

Droning On: Explaining the Proliferation of Unmanned Aerial Vehicles



Cody Crunkilton - Department of Political Science, University of Wisconsin–Madison

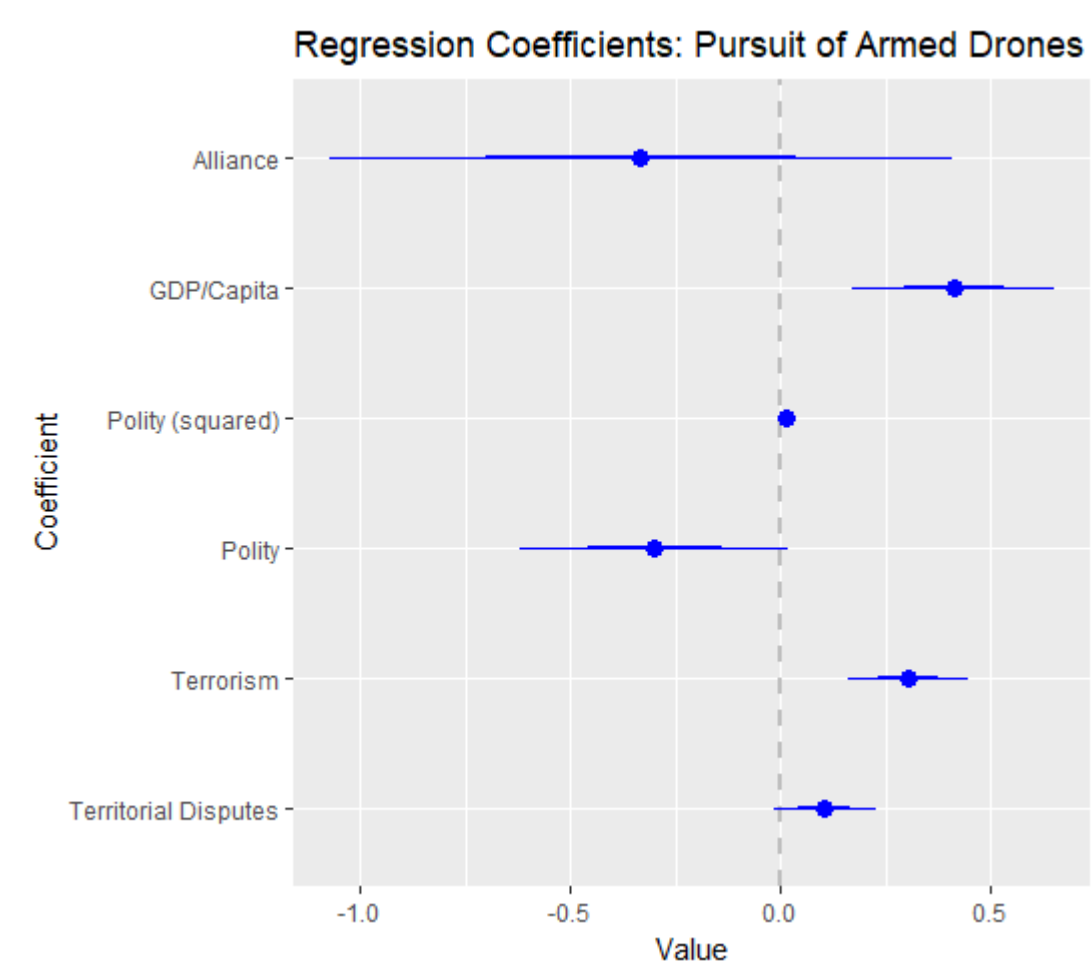
Introduction

Why do some states pursue drones whereas others do not? "Droning On" proposes several explanations, most interesting of which is a finding of a U-shaped relationship between a state's regime type and probability of pursuing an armed drone program. Strong autocracies and strong democracies will be likely to pursue drones, while mixed regimes will not. I replicate the findings and prepare four extensions, two of which are presented in this poster:

