

# Re-Evaluating Capitalist and Democratic Peace Models<sup>1</sup>

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After replicating Oneal and Russett's (*International Studies Quarterly*, 41, 1997, 267; *Journal of Peace Research*, 36, 1999, 423) democratic peace model, Gartzke's (*American Journal of Political Science*, 51, 2007, 180) study contends that "capitalism, and not democracy, leads to peace. Additional research is needed to corroborate, extend, and even refute the findings reported here." In response to this open invitation, this study re-evaluates Gartzke's capitalist peace model along with Oneal and Russett's democratic peace model. This study identifies that while the capitalist peace model suffers from model misspecification, observation omission, and sample selection bias, the democratic peace model commits measurement error. After correcting these four problems, this study uncovers that while capitalism does not emerge as a cause mitigating militarized disputes or wars in a consistent manner, democracy does.

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Since the collapse of the Soviet Union, myriad research questions of what causes liberal peace have been explored (for example, Gibler 2007; Choi 2010a,b). In particular, Russett and Oneal's (2001) study on the democratic peace has emerged as one of the most influential research programs in the area of international conflict, crisis, and war. However, several recent studies have taken a new direction by attempting to distinguish which liberal peace argument has more explanatory power; for example, Gartzke's (2007) study on the capitalist peace, built off Oneal and Russett's (1997) democratic peace model, represents one of these new groundbreaking studies. It reports that "economic development, free markets, and similar interstate interests all anticipate a lessening of militarized disputes or wars. This capitalist peace also accounts for the effect commonly attributed to regime type in standard statistical tests of the democratic peace" (Gartzke 2007:166). Gartzke (2007:182) concludes with an intriguing statement that "the statistical models I develop, and the findings that I present, can be altered, possibly in ways that again show that democracy matters." In response to this open invitation, this study re-evaluates Gartzke's capitalist peace model along with Oneal and Russett's democratic peace model.

A re-examination of these two models on the liberal peace leads to some interesting developments. This study identifies that the capitalist peace model suffers from model misspecification, observation omission, and sample selection bias, while the democratic peace model commits measurement error. Two data sets are fitted to compare the relative importance of capitalism and democracy: all

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dyads and politically relevant dyads. After correcting those four problems, this study uncovers that while capitalism does not emerge as a cause mitigating militarized disputes or wars in a consistent manner, democracy does.

### **The Capitalist Peace Model: Three Errors**

Based on a sample of all dyad years from 1950 to 1992, Gartzke's (2007) work addresses the question of whether capitalism exerts a pacifying effect on the onset of international conflict.<sup>2</sup> It proposes that the absence of militarized disputes between democracies is largely explained by the fact that since democracies tend to espouse capitalism, the likelihood of disputes is greatly reduced. More specifically, economic development, globalization of capital, and similar state policy interests are hypothesized to lead dyads to be less likely to experience a dispute. For empirical testing, the capitalist peace model is built on a replication of the democratic peace model proposed by Oneal and Russett [1997:278, Model 1, Table 2, as indicated in note 47 of Gartzke's (2007:176) study], which "allows for ready comparison of results and diminishes the danger that [his] findings result from idiosyncrasies in coding or model specification" (Gartzke 2007:173). The model consists of a lower score of democracy, a higher score of democracy, capitalist variables, and several control variables.<sup>3</sup>

#### *Model Specification Error: Peace Years*

Taking note of Beck, Katz, and Tucker's (1998) methodological suggestion, Gartzke's capitalist peace model includes three temporal spline variables (that is, spline1, spline2, and spline3) to control for time dependence. However, a peace year variable that measures the number of peace years since the last conflict and that serves as the base variable to create those three spline variables is left out. Since logit splines require that all four variables be included together, the exclusion of a peace year variable makes the estimates of the capitalist peace model untenable. Because Gartzke's study does not control for the complete spline function for the years of peace, it obtains inconsistent parameter estimates and incorrect standard errors.<sup>4</sup> Thus, the capitalist model is misleading because its estimation suffers from omitted variable bias. These omissions explain why the effect of democracy does not hold up in the capitalist peace model, rather than the capitalist variables winning over the democracy variable in competition. As demonstrated in the next section, when the model specification error is properly corrected, democracy re-emerges as a pacifying factor in a consistent manner, whether a crisis is related to a militarized dispute or a war.

#### *Observation Omission: Regional Dummies*

When statistical software drops some observations upon the execution of a model, it issues warning notes. Generally, researchers investigate whether those drops are a justifiable procedure in order to obtain unbiased and consistent estimates. If researchers overlook critical error messages about observation drops and report coefficients and standard errors as they are, their findings may be misleading or even worse, erroneous. The next section illustrates how ignoring

<sup>2</sup> One may argue that the democratic peace is concerned with the escalation of disputes and not their onset (see Chan 1997); however, this study follows Gartzke's step to allow for a comparison between the findings on onset.

