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ALLIANCES, CONFLICT ESCALATION, AND THE OUTBREAK OF INTERSTATE WAR, 1816–2000

SOJUSZE, ESKALACJA KONFLIKTÓW I WYBUCH MIĘDZYPAŃSTWOWYCH WOJEN, 1816–2000

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ABSTRACT

In international relations theory alliances are often regarded as factors influencing the incidence of interstate war. This study statistically examines this claim on a population of cases taken from the Correlates of War project data sets, consisting of 3216 instances of militarized interstate disputes (MIDs) that occurred in the period 1816–2000, 307 of which were wars. In the test, this initial data set has been divided into three sub-sets comprising: (1) originator dyads, (2) originators-as-initiators-and-joiners-as-targets dyads, and (3) joiners-as-initiators-and-originators-as-targets dyads; and ten variables were used to determine the impact of alliances on whether MIDs will become wars. These variables included unit-, dyad-, and system-level indicators of the presence of alliances, their capabilities and tightness. Combined, this enabled the analysis to test hypotheses related to the capability-aggregation and war-diffusion functions of alliances as well as arguments on the relationship between polarity and war.

ABSTRAKT

W teorii stosunków międzynarodowych sojusze są często postrzegane jako czynniki wpływające na częstość występowania międzypaństwowej wojny. Niniejsze badanie w sposób statystyczny sprawdza powyższe twierdzenie na populacji zaczerpniętej z baz danych projektu Correlates of War, obejmujących 3216 przypadków zmilitaryzowanych dysput międzypaństwowych, do których doszło w okresie od 1816 do 2000 r., przy czym 307 stanowiły wojny. W ramach tego testu pierwotny zbiór danych podzielono na trzy podzbiory obejmujące: (1) diady pierwotnych uczestników konfliktów, (2) diady, w których pierwotny uczestnik występował jako inicjator, a państwo, które przyłączyło się do konfliktu, jako cel, oraz (3) diady, w których państwo, które przyłączyło się do konfliktu, występowało jako inicjator, a pierwotny uczestnik konfliktu – jako cel. Do określenia wpływu sojuszy na to, czy zmilitaryzowane dysputy międzypaństwowe staną się wojnami, wykorzystano natomiast dziesięć zmiennych. Zmienne te obejmowały

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jednostkowe, diadyczne i systemowe wskaźniki obecności sojuszy, ich potencjałów i zwartości. Wszystko to pozwoliło na testowanie hipotez odnoszących się do funkcji sojuszy polegających na agregacji potencjałów i rozprzestrzenianiu wojny, a także twierdzeń o związku między biegunowością i wojną.

Słowa kluczowe: sojusze, bezpieczeństwo międzynarodowe, konflikty międzypaństwowe, teoria wojny, metody ilościowe

A considerable amount of literature in international politics has been focused on the issue of why interstate conflicts occur, and among efforts aimed to answer this question a certain pride was always given to the ultimate type of interstate conflict, i.e. war. These efforts have led scholars to various explanations and pointed to a plethora of unit-, dyad-, and system-level factors that influence the incidence of war (Bennett, Stam, 2007, p. 70–106; Geller, Singer, 1998, p. 46–139), one of the most often regarded as such a factor being alliances (Bennett, Stam, 2007, p. 38–43), either as an independent cause or a feature that effects other causes: conventional deterrence, balance of power/power preponderance, power transition, or system polarity.

