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ARTICLE

Hierarchy and war

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Abstract

Scholars have written extensively about hierarchical international order, on the one hand, and war on the other, but surprisingly little work systematically explores the connection between the two. This disconnect is all the more striking given that empirical studies have found a strong relationship between the two. We provide a generative computational network model that explains hierarchy and war as two elements of a larger recursive process: The threat of war drives the formation of hierarchy, which in turn shapes states' incentives for war. Grounded in canonical theories of hierarchy and war, the model explains an array of known regularities about hierarchical order and conflict. Surprisingly, we also find that many traditional results of the international relations literature—including institutional persistence, balancing behavior, and systemic self-regulation—emerge from the interplay between hierarchy and war.

While a strong relationship exists between hierarchical international order and international conflict (Beardsley et al., 2020; McDonald, 2015; Travlos, 2016; Wallensteen, 1984), we know little about the mechanisms that produce that relationship. Does hierarchy reduce the frequency of conflict, or does the absence (or, conversely, threat) of conflict produce hierarchy? Are both hierarchies and the absence of conflict endogenous to major war, ideological affinity, or other factors? Why is there a relationship between hierarchy and war?

Studies of hierarchy offer little insight into this question. They generally focus on relationships within hierarchies, not between or among them. Consequently, they cannot explain external influences on hierarchy formation or differences in rates of conflict initiation within and outside of hierarchies (Glaser, 2019).

Similarly, the theoretical literature on war has surprisingly little to say about the role of international order, hierarchical or otherwise. Formal and game-theoretic models of war (e.g., Fearon, 1995; Filson & Werner, 2002; Slantchev & Tarar, 2011) are typically dyadic and not designed to incorporate multiactor behavior like hierarchy formation. International security scholars have produced arguments that relate the distribution of power in the system to major wars (Gilpin, 1981; Organski & Kugler, 1980), but they use "hierarchy" only in the narrower sense of a distribution of power among Great Powers, typically assume a single, global hierarchical order, and seek to explain only large, systemic wars.

Verification Materials: The data and materials required to verify the computational reproducibility of the results, procedures, and analyses in this article are available on the *American Journal of Political Science* Dataverse within the Harvard Dataverse Network, at: https://doi.org/10.7910/DVN/J2MNEU. The code for the theoretical model is available at the CoMSES Model Library at https://www.comses.net/codebases/6f1b45d2-7fc3-491c-9d73-44b6c1f32fa7/releases/1.0.0.

This gap in the literature has significant real-world implications. Changes in patterns of international order can be associated with dramatic changes in conflict worldwide: The dissolution of the Soviet bloc, for example, coincided with a striking decline in the rate of international conflict initiation (Braumoeller, 2019, chapter 4). Without a convincing explanation of why that decrease occurred, policymakers have little concrete guidance on the question of how to sustain it.

In this article, we offer a generative theoretical model in which hierarchy and war both emerge from the interactions of agents and structure their subsequent behavior.[1] Building on established theories of each, we create a model in which states negotiate over issues of mutual importance, risking war in the process, and have the option of contracting with a hierarch to reduce the danger of war. The hierarch offers benefits that help member states avoid war and drive better bargains. In exchange, subordinate states provide benefits of value to the hierarch (e.g., formal alliances, basing rights, United Nations votes). States join hierarchies if the benefits outweigh the costs, a calculation that is influenced both by the number and membership status of other states and the overall danger of war in the international system.

Despite its relative simplicity, our model produces an array of regularities that map to known outcomes, even as it challenges conventional explanations for some of them. It explains the now well-established regularity that members of the same hierarchy tend not to fight one another. It also reproduces the observed pattern that most conflict occurs in dyads where the states belong to different hierarchies while calling into question the claim that being in separate hierarchies necessarily makes those states more hostile. Instead, it highlights a new mechanism by which belligerent pairs of states screen themselves into different hierarchies, redistributing wars rather than increasing their frequency. Similarly, our model challenges the conclusion that multiple hierarchies are a recipe for more systemic conflict, concluding instead that systemic conflict increases the demand for hierarchy. The model also explains the fact that hierarchical orders tend to be founded in the aftermath of major wars, and it predicts that support for order should diminish as the memory of such wars fades.

More surprising still, the model produces a range of outcomes that are well-established in other literatures but had not previously been theorized as outcomes of the interplay between hierarchy and war. These include institutional persistence, endogenous balancing and bandwagoning behavior, and a Poisson distribution of conflict onsets per period—an empirical regularity first noted 80 years ago (Richardson, 1944) but rarely theorized.

The model has considerable value to scholars and policymakers alike. It shows how straightforward dyadic bargains aggregate into broader patterns of international hierarchy and those patterns of hierarchy, in turn, change the calculus of bargaining. It organizes a range of disparate empirical generalizations and known facts under the umbrella of a single explanation. It produces nonobvious implications and directions for future study. It articulates a clear causal mechanism that offers guidance for policymakers attempting to navigate rival spheres of influence. Most of all, it does what scientific models do best: provide specialists with a compact means of conceiving of and conveying the core knowledge of a discipline so that others can build on it.

HIERARCHY AND WAR

We first sketch the theoretical foundation of our model, which we implement formally in the next section. Our goal is to capture the elements necessary to understand the essence of the relationship between hierarchy and war while abstracting away from other theoretical nuances, such as geography and substate-level actors, that would increase verisimilitude at the expense of parsimony (Healy, 2017; Waltz, 1979, p. 115).

States

Our model begins with a world similar to that described by Realist students of polarity and war: a stylized interstate system in which power is relevant mainly in that it distinguishes poles from nonpoles (Christensen & Snyder, 2011; Kupchan, 2021; Wohlforth, 2009). For our purposes, only major powers—those with a significant amount of influence on international relations and the ability to shape regional or global events—are potential hierarchs.

States also have varied interests, broadly separated in two categories. *Intrinsic* interests are valuable in their own right (material resources, territory, etc.). *Governance* interests are those that involve the social purpose of, and principles of legitimacy that underpin, hierarchy. For example, hierarchies are often organized around specific forms of governance (e.g., monarchism in the Concert of Europe or communism in the post-1945 Soviet sphere) while excluding others (republican liberalism and liberal democracy, respectively). These international governance interests are often driven by hierarchs' own domestic principles of legitimation, as well as by perceived

[1] Epstein (2006) defines a generative account as one in which outcomes are produced by the decentralized local interactions of autonomous agents. He argues that generative models represent a fundamentally new standard of explanation: put succinctly, "If you didn't grow it, you didn't explain it" (p. xii).

ideological threats to those principles (Kupchan, 2014; Lascurettes, 2020).

Our approach to governance interests draws on established understandings of how beliefs about appropriate governance provide the "foundational principles of domestic political legitimacy" that affect the state's perceptions of external threats (Haas, 2018, p. 1) and promote cooperation among similar states (Owen, 2005). Even those realists who are skeptical of the claim that domestic regime type is relevant to state behavior agree that hegemons may prefer the principles of legitimacy upon which they themselves rely (Gilpin, 1981; Mearsheimer, 2018, p. 37). Some realists go further, acknowledging a central role for domestic ideology in determining the rules of legitimate international conduct: "[i]f the domestic structures (of states in an international system) are based on commensurable notions of what is just, a consensus about permissible aims and methods of foreign policy develops" (Kissinger, 1966, p. 503). This perspective informs, for example, Schake's (2017) argument that compatible ideologies among rising and declining powers allow for peaceful transitions between hegemonic orders.

Disputes—disagreements that have the potential to lead to armed conflict—may arise due to differences in intrinsic or governance interests. Common issues include wealth and territory for the former and principles of domestic governance for the latter. Because ideologically similar states may still have major differences in intrinsic interests, it is not automatically true that they will not fight one another, but in periods dominated by clashes over governance issues, they should have fewer reasons to fight.

Assumption 1. States' power varies; the strongest states are potential hierarchs.

Assumption 2. States typically have different intrinsic and governance interests.

Assumption 3. Disputes between states are more likely to arise as differences between their interests increase.

War

Not all disputes escalate to war.[2] States first attempt to negotiate over disputed issues. If bargaining fails to produce a negotiated settlement, states resort to armed conflict to resolve their disagreements. This understanding of war as the outcome of a process of failed negotiation dates back at least to the work of von Clausewitz (1832), though the best-known articulation of the bargaining paradigm is Fearon (1995). The bargaining model of war's capacity to capture key strategic dimensions of war has made it the "state of the art" in the study of conflict (Gartzke & Poast, 2017).

