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Trilateral politics in hierarchy, war, and state formation

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Abstract

This paper presents a set of theoretical models that links a two-phase sequence of cooperative political integration and conflict to explore the reciprocal relationship between war and state formation. It compares equilibria rates of state formation and conflict using a Monte Carlo that generates comparative statics by altering the systemic distribution of ideology, population, tax rates, and war costs across polities. This approach supports three core findings. First, war-induced political integration is at least 2.5 times as likely to occur as integration to realize economic gains. Second, we identify mechanisms linking endogenous organizations to the likelihood of conflict in the system. For example, a greater domestic willingness to support public goods production facilitates the creation of buffer states that reduce the likelihood of a unique class of trilateral wars. These results suggest that the development of the modern administrative state has helped to foster peace. Third, we explore how modelling assumptions setting the number of actors in a strategic context can shape conclusions about war and state formation. We find that dyadic modelling restrictions tend to underestimate the likelihood of cooperative political integration and overestimate the likelihood of war relative to a triadic modelling context.

Keywords: trilateral politics; hierarchy; state formation; Monte Carlo; War

Introduction

The reciprocal relationship between war and state formation is well-documented in multiple scholarly traditions, including international relations, comparative politics, and historical sociology. Often attributed to the work of Charles Tilly, the bellicist theory of state-making holds that external pressures associated with war sparked the development of the modern state in Europe.[1] The converse claim holds that modern, centralized states with efficient administrative bureaucracies are more likely to make war.[2]

[1]Tilly 1990; Kaspersen and Strandsbjerg 2017; Cederman *et al.* 2023.

[2]Research identifying a territorial peace draws on these theoretical traditions. See Gibler 2012 for example.

Recent research critiques multiple components of these claims. Scholars question the relative role of war and economic development in propelling state formation, the generalizability of these arguments outside of Europe, and the limited attention devoted to identifying the microfoundations of any relationship between war and the state.[3] The 'microfoundations' challenge emerges from a common reticence to specify a strategic context in which costly decisions for war and political aggregation depend on each other and the actions of neighbouring actors in the international system.[4]

Many studies sidestep important implications of the endogeneity between war and state formation by restricting theoretical attention to one direction of this relationship. Instead, they assume the existence of states and examine sources of variation in military conflict rates among them.[5] This assumption overlooks the possibility that many states emerge as a peace settlement that terminates some prior war. As a result, the same conditions associated with war and its termination that create new states could also influence the capacity of any new state to remain at peace.[6] Similarly, studies of state formation treat interstate war as an exogenous variable while neglecting the systemic conditions that could both trigger war and shape the trajectory of state formation.[7]

Motivated by these critiques, we present two complete information, three-player theoretical models that explore how state formation and war simultaneously condition the occurrence of each other. Both models include a two-phase sequence of cooperative political integration and war. The models – a dyadic and a triadic variant – differ according to whether the two phases of conflict and cooperation are strategically independent or dependent. The triadic variant links the phases such that the threat of war from a third party influences potential integration. Similarly, decisions for war depend on whether integration occurred in the prior phase. Alternatively, the dyadic model strategically disconnects the cooperation and conflict stages. Offers of integration are made and accepted/rejected without regard to whether war will occur in the second phase.

Our theoretical approach blends insights from bargaining theory, research on hierarchy, and predatory theories of the state to explore how distributional conflict, ideological similarity, and the threat of violent conquest jointly shape state formation. We conceptualize state formation as an act of political integration whereby heterogeneous groups form a single polity that pursues a common national interest while internally distributing the costs of public goods provision unevenly.[8] Our

[3]See for example the contributions to Kaspersen and Strandsbjerg 2017, particularly Spruyt 2017; Hui 2005; Huang and Kang 2022; Grzymala-Busse 2023a, 2023b; and Abramson 2017.

[4]See Spruyt 2017 for the development of this critique.

[5]For variants of this critique see Wagner 2007 and Lemke and Carter 2016.

[6]Lemke and Carter 2016 show that the conditions associated with state birth influence a new state's participation in war and its likelihood of military victory.

[7]Spruyt 2017.

[8]This conceptualization differs from much of the bellicist literature that treats state formation as the development of a centralized administrative bureaucracy that progressively builds greater state capacity over the people that live within a state. The focus here on the aggregation of different groups into a common national polity resembles the discussions of state formation found in Ruggie 1993; Spruyt 1996; and Alesina and Spolaore 2005 which focus on the creation of 'sovereign territorially demarcated authority structures'. For a comparison of these two conceptions of state formation see Spruyt 2017, 83–85.

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approach differs from prior studies of war and state formation in three primary ways. First, our theoretical models simultaneously endogenize state formation and decisions for war. This setup enables two sets of hypotheses: those identifying conditions under which interstate conflict shapes state formation; and those specifying how the construction of political organizations can shape decisions for war.

Second, our focus on the role of third parties in shaping decisions for political integration and war allows us to examine a deeper set of questions about how modelling assumptions can shape theoretical conclusions. Dyadic models still play a significant role in studies of conflict and cooperation. However, this modelling approach effectively treats third parties as strategically disinterested in the outcome of any bilateral interaction. It rules out the possibility that the outcome of any political or military conflict between two parties is determined by what Schattschneider describes as its contagiousness, or the choices made by an external audience on whether to participate.[9]

We build dyadic and triadic variants of the same underlying strategic processes and distinguish between bilateral and trilateral equilibria in the latter to examine the costs of dyadic restrictions. These trilateral equilibria reflect trilateral politics, which we define here as the set of potential or realized changes to a bilateral relationship induced by the addition of a third actor to the relevant strategic context.[10] We then identify systemic conditions under which third-party threats facilitate statebuilding by encouraging 'domestic' groups to reach distributional settlements over public goods provision – a theoretical possibility prohibited by dyadic modelling assumptions.

Third, we employ Monte Carlo experiments to identify systemic conditions that strengthen the relationship between war and state formation and estimate when dyadic modelling restrictions can generate misleading theoretical conclusions. This computational technique randomly generates actors from artificially simulated systems that vary by multiple exogenous parameters like ideology, population, and tax rates; and calculates equilibria based on actor utilities. This modelling tool provides key benefits for our purposes. Each experiment produces a unique outcome. Running thousands of experiments generates comparative statics that describe relative outcome rates based on parameter inputs. We trace how different systemic conditions make 'war and state' equilibria more or less likely. The approach allows us to identify when dyadic modelling assumptions are most appropriate because a randomly selected third party is strategically unwilling or unable to influence a dyadic interaction. The use of simulations also helps compensate for limited data on subnational or pre-state characteristics in empirical studies focused on Europe and/or the post-1815 period.

We highlight three sets of findings. The first focuses on cooperative integration equilibria. Our triadic model distinguishes between two classes of political integration. One emerges from unit-level or national distinctions that create opportunities

[9]Schattschneider 1960.

[10]The concluding section of the paper discusses how trilateral politics reflect strategic contexts in which the addition of a third actor either alters the equilibrium outcome or changes strategic incentives so that different causal mechanisms produce an equilibrium outcome that does not change between dyadic and triadic settings.

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for mutually beneficial exchange in the joint production of security. This outcome occurs independently of any threat of war by a third party and is a bilateral equilibrium, like the general form of a political organization common in the hierarchy literature.[11] Alternatively, the threat of violent conquest activates a second class of political integration. Relatively weak polities purchase greater protection from a stronger polity to deter invasion by a third party. Across all Monte Carlo experiments, war-induced political integration was 2.5–5 times more likely to occur than integration for economic gains. These findings reinforce prominent claims identifying war as an important cause of state formation. They also suggest that standard models of hierarchy mischaracterize the sources of many political organizations while underpredicting their formation.

The second set of findings treats military conflict as the dependent variable. By nesting cooperation in the possibility of conflict, we identify mechanisms linking endogenous organizations to the likelihood of conflict. We identify systemic conditions – greater variance in tax rates and higher average war costs – that link state formation to lower likelihoods of conflict. These results support claims that hierarchy fosters peace and complement recent findings linking the forms of state birth to a state's subsequent participation in conflict.[12] Monte Carlo results also identify a unique systemic condition under which the decentralization of political authority, through the creation of buffer states, promotes peace by reducing multiple forms of trilateral military conflict. As domestic groups become more willing to shoulder the costs of public goods production (captured through higher mean tax rates), systemic rates of military conflict tend to fall. This finding suggests that the development of the modern administrative state, by increasing domestic public goods provision, has helped to foster peace.

Third, the Monte Carlo approach allows us to explore how modelling assumptions setting the number of relevant actors in a strategic context influence theoretical conclusions about war and state formation. A comparison of outcome rates suggests that dyadic restrictions tend to underestimate the likelihood of cooperation and overestimate the likelihood of war relative to the triadic model. Our findings also suggest that trilateral outcomes grow more likely as states pay, on average, lower war costs, and as the variance of national interests among states in the system increases. We conclude that theoretical models of the relationship between war and state formation should generally include at least three actors.

The models

We generate two theoretical models – a dyadic and a triadic variant – of strategic interaction between three actors, *i*, *j*, and *k* in which actors may voluntarily or violently form political unions. Both models include a two-phase sequence of cooperative political integration and war. In the first phase, an independent *j* chooses whether to accept an offer of political integration from *i*. Integration aggregates the military capabilities of *i* and *j*, simultaneously increasing the consumption of protective services for both. However, *j* pays for this protection by surrendering

[11]For a discussion of this form of hierarchy, see Lake 2009 and Mattern and Zarakol 2016.

[12]On research linking hierarchy to peace, see McDonald 2015 and Beardsley *et al.* 2020. On the relationship between state birth and conflict, see Lemke and Carter 2016 and Lemke and Crabtree 2020.

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its sovereign capacity to set the national interest and by shouldering relatively higher tax burdens for public goods provision. In the second phase, a third party, *k*, observes whether political integration occurred in the first phase and decides whether to launch a war to conquer the polity that was initially offered protection. The winner of any subsequent war conquers the other participating polities, assigns them to the opposition coalition of a new state, and redistributes greater financial responsibility for public goods spending on those conquered groups. Actors' decisions across these two phases are conditioned by multiple factors, including welfare gains from joint military production, ideological similarity among polities, tax rates assigned by governing coalitions, military threats posed by third parties, potential economic gains from conquest, and the costs of war.

