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# An Interactive Model of Democratic Peace

[Forthcoming *Journal of Peace Research*]

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## Abstract

Democracies do not take up arms against each other. Although this axiom has attained the status of a mantra in the field of international relations, this statement is much more complex than it appears in part because it is highly contingent on the definitions and operationalizations of both democracy and conflict. This article revisits democratic peace theory, combining both institutional constraints and similarity-based arguments. Interactions between the democratic level of the dyad (the average democratic level of its members) and its democratic spread (difference between the democratic scores of its members) create a dyadic triangle that encompasses all possible combinations of cases, revisiting which dyads are more prone to conflict. The findings partially confirm and partially refute both the institutional constraints and the similarity-based arguments, leading to a nuanced alternative theory: the *Interactive Model of Democratic Peace*. Akin to democratic peace theory, our evidence shows that the higher a dyad's level of democracy is, the lower the probability of fatal militarized interstate disputes between that pair of states. However, contrary to democratic peace theory, we find that dissimilar-regime dyads can still be peaceful as long as they have a high mean of democracy. Following the theory of regime similarity, we consider the democratic spread of each dyad, but we find that being similar is not a sufficient condition for peace between the members of a dyad. From the empirical evidence, the article derives three heuristic zones of conflict, filling much of the gray area that has been left unexplained by previous models.

## Keywords

democratic peace, regime similarity, institutional-constraints, democratic spread, democratic mean, dyadic triangle, fatal MIDs

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## Introduction

In 1795, Immanuel Kant postulated that, in a world of constitutional republics, there would be no room for war. Thomas Paine (1776) and Alexis de Tocqueville (1835-1840) also defended republics and democracies by stressing their lower propensity to war. However, it was not until the second half of the twentieth century that these ideas gained empirical traction from the ground-breaking work of Babst (1964), Rummel (1983), and Doyle (1986). The combination of these ideas, hypotheses, and tests is collectively known as the theory of democratic peace.

Although diverse empirical tests confirm that wars (or military conflicts) between democracies are extremely rare—to the point of being almost nonexistent (Gleditsch, 1992; Maoz & Russett, 1993)—according to the views of Paine and Tocqueville, it is not that democracies do not go to war (they do); rather, they rarely go to war *against each other* (Bremer, 1992; Dixon, 1994). Consequently, the contemporary theory of democratic peace maintains that democracies are less likely to go to war with other democracies (Maoz & Abdolali, 1989).<sup>1</sup> Empirically, evidence supporting the existence of democratic peace is so convincing that Jack Levy has claimed that the absence of war between democracies is the closest thing to an empirical law that exists in international relations (Levy, 1989: 270).

Notwithstanding the robustness of this literature, we claim that the operationalization and measurement of democracy could be further improved. Despite being one of the most empirically tested theories in international relations—and in the discipline of political science as a whole—the majority of tests have relied on the same measures of democracy (Polity).<sup>2</sup> Even if we assume for the moment that the concept of democracy is fully captured by this measure, almost all studies set an arbitrary cutoff point to distinguish between democracies and nondemocracies without further justification as to why this particular point was chosen along the authoritarian-democratic continuum (e.g., “0.5”).<sup>3</sup> However, without a theoretical reason for this choice, it is not inherently obvious where one group ends and the other begins, making it difficult to analyze those cases closest to that capricious threshold.

This research not only makes a further step towards testing democratic peace theory

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<sup>1</sup> In fact, democracies go to war about as often as undemocratic states—just not with each other (Gartzke, 1998; Ray, 2003).

<sup>2</sup> However, some of the path breaking works of this literature, such as Babst (1964), Doyle (1986), or Rummel (1983), rely on dichotomous measures of democracy. For a discussion of the limitations of dichotomous measures of democracy see Munck and Verkuilen (2002).

<sup>3</sup> See Bogaards (2012) for a discussion about the use of an arbitrary cutoff point to differentiate democracies from other type of regimes. Actually, Bogaards identifies no fewer than 18 different ways of using Polity to classify democracies.

using a novel, more robust measure of democracy but also posits a set of interactive theoretical hypotheses and tests how far this theory travels without setting an arbitrary cutoff point between democracies and nondemocracies. This approach allows us to go one step further and build new theoretical arguments about this relationship, which is a crucial test because, as democracy has been mainly operationalized using a single indicator, the observed ‘democratic peace’ might be an artifact of a flawed measure rather than an actual relationship among democracies. Indeed, the literature is well aware of the fact that the way democracy or war are operationalized ‘can play a decisive role in the testing of falsifiable hypotheses’ (Bernhard, Örsün & Bayer, 2017).<sup>4</sup> Therefore, by measuring the independent variable differently, we should be able to reject this alternative hypothesis.

Conventionally, previous research in this area has examined the likelihood that two countries will go to war with one another based on their respective levels of democracy.<sup>5</sup> The basic hypothesis posits that if any two countries were above a certain democratic cutoff point, their probability of going to war would be close to zero. Unlike previous studies that set an arbitrary cutoff point between democratic and nondemocratic regimes, working outside a dichotomous frameset allows our theory to better capture the mixed or hybrid reality of many regimes and thereby test the elasticity of the theory. In other words, we examine how well this theory travels along the democratic continuum, not only in terms of a dyad’s absolute level of democracy but also in relation to the democratic divide between states, which refers to the absolute difference between the level of democracy of each member of a given dyad.

### **Democratic Peace’s Theoretical Arguments**

Within democratic peace theory, there are two major causal explanations for the relationship between democracy and peace. The ‘cultural-normative’ argument (Russett & Oneal, 2001) claims that democratic societies are inherently reluctant to go to war because citizens do not vote to send themselves to war, and democracies share the basic principle of peaceful conflict resolution, which extends to their relationships with other countries (Levy, 2002: 359). The institutional version of democratic peace is based on ‘institutional constraints’ (Levy 2002: *ibid*) and emphasizes structural

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<sup>4</sup> See also Mansfield (1988) in terms of how different definitions of war affect the democratic peace literature. Additionally, these definitions become acutely important when extending the historical breath of the research, as contemporary definitions of democracy are extremely demanding.

<sup>5</sup> There are various possible strategies to empirically address this issue. Following Dixon (1994), many authors use the ‘weakest link’ assumption in which a dyad is coded with the democracy score for the least constrained (or the least democratic) country. We discuss this in the empirical section.

elements rather than informal rules. Such elements include formal and informal vetoes that may exist, checks and balances between the powers of the state, and, more generally, the dispersion of power and the role of the free press. The argument of institutional constrictions is based on the notion that political action in democracies requires the mobilization of a series of institutions, actors, and public opinion. Failure to take into account the positions of other democratic actors can have serious consequences, including removal from office (Russett, 1994: 38). The dyadic nature of this mechanism lies in the reciprocal effect of institutional constraints between two states. On the one hand, democracies know that other democratic states are subject to similar constraints, which effectively require a public debate before any military action can be taken.