The core elements of the model are as follows. When states bargain over contested issues, they do so with limited information regarding their partner's reservation value. War is costly, and uncertainty about how far a negotiating partner can be pushed without provoking a war leads states to demand less than they would if they had better information. The resulting demand reflects a balance between the value of a negotiated settlement and the probability of war. The probability of war, in turn, is a function of both uncertainty and the cost of war.

Because we specify the logic of interaction but do not restrict the players to substantively rational beliefs or preferences, this account of bargaining can serve as a robust representation of a wide range of conflict bargaining processes. Any issue could give rise to conflict, for example, and uncertainty could come from any number of sources, including irrational ones such as psychological biases, without changing the logic of the model or its implications.[3] As Fearon (1995) himself notes, his article does not deny the existence of nonrational explanations for war; it just does not address them. In other words, bargaining models are not inherently rational-choice models; they are models of choice that are most often employed by rationalists.

Assumption 4. Wars are the results of bargaining failure over disputed issues.

Hierarchies

In line with a growing literature on hierarchy (Ikenberry, 2011; Kang, 2010; Lake, 2009), we understand hierarchy to be a relationship of legitimate authority among states—Bially Mattern and Zarakol's (2016) "narrow" conception of hierarchy. More specifically, we define hierarchy as an institutionalized functional bargain in which the subordinate state pays a price—or "tribute" (Axelrod, 1995)—in exchange for security provided by the superordinate state (the hierarch). Throughout history, this tribute has taken many forms, from outright payments to basing rights to domestic and foreign policy adjustments. Typically, these represent a sacrifice of autonomy. In exchange,

[2] We follow convention in the formal-theory literature and use "war" in the broad sense of a condition of armed conflict between two or more states in the international system (e.g., Fearon, 1995; Filson & Werner, 2002; Slantchev & Tarar, 2011; Wagner, 2000).

[3] Many others have argued that rational choice models could incorporate nonrational motives (e.g., Cook & Levi, 2008; Elster, 2015; Lupia, 2002). Reiter (2003) argues for the merits of such syntheses in the context of the bargaining model.

the hierarch provides security, for example, by sharing information related to the subordinate's enemies or by taking up arms to aid the subordinate state. Systems of alliances, protectorates, suzerainties, empires, and spheres of influence all qualify as hierarchies if they share this logic of tribute-for-security (Lake, 1996).

We should note that, while international order is often associated with liberal theories of cooperation under anarchy, functional bargains of this nature can be driven by a wide range of state motivations. When states join a hierarchy, they do so not just to reduce the probability of war, but to gain a bargaining advantage vis-à-vis other states. Therefore, the microfoundations of large-scale cooperation among states are entirely consistent with a realist perspective in which states leverage international institutions to further predatory rather than peaceful goals (Morgenthau, 1960; Schweller & Preiss, 1997).

The benefits of hierarchy

Hierarchies enable better bargains by increasing the war costs for nonmembers who clash with members, and by reducing uncertainty for members. To increase opponents' war costs, hierarchs intervene directly or indirectly to inflict additional economic or military costs on the subordinate state's opponent.[4]

Hierarchies reduce uncertainty both via direct intelligence sharing with subordinate states and by establishing lateral information-sharing fora in which member states pool information about nonmember states' capabilities, resolve, and intentions (Axelrod & Keohane, 1985; Keohane, 1986). NATO, a core military institution of the liberal international order, provides a salient, contemporary example of how a hierarchy provides both sharing mechanisms. During the NATO mission in Kosovo, NATO provided an intelligence cell in which member states shared their own national intelligence laterally with other allies (Gordon, 2017, p. 15). When NATO expanded its intelligence-sharing efforts through the NATO Intelligence Fusion Cell in late 2005 and early 2006, it was a top-down United States-led effort to provide intelligence to NATO allies (Gordon, 2017, pp. 16–17). Bilateral relations outside of NATO serve the same function. For example, the relations of the United States with Iraq include both intelligence sharing and military assistance (U.S. Embassy Baghdad, 2022).

Assumption 5. Hierarchies reduce uncertainty about opponents' war costs and increase opponents' war costs.

[4] Hierarchies may also involve mutual defense, which achieves the same result by distributing interventions across member states. Because doing so adds considerable complexity, we address this scenario as a possible future extension in the Online Appendix.

The cost of hierarchy

For powerful states, the central benefit of establishing a hierarchy comes in the form of the tribute they receive from members. Like the issues that prompt conflict among smaller states, hierarchs have a mix of material and ideological goals. The cost that subordinates pay to join a hierarchy may include the extraction of resources, basing rights or other forms of defense coordination, shifting the subordinate's foreign or domestic policy positions closer to those of the hierarch, and the like. We assume that two considerations drive the size of this tribute.

First, governance costs for the hierarch rise with the incompatibility of governance interests (Lake, 1996), and the hierarch demands more tribute to offset these costs. For example, a communist state would be required to make more substantial adjustments than a democracy would in order to join a hierarchy founded on democratic principles, and it would have to justify hierarchy membership to domestic audiences without undermining its own domestic legitimacy (cf. Lake, 2013). These considerations do not *prevent* states from joining a hierarchy whose governance interests diverge from their own, but such a hierarchy will be less attractive than one nearer to the states' ideal point.

Second, hierarchs sometimes reduce the tribute of states with strong strategic value, due, for example, to their geographic position or abundance of natural resources. U.S. relations with Saudi Arabia are a good illustration of this point: Absent massive oil reserves, a repressive state operating under Shari'a law would likely not possess the third-largest fleet of F-15s in the world or agree to use its influence to prevent the depreciation of the dollar and erosion of America's role in world financial markets (Bapat, 2019).

Assumption 6. To join a hierarchy, states must pay the tribute set by the hierarch.

Assumption 7. The tribute hierarchs demand is a function of states' governance interests and strategic value.

Systemic incentives

A state's calculations about the costs and benefits of joining a hierarchy are not dyadic. Rather, they are a function of the interests and hierarchy memberships of all other states in the international system. The decision to join a hierarchy is the result of a complex evaluation process informed by the intrinsic and governance interests of the state in relation to the interests of other states and those states' hierarchy

membership.[5] Joining, in turn, changes the calculations of the other states in the system.

Joining hierarchies is not the only behavior in which states engage. Some leave hierarchies (e.g., China following the Sino–Soviet split during the Cold War), switch hierarchies (e.g., Nicaragua after its 1979 revolution), or remain outside in anarchy (e.g., India, Egypt, and other members of the Non-Aligned Movement). These decisions, too, are driven not just by the security afforded by different hierarchs but by the nature of the interactions they can expect given the interests and hierarchy memberships of all other states in the system.

Assumption 8. States decide whether to join or leave a hierarchy strategically, taking into account their own interests and the interests and hierarchy memberships of all states in the system.

FORMAL MODEL

Having introduced our model in general terms, we now turn to a formal specification. Because dynamic, many-actor models are hostile to closed-form solutions, scholars have increasingly turned to simulation methods to understand their properties (e.g., de Marchi & Laver, 2020; Filson & Werner, 2007; Jung & Lake, 2011). Accordingly, we codify the actors and these assumptions about their behavior in the form of a computational network model and use simulation to explore the ways in which changes in inputs have an impact on state behavior and equilibrium conditions.[6]

States and war

Each state $i \in \{1 \dots i \dots n\}$ has intrinsic, r_i, and governance, s_i, interests. The relative importance of each kind of interest is captured by v, which takes a value on the unit interval. The probability that a contentious issue will produce a dispute between i and another state j (Diehl, 1992; Hensel, 2001) in a given time period is a function of the Euclidean distance between their interest positions along both dimensions, weighted by the relative importance of each: $d(i,j) = \sqrt{((r_i - r_j)(1-v))^2 + ((s_i - s_j)(v))^2}$. Finally, states have a strictly nonnegative strategic value, z_i, to potential hierarchs.

If a dispute arises, states negotiate. We take the value of the disputed issue, π, to be constant and assume for the sake of simplicity that states have equal probabilities of victory, $p_{victory}$. States' cost of war consists of a baseline cost, c, and an uncertainty component, ε, drawn from a Normal distribution known to all states, $\varepsilon \sim N(0,\sigma)$. σ captures systemic uncertainty and, per standard practice, we enforce $c + \varepsilon \geq 0$ to ensure that war remains costly. Importantly, we do not fix the probability of war, p_{war}, which is the probability that j rejects i's demand and is thus endogenous to i's decision-making process regarding what demand to make.