Both models have four potential outcomes. First, all actors retain their status quo independence when *j* refuses *i*'s offer of integration and *k* decides not to challenge it. Second, peaceful integration occurs when *j* merges with *i* and no challenge is lobbed by *k*. The third outcome is a bilateral war in which *i* and *j* both retain independence and *k* subsequently attacks a singleton *j*. Finally, systemic war involves an attack by *k* against a polity that includes *i* and *j*.

The dyadic and triadic models differ along one important dimension: whether the choices and outcomes of the cooperation phase are strategically independent or dependent on the outcomes of the conflict phase. In the dyadic variant, the respective utilities that structure *j*'s choice in the cooperation phase do not incorporate the possibility that *k* might launch a subsequent military attack against it. This imposes a bilateral restriction on both subgames such that the interests and capabilities of a third party cannot influence the choices of the other two actors or the resulting equilibrium. The triadic variant eliminates this separation between the cooperation and conflict phases. Choices by *i* and *j* in the cooperation phase explicitly incorporate the interests and capabilities of a third party (*k*) that might subsequently attack in the conflict phase.[13]

The actors

Actors in each model are strategic and endowed with a unique set of characteristics. We describe actors as polities with distinct political interests, utility for public goods consumption, tolerance for inequality, and material resources. Polities can consist of a single group of citizens that share a common ideological orientation (or 'national' interest) or multiple groups.[14] Single-group polities supply the only public good of military protection through self-taxation.[15] Different groups in the same polity hold membership in either the governing (*G*) or opposition (*O*) coalition.[16] Members of *G* set the national interest and taxation rates for the entire polity.

[13]Both models use subgame perfect equilibrium (SPE) solution concepts. The difference is that *j*'s utility functions in the dyadic setup do not incorporate *k*'s capabilities or interests. The relevant equations are defined in the next section.

[14]We assume that individual citizens within political groups define their utility functions similarly. Accordingly, any group's mix of characteristics can be thought of as reflecting a collective identity binding individuals together in the same way that nationalism, ethnicity, class, or religion does.

[15]A similar modelling choice can be found in Konrad and Skaperdas 2012.

[16]We distinguish our use of the term 'opposition coalition' here from Comparative and American literature. Our use refers to the group in a polity that surrenders its sovereign capacity to set the national interest

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Actors' political interests are defined by a generic ideology score s_i that ranges from 0 to 1. Ideology serves two functions, both of which draw on the modelling intuition found in Alesina and Spolaore 2005.[17] First, this representation effectively collapses all conflicts to a single dimension and orients the interests of all polities to this issue. This construction allows us to represent the level of political conflict or agreement between any two groups through the difference in their ideologies. Larger gaps indicate a greater potential for political and military conflict. Second, ideology sets the political purpose to which public goods spending by a polity is directed. We assume that all public goods production is spent on the military and supports the political interests of the government. The utility that an opposition group derives from public goods consumption (which is non-excludable by definition) is discounted by the gap in its ideology score from that of the government.[18]

Each actor possesses a self-tax rate h_i, or hawkishness, that sets the proportion of the ruling coalition's resources directed to the sole public good of national defence. Ranging from 0.01 to 0.9, this self-tax rate reflects a group's willingness to pay for self-protection or defence. The remaining national resources are allocated to private consumption.[19]

Actors are also distinguished by a predation parameter t_i that sets the tax rate they would impose on groups assigned to the opposition coalition after integration through peaceful cooperation or conquest. We assume that ruling coalitions tax opposition groups at higher rates, so t_i is bounded between h_i and 1. This parameter carries at least two relevant conceptual implications. First, it helps to generate insights about the global market for protection by representing the price at which a polity offers to supply military protection to the other actors in the system. Some polities may opt for cooperative integration to purchase protection for less than they would otherwise pay through domestic production (or self-protection).[20] Additionally, this parameter captures each polity's underlying proclivity to

and taxation rates to a ruling or governing group. We adopt this term with the intent to expand this project and allow for coordination among multiple opposition groups.

[17]Alesina and Spolaore model optimal state size or the geographic scope of territorial boundaries as reflecting a trade-off between the benefits of scale and the costs of preference heterogeneity. As polities grow larger, they can capture greater efficiencies in public goods production. However, greater preference heterogeneity can offset these economic gains by activating secessionist demands as larger states incorporate more groups with increasingly different interests over the level and type of public goods spending. Similarly, we incorporate a single ideological dimension into the definition of our utility functions that allows us to examine how political conflict over public goods provision influences state formation.

[18]To see the implications of this distinction, imagine two domestic groups that have different foreign policy goals, say Israeli Arabs and conservatives that support Likud. In the case of the Israeli-Palestinian conflict, this ideological discounting suggests that Israeli Arabs generate less utility from military spending by the Israeli government directed against Hamas than conservative Israelis.

[19]Hawkishness can also be conceptualized as setting the relative importance of public goods consumption in the utility function for any group and its members' tolerance of public goods spending by the state. As this self-tax rate increases, the group derives a greater proportion of its utility or welfare from public goods consumption. As discussed later, we will associate higher tax rates with modern states characterized by extensive administrative bureaucracies and high levels of public goods provision.

[20]A comparison of these prices across polities also provides a way to gauge the relative efficiency of polities in the provision of military protection.

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Table 1. Simulation inputs

Attribute	Distribution	Mean μ	Variance σ^2	Range
s_i ideology	Normal	0.1, 0.3, 0.5, 0.7, 0.9	0.1, 0.2, 0.3, 0.4, 0.5	[0, 1]
h_i hawkishness	Normal	0.05, 0.1, 0.15, 0.2, 0.25, 0.3, 0.35	0.05, 0.1, 0.15	[0.01, 0.9]
t_i predation	Uniform	–	–	[h_i, 1]
c_i war cost	Normal	0.01, 0.03, 0.05, 0.07, 0.09	0.01, 0.02, 0.03	[0.001, 0.999]
l_i labour	Normal	500, 2500, 5000	50, 150, 250	[1, *inf*]
d_i capital	Gamma	$K = 0.4$, $\theta = 4$	–	[0.9, 1.3]

redistribute the cost of public goods provision away from itself.[21] A comparison between the self-tax rate and the predation parameter provides one way to describe the tolerance for inequality within any polity. Larger gaps between h_i and t_i represent higher levels of inequality between members of the governing and opposition coalitions. Its inclusion also allows for domestic distributional conflict over the foreign policy of a multi-group polity.

The material resources of a polity are captured through its relative endowments of labour l_i and capital d_i.[22] Capital can be conceptualized as a generic technological implement that increases the marginal productivity of a unit of labour through access to financial capital, machine tools, transportation equipment, or military hardware. We assume that polities integrated by either war or peace share their capital, meaning each assumes a higher value between them. Consequently, a government can enhance its military productivity (and power) by conquering groups with higher capital endowments.[23] Table 1 lists unit characteristics.

The absolute military power P_i of each actor is set by the proportion of its capital and labour endowments devoted to public goods production. Formally,

$$P_i = d_i \cdot [(l_G \cdot h_i) + (l_O \cdot t_i)] \tag{1}$$

Imagine a state with 1000 people, a capital endowment of 1.2, and a self-tax rate of 30%. This means that 30% of its labour force, or 300 people, have enlisted into military service. The state's capital endowment enhances the fighting power or raw material capabilities of those 300 troops by a factor of 1.2 to 360. Its military capabilities would be equivalent to those of another state with 360 troops and a capital endowment of 1.

The triadic model

In the triadic model, polity *i* first chooses whether to offer military protection to polity *j*. If *i* opts not to offer protection, the subgame ends and both states maintain

[21]For a similar modelling setup, see Chapman *et al.* 2015.

[22]Separate multiplicative material endowments play a small role in the current simulations but are included so that the setup can be expanded in future iterations.

[23]Milner and Solstad 2021.

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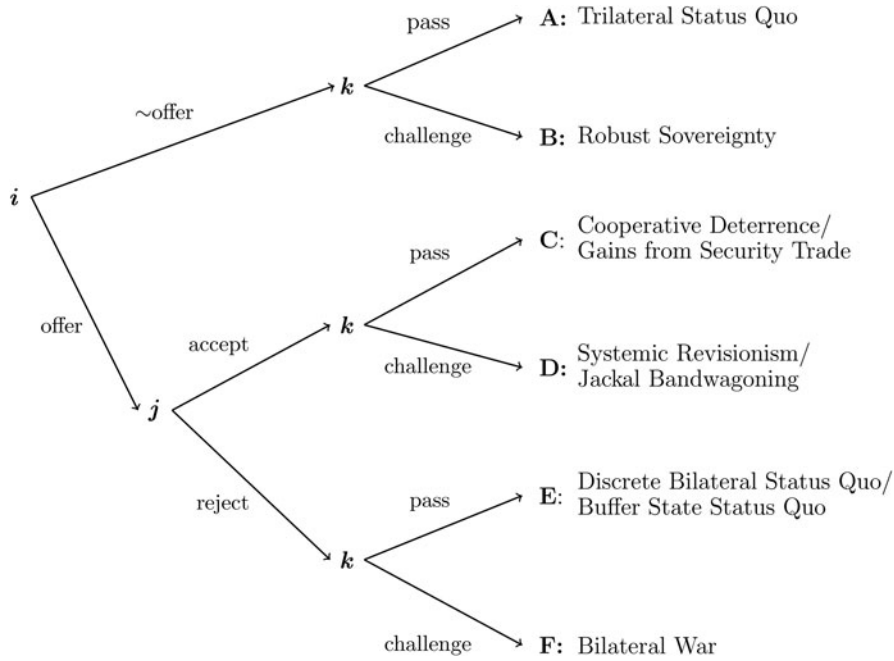

Figure 1. Triadic model.

their political independence. If the offer is made, then *j* decides between accepting and rejecting opposition status in a state led by *i*. If *j* rejects the offer, the subgame ends and both states maintain their political independence. Alternatively, if polity *j* accepts the offer, both polities merge into a new state that assigns the members of group *i* to the governing coalition and the members of group *j* to the opposition coalition. Both decisions are made in the shadow of war with *k*.

Next, *k* chooses whether to launch a military attack against the polity that includes *j* (as either an independent state or as the member of the opposition coalition in a state led by *i*). A decision by *k* to forego a military attack preserves the political status quo in which *k* and the polity including *j* both maintain independence. Alternatively, *k*'s decision for war merges all participants into a single polity led by the governing coalition of the military victor.