The present study aims to statistically examine in what way, if any, alliances influenced the incidence of war in the period 1816–2000. There are several aspects to this problem. First, a distinction has to be made between the outbreak of war between the two initial warring states (originators) and its spreading to other states who enter the fight along these originators (joiners). The latter is a case of war diffusion, so by separating the two events one is able to test the war-diffusion explanation, one of several claims that illustrate how alliances affect the incidence of war. Second, arguments related to various levels of analysis may be utilized to solve the problem. These include distinct properties of the initiators and targets, and their respective alliances (provided there are any), properties of the dyads, and – finally – properties of the international system to which these dyads belong. The present study is intended to employ all three levels. Given this, and third, various unit-, dyad-, and system-level parameters may be applied. At minimum, these should include parameters that indicate whether there are any alliances on each side, in the system, etc., and – if one intends to test the capability-aggregation explanation, another claim about the relationship between alliances and war – parameters that specify the capabilities of these alliances. Both groups of these variables have been applied in this study as well as measures of tightness (cohesiveness) of alliances. Fourth, there is the question of what to put wars up against. Typically, in cases like this, war is opposed simply to no war (e.g. Bueno de Mesquita, 1978, p. 253; Garnham, 1976, p. 239; Houweling, Siccama, 1988, p. 97; Levy, 1981, p. 586–587; Siverson, King, 1980, p. 6). Some scholars, however, have employed a different approach, based on a distinction between conflicts of varying degrees of hostility. Randolph M. Siverson and Michael R. Tennefoss, for example, used a three-point scale of conflicts comprising threat, unreciprocated military action, and reciprocated military action, with the last category including also wars (1984, p. 1059). Similarly, D. Scott Bennett and Allan C. Stam constructed their analysis around a five-point scale in which the highest level corresponded to war (2007, p. 63). The following investigation of the relationship between alliances and war is based on a modified version of the latter approach. The reason for this stems from a loose understanding of Kenneth N. Waltz's theory of the causes of war, in which he argued that wars are often a result of special, and sometimes trivial, circumstances that act as immediate (or efficient) causes, as well as of the structure of the international system being the permissive cause (1954, p. 232–238). These special circumstances might lead to war as well as to other conflicts of lesser intensity or scale. However, given that war is the most serious type of conflictual event, and its outbreak is – in many cases – preceded by a series of events that turn minor at first hostilities into full-fledged fighting, it is reasonable to say that a decision to go to war requires at least some nontrivial factors (not necessarily structure) to come into play. Minor conflicts, on the other hand, may develop solely for trivial reasons. Hence, by opposing war to other types of conflict, one is able to – to at least some degree – diminish the impact of special circumstances, which – by definition – are difficult to study and do not form any consistent relationship with anything.

The following text has been divided into six sections. Section one lists the hypotheses that have been tested. Section two consist of a review of previous statistical analyses on the relationship between alliances and war that formed the basis for the problem raised in the previous paragraph and the hypotheses and impacted methodological choices regarding the execution of the present analysis. Section three describes the method employed to identify particular alliances that consists in the use of Kendall's τ_b rank correlation coefficient scores and typal analysis. Section four illustrates the methodological design of the analysis: data sources, the population of cases, and the variables. Section five contains results of the analysis and their interpretation. Finally, section six comprises more general conclusions and confronts the results of this study with the hypotheses and the results of previous studies.

HYPOTHESES

A total of ten hypotheses and their alternatives have been tested to analyze the relationship between alliances and the outbreak of war. They included:

- unit-level hypotheses:
  - H_1: Having allies by the initiator state increased/decreased the probability of war.
  - H_2: Having allies by the target state increased/decreased the probability of war.
  - H_3: The tighter the alliance bonds in the initiator state's alliance, the higher/lower the probability of war.
  - H_4: The tighter the alliance bonds in the target state's alliance, the higher/lower the probability of war.
  - H_5: The greater the capabilities of the initiator state's alliance, the higher/lower the probability of war.
  - H_6: The greater the capabilities of the target state's alliance, the higher/lower the probability of war.
- dyadic-level hypotheses:
  - H_7: Having an alliance signed by the initiator and target states increased/decreased the probability of war.
  - H_8: The greater the difference between the capabilities of the initiator's and target's alliances, the higher/lower the probability of war.
- system-level hypotheses:
  - H_9: The greater the number of alliance clusters (poles) in the system, the higher/lower the probability of war.
  - H_{10}: The more evenly distributed the capabilities among alliance clusters (poles) in the system, the higher/lower the probability of war.

ALLIANCES AND THE OUTBREAK OF WAR

As pointed out by Ido Oren, analyses of the relationship between alliances and the incidence of war conducted in the past often did not test any particular theoretical perspective but were attempts to determine the overall impact of alliances (1990, p. 210). In one of the early efforts of this sort, J. David Singer and Melvin Small estimated the correlation between the number of states in alliances each year and the frequency of war (number of wars per year) in the period 1815–1945. The results they obtained were somewhat contradictory, as they observed a negative correlation between the two variables for the nineteenth century and a positive correlation for the twentieth century and the whole period (1967, p. 258–280). A similar research, conducted by Charles W. Ostrom Jr. and Francis W. Hoole, failed to confirm these findings. The authors used Singer and Small's database but found no convincing relationship between the annual number of defense alliance dyads per nation and the annual number of interstate war dyads per nation (1978, p. 219, 233–234).

In a different study of the same sort, Jack S. Levy focused his attention on the great powers in the period 1495–1975 and attempted to determine whether any coherent relationship exists between the formation of alliances involving such states and the outbreak of wars with great power participants. He contended that for the sixteenth, seventeenth, and eighteenth centuries the formation of alliances within a 5-year period was followed by an average of one-third more war than would be expected by chance. The results were also the opposite for the nineteenth century – about 40% less war than anticipated on the basis of a random distribution of both variables – and mixed (either more or less war, depending on the type of alliances and/or wars), but again pointing rather to a positive correlation between alliance formation and war outbreak for the twentieth century. These findings were also generally supported after switching attention to the proportion of wars preceded by alliance formation (1981, p. 585, 587–590, 601–602).

