\alpha_j) = 0$ if $\alpha_j = 1$ and $\phi_j = 1$ if $\alpha_j < 1$ for $j \in \{1, 2\}$. These functions each remove all trade under the GSP for any amount of noncompliance on either issue. The EU's issue specific punishment function representing conditionality on environmental rights could be $\phi_1(\alpha_1) = 0$ if $\alpha_1 = 1$ and $\phi_1(\alpha_1) = k$ if $\alpha_1 < 1$ reflecting how beneficiaries lose k percent of their trade benefit by losing access to GSP+ if they do not fully comply with environmental protection. The function for EU conditionality on human rights could be $\phi_2(\alpha_2) = 0$ if $\alpha_2 = 1$, $\phi_2(\alpha_2) = k$ if $\rho < \alpha_2 < 1$, and $\phi_2(\alpha_2) = 1$ if $\alpha_2 < \rho$. The two steps in this function reflect how states which choose an intermediate level of compliance can be excluded from GSP+ while maintaining eligibility in the less generous basic GSP program. Some other possible issue specific punishment functions are depicted in Appendix Figure 2.

An issue specific punishment function regarding a particular issue j exhibits **maximum leverage** if $\max_{\alpha_j} \phi_j(\alpha_j) - \min_{\alpha_j} \phi_j(\alpha_j) = 1$. In other words, an issue specific punishment function exhibits maximum leverage if and only if the maximum possible economic value is tied to compliance. [9] For example, the issue specific punishment function $\phi_j(\alpha_j) =$

[9] Because α_j is restricted to the unit interval and ϕ_j must be nonincreasing, the maximum must be attained at $\alpha_j = 0$ and the minimum must be attained at $\alpha_j = 1$. Therefore, an equivalent formulation is $\phi_j(0) - \phi_j(1) = 1$. This alternative formulation says that 0% compliance is punished with a full withdrawal of economic value and 100% compliance is rewarded with full access to the economic volume.

$1 - \alpha_j/2$ does not exhibit maximum leverage. We see that $\phi_j(0) = 1$ and $\phi_j(1) = 1/2$, thus $\phi_j(0) - \phi_j(1) < 1$. By contrast the issue specific punishment function $\phi_j(\alpha_j) = 1 - \alpha_j$ does exhibit maximum leverage because $\phi_j(0) = 1$ and $\phi_j(1) = 0$. In more casual language, maximum leverage means that the sender is creating the maximum possible incentive for compliance on a particular issue.[10]

A total punishment function exhibits **consistent enforcement** if and only if, for all issues j, $\max_{\alpha_j} \phi(\alpha_1, \alpha_2) - \min_{\alpha_j} \phi(\alpha_1, \alpha_2)$ is not increasing in α_i where $i \neq j$. In more casual language, enforcement is consistent unless reducing compliance in some issue area also reduces the leverage applied to some other issue area. For example, the total punishment function $\phi(\alpha_1, \alpha_2) = \min\left\{2 - \frac{\alpha_1}{2} - \alpha_2, 1\right\}$ does not exhibit consistent enforcement.[11] Inconsistent enforcement means that the target might be able to reduce its costs of noncompliance on issue j by choosing to reduce its compliance on some issue i (unless the sender chooses not to enforce conditionality on issue i). For example, expelling a state that violates labor rights from the GSP would remove its incentive to protect intellectual property rights.

Finally, a program is said to have a *broad coalition of support* if there are at least two issues associated with conditionality, or $J > 1$.[12] At this point it is possible to formally establish the economic coercion trilemma. The formal statement is given in Proposition 1 and the proof is found in Appendix A.3. The proposition describes the precise sense in which maximum leverage and consistent enforcement are incompatible – unless only one issue is tied to the conditionality, achieving one objective precludes the achievement of the other. The trilemma is a consequence of the fixed volume of commerce available to the sender acting

[10] See Appendix A.2 for more on marginal incentives.

[11] From the definition for $j = 1$:

$$\begin{aligned}\max_{\alpha_1} \phi(\alpha_1, \alpha_2) - \min_{\alpha_1} \phi(\alpha_1, \alpha_2) &= \max_{\alpha_1} \left(\min\left\{2 - \frac{\alpha_1}{2} - \alpha_2, 1\right\}\right) - \min_{\alpha_1} \left(\min\left\{2 - \frac{\alpha_1}{2} - \alpha_2, 1\right\}\right) \\ &= \min\{3/2 - \alpha_2, 1\} - \min\{1 - \alpha_2, 1\} \\ &= \begin{cases} 1/2 \text{ if } \alpha_2 > 1/2 \\ \alpha_2 \text{ if } \alpha_2 \leq 1/2 \end{cases}\end{aligned}$$

which is an increasing function of α_2 over a subset of its domain ($\alpha_2 \leq 1/2$).

[12] The behavior of the domestic interest groups is outside the scope of the model.

as a "budget constraint" of political influence on the target. The remainder of this section explores what conditions would cause a sender state to prioritize one objective over another. There are two main factors: the degree of asymmetric dependence and issue compatibility.

Proposition 1 (Economic Coercion Trilemma) *Every issue specific punishment function which exhibits maximum leverage is also part of an inconsistently enforced total punishment function unless there is only one issue tied to conditionality.*

2.2 The Behavior of States: Making Tradeoffs Under the Trilemma

Having established the trilemma as a fundamental challenge in the design of economic coercion, a natural question arises: How might states choose one design over another? Certainly, many factors could contribute to these choices depending on the strategic environment and the domestic politics of the states involved. Any predictions require assumptions about the preferences of the states. This section will analyze some circumstances that may affect the choices states make under the trilemma. Although no single factor is likely to explain any single case, it is still useful to consider why one design could be better than another.

2.2.1 Complementarities in Noncompliance

How do states choose between leverage and enforcement limited designs? Inconsistent enforcement creates problems by potentially allowing the target to reduce its costs of noncompliance on issue j by reducing its compliance on some other issue i. But there can be advantages to enforcement limited strategies as well. Targets which are especially averse to the costs of punishment might choose a higher degree of compliance when more economic value is tied to conditionality. Thus, the inconsistent enforcement property is polarizing in the sense that 1) targets might be less inclined to comply when confronted with these incentives and 2) targets that do comply will provide a higher degree of compliance.

Proposition 2 *If the total punishment function is not consistently enforceable and the target's utility function is additively separable then the target's optimum level of compliance on issue i is an increasing function of its compliance on other issues j.*

The precise statement and proof, which explore the total punishment function through the lens of submodularity, are provided in Appendix B.[13] The intuition of the result is that inconsistent enforcement creates complementarities in noncompliance that encourage the target to choose either full compliance on all issues or zero compliance on all issues. In other words, inconsistent enforcement polarizes the compliance of the target.

The following example illustrates the core properties of consistent enforcement more concretely for specific functional forms. Consider two total punishment functions shown in (1) and (2). Note that ϕ and γ differ only in the fraction of trade that can be used to incentivize compliance on issue 1. And yet ϕ is consistently enforceable over the entire domain while γ is not consistently enforceable for $\{\alpha_1, \alpha_2 : \alpha_1/2 + \alpha_2/2 < 1/2\}$. Consider a target state having utility $U_t(\alpha_1, \alpha_2; h) = -\frac{a_1}{4}{\alpha_1}^2 - \frac{a_2}{4}{\alpha_2}^2 - h(\alpha_1, \alpha_2)^2$ where $h \in \{\phi, \gamma\}$ and a_i are positive real coefficients determining the weights on the two issues relative to the pain of lost economic surplus (coefficient 1 on h).[14]

$$\phi = \min\left\{\frac{1}{2} - \frac{\alpha_1}{2} + \frac{1}{2} - \frac{\alpha_2}{2}, 1\right\} = \min\left\{1 - \frac{\alpha_1}{2} - \frac{\alpha_2}{2}, 1\right\} \tag{1}$$

$$\gamma = \min\left\{1 - \frac{\alpha_1}{2} + \frac{1}{2} - \frac{\alpha_2}{2}, 1\right\} = \min\left\{\frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2}, 1\right\} \tag{2}$$

How will such a target respond to the incentives of the program of economic coercion? The target will choose α_1 and α_2 to maximize their utility given the consequences of being punished according to ϕ or γ. The target's optimal compliance choices when facing ϕ and γ

[13] The general strategy of the proof is to show that 1) the total punishment function is strictly submodular wherever the sum of the issue specific punishment functions is greater than one, 2) subject to some assumptions, the target's utility function is supermodular over that domain, and 3) by the Topkis theorem there are cross-issue complementarities in compliance where the target's utility function is supermodular.

[14] Dividing by 4 simplifies the arithmetic by rescaling the units.

Sender choice	Target response α_1^*	Target choice α_2^*
ϕ	$\frac{2}{3a_1}H(1, a_1, a_2)$	$\frac{2}{3a_2}H(1, a_1, a_2)$
γ	$\frac{1}{a_1}H(1, a_1, a_2)$	$\frac{1}{a_2}H(1, a_1, a_2)$

Table 1: The target's optimal compliance choices for γ and ϕ.

are calculated in Appendices C.1 and C.2 and the results are given by the results in Table 1. where H is the harmonic mean. Recall that the harmonic mean is equal to the weighted arithmetic mean with weights $(1/x_i)/(\sum_j 1/x_j)$. In other words, when facing ϕ the optimal level of compliance is about 2/3 of the harmonic average of the weights on each component of the utility function. Also, compliance is decreasing in the weight associated to that issue. Note that the optimal choice of compliance on one issue is decreasing in the compliance of the other. The target effectively has a "budget constraint" of economic value defined by ϕ which is divided across compliance on two issues. The target chooses the optimal compliance vector by shifting along this negatively sloped budget constraint.