As shown in Figure 1, the game yields four possible outcomes. First, the three polities may retain a status quo (SQ) that preserves the political independence of each. Second, *j* and *k* may fight a bilateral war (BIWAR). Third, peace is coupled with cooperative integration (COOPINT) when *j* joins a new state led by *i* and *k* chooses not to attack either of them. Fourth, a mixed outcome that blends cooperative integration and war with all three actors (TRIWAR) occurs when *i* and *j* first voluntarily cooperate to form a new state before *k* subsequently launches a war to conquer both polities.

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Actor utilities

We begin by defining the utility for status quo political independence in single group polities. It depends exclusively on actors' labour and capital endowments (l_i and d_i). The division of production towards private and public goods does not impact the utility of citizens. All are taxed at the same rate; and no group faces a discount on public goods consumption as these resources support a common ideology. Independence yields:

$$W_i = d_i \cdot l_i \tag{2}$$

Actors i and j consider their respective utilities from cooperative integration. Upon integration, both contribute towards a common public good and share the pooled resource according to their relative populations. However, utility from public goods spending depends on 'domestic' political status, namely whether a group holds membership in the governing or opposition coalition. When in the governing coalition G, a group's utility from public goods consumption is simply its share (set by population weight) of military production. Because it defines the state's interests, military production fully supports the political interests of the group in power.[24] Alternatively, utility from public good consumption for the opposition coalition O is discounted by the ideological distance $|s_G - s_O|$ between it and the government. Accordingly, the respective utilities for i and j are:

$$U_G\ (COOPINT) = d_{max} \cdot \left[(1 - h_G) \cdot l_G + \frac{l_G}{l_G + l_O} \cdot (l_G \cdot h_G + l_O \cdot t_G)\right] \tag{3}$$

$$U_O\ (COOPINT) = d_{max} \cdot \left[(1 - t_G) \cdot l_O + (1 - |s_G - s_O|) \cdot \frac{l_O}{l_G + l_O} \cdot (l_G \cdot h_G + l_O \cdot t_G)\right] \tag{4}$$

where d_{max} is the larger capital endowment held by either i or j.

Next, j and k consider their utilities for fighting a bilateral war. We use standard conventions in the conflict literature to set expected utilities. All sides pay a certain cost c_i for participation in a war that destroys some proportion of their labour endowment. The losing side is assigned to the opposition coalition in a new state that includes all war participants. Defeat forces them to pay higher taxes than the governing coalition and discount their utility from public goods consumption by their ideological distance from the military victor. Each side's chance of military victory is defined by its relative share of aggregate military capabilities, P_i, of participating actors. We define an entity's post-conflict population as

[24]In other words, because i is the governing coalition, the interest terms (s_O and s_G) are equal.

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$\widehat{l_i} \equiv l_i \cdot (1 - c_i)$. The expected bilateral war utility for j is then:

$$U_j\ (BIWAR) = d_{max} \cdot \frac{P_j}{P_j + P_k} \cdot \left[(1 - h_j) \cdot \widehat{l_j} + \frac{\widehat{l_j}}{\widehat{l_j} + \widehat{l_k}} \cdot (h_j \cdot \widehat{l_j} + t_j \cdot \widehat{l_k}) \right] + d_{max} \cdot \frac{P_k}{P_j + P_k} \cdot \left[(1 - t_k) \cdot \widehat{l_j} + (1 - |s_j - s_k|) \cdot \frac{\widehat{l_j}}{\widehat{l_j} + \widehat{l_k}} \cdot (h_k \cdot \widehat{l_k} + t_k \widehat{l_j}) \right] \tag{5}$$

while k's utility reflects the same structure (with subscripts reversed).

Finally, trilateral war matches a unified ij against a singleton k. The winner of the violent lottery is again determined by the relative military strengths of opposing sides. We assume that the higher war cost between i and j is shared in the conjoint polity and that the resulting polity adopts the highest capital endowment among the three actors. Utilities for i and k follow the same construction: depending on the war outcome, each will either rule over the other two or reside in the opposition. These respective utilities are:

$$U_i(TRIWAR) = d_{max} \cdot \frac{P_i}{P_i + P_k} \cdot \left[(1 - h_i) \cdot \widehat{l_i} + \frac{\widehat{l_i}}{\widehat{l_i} + \widehat{l_O}} \cdot (h_i \cdot \widehat{l_i} + t_i \cdot \widehat{l_O}) \right] + d_{max} \cdot \frac{P_k}{P_i + P_k} \cdot \left[(1 - t_k) \cdot \widehat{l_i} + (1 - |s_i - s_k|) \cdot \frac{\widehat{l_O}}{\widehat{l_k} + \widehat{l_O}} \cdot (h_k \cdot \widehat{l_k} + t_k \cdot \widehat{l_O}) \right]. \tag{6}$$

where l_O is the resulting opposition population.[25] Finally, j is definitively in the opposition. Its utility is:

$$U_j(TRIWAR) = d_{max} \cdot \frac{P_i}{P_i + P_k} \cdot \left[(1 - t_i) \cdot \widehat{l_j} + (1 - |s_i - s_j|) \cdot \frac{\widehat{l_O}}{\widehat{l_i} + \widehat{l_O}} \cdot (h_i \cdot \widehat{l_i} + t_i \cdot \widehat{l_O}) \right] + d_{max} \cdot \frac{P_k}{P_i + P_k} \cdot \left[(1 - t_k) \cdot \widehat{l_j} + (1 - |s_k - s_j|) \cdot \frac{\widehat{l_O}}{\widehat{l_k} + \widehat{l_O}} \cdot (h_k \cdot \widehat{l_k} + t_k \cdot \widehat{l_O}) \right]. \tag{7}$$

Strategies

While most research using game theoretic models solve for parameter spaces that produce specific equilibria we instead explore how actors' decision-making is influenced by two factors: the systemic distribution of unit characteristics and strategic model settings. In other words, we are interested in the likelihood of each equilibria

[25]The opposition is either j plus k less their respective war costs if i wins; or ij if k wins less war costs.

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under different systemic and modelling conditions. Each player has a unique set of choices over potential outcomes. The preferences of *i* are defined over SQ, COOPINT, and TRIWAR; those of *j* over SQ, COOPINT, BIWAR, and TRIWAR; and those of *k* over SQ, BIWAR, and TRIWAR. These comparisons yield 864 configurations of preferences.[26] We reduce this to 432 by imposing one restriction on *i*'s preferences namely that it always prefers cooperative integration with *j* over the status quo.[27] These configurations yield nine distinct equilibria in the triadic model. Table A.1 maps preferences onto outcomes.

In the following discussion, we distinguish each equilibrium along two dimensions – its outcome (status quo, war, peaceful integration; or mixed outcome that includes cooperative political integration and war) and whether it reflects bilateral or trilateral strategic processes. In a trilateral equilibrium, the addition of a third actor to a previously bilateral interaction alters the strategic incentives producing the outcome and/or changes the outcome itself. In a bilateral equilibrium, we can safely characterize the third actor as strategically disinterested because it does not alter the incentives facing the other two actors or influence their choices. We discuss all nine equilibria to illuminate the underlying mechanisms and compare expectations for when each will occur.

Trilateral status quo (outcome A). In this equilibrium *k*'s preferences set its principal adversary as *i* rather than *j*. As a result, *i* prevents a trilateral war by not offering military protection to *j*. While *k* prefers to fight a trilateral war over retaining the status quo, it also prefers the status quo over a bilateral war against *j*. Knowing this, *i* foregoes the additional public goods gains associated with integrating *j* to avoid subsequent war with *k*. This equilibrium reflects trilateral politics. Even though *j* is willing to pay the costs of purchasing military protection from *i* in the cooperation game, it is denied that opportunity by the threat of war in the subsequent conflict game. Similarly, *i*'s choice to govern a smaller polity that excludes *j* in the cooperation game prevents a subsequent war among all three actors in the conflict game.

Robust sovereignty bilateral war (outcome B). This equilibrium also reflects trilateral politics. The absence of cooperation in the protection subgame between *i* and *j* is set by *k*'s threat to *i*. Like outcome A, polity *i* chooses to avoid the costs of war by not offering protection to *j*. However, *k* prefers fighting either a bilateral or trilateral war over status quo independence. Thus, the bilateral war between *j* and *k* rests on *i*'s choice to remain aloof from the conflict.[28]

Cooperative deterrence (outcome C). Here *j* prevents war with *k* by opting for voluntary subordination under *i*. While *k* would fight an isolated *j*, it prefers the status quo over a three-party war that includes *i*. This allows *j* to purchase protection from *i* at the cost of assuming opposition status. Their aggregated military capabilities then deter a subsequent attack by *k*. Had *i* chosen not to offer

[26] 3!*4!*3! = 864.

[27] We defend this assumption by noting that members of the governing coalition can distribute a greater proportion of the costs of public good production on the opposition coalition by assigning them higher taxes.

[28] Hypothetically, if *j* and *k* were members of the same state, this equilibrium would resemble a civil war without intervention. Accordingly, *i*'s choice not to fight in support of *j* reinforces non-interventionist norms associated with sovereignty.

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protection to *j*, *k* would have attacked as in the *Robust sovereignty bilateral war* outcome. This equilibrium also reflects trilateral politics. The incorporation of *k*'s interests and capabilities into the cooperative strategic environment between *i* and *j* alters the outcome in the conflict phase between *j* and *k* from war to peace.

Gains from security trade (outcome C). This peaceful integration equilibrium differs from *Cooperative deterrence* in that *j* does not face a pending attack from *k*. Instead, *k* prefers status quo independence over either a bilateral or trilateral war. As a result, *j* does not need to purchase protection from *i* to avoid paying the costs of war. It still opts for cooperative integration to realize additional welfare gains from security trade. These gains can stem from expanded public goods production associated with aggregating their militaries or increases in private consumption if *i*'s predation rate is lower than *j*'s self-tax rate. This equilibrium does not reflect trilateral politics. Instead, the outcomes of the cooperation and conflict phases are independent and can be modelled with two discrete bilateral interactions.

More broadly, these possibilities resemble the supply effect described in Hirschman 1945 whereby international trade increases the national income and military power of states. These unique incentives prompting cooperation also reflect those enabling hierarchical organizations described in Lake 2009 whereby one polity sacrifices some of its sovereignty in return for some set of political and economic benefits. In this case *j* assumes opposition status to purchase additional military protection.

