

## **Web Appendix: Arms Race Data and Coding Procedures for the article, “Taking Arms Against a Sea of Troubles: Conventional Arms Races during Periods of Rivalry.”**

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This Web Appendix supports, “Taking Arms Against a Sea of Troubles: Conventional Arms Races during Periods of Rivalry,” by describing the methods we used to generate the arms race dataset for the article. We proceed in this discussion through a series of steps we followed in creating the data. First, we briefly describe the selection of rivalry dyads in which arms races may be taking place – Step One. We then outline the two criteria – one quantitative (Step Two) and one qualitative (Step Three) – used to identify arms race cases. Finally, we conclude with a description of the overall dataset and a list of works consulted to confirm interdependent arming.

### **I. CODING PROCEDURES**

#### ***Step One – Identifying Cases of Strategic rivalry***

We began construction of the arms race dataset by focusing on a sample of cases most likely to contain all dyads undergoing interdependent and hostile arming – Thompson’s (2001) list of strategic rivalry dyads. Thompson argues that there are three basic criteria by which one state must view the target state in order for the dyad to be considered a strategic rivalry: the states must view each other as competitors, as sources of actual or latent threats that pose some possibility of becoming militarized, and as enemies. We feel that each of these criteria also apply well to the types of cases most likely to be arms races.

Thompson does not employ *a priori* duration criteria for rivalry termination. Each dyadic rivalry is also independent of others, and the duration is dictated by policy aims of the individual states involved. Since domestic constituencies may disagree about who the target rival state should be, only the opinions of the leadership in control of the government are considered. A rivalry that develops during a war is not included unless the rivalry outlasted the war. Rivalry onset and termination is based on the perceptions and policy statements of decision makers in the respective governments. Finally, Thompson assumes the rivalry has not terminated unless there is explicit indications that threat perceptions and hostility levels have decreased considerably. This is accomplished by examining government policy statements for clear evidence that a competitive atmosphere no longer exists.

Thompson’s definition of rivalry provides an important added advantage for our analyses since his definition is not based on dispute onset but rather on the analysis of historical records. This enables us to test whether arms races can prevent the occurrence of dispute as well as their effects on dispute escalation. In all, we generated 6,588 strategic rival dyad-years between 1816 and 1992 from Thompson’s (2001) list of cases. These dyad-

years constitute the sample we used for isolating the mutual military buildups described in Step Two below.

***Step Two – Isolating All Mutual Military Buildups Occurring During Strategic Rivalry***

We use two indicators to identify whether an arms race has taken place within a rivalry. First, both states must have increased their military spending, personnel, or both, by 8% or more in each year of a three-year period. Diehl (1983) originally used the 8% figure in order to prevent capturing gradual increases in expenditures due to inflation or routine increases aimed at upgrading equipment; three-year periods also make it more likely that we capture single incidents of arming. As we note in the article, we do not assume that 8% has any great significance in terms of war or arms race initiation. Rather, we wish to avoid complicating this literature still more by creating yet another measure of military increases, and the Diehl measurement allows for a sample size that is reasonably large for inference but still small enough for establishing interdependence using the qualitative examinations we discuss below.

Using Thompson's (2001) list of strategic rivals, we isolated 108 separate instances of dyads engaged in mutual military buildups over time periods lasting three years or more; these cases comprised 439 of the 6,588 total strategic rivalry dyad-years. Of course as Diehl (1983) notes well, mutual military buildups are not the same as arms races. Two states may be arming against each other, with each other against a third party, or may just be coincidentally arming. To determine which cases of mutual military buildup constitute arms races, we proceed to Step Three and establish the existence of interdependent arming by consulting news accounts contemporary to the buildups and historical reviews of individual state foreign policies.

***Step Three – Mutual Buildup or Arms Race? A look at the record...***

Our second indicator for identifying arms races in strategic rival dyads is based on evaluations of historical accounts and contemporary news sources during times of mutual arming. We should emphasize that the qualitative investigation was used only to establish or disprove interdependence in cases we had identified with the quantitative criterion used in Step Two above. In other words, the qualitative investigation only eliminated arms race cases from our data set; no cases were added with these analyses.