On the other hand, the need for a public debate also serves an important signaling function, lending credibility to any commitments (Fearon, 1994), which is reinforced by the fact that the existence of greater institutional constraints entails a greater audience cost, reducing the incentive to bluff. In other words, institutional constraints make mutual behaviors more predictable. Hegre et al. (2018) claim that both the constraints and signaling arguments rest on the idea that democracies have a set of institutionalized mechanisms through which leaders are held accountable for their actions. Accordingly, these authors have developed new tests that refine the mechanisms of institutional constraint, differentiating between those that are formally vertical (elections), informal (civil society activism), and horizontal (the constraints that other branches place on the executive).

Given its prominence within the field, the theory of democratic peace has been challenged in numerous counts. It has been argued that the causal relationship between the two is spurious (Mousseau, 2009; Mousseau, 2013; Rosato, 2003) and is driven instead by international institutions, geographic distance, political and military alliances, economic interdependence, political stability or state capacity (Russett, 1994).<sup>6</sup> Moreover, a stronger criticism insists that it is not democracy that causes peace but instead the similarity between regimes (Gartzke, 2000; Lektzian & Souva, 2009; Peceny, Beer & Sanchez-Terry, 2002; Raknerud & Hegre, 1997; Werner, 2000). This reasoning, which dichotomically classifies democratic and authoritarian regimes, assumes that those regimes that are similar to each other have a lower probability of conflict than mixed dyads, which applies to both the subset of democratic states as well as the subset of autocratic states.

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<sup>6</sup> One of the main alternative explanations is economic; 'capitalist peace' theory (Gartzke, 2007; Mousseau, 2013) claims that the level of economic development explains both democracy and peace between democratic countries. These alternative explanations do not undermine the empirical regularity of the phenomenon, but they do challenge the causal arguments identified in the aforementioned literature.

The similarity argument derives from the fact that democratic states do not fight each other; however, this does not mean they do not fight other types of states. In this way, both Gleditsch & Hegre (1997) and Raknerud & Hegre (1997) hypothesize that the probability of war in a mixed dyad must be greater than the probability of war in a democratic or autocratic dyad. Likewise, Werner (2000) argues that similar states are less likely to enter into conflict than disparate states, testing this view with an analysis of the survival of peace duration in similar and mixed dyads. Werner's results show that politically akin dyads are more likely to enjoy a lasting peaceful relationship over time, even controlling for the democratic character of those states. The dyads of democratic states remain the most peaceful, but even the dyads of autocratic states are notably more peaceful than mixed dyads. This final fact gave birth to what we now know as the 'autocratic peace.'

Gartzke (1998; 2000) explores a parallel argument, hypothesizing that it is the similarity between state preferences that causes peace and not the democratic character of those states. In his words, 'If similar regime type leads to similar preferences, then we have not a "democratic peace" so much a "regime type similarity peace"' (Gartzke, 1998: 11). Peceny et al. (2002) disaggregate the category of autocracies into several subsets and argue that similarity among autocracies presents a lower probability of conflict compared to mixed dyads but a higher probability than in the case of democratic dyads. Following a similar intuition, Bennett (2006) tests a multinomial logit model that classifies states into democratic, autocratic or mixed dyads. Taking the mixed dyads as a base category, the result confirms that the autocratic dyads have a 35% lower chance of conflict, and the democratic dyads have a 55% lower chance of conflict.

The cultural-normative mechanism of the theory of democratic peace assumes that there is something inherently different in the relations between democratic states that is not present in the relationship between autocratic states. For this reason, the theory can hardly be complemented with arguments such as regime similarity. In contrast, the mechanism of 'institutional constraints' is not limited only to democracies (constrictions also exist in autocracies, although to a different degree), which allows us to integrate both arguments.

### **Explaining the Rationale of the Interactive Model of Democratic Peace**

Despite their differences, the institutional constraints explanation and 'similarity-based peace' are complementary in several respects. The perspectives are not the same: democratic peace holds that the elements that reduce the likelihood of conflict are found only in democracies, while similarity-based peace holds that such elements can also be present in autocratic states. Nonetheless, the causal logic of the two arguments

is not entirely in conflict for at least two reasons.

First, the autocratic peace argument tries to explain why autocratic dyads have a lower probability of conflict than mixed dyads—an empirical fact that has already been observed by the theorists of democratic peace (Bremer, 1992; Hewitt & Wilkenfeld, 1996). Authors in this tradition argue that institutional constraints are not unique to democratic states but are also present (to some degree) in a wide range of autocracies. Checks and balances, veto powers and the need to mobilize popular support are also present in many autocracies—a fact that underscores the need to exercise caution when operationalizing ‘democracy.’ Therefore, the reciprocal effect of ‘institutional constraints’ described in the previous section may also apply to this argument. Since institutional constraints exist in both democracies and autocracies, the same causal logic may be used. Second, there is another possible causal complementarity, as the base argument of similarity-based peace (regime as a heuristic for identifying friends and enemies in the international system) does not necessarily exclude the idea of democratic dyads being less conflict-prone than autocratic dyads (see Gartzke & Weisiger, 2013; Weisiger & Gartzke, 2016).

Based on the complementary characters of the institutional constraints perspective and the similarity-based view, Figure 1 depicts an interactive effect between both mechanisms. This figure illustrates every possible dyad based on each country’s democratic level and the democratic difference within each dyad. The figure shows five hypothetical dyads of countries (a, b, c, d, and z) along two axes: the democratic level of the dyad and its democratic spread. Dyad “a” has a combined level of democracy of 0.9 due to the democratic scores of its members ( $|1.0| - |0.8|$ ); the spread—or absolute difference between the democratic scores of both members—is 0.2 ( $|1.0| - |0.8|$ ). Likewise, dyad “b” has a democratic mean of 0.15 and a spread of 0.1 given by the values of each country ( $|0.1| - |0.2|$ ). Dyad “c” has a democratic level of 0.675 and a spread of 0.4. Dyad “d” has the broadest spread of these examples of (0.7) due to its member values ( $|0.05| - |0.75|$ ) and a combined democratic mean of 0.4. Finally, dyad “z” denotes a logically impossible dyad, as having a mean of 0.9 and a spread of 0.4 requires one country to be beyond the democratic scale. There are no dyads with democratic means outside the denoted triangle.