<sup>3</sup> Gartzke's replication data file is available at <http://dss.ucsd.edu/~egartzke/>.

<sup>4</sup> Beck, Katz, and Tucker's (1998:1269) warning is that "the costs of incorrectly imposing duration dependence are, at a minimum, inefficiency and incorrect standard errors, and in some complicated cases may even lead to inconsistent parameter estimates" (see also Dafoe 2011).

TABLE 1. Logit Regression of Liberal Variables on International Conflict

Variable	All MIDs					
	Replicated		Democratic Difference		All Wars	
	Model 1	Peace Years	Model 2	Model 3	Model 4	Peace Years
Democracy (Low)	-0.0171 (0.0119)	-0.0282 (0.0107) **	-0.0370 (0.0143) **	-0.0951 (0.0477) *	-0.1076 (0.0490) *	-0.0894 (0.0482) *
Democracy (High)	-0.0022 (0.0125)	-0.0088 (0.0110)		0.0378 (0.0332)	0.0182 (0.0328)	
Political Distance			-0.0088 (0.0110)			0.0182 (0.0328)
Trade Dep. (Low)	-5.4023 (9.0358)	4.8571 (6.4173)	4.8571 (6.4173)	-99.2129 (165.7359)	-50.0391 (131.6930)	-50.0391 (131.6930)
Fin. Open. (Low)	-0.2468 (0.0581) ***	-0.2051 (0.0502) ***	-0.2051 (0.0502) ***	-0.6612 (0.1745) ***	-0.5238 (0.1589) ***	-0.5238 (0.1589) ***
GDPPC (Low)	0.0002 (0.0000) ***	0.0002 (0.0000) ***	0.0002 (0.0000) ***	0.0004 (0.0001) ***	0.0004 (0.0001) ***	0.0004 (0.0001) ***
GDPPC*Contig.	-0.0003 (0.0000) ***	-0.0003 (0.0000) ***	-0.0003 (0.0000) ***	-0.00027 (0.00022)	-0.0004 (0.0002) *	-0.0004 (0.0002) *
INTERESTS	-0.9824 (0.2005) ***	-1.0254 (0.1634) ***	-1.0254 (0.1634) ***	1.5095 (0.8497) *	0.5298 (0.7911)	0.5298 (0.7911)
Contiguity	3.7404 (0.2734) ***	3.4783 (0.2592) ***	3.4783 (0.2592) ***	4.7966 (0.9239) ***	4.8116 (0.8175) ***	4.8116 (0.8175) ***
Distance	-0.4164 (0.0853) ***	-0.3789 (0.0896) ***	-0.3789 (0.0896) ***	-0.6173 (0.1948) ***	-0.4718 (0.1789) **	-0.4718 (0.1789) **
Major power	1.4035 (0.2733) ***	1.3824 (0.2320) ***	1.3824 (0.2320) ***	1.4143 (1.1347)	1.0447 (1.1006)	1.0447 (1.1006)
Alliance	-0.0073 (0.2334)	0.1530 (0.1905)	0.1530 (0.1905)	-1.2558 (0.5311) **	-0.7385 (0.5351)	-0.7385 (0.5351)
Capability ratio	-0.1506 (0.0555) **	-0.0953 (0.0498) *	-0.0953 (0.0498) *	-0.9019 (0.1936) ***	-0.8194 (0.2179) ***	-0.8194 (0.2179) ***
Peace years		-0.6366 (0.0525) ***	-0.6366 (0.0525) ***		-0.9601 (0.2549) ***	-0.9601 (0.2549) ***
Spline1	0.0047 (0.0006) ***	-0.0070 (0.0009) ***	-0.0070 (0.0009) ***	0.0038 (0.0016) **	-0.0125 (0.0038) ***	-0.0125 (0.0038) ***
Spline2	-0.0044 (0.0007) ***	0.0049 (0.0008) ***	0.0049 (0.0008) ***	-0.0029 (0.0018)	0.0094 (0.0028) ***	0.0094 (0.0028) ***
Spline3	0.0016 (0.0004) ***	-0.0015 (0.0003) ***	-0.0015 (0.0003) ***	0.0007 (0.0009)	-0.0032 (0.0011) **	-0.0032 (0.0011) **
Constant	-1.0878 (0.7615)	-0.2776 (0.7956) ***	-0.2776 (0.7956)	-3.2875 (1.4587) *	-2.2022 (1.3754)	-2.2022 (1.3754)
N	166,140	166,140	166,140	166,140	166,140	166,140
Log-likelihood	-2,078.058	-1,912.658	-1,912.658	-187.2447	-165.875	-165.875
$\chi^2$	1,607.35 ***	1971.50 ***	1971.50 ***	289.85 ***	643.44 ***	643.44 ***

(Notes: Numbers in parentheses are robust standard errors adjusted for clustering on dyads. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ , one-tailed tests.)