As discussed previously, the target will never choose full noncompliance on both issues when the total punishment function is ϕ. Some positive amount of compliance is always preferred because there is always a marginal incentive to comply for both issues. However, when the total punishment function is γ this is no longer true. After a certain point the sender has exhausted all its leverage and it cannot withdraw any more economic value. At this point the marginal incentive to continue complying has evaporated and the target will cease to comply. As shown analytically in Appendix C.2, the target chooses total noncompliance on both issues for values of a_1 and a_2 satisfying $4/3 < H(1, a_1, a_2) < 2$. In this region it is feasible for the target to choose the interior solution, but the target can get more utility from exploiting the complementarities of noncompliance. For $4/3 > H(1, a_1, a_2)$ the target chooses the interior solution, meaning that they prefer to comply some amount on both issues. When they do choose compliance on both issues, the target chooses more compliance under γ than they would have under ϕ. Finally, when $H(1, a_1, a_2) > 2$ the target is at a boundary solution and chooses zero compliance because the needed compliance vector is not

in the feasible set.

2.2.2 Asymmetric Dependence

This subsection identifies a sufficient condition for the existence of an enforcement limited strategy that elicits full compliance under conditions of asymmetric dependence. Put simply, it will be possible to extract full compliance using an enforcement limited strategy if the target values the economic relationship significantly more than it values its policy autonomy. The proof appears in Appendix D.

Proposition 3 (Asymmetric Dependence) *Let* $\bar{U} = \max_{\alpha_1,\alpha_2} U_t(\alpha_1, \alpha_2; \phi)$ *s.t.* $\phi(\alpha_1, \alpha_2) = 1$ *be the highest utility the target can attain given the maximum possible punishment. Also, let* $\underline{U} = \max_{\alpha_1,\alpha_2} U_t$ *s.t.* $\phi(\alpha_1, \alpha_2) = 0$ *be the highest utility the target can attain given minimum possible punishment. If* $\bar{U} < \underline{U}$ *then there exists a leverage limited strategy that elicits full compliance.*

The sufficiency threshold is that the target must be willing to make full concessions on both policies to avoid a total loss of market access. Such a target would never risk the loss of its foreign markets to achieve a better outcome in one policy domain. Importantly, it does not matter what preferences the target has over other all other compliance choices and punishments. In particular, the rate at which the target is willing to substitute compliance for market access does not matter as long as the above condition holds. The result partially explains why states that depend heavily on the global economy are vulnerable to coercion. In addition to having more ability to pressure the target into making concessions on a single issue, the target's dependence on trade also helps the sender avoid the associated challenge of maintaining credibility.

2.2.3 Issue Compatibility

Two issues are called compatible if a target which is noncompliant on one issue is unlikely to be noncompliant on the other. Issue compatibility minimizes the costs of inconsistent

enforcement. Inconsistent enforcement is only a problem when the sender must enforce the conditionality in two separate issue areas simultaneously, which is unlikely to happen when issues are compatible. For example, consider a hypothetical program to combat climate change by financing the construction of nuclear power plants. The program might remove its funding from states that either 1) fail to build enough capacity to reduce their dependence on fossil fuels or 2) use the technology to pursue a nuclear weapons capability. These conditions are compatible because it is unlikely that a target would violate both simultaneously. If the target wishes to use the technology to surreptitiously enrich uranium they would need to be building the reactors. Thus, all the funding can be withdrawn if either condition is not satisfied without creating any strategic dilemma. Punishing the target for noncompliance on one issue does not reduce the target's incentives to continue compliance on the other.

An example of incompatible issues is useful for illustrating the concept. Imagine a program of economic coercion that made market access conditional on 1) giving subsidies to a particular domestic industry and 2) not giving subsidies to that same industry. Clearly, it would be impossible to satisfy these conditions because any state that satisfies condition 1) would certainly not satisfy condition 2). Although that specific extreme program would be implausible, states might accidentally implement a program that differs only by degree. For example, imagine a program of economic coercion that made market access conditional on 1) having low carbon emissions and 2) not giving subsidies to domestic industries. On the surface, these two issues can be achieved simultaneously. But if there are states whose options for renewable energy are unusually costly it might be impossible to reduce carbon emissions without domestic subsidies for renewables. In such a case it could be unlikely for 1) to be achieved without violating 2). Thus, the compatibility of issues can depend on the characteristics of the target state.

Issues might be compatible for a variety of reasons. It could be that the target needs to choose noncompliance on one of two issues but it could choose either. For example, it could be that the target state is subject to multiple domestic pressures, one encouraging

compliance on both issues and one preferring noncompliance, and the state wishes to take the middle ground. Or it could be that the type of state which might prefer noncompliance on one issue is predisposed to compliance on another. For example, the states that produce greenhouse gas emitting products such as oil and coal tend not to be the ones that consume them. Thus, the issues of oil/coal consumption and production are probably compatible and can be conditioned on the same commercial volume.

To illustrate how issue compatibility can play a role in facilitating enforcement limited strategies I return to the example from the previous section with one modification: now we assume that the weights a_1 and a_2 are random variables drawn from the known joint distribution $F(a_1, a_2)$. This setup could be interpreted to mean that the sender is attempting to influence an entire population of targets using one program of economic coercion, or that the sender does not know the weights for a particular target. Appendix D.1 analyzes the case where a target having utility function $U_t = -\frac{a_1}{4}\alpha_1^2 - \frac{a_2}{4}\alpha_2^2 - h(\alpha_1, \alpha_2)^2$ faces the enforcement limited total punishment function $h = \gamma$ chosen by the sender. The analysis demonstrates how the probability of the target choosing full compliance is decreasing in the correlation of a_1 and a_2.

The concept of issue compatibility presents a criterion for evaluating which political issues can be bundled. Compatible issues are less likely to trigger problems when bundled in a program of economic coercion. The literature has previously said relatively little about why some issues are more likely to be linked than others. Compatible issues are easier to bundle credibly because the sender is unlikely to need to choose between enforcing one or the other.

2.3 Applications: Iran Deal Negotiation

In August 2002 an Iranian separatist group revealed the existence of two previously undisclosed uranium enrichment facilities at Natanz and Arak. The revelation of these clandestine facilities signaled the progress Iran had made towards its nuclear ambitions and touched off

an international crisis (IAEA 2003).[15] The high potential costs of military strikes against the facilities pushed the United States towards economic sanctions as its primary method of pressuring the Iranian government to end its nuclear program.

After many long years of deeply contentious negotiations, Iran did finally indicate its willingness to potentially cease its nuclear program in exchange for sanctions relief.[16] The productivity of the international negotiations immediately sparked an acrimonious political conflict within the United States. The conflict was a consequence of the economic coercion trilemma. The United States had an opportunity to remove its sanctions to secure the end of Iran's nuclear program, but doing so would undermine its ability to influence Iran's behavior in other issue areas. There was an intense debate between those who wanted to incentivize Iran sufficiently to end its nuclear program and those who cared about maintaining incentives regarding Iran's behavior outside of the nuclear issue. The fraught debate about whether and how the sanctions should be terminated can be understood as an attempt to change the design of the sanctions program. The US could choose an enforcement limited strategy by requiring an end to both state sponsored terrorism and the nuclear program before sanctions would be terminated. The alternative would be to pursue a leverage limited strategy by dividing the sanctions between the issues.

Ultimately, US sanctions were divided. The existing sanctions regime targeting human rights and terrorism was largely untouched during the negotiations. Instead of opening its markets directly, the US offered to waive its secondary sanctions if Iran terminated its nuclear program. These were sanctions that could be imposed on firms outside the US that continued to do business in Iran. Effectively, the sanctions program was divided such that primary sanctions were applied to the issue of countering terrorism and promoting human rights while the secondary sanctions were assigned to nuclear proliferation. Thus, the conflict between US domestic interest groups was resolved by converting a previously enforcement

[15] Detailed timelines are available from Davenport (2015) and Davenport (2018).

[16] See also Riccardo Alcaro (2014), Davenport (2015), Rogin (2015), US Department of Treasury and US Department of State (2016), Schumer (2015), McCain and Graham (2015), Fabius (2016), R. Alcaro (2018), and Davenport (2018).

limited strategy into a leverage limited strategy.

2.3.1 The Value of Manipulable Commerce

In the context of the trilemma, the "fixed commercial value" that constrains the design of sanctions was the maximum amount of trade that the US could use as leverage in the negotiations. Access to American markets, some of the largest in the world, was certainly valuable to Iran. The exact value of this commerce is hard to measure because the US has restricted trade with Iran continuously since its addition to the State Department's list of sponsors of terrorism in 1984. Without observing how much trade would occur under free trade, the analysis can proceed by surveying the existing restrictions on trade with Iran.

By the time the enrichment facilities were revealed there was little trade between the United States and Iran due to two decades of ever strengthening sanctions. Restrictions were implemented through both executive orders and laws.[17] The earliest and most extensive ban was Executive Order 12613, issued in 1987, which ordered "Except as otherwise provided in regulations issued pursuant to this Order, no goods or services of Iranian origin may be imported into the United States." The only exceptions at that time were for petroleum products and publications. Although this early ban was implemented via executive order, the US Congress passed multiple laws that duplicated its provisions beginning in 1996.

