

## Quantitative and Formal Methods in IR Assignment 2

This assignment is due at the beginning of lecture (Thursday) the fifth week of Hilary Term (19/02/2009). You will hand me a printed copy in class and e-mail the assignment to me ([david.armstrong@politics.ox.ac.uk](mailto:david.armstrong@politics.ox.ac.uk)) *before* the Thursday lecture when the assignment is due. The assignments will be graded on the usual scale where 60 is considered passing. For those from outside the Oxford system who have yet to be formally assessed here, scores ranging from 60 to 70 are considered perfectly acceptable. On rare cases, scores of above 70 will be awarded for exceptional work. Scores less than 60 are considered failing. You will be allowed to resubmit any failed assignments by the end of the term as per the course syllabus. Changes to the deadline for assignments will be entertained on a case-by-case basis in the presence of exceptional circumstances when I am contacted *before* the deadline. Assignments not turned in by the deadline will receive a score of zero.

Please type your responses to the questions. I leave the formatting of the responses up to you, but it would be to your benefit to make it easy for me to navigate through the document. This could include, clearly marking sections to which the answers apply and putting all copied Stata output in a fixed-width font (I recommend 8 or 9pt Courier New). I do not require you to distill the Stata output into tables, though if you want, you are certainly welcomed to do so.

The questions below will require you to use the `assignment2.dta` dataset that can be downloaded from the course website: <http://www.quantoid.net/IRStats.PHP>. Notes pertaining to the dataset and individual variables can be seen by typing `notes` in the Stata command window and hitting “enter.” Below is a description of the variables in the dataset:

**stateabb** State abbreviation

**ccode** Correlates of War numeric state code.

**defense** Number of mutual defense pacts to which each country belongs in 2000. A mutual defense pact commits its signatories to intervene militarily when any other treaty partner is attacked.

**entente** Number of ententes to which each country belongs in 2000. Ententes pledge consultation and/or cooperation in a crisis, including armed attack.

**nonag** Number of neutrality or non-aggression treaties to which each country belongs in 2000. Neutrality and Non-aggression treaties require that partners remain militarily neutral if any co-signatory is attacked.

**ally** Total number of alliances to which each country belongs. This variable is the sum of defense, entente and nonag

**cinc100** COW’s military capabilities index. This is an index made up from military expenditures, mobilized military personnel, energy consumption, iron and steel production and both total and urban populations.

**democ** Polity IV's democracy variable. This variable was originally coded on a 0-10 scale, but I have recoded it so that original values of seven or greater are coded 1 and original values of 6 or less are coded 0. So, countries coded 1 can be considered democracies and countries coded 0 can be considered non-democracies.

## Question 1

Countries could be thought to be always ready for any military contingency. However, belonging to formal alliances may change the way in which countries prepare for military contingencies. There are, perhaps, reasonable explanations that would suggest treaty signatories are either more or less militarily capable. One argument could be that countries who have formed alliances will have the support of other countries and as such could be slightly less capable themselves. On the other hand, being a member of a treaty requires each country to support all of its co-signatories and as such might require a country to be more militarily capable.

1. First, for each of the four alliance variables (**ally**, **defense**, **entente**, **nonag**), generate binary variables indicating whether each country was part of at least one alliance of each various kind or part of no alliances of each kind. So, you will generate four binary variables here.
2. Test the difference of means in military capabilities by whether or not a country was in at least one alliance of any kind (**ally**). What do you find?
3. It might be the case that this difference in means is due to a particular type of agreement. Given that, perhaps, weak states could join with strong states in mutual defense pacts, maybe the military capabilities of states in defense pacts are not different from those states not in any mutual defense pacts. Test this null hypothesis against the alternative that there is some difference in the means. What do you find?
4. Test the other two potential null hypotheses here against their two-sided alternatives - that countries in ententes have the same military capabilities as countries in no ententes and that countries in non-aggression pacts have the same military capabilities as countries in no non-aggression pacts. What do you find?
5. What do you conclude about the nature of alliances and military capabilities?

## Question 2

Everyone wants to be friends with democracies, right? Well, we're going to find out. It seems reasonable that given the stability of democracies, they would make good allies.

1. Using the binary variables you created above for the alliance measures, test the hypothesis that proportion of democracies with at least one ally is greater than the proportion of non-democracies with at least one ally against the null that both groups are equally likely to have at least one ally.

2. It could be the case that democracy influences alliance formation in a different way. It could be that non-aggression pacts and ententes are more likely between non-democracies. The reasoning could be that given the nature of democratic accountability, it is unlikely that democracies will start wars with other nations (recent experience notwithstanding). On the other hand, unconstrained leaders in non-democracies can mobilize military forces and prosecute aggressive military campaigns on a whim. Therefore, it would be more important for non-democracies to have ententes and non-aggression pacts. Test these two one-sided alternatives against their respective null hypothesis that there is no difference in the proportion of democracies and non-democracies with in each type of alliance.
3. What do you conclude about the democracy and alliances? Which reasoning seems to make the most sense?