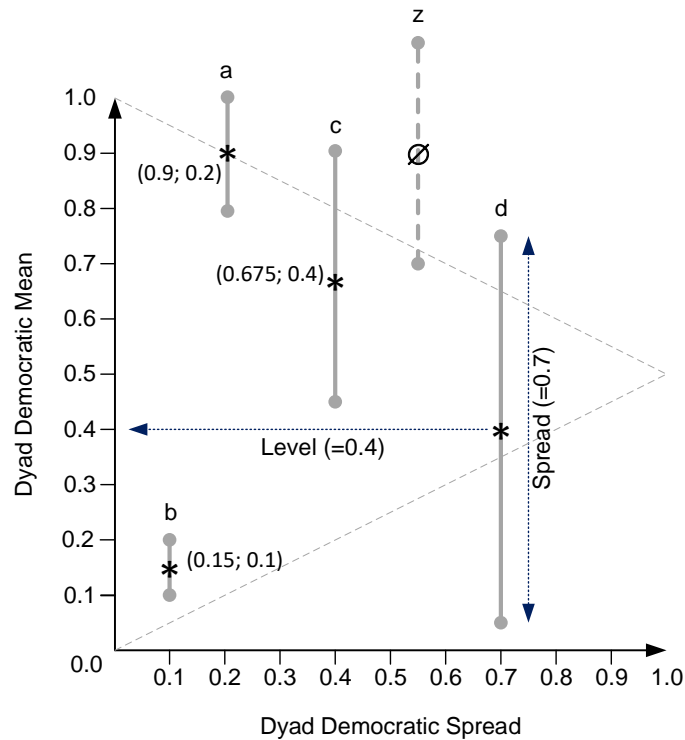


Figure 1. Dyad's Democratic Mean and Spread

Whether it is due to its high democratic level or its minimal democratic spread, virtually all students of democratic peace—regardless of their theoretical reasoning—will agree that dyad “a” is the one with the lowest probability of conflict. In dyad “b,” both members are clearly nondemocratic, which means that the likelihood of conflict should be larger than that in dyad “a,” at least from an institutionalist perspective. From a similarity-based view, the members of this dyad are even more similar than those in dyad “a” ( $\text{spread}_a > \text{spread}_b$ ); therefore, the probability of conflict should be even lower than that in “a.” Dyad “d” is certainly the most conflict-prone group of all, as it is composed of a democratic regime and an unambiguously authoritarian regime, with a large concomitant difference. Of course, these are simple examples for the sake of explanation; for any given democratic level, there are an infinite number of dyadic pairs whose spreads will differ.

Theoretically speaking, the dyad with the broadest possible spread is the pairing in which one member has a democratic score of one, while the other has a score of zero. By definition, this dyad cannot have a combined democratic average of anything other than 0.5. Thus, there is a *dyadic triangle*—drawn by the dashed lines—that circumscribes the area in which all potential imaginable dyads can be found. (Please note that this triangle refers to the characteristics of the dyad, not the countries forming



the dyad).

Building on the graphical description of dyad means and spreads in Figure 1, Figure 2 represents the expected regions of peace and conflict based on the literature discussed above. Following Russett (1994), Figure 2a depicts the expectation of the original idea that democracies do not fight one another. Thus, the circle in the upper left shows the anticipated region of peace based on the institutionalist perspective (dyads composed of quite similar and highly democratic countries). Figure 2b, however, sketches the similarity-based view. There is a peace zone concentrated vertically at the left of the dyadic triangle, encompassing those regimes that are notably similar (very low spread) in terms of their democratic level, regardless of the absolute value of the level itself. At the far right of the dyadic triangle, there is a region of risk, which by definition involves extremely different regimes.

This orthogonal space delimited by the democratic mean and spread of each dyad is congruent with a certain part of the literature but differs in the evident avoidance of a clear cut off point between democracies and nondemocracies. This result is a major departure from all the previously mentioned approaches. We do not use a 'pure' traditional or similarity-based approach but instead use a new version built around the notion of their interaction. Working with pairs of binary variables (i.e., democracy vs. nondemocracy), outcomes are logically restricted to a 2×2 matrix, which limits possible combinations and other types of relationships. Employing a continuous measurement of democracy has the benefit of allowing for identify variation in the effect along the democratic continuum, without theoretically presupposing it in advance. Additionally, this approach opens the door to the possibility that the effect of the level of democracy varies conditionally by the democratic spread of both countries or vice versa, without ruling out in advance the potential existence of causal heterogeneity, allowing us to better approach certain cases that are part of the 'gray area' in which defining a regime as democratic or nondemocratic is difficult.

Thus, using Figure 1 as a hypothesis generator, we expect that *the lower a dyad's average level of democracy and the larger its democratic spread, the higher the probability of a conflict is between its component states*. This is to say, we expect conflict to occur close to the lower side of the triangle previously described in what we term the 'risk region.' Likewise, the mirror image of the hypothesis, *the higher a dyad's level of democracy and the smaller its democratic spread, the lower the probability of a conflict between its component states is*, leads us to anticipate a 'zone of peace.' Both zones are depicted in Figure 2c.<sup>7</sup>

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<sup>7</sup> Our theoretical argument is the heir of the 'peace scale for State relationships' elaborated by Goertz et al. (2016: 27). The authors suggest three groups of indicators that produce three categories: Rivalry, Negative Peace, and Positive Peace, respectively.

Obviously, the fact that a dyad is located close to the lower side of the triangle, within the risk region, is not sufficient for a conflict to occur. Indeed, many thousands of dyads in that region coexist peacefully without ever exhibiting even the slightest signal of aggression towards one another (e.g., Cuba and Nepal in 1980). Therefore, we cannot forget that we are working with a probabilistic hypothesis. Likewise, the fact that a dyad is located outside the risk zone does not mean that the probability of a war is zero; in reality, some wars clearly occur beyond the risk region (e.g., Poland-Lithuania in 1920, India-Pakistan 1999). Although a few cases in a universe of several hundred thousand cases do not invalidate a theory (King, Keohane & Verba, 1994), they do compel a more detailed and nuanced elaboration.

