The Network of Foreign Direct Investment Flows

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Introduction

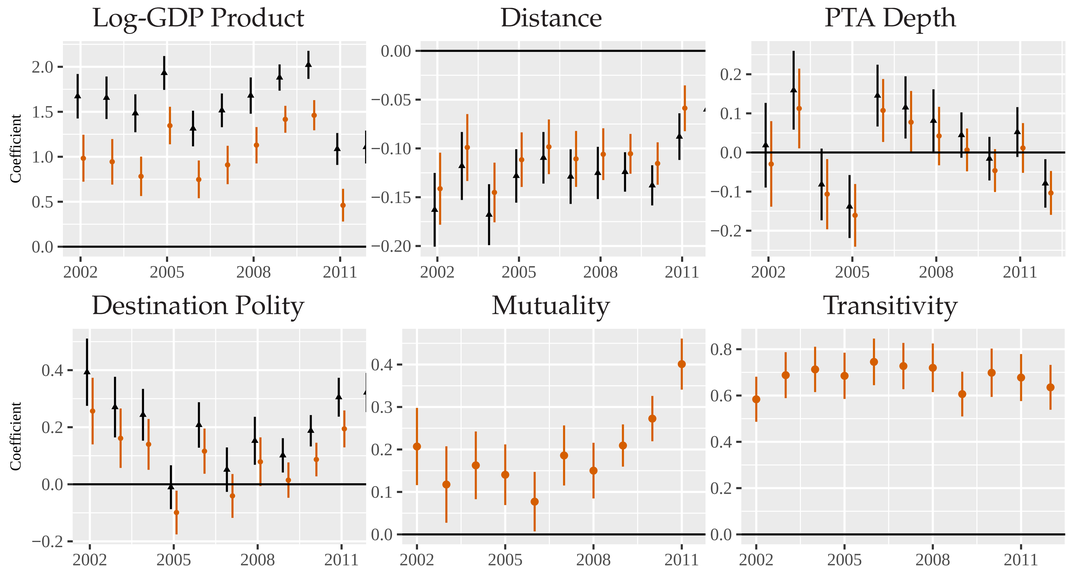
The political economy of FDI literature has established several theoretical claims and empirical regularities regarding exogenous political and economic determinants of FDI inflows. However, existing studies—based on monadic and to a lesser degree, dyadic regression models—overlook the complex dependencies that are likely to characterize the network. Recent developments in methodology for studying international relations show that the regression framework is typically inadequate for quantitatively modeling dyadic relational data, such as FDI flows. 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.

Theory

MNC expansion via FDI often face opposition from host countries due to concerns over national security and protection for local firms that do not want to compete with foreign firms. To overcome this political opposition, countries enter into reciprocal agreements. Therefore we expect one structural dependency to be mutuality, which we measure as the increase of FDI given the minimum value in the dyad.

The second structural dependency we model is transitivity, or the likelihood that country A, will send FDI to country C, given that country A sends FDI to country B and country B send FDI to country C. We expect this clustering given the fragmented global supply chains for production and the vertical FDI that follows.

Key Results



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

Data

- Bilateral FDI statistics from UNCTAD, 2001-2012
- Dyad-level Covariates
  - Gravity +
  - Contiguity +
  - Common Language +
  - Four Types of Defense Treaties +
  - Colonial Relationships +
  - PTA depth[1] +
- Node-level Covariates
  - GDP per capita +/-
  - GDP Growth Rate +
  - Polity IV +
  - Political Violence -
  - Trade Openness +

ERGM Count Model

$$\Pr_{\boldsymbol{\theta};h;\boldsymbol{g}}(\boldsymbol{Y}=\boldsymbol{y}) = \frac{h(\boldsymbol{y})\exp(\boldsymbol{\theta}\cdot\boldsymbol{g}(\boldsymbol{y}))}{\boldsymbol{\kappa}_{h,\boldsymbol{g}}(\boldsymbol{\theta})}$$

Sum : $\boldsymbol{g}(\boldsymbol{y}) = \sum_{(i,j)\in\mathbb{Y}} \boldsymbol{y}_{i,j}$

Sum, Fractional Moment : $\boldsymbol{g}(\boldsymbol{y}) = \sum_{(i,j)\in\mathbb{Y}} \boldsymbol{y}_{i,j}^{1/2}$

Non-Zero : $\boldsymbol{g}_k = \sum_{(i,j)\in\mathbb{Y}} \mathbb{I}(\boldsymbol{y}_{i,j} \neq 0)$

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

Transitive Weights :

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

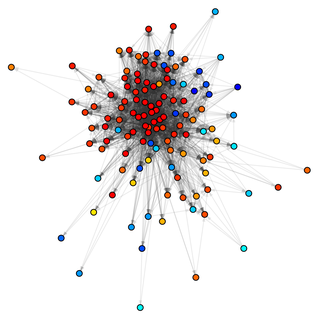
Dyadic Covariate : $\boldsymbol{g}(\boldsymbol{y},\boldsymbol{x}) = \sum_{(i,j)} \boldsymbol{y}_{i,j}\boldsymbol{x}_{i,j}$

Sender Covariate : $\boldsymbol{g}(\boldsymbol{y},\boldsymbol{x}) = \sum_i \boldsymbol{x}_i \sum_j \boldsymbol{y}_{i,j}$

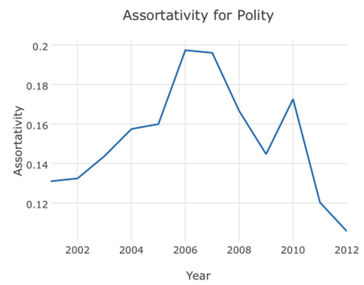
Receiver Covariate : $\boldsymbol{g}(\boldsymbol{y},\boldsymbol{x}) = \sum_j \boldsymbol{x}_j \sum_i \boldsymbol{y}_{i,j}$

Network Plots

Figure 1: Plot for 2011. Blue represents autocratic regimes and red represents democratic regimes



- Clustering, based on the edges between nodes, which here is FDI flow between countries, is visually present.
- It also appears that regime type plays a role in clustering as well, with red, democratic nodes often close to one another, albeit weakly. This assortativity is measured below.



Acknowledgement

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References

1. Dür, A., Baccini, L., & Elsig, M. (2014). The design of international trade agreements: Introducing a new dataset. The Review of International Organizations, 9(3), 353-375.

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