Uncovering Vote Trading Through Networks and Computation

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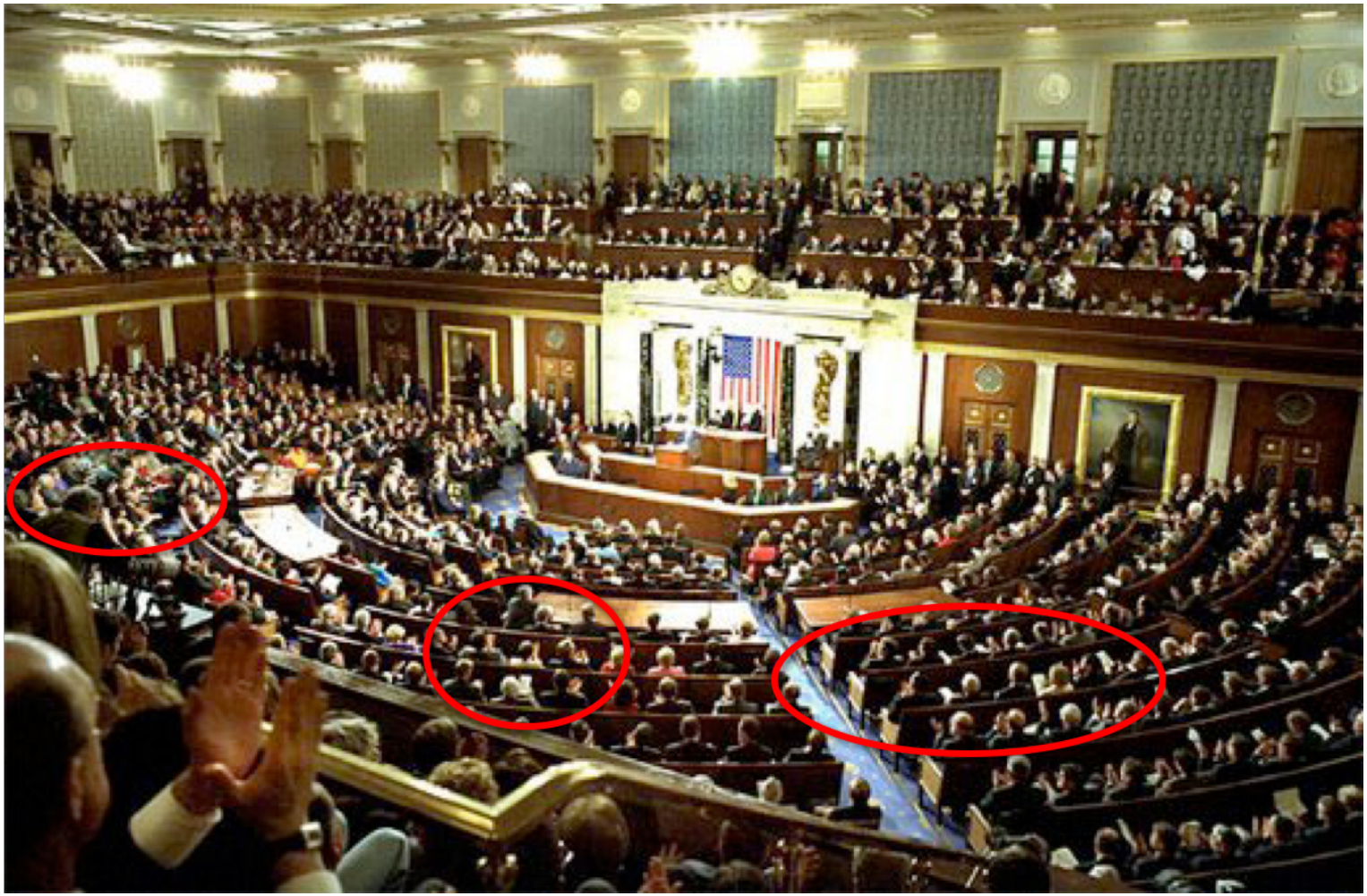
Introduction

Simple majority voting rule



Introduction

Theoretical key points

- Incentives to trade votes are stronger if the outcome of the vote is expected to be narrow.
- A traded vote is a deviation from a legislator's 'preferred' policy position.