Systemic revisionism (outcome D). Here *k* is a pure predator that values both war possibilities over status quo independence. Aware that a war with *k* is pending, *j* opts for integration with *i* to avoid being conquered by *k*. This implies that *j* would rather be in the opposition coalition of a polity ruled by *i* than one ruled by *k*. This equilibrium reflects trilateral politics. The cooperation game alters the outcome of the conflict game between *j* and *k*, expanding what would otherwise been a bilateral war to include an additional participant. Dyadic modelling restrictions that focus solely on the conflict between *j* and *k* would artificially prevent other system members from participating in this conflict, simultaneously rendering such specifications unable to explain or predict outcomes in which *i* wins.

Jackal bandwagoning (outcome D). While this equilibrium also results in a trilateral war, *k*'s preferences differ. Even though *k* prefers to fight a three-party war over retaining status quo independence, it also prefers the status quo over a bilateral war with *j*. This situation might emerge for example when *j* and *k* hold sufficiently similar interests such that *j* poses a minimal threat to *k*. However, *j*'s integration with *i* prompts *k* to launch a war against the recently unified state. These preferences might stem from a direct political conflict or rivalry between *i* and *k*. A political union between *i* and *j* aggravates this rivalry, effectively creating a commitment problem between *j* and *k* where *j*'s political interests change as they are subsumed by *i*'s interests in the new state.[29] Drawing on Schweller 1994 we describe this equilibrium as *jackal bandwagoning* because *j* holds the strategic capacity to prevent war. It could assume the status of a buffer state and prevent war by remaining independent (Fazal 2011). Instead, political union with *i* creates an

[29]Wolford 2012.

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opportunity to join a coalition targeting *k*. These strategic incentives reflect trilateral politics as a modelling decision to focus solely on the relationship between *j* and *k* would produce a different expectation of peace.

Discrete bilateral status quo (outcome E). This is the canonical set of bilateral interactions that can be safely modelled without third parties. Polity *k* values status quo independence over either war outcome. As a result, *k* never challenges *j*. Because *j* knows that it can unilaterally deter *k*, it evaluates the offer of protection from *i* solely in terms of the potential gains from the security trade. Limited gains from the security trade insufficiently compensate *j* for the costs of losing political independence, so it rejects *i*'s protection offer. This configuration of preferences eliminates the potential for trilateral politics. The absence of a security threat from *k* detaches the cooperation and conflict phases of the game so *j* evaluates its bilateral relationship with *i* separately from its bilateral relationship with *k*.

Buffer state status quo (outcome E). In this equilibrium, *j* prevents a trilateral war by rejecting the offer of protection from *i*. As in the case of *jackal bandwagoning*, *k* would launch a trilateral war to conquer *i* if *j* accepts integration. However, *j*'s preference for status quo independence over integration leads it to reject a protection offer from *i*. Accordingly, *j*'s political independence helps to solve a commitment problem between *i* and *k* that could be activated by a shift in the distribution of power (like an augmented *ij* war chest) or a shift in political interests (such as when *j*'s are subsumed in a new polity). This equilibrium reflects trilateral politics. It shows how the presence of an independent third party can alleviate the pressure of war in a bilateral relationship. This possibility also suggests that political independence of at least three states often associated with anarchy can sometimes foster peace.

Bilateral war (outcome F). Here *j* and *k* fight a bilateral war after *j* rejects the offer of integration from *i* knowing that *k* will attack in the conflict subgame. However, the costs of assuming opposition status in a polity led by *i* are too high. Consequently, the two subgames can be separated and modelled as discrete bilateral outcomes.

The dyadic model

The dyadic model replicates the triadic variant but removes the strategic interdependence between the cooperation and conflict phases. As shown in Figure 2, *j* first decides whether to accept *i*'s offer of integration. This decision determines the state in which *k* subsequently decides whether to initiate war.[30] *J*'s decision is based solely on a comparison of two political outcomes: status quo independence or cooperative political integration. Relevant expected utilities are defined in

[30]The exclusion of the third decision point where *i* decides whether to offer protection to *j* from the triadic model (as shown by nodes A and B in Figure 1) is a product of the assumption that *i* always offers protection over the status quo. In the triadic model, *i*'s decision not to offer protection is a function of trilateral politics created through the presence of *k*. In the dyadic variant, the lack of strategic complexity induced by the presence of *k* simplifies *i*'s calculus and removes the decision altogether. In other words, *i* only weighs status quo independence against holding dominion over an opposition group; the latter is empirically always greater, so *i* always makes the offer.

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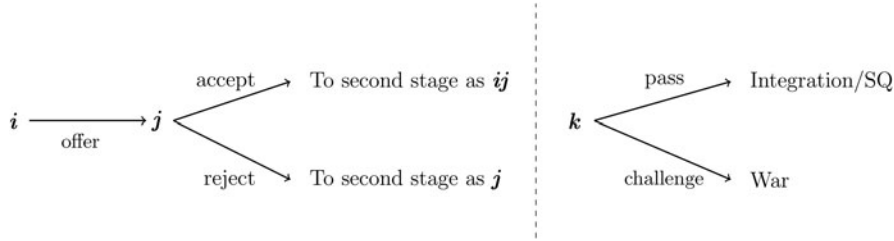

Figure 2. Dyadic model.

equations 2 and 4. Because k is not a threat, j's choice here reflects the potential welfare gains of security trade from the triadic setup.

Next k's choice to attack j is decoupled from j's choice over a voluntary political union with i. Its utilities are defined by equations 2 and 5 or 6 (depending on the first subgame's outcome). If k passes, both sides avoid the costs of war and retain independence. If k chooses instead to attack, both it and the polity including j fight a costly military contest. The winner acquires membership in the governing coalition in a newly aggregated polity that includes all participants from the war. The losing polities join the opposition and are assigned its attendant costs on top of those already paid for fighting a war.

The dyadic specification produces four equilibrium outcomes that vary across two dimensions – whether j accepts or rejects i's offer; and whether k challenges or passes. Figure 2 illustrates this sequence of choices. In the subsequent Monte Carlo, this setup creates opportunities for theoretical comparison by restricting the complexity of the strategic environment to eliminate the potential for trilateral politics.

Monte Carlo

In the following sections, we use Monte Carlo experiments[31] to compare the dyadic and triadic models of war and state formation. Monte Carlo is a computational technique that repeatedly draws from a set of input variables to simulate outcomes based on underlying game theoretic models governing actor behaviour.[32] We explore relationships between input (incentive) and output (behaviour) using simple comparative statics. Computational models like Monte Carlo experiments and their extensions, agent-based models, are underused in International Relations.[33] This approach is useful given that we lack data on numerous real-world systems, particularly outside of Europe and before 1815.[34] The state centrism of international relations compounds this problem for studies of state formation as pre-state data for common variables is particularly limited. However, the Monte

[31]We use the terms 'simulation' and 'experiment' interchangeably.

[32]Paravantis 2016.

[33]Geller 2011; de Marchi and Page 2014. However, see Majeski 2004; Findley 2008; Jung and Lake 2011; Gartzke and Weisiger 2013; and Walbert *et al.* 2018 for exceptions.

[34]Pepinsky 2005.

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Carlo approach allows us to generate thousands of systems with different distributions of unit characteristics. We leverage this method to study two classes of outcomes. First, we analyse how differences in simulated systems influence patterns of war and state formation and the endogenous relationship between them. Second, we identify conditions under which dyadic modelling restrictions that treat third parties as strategically disinterested are more or less appropriate.

Each strategic interaction begins by generating three autonomous and sovereign agents *i*, *j*, and *k* representing polities in a primitive environment. Before they interact, agents have complete control over their foreign policy which is used to make offers of integration, accept offers, or go to war. Actor attributes are assigned through random draws from distributions with parameters outlined in Table 1. We are intentionally agnostic about unit distributions. While some computational research designs motivate their exogenous parameters based on real-world data,[35] we choose not to. The political processes associated with war and state formation – the very outcomes we are trying to model – alter the organizational composition of the system and the resulting systemic distribution of important unit-level characteristics like population military capabilities and economic size. This is reflected by how the collapse of the Soviet Union in 1991 dramatically contracted the military capabilities, economic size, and population of one great power while creating a series of new states with small economies and limited military capabilities. We opt to draw attributes from generic normal distributions to alleviate such concerns.[36] Moreover model behaviour is sensitive to initial parameter distributions[37] so any decision by the researcher to shape attribute distributions introduces bias by assuming past military conquest or political integration.

We conceptualize each distribution of unit characteristics as a different international system. Accordingly, we generate 70,875 unique systems that vary based on the mean and/or variance of ideology, population, hawkishness, and war costs.[38] We run 100 iterations of both the triadic and dyadic games in each of these artificial systems.[39] At the outset of each strategic interaction, the simulation draws three new actors.[40] By randomly assigning attributes to each actor and iterating each simulated system a hundred times, we model all possible combinations of relative actor endowments and avoid possible bias from the order in which actors move.[41] This process

[35]Walbert *et al.* 2018; de Marchi and Laver 2020.

[36]There are two exceptions. Because the predation parameter is bounded between a variable drawn from a normal distribution (hawkishness) and one, we opt to draw it from a uniform distribution across that range. Second, because of the multiplicative relationship between labour and capital in utility calculations, we draw capital from a gamma distribution so that it does not dominate respective utility considerations.

[37]Geller 2011.

[38]This count (70,875) reflects the product of distinct values from: (5) ideology mean × (5) ideology variance × (7) hawkishness mean × (3) hawkishness variance × (5) war cost mean × (3) war cost variance × (3) population mean × (3) population variance.

[39]This generates a total of 14,175,000 strategic interactions (200 runs for each of the 70,875 systems).

[40]This modelling decision distinguishes our approach from others such as Cederman 1997. By intentionally drawing a new set of three actors from the same underlying distribution at the outset of each interaction we focus on the spatial distribution of unit characteristics across different international systems. This choice prevents actor characteristics from being endogenous to the history of play.

[41]For example, relative military strengths of the three actors in some simulations is $P_i < P_j < P_k$, in others $P_k < P_j < P_i$, implying that *i* is sometimes the strongest actor and sometimes the weakest.