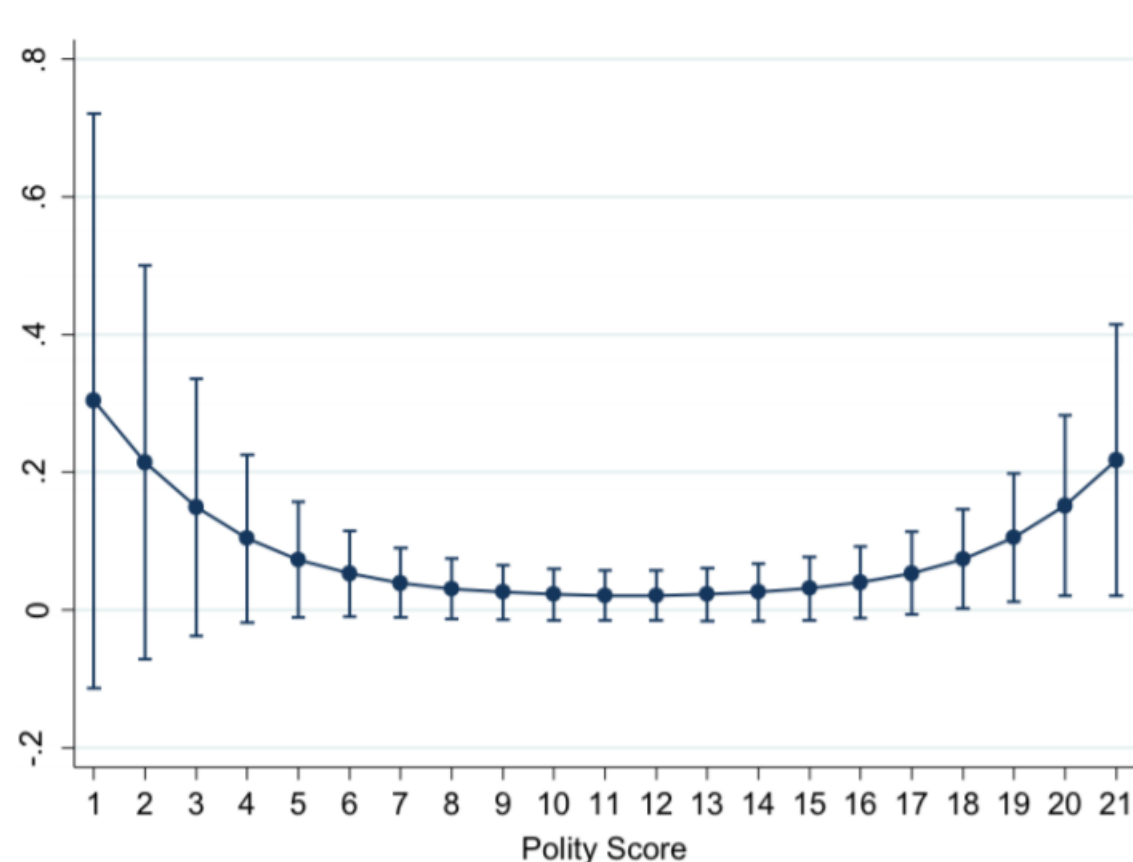
- A more precise measurement of democracy, using V-Dem data instead of Polity.
- Networked version of their data
- Multiple Imputation (Omitted from this poster)
- Unarmed drones as the DV (Omitted from this poster)

The paper replicates successfully, and my extensions are mostly in line with the authors' findings. (Which should not be surprising, given that Jon approved the paper about a year ago.)