Typically, a sender state can only affect the openness of its own markets. However, in the case of the Iran deal negotiation the United States had access to an unusual legal instrument which expanded its reach. The Iran and Libya Sanctions Act of 1996 (ILSA) allowed the US to sanction any foreign firm that did business in Iran through "secondary sanctions." For example, any European firm that continued to import from sanctioned Iranian entities could potentially lose its right to do business in the United States (Dunning 1998). Although secondary sanctions were a less powerful instrument, many multinational firms would hesitate before risking their access to the enormously profitable American markets. The passage of

[17] See also https://home.treasury.gov/policy-issues/financial-sanctions/sanctions-programs-and-country-information/iran-sanctions.

this act was immediately controversial among US allies, particularly France (McCurdy 1997). Thus, in this instance, the United States could interrupt more than their own trade with Iran – it could also interfere with European business interests in Iran.

2.3.2 The Issues

Security concerns have always been a rationale for US sanctions on Iran. For example, the preamble of Executive Order 12613 states "I, Ronald Reagan, President of the United States of America, find that the Government of Iran is actively supporting terrorism as an instrument of state policy." President Clinton (1996) said at the signing of ILSA: "With this legislation we strike hard where it counts, against those who target innocent lives and our very way of life. It shows we are fully prepared to act to restrict the funds to Iran and Libya that fuel terrorist attacks." A potential Iranian nuclear program also played a role in early sanctions.[18]

The US actually expanded the scope of its objectives after 2003 to include the promotion of human rights and encouraging regime change. The Comprehensive Iran Sanctions, Accountability, and Divestment Act of 2010 states: "The Government of Iran continues to engage in serious, systematic, and ongoing violations of human rights, including suppression of freedom of expression and religious freedom, illegitimately prolonged detention, torture, and executions. Such violations have increased in the aftermath of the fraudulent presidential election in Iran on June 12, 2009". The Iran Threat Reduction and Syria Human Rights Act of 2012 includes an entire section titled "Measures Relating to Human Rights Abuses in Iran." The Iran Freedom and Counter-Proliferation Act of 2012 states one of its purposes is to "fully and publicly support efforts made by the people of Iran to promote the establishment of basic freedoms that build the foundation for the emergence of a freely elected, open, and democratic political system." As the nuclear crisis unfolded, human rights and

[18]From the ILSA preamble: "The objective of preventing the proliferation of weapons of mass destruction and acts of international terrorism through existing multilateral and bilateral initiatives requires additional efforts to deny Iran the financial means to sustain its nuclear, chemical, biological, and missile weapons programs."

non-nuclear security concerns became entwined with the US sanctions program.

2.3.3 Debating Sanctions Design Under the Trilemma

The economic coercion trilemma posits that any program of economic coercion can achieve at most two of the three objectives: broad coalition of support, maximum leverage, and consistent enforcement. As described above, by 2010 the Iran sanctions program had at least three objectives: nuclear proliferation, support for terrorism, and human rights. Thus, the program design had to choose between maximum leverage and consistent enforcement. Initially, there were few executive orders or laws that formally defined the US apportionment of trade value among the issues. Instead, the executive orders and laws simply listed most (or all) of the US objectives in their preambles. The sanctions program implicitly exhibited maximum leverage by linking every issue to every trade restriction. However, due to the nonbinding nature of aspirational goals listed in preambles, the strategy was always subject to change.

Clarifying the choice between maximum leverage and consistent enforcement became an urgent priority in 2013. In that year the negotiations changed with the election of Hassan Rouhani to the Iranian presidency. Suddenly, there was a real possibility that Iran would be willing to end the nuclear program in exchange for sanctions relief. The US government had to decide whether its sanctions program should be modified as a result. If the sanctions were removed as a reward for a credible end to the nuclear program it would undermine pressure on Iran on the issues of human rights and terrorism. The Obama administration wanted the political credit for successfully negotiating a deal that could end or substantially delay Iran's nuclear ambitions. The President pressed Congress for a bill that would remove significant barriers to trade with Iran.

Predictably, Republicans in Congress were opposed to any measure that would benefit a president of the opposite party. However, Obama encountered enough opposition from within his own party to torpedo any hopes of significant sanctions relief for Iran through

Congress. The critics' primary concern was that the deal did not address Iranian behavior outside of the weapons program. Then Chairman of the Democratic Senatorial Campaign Committee and future Majority Leader Chuck Schumer (D-NY) decided to vote against the deal partly because of what he called "non-nuclear" components of the agreement:

> [The non-nuclear elements] of the deal give me the most pause. For years, Iran has used military force and terrorism to expand its influence in the Middle East, actively supporting military or terrorist actions in Israel, Syria, Lebanon, Yemen, Iraq, and Gaza. That is why the U.S. has labeled Iran as one of only three nations in the world who are "state sponsors of terrorism." Under this agreement, Iran would receive at least $50 billion dollars in the near future and would undoubtedly use some of that money to redouble its efforts to create even more trouble in the Middle East, and, perhaps, beyond. (Schumer 2015)

Schumer was not alone in his party's opposition to President Obama's deal. On September 11, 2015 the 244 House Republicans were joined by 25 Democrats to defeat HR3461, which would have granted Congressional approval to the Iran Deal. As previously stated, the Republicans had political motivations to oppose the bill. But the arguments they used to support their position against the deal were tellingly close to those of Schumer. Republican Senators John McCain (R-AZ) and Lindsey Graham (R-SC) said in a joint statement that:

> President Obama's deal with Iran empowers one of our chief antagonists. . . . Instead of weakening this radical regime, a regime with American blood on its hand, this agreement would make Iran stronger. Before the deal, Iran was able to destabilize Yemen, Iraq, Syria, and Lebanon. After this deal, Iran's power in the region will only be enhanced as it ultimately becomes a member of the nuclear club. A more powerful Iran with a bomb in the Ayatollah's hands is a direct threat to the United States and an existential threat to our allies in Israel. (McCain and Graham 2015)

All these accounts highlight Iran's behaviors as a destabilizing force in the region and as a supporter of terrorism. They portray a choice between continuing to pressure Iran on these issues and rewarding Iran for ending its nuclear program. This choice directly reflects the underlying economic coercion trilemma. Congress clearly preferred to maintain maximum leverage on each issue area. However, the Obama administration preferred to redesign the

sanctions program for consistent enforcement. They wanted to give up maximum leverage by dividing the trade value between the nuclear issue and the other issues. That way, some amount of leverage could be maintained in the other issue areas while rewarding Iran for making progress on the nuclear issue.

2.3.4 Resolving the Design Debate

According to the theory of the economic coercion trilemma, states make tradeoffs when designing sanctions to maximize their utility from the target's compliance in multiple issue areas. But states also face various exogenous constraints on the available designs that also affect the ultimate design choice. In this case, the institutions of the Congress and the Presidency affected how the program was redesigned. Any sanctions that were codified in law could not be unilaterally removed by the President without the consent of Congress. The failure of HR3461 effectively ensured that at least some leverage would be maintained on the issues of human rights and support for terrorism. But the Congress had previously granted the President some limited discretion over the enforcement of certain sanctions laws. In particular, the President could waive the right to enforcing the secondary sanctions allowed by ILSA. President Obama's commitment to waive these secondary sanctions was an important concession to Iran because it guaranteed the value of European market access.[19]

Did the nature of the nuclear issue also contribute to its partial de-linking from the other issues? The economic coercion trilemma provides some guidance here as well. Of the three issues, nuclear proliferation arguably posed the most imminent and serious risk to security in the Middle East. The issues of human rights and support for terrorism were areas where Iran maintained an intransigent position even while showing signs of openness to negotiating on the nuclear issue. Pursuit of a maximum leverage strategy would have invited risky complementarities in noncompliance: if the Iranian government decided not to concede on one issue then all progress on the nuclear issue would be lost. The nuclear issue was

[19] See also Mangini (2023).

arguably too pressing a concern for that risk to be acceptable to the Obama administration. In the words of Obama in an address on the potential deal:

> [The Iran Deal] contains the most comprehensive inspection and verification regime ever negotiated to monitor a nuclear program. As was true in previous treaties, it does not resolve all problems; it certainly doesn't resolve all our problems with Iran. It does not ensure a warming between our two countries. But it achieves one of our most critical security objectives. As such, it is a very good deal. (Obama 2015)

In the same speech, Obama also discussed the criticism that the Iran Deal was surrendering leverage in the human rights and terrorism issue areas. His answer emphasizes how he saw the nuclear issue as taking precedence: "The truth is that Iran has always found a way to fund these efforts, and whatever benefit Iran may claim from sanctions relief pales in comparison to the danger it could pose with a nuclear weapon."

2.3.5 The Trilemma and the Iran Deal

The economic coercion trilemma explains the positions taken by interested parties on the Iran Deal between 2013 and 2015. Exchanging sanctions relief for an end to the Iran nuclear program required the consent of stakeholders who wanted sanctions for other reasons. The government had to decide whether sanctions should be linked to every issue area or if the trade value could be split among the issues. A coalition in Congress refused to de-link the issues of human rights and support for terrorism from the nuclear program, effectively promoting a strategy of maximum leverage. They were unwilling to sacrifice leverage on their preferred issues to elicit Iran's compliance in another issue area. The President used all available legal instruments to separate the issue of the nuclear program from other issues. Obama's preference was to prioritize consistent enforcement such that Iran's compliance on the nuclear issue could be rewarded even without progress in other issue areas.

