Appendix to: Team of Former Rivals: A Multilateral Theory of Nonaggression Pacts

Yonatan Lupu
Department of Political Science
George Washington University

Paul Poast
Department of Political Science
University of Chicago

October 9, 2015

Robustness Tests

Table A.I provides the results of several robustness tests discussed in the text. Model 1 operationalizes *Rivalry Cessation Density* by considering rivalry cessations in the prior 5 years. Model 2 operationalizes *Rivalry Cessation Density* by considering rivalry cessations in the prior 15 years. Model 3 controls for the proportion of states that are joint members of a nonaggression pact. Model 4 excludes k-ads that include more than 5 members.

Table A.II includes re-estimates of the models reported in the main text while accounting for overlapping nonaggression pact formations. In 5 cases, all of them dyadic, states formed two nonaggression pacts. The overlapping cases are the Soviet Union/Russia and Lithuania (1926, 1991); the Soviet Union and Finland (1932, 1940); the Soviet Union/Russia and China (1937, 1992); Yemen and China (1958, 1964); and India and Pakistan (1966, 1972). While our main analysis treats each pact formation as a separate panels (e.g. the Soviet Union and Lithuania up to 1926 are treated as a separate panel from Russia and Lithuania up to 1991), one might be concerned that our results are being driven by 'double counting'

these k-ads. Therefore, we remove the second panel for these 5 k-ads and then reestimate the models.

Table A.I. Robustness Tests

	(1) Rivalry Cessation Density Previous 5 years	(2) Rivalry Cessation Density Previous 15 years	(3) Control for Proportion Already in Pact	(4) Drop k-ads with more than 5 members
Main Explanatory Variable				
Rivalry Cessation Density	10.16**	3.61**	5.26**	5.56**
	(7.26)	(2.92)	(2.31)	(3.17)
Key Control Variables				
Number of Members	1.23**	1.23**	1.20**	3.21**
	(0.04)	(0.05)	(0.04)	(0.77)
Proportion of k-ad members	1.29	1.24	1.13	1.40
fought a MID against one another	(0.30)	(0.29)	(0.28)	(0.33)
in the past 10 years				
Controls Common to Alliance Studies				
Total CINC	26.51	27.83	14.18	2.9E+05**
	(101.22)	(106.03)	(56.04)	(1.4E+06)
Total CINC^2	1.81E-08**	1.57E-08*	2.94E-07*	2.48E-26**
	(1.64E-07)	(1.41E-07)	(2.81E-06)	(4.75E-25)
Maximum Distance	0.99**	0.99**	0.99**	0.99**
	(0.00)	(0.00)	(0.00)	(0.00)
Maximum Polity Difference	1.04**	1.04**	1.05**	1.03*
	(0.02)	(0.02)	(0.02)	(0.02)
Minimum Polity	1.02	1.02	1.00	1.02
	(0.02)	(0.02)	(0.02)	(0.02)
Mean S	4.13*	4.28**	3.65*	21.96**
	(2.31)	(2.40)	(2.04)	(15.72)
Russia	1.14	1.17	0.83	1.17
	(0.47)	(0.48)	(0.36)	(0.49)
China	1.88	1.89	2.32*	1.74
	(0.77)	(0.77)	(0.96)	(0.74)
Proportion Already in Pact			17.94**	
			(4.62)	
Number of Observations	10,499	10,499	10,499	10,440

* p<0.05, ** p<0.01

Table A.II. Robustness Tests: Drop Overlapping Dyadic Nonaggression Pact Formations

	(1) Base Model	(2) + Key Controls	(3) + Russia and China Fixed Effects	(4) + Other Controls
Main Explanatory Variable				
Rivalry Cessation Density in past 10 years	7.64**	7.01**	7.64**	5.63**
	(4.18)	(3.77)	(4.13)	(3.14)
Key Control Variables				
Number of Members		1.09**	1.08**	1.22**
		(0.03)	(0.05)	(0.03)
Proportion of k-ad members fought a MID against one another in the past 10 years		2.15**	1.81*	1.34
		(0.47)	(0.42)	(0.31)
Russia			1.05	1.49
			(0.27)	(0.67)
China			2.45**	2.49*
			(0.75)	(1.10)
Controls Common to Alliance Studies				
Total CINC				4.27
				(16.78)
Total CINC^2				2.31E-06
				(1.91E-05)
Maximum Distance				0.99**
				(0.00)
Maximum Polity Difference				1.04*
				(0.02)
Minimum Polity				1.02
				(0.02)
Mean S				3.97*
				(2.25)
Number of Observations	10,427	10,427	10,427	10,258

* p<0.05, ** p<0.01

Test of proportional hazard assumption (Model 4) produces p-value of 0.71, indicating no violation of the assumption.

Dyadic Models

To illustrate the importance of using k-adic data to assess the relationship between rivalry cessation and nonaggression pact formation, we re-estimate our models using a traditional dyadic framework. In these models, we disaggregate multilateral nonaggression pact formations into their dyadic components. Thus, in the most extreme case, the nonaggression pact that includes 31 members is disaggregated into 465 separate dyadic observations. We code *Rivalry Cessation Density* as "1" if a rivalry between the dyad members ceased during the prior 10 years, and "0" otherwise. So, with respect to multilateral nonaggression pacts, *Rivalry Cessation Density* only captures whether a rivalry ceased among the dyad members, but does not capture the extent to which a rivalry ceased among the *other* members of the nonaggression pact.