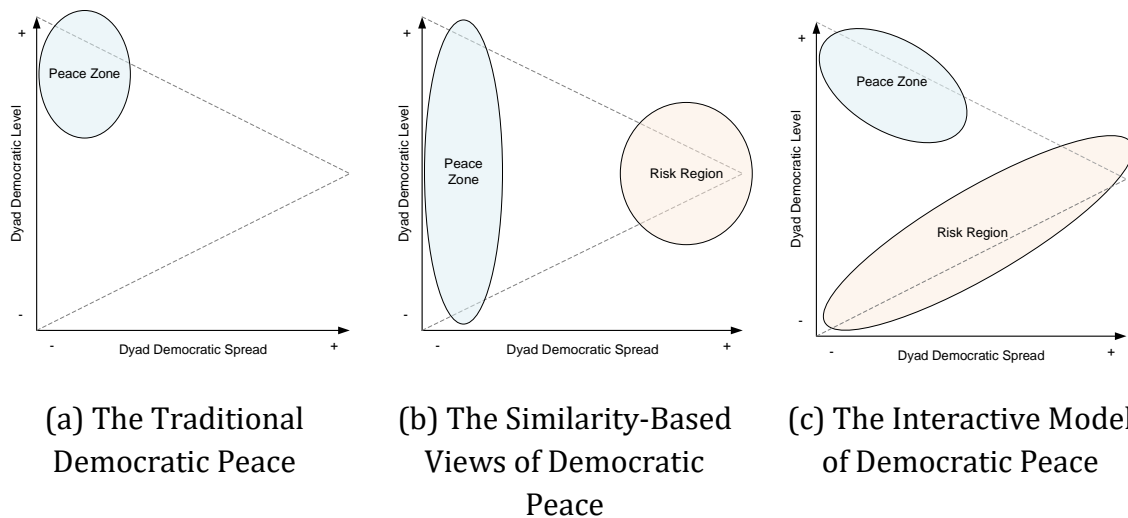


Figure 2. Theories of the Democratic Peace based on a Dyad's Democratic Mean and Spread

## Research Design: Variables and Methods

*Dependent variable: Fatal Militarized Interstate Dispute (MID)*

It is abundantly clear that the different ways conflict is operationalized have a clear impact on any study of democratic peace. Different definitions result in the inclusion or exclusion of particular cases, thereby altering the results. Moreover, even agreeing on what constitutes 'democracy' and 'war' may prove controversial. For example, 'By Doyle's definition, Spain only became a liberal regime in 1978, but Lake's article, making use of the Polity II data set, codes Spain as democratic in 1898' (Spiro, 1994: 60). Spiro adds that 'because the literature on democracy and war is highly empirical, it is important to remember that the subjective judgments by which variables are coded in data sets have significant and important effects on the results yielded by analysis of

those data' (Spiro, 1994: 62).

Because war is (thankfully) a rare occurrence, the literature testing democratic peace theory has mostly used militarized interstate disputes (MIDs) as a dependent variable, which includes a greater range of conflict than just war (Bremer, Singer & Stuckey, 1972; Jones, Bremer & Singer, 1996).

In addition to full-blown war, MIDs also include threats, signs of force, and more limited uses of force. It is worth noting that the term 'militarized interstate dispute' only applies to conflicts between internationally recognized sovereign states; therefore, conflicts within countries (e.g., Syria at present), colonial wars (Algeria v. France), or armed conflicts involving nonstate actors (FARC v. Colombian state) are excluded from the analysis. From this perspective, war is a subset of MIDs. The concept of war commonly refers to the use of lethal violence, institutionally organized, and on a large scale (Russett, 1994: 12).

Following previous work (Hegre, 2000), we use the 'fatal MID' standard to define our dependent variable, as 'disputes with battle-deaths are more clearcut examples of militarized disputes than those not involving fatalities' (2000: 13).<sup>8</sup> The COW dataset (Palmer et al., 2015) measures the number of fatalities in each incident, and from this measure, we derive our dichotomous dependent variable, as shown in Table 1. From 656,000 yearly dyads, 99.79% count as having 0 fatalities.

Table I. Codification of the dependent variable

Number of Fatalities	Dependent Variable: Fatal MID	Robustness Check: Fatal MIDs (ordinal)
None	0	0
1-25 deaths	1	1
26-100 deaths	1	2
101-250 deaths	1	3
251-500 deaths	1	4
501-999 deaths	1	5
> 999 deaths	1	6

Source: Correlates of War.

<sup>8</sup> Gibler & Little find that 'well over 400 articles, including some of our own, have used fatal MIDs as a dependent variable in at least one analysis' (2017: 191).

### *Independent Variables: Dyadic Democratic Mean and Spread*

As mentioned above, a majority of recent studies on democratic peace use Polity as an indicator of democracy,<sup>9</sup> which is a measure that is in itself quite problematic for two reasons: 1) values must be accepted at face value (since they cannot be replicated) and 2) it is an ordinal variable that is routinely treated as continuous (Coppedge et al., 2011; Munck & Verkuilen, 2002).<sup>10</sup> Of course, we are well aware that, until very recently, Polity was the only truly cross-national and longitudinal database available to researchers, a situation that has drastically changed since the release of V-DEM's database.<sup>11</sup>

V-DEM's data are compiled by experts in each country through questions with well-defined response categories or scales of measurement. Ideally, at least five experts contribute to each indicator for each country-year. Therefore, more than 3,000 experts in total have participated in the data collection. At the same time, the individual expert scores are aggregated using a Bayesian IRT model, which produces an estimate of the latent variable for each indicator (Teorell et al., 2019). Likewise, its continuous nature (the variable ranges from 0 to 1) does not assume a fixed boundary between democracy and nondemocracy, taking into account the variations in the effect depending on the value that the independent variable takes. In this way, the nonlinearity proposed by the logit models is used (Agresti, 2007; Long, 1997).

The electoral democracy index used here (*v2x\_polyarchy*) is the basis for all indices of democracy developed by V-DEM. The index takes as a reference the concept of polyarchy developed by Dahl (1971; 1989). This variable is understood as a core element of any other conception of representative democracy: liberal, participative, deliberative, egalitarian or other (Coppedge et al., 2016a; Coppedge et al., 2016b). The index is formed by taking the average of 1) the weighted average of the indices that measure freedom of association, suffrage, free elections, elected executive, and freedom of expression and 2) the multiplicative interaction between these five indices. Therefore, unlike Polity, the variable measures many of the institutional constraints that are key to our theoretical argument.

Based on V-DEM's polyarchy index, we calculate the democratic mean and democratic spread for each dyad-year between 1900 and 2000. *Democratic mean* refers to the

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<sup>9</sup> This is not to ignore the existence of other alternatives such as Vanhanen's Polyarchy dataset (2000), or Freedom House (2015).

<sup>10</sup> We are aware that these variables are not perfectly continuous, but we treat them as though they were. On the problems of using discrete indicators as if they were continuous, see Long and Freese (2006).

<sup>11</sup> VDEM's polyarchy index includes critical aspects not considered in any other cross-national and longitudinal measure of democracy (Teorell et al., 2019).

average of both members of the dyad polyarchy measures, and *democratic spread* is determined by the absolute difference between the democratic values of each member of the dyad. *Democratic spread* therefore follows the same logic as the *dyadic difference* measure proposed by Gartzke & Weisiger (2013) based on Polity. The interplay of these two variables creates a set of finite possibilities that we define as the *dyadic triangle*, as described in Figure 1.<sup>12</sup> (See Figure A1 in the online appendix for a graphical distribution of these variables for all our observations.)