When available, we consulted government documents, accounts presented by historians, and reputable news services (e.g., The New York Times, BBC, and Agence France Presse, and Keesing's) in order to determine the nature of the rival relationship during the buildups. We conducted extensive searches of news articles for any statements from government officials declaring the purpose of their military buildup, with a notation by government officials of the rival as the target of the arming serving as confirmation for cases of arms race. Most of our news archives provide adequate search engines only for the post World War II era, so we therefore supplemented our case searches using secondary historical accounts for the mutual military buildup cases from 1816 to 1945. A complete list of both the news sources and the secondary historical information used to confirm each case, or eliminate coincidental buildup cases, is included at the end of this appendix.

The cases eliminated from our dataset by the qualitative criterion for our study can be divided into two categories. In some cases we were unable to find information on why the two states were arming at an escalated level. We eliminated each of these cases. For instance, our 8% buildup criterion indicated that Greece engaged in mutual buildups with both Yugoslavia and Bulgaria during World War I and, in the case of Yugoslavia, extending until 1921. While it could have been the case that Greece was arming in response to their long-term rivals, especially following the two Balkan Wars, our search for historical corroboration found no evidence supporting the conclusion that either Yugoslavia or Bulgaria were arming in response to Greece. The Greek countryside was mired in a civil conflict, with half the country supporting the Alliance (and Bulgaria) and the other half backing the Entente (and Yugoslavia), and in the case of Yugoslavia and Greece, they had established cordial relations following the post-war unification (Pavlowitch 1988; 1999). All in all, we found no evidence indicating the interdependence necessary to code these mutual military buildups as arms races. Our qualitative examinations excluded 20 mutual military buildups as cases of arms race for lack of evidence; these cases are listed in Appendix Table 1 below:

**Appendix Table 1: Cases of mutual military buildups eliminated from arms race data because no confirming historical evidence could be found**

Case #	Start Year	End Year	Ccode	State #1		State #2		Arms Race?
				State Name	Ccode	State Name	Ccode	
1	1944	1947	100	Colombia	101	Venezuela	No	
2	1949	1951	100	Colombia	101	Venezuela	No	
3	1912	1914	145	Bolivia	150	Paraguay	No	
4	1912	1914	145	Bolivia	155	Chile	No	
5	1940	1942	155	Chile	160	Argentina	No	
6	1960	1962	155	Chile	160	Argentina	No	
7	1969	1973	260	West Germany	265	East Germany	No	
8	1914	1921	345	Yugoslavia	350	Greece	No	
9	1914	1916	350	Greece	355	Bulgaria	No	
10	1947	1951	350	Greece	355	Bulgaria	No	
11	1973	1975	471	Cameroon	475	Nigeria	No	
12	1974	1976	500	Uganda	625	Sudan	No	
13	1972	1974	501	Kenya	520	Somalia	No	
15	1971	1975	510	Tanzania	553	Malawi	No	
16	1976	1978	551	Zambia	560	South Africa	No	
17	1963	1965	645	Iraq	651	Egypt	No	
18	1983	1985	651	Egypt	652	Syria	No	
20	1968	1970	710	China	713	Taiwan	No	

In a second set of cases, we found evidence that one or both of the states were arming for reasons totally unrelated to the rivalry dynamic. For example, both Iraq and Saudi Arabia rapidly increased their military size between 1950 and 1954. Although these countries were strategic rivals during this time period, our historical analyses indicate that this mutual military buildup was not interdependent. In Saudi Arabia, the rapid military buildup was targeted at rivals Egypt and Yemen. The Saudi government purchased large

numbers of weapons from the United States and Great Britain to respond to threats from Nasser’s Egypt and Yemen (Safran 1985). We could find no evidence that Saudi Arabia’s military buildup was in response to the concurrent military buildup in Iraq. Since Saudi Arabia’s military buildup was a response to pressures outside the Iraq-Saudi Arabia rivalry dynamic, we eliminated this case from our dataset. We eliminated a total of 23 cases of possible arms race using historical evidence suggesting the mutual military buildups were not directed at the rival state; these cases are listed in Appendix Table 2 below:

