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The Return on Social Bonds:
Social Hierarchy and International Conflict

Mark David Nieman*

Abstract

This paper takes game-theoretic and latent variable approaches to modeling international social hierarchies and their effect on conflict among states. I argue that, within these hierarchies, states adopts one of two roles—a dominant or a subordinate. Each resulting (dyadic) dominant–subordinate relationship is a social (informal) contract, in which the subordinate concedes some autonomy in exchange for dominant's protection. This social hierarchy affects the relationships between each subordinate and dominant, as well as the relationships among subordinates. A state's degree of subordination reduces its probability of conflict initiation. The decision to initiate conflict is also affected by the target's relative level of subordination vis-à-vis the challenger. These predictions are supported by empirical analyses of states within the US hierarchy (1950–2000).

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Introduction

International states are social actors and, as such, are nested within dense informal networks of friendly and conflictual relationships. Rather than lateral relationships among equals, networks among states tend to have a vertical or *hierarchical* structure. During different time periods, states have chosen to look for policy cues and leadership to one or few policy leaders or innovators (e.g., the UK in the 18^{th} and 19^{th} centuries, the US or the Soviet Union/Russia in the 20^{th} century). Importantly, international hierarchical relationships may arise as a result of both material power asymmetries as well as non-material asymmetries that stem from political legitimacy or policy innovation. The latter type of hierarchies—social hierarchies have received little scholarly attention (Lake 2009). While most scholars (implicitly) acknowledge the existence of such social hierarchies among international states, few studies have modeled such hierarchies and their effects on international outcomes.[1]

The most obvious reason for this lack of attention is that the study of social authority or legitimacy is often impeded by the informal or intangible nature of these concepts. Measuring a state's intangible power to persuade is not as simple as counting up its number of tanks or warships. Unlike material power, a state's level of authority can *only* be measured in a relational way. When the US, for example, increases its number of tanks, it is increasing its material power vis-à-vis every other state. Most would agree, however, that when it comes to authority, an increase in US legitimacy vis-à-vis Egypt is not necessarily associated with a change in legitimacy in the US–Argentina relationship. Each state, in other words, grants and is granted varying degrees of authority by every other state.

To alleviate some of these theoretical issues, I model the effects of social hierarchy using a game-theoretic approach. I start by assuming that international social hierarchies are made up of states that adopt one of two roles: a *dominant*, who acts as the creator and enforcer

[1]Despite over-lapping terminology, it is important to distinguish between the study of social hierarchy—the goal of the current manuscript—and the rich literature on material hierarchies/hegemonies (Ikenberry 2000; Modelski 1987; Organski 1958). In contrast to the hierarchy/hegemonic literature, the current study focuses on social, rather than material, hierarchy. Moreover, rather than explaining conflict or other outcomes at the systemic level—the traditional focus of the hierarchy/hegemonic literature—I derive predictions regarding the hierarchy's effect on minor powers' interaction—a topic of little interest to the traditional hegemonic literature.

of social contracts, and a *subordinate*, who decides to what degree, if any, to accept the dominant's authority. Dominant states are defined as states that serve (and are viewed by subordinates) as legitimate authorities on policy-innovation; they are "trusted" as having expertise in some or most policy areas (Fordham and Asal 2007; Thies 2013). Legitimate authority, or "rightful rule," is particularly important for separating states that take on the role of the dominants within a social hierarchy from a hegemon whose dominance is based solely on material power (Lake 2009, 8).[2] In fact, as I show later, the degree of social hierarchy between two states is uncorrelated with differences in their material power capabilities.

A state's *degree of subordination* within a dominant's hierarchy refers to this state's level of (informal) policy dependence on the dominant. Belarus, for example, has a high degree of subordination to Russia: Minsk looks to Moscow for policy guidance and approval, and is unlikely to implement policies that contradict Moscow's interests. Contrast this with Japan, which has a low degree of subordination to Russia: Russia's policy interests do not enter into Japan's policy decisions. A state's *relative level of subordination*, on the other hand, is defined as its hierarchical position vis-à-vis another subordinate state. Continuing with the example of Russia's social hierarchy, prior to the 2013–2014 EuroMaidan protests, Ukraine might have been characterized as moderately subordinate to Moscow, perhaps *less* subordinate than Belarus, yet *more* subordinate than Japan.

Importantly, in addition to explaining the dominant—subordinate interactions, this theoretical framework helps explain interactions *among* subordinate states. Belonging to the same hierarchy, for example, may alleviate a *rivalry* between subordinate states, as long as each subordinate values its relationship with the dominant more than it distrusts a rival. The quasi-alliance between Japan and South Korea (via the US), for example, is often used to explain why their oft-contentious relationship has seldom boiled over into militarized conflict (Cha 1997). Sharing dense ties to the US is also a contributing factor in creating a peaceful culture of dispute resolution among Latin American states, despite numerous competing

[2]While often conflated, material superiority and legitimacy are distinct concepts (Lake 2009, 21-23). For example, despite military superiority, a foreign occupier is not always viewed as legitimate.

territorial claims and rivalries (Thies 2008).

The theoretical model also sheds light on the debate within the alliance literature on whether close ties between states (e.g., alliances) have a constraining or emboldening effect (Leeds 2003; Machain and Morgan 2013; Smith 1995). States with higher levels of subordination, relative to their rivals may, for example, expect the dominant to "look the other way," should they decide to settle scores. Yet, on balance, the model shows that subordination has a constraining effect on conflict initiation, as long as the (potential) challenger has at least a small degree of uncertainty regarding the dominant's likely response.

I test the theory by empirically modelling the relationships between the US and its subordinates using a strategic probit—a type of random utility model. The estimator isolates the deterring effects, such as the military balance of power, from factors that make states less inclined to challenge the status quo in the first place, such as social hierarchy. Interestingly, by separating preferences for the status quo from deterrence, the model allows for conducting one of the few direct tests of general deterrence.

Social Hierarchy

International social hierarchy is made up of bilateral social contracts, in which subordinate states concede varying levels of policy autonomy, in return for ideological and material benefits provided by the dominant state (Lake 2009; Thies 2013; Wendt and Friedheim 1995). Expressions of social hierarchy permeate every aspect of international relations. They manifest themselves, for example, in symbolic alliance networks among the dominant's allies (e.g. alliance among Costa Rica, Haiti, and Uruguay): while, on its own, each of these bilateral alliances may contribute little to their members' defense, taken together, dense embeddedness within the US alliance network signals (to the US and others) rather tangible policy dependence on the US, as such alliances are often associated with reductions in defense spending among smaller states (Machain and Morgan 2013; Lake 2009). Although not using the social hierarchy terminology, Morrow (1991) makes a similar argument regarding asymmetric alliances, which he views as arrangements, in which the weaker state effectively trades some policy flexibility for security guarantees by the stronger state.

Hierarchy manifestations are, of course, not limited to alliance relationships. Hierarchical relationships are reflected in membership patterns within international organizations, adherence to certain economic policies, or high embeddedness within the dominant's trade network. The strength of British social hierarchy between 1815–1914, for example, can be gleaned from the density of trade connections/exchanges among the states, adhering to British leadership (Pahre 2008).

Although not problematized here, the subordinate's choice to follow the policy lead (join the hierarchy) of a particular dominant is often explained as resulting from social interactions among political and economic elites. Cox and Sinclair (1996, 518) note, for example, that social hierarchy "derives from the ways of doing and thinking of the dominant social strata of the dominant state or states insofar as these ways of doing and thinking have *inspired emulation or acquired the acquiescence* of the dominant social strata of other states" (emphasis added). Ikenberry and Kupchan (1990, 283) agree, arguing that "[e]lites in secondary states buy into and internalize norms that are articulated by the hegemon and therefore *pursue policies consistent with the hegemon's notion of international order*" (emphasis added). Thus, the number of Western-educated elites within a state increase the likelihood of democratization (Gift and Krcmaric 2015) and economic liberalization (Weymouth and MacPherson 2012).

Acceptance of a social contract limits expressions of power and reduces the range of possible actions for both parties. While material factors put physical restraints on a state's reach (e.g., loss of strength gradient), social hierarchy acts as a social constraint on both dominant and subordinate states. The trade-off between autonomy and security within the alliance arrangements, for example, is known to produce more reliable alliances than those that merely aggregate capabilities or "marriages-of-convenience," because the former are based on shared preferences rather than short-term material considerations (Gibler and Rider 2004; Morrow 1991).

The central argument here is that identifying and modeling social hierarchies helps gain leverage on explaining (foreign and domestic) policy choices of international states, in a similar way that studying social cliques helps understand actions of their individual members. In particular, knowing a state's relative position within a hierarchy provides information on its relationships with other states that occupy higher or lower position within this hierarchy. Much like members of social cliques adopt particular habits and style, states internalize or beauracratize the policies dictated by their hierarchical position (Wendt and Friedheim 1995).

Subordinates are more likely to pursue "appropriate" policies (from the dominant's perspective) if they are more committed to the dominant's ideological/normative policies (Lake 2009; Thies 2013). Yet, even states with a high degree of subordination to a dominant may still hold some roles, and even act on roles, that are inconsistent with the dominant's preferences. State A may, for instance, value its role as a rival of State B more than its role as the dominant's ally, even if State A is highly subordinate to the dominant. In this scenario, State A would adhere to the dominants preferences as they relate to all states, except its rival (State B). For example, despite otherwise implementing policies consistent with US preferences throughout 1960-1970s (secular government, host US military bases, economic liberalization), Turkey continued to engage in militarized disputes with Greece.

The pursuit of foreign policies that are incongruent with the dominant's interests are defined as (foreign) policy *challenges*. In the security domain, a challenge may involve, for example, (unsanctioned) conflict initiation against a third-party (e.g., settling rivalries, despite the dominant's disapproval). The dominant state may respond to a challenge with a *punishment*, such as military or economic sanctions (Lake 2009; Stone 2004).[3]

In the immediate aftermath of World War II, for example, Yugoslavia was highly subordinate to the USSR, accepting the USSR as the leader of global communism. This had changed, however, in 1948, when Yugoslavia rejected Soviet input regarding its domestic economic plan. Yugoslavia continued to challenge Soviet authority by failing to before intervening in the Greek civil war or signing a treaty with Bulgaria (Priestland 2009, 218-219).

[3] *Punishments* can only occur in response to a *challenge* and aim to re-enforce the hierarchical relationship. In contrast, predatory actions, are coercive actions by the dominant for imperial or other reasons, do not occur in response to a *challenge* and generally serve to undermine the authority which social hierarchy is built on.

Table 1: Punishments and US Security Hierarchy, 1950–2000

	Relative Target–Challenger Subordination		
	Challenger $\leq$ Target	Challenger $>$ Target	Total
Punishment	303 (42.4%)	79 (12.9%)	382 (28.8%)
No Punishment	411	533	944
Total	714	612	1326

Degree of subordination within US security hierarchy. Variable measurements discussed in Research Design.

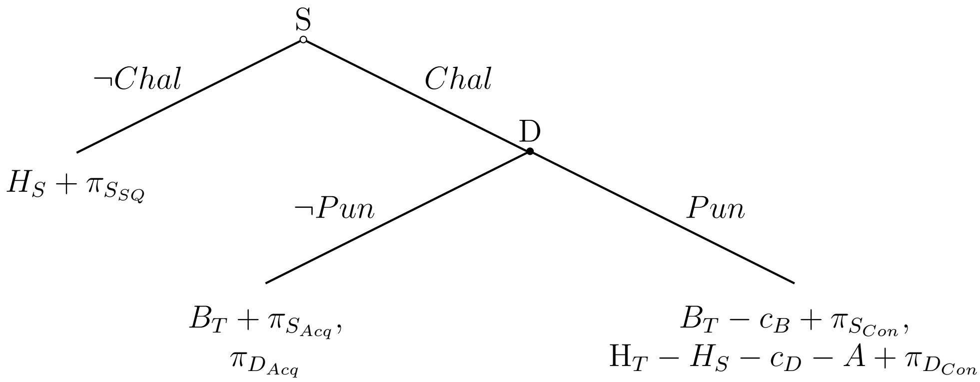
The USSR responded to these challenges by expelling Yugoslavia from the Communist Information Bureau and terminating their bilateral alliance (Leeds et al. 2002). By 1955, however, Yugoslavia moved back up in the Soviet hierarchy, with the two states reconciling and exchanging ambassadors (Priestland, 2009, 332-333; Valdez, 1993, 40).