### *Control Variables*

The control variables included in our model follow the relevant literature and correspond to potential alternative explanations for the relationship between democracy and conflict.

- *Geographic distance and contiguity.* This variable is based on the assumption that neighboring countries are more likely to experience conflict than distant countries. This is measured through two variables: (a) contiguity, which takes the value of 1 when countries are contiguous and 0 when they are not, and (b) distance, which is the natural logarithm of the number of miles between the two capital cities in the dyad.<sup>13</sup> Incorporating distance allows for the differentiation between the effect of proximity and preferences (Senese, 2005).
- *Alliance.* This variable is based on the assumption that the existence of an alliance has an effect on the likelihood of conflict. This dummy variable codes the presence of a defense pact, neutrality pact, or entente in the dyad as 1 and the absence of these pacts as 0, using the Alliances database of the Correlates of War project (Singer & Small, 1966; Small & Singer, 1969).
- *Proportion of material capacities.* This variable is based on the assumption that material capabilities determine the ability of states to carry out an armed conflict. This variable is typically measured using the Composite Index of National Capabilities (CINC) (Singer, 1988). This index incorporates an average of six indicators: military spending, military personnel, energy consumption, iron and steel production, urban population, and population size (as a proportion of the world's population). In turn, the proportion of material capacities used here measures the sum of the CINC in the dyad, which is

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<sup>12</sup> If one observes the evolution of the polyarchy means and spreads between 1900 and 2000, it is clear that both variables are correlated in time and that, after 1989, when the Cold War ended, the average polyarchy score increased, while the difference has remained unchanged, showing that there has been a democratization wave. This same trend is observable in 1945, 1919 and 1901 (see Figure A2 at the appendix).

<sup>13</sup> Or nearest major cities, in the case of some large countries.

expressed as a percentage.

- *Trade interdependence.* To include one of the main alternative explanations for democratic peace, studies typically include a measure of trade dependence for each dyad, which results from the sum of the dependence of both countries on trade. This variable has many missing values (the periods of 1914-1919, 1939-1945 and 1993-2000), so the literature usually includes it only as a robustness check (Gartzke & Weisiger, 2013). We create one variable using the trade dependence variable, as suggested by Oneal & Russett (1997) and discussed by Barbieri and Peters (2003).
- *Trade growth rate.* We include a second control for economic interdependence, which measures the average trade interdependence growth rate in the dyad, which is expressed as a percentage. Independent of trade interdependence in the dyad, we expect MIDs to be more likely when trade growth rates are negative and less likely when trade growth rates are positive.
- *Time autocorrelation.* There are three ways to address time dependence in binary data: one could use splines or time dummies, which are both addressed by Beck, Katz, and Tucker (1998), or include  $t$ ,  $t^2$ , and  $t^3$  in the regression, as suggested by Carter and Signorino (2010). We opted for the latter alternative, as it is much easier to implement than splines and avoids the problem of the quasi-complete separation of time dummies.

Two main objections have been raised to the causal inference: peace may cause democracy, or some other societal factors may cause both democracy and peace (Hegre, 2014: 163). Because our contribution is to test an alternative understanding of democracy peace, which we believe has many advantages over previous studies, our control variables are those most frequently found in the literature. We do not address, for instance, the democratic peace-capitalist peace debate, which would require an extensive array of economic variables. We aim to offer a model as parsimonious as possible to explore the interplay between democratic mean and democratic spread in country dyads.

### Statistical Analyses

We pursue our empirical analysis on relevant dyads only. Relevant dyads are pairs of contiguous states or pairs of states, including at least one major power, and have become standard in testing democratic peace theory.<sup>14</sup> Our universe of analysis is

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<sup>14</sup> Lemke and Reed check both samples and conclude that potential biases and errors from the selection process ‘appear to be relatively small and substantively unimportant’ (2001: 141).

constituted by approximately 33,000 observations. Although *democratic mean* and *democratic spread* have approximately 58,200 observations each, trade variables exhibit 42,600 observations. Our models remain notably robust even without including these variables.

Our baseline model can be specified as

$$\begin{aligned} \text{Pr(Fatal MID)}_{i,t} &= \beta_0 + \beta_1 \text{DemMean}_{i,t} + \beta_2 \text{DemSpread}_{i,t} \\ &+ \beta_3 \text{DemMean} \times \text{DemSpread}_{i,t} + \beta_4 \text{Contiguity}_i + \beta_5 (\log) \text{Distance}_i \\ &+ \beta_6 \text{Alliance}_{i,t} + \beta_7 \text{CINC}_{i,t} + \beta_8 \text{TradeInterdependence}_{i,t} \\ &+ \beta_9 \text{Tradegrowthrate}_{i,t} + \beta_{10 \dots 12} \text{TimeAutocorrelation}_{i,t} \end{aligned} \quad (1)$$

where subscript  $i$  denotes the dyad and  $t$  the year. We include standard errors clustered by year.<sup>15</sup>

As seen in Table 2, Model 1 uses a logit model with a dichotomous indicator of fatal MID as the dependent variable.<sup>16</sup> We then use the ordinal fatal MID variable with the seven-category variable in Model 2. Our main interest is in the interplay between *dyad democratic spread* and *dyad democratic mean* expressed in an interactive term. The results are notably robust across all models and meet our expectations.<sup>17</sup> Of all the controls included in the specifications, trade variables and alliances have a negative effect on the likelihood of a fatal MID, while contiguity and CINC have a positive effect.<sup>18</sup>

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<sup>15</sup> Clustered errors by dyads do not change our results.

<sup>16</sup> In the online appendix we also test alternative measures for the dependent variable, such as the severity of MID (Klein, Goertz & Diehl, 2006). Likewise, we run the baseline model measuring the spread and the mean using Polity. Although we should not expect substantially different results between Polity and VDEM because they are measuring the same latent variable, the results differ. When we run the models of Table 2 using Polity, the coefficients have the same direction but are weaker in both magnitude and significance. This check underlines that the choice of which data are used for measuring democracy is not a trivial one in this theoretical debate.

<sup>17</sup> While the standard procedure has been to use the minimum and maximum of the two countries, our theoretical framework uses the mean and the spread instead. Nonetheless, in the online appendix, we checked the validity of our findings using the mentioned measures as well. The results confirm our findings, but the interactive model works better with our chosen variable, and it is easier to interpret.