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allows us to analyse counterfactual international systems and specifies the microfoundations stemming from variation in exogenous systemic conditions that influence aggregate rates of conflict, cooperation, and trilateral politics more generally.[42]

Our unit of analysis is a strategic interaction. A single interaction includes an iteration of both the cooperation and conflict phases. The following results include 7,087,500 strategic interactions for each of the dyadic and triadic setups. Rates described below refer to the percent of outcomes within a group of experiments that correspond to each potential equilibrium shown in Figures 1 and 2.[43] For example, if 95,000 of all triadic strategic interactions result in trilateral status quo (outcome A), then the rate for that outcome would be 1.34%. Alternatively, 175,000 trilateral status quo outcomes in a set of experiments in which population mean is fixed (out of 2,362,500) would produce a rate of 2.47%. These statistics are analogous to comparative statics and allow us to analyse the relationship between changes in theoretically relevant parameters and relative equilibria frequencies without providing formal proofs of actors' optimal strategies.[44] The following sections explore relative rates of equilibria outcomes across all experiments.

Results

We discuss Monte Carlo results in three parts. All concentrate on relative rates of equilibrium outcomes specified through the game theoretical models – either to facilitate comparisons across equilibria or identify the systemic sources of changing equilibria rates. The first section examines the cooperative integration outcomes comparing the bilateral (*gains through security trade*) with the trilateral variants (*cooperative deterrence*, *systemic revisionism*, and *jackal bandwagoning*). This comparison allows us to estimate the relative importance of war in state formation and reinforces the importance of third-party threats. We also explore how different systemic distributions of core unit characteristics like political ideology and tax rates can either strengthen or weaken the relationship between war and state formation.

The second part examines how endogenous state formation influences rates of military conflict. It compares differences in rates of the bilateral (*bilateral war*) and trilateral war outcomes (*systemic revisionism*, *jackal bandwagoning*, and *robust sovereignty bilateral war*). It also identifies systemic conditions that influence their likelihoods and examines the conditions under which political integration can foster peace. It contributes to debates about bellicist theories of state formation and the origins of war by identifying microfoundations of the endogenous relationship between war and the state.

The third section details how restricting the relevant strategic context to two or three players can influence theoretical expectations about cooperation and conflict. It focuses on the aggregated rates of the six trilateral equilibria from the triadic model to identify a set of systemic conditions in which third parties are least likely to be strategically disinterested from bilateral interactions. We use these findings to estimate when bilateral modelling restrictions are most appropriate.

[42]Siegel 2018.

[43]Rates can also be conceptualized as the probability of any particular outcome being realized within a parameter set de Marchi and Laver 2020.

[44]Siegel 2018; de Marchi and Laver 2020.

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Table 2. Classes of political integration in triadic model

	Bilateral	Trilateral
Peaceful cooperation	Gains from security trade	Cooperative deterrence
Mix	–	Jackal bandwagoning Systemic revisionism
Conflict	Bilateral war	Robust sovereignty bilateral war

Cooperative political integration as state formation

As noted in the introduction our conception of state formation focuses on the integration of at least two polities into a single political organization. We can think of this newly formed state as a territorial unit that pursues a common national interest and distributes the costs of public goods production unevenly between groups in the governing and opposition coalitions. The triadic model identifies six equilibria in which some form of political integration occurs. These equilibria displayed in Table 2 vary along two dimensions. The first indicates whether they emerge through peaceful cooperation, violent integration, or a mix of the two. The second classifies them as an outcome that reflects bilateral or trilateral strategic processes. We first focus on cooperative outcomes (displayed in the top two rows) that reflect voluntary integration into another polity at some stage.

War and state formation

Table 3 shows the cumulative frequencies of *cooperative deterrence* and *gains from security* trade to define the aggregate rate of peaceful political integration. These results indicate that in 6% of all interactions, one polity purchases protection from another at the cost of accepting opposition status in a newly aggregated state. The trilateral outcome *cooperative deterrence* occurs nearly 2.5 times more frequently than the bilateral outcome *gains from security trade*. This difference underscores the theoretical costs associated with restricting the relevant strategic

Table 3. Triadic outcome rates (%)

Equilibrium	Trilateral politics?	Outcome	Rate
Gains from security trade	No	Cooperative integration	1.72
Cooperative deterrence	Yes	Cooperative integration	4.28
Systemic revisionism	Yes	Mixed	3.02
Jackal bandwagoning	Yes	Mixed	1.61
Robust sovereignty bilateral war	Yes	Violent conquest	2.85
Bilateral war	No	Violent conquest	25.3
Buffer state status quo	Yes	Status quo	7.83
Trilateral status quo	Yes	Status quo	1.38
Discrete bilateral status quo	No	Status quo	52.0

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environment to two actors. Third-party threats motivate more cooperative political integration than the economic gains associated with the joint production of military protection. Accordingly, models that neglect third parties risk misidentifying the causes of a significant proportion of peaceful integration.

Relatedly, *systemic revisionism* and *jackal bandwagoning* are a mix of voluntary integration and violent conquest. In these outcomes, *i* and *j* integrate in anticipation of fighting in the subsequent conflict stage. Unlike *cooperative deterrence*, their political union fails to prevent military conflict. These mixed cases comprise an additional 4.63% of outcomes.

The aggregation of *cooperative deterrence*, *systemic revisionism*, and *jackal bandwagoning* outcomes provides an estimate of the likelihood of war-induced state formation. In all three equilibria, the threat of conquest by *k* fosters the voluntary political integration of *i* and *j* into a single state. Together, they make up almost 9% of all interactions. War-induced political integration is nearly five times as likely as the gains from security trade outcome. This statistic reinforces the importance of war as a cause of state formation.

Systemic sources of cooperative integration

We next address a question raised by Spruyt 2017: How does the relationship between war and state formation change across different international systems? Our computational approach provides a unique way to explore this question. Comparative statics generated from thousands of experiments with various exogenous distributions of unit characteristics allow us to trace how systemic changes influence the relative rates of war-induced state formation. Figure 3 displays the relationship between four key parameters – ideological variance, mean rates of hawkishness, variance in hawkishness, and mean war costs – and four forms of political integration.[45]

First, differences in the distribution of ideology shape rates of voluntary political integration. As ideological variance increases, three randomly selected actors are more likely to have greater ideological disparities. These differences alter patterns of cooperation and conflict by increasing the utility losses associated with assuming opposition status in another polity. For example, ideological differences eliminate some wars of conquest by raising the long-term political costs of military defeat. In terms of bilateral outcomes, we observe a slight almost negligible change in *gains from security trade*. As σ_s^2 moves from 0.1 to 0.5, its outcome rate increases from 1.71 to 1.8% of simulations. The substantive consequences are more significant for *cooperative deterrence* and the two mixed outcomes – *systemic revisionism* and *jackal bandwagoning*. Greater ideological diversity reduces the rates for the latter. As σ_s^2 moves from 0.1 to 0.5, rates of *systemic revisionism* and *jackal bandwagoning* fall from 4.5 to 2.2% and from 2.67 to 1.01%, respectively.

These ideological changes alter patterns of political integration by changing actor preferences in three ways. First, in some cases they reorient *k*'s preferences from being willing to attempt the conquest of two polities to not wanting to challenge either. Accordingly, part of the decline in rates of mixed outcomes is

[45]For space we focus on this subset of parameters. The Appendix reports how changes to ideology mean war cost variance population mean and population variance influence rates of political integration.

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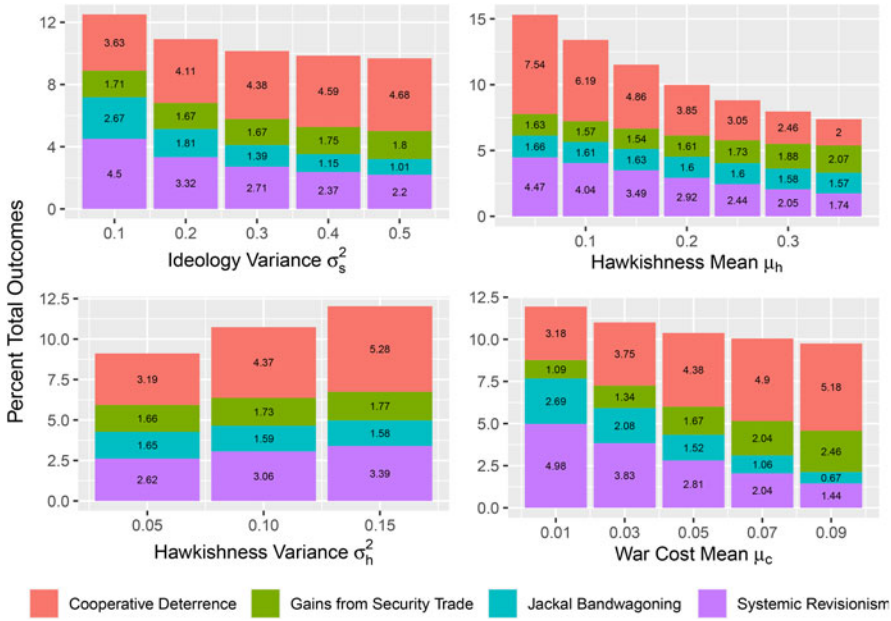

Figure 3. Rates (%) of triadic cooperation by parameter.

associated with a growth in the discrete bilateral status quo outcome (shown in Figure A.1). The second dynamic reorients *k*'s preferences such that it will challenge a singleton *j* but not a polity consisting of both *i* and *j*. Here part of the decline of trilateral war is offset by an increase in the rates of *cooperative deterrence* (from 3.63 to 4.66% of all outcomes) as the political integration of *i* and *j* deters an attack. Third, *j* becomes less willing to pay the costs of opposition status associated with joining a polity led by *i* to capture some of the gains associated with conquering *k*. Its decision to remain independent reduces cases of *jackal bandwagoning* by serving as a buffer state between *i* and *k*.

In summary, these results show that greater systemic variance in political ideology reduces rates of trilateral war and increases rates of peaceful cooperative integration. The combined rate of *cooperative deterrence*, *jackal bandwagoning*, and *systemic revisionism* into a single war-induced state formation outcome suggests that greater ideological variation in the international system weakens the relationship between war and state formation. These three equilibria comprise nearly 11% of all outcomes when ideological variance is low (0.1), but less than 8% when the variance is relatively higher (0.5).

