Alliances and Conflict, or Conflict and Alliances? Appraising the
Causal Effect of Alliances on Conflict:
Supplementary Information (SI) Appendix

Benjamin W. Campbell*
April 24, 2019

Contents

1 Systemic Study 2
1.1 Systemic Study Research Design 2
1.2 Systemic Study Results 3

*BWC: Doctoral Candidate in Political Science, The Ohio State University, e: campbell.1721@osu.edu
1 Systemic Study

1.1 Systemic Study Research Design

For a systemic study of alliances and conflict, I examine the relationship at the system-year level. In particular, I develop annual, system-wide measures for alliances, conflict, and a set of control variables. The relationship between these time series is then assessed using Fractionally Integrated Vector Autoregression (Box-Steppensmeier, Darmofal and Farrell, 2009) (FIVAR), which is preferable given the fractionally integrated nature of these series. FIVAR allows an analyst to examine the recursive relationship between a set of endogenous variables while accounting for the effect of a series of exogenous variables.

The first endogenous series examined is the annual density of the defensive alliance network. This network consists of all defensive alliance commitments between all states for a given year (Leeds et al., 2002). This network is undirected, implying that if there is a relationship from A to B, that relationship is necessarily reciprocated from B to A. The density of a network is defined as the proportion of observed connections (in this case the number of defensive alliances in a year) to possible connections (number of states choose two). The second endogenous series included is the annual density of the fatal militarized interstate dispute network (Maoz, 2005). Like the defensive alliance network, this network too is treated as undirected. Having both endogenous measures be computed on undirected network assists in exact comparability.

When conducting a systemic study, there are merits using the fatal MID network over the conventional MID network. In particular, the nuances of the fine-grained dyadic approach are lost when aggregating to the system, which means that the mechanisms at work are more about systemic conflict and the shifts in the behavior of alliance blocs (De Mesquita, 1978; Waltz, 1979; Maoz, 2006). As such, it may make sense that these shifts would only track with more costly forms of conflict that would be more likely to influence and be influenced by the prevalence of alliances in the system.

In addition to these endogenous variables, a series of three exogenous control variables are also used. It is worth noting that there are very few system-year measures commonly used to predict conflict. As such, for this study I use a variety of measures that are aggregated versions of dyadic covariates. First, the annual variance in CINC scores is used (Singer, Bremer and Stuckey, 1972). Measures of capabilities and the difference of capabilities within a dyad are commonly used to predict conflict. By examining the variance in CINC scores, I examine the effect of the distribution of capabilities on the system’s conflict propensity (Morgenthau, 1948; Singer, Bremer and Stuckey, 1972; Waltz, 1979; Snidal, 1985). The second control variable used is the count of IGO present in the system at any given year (Pevehouse, Nordstrom and Warnke, 2004). Often times, the number of common IGO memberships is used to account for similarity of interests and the presence of institutions to assist with crisis bargaining (Russett, Oneal and Davis, 1998; Boehmer, Gartzke and Nordstrom, 2004; Böhmel, 2010). The final control used is the proportion of states in the system that are democratic, measured as the percentage of states in the system with a regime score of at least seven (Marshall, Jaggers and Gurr, 2002; Gartzke and Weisiger, 2013). There is strong evidence to support the dyadic effect of joint democracy on preventing conflict (Maoz and Russett, 1993; Russett, 1994; Cranmer, Menninga and Mucha, 2015), and while the evidence of a systemic democratic peace has been challenged (Maoz, 2010), this measure is perhaps the easiest.

\footnote{For a more detailed discussion of this model, the reader is directed to Box-Steppensmeier, Darmofal and Farrell (2009) and Box-Steppensmeier et al. (2014).}
way to get a system-level measurement capturing the effect of democracy on conflict. With these
two endogenous variables and three control variables, I assess the endogenous relationship between
alliances and conflict in systemic perspective.