Replicated Findings

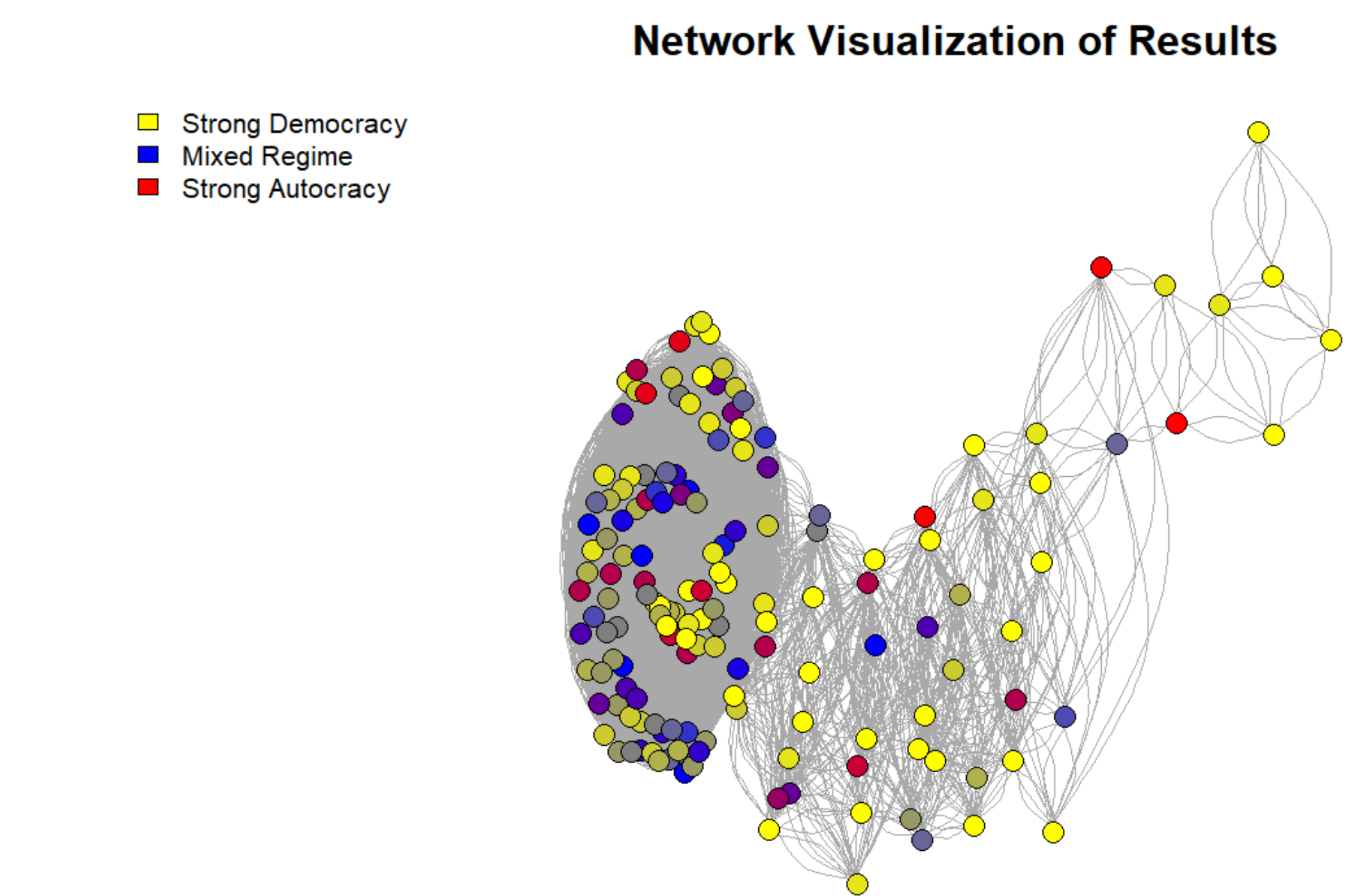


The Exciting Graph



Bars represent 95% confidence intervals. Vertical axis is predicted probability of having an armed drone program, horizontal axis is polity scores

Networked Visualization of Results



Nodes are states. Edges are between states with similar probabilities of pursuing an armed drone program. For visualization purposes, edges are only shown between states with predicted probabilities within 10% of each other.

Extension 1: V-Dem Instead of Polity

The authors theoretical explanation for this relationship is as follows:

For democracies:

- Casualty Aversion: Larger selectorates means democracies are especially casualty averse.
- Budget Pressures: Budgetary pressures in democracies incentivize the development of capital-intensive militaries.

For autocracies:

- Centralized Control: Autocracies "coup-proof" the regime by centralizing control over the military.
- Domestic Unrest: Autocracies can better surveil and contain domestic unrest.