Next, we examine how taxation influences the relation between war and state formation. Hawkishness (μ_h) sets the rate at which polities tax members of the governing coalition. Because governments always tax members of the opposition coalition at higher rates than themselves, higher average rates of hawkishness also increase tax rates imposed on groups assigned to the opposition. We can also associate higher average tax rates with the development of a modern administrative state in which government spending comprises a larger proportion of national economic

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activity. Hawkishness influences strategic outcomes by shaping a state's unilateral ability to deter attacks which then helps set its demand for external protective services. As hawkishness increases states should be less likely to purchase protection from other states at the cost of surrendering political independence.

We see these political consequences in the Monte Carlo results. When μ_h increases from 0.05 to 0.35, rates of *cooperative deterrence* fall from about 7.5 to just 2% of all outcomes. This decline brought on by *j*'s increased capacity to deter *k* corresponds with a rise in cases of *discrete bilateral status quo* whereby *j* rejects the offer of *cooperative integration* and successfully deters an attack with its own military capabilities.

More broadly, higher systemic rates of average hawkishness weaken the relationship between war and state formation. As average hawkishness increases from 0.05 to 0.35, the aggregated rate of *cooperative deterrence*, *jackal bandwagoning*, and *systemic revisionism* falls substantially from 13.67 to 5.31% of outcomes. An increase in average hawkishness also facilitates more economically motivated political integration. As μ_h increases from 0.05 to 0.35, the likelihood of the gains from security trade outcome increases from 1.63 to 2.07%. In this small group of outcomes that previously resulted in *cooperative deterrence*, *j*'s military power eliminates the threat posed by *k* without influencing the potential to capture some economic gains in the joint production of security.

Alternatively, higher variance in hawkishness rates strengthens the relationship between war and state formation by increasing the likelihood of both *cooperative deterrence* and *systemic revisionism*. Greater variance in tax rates creates larger gaps in military capabilities between any two randomly selected polities. This difference influences *j*'s demand for security and *k*'s willingness to attempt the conquest of *i* and *j*. As hawkishness variance increases from 0.05 to 0.15, the rate of *systemic revisionism* increases from 2.62 to 3.39% of all outcomes. This growth offsets declines in the rates of *discrete bilateral status quo* and *buffer state status quo* (Figure A.1). In both situations, *j* buys additional protection from *i* at the cost of opposition status because it can no longer deter *k* on its own. Across the same range, the likelihood of *cooperative deterrence* increases from 3.19 to 5.28%. This change stems from declining rates of *bilateral war* and *bilateral discrete status quo*. The growing risks of facing a *k* with higher rates of military spending make *j* more willing to join a state led by *i*.

Higher average war costs influence cooperation by discouraging attempts at violent conquest. As average war costs increase from 0.01 to 0.09, the likelihood of *gains from security trade* increases from 1.09 to 2.46%. These gains are offset by substantial drops in the rates of *systemic revisionism* and *jackal bandwagoning*. In both situations, the preferences of *k* are reoriented to not challenge any polity including *j*. Accordingly, the elimination of external threat reclassifies some outcomes that previously combined the threat of imminent conquest with the presence of some economic gains into outcomes that only include the latter incentives.

Higher average war costs also make *cooperative deterrence* more likely. This growth stems from a decline in rates of *systemic revisionism* and *robust sovereignty bilateral war*. Growing war costs reorient the preferences of some types of *k* from a willingness to conquer both *i* and *j* to just an isolated *j*. In these cases, *j* can prevent war by purchasing security from *i*. Similarly, the possibility that *k* pays higher costs

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of war eliminates some bilateral wars in which *i* had previously chosen to stay on the sideline. Higher war costs encourage *i* to offer military protection which *j* then accepts to deter *k*.

Finally, our results suggest that higher average war costs weaken the relationship between war and state formation. The combined rates of *cooperative deterrence*, *systemic revisionism*, and *jackal bandwagoning* fall from 10.85 to 8.71% of all outcomes as average war costs increase from 0.01 to 0.09. These findings possess additional implications for understanding the political consequences of the nuclear revolution. Conceptualized as a technological development that significantly raises war costs and discourages violent conquest, it may have encouraged political decentralization in the international system by reducing the need to secure military protection through political integration.[46]

Implications for hierarchy

Simulation results linking war and state formation hold significant implications for a growing literature on hierarchy in International Relations (IR). Much of that literature reevaluates a states-under-anarchy characterization frequently invoked in models of international politics.[47] It challenges a conventional wisdom that the existence of many states in the international system necessarily implies the absence of authority relationships among them. Instead, the autonomy and independence of many legally recognized states are compromised through voluntary bargains that trade public goods provision by an external actor for some restrictions on local sovereignty. Such conceptions of hierarchy rest at least partially on contractual or neoclassical models that cast states as competitive economic organizations that supply protection to some subset of the global population.[48]

Our findings prompt a reevaluation of these hierarchical models by asking: What are the theoretical consequences of setting the relevant strategic context to include two or three actors? Early variations of hierarchy models rely on two-actor setups to explain the formation of political organizations like states and empires as a contract between a dominant and subordinate political entity.[49] This approach imposes significant conceptual restrictions on the underlying global market for security motivating these models. It neglects how variation in third-party threats (like *k* in our model) influences a polity's (*j* in our model) demand for protection and its subsequent willingness to sacrifice sovereignty to join another hierarchical organization (*i* in our model). In two-actor models, the providers of security can only sell protection from themselves to local or 'domestic' consumers. This conceptualization eliminates a role for 'foreign' organizations that can either pose the threats that

[46]These results reinforce the claims of Chowdhury 2018.

[47]Lake 2009; Zarakol 2017; McConaughey *et al.* 2018.

[48]See for example North 1981; Lake 1992, 1999, 2016; Konrad and Skaperdas 2012; and Acharya and Lee 2018.

[49]Prominent examples of these early two-actor models of hierarchy include Lake 1999, 2009. Lake, 1999, 43 writes '[t]he threats faced by polities are assumed to be exogenous…the theory begins with the existence of a security threat from a third party and seeks to explain how the members of a dyad choose a particular response. This assumptions allows me to focus on the relationship between the two polities rather than the triadic relationship between two partners and a common foe'.

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set the demand for protection or facilitate greater competition in the supply of protection.

Alternatively, our trilateral Monte Carlo application offers a less restricted model of the global market for security. The addition of a randomly selected third actor to the relevant strategic context varies the external threat environment that helps to set the demand for protection services. Similarly, the repeated random selection of three actors allows any potential purchaser of security (polity j) to identify multiple suppliers (i).

Our theoretical model highlights two distinct political processes that can explain hierarchy or state formation. The first (*gains from security trade*) resembles the theoretical approach associated with Lake 1999. It focuses on unrealized economic opportunities stemming from differences in factor endowments or the tolerance of taxation burdens that encourage one polity to surrender its sovereignty and accept opposition status in another state. In the second (*cooperative deterrence*), the threat of military conquest by third parties facilitates the construction of hierarchical political organizations.[50] As the threat of military attack by a third party grows, hierarchy formation becomes more likely. Importantly, this equilibrium is not possible when the strategic context is defined narrowly to include only two actors. This suggests that two-actor models may underestimate the likelihood of hierarchy formation.

Our results show how the incorporation of third parties into the relevant strategic context can alter conclusions about the likelihood of cooperative political integration to form some new hierarchical order and the strategic incentives that drive such decisions. Comparative statics show that *cooperative deterrence* is 2.5 times more likely to occur than *gains from security trade*.[51] This implies that a reliance on two-actor theoretical models of hierarchy will tend to under-predict the likelihood of peaceful integration in the system while simultaneously misidentifying the strategic causes of hierarchy formation in a majority of cases.

Conflict

The formation of states and hierarchical relationships also influences the likelihood of military conflict. After briefly presenting aggregate patterns of conflict across Monte Carlo experiments we discuss how that relationship is conditioned by systemic variation in the distribution of unit characteristics. This discussion highlights how a series of understudied trilateral processes – associated with the preservation of buffer states – strengthen peace by providing organizational mechanisms to mitigate certain classes of commitment problems.

[50]The threat of pending war also motivates voluntary political integration in the *systemic revisionism* and *jackal bandwagoning* equilibria. However, to facilitate a more direct comparison with existing hierarchy research examining peaceful hierarchy formation we restrict our discussion here to the *cooperative deterrence* and *gains from security trade* equilibria.

[51]This ratio increases (making cooperative deterrence more likely) as ideological variance or hawkishness variance increases. The ratio falls (making *gains from security trade* more likely) as average hawkishness and war costs increase. Overall the likelihood of gains from security trade only exceeds that of *cooperative deterrence* as average rates of hawkishness approach (and exceed) 0.35.

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Table 4. Trilateral conflict rates (%)

Equilibrium	Rate	Total
Bilateral war	25.3	32.8
Jackal bandwagoning	1.61	
Robust sovereignty bilateral war	2.85	
Systemic revisionism	3.02	

The results in Table 4 show that bilateral strategic processes account for a sizable majority of wars. The bilateral war outcome occurs in 25.3% of simulations, or about 77% of the subset of war outcomes. The three other types of war – attributable to trilateral processes – comprise approximately 7.5% of strategic interactions.

Endogenous organizations and conflict

We explore how the creation of new hierarchical political organizations influences military conflict by focusing on *cooperative deterrence* and *jackal bandwagoning*.[52] In the former, the opportunity to purchase protection from a third party (i) prevents a war between j and k that would have otherwise occurred in a dyadic setting. Alternatively, the opportunity to join a new polity in *jackal bandwagoning* facilitates a three-party war that could have been prevented through the preservation of j's independence. Given that *cooperative deterrence* is more likely than *jackal bandwagoning* (4.3 vs. 1.6% of simulations), the formation of hierarchical orders has a modest downward effect on the overall rate of military conflict in the system. These results support prior research linking the presence of hierarchy to military conflict.[53] They also reinforce the broader need to move beyond dyadic restrictions in both theoretical and empirical models of military conflict as these pacific consequences only manifest in triadic strategic contexts that allow weaker polities to deter third-party attacks by securing membership in a hierarchical order.

Systemic sources of conflict

Next, we leverage the Monte Carlo approach to examine how systemic differences in the distribution of core unit characteristics influence rates of military conflict. Figure 4 displays variation in conflict rates across four exogenous parameters. First, systemic variance in hawkishness has no effect on conflict rates. Second, higher average war costs reduce conflict rates significantly by making k less likely to attempt military conquest of j. When average war costs shift from destroying 1 to 9% of a polity's economy the average rate of war falls by over 50% (from 44.7 to 21.2%).