A state's degree of subordination, in absolute and relative terms (in relation to the target/challenger) may affect its likelihood challenging and being punished. Table 1 shows the frequencies of challenges and punishments among the subordinates within the US hierarchy. We can see, in particular, that challenges by states with higher subordination (in relation to targets) are less frequent that vice versa (46% vs 54%), despite a substantially lower frequency of punishments against such challenges (13% vs 42%). While the results depicted in Table 1 do not account for strategic behavior, they provide some preliminary evidence that state behavior may be affected by their positions within social hierarchies.

A Model of Social Hierarchy and Conflict

I model the above argument as a two-player, non-cooperative game with private information and solve it using the quantal response equilibrium (QRE) concept (McKelvey and Palfrey 1998; Signorino 1999). The formal model helps flesh out the potential alliance–"emboldedness" dynamic induced by social hierarchy while also acknowledging the endogenous relationship between the degree of subordination and the relative degree of subordination: an increase in a state's degree of subordination both raises its own utility for the status quo, yet also reduces its likelihood of being punished by the dominant (since its relative

Figure 1: Interaction of Subordinate and Dominant in a Social Hierarchy.



degree of subordination also increases). The model extends previous work (e.g., Bueno de Mesquita and Lalman 1992; Powell 1999) by shifting the focus from material to ideational power relationships among states.

Consider a game between a dominant state, D, and a subordinate state, S. Both actors are rational and pursue actions that maximize their expected utility. In addition, two other actors influence the payoffs of S and D: the target of the subordinate state's challenge, T, and the presence of an alternative dominant, A. I normalize parameter values between 0 and 1, unless otherwise denoted. The extensive form game is depicted in Figure 1.

In the first stage, S chooses whether to challenge the status quo. If S does not challenge, the game ends with the status quo outcome, SQ. If S challenges, the game moves to the second stage where D decides whether to punish. If D does not punish, the game results in acquiescence by the dominant state, Acq. If D punishes, then the game ends with the conflict outcome, Con.

In addition to utilities, each payoff includes private information known only to player i. Private information captures uncertainty regarding the other state's true intentions and may represent a state's efficiency or resolve in coping with (levying) punishments (Signorino 1999). Private information is denoted as π_{i_j}, where i represents the player and j an outcome. Neither $\neg i$ nor the analyst knows the value of π_{i_j}; they do, however, know its mean and distribution. π_{i_j} are assumed to be independently and identically normally distributed with mean 0 and variance σ^2. When σ^2 is small, $\neg i$ and the analyst have a better idea of i's utility from each outcome.

The payoff for SQ reflects reflects S's degree of subordination within D's hierarchy, H_S, and private information $\pi_{S_{SQ}}$. As H_S increases, S places greater importance on adhering to the policies of D.[4] A state with high H_S, such as Great Britain, for example, is unlikely to act against US interests in the Middle East by selling Iran centrifuges. S's status quo utility can be written as $U_S^*(SQ) = \mathrm{H}_S + \pi_{S_{SQ}}$.[5]

S's payoffs for both Acq and Con include its expected benefits, B_T, from challenging by initiating conflict against T. Since the goal of the model is to isolate the dominant–subordinate interactions, rather than explicitly modeling S's interaction with T, I assume that S has calculated its expected utility from fighting T (for similar modeling assumptions, see Powell 1999, Appendix 5). A state that has territorial claims with a neighbor, such as Nicaragua's claims against Columbia in the San Andres Archipelago, has an expectation of the benefits/costs of resolving the claim.

The Con payoff also includes a cost parameter, c_S, which captures the costs that S pays as a result of being punished ($0 < \mathrm{c}_S \leq 1$). This parameter ensures that S prefers Acq to Con and reflects that punishments involve some cost. Returning to the Nicaragua–Columbia example, should Nicaragua decide to invade San Andreas, it would prefer that the US not respond with sanctions. The payoffs also include the private information terms $\pi_{S_{Acq}}$ and $\pi_{S_{Con}}$. More formally, the utilities for the outcomes are $U_S^*(Acq) = \mathrm{B}_T + \pi_{S_{Acq}}$ and $U_S^*(Con) = \mathrm{B}_T - \mathrm{c}_S + \pi_{S_{Con}}$.

D's payoff for Con includes the relative subordination between T and S, or $\mathrm{H}_T - \mathrm{H}_S$.[6] As $\mathrm{H}_T - \mathrm{H}_S$ increases in value, so does D's expected utility from punishment (Con). In other words, D derives greater benefit from punishing challenges, directed against targets with higher subordination (compared to the challenger): e.g., when Japan or South Korea receive threats from North Korea.[7] A cost parameter, c_D, is included to model D's costs of punishing ($0 < \mathrm{c}_D \leq 1$). To account for the presence of alternative dominants, D's payoff from Con

[4] The term H_S is an ideational analogue of Powell's (1999) "distribution of benefits."

[5] D's SQ payoff does not impact any decisions in the game and is not displayed in Figure 1.

[6] This is analogous to Kydd (2006) and Savun (2008), who argue that mediator's relative bias for/against claimant A compared to B, rather than their bias for/against A, affects mediation outcomes.

[7] Note that, even though $\mathrm{H}_T - \mathrm{H}_S$ can take on negative values, this does not mean that D prefers "challenge" to "not challenge"; this merely reflects that D views some targets as more valuable than others.

also includes S's degree of subordination to an alternative dominant, A. A represents the expected costs of intervention by an alternative dominant, should D choose Pun; hence, A serves as a deterrent on the dominant from punishing (the alternative dominant may intervene to fulfill its own obligation to defend its subordinates). I also include the private information term, $\pi_{D_{Con}}$. Finally, D's payoff for Acq includes only its private information, $\pi_{D_{Acq}}$. Formally, $U_D^*(Con) = \mathrm{H}_T - \mathrm{H}_S - \mathrm{c}_D - A + \pi_{D_{Con}}$ and $U_D^*(Acq) = \pi_{D_{Acq}}$.

Equilibria

The best response of a player is conditioned by the observable portion of the games (H_S, H_T, B_T, c_S, c_D, A), the known distributions of the unobservable terms ($\pi_{S_{SQ}}$, $\pi_{S_{Acq}}$, $\pi_{S_{Con}}$, $\pi_{D_{Acq}}$, $\pi_{D_{Con}}$), and the history of the game. Players make their decisions based on random utility assumptions, selecting the best choice available to them based on the equilibria distribution of their opponent's choices (McKelvey and Palfrey 1998, 9-10). More intuitively, players make strategic choices based on the expected action of the other player, and the game's equilibria are probabilistic.[8]

The game is solved backwards, by first solving for D's equilibria choice and then using this to inform S's equilibrium choice. D chooses Pun if and only if $U_D^*(Con) > U_D^*(Acq)$. Thus,

$$\begin{aligned} p_{pun} &= \Pr\left[\mathrm{H}_T - \mathrm{H}_S - \mathrm{c}_D - \mathrm{A} + \pi_{D_{Con}} > \pi_{D_{Acq}}\right] \\ &= \Pr\left[\pi_{D_{Con}} - \pi_{D_{Acq}} < \mathrm{H}_T - \mathrm{H}_S - \mathrm{c}_D - \mathrm{A}\right] \\ &= \Phi\left[\frac{\mathrm{H}_T - \mathrm{H}_S - \mathrm{c}_D - \mathrm{A}}{\sqrt{\sigma^2_{\pi_{D_{Con}}} + \sigma^2_{\pi_{D_{Acq}}}}}\right] \qquad (1) \end{aligned}$$

where p_{pun} is the probability that D chooses to play Pun and $\Phi(\cdot)$ is the standard normal cumulative distribution function (cdf). This implies that $1 - p_{pun}$ is the probability that D selects $\neg Pun$.

The numerator in Equation 1 represents the observed components of D's utility from

[8] QRE is consistent with other Nash-based concepts, such as perfect Bayesian equilibrium.

Pun. The denominator in Equation 1 represents the amount of uncertainty S has regarding D's utility. When S (and the analyst) are more certain, p_{pun} is closer to either 0 or 1, while less certainty moves p_{pun} closer to 0.5. Thus, p_{pun} reflects the analyst and S's belief that D will punish, while $1 - p_{pun}$ reflects the belief that D will acquiesce.

Moving up the game tree, we can derive S's equilibrium strategies. When calculating its expected utility from *Chal*, S takes into account D's expected actions. This means that S conditions its utility for *Acq* and *Con* based on the probability that D plays *Pun*, or p_{pun}. That is, $U_S^*(Chal) = (1 - p_{pun})(U_S^*(Acq)) + p_{pun}(U_S^*(Con))$. The utility for playing $\neg Chal$ is simply $U_S^*(SQ)$. S selects *Chal* if and only if $U_S^*(Chal) > U_S^*(SQ)$. This inequality yields:

$$\begin{aligned} p_{chal} &= \Pr\left[p_{pun}\left(B_T - c_S + \pi_{S_{Con}}\right) + (1 - p_{pun})\left(B_T + \pi_{S_{Acq}}\right) > H_S + \pi_{S_{SQ}}\right] \\ &= \Pr\left[p_{pun}\left(\pi_{S_{Con}}\right) + (1 - p_{pun})\,\pi_{S_{Acq}} - \pi_{S_{SQ}}\right. \\ &\qquad \left. < p_{pun}\left(B_T - c_S + \pi_{S_{Con}}\right) + (1 - p_{pun})\left(B_T + \pi_{S_{Acq}}\right) - H_S\right] \\ &= \Phi\left[\frac{p_{pun}\left(B_T - c_S\right) + (1 - p_{pun})\left(B_T\right) - H_S}{\sqrt{p_{pun}^2\sigma_{\pi_{S_{Con}}}^2 + (1 - p_{pun})^2\sigma_{\pi_{S_{Acq}}}^2 + \sigma_{\pi_{S_{SQ}}}^2}}\right] \end{aligned} \quad (2)$$

where p_{chal} is the probability that S selects *Chal* and $\Phi(\cdot)$ is the standard normal cdf. This implies that $1 - p_{chal}$ is the probability that S chooses $\neg Chal$.

The numerator in Equation 2 contains the difference in S's expected utility for playing *Chal* and $\neg Chal$. S is more likely to choose *Chal* when the observable parts of $U_S(Chal)$ increase relative to those of $U_S^*(SQ)$. The denominator again represents uncertainty, only this time, the uncertainty is conditioned by the beliefs p_{pun} and $1 - p_{pun}$.

Equilibrium outcome probabilities are calculated from the products of the choice equilibria of each player. The probability of observing the status quo is the same as the probability that S plays $\neg Chal$. The probability that D acquiesces is equal to the product of S playing *Chal* and D playing $\neg Pun$. Lastly, the probability of conflict is the product of S playing

Chal and *D* playing *Pun*.

$$\Pr(SQ) = 1 - p_{chal} \quad (3)$$

$$\Pr(Acq) = p_{chal}(1 - p_{pun}) \quad (4)$$

$$\Pr(Con) = p_{chal}p_{pun} \quad (5)$$

Empirical Implications

The equilibria lead to a number of testable propositions. I focus on two here.

The first proposition links the changes in the degree of subordination between a subordinate and dominant state to the likelihood of observing a challenge.

Proposition 1. *(For proof, see Appendix A) Assuming that the subordinate state has at least a moderate amount of uncertainty regarding the dominant's expected utilities,* p_{chal} *decreases as* H_S *increases. Thus, the probability of a challenge is negatively correlated with the degree of subordination.*

A change in H_S has both a direct and an indirect effect on the utility of the subordinate (note p_{pun} in Equation 2). These effects act in opposite directions: an increase in subordination decreases the likelihood of a challenge (direct effect), yet it also decreases the probability that the dominant will punish, as the relative target–challenger subordination decreases (indirect effect). The indirect effect represents a moral hazard—a possible emboldening effect of closeness to the dominant (Machain and Morgan 2013; Smith 1995). Assuming that players are at least moderately uncertain regarding other's expected utilities, however, the direct effect is necessarily larger than the indirect effect, because the indirect effect enters *S*'s utility as a part of the probability of punishment term, while the direct effect faces no such constraint. Despite its outstanding territorial claim against Belize (and military superiority), Guatemala is highly subordinate to the US and, thus, unlikely to pursue military options. It is not emboldened by its higher (relative to Belize) position in the US hierarchy, as long as there is some uncertainty regarding a US response.