1.2 Systemic Study Results

To provide additional leverage in understanding the effect of endogenous alliances on conflict, a
systemic study is conducted as described in the prior subsection. To disentangle the effect of
alliances and conflict, I use a Fractionally Integrated Vector Autoregression (FIVAR) model at
the system-year level between 1816 to 2002. These time series are presented in Figure 1. The
FIVAR model allows the analyst to examine the recursive relationship of a set of endogenous
time series while accounting for the explanatory effect of a set of exogenous time series. The
fractionally integrated approach to VAR, introduced by Box-Steffensmeier, Darmofal and Farrell
(2009), is particularly useful as most social scientific data tend not to be totally trend stationary
once aggregated (Box-Steffensmeier et al., 2014). This is certainly the case with some of these
series. While the density of the defensive alliance network, density of the fatal MID network, and
CINC variance series are all fractionally integrated to minuscule levels (less than 0.01), the IGO
count and democracy series show a great degree of fractional integration, approximately 0.49 for
both. Once the series were pre-whitened, a lag of four was chosen as to optimize in-sample model
fit according to AIC, as recommended by Box-Steffensmeier et al. (2014).

On these pre-whitened series, a VAR was estimated with the previously described variables
and a constant. Figure 2 presents the coefficients for both the defensive alliance network density
and fatal MID network density equations. As these equations are recursive in nature, directly
interpreting effects is difficult. It is nevertheless apparent, however, that more often on average,
the FMID network density appears to better explain the alliance network density series than the
alliance network density series explains the FMID network density.

Two additional tools are used to further understand the results from this systemic study. The
first, Granger causality, indicates causal and temporal ordering. Essentially, a variable $X_t$ is said
to Granger cause a variable $Y_t$ if $Y_t$ can be better predicted from past values of $X_t$ than from past
values of $Y_t$ alone (Pierce and Haugh, 1977). Granger causality can assist in understanding whether
the changes in the density of the alliance network can predict changes in the fatal MID network, or
vis-a-versa, if changes in the density of the fatal MID network can predict changes in the density of
the alliance network. Using the results presented in Figure 2, two Granger causality F-Tests were
conducted. The first assessed the null hypothesis that the density of the alliance network is not
a Granger cause of the fatal MID network. The F-Test for this returns a statistic of 1.654 and a
corresponding p-value of 0.16 leading me to accept the null that the alliance network cannot assist
us in explaining the fatal MID network at any conventional $\alpha$ level. The second test assessed the
reverse, that the density of the fatal MID network is not a Granger cause of the fatal MID network.
This F-Test returned a statistic of 4.52 and a p-value of 0.001, leading me to reject the null at any
conventional $\alpha$ level and conclude that the density of the fatal MID network is a Granger cause of
the alliance network.

To get a deeper sense of this finding, I use innovation accounting to calculate the impulse
response functions for the two endogenous variables of interest (Enders, 2010; Box-Steffensmeier
et al., 2014). Impulse response functions assist in understanding how a shock in one time series
leads to reverberations in another. In other words, they can be used to how a sudden increase in
the number of conflicts in the system can influence alliance formation, or how a sudden increase
Figure 1: Endogenous and Exogenous Time Series. Plots show the pre-whitened value of the variable over the full time scale from 1816 to 2002.
in the number of alliances in a system can influence the prevalence of conflict. Figure 3 shows both the impulse response functions for the effects of a shock in the alliance network on the fatal MID network and the effects of a shock in the fatal MID network on the alliance network. As to be expected, it does not appear that the formation of defensive alliances dramatically influences the systemic presence of fatal MIDs. The only significant change comes one year after a shock in the alliance network as there is a modest decrease in the density of the fatal MID network. Alternatively, a shock to the fatal MID network leads to a statistically significant increase in the prevalence of alliances for four and five years following a shock. This indicates that conflict may have dramatic short term and long term effects on the alliance network.

This systemic study has indicated that once you account for the endogenous and recursive relationship between the alliance network and the conflict network, alliance formation does not deter conflict. This, when paired with the previously discussed dyadic study, presents supportive evidence for my theory and calls into question a central finding in international relations.

**Figure 2: FIVAR Model Results.** Bands refer to 95% confidence intervals, while blue dots and bands refer to terms with confidence intervals excluding zero and red dots and bands refer to terms with confidence intervals including zero. Directly interpreting VAR coefficients is difficult, but it is apparent that the FMID network predicts alliances better than alliances predict conflict.
Figure 3: Impulse Response Function Results. Bands refer to 95% bootstrapped confidence intervals. These figures show that a “shock” to the density of the alliance network does not appear to produce significant increases in conflict network density, while a “shock” to conflict network density does indeed produce an increase in alliance network density.
References