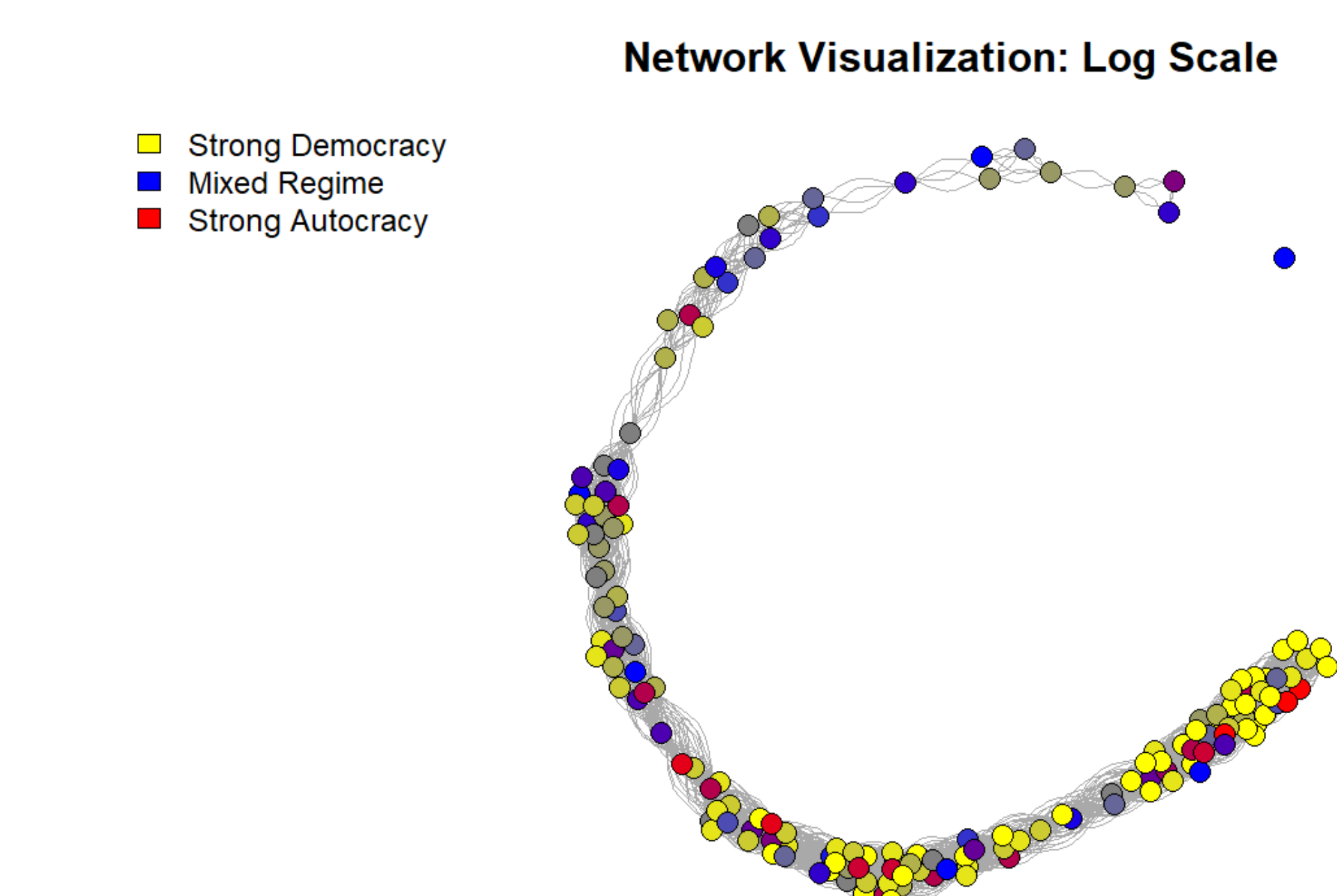
Polity is not the best measure for these theoretical mechanisms. I re-estimate the model using 7 V-Dem variables

- **Polyarchy**: The broadest measure of how well the ideal of electoral democracy is achieved
- **Liberal**: Emphasizing protection of individual and minority rights
- **Liberal democracy**: A mixture of protection for individual rights and electoral institution
- **Participatory democracy**: Measuring active participation of citizens in political processes
- **Deliberative democracy**: Focusing on how decisions are made within a polity
- **Egalitarian democracy**: Measuring how equally resources are distributed
- **Accountability**: How accountable a state's leaders are to the public. (Not an index)

Vdem Index	p value (linear)	p value (quadratic)
1 Polyarchy	0.47	0.37
2 Liberal	0.07	0.05
3 Liberal Democracy	0.94	0.78
4 Participatory Democracy	0.79	0.68
5 Deliberative Democracy	0.98	0.85
6 Egalitarian Democracy	0.82	0.99
7 Accountability	0.33	0.07