Hypothesis 1. *States with higher subordination are less likely to challenge the status quo.*

The second proposition concerns the relationship between the relative degree of challenger–target subordination and the probability of observing a punishment.

Proposition 2. *(For proof, see Appendix A) The probability of a punishment, p_{pun}, is positively affected by the relative difference in subordination between the target and challenger, $H_T - H_S$.*

Proposition 2 suggests that, from the perspective of a dominant, not all challenges are equally disruptive. When deciding whether to punish a challenge, the dominant considers the *relative degree of subordination* between the challenger and the target. The dominant is less likely to punish challenges against target with lower levels of subordination (relative to the challenger). For instance, even though the US did not authorize the Israeli bombing of an Iraqi nuclear facility in 1981, Israel faced only minor repercussions for this action.

Hypothesis 2. *Dominant states are more likely to punish challenges against targets with greater subordination relative to the challenger.*

This theoretical insight contributes and extends the general deterrence literature by treating the status of a *protégé* as a continuous and relational rather than a binary measure. The concept of general deterrence is enriched by considering the implicit threat of retaliation dependent on the location of the target and aggressor within dominant's hierarchy. The challenger's decision to attack a target is affected by the target's relative degree of subordination and the associated risk of punishment.

Research Design

The above theoretical framework is very general: one can use it to study the effects of social hierarchy at the regional or global level, or even in the presence of several competing dominant states. The empirical tests conducted in this paper, however, focus on exploring the effects of US social hierarchy between 1950-2000. Appropriate to this time period, the US is treated as the dominant state, the USSR/Russia is treated as an alternative dominant, and all other states are coded as subordinates with varying degrees of subordination to either dominant.[9]

The unit of analysis is directed-dyad-year. Directed-dyad-years account for both the actions of state A towards state B and state B towards state A. This unit of analysis allows for identification of the conflict initiator in the first stage of the analysis—the challenger of the status quo—and whether this action is punished by the dominant state in the second stage. The analysis is temporally constrained to 1950-2000 due to data availability on the degree of subordination explanatory variable. I measure subordination using data originally generated by Lake (2009, Ch 3). I have data for 141 countries, which yields a sample of 549,576 non-missing observations.

Methodology

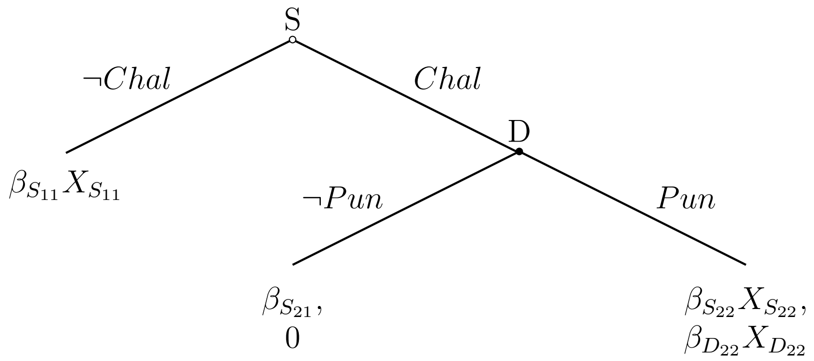
I conduct the analysis using a two-stage strategic probit model (Bas, Signorino and Walker 2008). A two-stage strategic probit is effectively a recursive system of equations, where estimates from later stages are used to improve parameter estimates from earlier stages, i.e. statistical backwards induction (Bas, Signorino and Walker 2008, 26-27). The estimator is able to separate the constraining effects of social hierarchy (i.e. the preference for the status quo) from the deterring effects of punishment, which is achieved by accounting for the challengers' strategic selection of targets.[10] A failure to model this selection effect would produce biased estimates and incorrect inferences (Signorino and Yilmaz 2003).

In substantive terms, the estimator treats subordinate states as able to calculate their expected utilities from a challenge by estimating the probability of a punishment from other observed cases of challenges. The subordinate uses this estimated probability, or a belief regarding the threat of punishment, to weigh its costs and benefits from challenging the status quo. This allows the estimator to effectively isolate the independent effects of the predictors, such as the pacifying effects of subordination, from the deterring effects of military

[9]For the sake of consistency, states not aligned with either of the dominants are defined as subordinates with 0-degree of subordination. Such states make up the plurality of the sample (approximately 61%).

[10]In contrast to a bivariate selection model, strategic models treat an actor's choice in the first stage as a function of both its own expected behavior *and the expected behavior of the other actor* in the second stage.

Figure 2: Specification of the Strategic Probit Estimator.



capabilities and relative target-challenger subordination, by allowing both *challenge* and *punishment* to have their own equation within the random utility model.

Figure 2 displays the empirical specification of the strategic model, where the observable components of the theoretical model are represented by a set of regressors X_{i_j}. The discrete nature of actor choices in Equations 1 and 2 allows for estimating the parameters of these regressors using two probit models, assuming variance is normally distributed with $\sigma^2 = 1$ (Bas, Signorino and Walker 2008). Consistent with the functional form of the theoretical model, I first estimate the probability of a punishment (Equation 2).[11] This provides estimates for $\beta_{D_{22}}$ as well as for p, the subordinate's belief that the dominant punishes a challenge. A larger value of p is associated with a greater belief that punishment is likely.

The subordinate's expected value for challenging can be calculated by multiplying p and the regressors $X_{S_{22}}$, while the constant from the *Acquiesce* outcome is multiplied by $(1-p)$. The modified regressors are necessary to account for the expected action of the dominant state when challenging. These modified regressors and the unmodified status quo regressors $X_{S_{11}}$ are then used in a probit model to identify the probability that the subordinate challenges (Equation 1).[12] Finally, I calculate the standard errors for coefficients related to the subordinate's action using nonparametric bootstraps, because the subordinate's choice is conditioned by the expected action of the dominant (Bas, Signorino and Walker 2008, 29).[13]

[11]The dominant's utility from *acquiesce* outcome is normalized to 0.

[12]The same variable cannot be included in every outcome or the model cannot be identified. I exclude a constant in $X_{S_{22}}$.

[13]See Appendix B for a more technical discussion.

Dependent Variables

The first dependent variable—*Challenge*—indicates whether a state challenges the status quo. Given US frequent military involvement, its willingness to form coalitions, and, more generally, its military capabilities and global interests, I argue that any challenger prefers to act as part of a coalition with the US, if at all possible.[14] A failure to convince the US to support the conflict from day one is, therefore, indicative of a lack of US support, and hence, constitutes a *challenge* (at least in a nominal sense).[15]

Then, in accordance to this paper's theoretical framework, international disputes in the second half of the 20th century can be thought of as falling into one of two categories: (1) those initiated by the US or by another state with US support or authorization, and (2) those that were initiated without US authorization. The latter group of disputes constitutes challenges—to some degree—of the US-established status quo. The strength of the challenge—captured in this study by the concept of relative target-challenger subordination—is an independent variable influencing how the US responds to a challenge and is discussed later.

Challenge, therefore, is a dichotomous variable coded as 1 if state A initiates a militarized interstate dispute (MID), defined as the threat, display or use of military force, without the US as originator on the same side. An independent dispute initiation is treated as an attempt to alter the status quo without approval from the dominant state. MID data are obtained from the Correlates of War project (Palmer et al. 2015). I exclude joiners—states which become conflict participants after the first day of a dispute—because they did not initiate a conflict, but may have been drawn in by an alliance or saw fighting spillover onto their soil (e.g., Syria's involvement in a 1994 clash between Israel and Lebanon).

[14] Great powers have a higher than average tendency toward conflict initiation (Chiba, Machain and Reed 2014). The US and other major powers frequently build coalitions—the US has been a coalition member in all of its modern wars—or seek authorization from international bodies prior to initiating conflicts (Krahmann 2005; Tago 2007).

[15] A possible alternative way of "authorizing" aggressor action is via arms transfers. Evidence regarding arms transfers inciting interstate conflict, however, is mixed. While the initial transfer of arms is found to produce more aggressive foreign policies, arms dependence restrains this effect (Craft 1999; Kinsella 1998). Thus, the presence of arms transfers on its own does not necessarily indicate support for initiating a conflict, nor does it identify an approved target. In contrast, involvement as a conflict originator is a clear signal of support.

Given the general willingness of the US to resort to military means when it seeks international change, as well as its tendency to form coalitions or aid allies, states that initiate conflict without initial US support must find their existing situation unacceptable and are unwilling to compromise their aims to the extent that is necessary to gain US support (Morrow 1991, 909). While the US may offer to support an ally's aggressive actions later, the lack of the initial US support suggests that it did not want a conflict to occur, at least at that particular time. Hence, such conflict initiation represents at least a nominal challenge to US authority.

The second dependent variable represents the dominant's (coercive) responses to challenges—*punishments*. *Punishments* are operationalized as a dichotomous variable indicating whether the US either initiated a MID or issued economic sanctions against the challenger in the same or following year as the challenge.[16] MIDs and economic sanctions are only considered a *punishment* if the subordinate has already initiated a *challenge*. Data related to the threat or use of sanctions are gathered from the Threat and Imposition of Sanctions (TIES) dataset (Morgan, Krustev and Bapat 2006). Sanctions are coded as "actions such as tariffs, export controls, embargoes, import bans, travel bans, freezing assets, cutting foreign aid, and/or blockades" (Morgan, Krustev and Bapat 2006, 1). The measure includes both military and economic actions, since they may be substitutes. In the sample, about 26% (169/652) of all *Challenges* are *Punished*. Approximately 64% (109/169) of all *Punishments* within the sample involve MIDs—about one-fifth of which are used in conjunction with economic sanctions (34/109)—with the exclusive use of economic sanctions making up the remaining 36% (60/169).[17]

Independent Variables

I argue that subordination increases the subordinate's value for the status quo ($X_{S_{11}}$). The measures of subordination are obtained from Lake (2009, Ch 3) and are measured on a continuous scale, consistent with the theory developed here. Subordination is measured along

[16]See Appendix C for robustness checks using various *punishment* operationalizations.

[17]Peterson and Drury (2011) also find that sanctions and MIDs are sometimes used together.

two dimensions: security and economic.[18] *US Security Subordination* is operationalized as the composite of two measures. The first is based on the number of US *Military Personnel*. It is measured as $\frac{\text{\#Military Personnel}}{\text{\#Host Population}}$.[19] Lake (2009, 69) argues that "to the extent that B accepts A's personnel on a continuing basis, this control can be regarded as legitimate and, therefore, authoritative" (see also Morrow 1991, 905). A subordinate's acceptance of the dominant's troops signals a (tacit) acceptance of their authority. The measure models the relational nature of hierarchy: both the dominant and the subordinate must agree to the troop placements (e.g., the territory holds strategic value).[20]

The second measure of *US Security Subordination* is related to the number of allies that the subordinate shares with the dominant as a proportion of all formal alliances. The logic here is that states with non-diversified alliance portfolios are more accepting of the dominant state's foreign policy (Morrow 1991). The measure implies that alliance networks anchored around key states provide more information about foreign policy preferences than a more general measure of alliance similarity. *Shared Alliances* is measured as $\frac{1}{\text{State i's \# of Independent Alliances}}$, where state i is assumed to always be allied with itself, to avoid undefined values (Lake 2009, fn 13). Larger values on *Shared Alliances* are associated with fewer independent allies and greater level of subordination. The security subordination variables are not highly correlated ($r = 0.17$), suggesting they are capturing different aspects of security hierarchy. Higher values of either measure are associated with greater security subordination.

The second dimension captures *US Economic Subordination*. This is also the composite of two measures. The first is related to exchange rates. A state's autonomy over its exchange rate directly affects its control over its monetary policy and, therefore, proxies the level of economic subordination. This measure seems an especially appropriate measure of authority "since exchange rates are typically chosen with only minimal pressure from the anchor

[18]The formal model makes no *a priori* assumption regarding the number of hierarchies that may affect conflict behavior. I include both security and economic issue dimensions because these have traditionally been the most salient within IR research.