Negotiation takes the form of i making a demand $x \in [0,\pi]$ that maximizes $U_i = p_{war}(\pi p_{victory,i} - c_i) + (1 - p_{war})x$ and j accepting that demand iff $1 - x \leq (p_{victory,j})\pi - (c_j + \varepsilon)$. If j rejects i's demand, war occurs. This is the canonical take-it-or-leave-it form of the bargaining model of war with uncertainty. As Fey and Kenkel (2021) demonstrate, more complicated bargaining games produce the same probability of war, even if they involve different opening offers, sequences of actions, and so forth.

Hierarchies

A hierarchy $h \sim \{1 \dots h \dots N\}$ reduces the danger of war for its members in two ways: by reducing uncertainty and by increasing opponents' costs of war. We implement uncertainty reduction as a discount factor, u, that reduces member states' uncertainty about their opponents' costs of war from $\varepsilon \sim N(0,\sigma)$ to $\varepsilon \sim N(0,\sigma(1-u))$. We implement an increase, c_h, in an opponent's costs of war similarly, by increasing the nonmember's cost of war so that $c_j = c(1 + c_h)$.

To model tribute costs, we begin with a baseline tribute, T_h, defined as the full price that a state with no strategic value and governance interests diametrically opposed to those of the hierarch would have to pay to join its hierarchy (e.g., North Korea regarding the United States). We assume that this baseline increases in the number of states in the system, for two reasons. First, for the hierarch, the cost of providing hierarchy increases in the number of states in the system. Second, for states, hierarchy becomes more valuable as the number of opportunities for using its benefits increases—a surplus that a rational hierarch would seek to capture.

This multilateral component is then complemented by bilateral processes. Specifically, the hierarch decreases the cost of tribute for states with similar governance interests and for those with strategic value. The final tribute, t_{ih}, the hierarch demands of subordinate state i to join hierarchy h therefore decreases in the strategic value of i, z_i, and in their closeness over governance interests, $\sqrt{(s_i - s_h)^2}$, so that $t_{ih} = (T_h - z_i)\sqrt{(s_i - s_h)^2}$.

[5] In this foundational model, we do not focus on coercion by the hierarch, but it could be captured by increasing the hierarch's propensity to attack states in anarchy.

[6] This model is implemented in Julia and NetLogo and is archived at the CoMSES Model Library. For those interested in building on it, we offer examples of plausible model expansions in the Online Appendix ("A Flexible Framework").

Algorithm 1: Simulation Loop
Initialization
loop
for all states **do**
Hierarchy evaluation stage (Algorithm 2)
end for
for all states **do**
Interstate bargaining stage (Algorithm 3)
end for
end loop

Algorithm 2: Hierarchy evaluation phase
Evaluate the utility of being under anarchy
for all hierarchies **do**
Evaluate the utility of joining this hierarchy
end for
if the utility of being under anarchy is greater than that of joining any hierarchy **then**
Be under anarchy
else
Join the hierarchy with the highest utility
end if

Algorithm 3: Interstate bargaining phase
for all other states **do**
Check if an issue arises with that state
if an issue arises **then**
Calculate the offer that maximize one's utility
if the other state accepts this offer **then**
(Peace) Share issue following offer settlement
else
(War) Both states pay the cost of war and the winner "takes all"
end if
end if
end for

FIGURE 1 High-level overview of the logic of the computational model.

Finally, states join a hierarchy if doing so yields greater utility than joining any other hierarchy or remaining in anarchy.[7] It makes this decision by calculating its aggregate utility in the next-round bargaining phase and comparing that utility to its aggregate next-round utility as a member of each available hierarchy. Formally, i joins h^* if $\forall h \neq h^*$, $\sum U_{i|h^*} - t_{ih^*} \geq \sum U_{i|h} - t_{ih}$ and $\sum U_{i|h^*} - t_{ih^*} \geq \sum U_{i|anarchy}$. If $\forall h, \sum U_{i|anarchy} \geq \sum U_{i|h} - t_{ih}$, i prefers to be in anarchy, leaving its current hierarchy if necessary (Figure 1).

Simulation

We describe the dynamic between hierarchy and war in algorithmic form in Table 1. During the first stage, the "Hierarchy evaluation stage" (Algorithm 2), every state compares the likely outcomes of interacting with other states under anarchy to the likely outcomes of interaction in the second stage if it were to join each available hierarchy. Based on these considerations and the tribute it would have to pay, it chooses to join one of the available hierarchies or remain under anarchy. In the second stage (Algorithm 3), issues arise between states who then seek to resolve them via negotiation, risking war in an attempt to strike the best feasible bargain. The model then iterates (Algorithm 1), typically reaching an equilibrium state within 10–20 rounds.

To derive theoretical implications, we wait until the system has reached equilibrium, manipulate the value of one variable, and measure the impact of that manipulation. This process mimics the logic of an experiment, with simulated treatments and randomized controls.

Unless specified otherwise, all simulations contain 200 states and three potential hierarchs. During initialization, three states are randomly selected to act as hierarchs and their hierarchies remain available to join throughout the simulation run. To account for

[7] We assume that commitments are credible. A hierarch that is not (or only somewhat) credible in the benefits it provides is equivalent to a hierarch that provides fewer benefits: The benefits-to-cost ratio has worsened. Similarly, a hierarch that provides more benefits to core members (e.g., those closest to it ideologically) would provide fewer benefits to more peripheral members, whom it would have a harder time attracting.

TABLE 1 Model implications and their empirical support.

Model implication	Empirical support
Fewer wars within hierarchies	Beardsley et al. (2020); McDonald (2015); Braumoeller (2019); Cranmer et al. (2015)
More wars across hierarchies	Beardsley et al. (2020); Braumoeller (2019)
Screening effect	New conjecture
Multiple hierarchies increase systemic conflict	Wallensteen (1984); Braumoeller (2019)
Hierarchies form after large wars	Ikenberry (2000); Gilpin (1981)
Postwar systems with high governance conflict produce more interhierarchy conflict	New conjecture
Long time since last major war produces entropy	Schweller (2014)
Balancing and bandwagoning	Waltz (1979); Van Evera (1999)
Institutional persistence	North (1990); Pierson (2011)
Stable systemic rates of war initiation	New conjecture
Poisson distribution of war onsets	Richardson (1944); Houweling and Kuné (1984)

the randomness involved in any individual simulation, we run 200 iterations, with nonfixed variables resampled from their distributions at each iteration. The values used for all parameters during the simulations are listed in the Online Appendix.

Despite its relative parsimony,[8] this interactive process captures some of the most important elements of two important mechanisms, the bargaining model of war and the contractual model of hierarchy, and it does so in the context of a system of states, yet it remains coherent and interpretable. Even so, when compared to the two-actor, one-outcome theoretical models that have dominated the literature, the model packs a surprising amount of theoretical bang for the buck.

To warrant this claim, we now turn to a discussion of the model's dynamics and demonstrate that it produces a surprisingly rich set of implications.

IMPLICATIONS

Statistical models are typically evaluated by calculating the statistical significance of one or more partial correlations and, sometimes, by comparing goodness of fit. Theoretical models, by contrast, are abstractions, and because all abstractions are wrong in some particulars, the interpretation of goodness of fit is less obvious. The more relevant criterion, rather, is whether models are useful (Box, 1976; Clarke & Primo, 2012). Criteria for usefulness include the validity of the model's microfoundations, the extent to which it captures key features of the phenomenon it seeks to explain, and the utility of the model to practitioners, which is a function of both the number and importance of the insights it produces (Clarke & Primo, 2007, 2012; Potochnik, 2017).

Below, we describe the variety of insights that the model produces and reference support for each from empirical studies. We provide an overview of these findings, and of existing findings that support them, in Table 1. While some of these implications—low rates of conflict within hierarchies, for example, and the formation of hierarchies after large wars—are well known and supported by existing empirical studies in the conflict literature, the model also offers subtle new insights into institutional screening effects and the relationship between multiple hierarchies and systemic conflict. Moreover, the model produces emergent behaviors such as institutional persistence, self-regulation, and a Poisson distribution of war onsets, which, although well established, have not previously been linked to the interplay between hierarchy and war.