<sup>18</sup> We performed the correction for the occurrence of rare events as proposed by King & Zeng (2001). When working with binary dependent variables that have many ‘zeros’ and very few ‘ones,’ there is a risk that the probability of occurrence of the event will be underestimated. Therefore, the authors propose a correction of the bias produced in the estimation. Knowing the probability of ‘ones’ in the population, this bias can be corrected by means of the method of prior correction. We tried the ‘politically relevant’ sample, as well as the full sample, of 300,000+ dyads. The results do not differ substantially from those reported in model 1 (see Table A in the appendix).

Table II. Probabilities of a Fatal MID

Dependent Variable: Model:	(1)	(2)
	Fatal MID Logit	Fatal MID Ordered Logit
Democratic mean × Democratic spread	0.999*** (-4.91)	0.998*** (-5.29)
Democratic mean	0.993 (-0.95)	0.991 (-1.04)
Democratic spread	1.058*** (7.34)	1.08*** (8.36)
Trade growth rate	0.957* (-2.48)	0.953** (-2.76)
Trade interdependence	0.583** (-3.11)	0.669* (-2.01)
Contiguity	9.29*** (9.04)	8.84*** (6.83)
Distance (log)	0.968 (-0.80)	0.959 (-0.80)
Material capabilities	1.019* (2.14)	0.999 (-0.06)
Alliance	0.34*** (-7.27)	0.256*** (-6.85)
$t$	0.972 (-0.68)	0.944 (-1.91)
$t^2$	1.001 (1.81)	1.001 (3.03)
$t^3$	0.999* (-2.66)	0.999 (-3.83)
AIC	5128.7	5207.5
Pseudo R <sup>2</sup>	0.17	0.14
%CP	98%	48%
N	32997	32828

*Note:* t statistics in parentheses. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.  
Coefficients are expressed as odds ratios.

Discussing how and why we include interaction terms is central to our theoretical argument, but it is also key from an empirical point of view. The recent debate focuses on the need to include this term to test the interaction in logistic models (Berry, DeMeritt & Esarey, 2010; Rainey, 2016; van der Maat, 2018). We follow the recommendation of including an interactive term as we are modeling a latent variable, namely, conflict in the dyad. This recent scholarship finds that while including or not including the interactive variable does not entirely remove the bias towards confirming



interactive hypotheses, it does greatly reduce it. Thus, including a product term makes the empirical argument more compelling by making the theory more vulnerable to the data (Rainey 2016: 627).

A negative interaction effect means that when the democratic mean increases, the effect of democratic spread decreases, and vice versa, but that is all we can know from the table. Because, in the probability metric, the values of all the variables in the model matter, even if they are not statistically significant, the best alternative to grasp our findings is by plotting them. Models 1 and 2 show that the interactive term between democratic spread and mean is statistically significant. It is worth clarifying that the constitutive terms (democratic mean and democratic spread) do not need to be statistically significant for our hypothesis to be confirmed.<sup>19</sup> To interpret the interaction, we created a figure of the predicted probabilities in all the possible combinations of our two variables of interest, keeping all other variables at their mean levels (see Figure 3). We offer a heuristic aid based on the probabilities of fatal MID, which overwhelmingly supports our theoretical expectation and is represented graphically in Figure 2c. Combining the estimated probabilities and the empirical distribution of cases, it is evident that the risk zone is constituted by the trapezoid along the lower bound of the triangle formed by democratic spread and democratic mean.

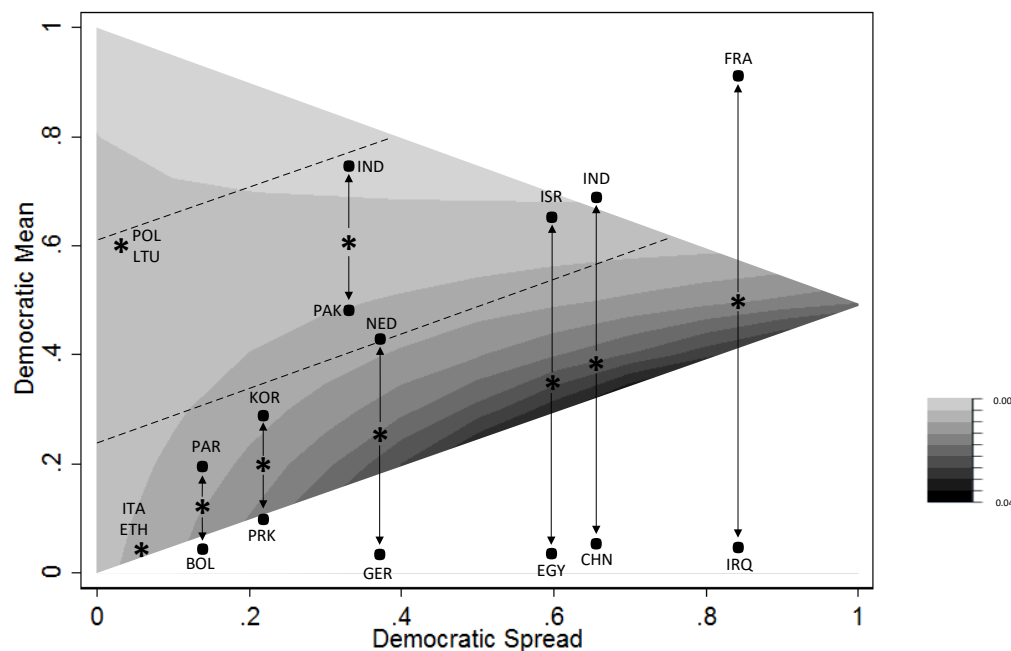


Figure 3. Predicted probabilities of fatal MID from Model 1

<sup>19</sup> The constitutive terms should always be included in regressions despite their significance, see Brambor et al. (2006) for more detail.

The figure above combines the probabilities of fatal MIDs, based on Model 1, with real exemplary cases.<sup>20</sup> The figure also illustrates the probability of a fatal MID through shades of gray: the darker the shade is, the higher the probability.<sup>21</sup> We have also indicated select examples of fatal MIDs using a star, which represents the dyad location on both crucial dimensions explained above (democratic mean and democratic spread). For a better understanding of this figure, we also include the democratic level of each country belonging to the selected cases. As theorized and represented in Figure 2, there is a risk region (the area under the lower bound) and a peace zone (the area above the upper bound), which can serve as rules to predict fatal MIDs among states.

Of all the dyads in the analysis, the dyad with the broadest democratic spread was during the Gulf War between France and Iraq in 1991. In contrast, the dyad with the highest democratic mean that went to war is that of Poland and Lithuania in 1920 (well outside the risk zone), and the dyad with the lowest democratic mean is the dyad composed of Italy and Ethiopia in 1936.