TABLE 2. Logit Regression of Liberal Variables on International Conflict: Politically Relevant Dyads

Variable	MIDs		Wars	
	Democratic Difference		Democratic Difference	
	Model 1		Model 2	
Democracy (Low)	-0.0210	(0.0124)*	-0.0889	(0.0497)*
Political Distance	0.0053	(0.0109)	0.0206	(0.0343)
Trade Dep. (Low)	1.6748	(5.1949)	-36.2768	(100.2275)
Fin. Open. (Low)	-0.1459	(0.0470)***	-0.5944	(0.1747)***
GDPPC (Low)	0.0001	(0.0000)***	0.0005	(0.0001)***
GDPPC*Contig.	-0.0001	(0.0001)*	-0.0005	(0.0002)**
INTERESTS	-0.6558	(0.1580)***	0.9602	(0.8184)
Contiguity	1.0979	(0.3270)***	-10.4748	(not estimated)
Distance	-0.1511	(0.0493)***	-0.4485	(0.1845)**
Major power	-0.4026	(0.2632)	-13.0496	(not estimated)
Alliance	0.0156	(0.1835)	-0.9986	(0.5169)*
Capability ratio	-0.1168	(0.0473)**	-0.7525	(0.2190)***
Peace years	-0.6010	(0.0509)***	-0.8493	(0.2376)***
Spline1	-0.0066	(0.0009)***	-0.0108	(0.0036)**
Spline2	0.0047	(0.0008)***	0.0082	(0.0029)**
Spline3	-0.0015	(0.0004)***	-0.0028	(0.0012)**
Constant	0.3751	(0.5271)	12.6813	(not estimated)
N	14,750		14,750	
Log-likelihood	-1,397.337		-123.645	
$\chi^2$	1,004.33***		Not estimated	

(Notes: Numbers in parentheses are robust standard errors adjusted for clustering on dyads. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ , one-tailed tests.)

warning notes about observation drops can stymie one's analysis. In particular, this relates to Gartzke's study that does not analyze the implications of warning notes regarding dropped observations that are caused by the inclusion of regional dummy variables.

#### Sample Selection Bias: All Dyads versus Politically Relevant Dyads

Sample selection bias is caused by the selection of a particular sample instead of conducting a census of the population. Gartzke's study examines the capitalism-conflict connection with a focus on all dyads but not on politically relevant dyads. However, the use of all possible dyads is open to two criticisms. The first is theoretical: for example, there is no reason to expect a militarized dispute between Malaysia and Uganda. The second is methodological, as the inclusion of all possible dyads makes the non-zero militarized dispute event extremely rare. Politically relevant dyads that either share a border or include at least one major power are considered more conflict prone than any other type of dyad because they are exposed to more opportunities to interact, increasing the likelihood of conflict. For this reason, students of conflict have emphasized the importance of politically relevant dyads over all dyads (for example, Lemke and Reed 2001; Russett and Oneal 2001). The next section demonstrates that when the capitalist peace model is fitted with politically relevant dyads, capitalist variables become less robust, and in some cases insignificant.

#### The Democratic Peace Model: One Error

Oneal and Russett (1997, 1999) put forward a theoretical argument that democratic leaders in both states in a dyad are restrained from engaging in a dispute

due to institutions and practices of democratic governance. The nature of democratic governance in both states invites various political participants such as legislators, bureaucrats, interest groups, and the public into the foreign policy decision-making process. Their participation in the democratic process inevitably slows down the onset of military violence.

*Measurement Error: Democracy (Low) and Democracy (High)*<sup>5</sup>

Oneal and Russett's (1997:273, 283) theoretical discussion on democracy leads to two hypotheses: (i) "the likelihood of dyadic conflicts is primarily determined by the less constrained of the two states in a dyad" (weak link assumption; see also Dixon 1994) and (ii) "increasing the political distance separating the pair makes the dyad more prone to conflict." Thus, the democratic peace hypotheses can be straightforwardly modeled as follows:

$$\begin{aligned} \text{International conflict} = & \beta_1 + \beta_2 \text{ Democracy(Low)} + \beta_3 \text{ Political Distance} \\ & + \beta_{4+k} \text{ Other Controls} + \varepsilon_1 \end{aligned} \quad (1)$$

In this equation, Democracy (Low) is operationalized as the lower score between the two democracy scores in a given dyad, while Political Distance is operationalized as the difference between the higher and lower democracy scores in a dyad.