The conflict between Congress and the President that unfolded in 2013-2015 over the Iran deal was not solely a consequence of political posturing or unimaginative sanctions policy. It

was a conflict induced by the reality of the economic coercion trilemma. No possible design could have achieved both maximum leverage and consistent enforcement and satisfied all parties. No amount of public messaging or clever sanctions engineering could have changed that reality.

3 Conclusion

Although the use of economic coercion is commonplace, states have chosen to implement conditionality using a wide variety of program designs. Some programs, such as the US GSP, condition market access on simultaneous compliance with conditionality in multiple policy areas. Others, including most trade negotiations, attach only a fraction of the market value to each issue area subject to conditionality. This paper explains the diversity of program designs as a consequence of how different sender states choose to navigate an underlying economic coercion trilemma. No program of economic coercion can simultaneously 1) secure a broad coalition of support for conditionality from multiple interest groups whose issues are linked to trade, 2) tie the maximum trade value possible to each issue, and 3) guarantee the program's consistent enforcement across issues. States with different institutions, preferences, and political environments will make the tradeoff differently, leading to the wide variety of program designs. The "budget constraint" that generates the trilemma is the fixed economic value available as a bargaining chip to the sender state.

What factors determine how sender states navigate the trilemma? I find that states which are willing to accept less compliance from the target in return for less fragile influence are more likely to prioritize consistent enforcement. I also find that consistent enforcement is relatively less important for states whose targets are highly dependent on trade. Finally, I find that compatible issues, or issues chosen so that the target is unlikely to simultaneously violate conditionality in multiple areas, can be bundled more effectively. Applying the economic coercion trilemma to real applications enables a deeper analysis of the strategic

situation of sender states. Taken as a whole, these results illustrate why some states can induce more compliance for every dollar of commerce tied to a political issue.

The economic coercion trilemma illuminates a new dimension of power in international politics. In general, states cannot tie the same dollar of commerce to multiple political issues without raising the possibility of inconsistent enforcement. However, in specific circumstances some sender states do not need to be concerned about the consequences of inconsistent enforcement. States that are risk-tolerant, that wish to bundle compatible issues, or whose targets are more dependent on international commerce are able to "double dip" by conditioning the same commercial volume on compliance in multiple issue areas.

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The Economic Coercion Trilemma
ONLINE APPENDIX

January 2022

A Simple Model

A.1 Issue Specific Punishment Function Examples

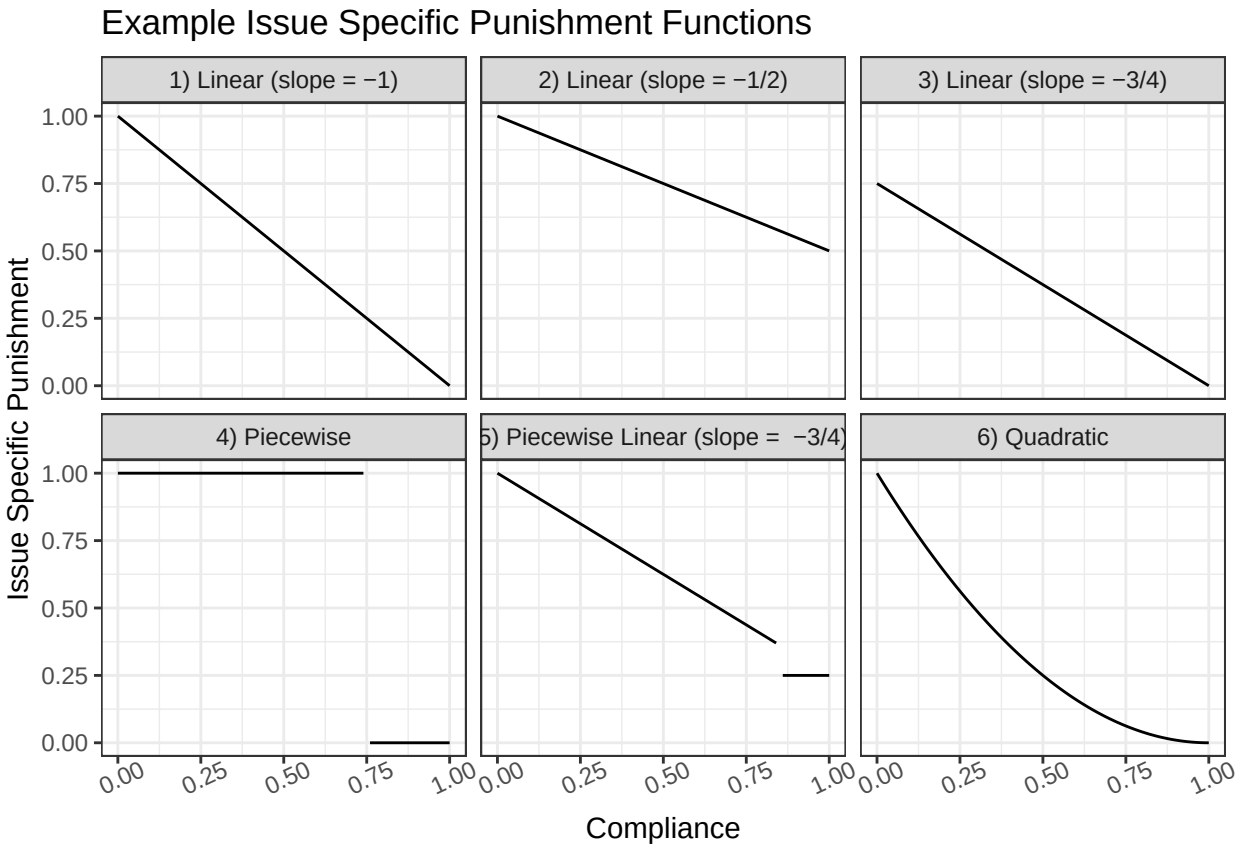

Figure 2: The only requirements on the issue specific punishment punishment functions $\phi_j(\alpha_j)$ is that the functions must 1) be nonincreasing in compliance and 2) map to the unit interval. Functions 1, 2, and 3 illustrate linear punishment functions where the total amount of trade tied to the issue varies. Function 1 rewards compliant behavior with full access to trade and punishes noncompliant behavior with zero trade. Functions 2 and 3 have different amounts associated with fully noncompliant and compliant behavior. In each of these cases less compliant targets are always punished more. Functions 4 and 5 illustrate discontinuities in the punishment schedule which correspond to strategies where trade is interrupted suddenly when the target crosses a compliance threshold. Function 6 illustrates a valid non-linear punishment schedule.

A.2 Discussion of Approach to Marginal Incentives

My focus on "leverage," defined as the economic value attached to conditionality, might at first glance appear neglectful of the target's incentives at the margin. Initial intuition from the literature might presume that the degree of compliance should depend on marginal incentives, i.e. the economic losses resulting from an infinitesimal decrease in compliance. I do not dispute that the target will respond to marginal incentives. But in this interaction the marginal incentives are not always well defined because of potential discontinuities in the total punishment function ϕ. For example, derivatives of the issue specific punishment function

$$\phi_j = \begin{cases} 0 & \text{if } \alpha_j < 1 \\ 1 & \text{if } \alpha_j = 1 \end{cases}$$

would be completely uninformative about the target's incentives where they exist. Instead of studying the marginal incentives, which frequently do not exist in many real world examples of conditionality, the analysis focuses on an upper bound of the marginal incentives: the total economic value tied to the issue. An increase in compliance cannot be rewarded with more economic value than would result from unrestricted commerce. Thus, the marginal incentives are bounded above by the total economic volume attached to conditionality on a particular issue. And this is why the maximum leverage property matters: issue specific punishment functions that exhibit maximum leverage have no artificial restrictions on the marginal incentives that can be used to encourage compliance from the target.

A.3 Proof of Proposition 1

Let ϕ be a consistently enforced total punishment function having one maximum leverage issue specific punishment function (ϕ_1 without loss of generality). By the consistent enforcement of ϕ it must be that $\max_{\alpha_1} \phi(\alpha_1, \alpha_2) - \min_{\alpha_1} \phi(\alpha_1, \alpha_2)$ cannot be an increasing function

of α_2. Simplifying the expression

$$\begin{aligned}\max_{\alpha_1}\phi(\alpha_1,\alpha_2)-\min_{\alpha_1}\phi(\alpha_1,\alpha_2) &= \max_{\alpha_1}\left(\min\left\{\phi_1(\alpha_1)+\phi_2(\alpha_2),1\right\}\right)-\min_{\alpha_1}\left(\min\left\{\phi_1(\alpha_1)+\phi_2(\alpha_2),1\right\}\right)\\ &= \min\left\{1+\phi_2(\alpha_2),1\right\}-\min\left\{\phi_2(\alpha_2),1\right\}\\ &= 1-\phi_2(\alpha_2)\end{aligned}$$

where the second line uses the property that $\phi_1(0) = 1$ and $\phi_1(1) = 0$ which is implied by the maximum leverage of ϕ_1. Note that because ϕ_2 is nonincreasing over its domain by assumption it must be that $1-\phi_2(\alpha_2)$ is an increasing function of α_2. The only way to avoid this difficulty is to tie only one issue to conditionality.

B Proof of Proposition 2

The proof proceeds by first establishing the submodularity of the total punishment function and then studying its implications for the behavior of the target. Unlike the other proofs in this section, the proof here is immediately extended to an arbitrary number of issues because the extension is straightforward from the main proof. It is necessary to use the submodularity of the total punishment function because of possible discontinuities and consequent nondifferentiability.