[19]To ease spatial and temporal comparability, each subordination measure is normalized to 1 by dividing by the highest value in 1995 (Lake 2009, 69).

[20]While post-war occupation hardly seems like granting "permission," post-war governments decide whether to continue the arrangement, e.g., contrast West Germany and contemporary Afghanistan.

country, but are nevertheless constraining..." (Lake 2009, 73). *Exchange Rate* is coded on a four-point scale using IMF measures where higher scores indicate greater subordination. These are, in order of most to least autonomous: floating exchanges, crawling peg, fixed exchange, and "merged" or "dollarization." Floating exchange rates change value according to market forces and include most of the world's major currencies (e.g., the Euro, Japanese yen, British pound, and US dollar). Crawling pegs are currencies that 'float' within a specified range of a foreign currency or a bundle of foreign currencies (e.g., Chinese yuan). Fixed exchange rates were used by most countries during the 1950s–1960s under Bretton Woods. Lastly, dollarization refers to pegging one's currency directly to a foreign currency, such as the US dollar (e.g., Ecuador, El Salvador, and Panama).

The second measure captures subordinates' trade dependence on the dominant compared to other major powers in the system. Similar to the independent allies argument, failure to diversify trading partners is viewed as an acceptance of the dominant's hierarchy. *Trade Dependence* is measured as $\frac{\text{(State i's Trade with the US)} - \text{(State i's Trade with Other Major Powers)}}{\text{State i's GDP}}$, where state i's trade with other major powers is truncated at zero.[21] As with security measures, measures of economic subordination are not highly correlated ($r = 0.23$).

The measures of subordination, described above, capture a contractual relational power that exists independent of coercive military power. In fact, neither the *Security* nor *Economic* dimensions of subordination are highly correlated with traditional measures of military power, such as the *Power Ratio* ($r = -0.09$ and $r = 0.01$, respectively). This means that a stronger state in terms of coercive capabilities, such as Great Britain or Japan, is nearly as likely to defer to the US as leader of a social hierarchy, as a weaker state, such as El Salvador or New Zealand. Finally, *Security* and *Economic Subordination* capture different types of hierarchy, as they are only correlated at $r = 0.25$.

The second primary explanatory variable is *Relative Target-Challenger Subordination*, which affects the likelihood that the dominant punishes a challenge ($X_{D_{22}}$). *Relative Target-Challenger Subordination* reflects the hierarchical position of a challenger in reference to

[21] Other major powers are defined as Great Britain, China, France, or Russia. Lake's original data do not include trade dependence or composite economic subordination figures for the other major powers. I add these countries to the data.

a target state within a dominant state's social hierarchy. As noted earlier, the dominant does not equally weigh all challenges. This variable represents the severity of a challenge as it is viewed by the dominant state; hence, *Relative Subordination* is measured as Target − Challenger for all subordinate dyads along both the security and economic dimensions. Thus, targets with greater relative subordination (than the challenger) have positive values on *Relative Subordination*: the dominant has a greater utility of punishing challenges against such targets.[22] This measure captures the importance of a challenge to the US.

To account for the presence of an alternative hierarchy, I create a variable which captures a state's subordination to the USSR/Russia within the security domain—*USSR/Russia Security Subordination*. *USSR/Russia Security Subordination* is analogous to the *US security subordination*, yet is limited to just the shared alliances measure. Greater USSR/Russia subordination is expected to deter the US from punishing, as a punishment may trigger USSR/Russia involvement (i.e. the alternative dominant may seek to fulfill its obligation to defend subordinates within its own hierarchy).

The literature identifies a number of material factors that influence interstate conflict, such as the power ratio, shared borders, and joint democracy, among others (e.g., Russett and Oneal 2001).[23] Table 2 lists the full set of control variables, which equation they are included in, their expected effect, and how they are measured.[24] Control variables are discussed in more detail in Appendix D.

Empirical Analysis

Table 3 presents the results of the strategic probit. Following the practice in the literature (e.g., Nieman 2015), the table of results is subdivided into four parts, which correspond to

[22]When the challenger has greater relative subordination than the target, *Relative Subordination* takes on negative values. This, of course, does not mean that the dominant prefers that the challenger attacks these targets, only that these targets are less important to the dominant.

[23]I do not include a dummy variable for the *Cold War*, as superpower ties are subsumed by the concepts of *US* and *USSR/Russia subordination*. Appendix C reports a model where a *Cold War* dummy is included; the primary results do not change.

[24]Nieman (2015, 438-439) demonstrates that strategic models are relatively robust to inclusion of spurious variables, and even to misplacement of variables in utility equations.

Table 2: Control Variables and Measures

Variable	Utility	Sign	Measure
USSR/Russia Security Subordination[a]	$X_{D_{22}}$	$-$	$\frac{1}{\text{State i's \# of Independent Alliances}}$
Power Ratio[b]	$X_{D_{22}}$, $X_{S_{22}}$	+,+	$\frac{\text{CINC A}}{\text{CINC A+CINC B}}$
Power Ratio Squared[b]	$X_{D_{22}}$, $X_{S_{22}}$	$-$,$-$	$\left(\frac{\text{CINC A}}{\text{CINC A+CINC B}}\right)^2$
Power Change[b]	$X_{D_{22}}$	+	$\text{CINC}_t - \text{CINC}_{t-1}$
Civil War[c]	$X_{S_{22}}$	$-$	Binary: 1 if civil war
Ongoing US MIDs[d]	$X_{D_{22}}$	$-$	Count of US MIDs at t
Previous Challenge[d]	$X_{D_{22}}$, $X_{S_{22}}$	+,$-$	Count of previous challenges at t
Contiguity[e]	$X_{S_{22}}$	+	Binary: 1 if shared border
Distance[e]	$X_{D_{22}}$	$-$	Log (Distance + 0.01)
Trade[f]	$X_{S_{22}}$	unclear	$\frac{\text{Trade A+Trade B}}{\text{GDP A}}$
Joint Democracy[g]	$X_{D_{22}}$, $X_{S_{22}}$	$-$,$-$	Binary: 1 if both ≥ 6 on Polity2
Alliance[a]	$X_{S_{22}}$	$-$	Binary: 1 if defense pact

[a] Gibler (2009)
[b] Composite Index of National Capabilities (CINC) (Singer 1987)
[c] Sarkees (2000)
[d] Palmer et al. (2015)
[e] Bennett and Stam (2000)
[f] Barbieri, Keshk and Pollins (2009)
[g] Marshall and Jaggers (2008)
See Appendix D for expanded coding rules and utility placement explanations.

each of the estimated equations: *Dominant's Conflict*, *Subordinate's Status Quo*, *Subordinate's Acquiescence*, and *Subordinate's Conflict*. Positive (negative) coefficients are interpreted as increasing (decreasing) the corresponding actor's utility from the given outcome. For example, a positive coefficient under *Subordinate's Status Quo* indicates that the associated regressor increases the subordinate' utility with the status quo and, all else equal, decreases its likelihood of challenging.[25]

The coefficient on *US Security Subordination* is positive and statistically significant in the *Subordinate's Status Quo* equation, while the coefficient on *US Economic Subordination* is insignificant. The positive result on *US Security Subordination* indicates that states with higher levels of subordination (in the security hierarchy) are more likely to value the status quo, relative to other outcomes (i.e. conflict and acquiescence). This is consistent with Hypothesis 1, which posited an inverse relationship between states' degree of subordination

[25]See Appendix C for robustness checks.

Table 3: Militarized Challenge and Punishment in US Hierarchy.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.185***	(0.56)		
US Economic Subordination	0.001	(0.048)		
Constant	4.788***	(0.806)		
Acquiesce Equation:				
Constant	1.400***	(0.258)		
Conflict Equation:				
Relative US Security Subordination			1.032***	(0.214)
Relative US Economic Subordination			0.284*	(0.160)
USSR/Russia Security Subordination			−0.393†	(0.275)
Challenger-Target Power Ratio	4.788***	(0.806)		
Challenger-Target Power Ratio^2	−4.016***	(0.690)		
Dominant-Subordinate Power Ratio			0.361***	(0.081)
Dominant-Subordinate Power Ratio^2			−0.243***	(0.049)
Power Change	−0.111	(0.380)		
Ongoing US MIDs			0.080*	(0.047)
Civil War	0.495***	(0.169)		
Previous Challenge	0.725***	(0.060)	−0.054**	(0.021)
Contiguity	3.273***	(0.166)		
Distance			−0.255***	(0.096)
Trade	4.600†	(3.284)		
Challenger-Target Joint Democracy	−1.025***	(0.232)		
Dominant-Subordinate Joint Democracy			−0.439***	(0.144)
Challenger-Target Alliance	−0.440**	(0.208)		
Constant			−10.939***	(3.299)
Log-Likelihood	-4054.323		-314.118	
Observations	549570		652	

Note: ***$p<0.01$, **$p<0.05$, *$p<0.1$, two-tailed; $^{+}p<0.1$, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

and the probability of challenging.

Relative US Security Subordination is positive and statistically significant in the *Dominant's Conflict* equation. This indicates that the dominant is more likely to punish challengers, when the target has a higher relative subordination (than the challenger) within the US security hierarchy. The coefficient on *Relative US Economic Subordination* is statistically significant at the 0.1 level, offering evidence that "low politics" are an important consideration in the dominant's punishment calculus. These results provide support for Hypothesis 2, which posited that the US is more likely to punish challenges, directed against targets with higher relative subordination.

It is worth highlighting that the *USSR/Russia Security Subordination* is negative and statistically significant (p-value< 0.1, one-tailed test). This indicates that the US is less likely to punish challengers who are subordinate to an alternative dominant state. Most of the other control variables have the expected effects or are statistically insignificant. A few of the results, however, are surprising. Subordinate states engaged in *Civil War* are more likely to initiate challenges in the *Subordinate's Conflict* equation. This may highlight the transnational aspects of civil war (Salehyan and Gleditsch 2006). *Trade* is also positive and statistically significant (p-value< 0.1, one-tailed test), suggesting that, once social hierarchy is accounted for, increased trade between subordinates is associated with a greater probability of conflict.

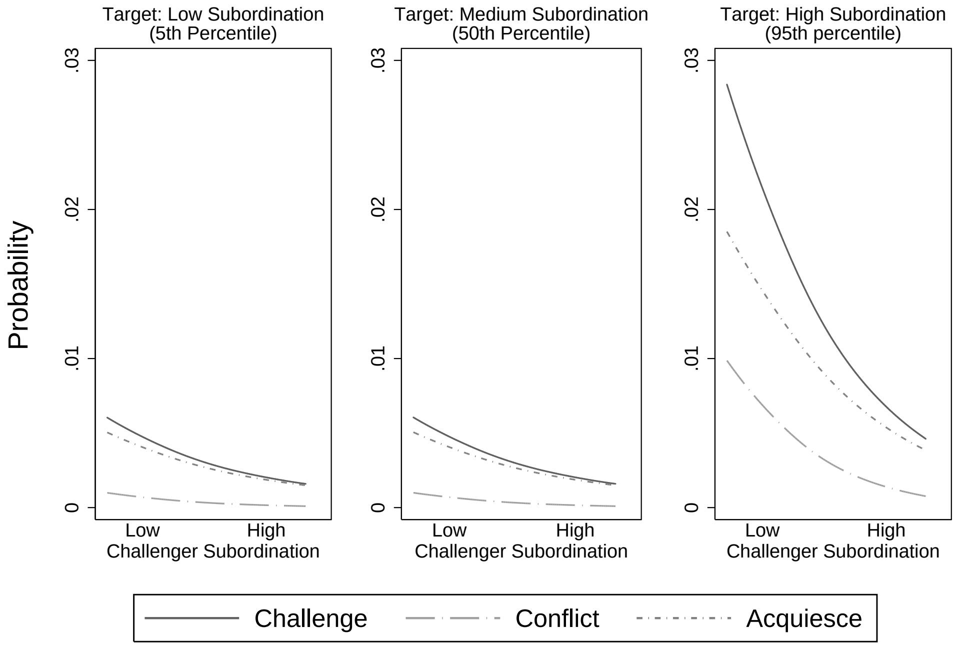
Table 3, of course, does not provide an easy way to gauge the net effect of social hierarchy, which enters the model in two separate ways—in the *Subordinate's Status Quo* equation (via the degree of subordination variable) and in the *Dominant's Punishment* equation (via the relative subordination variable). To account for the net effect of changes in a state's subordination, Figure 3 presents predicted probabilities for each of the three outcomes (status quo, acquiescence, and conflict between the dominant and challenger). Predicted probabilities are calculated by varying the challenger's security subordination, while holding the target's security subordination constant at either the 5^{th}, 50^{th} or the 95^{th} percentile (to reflect targets with low, medium, or high degree of subordination).[26] To make the predicted probabilities more substantively meaningful, I examine each outcome for the situation where challengers share a border with the target, while all other variables are held at their me median values.[27]

Figure 3 illustrates four substantively important results. First, increasing challenger's subordination (going from left to right within each sub-figure) is associated with a declining probability of challenge (solid line). This is consistent with the theoretical expectation that

[26]Note that increasing/decreasing challenger's (absolute) subordination leads to increases/decreases in the *relative* subordination between challenger and target (even through target's subordination remains constant in absolute terms).