Wars across hierarchies

The first regularity we explore is the existence of high levels of conflict across hierarchies. Interhierarchy conflict is historically common, the most obvious example being the conflict between the Western liberal order and the Soviet communist order during the Cold War, and shows up in studies of militarized interstate dispute initiation (Beardsley et al., 2020; Braumoeller, 2019). We focus on three mechanisms

[8] While this model is not simple, it is nevertheless at least as parsimonious as other models in international relations that seek to explain systemic behavior. Bueno de Mesquita et al. (1999), for example, used the same number of assumptions but a considerably more intricate game, with a decision tree with 25 distinct nodes. Jung and Lake (2011) vary 24 separate parameters, while we vary fewer than a dozen. The algorithm that Gartzke and Weisiger (2013, p. 36) introduce is considerably more elaborate than that described in our Table 1, and so on. We do not criticize these models; we intend only to use them as a baseline against which to judge the parsimony of our model.

that tie hierarchy and war: uncertainty reduction, increasing war costs, and screening, a previously unidentified mechanism that occurs when states likely to fight wars due to divergent interests are sorted by those interests into opposing hierarchies.

Our results were obtained as follows. First, the simulation was run for 50 turns to produce a baseline equilibrium state, after which we measure the values of key variables and introduce a manipulation. For uncertainty reduction, the manipulation consists of hierarchies reducing uncertainty to a greater degree than they had previously (u increases after turn 50).[9] For the increase of opponents' war costs, hierarchies increase war costs (c_h increases after turn 50). Finally, for screening, we go from a world in which conflicts are only due to intrinsic interests to one in which they are mostly due to governance interests (v increases after turn 50). Following each manipulation, we let the simulation run for 50 more turns and then measure the values of the variables at their new equilibrium. We refer to the average difference between pre- and post-manipulation equilibrium values across many runs of the simulation as the simulated average treatment effect (or "simulated ATE").

Figure 2 presents these mechanisms and their simulated results graphically. The highlighted paths in the diagram (top) refer to the different mechanisms we have described above, while the line graphs (bottom) illustrate the results of simulated experiments. Our outcome of interest is the simulated ATE, here in wars per turn, across 200 iterations. For example, when we increase hierarchs' uncertainty-reduction power, we find that there are fewer wars per turn across hierarchies than before this change. As in many formal models, the direction and significance of the results matter much more than the numerical values produced.[10] We calculate confidence intervals using a nonparametric sign test.

If a key purpose of hierarchy is to reduce the danger of war for members, why do we observe high rates of conflict initiation across hierarchies? As Figure 2 illustrates, neither uncertainty reduction nor increasing opponents' war costs can account for this regularity. Indeed, in the simulation, both manipulations cause a reduction in the number of wars per turn. This should come as no surprise: Institutional theory has long emphasized the pacifying role of uncertainty reduction, and realism and game theory have focused extensively on the deterrent effects of raising opponents' war costs.[11] Regardless of theoretical orientation, then, the empirical finding of high rates of conflict initiation between hierarchies cannot be accounted for by the stated purpose of hierarchies.

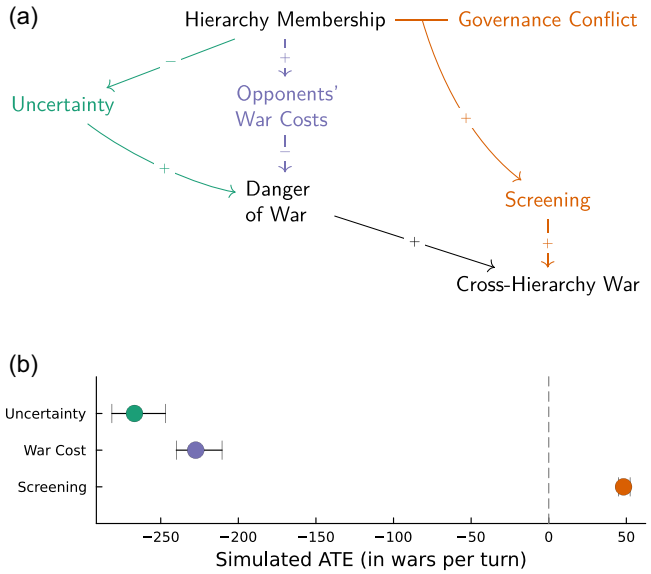

FIGURE 2 Hierarchy membership and cross-hierarchy wars, mechanisms and simulated results. *Note*: (a) Uncertainty, war costs, screening, and cross-hierarchy wars. Three pathways from hierarchy membership to cross-hierarchy wars. (b) Simulated results from uncertainty, war cost, and screening shocks on cross-hierarchy wars. When hierarchies become more effective at reducing their members' uncertainty or increasing opponents' war costs, wars across hierarchies become less common. However, when hierarchies screen for states with similar governance interests, wars across hierarchies become *more* common.

It can, however, be accounted for by screening (Figure 3). When there is conflict over governance issues, differences in governance interests affect both the probability of dyadic wars and the cost of joining a hierarchy. The result is a sorting effect, in which states with great differences over governance are both more likely to join different hierarchies and more likely to fight. Importantly, screening does not *create* more conflict. Rather, differences over governance principles lead states that were already likely to fight over these issues to select themselves into different hierarchies.

Scholars often argue that intergroup conflicts are motivated by increased hostility that results from group formation (Elias, 2000, p. 254; Hartmann & Heuser, 2001, pp. 247–248). Our model pushes researchers to explore the mechanism underlying that claim, as nothing about the tribute-for-security logic of group formation *per se* creates additional conflict. Hierarchy formation can produce increases in

[9] The values used for these manipulations are available in the Online Appendix.

[10] A reduction of nearly 300 wars per turn may seem like a lot, but in a system of 200 states, with each state in a dyad acting as sender on one issue and receiver on another, there are $200 \times 199 \times 2 = 79{,}600$ opportunities for conflict in each round. In contrast, in a system with 25 states, there are only 1200.

[11] As Fey and Ramsay (2011) have demonstrated, in bargaining models where only the cost of war is unknown, the probability of war is weakly decreasing in the cost of war.

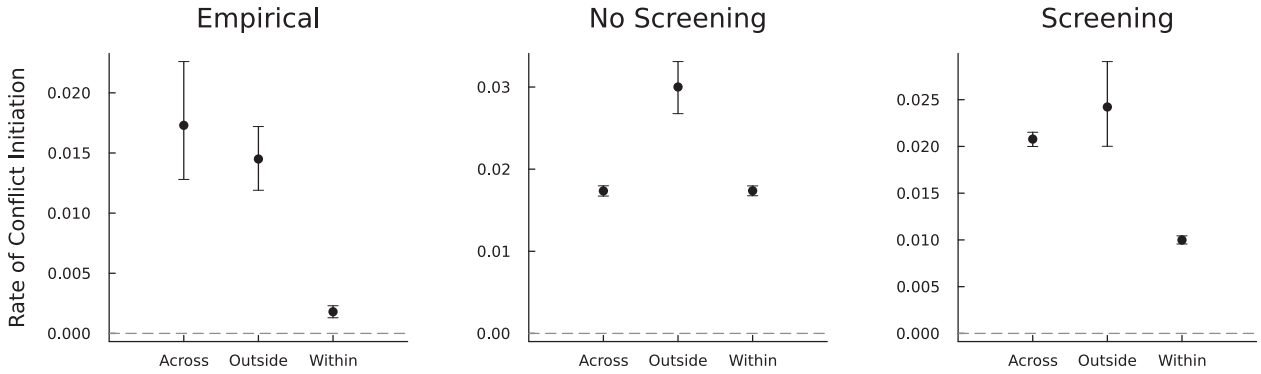

FIGURE 3 Conflict over governance and empirical and simulated conflict. *Note*: The existence of conflict over governance issues can explain relatively high historical rates of cross-hierarchy conflict. Left: Empirical rates of conflict initiation across, outside, and within hierarchies, 1815–2010 (data from Braumoeller, 2019). Center: Simulated rates of conflict initiation with no conflict over governance issues. Right: Simulated rates of conflict initiation with high conflict over governance issues.

intergroup conflict, but only via redistribution, not because of increased hostility.[12]

Wars within hierarchies

The second outcome we investigate is the rate of war initiation among states within the same hierarchies. Here, we review the impact of our three previous mechanisms (and their associated manipulations) on wars within hierarchies. These are illustrated in Figure 4.

As expected, we find that each mechanism reduces conflict within hierarchies. The intuition behind the first two mechanisms—that decreasing uncertainty and increasing bargaining partners' war costs would reduce conflict—is analogous to that described previously. In the case of the screening effect, the process is the obverse of that described above: When the world is dominated by conflicts over governance issues and states with similar positions on the governance dimension select themselves into the same hierarchies, hierarchies will be more peaceful—due both to redistribution and reduction of conflict. The formation of the liberal international order and, to a lesser extent, the formation of the League of Nations system, reflect this "birds of a feather" dynamic (Siverson & Emmons, 1991; Steiner, 2005).