Lemma 1 (Submodularity of the total punishment function) *The total punishment function is submodular. It is strictly submodular over the domain* Υ *where* $\Upsilon := \{\boldsymbol{\alpha} : \sum_{j\in\Upsilon}\phi_j(\alpha_j) > 1\}$.

Proof: by construction. For ease of notation, let $\sum_k \phi_k(\alpha_k) = \psi(\boldsymbol{\alpha})$ where $\boldsymbol{\alpha} = [\alpha_1,\ldots,\alpha_k,\ldots,\alpha_K]$. By definition, ϕ is submodular if and only if, for all $\boldsymbol{x}$ and $\boldsymbol{y}$,

$$\begin{aligned}\phi(\boldsymbol{x}\uparrow\boldsymbol{y})+\phi(\boldsymbol{x}\downarrow\boldsymbol{y}) &\leq \phi(\boldsymbol{x})+\phi(\boldsymbol{y})\\ \min\left\{\psi(\boldsymbol{x}\uparrow\boldsymbol{y}),1\right\}+\min\left\{\psi(\boldsymbol{x}\downarrow\boldsymbol{y}),1\right\} &\leq \min\left\{\psi(\boldsymbol{x}),1\right\}+\min\left\{\psi(\boldsymbol{y}),1\right\} \qquad (3)\end{aligned}$$

where $x \uparrow y = [\max\{x_1, y_1\}, \cdots, \max\{x_k, y_k\}, \cdots, \max\{x_K, y_K\}]$ denotes the componentwise maximum and $x \downarrow y = [\min\{x_1, y_1\}, \cdots, \min\{x_k, y_k\}, \cdots, \min\{x_K, y_K\}]$ denotes the componentwise minimum.

We proceed by considering cases describing the relationship between ϕ and ψ. First, note that if $\phi(\boldsymbol{x} \downarrow \boldsymbol{y}) < 1$ then it must be that $\phi(\boldsymbol{x} \uparrow \boldsymbol{y}) < 1$, $\phi(\boldsymbol{x}) < 1$, and $\phi(\boldsymbol{y}) < 1$. Thus, Definition (3) simplifies as follows:

$$\min\{\psi(\boldsymbol{x} \uparrow \boldsymbol{y}), 1\} + \min\{\psi(\boldsymbol{x} \downarrow \boldsymbol{y}), 1\} \leq \min\{\psi(\boldsymbol{x}), 1\} + \min\{\psi(\boldsymbol{y}), 1\}$$
$$\psi(\boldsymbol{x} \uparrow \boldsymbol{y}) + \psi(\boldsymbol{x} \downarrow \boldsymbol{y}) \leq \psi(\boldsymbol{x}) + \psi(\boldsymbol{y})$$

Observe that the final line above must hold with equality $\psi(\boldsymbol{x} \uparrow \boldsymbol{y}) + \psi(\boldsymbol{x} \downarrow \boldsymbol{y}) = \psi(\boldsymbol{x}) + \psi(\boldsymbol{y})$ because the left hand side is just a rearrangement of the terms on the right hand side. Every element appearing in $\boldsymbol{x}$ or $\boldsymbol{y}$ also appears in either $\boldsymbol{x} \uparrow \boldsymbol{y}$ or $\boldsymbol{x} \downarrow \boldsymbol{y}$.

Now consider the case where $\phi(\boldsymbol{x} \downarrow \boldsymbol{y}) = 1$, $\phi(\boldsymbol{x} \uparrow \boldsymbol{y}) < 1$, $\phi(\boldsymbol{x}) < 1$, and $\phi(\boldsymbol{y}) < 1$. In this case Definition (3) reduces to

$$\psi(\boldsymbol{x} \uparrow \boldsymbol{y}) + 1 \leq \psi(\boldsymbol{x}) + \psi(\boldsymbol{y})$$

This line must hold true because in this case $\psi(\boldsymbol{x} \downarrow \boldsymbol{y}) \geq 1$ and, as shown above, $\psi(\boldsymbol{x} \uparrow \boldsymbol{y}) + \psi(\boldsymbol{x} \downarrow \boldsymbol{y}) = \psi(\boldsymbol{x}) + \psi(\boldsymbol{y})$. Thus, $\psi(\boldsymbol{x} \uparrow \boldsymbol{y}) + 1 \leq \psi(\boldsymbol{x} \uparrow \boldsymbol{y}) + \psi(\boldsymbol{x} \downarrow \boldsymbol{y}) = \psi(\boldsymbol{x}) + \psi(\boldsymbol{y})$.

Now consider the case where either $\phi(\boldsymbol{x}) = 1$ or $\phi(\boldsymbol{y}) = 1$. These cases imply that $\phi(\boldsymbol{x} \downarrow \boldsymbol{y}) = 1$ because $\psi(\boldsymbol{x} \downarrow \boldsymbol{y}) \geq \psi(\boldsymbol{x}) \geq 1$. Definition (3) reduces to

$$\psi(\boldsymbol{x} \uparrow \boldsymbol{y}) + 1 \leq \psi(\boldsymbol{x}) + 1$$
$$\psi(\boldsymbol{x} \uparrow \boldsymbol{y}) \leq \psi(\boldsymbol{x})$$

The above line must be true because the punishment functions are nonincreasing in their arguments and $\uparrow$ is a componentwise maximum.

The final case is $\phi(\boldsymbol{x}) = 1$ and $\phi(\boldsymbol{y}) = 1$. These cases immediately imply that $\phi(\boldsymbol{x} \downarrow \boldsymbol{y}) = 1$ since ϕ is nonincreasing and $\boldsymbol{x} \downarrow \boldsymbol{y}$ is a componentwise minimum. Since $\phi(\boldsymbol{x} \uparrow \boldsymbol{y}) \leq 1$ it must be that Definition (3) must be satisfied. ■

Now it is possible to prove the proposition. Let the target's utility be given by $U_t(\boldsymbol{\alpha}; \phi)$. Assume that there exists a monotonic transformation of U_t that can be written as $U_t = au(\boldsymbol{\alpha}) - b\phi(\boldsymbol{\alpha})$ where $a, b > 0$. It is well known that linear combinations of supermodular functions with nonnegative coefficients are also supermodular. By definition, $-\phi$ is supermodular because ϕ is submodular by Lemma 1. Thus, U_t is supermodular if u is supermodular. A well known sufficient condition for the supermodularity of u is that $\partial^2 u / \partial \alpha_i \alpha_j \geq 0$ for all issues i and j. Thus, the target's problem will be $\max_{\boldsymbol{\alpha}} U_t$ where U_t is supermodular. Applying the result of Topkis (1978) it must be that $\alpha_i^*(\alpha_{-i}) = \arg\max_{\boldsymbol{\alpha}} U_t$ must be a nondecreasing function of α_{-i}. It will be a strictly increasing function when U_T is strictly supermodular, which will occur when ϕ is strictly submodular, which in turn occurs when $\psi(\boldsymbol{\alpha}) > 1$. ■

The interpretation of the proposition is that inconsistent enforcement (i.e. choices of ψ that allow $\psi(\boldsymbol{\alpha}) > 1$ for some $\boldsymbol{\alpha}$) creates complementarities in noncompliance (i.e. $\alpha_i^*(\alpha_{-i})$ increases in the elements of α_{-i}). These complementarities encourage the target to choose either full or zero compliance on all issues.

C Example of the Polarization Result

C.1 Optimal Response to Consistent Enforcement

First, consider the program ϕ. Because the program is consistently enforceable, ϕ can be simplified as $\phi = 1 - \frac{\alpha_1}{2} - \frac{\alpha_2}{2}$. The target's optimal response is characterized by

$$\max_{\alpha_1,\alpha_2\in[0,1]} U_t(\alpha_1,\alpha_2;\phi(\alpha_1,\alpha_2))$$
$$\max_{\alpha_1,\alpha_2\in[0,1]} -\frac{a_1}{4}{\alpha_1}^2 - \frac{a_2}{4}{\alpha_2}^2 - \left(1-\frac{\alpha_1}{2}-\frac{\alpha_2}{2}\right)^2$$

Solving this for optimal compliance:

$$\begin{aligned}
\frac{\partial U_t}{\partial \alpha_1} &= -\frac{a_1\alpha_1}{2} - 2\left(1-\frac{\alpha_1}{2}-\frac{\alpha_2}{2}\right)\left(-\frac{1}{2}\right) = 0 \\
0 &= -\frac{a_1\alpha_1}{2} + \left(1-\frac{\alpha_1}{2}-\frac{\alpha_2}{2}\right) \\
\alpha_1 &= \frac{2-\alpha_2}{a_1+1} \\
\alpha_2 &= \frac{2-\alpha_1}{a_2+1}
\end{aligned}$$

which writes α_2 using symmetry. Plugging in to get α_1^* in terms of parameters:

$$\begin{aligned}
\alpha_1 &= \frac{2-\frac{2-\alpha_1}{a_2+1}}{a_1+1} \\
\alpha_1(a_1+1) &= 2 - \frac{2-\alpha_1}{a_2+1} \\
\alpha_1(a_1+1)(a_2+1) &= 2(a_2+1) - 2 + \alpha_1 \\
\alpha_1((a_1+1)(a_2+1)-1) &= 2a_2 \\
\alpha_1 &= \frac{2a_2}{(a_1+1)(a_2+1)-1} \\
\alpha_1^* &= \frac{2a_2}{a_1a_2+a_1+a_2} \\
\alpha_2^* &= \frac{2a_1}{a_1a_2+a_1+a_2}
\end{aligned}$$

which again uses symmetry to find α_2^*. Rewriting the expression:

$$\begin{aligned}
\alpha_1^* &= \frac{2a_2}{a_1a_2 + a_1 + a_2} \\
\alpha_1^* &= \frac{2\frac{1}{a_1}}{1 + \frac{1}{a_1} + \frac{1}{a_2}} \\
\alpha_1^* &= \frac{2}{3a_1}\frac{3}{1 + \frac{1}{a_1} + \frac{1}{a_2}} \\
\alpha_1^* &= \frac{2}{3a_1}H(1, a_1, a_2) \\
\alpha_2^* &= \frac{2}{3a_2}H(1, a_1, a_2)
\end{aligned}$$

where H is the harmonic mean. Recall that the harmonic mean is equal to the weighted arithmetic mean with weights $(1/x_i)/(\sum_j 1/x_j)$. In other words, the optimal level of compliance is about 2/3 of the harmonic average of the weights on each component of the utility function. Also, compliance is decreasing in the weight associated to that issue.