As explained at the beginning of this research, we explicitly avoid setting a cutoff point between democracies and nondemocracies. Nonetheless, a view of the very few cases that fall well beyond the risk zone (such as the Polish-Lithuanian war of 1920) seem to be an explicit challenge to democratic peace theory. We contest this interpretation. Being outside the risk zone does not necessarily imply that the members of these dyads should be considered ‘democratic,’ at least in the fullest, most meaningful sense of the term. If we use the classification of regimes proposed by Lührmann et al. (2017), which is based on Lindberg (2016), Poland was the only liberal democracy of all four participating countries. In fact, Lührmann et al. (2017) consider Lithuania in 1920 to have been an electoral autocracy and in 1919—when Poland captured Vilnius—a closed autocracy, although, in 1920, it had a polyarchy score of 0.59, with a confidence interval oscillating between 0.54 and 0.64.

There is no case of a war in any dyad whose democratic level is above 0.61 using the V-DEM polyarchy score. Of course, as V-DEM’s measurement model is based on Bayesian item response theory (IRT) modeling techniques to estimate the latent characteristics of its collection of expert ratings (Pemstein et al., 2015), it should not be a surprise that some dyads change their democratic scores for the same year in different versions of the data. In other words, the measurement model is constantly readjusting itself as new

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<sup>20</sup> Although the predicted probabilities presented here might seem low, they have similar levels compared to some of the main works in the literature (Gartzke & Weisiger, 2013; Russett, 1994; Russett & Oneal, 2001; Weisiger & Gartzke, 2016). Since wars are infrequent events in history, the probability of war or conflict for a given dyad will always be relatively low.

<sup>21</sup> For a complete view of the distribution of all dyads with at least one fatality and those dyads coded as wars, see Figure A3 in the appendix.

waves of data come in, which implies that one cannot delimit the theorized regions using fixed thresholds but rather only using diffused regions.

Based on our theoretical framework and empirical models, we infer a heuristic that recognizes three large regions of political regimes in relation to the level and democratic spread of any dyad. On the one hand, any pair of countries located at or below the lower quartile [defined by the formula  $y = 0.25 + 0.5x$ ] has a substantially greater probability of a fatal MID. As expected, a dyad in the risk area is 50% more likely to experience a fatal MID than a dyad that is outside this region.<sup>22</sup> At the same time, while the peace triangle has no predictive power over the probability of war, it has a strong effect on fatal MIDs (dyads in the zone of peace see their probability of fatal MIDs cut in half). On the other hand, we identify a zone of peace that includes pairs of countries located at or above the sixth decile [defined by the formula  $y = 0.60 + 0.5x$ ]. The three resulting areas can be clearly identified in Figure 3 with dotted lines.

This heuristic rule is in harmony with previous theoretical works, such as Goertz et al. (2016: 27), when they suggest a ‘peace scale for state relationships.’ These papers propose three areas of dyadic conflict: rivalry, negative peace, and positive peace. The difference here is that, while these articles reach their models through a theoretical analysis, we conduct an inductive, data-driven analysis. Nevertheless, the elaboration of these papers overlaps with our findings: rivalry materialized in our risk region, positive peace is equivalent to our peace zone, and negative peace is represented as the area between the peace zone and the risk region.

Thus, proposing a risk area and a zone of peace hypothesis, we test the following model:

$$\begin{aligned}
 \text{Pr(Fatal MID)}_{i,t} &= \beta_0 + \beta_1 \text{PeaceZone}_{i,t} + \beta_2 \text{RiskArea}_{i,t} + \beta_3 \text{Contiguity}_i \\
 &+ \beta_4 (\log) \text{Distance}_i + \beta_5 \text{Alliance}_{i,t} + \beta_6 \text{CINC}_{i,t} \\
 &+ \beta_7 \text{Tradegrowthrate}_{i,t} + \beta_8 \text{TradeInterdependence}_{i,t} \\
 &+ \beta_{9...11} \text{TimeAutocorrelation}_{i,t}
 \end{aligned} \tag{2}$$

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<sup>22</sup> When we use war as a dependent variable, a dyad in the risk area is 40 times more likely to go to war than a dyad that is outside this region.

Table III. Zones of Peace and Risk

Dependent Variable:	(3)	(4)
	Fatal MID	Fatal MID
Model:	Logit	Ordered logit
Risk area	1.737* (2.67)	2.483*** (4.11)
Peace zone	0.665* (-2.34)	0.436*** (-3.78)
Trade growth rate	0.964* (-1.99)	0.962* (-2.00)
Trade interdependence	0.611*** (-4.10)	0.700* (-2.45)
Contiguity	11.19*** (10.50)	10.40*** (7.66)
Distance (log)	1.011 (0.32)	1.006 (0.13)
Material capabilities	1.027*** (3.40)	1.009 (0.95)
Alliance	0.375*** (-7.42)	0.302*** (-7.26)
$t$	0.981 (-0.47)	0.961 (-1.48)
$t^2$	1.001 (1.61)	1.001 (0.68)
$t^3$	1.000* (-2.50)	1.000 (0.06)
AIC	5658.88	5582.8
Pseudo R <sup>2</sup>	0.15	0.13
%CP	98%	53%
N	37217	37020

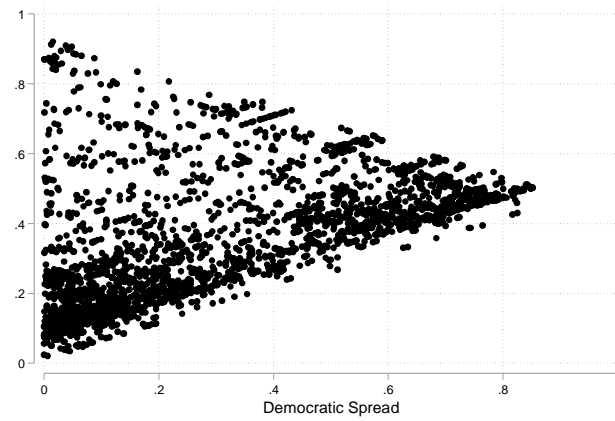
*Note:* t statistics in parentheses. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.  
Coefficients expressed as odds ratios.