The atheoretical perspective was employed also by Bennett and Stam, who conducted the probably most comprehensive to date statistical analysis of causes of interstate conflict. The authors tested hypotheses related to all of the most popular causes of war and, with respect to the influence of alliances, found that – in the period 1816–1992 – having a defense pact signed by two states decreased the probability of war between them by 39% in the case of all dyads and by 50% in the case of politically relevant dyads (2007, p. 120–122).

Other studies on alliances and war have been based on international relations theory that tells us alliances may serve several functions. The probably most common view is that they are capability-aggregation mechanisms (Morgenthau, 1948, p. 137–145; Osgood, Tucker, 1967, p. 86; Waltz, 1979, p. 164–170, 181–182) designed either to deter potential foes and, thus, prevent war from happening, or to enable states forming a coalition to win offensive wars which would have been lost if they had acted single-handedly. Dyadic-level explanations of war that stem from this argument include modified versions of: conventional deterrence, balance of power/power preponderance, and power transition theories. The argument, however, is also cited by system-level theorists advocating for the influence of systemic power transition or system polarity (cluster polarity) on war.

The conventional deterrence explanation was tested by Paul Huth and Bruce Russett, who analyzed 54 instances of attempted deterrence that took place between 1900 and 1980. These included cases in which one state (the attacker) was considering attacking another state (a protégé) that was allied or deemed important to a third state (a defender). They found that having a formal alliance signed by the protégé with the defender decreased chances of successful deterrence (from 77% to 39%) and – trying to explain the seemingly odd result – hypothesized that the attacker, knowing about the existence of a formal alliance between the protégé and the defender, takes into account the fact that he might have to fight both states before issuing any threats. Therefore, he will not be surprised by the defenders involvement and back down at some point (1984, p. 504–508, 515–517).

In a series of articles, Woosang Kim and Kim and James D. Morrow used several variables related to alliances to examine the balance of power/power preponderance and power transition models. The research provided substantial evidence for a positive correlation between the equality of power of the great powers adjusted for the influence of their allies' capabilities and the probability of war among them for both the 1648–1815 (with some exceptions) and the 1816–1975 periods as well as for no coherent relationship between war and other adjusted variables based on material capabilities: power transition, relative power growth rates, and interactives terms of the three power-based variables (Kim, 1989, p. 257–271; Kim, 1991, p. 838–848; Kim, 1992, p. 158–171; Kim, Morrow, 1992, p. 908–911, 913–917). What is more, Kim and Morrow expanded their models to include – besides the mentioned variables – indicators of attitudes of the great powers towards entering alliance commitments (risk attitudes). They found that war is more likely when the rising power pursues greater autonomy and, thus, refrains from signing alliances or when the declining power strives for greater security and does the opposite (1992, p. 911–917).

The probably first empirical evaluation based on the system polarity hypothesis was conducted by Michael D. Wallace. The author examined the link between the amount of war measured in nation-months and two other variables: (1) systemic polarization, calculated – among other things – on the basis of alliance commitments of states and (2) cross-cutting pressures stemming from the differences between these commitments and other patterns of allegiance. By doing so, he found support for a curvilinear relationship between both predictor variables and war in the period 1815–1964, i.e. war seemed more likely when their values were both low and high rather than when they were moderate (1973, p. 578–593, 597–599).

Tests of the same explanation were performed by Bruce Bueno de Mesquita and Bueno de Mesquita and David Lalman, who analyzed the relationships between the likelihood of war occurring in the international system in a given year between 1816 and 1965 and a set of variables referring to the system's polarity that were computed on the basis of similarity and dissimilarity of alliance portfolios of states. These variables included: the number of poles, systemic tightness (cohesiveness), and systemic discreteness (distance between the poles) as well as interactive combinations between these variables and their change in time. The results of these studies provided evidence for a positive relationship between systemic tightness and its change over time and the probability of war as well as for no influence of the other variables (Bueno de Mesquita, 1978, p. 253–262; Bueno de Mesquita, Lalman, 1988, p. 8–13).

A second popular view on the function of alliances that stems from theory is that they serve as war-diffusion mechanisms, as a war with one allied state is likely to spread to all or some of its allies. In an attempt to validate this view, Siverson and Joel King used discriminant analysis to investigate a set of 290 cases that occurred between 1815 and 1965 in which allied states did and did not join their alliance partners in war. Their goal was to examine the relative performance of six attributes of alliances as predictors of the option these states will choose. This enabled them to compile a list of these attributes, ordered from best to worst predictor, according to which states are more willing to join in when: many of their allies are engaged in fighting, the allies they support are minor powers, they have relatively few allies, the alliance is a defensive one, the alliance is relatively new, and they have a large number of alliances (1980, p. 5–11, 13).