However, in Oneal and Russett's (1997:281, see Equation 5) study, the two hypotheses are tested in a *strange* fashion:

$$\begin{aligned} \text{International conflict} = & \beta_1 + \beta_2 \text{ Democracy(Low)} + \beta_3 \text{ Democracy(High)} \\ & + \beta_{4+k} \text{ Other Controls} + \varepsilon_2 \end{aligned} \quad (2)$$

While Democracy (Low) is the same as that which appeared in the first equation, Democracy (High) is not a direct measure of the Political Distance hypothesis but a summation of Democracy (Low) + Political Distance. This model specification leads to a *biased* estimate of Democracy (Low). From an econometric point of view, Oneal and Russett's democratic peace model is equivalent to:

$$\begin{aligned} \text{International conflict} = & \beta_1 + \beta_2 \text{ Democracy(Low)} + \beta_3 (\text{Democracy(Low)} \\ & + \text{Political Distance}) + \beta_{4+k} \text{ Other Controls} + \varepsilon_2 \end{aligned} \quad (3)$$

When rearranged, the model becomes:

$$\begin{aligned} \text{International conflict} = & \beta_1 + (\beta_2 + \beta_3) \text{ Democracy(Low)} + \beta_3 \text{ Political Distance} \\ & + \beta_{4+k} \text{ Other Controls} + \varepsilon_2 \end{aligned} \quad (4)$$

When the effect of Democracy (Low) in Equation 1, whose construction is theoretically consistent with Oneal and Russett's original Hypothesis 1, is compared with that in Equation 4, as expressed in their statistical model (1997:281), we can see that the latter is double-counted (that is, the coefficient is a sum of  $\beta_2 + \beta_3$  instead of  $\beta_2$  itself). This is due to the fact that in addition to estimating  $\beta_3$  of Political Distance, Democracy (High) is also used to estimate  $\hat{\beta}_3$  of Democracy (Low) and then forces the latter to be added to  $\hat{\beta}_2$ . More specifically, if  $\hat{\beta}_3 > 0$  as noted by Oneal and Russett (1997:281), it is evident that the coefficient on Democracy (Low) in Equation 4 is artificially inflated and thus biased because the estimated coefficient becomes  $\hat{\beta}_2 + \hat{\beta}_3$ , not  $\hat{\beta}_2$ . Furthermore, Equation 4 causes the standard error of Democracy (Low) to differ from that in Equation 1 as Democracy (Low) is double counted. Put differently, the

<sup>5</sup> Although the other variables in the democratic peace model might be measured with error, the possibility is not discussed in this study because they do not directly alter the significance of the democracy variable.

coefficient on Political Distance and its standard error in Equation 4 should be the same as those in Equation 1. However, depending on the size of the coefficient on Political Distance, the biased coefficient on Democracy (Low) estimated by Equation 4 may turn out to be larger in magnitude than the unbiased coefficient on Democracy (Low) estimated by Equation 1, while the standard error of the former may be smaller than that of the latter. Therefore, the biased estimation of Equation 4 causes the coefficient on Democracy (Low) to be inflated but causes the standard error to be deflated. This increases the chance of rejecting the null hypothesis, resulting in an incorrect inference (Tsebelis and Choi 2009).

In sum, as indicated in Equation 4, the measurement error caused by the inclusion of the higher democracy score instead of a direct measure of political distance nullifies the purpose of introducing the weak link assumption, which is the basis of Oneal and Russett's original prediction on Democracy (Low).

### **Re-examining the Capitalist and Democratic Peace Models**

This study replicates Gartzke's (2007:177) Model 5 in Table 1 and Model 7 in Table 2 (2007: 181).<sup>6</sup> Model 5 is representative of Gartzke's capitalist model. It includes all democracy and capitalist variables along with several control variables as causes that mitigate all militarized interstate disputes (MIDs). Note that the substantive effect analysis shown in Figure 1 (Gartzke 2007:179) in Gartzke's study is based on Model 5. Model 7 predicts determinants of wars. Gartzke's study appears to rely on militarized dispute data due to their greater frequency, and war data to further test the essence of the democratic peace theory.