C.2 Optimal Response to Maximum Leverage

Now consider the other function γ which is not consistently enforceable but does exhibit maximum leverage. In this case the target's utility function is

$$U_t = \begin{cases} -\frac{a_1}{4}{\alpha_1}^2 - \frac{a_2}{4}{\alpha_2}^2 - \left(\frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2}\right)^2 & \text{if } \frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2} < 1 \\ -\frac{a_1}{4}{\alpha_1}^2 - \frac{a_2}{4}{\alpha_2}^2 - 1 & \text{if } \frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2} > 1 \end{cases}$$

The target's problem can be written

$$\max\left\{\max_{\{\alpha_1,\alpha_2:\frac{3}{2}-\frac{\alpha_1}{2}-\frac{\alpha_2}{2}<1\}} U_t, \max_{\{\alpha_1,\alpha_2:\frac{3}{2}-\frac{\alpha_1}{2}-\frac{\alpha_2}{2}>1\}} U_t\right\}$$

First considering the case where $\frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2} > 1$, it is clear that the target cannot reduce the punishment with any amount of compliance. Thus, the optimal choice is $\alpha_1 = \alpha_2 = 0$

and the utility will be $U_t(0,0,\gamma(0,0)) = -1$. Now consider the case where $\frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2} < 1$. Solving again for optimal compliance:

$$\begin{aligned}
\frac{\partial U_t}{\partial \alpha_1} &= -\frac{a_1\alpha_1}{2} - 2\left(\frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2}\right)\left(-\frac{1}{2}\right) = 0 \\
0 &= -\frac{a_1\alpha_1}{2} + \left(\frac{3}{2} - \frac{\alpha_1}{2} - \frac{\alpha_2}{2}\right) \\
\alpha_1 &= \frac{3-\alpha_2}{a_1+1} \\
\alpha_2 &= \frac{3-\alpha_1}{a_2+1}
\end{aligned}$$

where the final line follows from symmetry. By a similar procedure to the above, the final optimal compliance vector in terms of parameters is

$$\begin{aligned}
\alpha_1^* &= \frac{3a_2}{a_1a_2 + a_1 + a_2} \\
\alpha_2^* &= \frac{3a_1}{a_1a_2 + a_1 + a_2}
\end{aligned}$$

These values can also be rewritten in terms of the harmonic mean:

$$\begin{aligned}
\alpha_1^* &= \frac{3a_2}{a_1a_2 + a_1 + a_2} \\
\alpha_1^* &= \frac{3\frac{1}{a_1}}{1 + \frac{1}{a_1} + \frac{1}{a_2}} \\
\alpha_1^* &= \frac{1}{a_1}H(1, a_1, a_2) \\
\alpha_2^* &= \frac{1}{a_2}H(1, a_1, a_2)
\end{aligned}$$

Note that compliance is strictly greater under γ when the target chooses α_1^* and α_2^* than it was under ϕ.

However, recall that these formulae are only valid for $3/2 - \alpha_1/2 - \alpha_2/2 < 1$ or $1 < \alpha_1 + \alpha_2$.

Thus, the formulae are only valid when:

$$\begin{aligned}
1 &< \frac{3a_2}{a_1a_2+a_1+a_2} + \frac{3a_1}{a_1a_2+a_1+a_2} \\
\frac{1}{3} &< \frac{a_2+a_1}{a_1a_2+a_1+a_2} \\
1-\frac{1}{3} &> 1-\frac{a_2+a_1}{a_1a_2+a_1+a_2} \\
\frac{2}{3} &> \frac{a_1a_2}{a_1a_2+a_1+a_2} \\
\frac{2}{3} &> \frac{1}{1+\frac{1}{a_1}+\frac{1}{a_2}} \\
\frac{2}{3} &> \frac{1}{3}H(1,a_1,a_2) \\
2 &> H(1,a_1,a_2)
\end{aligned}$$

When valid, the utility received from the interior solution is

$$\begin{aligned}
U_t(\alpha_1^*,\alpha_2^*;\gamma) &= -\frac{a_1}{4}\left(\frac{3a_2}{a_1a_2+a_1+a_2}\right)^2 - \frac{a_2}{4}\left(\frac{3a_1}{a_1a_2+a_1+a_2}\right)^2 - \left(\frac{3}{2}-\frac{3}{2}\frac{a_2}{a_1a_2+a_1+a_2}-\frac{3}{2}\frac{a_1}{a_1a_2+a_1+a}\right. \\
&= -\frac{9}{4}\frac{{a_1}{a_2}^2}{(a_1a_2+a_1+a_2)^2} - \frac{9}{4}\frac{{a_1}^2a_2}{(a_1a_2+a_1+a_2)^2} - \left(\frac{3}{2}\left(1-\frac{a_1+a_2}{a_1a_2+a_1+a_2}\right)\right)^2 \\
&= -\frac{9}{4}\frac{{a_1}{a_2}^2+{a_1}^2a_2}{(a_1a_2+a_1+a_2)^2} - \frac{9}{4}\frac{{a_1}^2{a_2}^2}{(a_1a_2+a_1+a_2)^2} \\
&= -\frac{9}{4}\frac{{a_1}{a_2}^2+{a_1}^2a_2+{a_1}^2{a_2}^2}{(a_1a_2+a_1+a_2)^2} \\
&= -\frac{9}{4}\frac{a_1a_2}{a_1a_2+a_1+a_2}
\end{aligned}$$

The target will choose full noncompliance on both issues when $U_t(0,0;\gamma) > U_t(\alpha_1^*,\alpha_2^*;\gamma)$. Both quantities are now established in terms of parameters. The target chooses full noncompliance when

$$\begin{aligned}
-1 &> -\frac{9}{4}\frac{a_1a_2}{a_1a_2+a_1+a_2} \\
\frac{4}{9} &< \frac{a_1a_2}{a_1a_2+a_1+a_2}
\end{aligned}$$

Rewriting the above in terms of the harmonic mean:

$$\begin{aligned}\frac{4}{9} &< \frac{1}{1+\frac{1}{a_1}+\frac{1}{a_2}} \\ \frac{4}{9} &< \frac{1}{3}H(1,a_1,a_2) \\ \frac{4}{3} &< H(1,a_1,a_2)\end{aligned}$$

D Proof of Proposition 3

Let ϕ be the enforcement limited total punishment function where its component ϕ_j are defined

$$\phi_j = \begin{cases} 1 & \text{if } \alpha_j < 1 \\ 0 & \text{if } \alpha_j = 1 \end{cases}$$

In other words, this strategy calls for the sender to withdraw all trade for any infraction on the conditionality. It is immediately clear that the target must either comply on all issues or no issues because noncompliance on one issue reduces the cost of noncompliance on all other issues to zero. We now partition the compliance space into points where $\phi = 1$ and points where $\phi = 0$. The best that the target can do under maxmimum punishment (i.e. where $\phi = 1$) is $\alpha_1 = \alpha_2 = 0$. The best that the target can do under minimum punishment (i.e. where $\phi = 0$) is to choose $\alpha_1 = \alpha_2 = 1$ because only this choice confers minimum punishment. If the target chooses to comply on all issues their utility will be $\underline{U}$ and if they choose to noncompliance on all issues their utility will be $\bar{U}$. By the proposition we know $\bar{U} < \underline{U}$, so the target will choose full compliance. Strictly speaking, the condition describes absolute dependence rather than asymmetric dependence because the sender's utility does not come into play.

Furthermore, note that an enforcement limited strategy is not guaranteed to elicit full

compliance. Modify the total punishment function such that

$$\phi_j = \begin{cases} b_j & \text{if } \alpha_j < 1 \\ 0 & \text{if } \alpha_j = 1 \end{cases}$$

where $\sum_j b_j = 1$ and $b_j > 0$. The total punishment function is no longer enforcement limited, but it is leverage limited because $b_j \neq 1$ for any issue j. Now it is no longer the case that noncompliance on one issue reduces the costs of noncompliance to zero on all other issues. Therefore, the target may find it beneficial to comply on some issues but not others. It may be the case, for example, that $U_t(1,0;\phi(1,0)=b_2) > U_t(1,1;\phi(1,1)=0) > U_t(0,0;\phi(0,0)=1)$. In this case, partial compliance would be expected.