Additional evidence in support of the war-diffusion explanation was given by Huth and Russett in their already mentioned analysis of deterrence. Their results showed that a formal alliance between the protégé and the defender increased the probability that the defender will fight along its protégé if deterrence fails from 69% to 97% (1984, p. 521).

Finally, Oren tested the same explanation by investigating the influence of the size of alliances (number of allied states) and their magnitude (state-years) on the war proneness of these alliances, measured in terms of the number of nation-wars fought by each of them in the period 1816–1980. He found that the two independent variables displayed a positive correlation with the outcome variable for both the nineteenth and twentieth centuries as well as for the whole period (1990, p. 215–217, 221–228).

IDENTIFYING THE SCOPE OF ALLIANCES: SOME METHODOLOGICAL ISSUES

Testing hypotheses related to the influence of alliances on war in most cases requires devising a method of determining the scope of each alliance, i.e. identifying which states are its members. The issue might seem trivial at first, however, it may cause problems for conducting certain types of analyses as states sometimes make conflicting commitments or belong to several alliances that overlap or oppose each other. Approaches to identifying the scope of alliances that were developed in the past are essentially twofold. Both of them have their advantages and weaknesses, but the decision as to which one to choose depends primarily on what type of relationships are to be scrutinized.

The first approach is that members of an alliance correspond with states that have signed some formal alliance agreement (Bennett, Stam, 2007, p. 74–75; Levy, 1981, p. 587–589; Oren, 1990, p. 216–220; Ostrom Jr., Hoole, 1978, p. 219; Singer, Small, 1967, p. 258–280; Siverson, King, 1980, p. 4; Small, Singer, 1969, p. 261–271). Hence, in the case of two-party agreements, both states are being treated as parts of one alliance and, if the agreement was signed by multiple states, either all those signatories or particular dyads are counted as a single alliance. The method is simple and has several merits, however, it also has a downside to it – it enables one state to belong to several alliances – which makes it inappropriate for certain types of studies, dyadic analyses, in which the impact of alliances on each side is taken into account being one of them.

The second approach, and one that has also been applied in the present study, is to cluster states into alliances on the basis of the similarity and – in some cases – also dissimilarity of their alliance portfolios so that they belong either to none or just one alliance. The method requires an index of similarity of those portfolios to be computed and the values of the index used to cluster these states together. A handful of such indexes were employed in the past: coefficient α introduced by Wallace (1973, p. 580–581), Kendall's τ_b rank correlation coefficient proposed by Bueno de Mesquita (1975, p. 196–200), or *S* developed by Curtis S. Signorino and Jeffrey M. Ritter (1999, p. 125–130). As it is the second of these that has been used for the purpose of this study, it is the one that should be explained in more detail.

Kendall's τ_b (or tau-b) rank correlation coefficient is a measure that enables to compare and, thus, asses the similarity (and dissimilarity) of two sets of elements. Its calculation follows a procedure comprising several steps. Step one is to use the values for elements in each set to assign ranks to them, step two is to combine elements within both sets into all possible pairs, step three is to determine how the ranks change in these pairs, step four is to compare these changes in both sets to calculate the number of the so-called concordant, disconcordant, and tied pairs. Finally, a formula is used to calculate τ_b scores on the basis of the numbers of these pairs.

To cluster states into alliances, τ_b scores are computed independently for each dyad of states and usually Correlates of War (COW) Formal Alliance data is used to code each relationships on a scale from 0 to 3, where 0 = no alliance, 1 = entente, 2 = neutrality or nonaggression pact, 3 = mutual defense pact (Singer, Small, 1966, p. 5). In this case, if there are two states *i* and *j* that maintain relationships (*a*) with all states of the given system indexed $k, l = 1, 2, \ldots, N$; $k \neq l$, then their respective alliance portfolios are $A^i = [a^i_k, a^i_l, \ldots, a^i_N]$ and $A^j = [a^j_k, a^j_l, \ldots, a^j_N]$ where $a^i_k, a^j{}_{k,l} \in \{0, 1, 2, 3\}$. The relationships are then paired into joint rankings $(a^i_k, a^j_k), (a^i_l, a^j_l), (a^i_k, a^j_l), \ldots, (a^i_N, a^j_N)$ and:

- if $a^i_k > a^i_l$ and $a^j_k > a^j_l$ or $a^i_k < a^i_l$ and $a^j_k < a^j_l$, the pairs are concordant,
- if $a^i_k > a^i_l$ and $a^j_k < a^j_l$ or $a^i_k < a^i_l$ and $a^j_k > a^j_l$, the pairs are disconcordant,
- if $a^i_k = a^i_l$ and $a^j_k = a^j_l$, the pairs are tied (Signorino, Ritter, 1999, p. 117–120).