These mechanisms are consistent with a growing empirical literature that emphasizes the role of hierarchy-level variables as the source of conflict reduction among member states (Beardsley et al., 2020; Braumoeller, 2019; Cranmer et al., 2015; MacDonald, 2018; McDonald, 2015; Travlos, 2016; Wallensteen, 1984). They also complement and extend the theoretical mechanisms that those studies propose.

[12] Some extensions of the model, discussed in the Online Appendix, might do so.

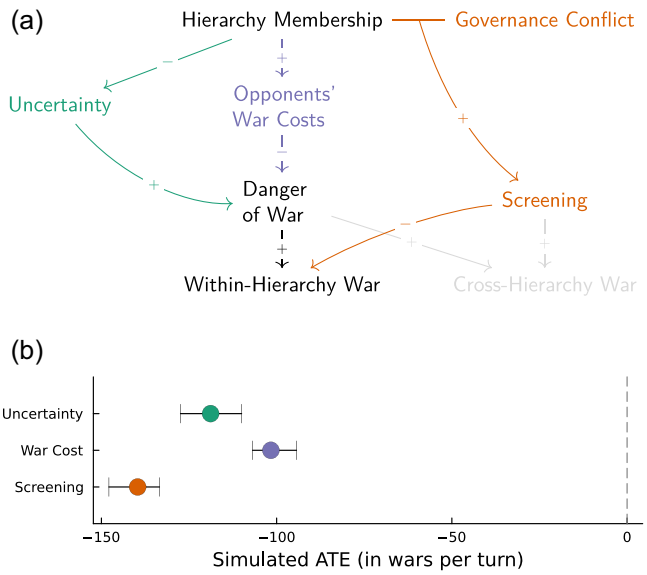

FIGURE 4 Hierarchy membership and within-hierarchy wars, mechanisms and simulated results. *Note*: (a) Uncertainty, war costs, screening, and within-hierarchy wars. Three pathways from hierarchy membership to within-hierarchy wars. (b) Simulated results from uncertainty, war cost, and screening shocks on within-hierarchy wars. When hierarchies become more effective at reducing their members' uncertainty, increasing opponents' war costs, or start screening for states with similar governance interests, wars within hierarchies become less common.

Importantly, these mechanisms exist independently of any management practices (e.g., Kagan, 2018) that hierarchs may also engage in to avoid internal conflict.

Hierarchy formation

Having discussed the impact of hierarchy on war, we now turn to a discussion of the impact of war on hierarchy. The observation that large wars tend to produce new hierarchies is widely accepted in the

literature (e.g., Ikenberry, 2000; Schweller, 2014; Norrlof & Wohlforth, 2019). Such wars may be fought with the intention of replacing one order with another, as in the case of hegemonic conflicts (Gilpin, 1981), or they may be fought for other reasons but have the effect of wiping away the old order. Regardless, systemic wars with clear outcomes enable the victor to establish terms of order that shape the subsequent peace.

While these arguments explain the calculus of the powerful states that create hierarchies in the wake of large wars, however, they are generally silent on the equally important question of why smaller states are willing to join those hierarchies.[13] In the absence of outright coercion, which is an implausible mechanism in many cases, our understanding of postwar hierarchy formation remains incomplete.

Our model suggests an answer: Major wars increase states' estimates of the likely cost of war (see, e.g., Levinson, 1921). Increased estimates of the cost of war increase the demand for hierarchy, which provides an increased incentive for powerful states to become hierarchs. Less obviously, we should also expect uncertainty over war costs to increase in the wake of large wars. As long as other, smaller wars have also been fought in the not-too-distant past, we can expect people to be less certain about war costs in the wake of major wars.

We implement two manipulations in our baseline simulation to capture these effects. The first increases systemic war costs, c_i; the second increases systemic uncertainty, σ. Figure 5 demonstrates that, as expected, both mechanisms produce increases in the demand for hierarchy, as evidenced by a rise in membership.

When combined with other implications of the model described above, this logic of hierarchy formation is rich with secondary implications. For example, when states expect conflict over governance issues, hierarchy formation should produce more ideologically aligned hierarchies, with higher rates of interhierarchy conflict, thanks to the screening effect discussed above. The corollary of the logic connecting major war to hierarchy formation is that, if states revise their assessments of the costs of future wars downward after time passes without major wars, the result would be a gradual decrease in demand for hierarchy and hierarchy membership—a process of disordering, or increasing entropy (Schweller, 2014). In the long run, that decrease in hierarchy membership would have the ironic result of producing more conflict, increasing the likelihood of major war.[14]

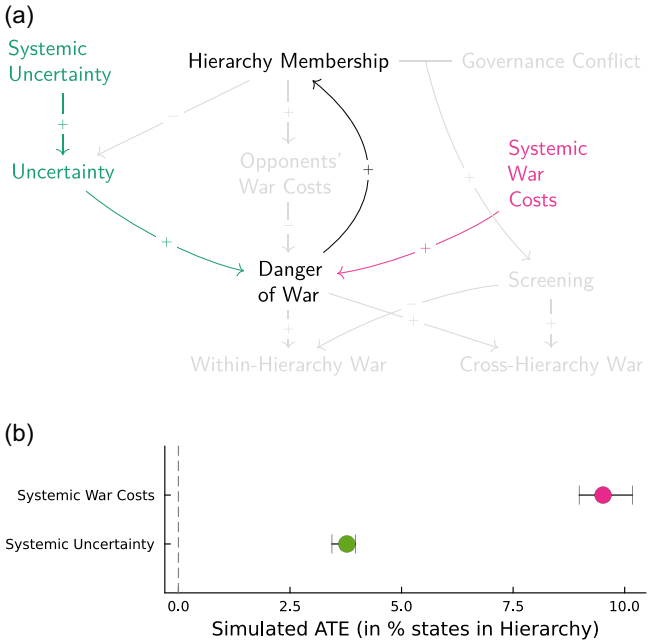

FIGURE 5 Large wars and the demand for hierarchy membership, mechanisms and simulated results. *Note*: (a) Systemic war costs, systemic uncertainty, and hierarchy membership. Two pathways to hierarchy formation after large wars. (b) Simulated results from systemic war costs and uncertainty shocks on hierarchy membership. Increases in systemic war costs and uncertainty both lead to increases in the demand for hierarchy and, here, hierarchy membership.

Multiple hierarchies and systemic conflict

To the extent that there is a conventional wisdom on the subject, it seems to be that systems with multiple hierarchies are more conflictual than systems with single hierarchies. Both the theoretical literature on polarity and war (e.g., Christensen & Snyder, 2011; Schweller, 1994), which points to a variety of pathologies in multipolar systems that also apply to systems with multiple hierarchs, and empirical studies (e.g., Braumoeller, 2019) support this conclusion.[15]

This finding creates a puzzle for our model. Hierarchy formation generally reduces rates of conflict initiation for dyads that include hierarchy members. Even when conflict over governance issues produces a screening effect, the result is a redistribution of conflict within the system, not a net increase. If the model is a reasonable representation, then, how could the existence of multiple hierarchies correlate with higher systemic rates of conflict initiation?

The manipulation introduced in the previous section offers an answer: The conventional story may

[13] For a rare attempt at answering this question, see Ikenberry (2000).

[14] This argument resembles Gilpin's (1981) work on cycles of systemic conflict, in which rising and declining states fight over who will order the system. For Gilpin, changes in the relative power of rising and declining states explain war in one specific dyad. Our model explains war more generally and is driven by state assessments of the costs of conflict.

[15] The two literatures differ on bipolar systems, which the theoretical literature on polarity and war typically consider to be less dangerous than multipolar ones, but this distinction is irrelevant for our purposes.

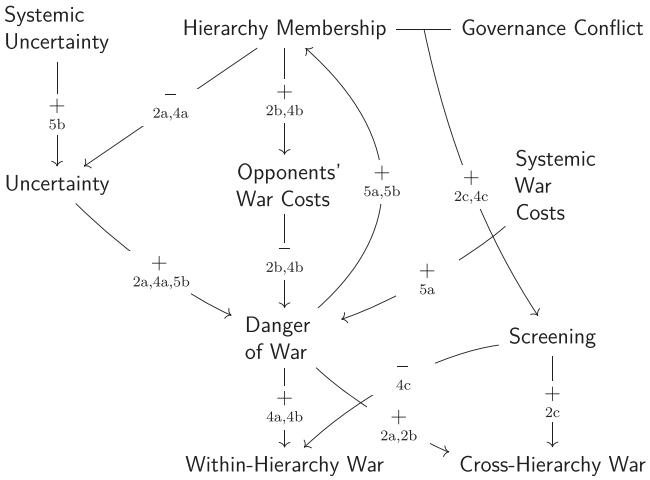

FIGURE 6 Hierarchy and war. *Note*: Aggregate diagram showing all pathways and the mechanisms in which they play a role. Numbers refer to figures in the main text, and (a, b, c) refer to mechanisms within those figures. So, for example, 4a refers to the mechanism in Figure 4 that connects hierarchy membership to uncertainty to the danger of war and within-hierarchy war.