Table 1 shows the re-estimated results of Gartzke's capitalist peace Model 5. For each of the two dependent variables (that is, militarized disputes and wars), three models are fitted. The first model is a replication of Gartzke's model. The second model corrects the omitted variable bias by adding a peace year variable to the first model. Lastly, the third model remedies the measurement error by replacing Democracy (High) with Political Distance. Model 1 successfully replicates Gartzke's Model 5 in which the dependent variable is all MIDs. Because Gartzke's study omits a peace year variable, Democracy (Low) is shown to be insignificant. In other words, since his study fails to control for temporal dependence correctly due to the omission of the peace year variable, the correlation between democracy and peace becomes weaker. The omitted variable bias contributes to a failure of correctly tracing out the path of temporal dependence, generating an imprecise estimate of the hazard rate. As a result, the coefficient of Democracy (Low) becomes smaller and its standard error becomes larger, leading to the insignificance of the test results.

When Beck et al.'s (1998) spline function of the years of peace (that is, peace years, spline1, spline2, and spline3) are correctly specified in Model 2, Democracy (Low) becomes significant at the .01 level, indicating that democracy reduces the likelihood of militarized disputes. However, since Model 2 still suffers from the previously identified measurement error, Model 3 corrects this by introducing Political Distance instead of Democracy (High). Again, the pacifying

<sup>6</sup> Appendix 1 shows a replication of Gartzke's Models 1 through 4 in Table 1 on p. 177. There is a discrepancy between the replication and Gartzke's reporting. The replication shows that the Trade Dep. (Low) variable is significant at the .01 level in Model 1, at the .05 level in Model 2, and at the .05 level in Model 3. On the contrary, Gartzke's study reports the insignificance of the Trade Dep. (Low) variable and contends that the introduction of Fin. Open. (Low) causes Trade Dep. (Low) to become statistically insignificant. However, the replication results should not be given too much credit because all the models are misspecified due to the absence of a peace year variable. Appendix 2 corrects the omitted variable bias by adding a complete set of peace years (i.e., peace years, spline1, spline2, and spline3). Unsurprisingly, the Democracy (Low) variable becomes significant across all four models, as noted earlier.

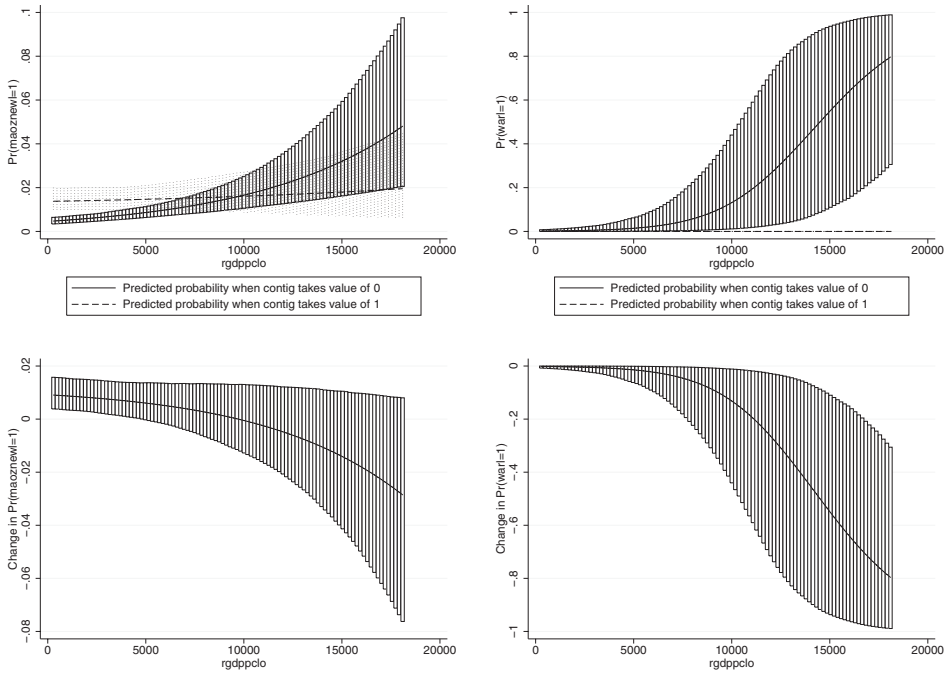


FIG 1. An interaction effect between GDPPC (low) and contiguity: Politically relevant dyads

effect of democracy persists at the same level of significance. Across Models 1 to 3, the three capitalist indicators for market integration (that is, Fin. Open. (Low)), the interaction between economic development and contiguity (that is, GDPPC\*Contig.),<sup>7</sup> and interests (that is, INTERESTS) also appear to show significance in the hypothesized direction.