There are several ways to calculate τ_b scores, one (Signorino, Ritter, 1999, p. 120) is to define two matrixes *x* and *y* for A^i and A^j respectively:

$$x_{kl} = \begin{cases} +1 \ if \ a^i_k < a^i_l \\ 0 \ if \ a^i_k = a^i_l \\ -1 \ if \ a^i_k > a^i_l \end{cases} \tag{1}$$

$$y_{kl} = \begin{cases} +1 \ if \ a_k^j < a_l^j \\ 0 \ if \ a_k^j = a_l^j \\ -1 \ if \ a_k^j > a_l^j \end{cases} \quad (2)$$

Then, the following formula may be used:

$$\tau_b = \frac{\sum_{k,l} x_{kl} y_{kl}}{\sqrt{\sum_{k,l} x_{kl}^2 \sum_{k,l} y_{kl}^2}} \ k,l = 1,2,\ldots,N; k \neq l \quad (3)$$

Calculated with COW Formal Alliance data, τ_b scores range from *–1* to *1*, where *–1* represents perfect disconcordance (dissimilarity) of alliance portfolios and *1* indicates their perfect concordance (similarity). What is more, to make these portfolios comprise relationships with the same set of states, it is assumed that each state has a relationship, namely a defense pact, with itself. Therefore, a τ_b score for a dyad can equal *1* only if the two states have a defense pact signed with one another (Bueno de Mesquita, 1975, p. 195).

Having τ_b scores calculated, the next step to determine the scope of alliances is to cluster states together on the basis of these scores. There are several ways to do that, and the one that has been applied in the present study is typal analysis (Bueno de Mesquita, 1975, p. 199). Using typal analysis, states are clustered together only with those other states that have the most similar alliance portfolios. Hence, if there are two states *i* and *j*, they will form a two-state alliance only when *i* has the highest τ_b score with *j* and *j* has the highest τ_b score with *i*. However, if for example *i* has the highest τ_b score with *j*, *j* has the highest τ_b score with *k*, and *k* has the highest τ_b score with *i*, *j* or both, all three will constitute a single alliance.

RESEARCH DESIGN AND THE MEASUREMENT OF VARIABLES

The data used for the analysis was taken from the COW project data sets on states' system membership, formal alliances, states' material capabilities, and militarized interstate disputes (MIDs) that are available in EUGene (the Expected Utility Generation and Data Management Program), a data management tool developed by Bennett and Stam (2000, p. 179–224)[1]. The initial population of cases created by combining these data sets comprised 3496 observations – one per each dyad participating in MIDs that occurred between 1816 and 2000. To account for the various circumstances that led to the engagement of particular states in these MIDs, as well as to test the war-diffusion explanation, three subsets have been extracted from the initial data set: the first (n = 2631) included only dyad-years of MIDs between their originators, i.e. states that were sides of particular MIDs from the first day; the second (n = 288) comprised cases in which MID originators drew other, previously uninvolved states (joiners) into an MID they were a side of at that moment; the third (n = 297) encompassed instances of previously uninvolved states joining an MID that was already taking place, as a side acting against one of the MID's originators. Dyad-years of MIDs between two joiners (n = 280) have been left out.

The outcome variable was a dummy indicating whether the MID taking place between two states was a war. Wars, as defined by Singer and Small (1982, p. 56), have been coded as 1s, and level 2 through 4 MIDs (Jones, Bremer, Singer, 1996, p. 167–174) have been coded as 0s.

The set of independent variables included a total of ten parameters. The first six were unit-level variables that consisted of two groups of three of the same variables calculated independently for both the initiator of the conflict and the target. These comprised a dummy representing whether the given side belonged to an alliance (*Is/Isn't in an Alliance*) as well as two continuous variables determining the tightness (*Alliance Tightness*) and capabilities (*Alliance Capabilities*) of each side's alliance. To distinguish alliances from one another, τ_b scores have been calculated for each dyad of the system and typal analysis has been applied to cluster together all states that had at least one alliance signed. *Alliance Tightness* has been computed as a mean value of all τ_b scores within a given alliance (Bueno de Mesquita, 1975, p. 200), and the capabilities of each alliance have been determined by adding the COW Composite Index of National Capability (CINC) scores (Singer, Bremer, Stuckey, 1972, p. 26–27; Singer, 1987, p. 115–132) of all its members except the state involved in the particular MID.

