The Network of Foreign Direct Investment Flows

John Schoeneman, Boliang Zhu, & Bruce Desmarais
Pennsylvania State University

Introduction

- While substantial work has been done investigating exogenous political and economic determinants of FDI flows, most existing studies of the political economy of FDI overlook the complex dependencies that are likely to characterize the network.
- In this paper, we integrate hypotheses regarding exogenous determinants and novel hypotheses regarding structural dependencies into a comprehensive exponential random graph model (ERGM) for weighted networks.[1]

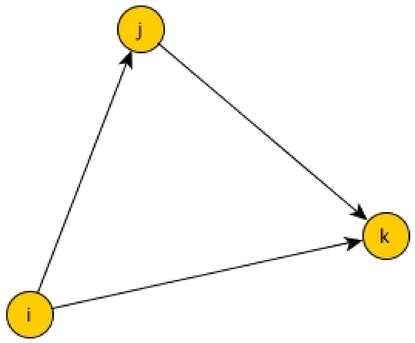
Dependence Hypotheses

Reciprocity

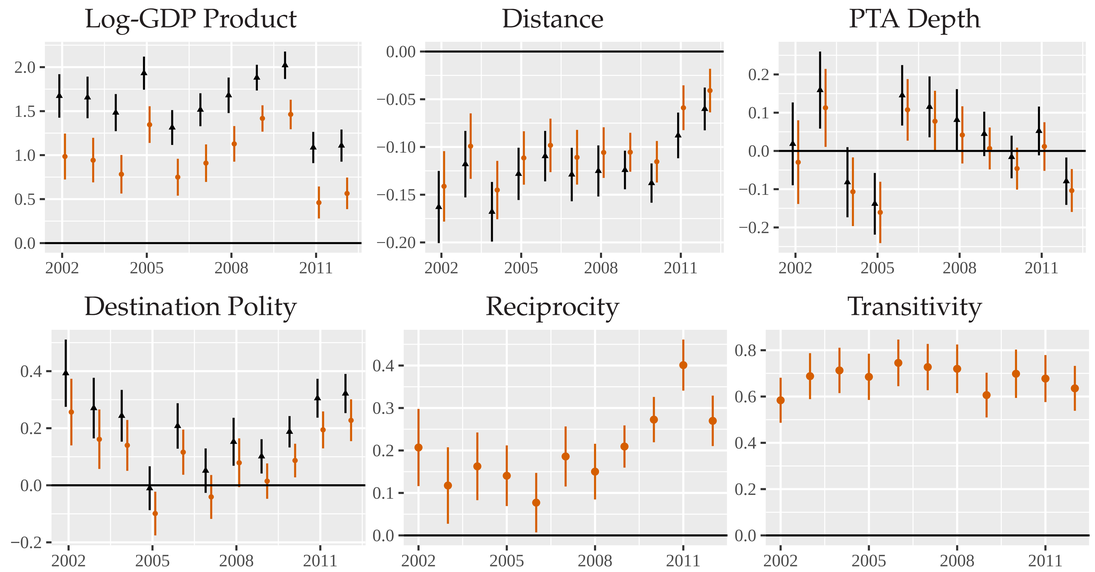
$$\sum_{(i,j)\in\mathbb{Y}} min(\boldsymbol{y}_{i,j}, \boldsymbol{y}_{j,i})$$

Transitivity

$$\sum_{(i,j)\in\mathbb{Y}} \min\left(\boldsymbol{y}_{i,j}, \max_{k\in N}\left(\min(\boldsymbol{y}_{i,k}, \boldsymbol{y}_{k,j})\right)\right)$$