With two minor modifications, Model 4 replicates Gartzke’s Model 7 where the dependent variable is wars. The wars variable is recognized as the deadliest form of conflict. Interestingly, among the three capitalist variables, the INTERESTS variable is excluded from Gartzke’s Model 7. The rationale for this decision is that the variable “is not statistically significant. . . . This makes sense as fatal conflicts and wars disproportionately involve resource competition (Vasquez 1993; Senese 2005), rather than the policy disputes captured by the interest variable” (Gartzke 2007:180). However, this study puts the variable back into the model not only because it is one of the three capitalist peace variables, but also because it may influence leaders’ war behavior under the correct model specification. In addition, this study excludes the six regional dummies from Gartzke’s Model 7 to correct for the observation drop error. Gartzke’s Stata do-file reveals that 4,881 observations for Europe and 1,434 observations for South America were dropped out of estimation due to no variation in the observations of the dependent variable, which undoubtedly caused the estimated coefficients to be biased. To avoid dropping these observations, this study excludes all the regional

<sup>7</sup> To isolate the effect of wealth on likely subjects of territorial aggression, Gartzke’s study employs an interaction term between economic development and contiguity. Economic development is expected to increase the likelihood of a dispute and is denoted as GDPPC (Low), which measures the lower of the two populations weighted by gross domestic product statistics for a given dyad. Contiguity is hypothesized to increase the likelihood of a dispute, and it is represented by a dichotomous variable with “1” for dyadic partners that share a land border or that are separated by <150 miles of water. The interaction variable, GDPPC\*Contig., is expected to decrease the likelihood of a dispute. Thus, both GDPPC (Low) and GDPPC\*Contig. should be significant but in opposite directions.

dummies from the Gartzke model.<sup>8</sup> By both including the INTERESTS variable and excluding the regional dummies, this study makes the results from the subsequent war models more comparable to those from the previous militarized dispute Models (1 through 3) where the INTEREST variable was present and the regional dummies were absent. Put differently, with these two minor changes, this study is allowed to employ the same number of total observations (that is, 166,140), regardless of the nature of the dependent variable, while enhancing the comparability between the statistical models.

Model 4 in Table 1 is a replication of Gartzke's Model 7 with the aforementioned two modifications. Unlike Gartzke's estimates reported in Model 7, the Democracy (Low) variable passes the standard significance test. More critically, the GDPPC\*Contig. variable turns out to be insignificant<sup>9</sup> and the INTERESTS variable is supported but in the wrong direction. Of course, one should be cautious in placing too much faith in these results due to the omitted variable of Peace Years. Model 5 reports the results upon the correction of the omitted variable bias in Model 4 by including a peace year variable. It reveals that democracy undoubtedly matters. While Fin. Open. (Low) and GDPPC\*Contig. appear to show a constraining effect, INTERESTS has no bearing on the onset of wars. According to Model 6, which corrects the biased coefficient and standard error of Democracy (Low) by including Political Distance instead of Democracy (High), the significance of Democracy (Low) continues to survive in competition with the three forces of capitalism.

In an effort to eschew sample selection bias, the sample of all dyads is confined to politically relevant dyads. These dyads are considered to be the most dangerous dyads in conflict studies because they have more opportunities and capabilities to interact. Again, Gartzke's study overlooks the analysis of politically relevant dyads, while this study explores their implications as a part of testing the robustness of the previous findings which may be subject to sample selection bias. Table 2 displays the results. Both Models 1 and 2 are corrected for all four of the previously discussed errors. Models 1 and 2 reveal the independent explanatory power of the Democracy (Low) variable in predicting the onset of conflict, irrespective of dispute type. Among the capitalist variables, the Fin. Open. (Low) variable produces a pacifying effect across all models while the INTEREST variable fails to achieve this effect across the same models.

It should be noted that as Zelner (2009) points out, the sign of the coefficient on the interaction term, GDPPC\*Contig., does not necessarily correspond to the hypothesized direction, and the standard error of this coefficient is not directly useful for the statistical significance test. These difficulties of interpreting interaction terms require special caution. For this reason, this study turns to the graphical method developed by King, Tomz, and Wittenberg (2000) and extended by Zelner (2009). The interaction effects between GDPPD (Low) and Contiguity are shown in Figure 1.<sup>10</sup> While the two graphs on the left side are drawn against politically relevant MIDs, the two graphs on the right side are drawn against politically relevant wars. The graphs on top portray the predicted probabilities and confidence intervals for GDPPC\*Contig., while the bottom two graphs show the difference in predicted probabilities associated with a unit

<sup>8</sup> Interestingly, the regional dummies are not included in Gartzke's most complete capitalist model (Model 5) "to show that the combined influence of liberal economic variables does not depend on the presence of controls for regional heterogeneity" (Gartzke 2007:178).