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[1] The data that is currently uploaded into EUGene is not necessarily the newest available Correlates of War data. The original Correlates of War data sets can be found at http://www.correlatesofwar.org/data-sets/folder_listing. EUGene is available for free download at http://www.eugenesoftware.org/.

Another two variables represented dyadic-level factors. These comprised a dummy showing whether both states of the dyad were parts of the same alliance cluster (*Alliance of Both States*) and a measure indicating the difference between the capabilities of the initiator's alliance and those of the target's alliance (*Capability Difference*). The relationship between both alliances' capabilities has been represented using a difference instead of a ratio since, in many cases, one or both sides of the dyad were not parts of an alliance making the value of the *Alliance Capabilities* variable for them equal 0 which, in turn, made calculating a ratio impossible or caused it to equal 0.

The last two variables related to system-level causes and included indicators of the number of alliance clusters in the whole international system (*Polarity*) and of the distribution of capabilities among them (*Capability Distribution*). The latter variable has been calculated using a modified version of Bueno de Mesquita's (1975, p. 203–204) alteration of a method of determining capability concentration among states initially proposed by Singer, Stuart Bremer, and John Stuckey (1972, p. 25–26). In its original form the method required computing a Concentration index (*Con*) equal to the square root of the quotient of the standard deviation of the system's states' CINC scores divided by the maximum possible deviation for a system in *N* states. The formula for computing *Con* was as follows:

$$Con = \sqrt{\frac{\sum_{i=1}^{n}(S_i)^2 - \frac{1}{N}}{1 - \frac{1}{N}}} \qquad (4)$$

where S_i was the value of particular states' share (or CINC scores) of the whole system's capabilities and *N* was the number of states in the system (Singer, Bremer, Stuckey, 1972, p. 26–27). Bueno de Mesquita's alteration of the method consisted in calculating *Con* with the use of alliance clusters' CINC scores rather than states' CINC scores, using the number of alliances in the system as a basis for *N*, and subtracting the result of *Con* from 1 so that higher values indicate more evenly distributed capabilities (1975, p. 203–204). The modification introduced here was that rather than computing the share of clusters' capabilities in the system's capabilities, the shares have been calculated in relation to the capabilities of all alliances in the system. In this case, capabilities of the whole alliances, i.e. including also MID participants, have been used. The final formulation, therefore, is as follows:

$$\textit{Capability Distribution} = 1 - \sqrt{\frac{\sum_{i=1}^{n}(S_i)^2 - \frac{1}{N}}{1-\frac{1}{N}}} \qquad (5)$$

where S_i is the value of particular clusters' share of the aggregated capabilities of all alliance clusters and N is the number of clusters in the system.

DATA ANALYSIS AND RESULTS

Since the outcome variable is a dummy, polynomial logit analysis has been used to determine the influence of alliances on the probability of war. The results of this analysis are shown in tables 1 and 2. Table 1 displays results of estimations performed separately on the three sub-sets of data from which the *Alliance Capabilities* of the target variable has been excluded. This is due to the fact that the inclusion of both this and the *Capability Difference* variables in the estimations caused one or the other to suffer from exact collinearity and, thus, the correlation coefficients could not be calculated. Therefore, as shown in table 2, the models presented in table 1 have been recalculated without the *Capability Difference* variable to include *Alliance Capabilities* of the target.

The results for each of the six models prove their statistical significance at the 0,01 level, however, they also indicate that the estimations do not perform much better in predicting the value of the outcome variable than models including only the constant. One way to interpret this is that alliances did affect the probability of war, although their influence was not substantial.

Models 1 and 4, which include only dyads that started each MID, suggest no statistical significance of dyadic-level variables and provide evidence for a positive correlation between the probability that the MID escalated into war and the fact that the target was in an alliance as well as for a negative correlation between the outcome variable and the tightness of the target's alliance and *Polarity*. Hence, states that belonged to loose alliances seem more likely to have faced war than those that were not members of alliances or were parts of tightly knit alliances. This may imply that conflict initiators had to use more drastic measures to try to enforce their will when opposed by adversaries that had allies and, on the other hand, that the tighter the alliance of those adversaries, the more able they were to deter potential foes. What is more, the models indicate that war was more likely in systems with a lesser number of alliances which provides backing to advocates of multipolarity, who argue that states are risk-averse actors that become more cautious as polarity and, thus, uncertainty in the system rises (e.g. Morgenthau, 1948, p. 272; Deutsch, Singer, 1964, p. 390–406).