As expected, a dyad in the risk area is 70% more likely to face a fatal MID than a dyad that is outside this region (see Model 1). At the same time, dyads in the peace zone see their probabilities of fatal MIDs cut by 40%. Based on these results, we plot the distributions of all MIDs, fatal MIDs, and wars in the system based on each dyad's democratic level and spread (Figure 4). As observed, MIDs occur throughout the triangle, meaning that there are fairly equal probabilities of a low risk conflict in all possible combinations of democratic means and spreads. However, as the intensity of the conflict rises (i.e., MID with at least one death and then a formal declaration of war),

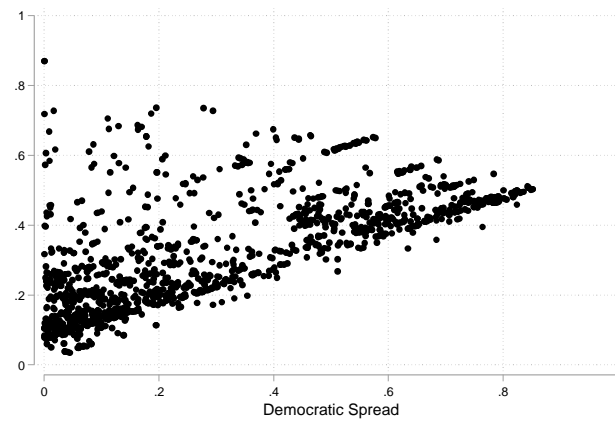
the higher incidence of events concentrates towards the lower side of the dyadic triangle.

An interesting implication of this analysis touches on the theory of regime similarity. A larger concentration of wars occurs at the lower left corner of the dyadic triangle instead of the rightmost vertex of the triangle, as the pure regime similarity argument would predict. Equally nondemocratic dyads are as likely to experience fatal MIDs as so-called mixed dyads. The bidimensional analysis of democracy offers insight not previously considered in the literature.

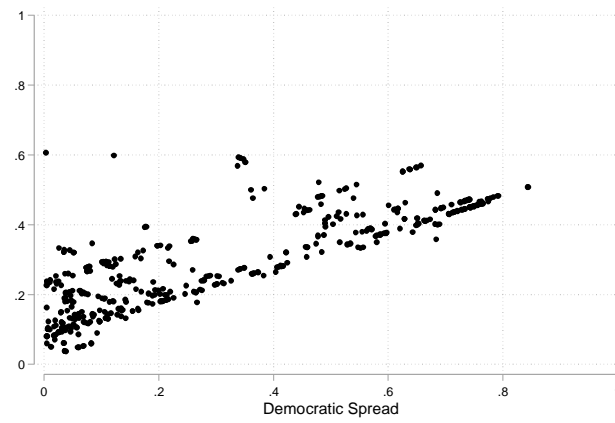
Think, for example, of the case of Argentina. In 1975, before the beginning of a military dictatorship that would last for eight years, Argentina's democratic score was 0.77 on the V-Dem scale. In the following years, two MIDs occurred: one that was well predicted by the similarity-based argument and one that was not. The first example is the Falklands (Malvinas) War in 1982. The Argentina-Great Britain dyad moved from the upper left corner of the dyadic triangle in 1975 (mean of 0.85, spread of 0.16) to the right-hand side in 1982 (mean of 0.54, spread of 0.78). Now, consider the Beagle conflict between Argentina and Chile in 1978. The Argentina-Chile dyad moved from the right side of the triangle in 1975 (mean of 0.46, spread of 0.62) to the lower left corner in 1978 (mean of 0.15, spread of 0) as a result of both countries being under authoritarian regimes. This conflict is counterintuitive for the similarity-based argument, as the dyad should have moved towards a peace zone. However, in our model, this conflict is absolutely predictable.



(a) All MIDs



(b) All Fatal MIDs



(c) All Wars

Figure 4. Distribution of all MIDs, fatal MIDs, and wars in the system based on a dyad's democratic level and spread

## Conclusions

This article addresses one of the richest literatures in the discipline: democratic peace, which is a literature that argues that democracies are very unlikely to fight each other (and does not mean that they are less likely to fight with other regimes). Given its relevance and explanatory power, this theory has been scrutinized from every possible angle and has been refuted and resurrected many times in recent years due to measurement decisions and methodological misspecifications (Dafoe, 2011; Dafoe, Oneal & Russett, 2013; Gartzke, 2007; Mousseau, 2013). This work offers a new twist on democratic peace theory and its major variant, the theory of regime similarity, which posits that similar regimes do not fight each other.

Taking advantage of a new, stronger, and more robust measure of democracy (V-Dem) and not relying on arbitrary cutoff points between democratic and nondemocratic regimes, we offer a new theory of democratic peace that complements both similarity-based and institutional arguments. Thus, we propose an *Interactive Model of Democratic Peace* that suggests that there is an interplay between the democratic mean and democratic spread of dyads. This interplay creates a triangle of possible outcomes that we call the *dyadic triangle*. From this model, we derive that the pattern of democratic peace, an empirical law for some colleagues, works differently from what has been predicted by traditional or similarity-based views.

Following democratic peace theory, our evidence shows that the higher a dyad's level of democracy is, the lower the probability of war (and also fatal militarized interstate disputes, F-MID) between that pair of states. However, complementing this theory, we estimate the democratic spread of the dyads (the absolute difference between the democratic scores of its members). Unlike democratic peace theory, our data better tolerate regime differences, as dyads can move much further towards the right-hand side of the triangle than democratic peace theory would predict. Following the theory of regime similarity, we pay attention to the democratic spread of each dyad. However, unlike this influential view of international conflict, we find that holding similar scores on democracy is not a sufficient condition for peace between the members of a dyad. This result suggests that similarity-based arguments hold as long as both regimes are clearly autocratic or democratic.

Using the interplay between dyads' democratic mean and spread, we were able to theoretically and empirically derive three heuristic zones, filling much of the gray area that has been left unexplained by previous models. Although our model is the first to explore these two dimensions interactively, the *Interactive Model* is still evolving (as democracy scores update yearly), filling the blanks (as there is missing data), and moving forward to incorporate more and more dyads' characteristics. Working with a

continuous measure of polyarchy, this article provides a finer evaluation of the supposedly peaceful behavior of those regimes located in the upper zone of the polyarchy index.

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### **Replication Data**

The dataset, codebook, and do-files for the empirical analysis in this article, along with the online appendix, can be found at <http://www.prio.org/jpr/datasets>. All analyses were conducted using Stata 14.

### **Acknowledgements**

Equal authorship implied. We are grateful to Carsten Schulz, Nicole Jenne, Naomi Altman, and Laura Levick for helpful comments. We thank the referees of the *Journal of Peace Research* for their suggestions. A previous version of this article appear as working paper of the Varieties of Democracy Institute (Altman, Rojas-de-Galarreta & Urdinez, 2018). All caveats apply.

### **Funding**

This research project was supported by the Riksbankens Jubileumsfond, Grant M13-0559:1, the Swedish Research Council, Grant C0556201, the Knut and Alice Wallenberg Foundation, Grant 2013.0166; by the V-Dem Institute, University of Gothenburg, Sweden, by FONDECYT Grants 1170096 and 11180081, and CONICYT - Programa de Capital Humano Avanzado / Doctorado Beca Nacional 2016 - Folio 21170691.

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