<sup>9</sup> To avoid confusion of the significance level, the magnitude of the coefficient on the GDPPC\*Contig. variable and its standard error is reported in five decimal places, -0.00027 and 0.00022, respectively. The *p* value is .210.

<sup>10</sup> The Stata command, *intgph*, is used to draw Figure 1. The command estimates a selected nonlinear model that includes a multiplicative interaction term, and uses simulated parameters generated by King et al. (2000) "est-simp" command (part of the "Clarify" suite of commands) to evaluate and graphically portray the effect of one interacted variable conditional on different values of the other interacted variable (Zelner 2009).



change in contiguity (that is, the vertical distance between contiguity and non-contiguity in the top graphs). According to the dotted predicted line in the top left graph, it appears that the likelihood of politically relevant MID's increases, though it is small, when dyadic states enjoy high levels of economic development and are neighboring countries. This is not consistent with Gartzke's hypothesis. Furthermore, the bottom left graph displays that most of the 95% confidence intervals include zero, effectively rendering the coefficient on GDPPC\*Contig. as statistically meaningless. According to the two graphs on the right side, there is no interaction effect between economic development and contiguity. The dotted line represents the predicted probability when Contiguity takes the value of 1, but the probability line does not move either downward or upward, indicating that GDPPC \* Contig has no causal effect on wars. In sum, this robustness test confirms that the liberal peace is hardly a product of capital, economic development, and interests, although capital markets alone appear to have some pacifying effect on politically relevant militarized disputes or wars.

### Conclusion

The question of which liberal peace matters more has become a salient issue in the scientific study of international conflict during the last two decades. Studies of the democratic peace show evidence that in explaining the prevalence of interstate peace, democracy outperforms all other factors. However, Gartzke's recent study reports that the capitalist variables of capital markets, the interaction between economic development and contiguity, and shared interstate interests remove the pacifying effect of democracy. This study demonstrates that Gartzke's results indicating that capitalism causes democracy to become insignificant are statistical artifacts of biased estimations due to model misspecification, observation omission, and sample selection bias. When these errors are properly corrected, democracy retains its explanatory power in relation to interstate conflict. It appears that democracy dies hard in the midst of the challenging forces of the three capitalist factors.

### Appendix 1: Logit Regression of Liberal Variables on Militarized Interstate Disputes: Replications

<i>Variable</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
Democracy (Low)	-0.0641 (0.0139)***	-0.0103 (0.0137)	-0.0152 (0.0140)	-0.0107 (0.0128)
Democracy (High)	0.0356 (0.0100)***	0.0077 (0.0122)	0.0074 (0.0120)	0.0080 (0.0122)
Trade Dep. (Low)	-37.8343 (15.8743)**	-16.9177 (10.0734)*	-24.3312 (14.0447)*	-5.2063 (8.4729)
Fin. Open. (Low)		-0.1877 (0.0529)***	-0.2116 (0.0604)***	-0.2143 (0.0588)***
GDPPC (Low)			0.0001 (0.0000)*	0.0002 (0.0000)***
GDPPC*Contig.				-0.0003 (0.0000)***
INTERESTS				
Contiguity	2.0028 (0.2112)***	2.7595 (0.3022)***	2.7581 (0.3060)***	3.4285 (0.3063)***
Distance	-0.6108 (0.0835)***	-0.4742 (0.0972)***	-0.4643 (0.0967)***	-0.4327 (0.0928)***
Major power	2.5152 (0.2567)***	2.0301 (0.3738)***	1.9481 (0.3680)***	1.9734 (0.3557)***
Alliance	-0.4299 (0.2030)*	-0.2381 (0.2404)	-0.2342 (0.2356)	-0.2172 (0.2318)
Capability ratio	-0.3040 (0.0548)***	-0.1286 (0.0598)*	-0.1273 (0.0596)*	-0.1295 (0.0578)*
Africa	0.4437 (0.3202)	0.1726 (0.3626)	0.2841 (0.3633)	0.1780 (0.3644)
Asia	1.3172 (0.2462)***	0.7064 (0.3609)*	0.7720 (0.3577)*	0.6314 (0.3644)*
Europe	-0.9231 (0.2948)***	-0.9167 (0.5070)*	-0.9871 (0.5044)*	-0.8978 (0.4635)*
Middle East	1.3296 (0.2668)***	1.0086 (0.3140)***	0.8818 (0.3198)**	0.9785 (0.3088)***
North America	0.1425 (0.3379)	0.7021 (0.4746)	0.7250 (0.4748)	0.7517 (0.4771)
South America	1.3191 (0.4395)**	0.8872 (0.4024)*	0.8315 (0.4009)*	0.8811 (0.3937)*