Table 1. Polynomial logit analysis of the effects of alliances on the escalation of interstate conflicts into war, 1816–2000

Variables:	Model 1: originators versus originators	Model 2: originators versus joiners	Model 3: joiners versus originators
constant	–1,74556 (0,33445)***	–0,52016 (0,59233)	1,55494 (0,66956)**
Unit Level			
Initiator			
Is/Isn't in an Alliance	0,03428 (0,50912)	1,16563 (0,90417)	0,84927 (0,80830)
Alliance Tightness	0,22679 (0,57477)	–0,34877 (0,97102)	–0,45837 (0,84962)
Alliance Capabilities	–1,34548 (1,60175)	1,62851 (2,33028)	–8,29907 (3,33128)**
Target			
Is/Isn't in an Alliance	1,15558 (0,56737)**	–0,69377 (0,83678)	3,59435 (1,11365)***
Alliance Tightness	–1,41519 (0,66465)**	0,67345 (0,87279)	–4,31851 (1,21705)***
Alliance Capabilities	–	–	–
Dyadic Level			
Alliance of Both States	–0,11056 (0,33666)	–0,57100 (0,45635)	0,32482 (0,48465)
Capability Difference	1,13797 (1,32250)	–5,44337 (1,79579)***	3,87167 (2,98810)
System Level			
Polarity	–0,13406 (0,02188)***	–0,08676 (0,02955)***	–0,05904 (0,03443)*
Capability Distribution	–0,17394 (0,59598)	0,54298 (1,00248)	–3,27812 (1,28543)**
n	2631	288	297
Chi-square [p for chi-square]	75,392 [0,0000]	28,6514 [0,0007]	51,6274 [0,0000]
Proportionate reduction in error	0%	3,9%	7,3%

Notes: standard errors are in parentheses; * p < 0,1; ** p < 0,05; *** p < 0,01.

Table 2: Revised polynomial logit analysis of the effects of alliances on the escalation of interstate conflicts into war, 1816–2000

Variables:	Model 4: originators versus originators	Model 5: originators versus joiners	Model 6: joiners versus originators
constant	−1,74556 (0,33446)***	−0,52016 (0,59233)	1,55494 (0,66956)**
Unit Level			
Initiator			
Is/Isn't in an Alliance	0,03428 (0,50912)	1,16563 (0,90417)	0,84927 (0,80830)
Alliance Tightness	0,22679 (0,57477)	−0,34877 (0,97102)	−0,45837 (0,84962)
Alliance Capabilities	−0,20751 (1,05408)	−3,81486 (1,56604)**	−4,42740 (1,79801)**
Target			
Is/Isn't in an Alliance	1,15558 (0,56737)**	−0,69377 (0,83678)	3,59435 (1,11365)***
Alliance Tightness	−1,41519 (0,66465)**	0,67345 (0,87279)	−4,31851 (1,21705)***
Alliance Capabilities	−1,13797 (1,32250)	5,44337 (1,79579)***	−3,87167 (2,98810)
Dyadic Level			
Alliance of Both States	−0,11056 (0,33666)	−0,57100 (0,45635)	0,32482 (0,48465)
Capability Difference	–	–	–
System Level			
Polarity	−0,13406 (0,02188)***	−0,08676 (0,02955)***	−0,05904 (0,03443)*
Capability Distribution	−0,17394 (0,59598)	0,54298 (1,00248)	−3,27812 (1,28543)**
n	2631	288	297
Chi-square [p for chi-square]	75,392 [0,0000]	28,6514 [0,0007]	51,6274 [0,0000]
Proportionate reduction in error	0%	3,9%	7,3%

Notes: standard errors are in parentheses; * p < 0,1; ** p < 0,05; *** p < 0,01.

Models 2 and 5, which deal with cases in which conflict originators drew previously uninvolved states into those conflicts, give somewhat different results. Still, both models confirm the argument that the higher the number of alliances in the system, the lesser the probability of war. Model 2 shows no statistical significance of unit-level factors and a negative correlation between *Capability Difference* and the likelihood of war. This might suggest that it was easier for the initiators to achieve their goals without resorting to war when their alliance was much stronger than the target's alliance. Additional support for this claim is given when *Capability Difference* is substituted with the target's *Alliance Capabilities*, as is in the case of model 5. Now, capabilities of both sides' alliances become statistically significant. The coefficients for the two variables have different signs and indicate a negative correlation between the initiator's *Alliance Capabilities* and war as well as a positive correlation between the target's *Alliance Capabilities* and war, which again would suggest that it is easier for initiators to impose their will without resorting to arms when being backed by a strong alliance or when opposed by targets with weak allies.