Table 1: Alternative Measurement of Democracy: V-Dem

Network Visualization of Results: Log Scale



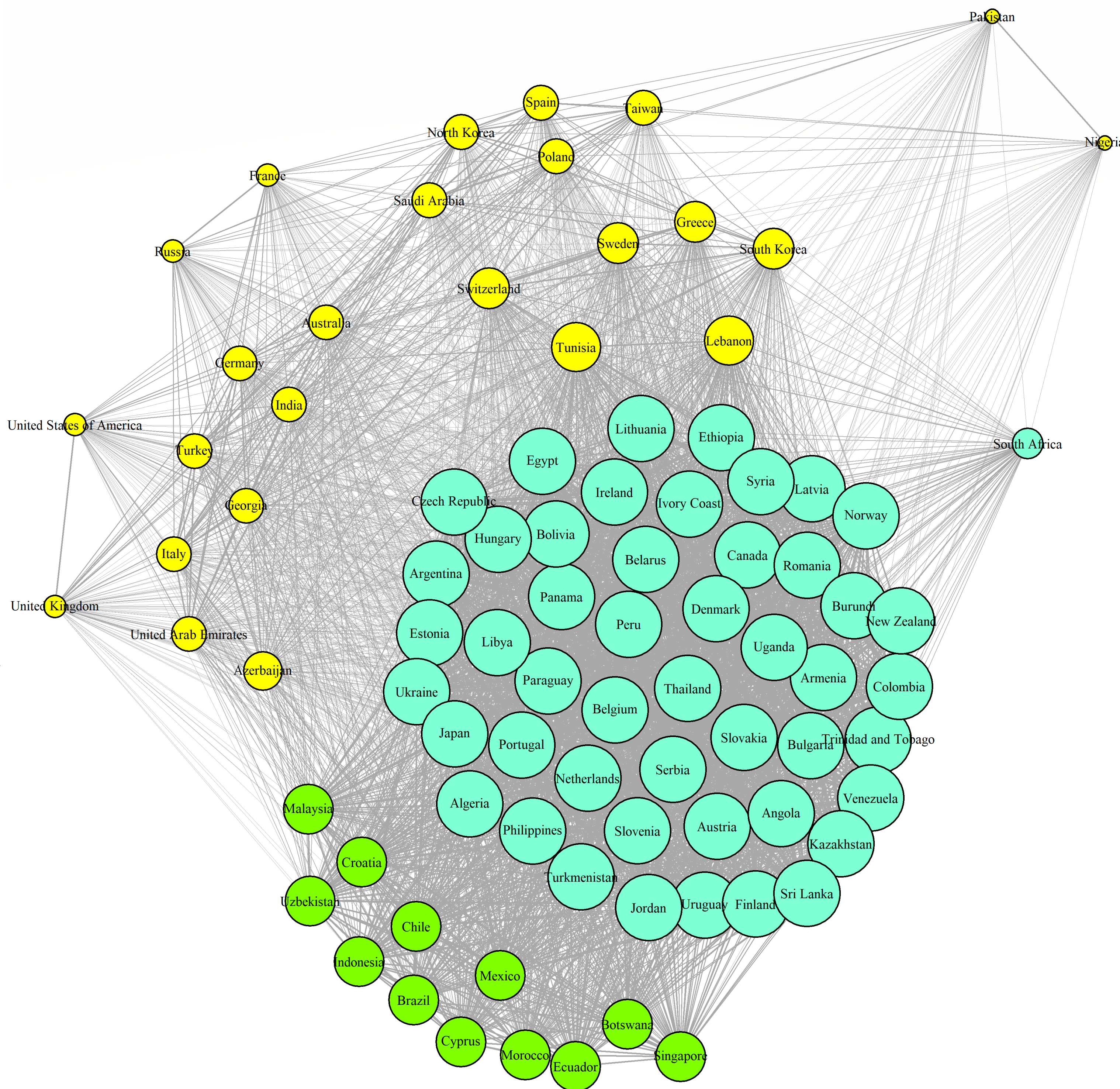
Nodes are states. Edges are between states with similar probabilities of pursuing an armed drone program. For visualization purposes, edges are only shown between states where the difference in the inverse of the log of predicted probabilities are less than two.

Extension 2: Networks

Networks are a useful tool for examining data when you do not have a clear causal theory or when the analysis is exploratory. The authors' paper is largely exploratory, and while it makes several causal claims the main thrust is clearly meant to be the introduction of a new dataset which could then be used for further work. This makes network analysis a useful tool to generate hypotheses for future research.

Below, I create a correlation network. The authors categorize drones across two dimensions – tactical vs advanced and armed vs unarmed. As a first attempt to assess if there are clusters of states with similar drone programs, I take each measure the authors provide for a state's drone program: tactical, armed tactical, advanced, armed possession, and three measures of pursuit of an armed program – and assess level of correlation among state's along those measures.

Similarity of Drone Programs: Louvain Clustering



In this figure, nodes are states. Edges are between states with similar types of drone programs, the strength of the edge is the strength of the correlation between the programs. Nodes are sized according to their degree, the programs which are most "common" will be larger. To assess if and how states are clustered I apply several clustering algorithms, and present the results of Louvain clustering above.

Citation: Horowitz, Michael C., and Matthew Fuhrmann. "Droning On: Explaining the Proliferation of Unmanned Aerial Vehicles." *International Organization*, (2017).