[27]I focus on neighboring states to give a substantively important scenario (Signorino and Tarar 2006, 596).

Figure 3: Predicted Outcomes at Varying Levels of Security Hierarchy.



Note: Predicted probabilities for contiguous states with all other variables held at median.

states with greater (absolute) subordination are more accepting of the status quo and are less likely to challenge. Second, dominants are always more likely to acquiesce (short dashed line) than punish/engage in conflict with the challenger (long dashed line). Third, comparing the probability of conflict (long dashed line) among the three sub-figures (from left to right), we can see that there is a positive relationship between the target's subordination and the probability of dominant-subordinate conflict. The probability of conflict is greater as we move from targets with low to medium subordination, and as we move from the targets with medium to high absolute subordination.

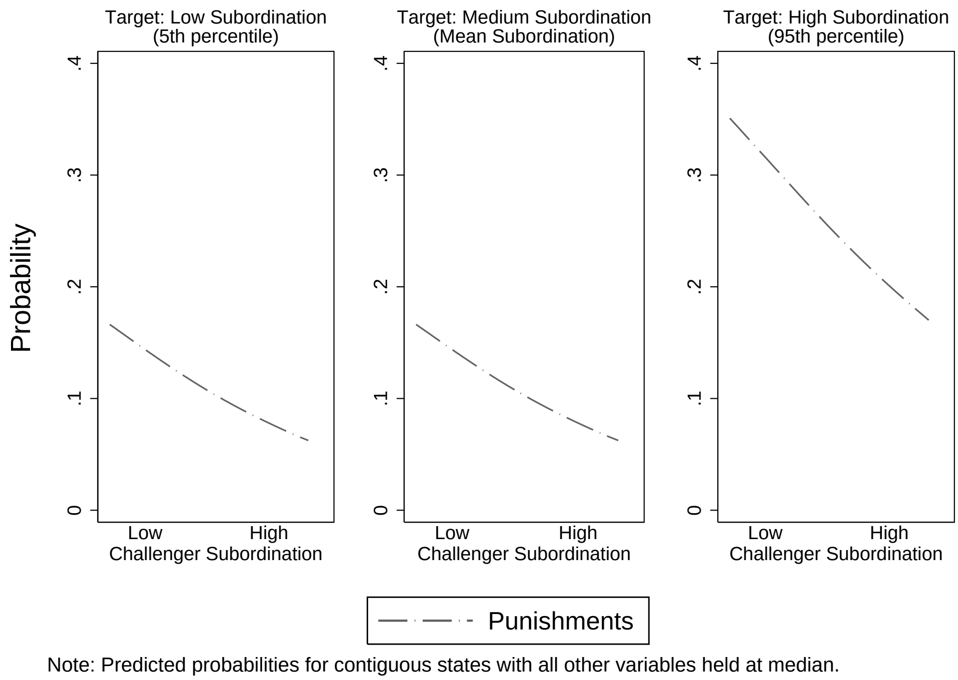
Fourth, comparing the probability of challenge (solid line) among the three sub-figures (from left to right) show that the targets with greater (relative) subordination are at the highest risk of being attacked, even though such challenges are the most likely to be punished by the dominant (as demonstrated in Figure 4 and discussed below). The higher rate of challenges against highly subordinate targets (compared to that against targets with moderate or low subordination) provides face validity to the conceptualization/measure of a *challenge*, adopted here. In other words, we should expect that, if independently (of the US) initiated military conflicts are indeed challenges to the US hierarchy (rather than just expressions of settling scores among states), then most of such conflict initiation will be directed against states that are more subordinate to the US, as they are. For example, unable to reach the US, North Korea frequently threatens Japan—a state with high security subordination to the US. Similarly, Iran has frequently linked its threats to the US with its threats to Israel.

Finally and related to the previous result, highly subordinate challengers (the right-hand side of each sub-figure) are more likely to initiate challenges against highly subordinate targets than against targets with moderate or low subordination. Taken together with the first point above, this result suggest an intriguing pattern of behavior among US subordinates: states with high subordination rarely challenge, but when they do, they tend to attack highly subordinate targets. This may be a result of selection: i.e. US subordinates only select into independent conflicts when they are highly motivated, and thus, are less likely to be deterred. Another possible explanation is that the result is an artifact of the data: hierarchy tends to be clustered geographically. Though militarized disputes are rarely observed in Latin America and Western Europe, those that take place tend to involve two states that are close to the US (as most states in these regions are highly vested in the US security and economic hierarchies).[28]

Figure 4 shows the proportion of challenges that result in conflict, as opposed to acquiescence, on the part of the dominant. If we move from left to right across the sub-figures, we can see that the probability of conflict between the dominant and the challenger increases with the targets degree of subordination. While dominants are always more likely to acquiesce to challenges than to punish, they are especially likely to acquiesce when the target is positioned lower than the challenger that vice versa. This is illustrated by the declining slope of the line as the degree of hierarchy increases in each of the graphs.

[28]Using the difference in degree of subordination—*relative US subordination*—helps to properly identify effects that might otherwise be obscured in the presence of spatial clustering. See Appendix C for additional robustness checks, in which both types of subordination are included in both dominant and subordinate states equations, as well as models with regional dummies.

Figure 4: Proportion of Punishments if a Security Challenge Occurred.



Conclusion

The account of social hierarchy developed and tested in this paper sheds new light on the strategic causes of international conflict. It highlights that states exist in a strategic environment; rather than simply a function of dyadic covariates, conflictual and peaceful interactions between pairs of states affected by factors beyond dyadic level of analysis, such as the social relationships/hierarchies within the international system. I am able to empirically isolate the effects of social hierarchy on subordinate states propensity to initiate conflicts from the deterring effects of material power, using a two-stage strategic probit estimator. The results suggest that variation in the degree of authority conferred to a dominant has wide ranging consequences on 3rd-party interactions.

The theory developed in the manuscript helps explain several recent conflicts. Despite increasing hostile rhetoric from both the Philippines and China, for example, there has been only one MID between these states during the 2002-2010 period (Palmer et al. 2015).

Such a peaceful, albeit uneasy, relationship, is consistent with the theoretical model, as the Philippines are tightly embedded within the US-alliance network, and are, therefore, less likely to attempt to revise the status quo by initiating disputes (as US policymakers have a strong preference for avoiding possible confrontation with China). China, similarly, seeks to avoid confrontation with a state close to the US.

The paper suggests several directions for future research. Extending the operationalization of *challenge* to include additional actions, such as shifts between social hierarchies, could help explain other instances where dominant states intervene in other states, such as Russia's incursions into Georgia and Ukraine following the latter governments' shifts towards Europe. Extending the framework to include intra- and extra-state actors would also allow it to intersect with recent work by Bapat (2006), who shows that states that host extra-state terrorist organizations affect the ability of target states to negotiate with terrorist groups. By treating the degree of subordination of dissatisfied political minorities (to either a domestic or external sponsor) as a continuous variable, we can expand our explanatory power of the political minority groups' decision to mobilize within the existing political structure, or choosing to take up arms

Future research could also explore the interaction between multiple hierarchical dimensions. The empirical results demonstrate, for example, that while *relative target—challenger economic subordination* affects the probability of *punishment*, the challenger's *degree of economic subordination* is not a significant predictor of *challenging.* This suggests that the two different types of social hierarchy impact the behavior of dominants and subordinates in different ways: while subordination within the economic hierarchy matters to dominants, it seems to have a smaller and indirect effect on the decisions of subordinates (by increasing the probability of punishment). Future research could explore the varying deterring effects of hierarchies on the dominant and subordinates, as well as the possible over-lap in the effects of different dimensions of hierarchy (e.g., does security hierarchy deter economic challenges?). This direction can also build upon Liu (2014), who explores the effect of language hierarchies on economic activities. Finally, one can explore the role of hierarchies in policy diffusion (e.g., Gift and Krcmaric 2015; Weymouth and MacPherson 2012).

The paper may also contribute to several literatures beyond the study of inter-state conflict. The theoretical framework is very general; it applies to the broad class of strategic interactions between actors with asymmetrical power, such as government-rebel negotiations during an intra-state crisis, opposition parties or factions bargaining among themselves or with the ruling party, or even the interaction between international investors and borrowers.

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Appendix A Proposition Proofs

Proof of Proposition 1.

Proof. To explore the change in p_{chal} wrt H_S, we must take the partial derivative of Equation 2.

$$\begin{aligned}\frac{\partial p_{chal}}{\partial H_S} &= f\left(\frac{\Phi[z](B_T - C_S) + (1-\Phi[z])(B_T) - H_S}{\sqrt{\Phi[z]^2\sigma^2 + (1-\Phi[z])^2\sigma^2 + \sigma^2}}\right) \\ &\times\left(\frac{(f[z](-C_S) - 1)\sqrt{\Phi[z]^2\sigma^2 + (1-\Phi[z])^2\sigma^2 + \sigma^2}}{\sigma^2\left(\Phi[z]^2 + \left(1-\Phi[z]^2\right) + 1\right)}\right. \\ &-\frac{(\Phi[z](B_T - C_S) + (1-\Phi[z])(B_T) - H_S)}{\sigma^2\left(\Phi[z]^2 + \left(1-\Phi[z]^2\right) + 1\right)} \\ &\left.\times\sqrt{2\sigma(\Phi[z])^2 + (1-\Phi[z])^2}\right) \qquad (6)\end{aligned}$$

where f($\cdot$) is the probability density function and $z = \frac{H_T - H_S - C_D - A}{\sqrt{2\sigma^2}}$. The first term is positive since it is a probability density, the first product of the second term is negative owing to the sign on C_S, while the sign of the second term is unclear, as $B_T - C_S$ can be either positive or negative in the second product of the second term. When $B_T - C_S$ is positive, then the derivative is negative; when $B_T - C_S$ is negative, then the sign of the derivative depends on the difference between the first and second products of the second term, which is determined, in part, on the value of σ. This means that the probability of S selecting *chal* depends on both the sign associated with the difference of $B_T - C_S$ and its level of certainty in D's expected utilities, represented by σ. Smaller values of σ represent greater certainty on the part of S.

I ran several simulations in order to identify the effect of H_S at varying levels of σ when $B_T - C_S$ is either positive, negative, or zero. Figure A.1 presents the first general pattern that emerges from these simulations when $C_D \geq 0.3$ or $A \geq 0.3$. Figure A.1 shows that, under this scenario, whether $B_T - C_S$ is either positive or negative, p_{chal} always decreases as H_S increases. This result holds regardless of the value of σ.

I repeat the above simulations under several scenarios. Only under one set of conditions

Figure A.1: Simulation of Comparative Statics for Proposition 1.