[52]The other two cases of cooperative political integration should have no effect on the likelihood of military conflict. In gains from security trade k was already unilaterally deterred by j. As a result the decision by j to join i has no independent influence on the outbreak of military conflict. In the case of systemic revisionism k's preferences are such that it would fight either j on its own or if it is integrated with i. The formation ij simply transforms that war from a two-party to a three-party conflict.

[53]See for example McDonald 2015; Beardsley *et al.* 2020.

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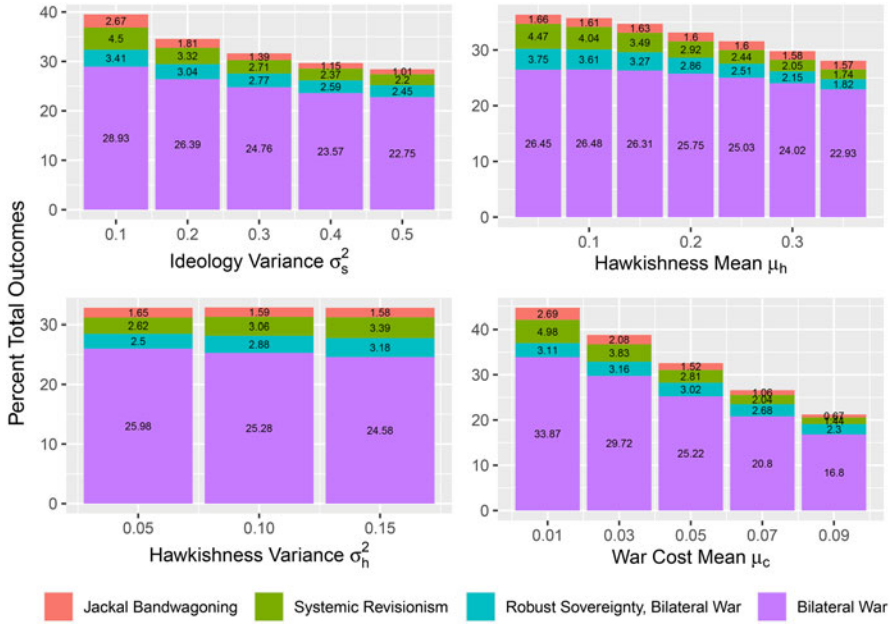

Figure 4. Rates (%) of triadic conflict by parameter.

Greater ideological variance also drives down conflict rates. As discussed above, greater ideological differences strengthen deterrence by increasing the costs associated with losing a war and being assigned to an opposition coalition. Greater ideological variance decreases the rates of all four types of wars. It has the largest proportional effect on the two forms of trilateral wars. Rates of *systemic revisionism* fall from 4.5 to 2.2% (a decline of 51%) as ideological variance increases from 0.1 to 0.5. This decline is offset by increases in the rates of *cooperative deterrence* (Figure 3) and *discrete bilateral status quo* (Figure A.1).[54] A similar change in ideological variance decreases the rates of *jackal bandwagoning* by over 62% (from 2.67 to 1.01% of all strategic interactions). This decline is offset by increases in the *discrete bilateral status quo* and *buffer state status quo* outcomes.[55]

Higher average rates of hawkishness also make war less likely. As μ_h increases from 0.05 to 0.35, the average rate of conflict falls by about 23% from 36.33 to 28.06% of experiments. Larger war chests reduce *j*'s demand for external protection by enhancing its ability to deter *k* unilaterally. This effect then transforms the preferences of some types of *k* that were previously willing to fight both *i* and *j* by reducing their tolerance for war such that they will only fight *i* or *j*. These declining

[54]Greater ideological variance helps this shift in outcomes by transforming some types of *k* such that they are only willing to fight one state rather than two. This creates new opportunities for *j* to purchase additional security through integration while simultaneously preventing war. Greater ideological variances also transform war into peace by altering some types of *k* to be unwilling to launch any war.

[55]In this situation greater ideological variances transform *j*'s preferences such that it is no longer willing to pay the costs of purchasing protection from another polity that is more ideologically distant from it.

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rates of war manifest in three of the four war outcomes – *bilateral war*, *systemic revisionism*, and *robust sovereignty bilateral war*.

The negative relationship between hawkishness and military conflict carries important implications for the broader question of how state formation influences war. Consider the *buffer state* and *trilateral status quo* outcomes. These equilibria emerge when *k* is willing to fight *i* but not *j*. Accordingly, the political separation of *j* from *i* prevents *k* from launching a war against a united *ij*. In the *buffer state status quo* outcome, *j*'s rejection of *i*'s offer facilitates this separation. Alternatively, in the *trilateral status quo* outcome *i*'s decision not to offer protection (because a war would follow) ensures the political independence of *j*. As average hawkishness increases from 0.05 to 0.35, the combined likelihood of these two peaceful outcomes increases by over 68% from 6.55 to 11.01% of all strategic interactions. This growth in peaceful outcomes is enabled by a decline in the likelihood of both *bilateral war* and *systemic revisionism*.

We can see the potential for the political independence of *j* to foster peace by drawing on the logic of the commitment problem.[56] The independence of one state can resolve two types of commitment problems between its neighbours. In the first, the political aggregation of *i* and *j* creates a shift in relative military capabilities between *i* and *k*. This shift then encourages *k* to launch a preventive war against the newly integrated *i*. The second stems from a reorientation of the political interests of *j* caused by its integration into *i*. The creation of this new state assigns *j* to the opposition coalition and subsumes its interests under those held by *i*. Accordingly, *k* now fights because *j* no longer holds the same interests that supported the prior peaceful status quo.[57]

More broadly, these relationships among hawkishness and peace suggest a new set of trilateral mechanisms by which political decentralization in the international system can enable interstate peace. Again, hawkishness captures a polity's willingness to fund public goods provision through self-taxation. If we associate the development of the modern administrative state with greater public goods provision, this implies that modern states are more capable of unilateral deterrence because they can secure sufficient domestic resources to do so. The resulting political independence resting on this internal capacity for public goods provision then resolves commitment problems between hostile neighbours by ensuring that the third state will not integrate with either. These possibilities carry broader modelling implications for the study of war. We cannot account for these trilateral processes with dyadic modelling restrictions that obscure how a political union of two political groups can enable conflict between them and a third party.

Trilateral politics

Any decision to restrict a strategic context to two actors necessarily imposes a set of auxiliary assumptions about the incentives and actions of third parties. Dyadic models effectively assume that third parties lack the interests or capabilities to

[56]See Powell 2006 or Wolford 2007 for relevant theoretical arguments.

[57]These mechanisms linking shifting political interests to war resemble the variant of a commitment problem attributable to leadership turnover discussed by Wolford 2012.

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influence decision-making by either of the initial two actors. This neglect of third parties can produce at least two types of theoretical missteps. In the first, the inclusion of a third actor alters a strategic outcome like that from war to peaceful integration in the *cooperative deterrence* equilibrium. In the second, the incorporation of a third actor leaves the predicted outcome unchanged but alters the strategic incentives responsible for it.

We explore the consequences of imposing dyadic restrictions in two ways. The first compares aggregate equilibria rates from the dyadic and triadic groups of Monte Carlo experiments. Results show that dyadic restrictions underpredict the likelihood of cooperative integration and overpredict the likelihood of military conflict. The second approach draws solely on the triadic model and compares relative rates of what we earlier described as either bilateral or trilateral equilibria. This approach allows us to identify systemic conditions under which neglecting third parties are more likely to generate misleading theoretical conclusions.

Dyadic vs. triadic modelling assumptions

We begin to see how two-actor modelling restrictions can influence theoretical conclusions by comparing four classes of outcomes in Table 5. These classes group together equilibria that include a status quo in which neither war nor cooperative integration occurs; peaceful cooperative integration in which two polities voluntarily form a single state; a war outcome in which one state conquers at least one other polity; and a mixed outcome that includes both cooperative integration and war.

This comparison shows that modelling decisions to include two or three strategic actors produce different rates of outcomes. Recall that the dyadic modelling setup disconnects the political integration and conflict subgames so that k's pending decision over whether to launch a war against j does not factor into j's decision to integrate with i. Rates of peaceful cooperative integration are three times more likely in the triadic setup (6%) than in the dyadic setup (2%). These differences across strategic contexts are similar to those between *gains from security trade* (a bilateral outcome) and *cooperative deterrence* (a trilateral outcome) in the triadic setup (1.72–4.28% of all outcomes). Together, these results suggest that lower rates of peaceful integration in the dyadic setup stem largely from its modelling restriction that overlooks the potential for third-party threats to encourage two previously independent polities to merge.

War is more likely when employing dyadic modelling restrictions. When aggregating the mixed and conflict outcome classes, war occurs in over 38% of strategic interactions. Alternatively, violent conflict occurs in just over 32.7% of triadic simulations. The possibility of trilateral equilibria in the triadic model helps explain

Table 5. Categorical equilibria by model

	Peaceful cooperation	Mixed	Conflict	Status quo
Dyadic	2.00	5.61	33.2	59.1
Triadic	6.00	4.63	28.1	61.2

For the dyadic model cooperation is accept pass; mixed is accept challenge; conflict is reject challenge; and status quo is reject pass. Triadic equilibria are described in Table 2.

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Table 6. Rates (%) of trilateral politics

Equilibrium	Rate	Political outcome	Total	Aggregate
Buffer state status quo	7.83	Status quo	9.21	21.0
Trilateral status quo	1.38			
Cooperative deterrence	4.28	Peaceful Integration	4.28	
Jackal bandwagoning	1.61	Violent integration	7.48	
Systemic revisionism	3.02			
Robust sovereignty bilateral war	2.85			

these differences in conflict rates transforming some cases of bilateral war into instances of either peaceful integration (*cooperative deterrence*) or the status quo (*buffer status quo* or *trilateral status quo*).

Trilateral outcome rates

Our second technique for evaluating the consequences of dyadic modelling assumptions compares rates of bilateral and trilateral equilibria from the triadic setup. Table 6 displays rates for all trilateral outcomes. In these equilibria, the addition of a third actor either changes the outcome that would have existed in a previously bilateral interaction; or alters the causal mechanisms producing that outcome. Trilateral equilibria comprise 21% of all strategic interactions. This result implies that the adoption of dyadic restrictions in the strategic context would either generate incorrect predictions about the likely outcome or mis-specify the causes of that outcome in 21% of strategic interactions.