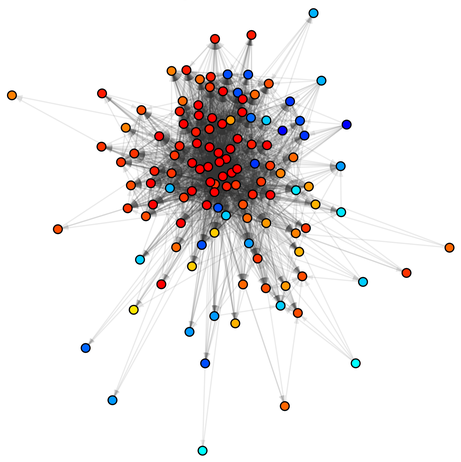
Select Results

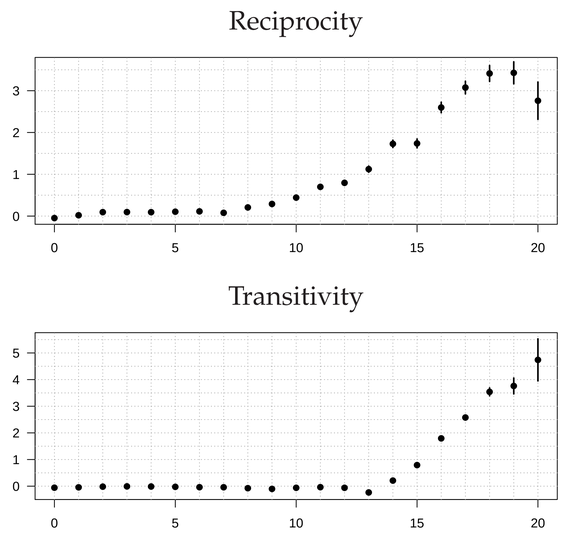


Bars represents 95% Confidence intervals. Black triangles are coefficient estimates without controlling for network dependencies. Orange circles are estimates with network controls.

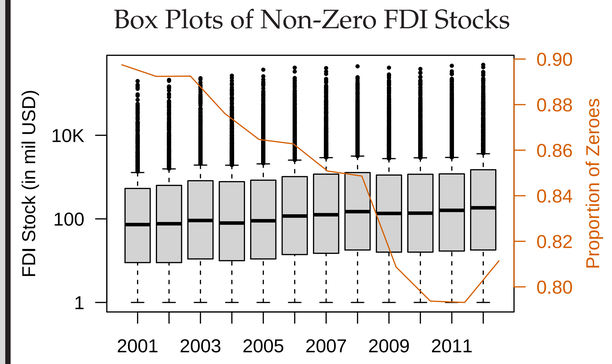
Structural Dependency Plots

Plot for 2011: Scale from Blue to red represents autocratic regimes to democratic regimes





Model Specification



- Network Statistics
  - Sum; Sum$^{1/2}$; Non-zero; Reciprocity; Transitive Weights
- Dyad-level Covariates (expected)
  - Gravity(+); Contiguity(+); Common Language(+); Four Types of Defense Treaties(+); Colonial Relationships(+); PTA depth(+)
- Node-level Covariates (sender/receiver)
  - GDP per capita(+/-); GDP Growth Rate(+/+); Polity IV(+/+); Political Violence(-/-); Trade Openness(+)

Discussion

Inclusion of Network Dependency Terms:

- For every year the model was fit, we saw a decrease in the BIC.
- The estimates of exogenous covariates shift opposite of the expected direction, moving from significant at the 95% level to insignificant in some cases
- The dependency terms are significant for every year.
- As the corresponding edge value(s) for structural dependency increase, models without structural terms become less accurate.

Acknowledgement

This material is based on work supported by the National Science Foundation under IGERT Grant DGE-1144860, Big Data Social Science.

Reference

1. Krivitsky, Pavel N. 2016. ergm.count: Fit, Simulate and Diagnose Exponential-Family Models for Networks with Count Edges. The Statnet Project (http://www.statnet.org). R package version 3.2.2. http://CRAN.R-project.org/package=ergm.count

Contact Information

Department Political Science, Pond Labratory
Web github.com/desmarais-lab
Email jbs5686@psu.edu