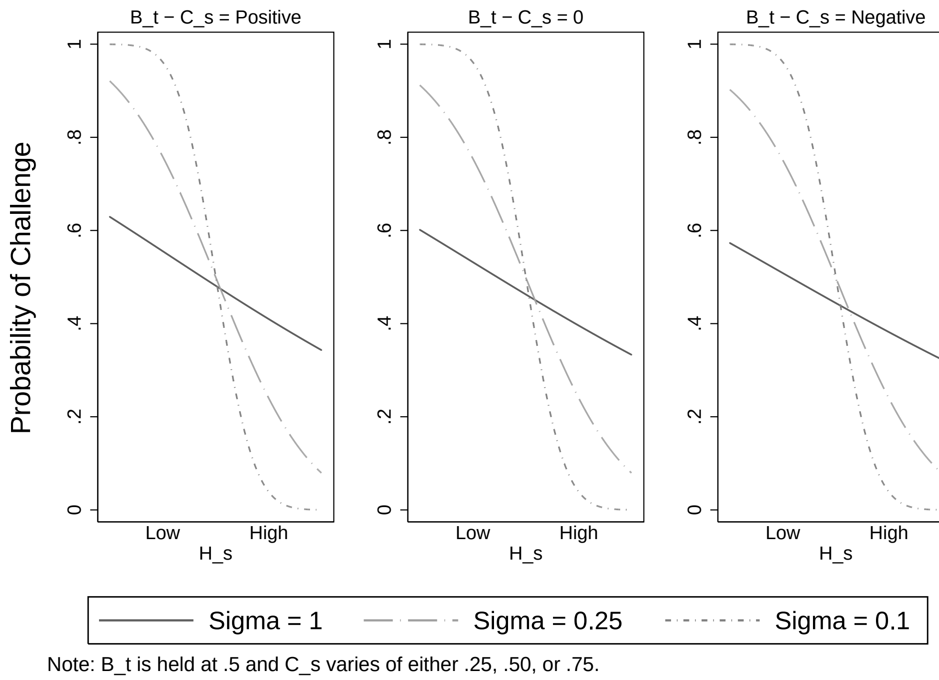
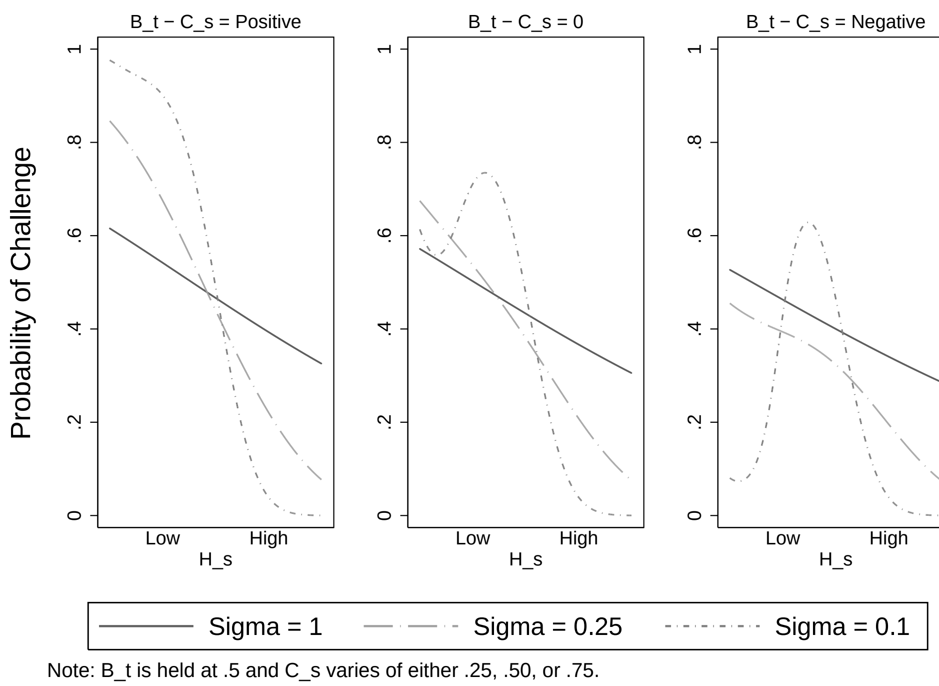


Figure A.2: Simulation of Comparative Statics for Proposition 1, When $C_D < 0.3$ or $A < 0.3$.



is there ever a non-monotonic relationship between p_{chal} and H_S: when $C_D < 0.3$ or $A < 0.3$, and σ is small (e.g. $\sigma = 0.1$). The most sharp non-monotonic relationship between p_{chal} and H_S is found when $C_D = 0.15$ or $A = 0.15$. These results are shown in Figure A.2. When $B_T - C_S$ is either zero or negative, the relationship between p_{chal} and H_S is non-monotonic when σ is small, as evident by the short dashed line in the second and third graphs in Figure A.2. As σ increases, however, the relationship between p_{chal} and H_S becomes negative and strictly monotonic (solid and long dashed lines, respectively). When $B_T - C_S$ is positive, however, even under conditions where C_D or A less than 0.3 and regardless of the value of σ, p_{chal} monotonically decreases as H_S increases.

More substantively, it is only when a subordinate is moderately close to the dominant, the expected benefits of attacking the target are greater than the costs imposed by the dominant (should it punish), the costs to punish for the dominant and the expected costs imposed by the alternative dominant are fairly low (both A and c_D are less than 0.3), and the degree of certainty on the part of the subordinate is very high (e.g., $\sigma = 0.1$), that subordinates are more emboldened than constrained. If these conditions do not apply, than subordinates are more constrained than emboldened in the foreign policy actions. The key point as applies to the current application, is that the results demonstrate that if S is at least a moderate amount of uncertainty regarding the dominant's expected utilities (e.g., $\sigma = .25$), then the relationship between H_S and p_{chal} is strictly negative. □

Proof of Proposition 2.

Proof. Taking the partial derivative of Equation 1 yields

$$\frac{\partial p_{pun}}{\partial H_T - H_S} = f\left(\frac{H_T - H_S - C_D - A}{\sqrt{2\sigma^2}}\right)\sqrt{2\sigma^2} \geq 0 \qquad (7)$$

where f is the probability density function. The product of a probability density function and square root is always either positive or zero, as both terms are either positive or zero. □

Appendix B Statistical Backwards Induction

Consistent with the theory outlined above, subordinates with high absolute hierarchy are expected to maintain the status quo. Thus, $X_{S_{11}}$ represents absolute hierarchy, which is treated as the observable component of the utility function depicted in Figure 2. This can be written formally as $U_S(\neg Chal) = \beta_{S_{11}} X_{S_{11}}$. Standard explanations of why a subordinate would initiate a conflict against a target are captured by observable variables represented by $X_{S_{22}}$, while the subordinate's utility from the dominant state acquiescing to a challenge is captured by a parameter, $\beta_{S_{21}}$. Each outcome depends on the expected action of the dominant, where p represents the subordinate's belief that the dominant will punish and $1 - p$ that it will not punish. Thus, the subordinate's expected utility from challenging can be rewritten as $U_S(Chal) = p(\beta_{S_{22}} X_{S_{22}}) + (1 - p)(\beta_{S_{21}})$.

The expectations associated with the dominant state are represented by $X_{D_{22}}$, which captures the relative hierarchy between a challenging subordinate and their target. This can be written as $U_D(Pun) = \beta_{D_{22}} X_{D_{22}}$. Finally, the acquiescence outcome for the dominant is normalized to zero, or $U_D(\neg Pun) = 0$.

Consistent with the SBI principles, the second stage of the model (the dominant's response to a challenge) is estimated first, and the resulting expectation is used to condition the behavior in the first stage (the subordinate's decision to challenge). If the variance is assumed to be normally distributed with $\sigma^2 = 1$, the probability that $U_D(Pun) > U_D(\neg Pun)$ in cases where a challenge occurred can be estimated using a probit model (Bas, Signorino and Walker 2008). This provides estimates for $\beta_{D_{22}}$ as well as for p, the subordinate's belief that the dominant punishes a challenge. A larger value of p is associated with a greater belief that punishment is likely.

The subordinate's expected value for challenging can be calculated by multiplying p by the regressors $X_{S_{22}}$, while the constant from the *Acquiesce* outcome is multiplied by $(1 - p)$. This mimics the theoretical structure depicted in Figure 1 by conditioning the expected benefits of a challenging state by the risk of punishment. These modified regressors are then included in a probit model identifying the probability that $U_S(Chal) > U_S(\neg Chal)$, which is the likelihood that the subordinate challenges (Bas, Signorino and Walker 2008, 7-9, 18-19). Modified regressors are necessary, because using first-order regressors would ignore that the variables associated with a challenge are conditioned by the expected action of the dominant state and, hence, produce biased and inconsistent parameters (Signorino and Yilmaz 2003). The use of the strategic model allows for isolating the effects of each theoretically relevant factor for both subordinate and dominant states.

Calculating the standard errors (SEs) is slightly more complicated. SEs for coefficients related to the dominant's choice require no modification because the dominant's choice does not depend on the expected actions of anyone else (Bas, Signorino and Walker 2008, 29). Instead, the dominant acts only when a subordinate challenges. Potential problems arise, however, when calculating SEs associated with the subordinate's coefficients because the subordinate's decision is conditioned by the expected action of the dominant state. Ignoring this conditional relationship would produce inconsistent SEs. To account for this, I employ nonparametric bootstraps.

Appendix C Robustness Tables

Table C.1: Militarized Challenge and Punishment in US Hierarchy, with *USSR/Russia* as an Alternative Hierarchy in a Subordinate's *Status Quo* Equation.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.197***	(0.063)		
US Economic Subordination	0.007	(0.0487)		
USSR/Russia Security Subordination	0.114†	(0.074)		
Constant	4.471***	(0.243)		
Acquiesce Equation:				
Constant	1.424***	(0.261)		
Conflict Equation:				
Relative US Security Subordination			1.032***	(0.214)
Relative US Economic Subordination			0.284*	(0.160)
USSR/Russia Security Subordination			−0.393†	(0.275)
Challenger-Target Power Ratio	4.779***	(0.778)		
Challenger-Target Power Ratio^2	−3.964***	(0.666)		
Dominant-Subordinate Power Ratio			0.361***	(0.081)
Dominant-Subordinate Power Ratio^2			−0.243***	(0.049)
Power Change	−0.170	(0.407)		
Ongoing US MIDs			0.080*	(0.047)
Civil War	0.512***	(0.150)		
Previous Challenge	0.731***	(0.061)	−0.054**	(0.021)
Contiguity	3.281***	(0.168)		
Distance			−0.255***	(0.096)
Trade	4.600†	(3.104)		
Challenger-Target Joint Democracy	−1.035***	(0.228)		
Dominant-Subordinate Joint Democracy			−0.439***	(0.144)
Challenger-Target Alliance	−0.442**	(0.225)		
Constant			−10.939***	(3.299)
Log-Likelihood				
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.2: Militarized Challenge and Punishment in US Hierarchy, with *Global Power* substituted in place of *USSR/Russia Security Subordination*.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.198^{***}	(0.055)		
US Economic Subordination	0.008	(0.046)		
Constant	4.715^{***}	(0.257)		
Acquiesce Equation:				
Constant	1.705^{***}	(0.277)		
Conflict Equation:				
Relative US Security Subordination			0.941^{***}	(0.219)
Relative US Economic Subordination			$0.225^{\dagger}$	(0.163)
Global Power			-0.074^{***}	(0.015)
Challenger-Target Power Ratio	5.110^{***}	(0.789)		
Challenger-Target Power Ratio^2	-4.151^{***}	(0.664)		
Dominant-Subordinate Power Ratio			0.360^{***}	(0.081)
Dominant-Subordinate Power Ratio^2			-0.239^{***}	(0.049)
Power Change	-0.149	(0.341)		
Ongoing US MIDs			$0.061^{\dagger}$	(0.047)
Civil War	0.506^{***}	(0.158)		
Previous Challenge	0.725^{***}	(0.052)	-0.069^{***}	(0.022)
Contiguity	3.131^{***}	(0.152)		
Distance			-0.219^{**}	(0.094)
Trade	$5.025^{\dagger}$	(3.066)		
Challenger-Target Joint Democracy	-0.945^{***}	(0.190)		
Dominant-Subordinate Joint Democracy			-0.392^{***}	(0.143)
Challenger-Target Alliance	$-0.315^{\dagger}$	(0.195)		
Constant			-8.989^{***}	(3.305)
Log-Likelihood	-4074.353		-301.758	
Observations	549570		652	