We can see examples of potential explanatory mistakes by looking at trilateral equilibria. *Cooperative deterrence* appears in 4.28% of all experiments. Accordingly, a two-actor modelling restriction focused on a dyad composed of j and k would mistakenly produce theoretical expectations of a bilateral war – rather than the peace attributable to the political union between i and j – in over 4% of all interactions. *Systemic revisionism* occurs in just over 3% of simulations. Two-actor models of j and k would predict a bilateral war rather than a conflict that expands to include i. That dyadic restriction would also impede that model's ability to explain the consequences of that war in which an actor cast as strategically insignificant (i) emerged victorious in a unified state that included both j and k. The *buffer status quo outcome* appears in nearly 8% of simulations. Dyadic models explain the peace between j and k by focusing on the distribution of military capabilities between them, their ideological similarity, and/or the costs that each pays for war. A triadic model would argue instead that the peace between j and k depends on these dyadic attributes *and* the continued political independence of j from both i and k.

As suggested earlier, the appropriateness of dyadic modelling restrictions depends on the validity of an assumption that a third party is either incapable or unwilling to influence a bilateral interaction. We leverage our Monte Carlo approach to examine how often a randomly selected third party exhibits strategic disinterest – so that its presence does not influence the bilateral interaction between

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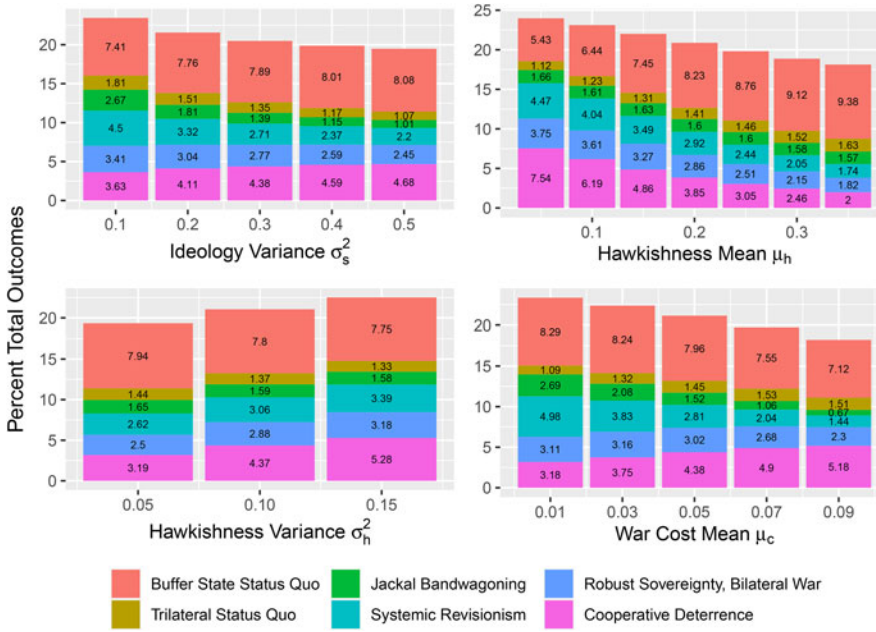

Figure 5. Rates (%) of trilateral outcomes by parameter.

two other polities. This likelihood of strategic irrelevance will depend on the systemic distribution of unit characteristics from which potential third parties are drawn. Here we group together the six trilateral equilibria and examine how their aggregated rate changes across different simulated systems.

Figure 5 shows how different systemic distributions of core unit characteristics influence the combined rate of trilateral equilibria. Greater systemic variance in hawkishness (self-tax rates) increases the relative proportion of trilateral outcomes. These changes are principally attributed to the outcomes of *cooperative deterrence*, *systemic revisionism*, and *robust sovereignty bilateral war*. These results imply that dyadic modelling assumptions will generate more theoretical mistakes when analysing international systems with higher variance in tax rates across polities.

Alternatively, the proportion of trilateral outcomes falls under three conditions: as ideological variance among polities increases; as average self-tax rates increase; and as mean war costs increase. These results imply that dyadic modelling restrictions are more appropriate when analysing international systems with high levels of ideological variance, higher average war costs, and modern states capable of higher levels of public goods provision. We can use these findings to suggest for example that dyadic modelling restrictions are more appropriate for analysing the interactions among nuclear-armed states because the costs of fighting a nuclear war would be so high.

Our findings reinforce the need to think carefully about modelling assumptions underlying strategic contexts. Decisions to focus on a dyadic relationship necessarily downplay the theoretical importance of third parties. Within the confines of this

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paper, simulations suggest that such restrictions would generate some form of theoretical mistake over 20% of the time. We can see these consequences when examining classes of war or peace. Peaceful integration is three times more likely when employing a triadic modelling specification. War is almost 19% more likely when adopting dyadic restrictions over triadic ones (38.81 vs. 32.7% of all interactions). We want to be careful not to overemphasize these aggregate estimates as they depend on the underlying distributional assumptions employed here. However, this last set of experimental results reduces the dependence of these conclusions on any set of distributional assumptions by showing *how* the theoretical costs of choosing a dyadic or triadic strategic context can vary across different systems.

Finally, we argue that this call for theoretical caution when employing dyadic modelling restrictions is particularly appropriate when studying war, state formation, and the relationship between them. Many models of the state and domestic politics focus on some distributional conflict between groups – say over the relative burdens of taxation for public spending – to explain variations in the institutional content of that domestic political order, its sustainability, or its policy choices – either domestic or foreign. However, the creation of a stable political organization among groups with some set of conflicting local interests also rests on the identification of some set of transcending common interests that facilitate the joint production of public goods and temper incentives for secession. As we have shown here, agreement on some third-party threat can serve as such a focal point to facilitate sustainable political integration. Two-actor models of the state focusing on domestic distributional conflict cannot explain how external third-party threats influence patterns of conflict and cooperation among domestic groups. They simultaneously downplay the importance of these external third-party actors in sustaining a coherent state.

Conclusion

This paper reexamines the reciprocal relationship between war and state formation. Its primary conclusions rest on a flexible complete-information theoretic model that: specifies mechanisms endogenizing state formation and war within a common strategic context; identifies systemic conditions that strengthen this endogenous relationship; and explores how common dyadic modelling restrictions influence conclusions about state formation, hierarchy, and war. Our core model identifies nine distinct equilibria that differ according to the outcome produced and whether that outcome reflects bilateral or trilateral strategic incentives. We employ Monte Carlo experiments to examine how the systemic distribution of multiple state-level characteristics – including ideology, tax rates, labour and capital endowments, and war costs – shapes state formation war and the positive relationship between them by comparing relative equilibria rates. We highlight three core sets of findings.

The first focuses on cooperative political integration as state formation. Our triadic model distinguishes between two classes of political integration that emerge either through the threat of war or through the economic gains from the joint production of military protection. Monte Carlo results show that war-induced political integration is 2.5–5 times more likely to occur as integration to realize some set of economic gains. These results imply that standard models of hierarchy which rely

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on dyadic modelling restrictions while focusing on the economic gains from joint military production often miscast the causes of political integration and underpredict the formation of new hierarchical political organizations.

We use Monte Carlo experiments to identify a series of systemic conditions under which war-induced political integration is more or less likely. We find that war-induced state formation is positively related to the variance of tax rates across polities; and negatively related to ideological variance, average of war costs, and average tax rates in the system. The latter group of results supports arguments that the nuclear revolution has weakened the relationship between war and state formation in the twentieth century.

Second, we leverage this theoretical framework to explore how endogenous political organizations influence the potential for military conflict. We identify systemic conditions – greater variance in tax rates and higher average war costs – that deter war by fostering the creation of hierarchical organizations. We also identify a systemic condition that we associate with the widespread development of the modern state – higher mean rates of public goods provision in the system – that reduces the likelihood of some trilateral wars. Greater public goods spending enhances a state's ability to unilaterally deter its rivals which supports its capacity to retain political independence and serve as a buffer state that prevents conflict between its neighbours.

Third, our modelling approach allows us to examine a deeper set of questions about how the adoption of dyadic modelling restrictions can generate misleading theoretical conclusions. We identify a set of trilateral equilibria in which dyadic modelling assumptions are inappropriate because the addition of a third party either alters the outcome of an interaction between two other actors or alters their incentives supporting that outcome. We then leverage Monte Carlo experiments to estimate how the rates of these trilateral equilibria vary across different simulated systems. Modelling decisions defining the relevant strategic context of a theoretical model carry unique relevance for the relationship between war and state formation. The threats posed by external third parties can encourage two different political groups with otherwise conflicting ideological and distributional interests to share the production of military protection within a common state. However, the neglect of variation in these third-party threats can lead dyadic models of the state with only two 'domestic' actors to overlook strategic situations in which state formation through political integration can occur. In these situations, a domestic political order is partially constituted by the interests and capabilities of actors that are deliberately excluded from it. These possibilities lead us to encourage the construction of theoretical models that are flexible enough to incorporate both bilateral and trilateral strategic processes when examining war and state formation.

Finally, we recognize that our unique theoretical and empirical choices may raise questions about generalizability. Our conclusions rest on modelling decisions to include two or three actors while simultaneously endogenizing war and state formation; the specific parameters selected; and assumptions about underlying distributions of actor characteristics. Our results demonstrate that these choices matter. Dyadic modelling assumptions set actors' utility calculations which in turn partially (in tandem with actor attributes) determine equilibrium outcomes. Simulations

show that this restriction can underpredict rates of peaceful political integration, overpredict rates of conflict, and misidentify the causes of wars stemming from trilateral processes.

While our parameter set is admittedly large, we wanted to illustrate various ways that seemingly taken-for-granted choices can influence theoretical claims. Many moving parts are not necessarily problematic. Monte Carlo experiments and simulation-based methods more generally produce comparative statics that allow researchers to isolate variation of interest while evaluating underappreciated modelling decisions. For example, we show how variation in a single actor attribute – war costs – changes global equilibria rates. In addition, randomly drawing attributes offsets the problems of bias inherent in using Eurocentric data. Our model configuration also enables us to show how the theoretical costs associated with neglecting third-party actors depend on the systemic distribution of some unit characteristics like the costs for war and the variance of interests across polities. Our abundance of moving parts has the benefit of allowing future researchers (including us) to build on the current research design. We hope that this reevaluation of common modelling choices in the study of international relations spurs additional conversations about how to build theories of war, states, and the endogenous relationship between them.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S1752971923000209.

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