Finally, models 3 and 6, which show instances of uninvolved states joining conflicts ongoing between their originators, in the same way as models 1 and 4, indicate no statistical significance of dyadic-level factors. Both of them, however, point to a positive correlation between the fact that the target was part of an alliance and war as well as a negative correlation between three other variables and war: the initiator's alliance capabilities, the target's alliance tightness, and *Capability Distribution*. The results with respect to the two variables related to the target confirm earlier findings that states that were members of loose alliances were more likely to fall victims of an attack than those that did not belong to alliances or had close allies. Additionally, the negative sign of the coefficient for the initiator's *Alliance Capabilities* variable may, similarly to model 5, suggest that states with strong allies were able to achieve their goals more easily than others. *Polarity*, this time, fails to reach the statistical significance level of 0,05, nevertheless its influence on war should not entirely be rejected as the *p-value* for the variable in both models 3 and 6 equals 0,0864. Therefore, provided it is to prove significant, it would confirm earlier results that the more alliances in the system, the lesser was the probability of war. On the other hand, the negative impact of *Capability Distribution* on war implies something utterly different than all other findings – that systems with alliances of roughly equal capabilities were more peaceful than others.

CONCLUSIONS

The primary conclusion of the analysis is that alliances provide some but, it seems, limited insight into the occurrence of interstate war. The way in which they exerted their impact, however miniscule it might have been, was influenced by their "personal" traits, whether the conflicts they were to affect were ongoing or not, as well as whether they were used offensively or defensively.

Confronted with the hypotheses listed in section two, the results provide no support for any of the two alternatives in three cases: H_1, H_3, and H_7. They also indicate that the probability of war increased:

- if the target state has allies (H_2), in the case of originator versus originator and joiner versus originator dyads;
- the greater the capabilities of the target state's alliance (H_6), in the case of originator versus joiner dyads;

and that the probability of war decreased:

- the tighter the alliance bonds in the target state's alliance (H_4), in the case of originator versus originator and joiner versus originator dyads;
- the greater the capabilities of the initiator state's alliance (H_5), in the case of originator versus joiner and joiner versus originator dyads;
- the greater the difference between the capabilities of the initiator's and target's alliances (H_8), in the case of originator versus joiner dyads;
- the greater the number of alliance clusters in the system (H_9), in the case of originator versus originator and originator versus joiner dyads;
- the more evenly distributed the capabilities among alliance clusters in the system (H_{10}), in the case of joiner versus originator dyads.

When compared with earlier studies, models 1 and 4 seem to confirm conclusions drawn by Huth and Russett that having a formal alliance signed by target states increases the probability that a conflict between its initial participants becomes a war, whereas models 3 and 6 support their claim that an alliance of this sort makes targets' allies also more likely to join the war (1984, p. 515–517, 521). Models 2 and 5, in turn, provide some support to Kim and Kim and Morrow who, in their investigation of great power behavior, found that the more even the capabilities of both sides, the greater the likelihood of war (Kim, 1989, p. 265–271; Kim, 1991, p. 845–848; Kim, 1992, p. 169–171; Kim, Morrow, 1992, p. 913–917). The results of the present analysis, however, conducted on a different population including all states, suggest this holds true only for originators versus joiners dyads. The estimations might also provide some insight into why the examinations conducted by Levy and Singer and Small pointed to a negative correlation between alliances and war for the nineteenth century and a positive correlation for the twentieth century (Levy, 1981, p. 601–602; Singer, Small, 1967, p. 258–280). This is because, given the results of particular models, alliances might act both a war-generating and war-preventing measures, depending on their personal characteristics such as tightness or capabilities. On the other hand, models 1, 2, 4, and 5 contradict findings of the analyses by Bueno de Mesquita and Bueno de Mesquita and Lalman that polarity does not influence war (Bueno de Mesquita, 1978, p. 255–258; Bueno de Mesquita, Lalman, 1988, p. 10–13). Similarly, all six models failed to support Bennett and Stam's assertion that having a defense pact signed by two states decreases the probability of war between them (2007, p. 120–122), however, in this and Bennett and Stam's analyses different types of alliances were taken into account (ententes, neutrality or nonaggression pacts, and defense pacts as opposed to defense pacts only).

The estimations presented in tables 1 and 2 support arguments for both offensive and defensive functions of alliances. Offensively it was their capabilities that mattered, which would suggest that, when faced with the risk of being attacked, states did not calculate whether the alliance they would have to oppose was tight and, thus, how likely it was to support the state issuing threats. Conversely, as defensive measures, only tight alliances seem to have effectively fulfilled their functions as deterrents while alliances that were loose and/or strong made conflicts escalate into wars more often. For those reasons, the results provide some backing to both the capability-aggregation and war-diffusion arguments. What is more, the outcome of the system-level analysis suggests that, globally, alliances performed their functions rather well both as offensive and defensive measures.

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