**Appendix Table 2: Cases of mutual military buildups eliminated from arms race data because of disconfirming historical evidence**

Case #	Start Year	End Year	Ccode	State #1	Ccode	State #2	Arms Race?
				State Name		State Name	
1	1917	1919	2	United States	740	Japan	No
2	1943	1945	130	Ecuador	135	Peru	No
3	1937	1944	200	United Kingdom	365	Russia	No
4	1914	1918	220	France	325	Italy	No
5	1962	1967	230	Spain	600	Morocco	No
6	1986	1988	230	Spain	600	Morocco	No
7	1936	1939	310	Hungary	315	Czechoslovakia	No
8	1934	1936	345	Yugoslavia	350	Greece	No
9	1939	1941	345	Yugoslavia	350	Greece	No
10	1934	1938	345	Yugoslavia	640	Turkey	No
11	1934	1936	350	Greece	640	Turkey	No
12	1949	1951	365	Russia	710	China	No
13	1964	1966	483	Chad	620	Libya	No
14	1971	1974	620	Libya	651	Egypt	No
15	1964	1970	630	Iran	651	Egypt	No
16	1972	1974	630	Iran	651	Egypt	No
17	1982	1984	645	Iraq	651	Egypt	No
18	1979	1981	645	Iraq	666	Israel	No
19	1950	1954	645	Iraq	670	Saudi Arabia	No
20	1963	1965	645	Iraq	670	Saudi Arabia	No
21	1972	1974	651	Egypt	652	Syria	No
22	1966	1969	651	Egypt	663	Jordan	No
23	1972	1974	652	Syria	663	Jordan	No

It is of note that the cases we eliminated span all areas of the globe and both pre- and post-World War II time periods, giving some added assurance that no particular trend in our coding procedures is driving these results. The only real trends we could find in these cases are the overwhelming effects of the world wars and the ever changing dynamic of Middle Eastern rivalries, in which Israel is often the target of arms and personnel increases even though most Arab states have other Arab rivals as well.

## II. A DESCRIPTION OF THE ARMS RACE DATASET

Using our two criteria – 8% buildups over three years and historical confirmation of interdependence – we found a total of 71 cases of arms race. These arms race cases last a

mean of 4.2 years in our data set, ranging from 3 years (our arbitrary minimum duration) to 9 years. In total, we found 289 dyad-years of arms races during 6, 293 dyad-years of strategic rivalry. A list of these cases is presented in Table 3 below.

Table 3 sorts the arms races by strategic rival code, lowest country code of the rivalry first. We include information on the type of military increases (personnel, expenditures, or both) for both states in the dyad, and this data suggests an interesting trend – military personnel increases are not as numerous as military expenditure increases in the dataset. Of the 142 state opportunities for increases of some kind (71 dyadic cases of arms racing rivals), 102 used only military expenditures to target their rival state while 15 used only military personnel increases. The remaining 25 state opportunities used both military personnel and military expenditures to race their rivals.

**Appendix Table 3: List of arms race cases**

<i>Race #</i>	<i>Ccode1</i>	<i>State Name</i>	<i>Ccode2</i>	<i>State Name</i>	<i>Years of Arms Race</i>	
1	200	United Kingdom	365	Russia	1854	1856
2	140	Brazil	150	Paraguay	1864	1866
3	220	France	300	Austria-Hungary	1912	1917
4	300	Austria-Hungary	365	Russia	1912	1915
5	220	France	255	Germany	1913	1918
6	255	Germany	365	Russia	1913	1915
7	200	United Kingdom	255	Germany	1914	1917
8	300	Austria-Hungary	325	Italy	1914	1917
9	300	Austria-Hungary	345	Serbia	1914	1917
10	345	Serbia	355	Bulgaria	1914	1916
11	355	Bulgaria	360	Romania	1914	1916
12	325	Italy	345	Yugoslavia	1916	1921
13	200	United Kingdom	325	Italy	1934	1936
14	200	United Kingdom	255	Germany	1934	1942
15	220	France	325	Italy	1934	1936
16	220	France	255	Germany	1934	1936
17	310	Hungary	345	Yugoslavia	1934	1939
18	325	Italy	640	Turkey	1934	1936
19	325	Italy	345	Yugoslavia	1934	1936
20	345	Yugoslavia	355	Bulgaria	1934	1937
21	350	Greece	355	Bulgaria	1934	1936
22	355	Bulgaria	640	Turkey	1934	1937
23	255	Germany	315	Czechoslovakia	1936	1939
24	255	Germany	365	Russia	1937	1940
25	2	United States	740	Japan	1940	1944
26	710	China	740	Japan	1940	1944
27	663	Jordan	670	Saudi Arabia	1949	1951
28	520	Somalia	530	Ethiopia	1961	1964
29	710	China	750	India	1961	1964
30	651	Egypt	670	Saudi Arabia	1962	1968
31	645	Iraq	666	Israel	1963	1965