Note: $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$, two-tailed; $^{+}p<0.1$, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.3: Militarized Challenge and Punishment in US Hierarchy, Including both *USSR/Russia Security Subordination* and *Global Power*.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.189***	(0.054)		
US Economic Subordination	0.011	(0.049)		
Constant	4.663***	(0.255)		
Acquiesce Equation:				
Constant	1.642***	(0.274)		
Conflict Equation:				
Relative US Security Subordination			0.941***	(0.219)
Relative US Economic Subordination			0.232†	(0.163)
USSR/Russia Security			−0.189	(0.275)
Global Power			−0.072***	(0.015)
Challenger-Target Power Ratio	5.072***	(0.794)		
Challenger-Target Power Ratio^2	−4.139***	(0.677)		
Dominant-Subordinate Power Ratio			0.363***	(0.081)
Dominant-Subordinate Power Ratio^2			−0.243***	(0.050)
Power Change	−0.192	(0.329)		
Ongoing US MIDs			0.060	(0.047)
Civil War	0.513***	(0.147)		
Previous Challenge	0.736***	(0.046)	−0.070***	(0.022)
Contiguity	3.046***	(0.157)		
Distance			0.227**	(0.095)
Trade	5.051†	(3.157)		
Challenger-Target Joint Democracy	−0.961***	(0.218)		
Dominant-Subordinate Joint Democracy			−0.413***	(0.147)
Challenger-Target Alliance	−0.278†	(0.197)		
Constant			−8.867***	(3.315)
Log-Likelihood	-4080.159		-301.520	
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^{+}p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.4: Militarized Challenge and Punishment in US Hierarchy. Subordination Index Reduced to Component Terms.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination				
Shared Alliances	0.143***	(0.033)		
Military Personnel	0.031	(0.040)		
US Economic Subordination				
Trade Dependence	−0.161†	(0.103)		
Exchange Rate	0.021	(0.044)		
Constant	4.507***	(0.259)		
Acquiesce Equation:				
Constant	1.463***	(0.276)		
Conflict Equation:				
Relative US Security Subordination				
Shared Alliances			0.484***	(0.129)
Military Personnel			0.640**	(0.296)
Relative US Economic Subordination				
Trade Dependence			0.128	(0.260)
Exchange Rate			0.205†	(0.139)
USSR/Russia Security Subordination			−0.395†	(0.275)
Challenger-Target Power Ratio	4.897***	(0.803)		
Challenger-Target Power Ratio^2	−4.076***	(0.669)		
Dominant-Subordinate Power Ratio			0.361***	(0.081)
Dominant-Subordinate Power Ratio^2			−0.243***	(0.049)
Power Change	−0.105	(0.377)		
Ongoing US MIDs			0.079*	(0.047)
Civil War	0.472***	(0.160)		
Previous Challenge	0.728***	(0.057)	−0.053**	(0.021)
Contiguity	3.270***	(0.164)		
Distance			−0.250***	(0.096)
Trade	4.581†	(2.799)		
Challenger-Target Joint Democracy	−0.992***	(0.211)		
Dominant-Subordinate Joint Democracy			−0.445***	(0.145)
Challenger-Target Alliance	−0.462**	(0.211)		
Constant			−10.981***	(3.299)
Log-Likelihood	-4052.305		-314.199	
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.5: Militarized Challenge and Punishment in US Hierarchy, All Subordination Terms Included for Both Players (Dominant and Subordinate).

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.188***	(0.061)		
US Economic Subordination	0.589	(0.055)		
USSR/Russia Security	0.121†	(0.075)		
Constant	4.312***	(0.250)		
Acquiesce Equation:				
Constant	1.256***	(0.264)		
Conflict Equation:				
US Security Subordination			0.561*	(0.319)
US Economic Subordination			−0.087	(0.325)
Relative US Security Subordination	−0.107	(0.087)	1.186***	(0.232)
Relative US Economic Subordination	−0.329**	(0.165)	0.252	(0.209)
USSR/Russia Security			−0.370†	(0.281)
Challenger-Target Power Ratio	4.656***	(0.786)		
Challenger-Target Power Ratio^2	−3.913***	(0.683)		
Dominant-Subordinate Power Ratio			0.360***	(0.083)
Dominant-Subordinate Power Ratio^2			−0.243***	(0.051)
Power Change	−0.176	(0.389)		
Ongoing US MIDs			0.081*	(0.047)
Civil War	0.574***	(0.165)		
Previous Challenge	0.724***	(0.057)	−0.057***	(0.021)
Contiguity	3.300***	(0.162)		
Distance			−0.190*	(0.105)
Trade	4.213†	(3.279)		
Challenger-Target Joint Democracy	−1.054***	(0.212)		
Dominant-Subordinate Joint Democracy			−0.487***	(0.146)
Challenger-Target Alliance	−0.458**	(0.199)		
Constant			−11.457***	(3.490)
Log-Likelihood	-4047.368		-312.653	
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.6: Militarized Challenge and Punishment in US Hierarchy, Punishment in the same year.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.176^{***}	(0.054)		
US Economic Subordination	0.005	(0.050)		
Constant	4.549^{***}	(0.281)		
Acquiesce Equation:				
Constant	1.498^{***}	(0.298)		
Conflict Equation:				
Relative US Security Subordination			0.966^{***}	(0.212)
Relative US Economic Subordination			0.266^{dagger}	(0.162)
USSR/Russia Security			$-0.369^{\dagger}$	(0.276)
Challenger-Target Power Ratio	5.244^{***}	(0.876)		
Challenger-Target Power Ratio^2	-4.444^{***}	(0.732)		
Dominant-Subordinate Power Ratio			0.364^{***}	(0.081)
Dominant-Subordinate Power Ratio^2			-0.246^{***}	(0.049)
Power Change	-0.132	(0.336)		
Ongoing US MIDs			0.083^{*}	(0.048)
Civil War	0.480^{***}	(0.176)		
Previous Challenge	0.830^{***}	(0.056)	-0.064^{***}	(0.022)
Contiguity	3.251^{***}	(0.164)		
Distance			-0.245^{**}	(0.096)
Trade	5.406^{*}	(3.035)		
Challenger-Target Joint Democracy	-1.093^{***}	(0.245)		
Dominant-Subordinate Joint Democracy			-0.409^{***}	(0.145)
Challenger-Target Alliance	-0.392^{*}	(0.213)		
Constant			-11.094^{***}	(3.309)
Log-Likelihood	-4079.490		-303.961	
Observations	549570		652	

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$, two-tailed; $^{+}p < 0.1$, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.7: Militarized Challenge and Punishment in US Hierarchy, Punishments Include Only MIDs (excludes economic sanctions).

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.206***	(0.060)		
US Economic Subordination	0.015	(0.046)		
Constant	4.843***	(0.331)		
Acquiesce Equation:				
Constant	1.813***	(0.342)		
Conflict Equation:				
Relative US Security Subordination			1.122***	(0.238)
Relative US Economic Subordination			0.149	(0.184)
USSR/Russia Security			−0.055	(0.338)
Challenger-Target Power Ratio	6.201***	(1.125)		
Challenger-Target Power Ratio^2	−5.275***	(0.973)		
Dominant-Subordinate Power Ratio			0.486***	(0.102)
Dominant-Subordinate Power Ratio^2			−0.314***	(0.063)
Power Change	0.999**	(0.065)		
Ongoing US MIDs			0.028	(0.057)
Civil War	0.258	(0.243)		
Previous Challenge	***	()	−0.098***	(0.030)
Contiguity	3.609***	(0.217)		
Distance			−0.202**	(0.101)
Trade	9.637***	(2.179)		
Challenger-Target Joint Democracy	−1.545	(1.455)		
Dominant-Subordinate Joint Democracy			−1.454***	(0.256)
Challenger-Target Alliance	−0.659***	(0.252)		
Constant			−16.810***	(4.161)
Log-Likelihood	-4307.600		-215.363	
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.8: Militarized Challenge and Punishment in US Hierarchy, Punishment Includes Only Actual Uses of Force (MID> 3).

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.196***	(0.062)		
US Economic Subordination	0.028	(0.044)		
Constant	4.826***	(0.307)		
Acquiesce Equation:				
Constant	1.776***	(0.320)		
Conflict Equation:				
Relative US Security Subordination			1.219***	(0.228)
Relative US Economic Subordination			0.111	(0.174)
USSR/Russia Security			−0.215	(0.308)
Challenger-Target Power Ratio	6.095***	(1.012)		
Challenger-Target Power Ratio^2	−4.991***	(0.865)		
Dominant-Subordinate Power Ratio			0.381***	(0.090)
Dominant-Subordinate Power Ratio^2			−0.251***	(0.056)
Power Change	0.355	(0.446)		
Ongoing US MIDs			−0.057	(0.053)
Civil War	0.414*	(0.213)		
Previous Challenge	0.855***	(0.085)	−0.050**	(0.023)
Contiguity	4.143***	(0.208)		
Distance			−0.164*	(0.099)
Trade	8.804***	(2.591)		
Challenger-Target Joint Democracy	−1.227**	(0.513)		
Dominant-Subordinate Joint Democracy			−1.093***	(0.201)
Challenger-Target Alliance	−0.882***	(0.250)		
Constant			−12.633***	(3.602)
Log-Likelihood	-4213.753		-246.992	
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.9: Militarized Challenge and Punishment in US Hierarchy, Controlling for Cold War.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.197***	(0.059)		
US Economic Subordination	0.005	(0.046)		
Constant	4.537***	(0.243)		
Acquiesce Equation:				
Constant	1.504***	(0.258)		
Conflict Equation:				
Relative US Security Subordination			1.044***	(0.215)
Relative US Economic Subordination			0.296*	(0.161)
USSR/Russia Security			−0.484*	(0.283)
Challenger-Target Power Ratio	4.700***	(0.788)		
Challenger-Target Power Ratio^2	−3.849***	(0.677)		
Dominant-Subordinate Power Ratio			0.375***	(0.082)
Dominant-Subordinate Power Ratio^2			−0.251***	(0.050)
Power Change	−0.143	(0.364)		
Ongoing US MIDs			0.066†	(0.048)
Civil War	0.451***	(0.163)		
Previous Challenge	0.702***	(0.054)	−0.059***	(0.021)
Contiguity	3.238***	(0.157)		
Distance			−0.236**	(0.097)
Trade	4.103†	(2.813)		
Challenger-Target Joint Democracy	−1.035***	(0.212)		
Dominant-Subordinate Joint Democracy			−0.480***	(0.147)
Challenger-Target Alliance	−0.413**	(0.201)		
Cold War			−0.217†	(0.159)
Constant			−11.427***	(3.353)
Log-Likelihood	-4070.247		-313.196	
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.10: Militarized Challenge and Punishment in US Hierarchy, Including Joint IGO Memberships.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Subordination	0.185***	(0.056)		
US Economic Subordination	0.001	(0.051)		
Constant	4.522***	(0.252)		
Acquiesce Equation:				
Constant	1.466***	(0.270)		
Conflict Equation:				
Relative US Security Subordination			1.032***	(0.214)
Relative US Economic Subordination			0.284*	(0.160)
USSR/Russia Security Subordination			−0.393†	(0.275)
Challenger-Target Power Ratio	4.706***	(0.783)		
Challenger-Target Power Ratio^2	−3.937***	(0.672)		
Dominant-Subordinate Power Ratio			0.361***	(0.081)
Dominant-Subordinate Power Ratio^2			−0.243***	(0.049)
Power Change	−0.114	(0.361)		
Ongoing US MIDs			0.080*	(0.047)
Civil War	0.502***	(0.158)		
Previous Challenge	0.722***	(0.060)	−0.054**	(0.021)
Contiguity	3.254***	(0.165)		
Distance			−0.255***	(0.096)
Trade	4.593†	(3.025)		
Challenger-Target Joint Democracy	−1.040***	(0.233)		
Dominant-Subordinate Joint Democracy			−0.439***	(0.144)
Challenger-Target Alliance	−0.444**	(0.214)		
Challenger-Target Joint IGO Memberships	0.127	(0.140)		
Constant			−10.939***	(3.299)
Log-Likelihood			-314.118	
Observations	549570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Table C.11: Militarized Challenge and Punishment in US Hierarchy, Including Regional Dummies to Account for Geographical Clustering in US Hierarchy.