D.1 Example of Issue Compatibility

As before, the target will choose the interior solution when facing the total punishment function γ if

$$\begin{aligned} \frac{a_1 a_2}{a_1 a_2 + a_1 + a_2} &< \frac{4}{9} \\ a_1 a_2 &< \frac{4}{9}(a_1 a_2 + a_1 + a_2) \\ \frac{5}{9} a_1 a_2 &< \frac{4}{9}(a_1 + a_2) \\ \frac{5}{4} &< \frac{a_1 + a_2}{a_1 a_2} \\ \frac{5}{4} &< \frac{1}{a_2} + \frac{1}{a_1} \\ \frac{4}{5} &> \frac{1}{\frac{1}{a_2} + \frac{1}{a_1}} \\ \frac{8}{5} &> \frac{2}{\frac{1}{a_2} + \frac{1}{a_1}} \\ \frac{8}{5} &> H(a_1, a_2) \end{aligned}$$

where H is the harmonic mean (which is well defined because the weights must be positive by definition). This expression interprets the weights a_j as ratios measuring how much the target values noncompliance relative to how much it values potential lost economic surplus (recall lost economic surplus has weight 1). The target will choose some amount of compliance as long as the average ratio is sufficiently small – targets that weight economic surplus relatively more will be inclined towards compliance. Note that the harmonic mean has the following property:

$$\lim_{a_1 \to \infty} \frac{2}{\frac{1}{a_2} + \frac{1}{a_1}} = \lim_{a_1 \to \infty} \frac{2a_1 a_2}{a_1 + a_2} = 2a_2$$
$$\lim_{a_2 \to \infty} \frac{2}{\frac{1}{a_2} + \frac{1}{a_1}} = \lim_{a_2 \to \infty} \frac{2a_1 a_2}{a_1 + a_2} = 2a_1$$

Because both limits must hold true simultaneously, and because these functions approach the limit monotonically from below, it must be that $H(a_1, a_2) \leq 2a_1$ and $H(a_1, a_2) \leq 2a_2$. These two inequalities can be written more compactly as $H(a_1, a_2) \leq 2\min\{a_1, a_2\}$. This result forms an upper bound on the harmonic mean of the two weights. Indeed, it directly implies that the harmonic mean is decreasing in the correlation of its inputs. Negative correlation means that there is a higher chance of having one low and one high value. Positive correlation between the inputs is the only way to raise the expectation of the minimum value of the two random variables. Thus, we can already conclude that the probability of the target choosing the interior solution is decreasing in the correlation of the two variables.[1] More formally, we can say that a sufficient condition for the target to choose the interior solution is

$$\frac{8}{5} > 2\min\{a_1, a_2\} \geq H(a_1, a_2)$$
$$\frac{4}{5} > \min\{a_1, a_2\}$$

[1]The monotonicity of the function ensures that the harmonic mean decreases at every point when its minimum input decreases.

When seeing the weights as random variables drawn from $F(a_1, a_2)$, the probability of meeting this constraint is

$$\begin{aligned} P(\min\{a_1, a_2\} < 4/5) &= P(a_1 < 4/5 \cup a_2 < 4/5) \\ &= P(a_1 < 4/5) + P(a_2 < 4/5) - P(a_1 < 4/5, a_2 < 4/5) \\ &= F_{a_1}(4/5) + F_{a_2}(4/5) - F(4/5, 4/5) \end{aligned}$$

where $F_{a_j}(x) = \lim_{a_i \to \infty} F(x, a_i)$ is the marginal distribution of a_j. Let I_{a_1} and I_{a_2} be indicator variables for the events $A : a_1 < 4/5$ and $B : a_2 < 4/5$, respectively. Note that $Var(I_{a_1}) = \mathbb{E}[I_{a_1}^2] - \mathbb{E}[I_{a_1}]^2 = P(A) - P(A)^2 = P(A)(1 - P(A))$. For ease of notation, let $\sqrt{Var(I_{a_1})} = \sigma_{a_1}$. Then:

$$\begin{aligned} Cov(I_{a_1}, I_{a_2}) &= \mathbb{E}[I_{a_1} I_{a_2}] - \mathbb{E}[I_{a_1}]\mathbb{E}[I_{a_2}] \\ Cov(I_{a_1}, I_{a_2}) &= P(A \cap B) - P(A)P(B) \\ Cov(I_{a_1}, I_{a_2}) + P(A)P(B) &= P(A \cap B) \\ Cov(I_{a_1}, I_{a_2}) + P(A)P(B) - P(A) - P(B) &= P(A \cap B) - P(A) - P(B) \\ -Cov(I_{a_1}, I_{a_2}) - P(A)P(B) + P(A) + P(B) &= -P(A \cap B) + P(A) + P(B) \\ -Cov(I_{a_1}, I_{a_2}) - P(A)P(B) + P(A) + P(B) &= P(A \cup B) \\ \sigma_{a_1}\sigma_{a_2}\left(-\frac{Cov(I_{a_1}, I_{a_2})}{\sigma_{a_1}\sigma_{a_2}} + \frac{-P(A)P(B) + P(A) + P(B)}{\sigma_{a_1}\sigma_{a_2}}\right) &= P(A \cup B) \\ \sigma_{a_1}\sigma_{a_2}\left(-\rho_{I_{a_1} I_{a_2}} + \frac{-P(A)P(B) + P(A) + P(B)}{\sigma_{a_1}\sigma_{a_2}}\right) &= P(A \cup B) \end{aligned}$$

This final line indicates that the probability of a target meeting the condition for an interior solution $P(A \cup B) = P(a_1 < 4/5 \cup a_2 < 4/5)$ is decreasing in the correlation coefficient $\rho_{I_{a_1} I_{a_2}}$. In other words, when the issue weights are anti-correlated there is a better chance of an enforcement limited strategy ultimately proving successful. This is true regardless of the underlying joint distribution of weights on compliance (so long as its moments exist).

To summarize, this section claimed that enforcement limited strategies are more successful when seeking to influence two compatible issues. Two issues are compatible if the target is unlikely to choose noncompliance on both issues simultaneously. In an extension of the previous model I showed that, when faced with the enforcement limited strategy γ, 1) the target will choose nonzero compliance when the harmonic mean of the weights a_1 and a_2 is less than 8/5, 2) an upper bound on the harmonic mean is $2\min\{a_1, a_2\}$, 3) the probability that $\min\{a_1, a_2\} < 4/5$ is decreasing in the correlation of the two events $a_1 < 4/5$ and $a_2 < 4/5$. This last statement illustrates the conclusion that an enforcement limited strategy has a better chance of success when the two issues are compatible, meaning that the correlation between a_1 and a_2 is negative (more precisely, when the correlation in the two events $a_1 < 4/5$ and $a_2 < 4/5$ is negative).

E Extension for Arbitrary Number of Issues

This section of the appendix extends the simple model to account for an arbitrary number of issues. The purpose of this extension is to illustrate that the model can accommodate real world applications such as trade agreements where it is common for many issues to be linked to a program of economic coercion.

A few notational changes need to be made to accomodate an arbitrary number of issues. The vector $\boldsymbol{\alpha} = [\alpha_1, \ldots, \alpha_J]$ is the **compliance vector** representing the target's compliance on each issue. The issue specific punishment functions are still normally tied to a single issue, but now the total punishment function takes a compliance vector as its argument.

E.1 Proof of Proposition 1 for Arbitrary Number of Issues

First we need to show the following two lemmas. Under what conditions is the total punishment function ϕ consistently enforceable?

E.1.1 Lemma 2

Lemma 2 *The total punishment function ϕ is consistently enforceable if $\sum_j \phi_j(\alpha_j) \leq 1$ for all α_j. Equivalently, the function is consistently enforceable if no dollar of trade is conditioned on more than one issue.*

Proof of Lemma 2: The proof is by construction. Rewriting the total leverage with respect to an arbitrary issue j:

$$\begin{aligned}\max_{\alpha_j} \phi(\boldsymbol{\alpha}) - \min_{\alpha_j} \phi(\boldsymbol{\alpha}) &= \max_{\alpha_j} \left(\min \left\{ \sum_t \phi_t(\alpha_t), 1 \right\} \right) - \min_{\alpha_j} \left(\min \left\{ \sum_t \phi_t(\alpha_t), 1 \right\} \right) \\ &= \max_{\alpha_j} \left(\min \left\{ \phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t), 1 \right\} \right) - \min_{\alpha_j} \left(\min \left\{ \phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t), 1 \right\} \right)\end{aligned}$$

Now we invoke the lemma's condition that $\sum_k \phi_k(\alpha_k) \leq 1$. Then:

$$\begin{aligned}\max_{\alpha_j} \phi(\boldsymbol{\alpha}) - \min_{\alpha_j} \phi(\boldsymbol{\alpha}) &= \max_{\alpha_j} \left(\min \left\{ \phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t), 1 \right\} \right) - \min_{\alpha_j} \left(\min \left\{ \phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t), 1 \right\} \right) \\ &= \max_{\alpha_j} \left(\phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t) \right) - \min_{\alpha_j} \left(\phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t) \right) \\ &= \phi_j(0) + \sum_{t \neq j} \phi_t(\alpha_t) - \phi_j(1) - \sum_{t \neq j} \phi_t(\alpha_t) \\ &= \phi_j(0) - \phi_j(1)\end{aligned}$$

The above expression is not a function of any compliance level except for α_j, so the total punishment function is consistently enforced. ■

E.1.2 Proof Extension – Generalized Punishment Functions

Note that a slightly limited version of the above proof can be extended to an even more general class of punishment functions. Let an issue specific punishment function be defined as $\phi_j : \mathbb{R}^J \to \mathbb{R}$ which is a nondecreasing function in all its arguments. This issue specific

punishment function can also include cases where the compliance levels are not separable. For example, the issue specific punishment function $\phi_1(\alpha_1, \alpha_2) = 1 - \alpha_1 - \alpha_2 - \alpha_1\alpha_2$ is now permitted.