Let us now suppose that States A, B, C, D, and E form a nonaggression pact, and further suppose that a rivalry recently terminated between States D and E. In the case of the A-B dyad, nonaggression pact formation will be coded as "1" and *Rivalry Cessation Density* will be coded as "0". This model is therefore likely to bias down our estimate of the relationship between *Rivalry Cessation Density* and nonaggression. If rivalry cessation had any impact on the formation of the multilateral A-B-C-D-E pact, only the D-E observation in the dyadic data set allows us to account for this, whereas all of the other dyads in the nonaggression pact will have *Rivalry Cessation Density* coded as "0".

For analogous reasons, scholars have long lamented that dyadic data sets split multilateral events into many bilateral events (Signorino, 1999; Gibler, Rider and Hutchison, 2005; Croco and Teo, 2005). A canonical example of the problem might be World War I. In that case, the outcome is generally thought of as a single multilateral conflict rather than a series of bilateral conflicts. It is intuitive, therefore, to view the process creating that outcome as a multilateral process, a view supported by the scholarship on the crises leading up to war (Levy, 1990; Gartzke and Lupu, 2012). Scholars have therefore begun addressing the problem caused by separating multilateral events that result from a single process

into multiple dyadic events (Croco and Teo, 2005; Gibler and Wolford, 2006; Poast, 2010; Cranmer, Desmarais and Menninga, 2012; Fordham and Poast, Forthcoming, 2015)

The results of dyadic models, shown in Table A.III, illustrate this. In the fully specified model (4) the hazard ratio of *Rivalry Cessation Density* is estimated to be relatively small (1.33), yet, as we have argued above, this is because the model is not appropriate for capturing the process by which nonaggression pacts are formed. This model includes many dyadic observations in which a rivalry did not recently cease (so *Rivalry Cessation Density* is coded as "0"), but in which the dyad joined a multilateral nonaggression pact with others that did experience a recent rivalry cessation. Among many other important assumptions, the model therefore makes the strong assumption that a rivalry cessation in a given dyad that joins a multilateral nonaggression pact has no effect on the probability of other dyads joining the same multilateral nonaggression pact. As our theory argues, this assumption may not be valid. The models reported in the main text allow us to relax this assumption.

Table A.III. Dyadic Models

	(1) Base Model	(2) + Key Controls	(3) + Russia and China Fixed Effects	(4) + Other Controls
Main Explanatory Variable				
Rivalry Cessation Density	8.17**	5.87**	5.40**	1.45
	(3.12)	(2.27)	(2.11)	(0.56)
Key Control Variables				
Proportion of dyad members fought a MID against one another in the past 10 years		4.52**	4.03**	1.06
		(0.65)	(0.68)	(0.17)
Russia			2.05**	2.13**
			(0.34)	(0.42)
China			0.99	2.61**
			(0.26)	(0.74)
Total CINC				1.40
				(2.96)
Total CINC^2				1.43E-04
				(1.13E-03)
Distance				0.99**
				(0.00)
Polity Difference				1.04**
				(0.01)
Minimum Polity				1.07**
				(0.01)
Mean S				1.22
				(0.17)
Number of Observations	761,854	761,854	761,854	681,559

* p<0.05, ** p<0.01

References

Cranmer, Skyler J., Bruce A. Desmarais and Elizabeth J. Menninga. 2012. "Complex Dependencies in the Alliance Network." *Conflict Management and Peace Science* 29(3):279–313.

Croco, Sarah E. and Tze Kwang Teo. 2005. "Assessing the Dyadic Approach to Interstate Conflict Processes: AKA dangerous Dyad-years." *Conflict Management and Peace Science* 22(1):5–18.

Fordham, Benjamin and Paul Poast. Forthcoming, 2015. "All Alliances are Multilateral." *Journal of Conflict Resolution* .

Gartzke, Erik and Yonatan Lupu. 2012. "Trading on Preconceptions: Why World War I Was Not a Failure of Economic Interdependence." *International Security* 36(4):115–150.

Gibler, Douglas M and Scott Wolford. 2006. "Alliances, then democracy an examination of the relationship between regime type and alliance formation." *Journal of Conflict Resolution* 50(1):129–153.

Gibler, Douglas M., Toby J. Rider and Marc L. Hutchison. 2005. "Taking Arms Against a Sea of Troubles: Conventional Arms Races During Periods of Rivalry." *Journal of Peace Research* 42(2):131–147.

Levy, Jack S. 1990. "Big Wars, Little Wars, and Theory Construction." *International Interactions* 16(3):215–224.

Poast, Paul. 2010. "(Mis) Using Dyadic Data to Analyze Multilateral Events." *Political Analysis* 18(4):403–425.

Signorino, Curtis S. 1999. "Strategic Interaction and the Statistical Analysis of International Conflict." *American Political Science Review* pp. 279–297.