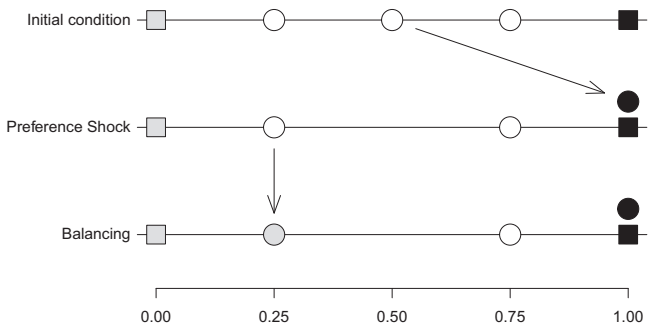

FIGURE 7 Hierarchy and balancing. *Note*: A change in preferences prompt a balancing behavior. Top to bottom: a shift in the preferences of the state in the center from $s_i = 0.5$ to $s_i = 1$ prompts it to join the black hierarchy led by the square hierarch at 1.0, which in turn prompts the second state ($s_i = 0.25$) to balance against it by joining the light gray hierarchy led by the square hierarch at 0.0.

have the causal arrows reversed. While more hierarchy membership does not increase the danger of war in our model, an increase in the danger of war does drive an increased demand for hierarchy. More hierarchy membership reduces the threat of war, but only somewhat, so the result is typically a net increase in systemic conflict levels. Recent history bears out this interpretation: In both the interwar period and the Cold War, increases in international tension preceded, rather than followed, the formation of multiple hierarchies (Kimmich, 1976; Nish, 1992; Yergin, 1990).

The distinction between multiple hierarchies causing war and the threat of war causing multiple hierarchies is a critical one for, to take one example, American analysts contemplating the possibility and implications of a Chinese-led international order (e.g., Loke, 2021; Mazarr et al., 2018; Weiss & Wallace, 2021). To this discussion, our model adds the important but neglected point that rival order formation can be a symptom rather than a cause of hostility (Figure 6).

Balancing and bandwagoning

The model generates both *balancing* and *bandwagoning* behaviors—that is, joining a weaker hierarchy against a stronger one, or joining the stronger one against the weaker, respectively. Here, balancing and bandwagoning result either from changes in the costs and benefits of joining a hierarchy or from the tendency of hierarchy membership to become more attractive to prospective members as other states join. Importantly, these considerations are driven by strategic interdependence: They vary depending on the choices made by other states in the system.

Balancing and bandwagoning can be prompted by increases in the danger of war or by decreases in expected returns from negotiated settlements, both of which make joining a hierarchy more attractive. The decisions of Finland and Sweden to join NATO and balance against Russia in light of Russia's 2022 war on Ukraine are a striking recent example of balancing that results from the former consideration (Walt, 1987).

Balancing and bandwagoning behavior can also result from the decisions of other states to join hierarchies. When a state joining an existing hierarchy creates an incremental bargaining disadvantage for another state, that disadvantage increases the second state's incentive to join an opposing hierarchy. The simulation results in Figure 7 illustrate this process. Here, the manipulation consists of changing the governance interests, s_i, of the middle state from middling preferences to extreme ones ("Preference Shock"), which prompts the state at 0.25 to join the gray hierarchy ("Balancing").[16]

States also "bandwagon for profit" (Schweller, 1994)—that is, to benefit from the increased bargaining leverage that hierarchy brings. As we noted in section "Hierarchies," hierarchy conveys a predatory advantage, in that it allows states to strike better bargains with states outside the hierarchy. When hierarchy membership is low, leaving many states vulnerable to predation, or the costs of war are high, the temptation to jump on a hierarchical bandwagon is great. By the same logic, interestingly, as hierarchy membership grows, the dwindling number of opportunities

[16] The behavior is fairly generic; the code for the computational proof of existence shown in Figure 7 is available with the rest of the replication files.

for predation reduces the predatory incentives for further growth.

ADDITIONAL WARRANTS

Theoretical models should be judged, in part, by their fecundity—the number of important insights they generate (Clarke & Primo, 2012, p. 100). In addition to the implications discussed above, the model produces insights about some other known regularities:[17]

Endogenous institutional persistence (North, 1990; Pierson, 2011)

As a hierarch's ability to provide information or increase opponents' war costs declines, states remain in a hierarchy beyond the point in its decline at which they would not have joined in the first place. They remain in the hierarchy because the value of hierarchy is a function of the number of existing members.

This process is reflected in the persistence of the security institutions at the hearts of hierarchical orders even after the obvious need for them has disappeared—an outcome that is currently not well understood. As Ikenberry (1998, p. 43) points out, for example, institutional persistence is "one of the most puzzling aspects of world order after the Cold War." McCalla (1996) uses institutionalist theory to argue that the Western alliance has persisted largely because it is more efficient for members to adapt an existing institution to new circumstances than it to build a new one.

Our model, by contrast, suggests that the value of an institution depends on the number of states that are members. Established institutions persist because their value to members increases with their size. That additional value insulates them from changes that might otherwise obviate them. At the end of the Cold War, for example, a NATO member contemplating leaving the alliance did not face the prospect of negotiating a new alliance with some group of similarly situated states under anarchy. Instead, it faced the prospect of being left out of an alliance whose existence removed some incentive for members to depart. NATO may have been a dwindling asset, but its value was enhanced by its existing membership.[18]

These effects exist independent of any reputational or mechanical "switching costs" that states might face for leaving hierarchies. To the extent that they exist, such costs would make hierarchies even more sticky, but hierarchies should exhibit institutional persistence even in their absence.

Stable systemic rates of war initiation (Braumoeller, 2019; Gartzke & Weisiger, 2014)

Because states can "buy" hierarchy when conflict becomes more likely, increases in the threat of war may produce increases in hierarchy, not increases in systemic rates of conflict initiation. The resulting *homeostatic* effect will tend to push systemic levels of conflict toward a stable point, much as a house thermostat regulates temperature.

The transformation of U.S. and Soviet relations from indifference to hostility in the aftermath of World War II illustrates this process of systemic self-regulation. At the end of the war, the United States demobilized service members by their individual characteristics (time in service, wounds, etc.) rather than unit by unit, rendering those units that remained in Europe unable to function (Cohen, 1993, p. 23). The Soviets, too, seemed prepared to walk away from Central Europe, allowing free or nearly-free elections in Austria, Czechoslovakia, and Hungary. As worrisome signs—the slow Sovietization of Poland and the Balkans, the announcement of the Truman Doctrine and the Marshall Plan, the Berlin blockade—soon made clear, neither side envisioned a postwar *status quo* that was acceptable to the other (Leffler, 1992). Rather than erupting into war, however, rising tensions resulted in the formation of two rival hierarchies, the Western liberal order and the Soviet communist order, which in turn dampened the rising threat of war.

One underappreciated implication of the feedback loop between war and hierarchy is that empirical studies of the effects of security institutions risk understating those effects unless their endogeneity is taken into account. States are more likely to establish security institutions when the danger of conflict is high. When the danger of conflict is low, institutions have less value. Accordingly, naive comparisons of conflict rates in the presence or absence of institutions are likely to be systematically biased against finding an effect of institutions on conflict. Ascertaining the true effect requires conditioning on the likelihood and costs of conflict absent institutions.

A Poisson distribution of war onsets (Mansfield, 1988; Richardson, 1944)

That war outbreak follows a Poisson distribution is one of the oldest findings in the quantitative conflict literature. Some have taken this distributional observation

[17] Space permits only brief discussion here; for full explanation and simulation results, see the Online Appendix.

[18] We should note that endogenous persistence becomes more pronounced when subordinate states are able to influence the hierarchy's ideal point (see the extension under "A Flexible Framework," in the Online Appendix).

to mean that the underlying mechanism is a Poisson data generating process and, consequently, that "wars are simply random independent events and that no deeper underlying cause or process exists" (Zinnes, 1976). In contrast, our model demonstrates that one of the most widely accepted theories of conflict in the international relations literature also produces a Poisson distribution of war outbreak and thus constitutes an alternative data-generating process. Far from being simple random noise, this process is driven by the strategic decision-making process of states, aggregated to the level of the international system.