## Appendix 1: (Continued)

Variable	Model 1	Model 2	Model 3	Model 4
Peace years				
Spline1	0.0051 (0.0005)***	0.0045 (0.0006)***	0.0044 (0.0006)***	0.0044 (0.0006)***
Spline2	-0.0049 (0.0006)***	-0.0041 (0.0007)***	-0.0040 (0.0007)***	-0.0041 (0.0007)***
Spline3	0.0029 (0.0003)***	0.0015 (0.0004)***	0.0015 (0.0004)***	0.0015 (0.0004)***
Constant	-0.4677 (0.7076)	-1.1358 (0.8399)	-1.2880 (0.8302)	-1.8606 (0.8089)*
N	282,287	174,548	171,509	171,509
Log-likelihood	-5,120.999	-2,170.270	-2,146.564	-2,121.190
$\chi^2$	1,868.46***	1,717.58***	1,719.86***	1,698.78***

(Notes. Numbers in parentheses are robust standard errors adjusted for clustering on dyads. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ , one-tailed tests.)

## Appendix 2: When Peace Years Are Included

Variable	Model 1	Model 2	Model 3	Model 4
Democracy (Low)	-0.0747 (0.0136)***	-0.0236 (0.0125)*	-0.0275 (0.0127)*	-0.0226 (0.0116)*
Democracy (High)	0.0331 (0.0095)***	0.0019 (0.0106)	0.0017 (0.0105)	0.0022 (0.0107)
Trade Dep. (Low)	-25.3397 (12.4518)*	-8.3074 (9.1031)	-13.0888 (12.7440)	4.5299 (6.3126)
Fin. Open. (Low)		-0.1772 (0.0489)***	-0.1971 (0.0547)***	-0.2008 (0.0524)***
GDPPC (Low)			0.0001 (0.0000)*	0.0002 (0.0000)***
GDPPC*Contig.				-0.0003 (0.0000)***
INTERESTS				
Contiguity	1.8932 (0.1988)***	2.5555 (0.2818)***	2.5562 (0.2858)***	3.2307 (0.2822)***
Distance	-0.5448 (0.0799)***	-0.4246 (0.0997)***	-0.4179 (0.0994)***	-0.3895 (0.0960)***
Major power	2.5086 (0.2405)***	2.1088 (0.3263)***	2.0183 (0.3203)***	2.0389 (0.3053)***
Alliance	-0.1320 (0.1879)	-0.1106 (0.2058)	-0.1171 (0.2020)	-0.1073 (0.1971)
Capability ratio	-0.2793 (0.0504)***	-0.0857 (0.0540)	-0.0830 (0.0540)	-0.0882 (0.0512)*
Africa	0.4353 (0.2914)	0.2790 (0.3190)	0.3740 (0.3221)	0.2824 (0.3228)
Asia	1.2510 (0.2464)***	0.6365 (0.3023)*	0.6908 (0.3015)*	0.5730 (0.3070)*
Europe	-0.8344 (0.2816)**	-1.0642 (0.4905)*	-1.1318 (0.4886)*	-1.0556 (0.4401)**
Middle East	1.2672 (0.2373)***	0.8523 (0.2892)**	0.7351 (0.2945)**	0.8452 (0.2867)**
North America	0.1115 (0.3214)	0.6796 (0.4198)	0.6804 (0.4310)	0.7565 (0.4258)*
South America	1.1679 (0.4047)**	0.8194 (0.3552)*	0.7633 (0.3554)*	0.8358 (0.3531)**
Peace years	-0.6509 (0.0409)***	-0.6249 (0.0549)***	-0.6224 (0.0545)***	-0.6144 (0.0536)***
Spline1	-0.0079 (0.0007)***	-0.0068 (0.0009)***	-0.0068 (0.0009)***	-0.0067 (0.0009)***
Spline2	0.0058 (0.0006)***	0.0048 (0.0007)***	0.0048 (0.0007)***	0.0047 (0.0007)***
Spline3	-0.0019 (0.0003)***	-0.0015 (0.0003)***	-0.0015 (0.0003)***	-0.0015 (0.0003)***
Constant	-0.0503 (0.6664)	-0.4121 (0.8594)	-0.5412 (0.8519)	-1.1108 (0.8371)
N	282,287	174,548	171,509	171,509
Log-likelihood	-4,716.397	-2,012.004	-1,990.117	-1,967.084
$\chi^2$	2,509.64***	2,323.30***	2,280.29***	2,295.69***

(Notes. Numbers in parentheses are robust standard errors adjusted for clustering on dyads. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ , one-tailed tests.)

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