Let $\sum_k \phi_k(\alpha_k) = \xi_j(\boldsymbol{\alpha}) + \xi_{-j}(\boldsymbol{\alpha})$ be a partition of the total punishment function where ξ_j is the the sum of all issue specific punishment functions where the issue j appears and ξ_{-j} is the sum of issue specific punishment functions where it does not. Rewriting the total leverage with respect to an arbitrary issue j:

$$\begin{aligned}
\max_{\alpha_j} \phi(\boldsymbol{\alpha}) - \min_{\alpha_j} \phi(\boldsymbol{\alpha}) &= \max_{\alpha_j} \left(\min \left\{ \sum_t \phi_t(\alpha_t), 1 \right\} \right) - \min_{\alpha_j} \left(\min \left\{ \sum_t \phi_t(\alpha_t), 1 \right\} \right) \\
&= \max_{\alpha_j} \left(\min \left\{ \xi_j(\boldsymbol{\alpha}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\} \right) - \min_{\alpha_j} \left(\min \left\{ \xi_j(\boldsymbol{\alpha}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\} \right) \\
&= \min \left\{ \xi_j(0, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\} - \min \left\{ \xi_j(1, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\}
\end{aligned}$$

There are two cases. First, let $\sum_k \phi_k(\alpha_k) > 1$ for some $\boldsymbol{\alpha}$. In that case there exists a compliance vector $\boldsymbol{\alpha}$ such that $\xi_j(0, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}) > 1$. In that case:

$$\min \left\{ \xi_j(0, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\} - \min \left\{ \xi_j(1, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\} = 1 - \xi_j(1, \boldsymbol{\alpha}_{-j}) - \xi_{-j}(\boldsymbol{\alpha})$$

Thus, the total leverage is absolutely a function of compliance on issues other than j because $-\xi_{-j}$ appears in the expression. This term, unless it is empty, will ensure that the total leverage is increasing in compliance on other issues.

Second, consider the case that $\sum_k \phi_k(\alpha_k) \leq 1$. Then:

$$\begin{aligned}
\min \left\{ \xi_j(0, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\} - \min \left\{ \xi_j(1, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}), 1 \right\} &= \xi_j(0, \boldsymbol{\alpha}_{-j}) + \xi_{-j}(\boldsymbol{\alpha}) - \xi_j(1, \boldsymbol{\alpha}_{-j}) - \xi_{-j}(\boldsymbol{\alpha}) \\
&= \xi_j(0, \boldsymbol{\alpha}_{-j}) - \xi_j(1, \boldsymbol{\alpha}_{-j})
\end{aligned}$$

The above expression is potentially increasing in variables other than α_j. However, we

know that each term in $\xi_j(\alpha_j, \boldsymbol{\alpha}_{-j})$ is nonincreasing in $\boldsymbol{\alpha}_{-j}$. Thus, the only way that the expression is increasing in compliance of issues other than j is when $\xi_j(0, \boldsymbol{\alpha}_{-j})$ is decreasing in its arguments faster than $\xi(1, \boldsymbol{\alpha}_{-\boldsymbol{j}}$. More precisely, the function is not consistently enforceable in this case if, for all $\boldsymbol{\alpha}_{-j}$ and $\boldsymbol{\alpha}'_{-j}$ such that $\boldsymbol{\alpha}'_{-j}$ is strictly greater in at least one component, $\xi_j(0, \boldsymbol{\alpha}_{-j}) - \xi_j(0, \boldsymbol{\alpha}'_{-j}) > \xi_j(1, \boldsymbol{\alpha}_{-j}) - \xi_j(1, \boldsymbol{\alpha}'_{-j})$. In all other cases the function is consistently enforceable. ■

E.1.3 Lemma 3

Now we must investigate the other direction of the implication. Does a consistently enforced total punishment function necessarily require $\sum_k \phi_k(\alpha_k) \leq 1$ for all α_k?

Lemma 3 *If the total punishment function ϕ is consistently enforceable then it must be that $\sum_j \phi_j(\alpha_j) \leq 1$ for all α_j.*

Proof of Lemma 3:

Suppose not. Then there must exist some $\alpha_j = \bar{\alpha}$ such that $\phi_j(\bar{\alpha}) + \sum_{t \neq j} \phi_t(\alpha_t) > 1$ where the issue specific punishment functions ϕ_j are part of a consistently enforceable total punishment function.

Because we know that $\phi_j(\bar{\alpha}) + \sum_{t \neq j} \phi_t(\alpha_t) > 1$ we can conclude that $\max_{\alpha_j} \left(\phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t) \right) > 1$. At this point there are two cases. If $\min_{\alpha_j} \left(\phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t) \right) < 1$ then the total leverage with respect to the issue j is

$$\begin{aligned} \max_{\alpha_j} \phi(\boldsymbol{\alpha}) - \min_{\alpha_j} \phi(\boldsymbol{\alpha}) &= \max_{\alpha_j} \left(\min \left\{ \sum_t \phi_t(\alpha_t), 1 \right\} \right) - \min_{\alpha_j} \left(\min \left\{ \sum_t \phi_t(\alpha_t), 1 \right\} \right) \\ &= 1 - \phi_j(1) - \sum_t \phi_t(\alpha_t) \end{aligned}$$

which is a contradiction because the total leverage with respect to issue j depends on compliance with the other issues and thus is not consistently enforceable.

In the second case we have that $\min_{\alpha_j} \left(\phi_j(\alpha_j) + \sum_{t \neq j} \phi_t(\alpha_t) \right) \geq 1$. In this case the total leverage is always zero because $\sum_{t \neq j} \phi_t(\alpha_t) > 1$. But this means that the total leverage is

indeed a function of some other compliance value, since it is always possible to reduce at least one compliance value such that $\sum_{t \neq j} \phi_t(\alpha_t) < 1$. ■

The interpretation of Lemmas 2 and 3 is that a total punishment function is consistently enforceable if and only if no dollar of trade is conditioned on more than one issue. The intuition is that interrupting a dollar of trade as a penalty for noncompliance on one issue means that dollar cannot be interrupted as a penalty for noncompliance on other issues. If the punishment function does not allow any trade to be tied to more than one issue then the enforcement of conditionality on one issue cannot undermine leverage over other issues.

Proof of Proposition 1 Suppose not. Let the issue specific punishment function ϕ_i exhibit maximum leverage and be a component of the total punishment function ϕ which is consistently enforceable. By definition of maximum leverage it must be that $\phi_i(0) - \phi_i(1) = 1$. Since all issue specific punishment functions are bounded on the unit interval it must be that $\phi_i(0) = 1$ and $\phi_i(1) = 0$. By Lemma 2 the total punishment function is consistently enforceable if and only if $\sum_t \phi_t(\alpha_t) \leq 1$ for all α_t. But since $\phi_i(0) = 1$ then there must exist a compliance vector such that $\phi_i(0) + \sum_{t \neq i} \phi_t(\alpha_t) = 1 + \sum_{t \neq i} \phi_t(\alpha_t) \geq 1$. If the inequality holds with equality then $\sum_{t \neq i} \phi_t(\alpha_t) = 0$ for all α_t where $\alpha_i = 0$. If $\phi_t = 0$ for all t and α_t with $t \neq i$ then the sender is only exerting influence on issue i. Therefore, unless i is the only issue tied to conditionality, there is a contradiction because ϕ must not be consistently enforceable. ■

E.2 Proof of Proposition 4

Enforcement limited program designs are effective when trade is very important to the target. If the target always prefers no punishment (free trade) to full punishment (no trade) regardless of its chosen compliance on every issue then there will exist a total punishment function consisting only of maximum leverage issue specific punishment functions that elicits full compliance. The formal statement is given in Proposition 4. The target complies because it is so dependent on trade that no amount of noncompliance can overcome the costs of

punishment.

Proposition 4 *Let $U_t(\boldsymbol{\alpha}; \phi(\boldsymbol{\alpha}))$ be the target's utility function such that $U_t(\boldsymbol{\alpha}; \phi(\boldsymbol{\alpha}) = 1) < U_t(\tilde{\boldsymbol{\alpha}}; \phi(\tilde{\boldsymbol{\alpha}}) = 0)$ for all $\boldsymbol{\alpha}$ and $\tilde{\boldsymbol{\alpha}}$. Then there exists an enforcement limited total punishment function ϕ consisting only of maximum leverage strategies which elicits full compliance from the target.*

Proof: Suppose not. Then every total punishment function ϕ consisting of all maximum leverage functions ϕ_j does not elicit full compliance from the target on at least one issue. Let this issue be denoted i such that the target's optimum choice of $\alpha_i < 1$. Issue specific punishment functions are nonincreasing, which means that $\phi_i(\alpha_i) \geq 0$. Therefore, the total punishment must be $\phi(\boldsymbol{\alpha}) \geq 0$ where α_i is a component of $\boldsymbol{\alpha}$. Because every issue has the maximum leverage property it is possible to choose α_i and a vector $\boldsymbol{\alpha}_{-i}$ such that $\phi_i(\alpha_i) = 0$. Since $U_t(\boldsymbol{\alpha}; \phi = 1) < U_t(\tilde{\boldsymbol{\alpha}}; \phi = 0)$ it must be that α_i is not optimal since choosing 1 instead of α_i on issue i in combination with the compliance vector $\boldsymbol{\alpha}_{-i}$ would have yielded higher utility. Note that the total punishment function ϕ is not consistently enforceable by Lemma 2. ■