CONCLUSION

Our goal in this article has been to lay out a useful foundational model of the relationship between hierarchy and war that can serve as a guide for scholars and analysts and an easily extended tool for theorists. We have sought to articulate the subtle dynamics and emergent outcomes that arise when these processes play out in tandem across the international system. The model's warrants include compelling microfoundations, in the form of two canonical models of war and hierarchy; a wide range of empirical implications that are supported by findings in diverse literatures; and broad utility, both to scholars and to the policy community.

The value of a theoretical model lies in its ability to organize a range of known outcomes into a coherent framework and to provide new and interesting insights. This model scores well on both counts. It offers a unified account of within-hierarchy pacification, cross-hierarchy war, the formation of hierarchies after large wars, and balancing and bandwagoning behavior under the umbrella of a single model. It also implies a handful of known outcomes—institutional persistence, stable systemic rates of conflict initiation, and a Poisson distribution of conflict onsets—that have not previously been understood to be related either to one another or to the logic of hierarchy and conflict.

More valuable still is the model's contribution to our understanding of the relationship between, as Schelling (1978) puts it, the micromotives of actors and the macrobehavior of the system within which they interact. As part of a model of state behavior in systemic context, rather than just an explanation of dyadic conflict, the bargaining model implies a wealth of unanticipated behaviors. Because hierarchy both reduces the probability of war and allows states to drive better bargains with outside states, for example, hierarchies sometimes form for predatory reasons. Hierarchy can also be self-limiting, not due to resource constraints or preference heterogeneity, but because the predatory value of hierarchy decreases as the number of potential victims outside the hierarchy declines. High war costs produce fewer wars, but they also enhance the value of hierarchy for predation. These outcomes make sense, in retrospect, but they are rarely if ever discussed in the literature on contractual hierarchy, which tends to be implicitly cooperative in orientation. The interplay between institutions and bargaining, in short, produces a much richer description of state behavior and systemic dynamics than either perspective alone.

Finally, the prospect of institutions that form for a range of reasons that include both conflict reduction and power maximization demonstrates that a systemic perspective on hierarchy and conflict can reconcile, or even obviate, the hoary paradigmatic divisions that have occupied international relations theorists' attention for decades. That ambition may, in the end, prove difficult to achieve, especially if advocates of the "clash of paradigms" refuse to build toward it. Regardless, our hope is that the utility of the model and the low entry costs of building on it will make this an attractive foundation for future research.

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REFERENCES

Axelrod, Robert. 1995. "A Model of the Emergence of New Political Actors." In *Artificial Societies: The Computer Simulation of Social Life*, edited by Nigel Gilbert and Rosaria Conte, 15–32. London: University College Press.

Axelrod, Robert, and Robert O. Keohane. 1985. "Achieving Cooperation under Anarchy: Strategies and Institutions." *World Politics* 38(1): 226–54.

Bapat, Navin A. 2019. *Monsters to Destroy: Understanding the War on Terror*. New York, NY: Oxford University Press.

Beardsley, Kyle, Howard Liu, Peter J. Mucha, David A. Siegel, and Juan F. Tellez. 2020. "Hierarchy and the Provision of Order in International Politics." *Journal of Politics* 82(2): 731–46.

Bially Mattern, Janice, and Ayşe Zarakol. 2016. "Hierarchies in World Politics." *International Organization* 70(3): 623–54.

Box, George E. P. 1976. "Science and Statistics." *Journal of the American Statistical Association* 71(356): 791–99.

Braumoeller, Bear F. 2019. *Only the Dead: The Persistence of War in the Modern Age*. New York, NY: Oxford University Press.

Bueno de Mesquita, Bruce, James D. Morrow, Randolph M. Siverson, and Alastair Smith. 1999. "An Institutional Explanation of the Democratic Peace." *American Political Science Review* 93(4): 791–807.

Christensen, Thomas J., and Jack L. Snyder. 2011. "Multipolarity, Perceptions, and the Tragedy of 1914." *International Studies Quarterly* 55(2): 305–08.

Clarke, Kevin A., and David M. Primo. 2007. "Modernizing Political Science: A Model-Based Approach." *Perspectives on Politics* 5(4): 741–53.

Clarke, Kevin A., and David M. Primo. 2012. *A Model Discipline: Political Science and the Logic of Representations*. Oxford, New York: Oxford University Press.

Cohen, Warren I. 1993. *America in the Age of Soviet Power, 1945-1991*. The Cambridge History of American Foreign Relations. New York, NY: Cambridge University Press.

Cook, Karen Schweers, and Margaret Levi. 2008. *The Limits of Rationality*. Chicago, IL: University Of Chicago Press.

Cranmer, Skyler J., Elizabeth J. Menninga, and Peter J. Mucha. 2015. "Kantian Fractionalization Predicts the Conflict Propensity of the International System." *Proceedings of the National Academy of Sciences* 112(38): 11812–816.

de Marchi, Scott, and Michael Laver. 2020. "Government Formation as Logrolling in High-Dimensional Issue Spaces." *Journal of Politics* 82(2): 543–58.

Diehl, Paul F. 1992. "What Are They Fighting For? The Importance of Issues in International Conflict Research." *Journal of Peace Research* 29(3): 333–44.

Elias, Norbert. 2000. *The Civilizing Process: Sociogenetic and Psychogenetic Investigations*. Revised edition. Oxford; Malden, MA: Blackwell Publishing.

Elster, Jon. 2015. *Explaining Social Behavior: More Nuts and Bolts for the Social Sciences*. Revised edition. Cambridge, UK: Cambridge University Press.

Epstein, Joshua M. 2006. *Generative Social Science: Studies in Agent-Based Computational Modeling*. Princeton Studies in Complexity. Princeton, NJ: Princeton University Press.

Fearon, James D. 1995. "Rationalist Explanations for War." *International Organization* 49(3): 379–414.

Fey, Mark, and Brenton Kenkel. 2021. "Is an Ultimatum the Last Word on Crisis Bargaining?" *Journal of Politics* 83(1): 87–102.

Fey, Mark, and Kristopher W. Ramsay. 2011. "Uncertainty and Incentives in Crisis Bargaining: Game-Free Analysis of International Conflict." *American Journal of Political Science* 55(1): 149–69.

Filson, Darren, and Suzanne Werner. 2002. "A Bargaining Model of War and Peace: Anticipating the Onset, Duration, and Outcome of War." *American Journal of Political Science* 46(4): 819.

Filson, Darren, and Suzanne Werner. 2007. "The Dynamics of Bargaining and War." *International Interactions* 33(1): 31–50.

Gartzke, Erik A., and Paul Poast. 2017. *Empirically Assessing the Bargaining Theory of War: Potential and Challenges*. Vol. 1. Oxford: Oxford University Press.

Gartzke, Erik, and Alex Weisiger. 2013. "Fading Friendships: Alliances, Affinities and the Activation of International Identities." *British Journal of Political Science* 43(1): 25–52.

Gartzke, Erik, and Alex Weisiger. 2014. "Under Construction: Development, Democracy, and Difference as Determinants of Systemic Liberal Peace." *International Studies Quarterly* 58(1): 130–45.

Gilpin, Robert. 1981. *War and Change in World Politics*. Cambridge: Cambridge University Press.

Glaser, Charles L. 2019. "A Flawed Framework: Why the Liberal International Order Concept Is Misguided." *International Security* 43(4): 51–87.

Gordon, Joseph S. 2017. "Intelligence Sharing in NATO." *Atlantisch Perspectief* 41(6): 15–19.

Haas, Mark L. 2018. *The Ideological Origins of Great Power Politics, 1789-1989*. Ithaca, NY: Cornell University Press.

Hartmann, Anja, and Beatrice Heuser, eds. 2001. *War, Peace, and World Orders in European History*. London and New York: Routledge.

Healy, Kieran. 2017. "Fuck Nuance." *Sociological Theory* 35(2): 118–27.

Hensel, Paul R. 2001. "Contentious Issues and World Politics: The Management of Territorial Claims in the Americas, 1816-1992." *International Studies Quarterly* 45(1): 81–109.

Houweling, H. W., and J. B. Kuné. 1984. "Do Outbreaks of War Follow a Poisson-Process?" *Journal of Conflict Resolution* 28(1): 51–61.