Actor	Subordinate		Dominant	
Status Quo Equation:				
US Security Hierarchy	0.106**	(0.052)		
US Economic Hierarchy	−0.061	(0.049)		
Constant	4.740***	(0.318)		
Acquiesce Equation:				
Constant	1.600***	(0.323)		
Conflict Equation:				
Relative US Security			0.953***	(0.240)
Relative US Economic			0.101	(0.167)
USSR Security			0.123	(0.320)
Challenger-Target Power Ratio	3.947***	(0.927)		
Challenger-Target Power Ratio^2	−3.586***	(0.752)		
Dominant-Subordinate Power Ratio			0.444***	(0.091)
Dominant-Subordinate Power Ratio^2			−0.308***	(0.056)
Power Change	−0.001	(0.278)		
Ongoing US MIDs			0.080†	(0.049)
Civil War	0.300**	(0.149)		
Previous Challenge	0.568***	(0.043)	−0.054**	(0.023)
Contiguity	2.900***	(0.153)		
Distance			−0.101	(0.110)
Trade	8.230***	(2.215)		
Challenger-Target Joint Democracy	0.402**	(0.166)		
Dominant-Subordinate Joint Democracy			−0.366**	(0.153)
Challenger-Target Alliance	−0.028	(0.180)		
Europe	1.485***	(0.253)	−1.751***	(0.338)
Middle East	−0.028	(0.340)	−0.773***	(0.263)
Africa	1.225***	(0.163)	−0.188	(0.204)
North and Central Asia	0.920***	(0.214)	−1.287***	(0.326)
South East Asia and Oceania	0.759**	(0.383)	−1.072***	(0.383)
Constant			−13.734***	(3.664)
Log-Likelihood	-4069.833		-285.959	
Observations	549,570		652	

Note: ***p <0.01, **p <0.05, *p <0.1, two-tailed; ^+p <0.1, one-tailed. Subordinate S.E. are bootstrapped (500 simulations).

Appendix D Control Variables

The literature is the best guide of which controls to include: i.e., the models only include control variables that have been consistently included in other recent studies of inter-state conflict. I discuss the variable, measure, and justification for each control variable included in the empirical model (by equation).

Subordinate Conflict Regressors ($X_{S_{22}}$)

Subordinate's utility from challenging the status quo depends on a number of factors aside from social hierarchy. States that are strong in terms of material power are expected to seek greater autonomy. Three measures are used to represent a state's military capabilities: *power ratio*, *squared power ratio* and *power change*. These are measured using the Correlates of War's CINC variable, which measures a country's power based upon economic and military capabilities and population size (Singer 1987).[29] *Power ratio* is measured as $\frac{\text{CINC A}}{\text{CINC A+CINC B}}$. In this equation, state A represents the potential challenger and B the potential target state. Perfect preponderance would equal 1 and perfect symmetry would equal 0.5.

Power ratio and *squared power ratio* and capture the well-known non-linear relationship between power and conflict (Bennett and Stam 2004; Kugler and Lemke 1996). A state is more likely to initiate a conflict when its target is relatively equal to it in strength. States with an overwhelming preponderance of power, on the other hand, are less likely to engage in militarized disputes, as the weaker state will back down if confronted. The inclusion of the squared term captures this non-linear effect.

Power change reflects the idea that rising states may be more dangerous, as they have an expectation of continued growth and may seek to obtain more resources (Gerschenkron 1962; Doran 2003; Gilpin 1981) *Power change* is measured by subtracting State A's CINC score in the current year from its CINC score the previous year.

I also include a control for *civil wars*, which are expected to reduce the likelihood of a

[29]Economic capabilities are based upon a state's iron and steel production and energy consumption. a state's military personnel and military expenditure compose its military capabilities. Finally, population capabilities are configured as a state's total population, as well as its urban population.

challenge, as states experiencing a civil war are preoccupied with domestic concerns. Civil war is defined as any conflict between the government and non-state actor with at least 1,000 battle deaths in a twelve month period. *Civil wars* are coded dichotomously and are obtained from the Correlates of War project (Sarkees 2000). The number of *previous challenges* by a state is also included in the analysis as conflict may be path dependent, with state pairs viewing each other in more antagonistic terms with each additional conflict (Colaresi 2004; Goertz and Diehl 1995; Thompson 2001). A large number of previous challenges could also represent a state that is outside of the dominant's hierarchy (i.e., non-aligned subordinate).

Subordinates are more likely to initiate challenges against contiguous neighbors. due to both more frequent interaction and the fact that neighbors are more likely to have outstanding, highly salient territorial disputes (Hensel 2001; Gibler 2012; Vasquez 1995). I treat *contiguity* as a dichotomous variable where 1 indicates that states share a land border and 0 otherwise (Bennett and Stam 2000).[30]

The literature offers a number of theoretical expectations regarding the effect of trade on subordinate-subordinate conflict (Barbieri and Schneider 1999). Trade may reduce conflict by increasing ties and opportunity costs of fighting (Gartzke 2007; Russett and Oneal 2001; Snidal 1991), though it could increase conflict as states become concerned with relative gains (Barbieri 2002; Gowa 1989, 1994; Grieco 1988). I control for *trade* and measure it as a percent of GDP using data from the Correlates of War project (Barbieri et. al. 2009).

Previous studies demonstrate that democracies are less likely to attack other democracies (Reed 2000). *Joint democracy* may represent an ideological cost or operate as an institutional constraint on leaders who wish to initiate a conflict (Bueno de Mesquita et al 1999; Maoz and Russett 1993; Russett and Oneal 2001). Democracy is measured using the 21 point Polity score of the country where scores of 10 indicate democracy and scores of -10 autocracy (Marshall and Jaggers 2008). *Joint democracy* is a dichotomous variable that is given a value of 1 if both members have democracy scores of at least 6, and 0 otherwise.[31]

Finally, I account for whether a challenger and target have an *alliance*, as allies are

[30] Changing the operationalization of *contiguity* to include neighbors with 12 miles or even 400 miles of open sea did not substantially alter the results.

[31] Other thresholds were used without altering the results in any meaningful way.

expected to be less conflict prone (Leeds 2003; Mattes and Vonnahme 2010). Alliance data are obtained from Gibler (2009).[32]

Dominant Conflict Regressors ($X_{D_{22}}$)

I control a number of other important factors that may influence a dominant state's likelihood of punishing a challenge. In addition to several analogously motivated variables (power ratio, power ratio squared, previous challenge, joint democracy), I account for several other standard control variables that may influence whether the US punishes a challenger. *USSR/Russia security subordination* captures the idea that the US might be less likely to punish a challenge if the challenger is closely tied to Russia, as Russian hierarchy might deter it (i.e. fear of confronting a major power). This variable is analogous to the measure discussed by Lake (2009: Ch 3) for capturing the US security hierarchy. The USSR/Russia measure, however, only includes the shared alliances measure, $\frac{1}{\text{State I's \# of Independent Alliances}}$. Unfortunately, I was unable to generate an analogous economic subordination measure, due to the lack of data for the Soviet era. The correlation between the US and USSR/Russia security subordination is $r = 0.19$.[33]

Ongoing MIDs is a count variable tracking the total number of MIDs with US involvement in a given year. This variable captures the idea that US resources (and resolve) are finite, so involvement in a war on one theater ties up resources and increases the marginal costs of entering a new conflict.

More distant locations increase the cost of fighting, as the costs of supporting troops increases (Bueno de Mesquita 1981; Bueno de Mesquita and Lalman 1992; Lemke 2002). This holds even if the dominant state has troops stationed in nearby states, as invading or occupying a hostile country requires greater logistical prowess. Data regarding *distance* are logged and obtained from EUgene (Bennett and Stam 2000).

I also control for the effect of *previous challenges*. In this equation, *Previous challenges*

[32] I include only pairs of states with defense pacts as allies. I have also analyzed results with other types of alliance, with little effect on the main results.

[33] There is generally very little membership overlap between the US and USSR camps during the Cold War, with only 12 country-years of joint membership. These 12 years consist of 6 each for Great Britain and France, and are remnants of World War II, as each cancels their Soviet defense pact in 1955.

help identify states that are completely outside of the US hierarchy; states that continuously initiate disputes have demonstrated that they are unlikely to be deterred by the US.

It is noteworthy that any control variable in the Punishment equation do impact the variables in the Challenge equation, through the subordinates expectation of punishment.

Finally, *Global power* represents the degree to which the dominant state has military supremacy over other major powers. This variable intended to account for potential alternative social hierarchies that subordinates can turn to if the dominant (US) is failing at providing political order (security). The logic behind this is simple supply and demand: dominant states prefer that subordinates adhere to their interests, as opposed to those of an alternative dominant. Providing benefits to subordinates, such as political security, however, is costly. In the absence of credible alternative hierarchies, dominants are likely to reduce the quality of benefits they provide in order to save costs. The theoretical expectation is that an increase in Global Power (i.e., a increase in US power in relation to alternative dominants) decreases the pressure on the dominant to provide order to its subordinates (similar to the monopolistic competition idea). Analogously, when Global Power is low, US faces stronger competition from alternative hierarchies (as strong alternative hierarchies are more attractive to subordinates than weak alternative hierarchies); hence, the US has a greater incentive to provide order to its subordinates. That is, the inverse of *global power* represented the latent risk of a subordinate joining an alternative hierarchy if the dominant fails to punish challengers. Theoretically, this idea is distinct and runs counter to the deterring effect *USSR/Russia Security Subordination*, as *Global Power* captures the idea of a global competition for subordinates, while *USSR/Russia Security Subordination* accounts for Soviet affinity within a dyad (and a subsequent deterring effect from an additional potential entrant to an existing conflict). *Global power* is measured as $\frac{\text{CINC US}}{\sum \text{CINC Other Great Powers}}$.[34] This measure is included only in robustness checks.

[34] Within the time frame under review, great powers are operationalized as China (1950-2000), France (1950-2000), Germany (1991-2000), Japan (1991-2000), Great Britain (1950-2000), the US (1950-2000), and Russia/USSR (1950-2000) (Bennett and Stam 2000).

Table D.1: Descriptive Statistics, US Hierarchy and Conflict.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Challenge	549570	0.001	0.034	0	1
Security Hierarchy	549570	0.234	0.393	0	5.913
Shared Alliances	549570	0.373	0.479	0	1
Military Personnel	549570	0.096	0.546	0	10.826
Economic Hierarchy	549570	0.200	0.311	0	2.781
Trade Dependence	549570	0.054	0.140	0	2.708
Exchange Rate	549570	0.213	0.359	0	1
Power Ratio (Challenge)	549570	0.515	0.356	0	1
Power Change	549570	0.001	0.081	-3.58	0.916
Previous Challenge (Challenge)	549570	0.026	0.322	0	21
Contiguity	549570	0.024	0.154	0	1
Joint Democracy (Challenge)	549570	0.209	0.406	0	1
Alliance	549570	0.041	0.199	0	1
Trade	549570	-6.638	0.602	-6.908	0.265
Civil War	549570	0.068	0.253	0	1
Punishment	652	0.259	0.439	0	1
Relative Security Hierarchy	652	0.046	0.310	-2.303	1.32
Relative Shared Alliances	652	0.087	0.483	-1	1
Relative Military Personnel	652	0.004	0.328	-4.605	1.641
Relative Economic Hierarchy	652	0.006	0.385	-1.258	1.742
Relative Trade Dependence	652	0.009	0.225	-1.678	2.323
Relative Exchange Rate	652	0.000	0.450	-1	1
USSR/Russia Security Hierarchy	652	0.084	0.276	0	1
Global Power	652	33.383	4.497	28.274	46.638
Power Ratio (punishment)	652	93.582	9.224	53.22	99.993
Distance	652	8.524	0.602	0	9.099
Joint Democracy (punishment)	652	0.275	0.447	0	1
Ongoing MID	652	3.307	1.244	1	6
Previous Challenge (punishment)	652	1.856	2.754	0	21