32	645	Iraq	690	Kuwait	1963	1965
33	651	Egypt	666	Israel	1963	1971
34	130	Ecuador	135	Peru	1964	1966
35	500	Uganda	625	Sudan	1965	1968
36	663	Jordan	666	Israel	1956	1958
37	663	Jordan	666	Israel	1966	1969
38	365	Russia	710	China	1968	1970
39	500	Uganda	510	Tanzania	1970	1972
40	230	Spain	600	Morocco	1971	1974
41	678	Yemen Arab Republic	680	Yemen Peoples Republic	1971	1979
42	130	Ecuador	135	Peru	1972	1975
43	350	Greece	640	Turkey	1972	1976
44	520	Somalia	530	Ethiopia	1972	1974
45	600	Morocco	615	Algeria	1972	1977
46	678	Yemen Arab Republic	698	Oman	1972	1976
47	452	Ghana	461	Togo	1973	1977
48	530	Ethiopia	625	Sudan	1973	1975
49	620	Libya	625	Sudan	1973	1976
50	630	Iran	645	Iraq	1973	1978
51	645	Iraq	670	Saudi Arabia	1973	1981
52	645	Iraq	652	Syria	1973	1978
53	645	Iraq	690	Kuwait	1973	1977
54	731	North Korea	732	South Korea	1973	1976
55	432	Mali	439	Burkina Faso	1975	1977
56	541	Mozambique	560	South Africa	1976	1978
57	541	Mozambique	552	Zimbabwe	1976	1978
58	551	Zambia	552	Zimbabwe	1976	1978
59	155	Chile	160	Argentina	1977	1981
60	500	Uganda	510	Tanzania	1977	1979
61	501	Kenya	520	Somalia	1977	1979
62	750	India	770	Pakistan	1977	1980
63	2	United States	365	USSR	1978	1981
64	145	Bolivia	155	Chile	1978	1981
65	160	Argentina	200	United Kingdom	1978	1980
66	483	Chad	620	Libya	1978	1980
67	731	North Korea	732	South Korea	1978	1981
68	93	Nicaragua	100	Colombia	1979	1983
69	100	Colombia	101	Venezuela	1979	1982
70	91	Honduras	92	El Salvador	1982	1984
71	620	Libya	651	Egypt	1982	1984

The only temporal clustering in the cases surrounds the two world wars, as the data is distributed somewhat evenly between the Cold War and pre-World War II eras. However, only two of the arms race cases occur prior to 1900, and both involved military personnel increases solely. The dearth of arms race cases in the 19<sup>th</sup> century may imply a need for future research to re-examine the 8% threshold we used in this research,

especially for arms races involving military personnel only, as this may be too high a threshold. Nevertheless, and as we note in the article, few cases are added by lowering the threshold one or two percentage points, and none of these occur in the 19<sup>th</sup> century.

We hope to eventually provide more detailed studies of each of the 71 arms races cases, but until then readers and users of the dataset are encouraged to report any errors or provide additional information to us via email at [dgibler@uky.edu](mailto:dgibler@uky.edu). Users of the dataset are asked to cite the printed article as reference for the data.

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