Ikenberry, G. John. 1998. "Institutions, Strategic Restraint, and the Persistence of American Postwar Order." *International Security* 23(3): 43–78.

Ikenberry, G. John. 2000. *After Victory: Institutions, Strategic Restraint, and the Rebuilding of Order after Major Wars*. Princeton, NJ: Princeton University Press.

Ikenberry, G. John. 2011. *Liberal Leviathan: The Origins, Crisis, and Transformation of the American World Order*. Princeton Studies in International History and Politics. Princeton, NJ: Princeton University Press.

Jung, Danielle F., and David A. Lake. 2011. "Markets, Hierarchies, and Networks: An Agent-Based Organizational Ecology." *American Journal of Political Science* 55(4): 972–90.

Kagan, Robert. 2018. *The Jungle Grows Back: America and Our Imperiled World*. New York: Alfred A. Knopf.

Kang, David C. 2010. *East Asia Before the West: Five Centuries of Trade and Tribute*. Contemporary Asia in the World. New York, NY: Columbia University Press.

Keohane, Robert O. 1986. "Realism, Neorealism and the Study of World Politics." In *Neorealism and Its Critics*, edited by Robert O. Keohane, 1–26. New York, NY: Columbia University Press.

Kimmich, Christoph M. 1976. *Germany and the League of Nations*. Chicago, IL: University of Chicago Press.

Kissinger, Henry A. 1966. "Domestic Structure and Foreign Policy." *Daedalus* 95(2): 503–29.

Kupchan, Charles A. 2014. "Unpacking Hegemony: The Social Foundations of Hierarchical Order." In *Power, Order, and Change in World Politics*, edited by G. John Ikenberry, 19–60. Cambridge; New York: Cambridge University Press.

Kupchan, Cliff. 2021. "Bipolarity Is Back: Why It Matters." *Washington Quarterly* 44(4): 123–39.

Lake, David A. 1996. "Anarchy, Hierarchy, and the Variety of International Relations." *International Organization* 50(1): 1–33.

Lake, David A. 2009. *Hierarchy in International Relations*. Ithaca, NY: Cornell University Press.

Lake, David A. 2013. "Legitimating Power: The Domestic Politics of U.S. International Hierarchy." *International Security* 38(2): 74–111.

Lascurettes, Kyle M. 2020. *Orders of Exclusion: Great Powers and the Strategic Sources of Foundational Rules in International Relations*. New York, NY: Oxford University Press.
Leffler, Melvyn P. 1992. *A Preponderance of Power: National Security, the Truman Administration, and the Cold War*. Palo Alto, CA: Stanford University Press.
Levinson, Salmon. 1921. *Outlawry of War*. Chicago, IL: American Committee for the Outlawry of War.
Loke, Beverley. 2021. "The United States, China, and the Politics of Hegemonic Ordering in East Asia." *International Studies Review* 23(4): 1208–29.
Lupia, Arthur. 2002. "Who Can Persuade Whom? Implications from the Nexus of Psychology and Rational Choice Theory." In *Thinking about Political Psychology*, edited by James H. Kuklinski. First edition, 51–88. Cambridge: Cambridge University Press.
MacDonald, Paul K. 2018. "Embedded Authority: A Relational Network Approach to Hierarchy in World Politics." *Review of International Studies* 44(1): 128–50.
Mansfield, Edward D. 1988. "The Distribution of Wars over Time." *World Politics* 41(1): 21–51.
Mazarr, Michael, Timothy Heath, and Astrid Cevallos. 2018. *China and the International Order*. Santa Monica, CA: RAND Corporation.
McCalla, Robert B. 1996. "Nato's Persistence After the Cold War." *International Organization* 50(3): 445–75.
McDonald, Patrick J. 2015. "Great Powers, Hierarchy, and Endogenous Regimes: Rethinking the Domestic Causes of Peace." *International Organization* 69(03): 557–88.
Mearsheimer, John J. 2018. *The Great Delusion: Liberal Dreams and International Realities*. The Henry l. Stimson Lectures Series. New Haven, CT: Yale University Press.
Morgenthau, Hans J. 1960. *Politics Among Nations: The Struggle for Power and Peace*. 3rd ed. New York, NY: Alfred A. Knopf.
Nish, Ian Hill. 1992. *Japan's Struggle with Internationalism: Japan, China, and the League of Nations, 1931-3*. London; New York: K. Paul International.
Norrlof, Carla, and William C. Wohlforth. 2019. "Raison de l'Hégémonie (The Hegemon's Interest): Theory of the Costs and Benefits of Hegemony." *Security Studies* 28(3): 422–50.
North, Douglass C. 1990. *Institutions, Institutional Change, and Economic Performance*. Cambridge; New York: Cambridge University Press.
Organski, A. F. K., and Jacek Kugler. 1980. *The War Ledger*. Chicago, IL: University of Chicago Press.
Owen, John M. 2005. "When Do Ideologies Produce Alliances? The Holy Roman Empire, 1517-1555." *International Studies Quarterly* 49(1): 73–99.
Pierson, Paul. 2011. *Politics in Time: History, Institutions, and Social Analysis*. Princeton, NY: Princeton University Press.
Potochnik, Angela. 2017. *Idealization and the Aims of Science*. Chicago, IL: University of Chicago Press.
Reiter, Dan. 2003. "Exploring the Bargaining Model of War." *Perspectives on Politics* 1(01): 27–43.
Richardson, Lewis F. 1944. "The Distribution of Wars in Time." *Journal of the Royal Statistical Society* 107(3/4): 242–50.
Schake, Kori N. 2017. *Safe Passage: The Transition from British to American Hegemony*. Cambridge, MA; London, UK: Harvard University Press.
Schelling, Thomas C. 1978. *Micromotives and Macrobehavior*. New York: W. W. Norton.
Schweller, Randall, and David Preiss. 1997. "A Tale of Two Realisms: Expanding the Institutions Debate." *Mershon International Studies Review* 41(1): 1–32.
Schweller, Randall L. 1994. "Bandwagoning for Profit: Bringing the Revisionist State Back In." *International Security* 19(1): 72–107.
Schweller, Randall L. 2014. *Maxwell's Demon and the Golden Apple: Global Discord in the New Millennium*. Baltimore, MD: The Johns Hopkins University Press.
Siverson, Randolph M., and Juliann Emmons. 1991. "Birds of a Feather: Democratic Political Systems and Alliance Choices in the Twentieth Century." *Journal of Conflict Resolution* 35(2): 285–306.
Slantchev, Branislav L., and Ahmer Tarar. 2011. "Mutual Optimism as a Rationalist Explanation of War." *American Journal of Political Science* 55(1): 135–48.
Steiner, Zara. 2005. *The Lights That Failed: European International History, 1919-1933*. Oxford History of Modern Europe. Oxford; New York: Oxford University Press.
Travlos, Konstantinos. 2016. "From Universalism to Managerial Coordination: Major Power Regulation of the Use of Force." *Asian International Studies Review* 17(2): 27–53.
U.S. Embassy Baghdad, Department of State. 2022. "Assistant Secretary of Defense Visits Iraq." https://iq.usembassy.gov/assistant-secretary-of-defense-visits-iraq/
Van Evera, Stephen. 1999. *Causes of War: Power and the Roots of Conflict*. Ithaca, NY: Cornell University Press.
von Clausewitz, Carl. 1832. *On War*. Princeton, NJ: Princeton University Press.
Wagner, R. Harrison. 2000. "Bargaining and War." *American Journal of Political Science* 44(3): 469–84.
Wallensteen, Peter. 1984. "Universalism vs. Particularism: On the Limits of Major Power Order." *Journal of Peace Research* 21(3): 243–57.
Walt, Stephen M. 1987. *The Origins of Alliances*. Cornell Studies in Security Affairs 3. print ed. Ithaca, NY: Cornell University Press.
Waltz, Kenneth N. 1979. *Theory of International Politics*. New York, NY: Random House.
Weiss, Jessica Chen, and Jeremy L. Wallace. 2021. "Domestic Politics, China's Rise, and the Future of the Liberal International Order." *International Organization* 75(2): 635–64.
Wohlforth, William C. 2009. "Unipolarity, Status Competition, and Great Power War." *World Politics* 61(1): 28–57.
Yergin, Daniel. 1990. *Shattered Peace: The Origins of the Cold War and the National Security State*. second ed. New York, NY: Penguin Books.
Zinnes, Dina A. 1976. *Contemporary Research in International Relations: A Perspective and a Critical Appraisal*. New York, NY: Free Press.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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