Literature

- Large theoretical literature in political economics and political science (e.g., Buchanan and Tullock 1962, Tullock 1970, Bernholz 1974).
- Very few empirical studies with a reasonable test to identify logrolling. (Stratmann 1992, Stratmann 1995, Cohen and Malloy 2014, Esteves and Geisler 2017)
- A lot of open questions...
  - How prevalent is vote trading?
  - How does it evolve?
  - How stable is it?
  - What are the driving factors behind it?

Literature

Limitations of previous approaches

"To test for the presence of logrolling using [this method], one must be able to identify the particular issues on which trading takes place."

(Stratmann 1992:1164; AER)

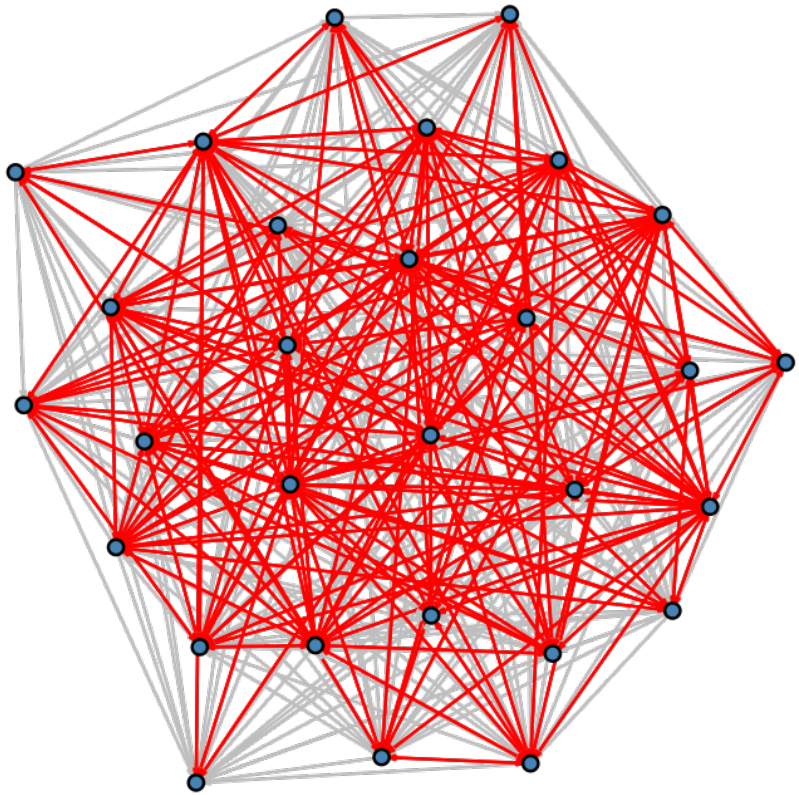
Literature

Limitations of previous approaches

"Thousands of votes are taken during a session of Congress, many of which involve no logrolling. Moreover, the potential patterns of trades are limitless."

(Stratmann 1992:1164; AER)

A New Methodology



Methodology

Four theoretical pillars

1. Incentives to trade are higher the **narrower vote outcomes** are (perceived to be).
2. A traded vote is a **deviation** from the legislator's 'preferred' policy position.
3. Such a deviation must be **in favor of another** legislator's preferences towards the bill.
4. These deviations in favor of other legislators are **reciprocal**.

Methodology

Three ingredients

1. How did legislators vote on various bills?
   - The roll call matrix
   - $\mathbb{V}$
2. Information on legislators and bills.
   - A set of variables describing bills and legislators.
   - $\mathbf{X}$
3. Who has strong preferences for which bill?
   - The 'signaling' matrix
   - $\mathbb{S}$

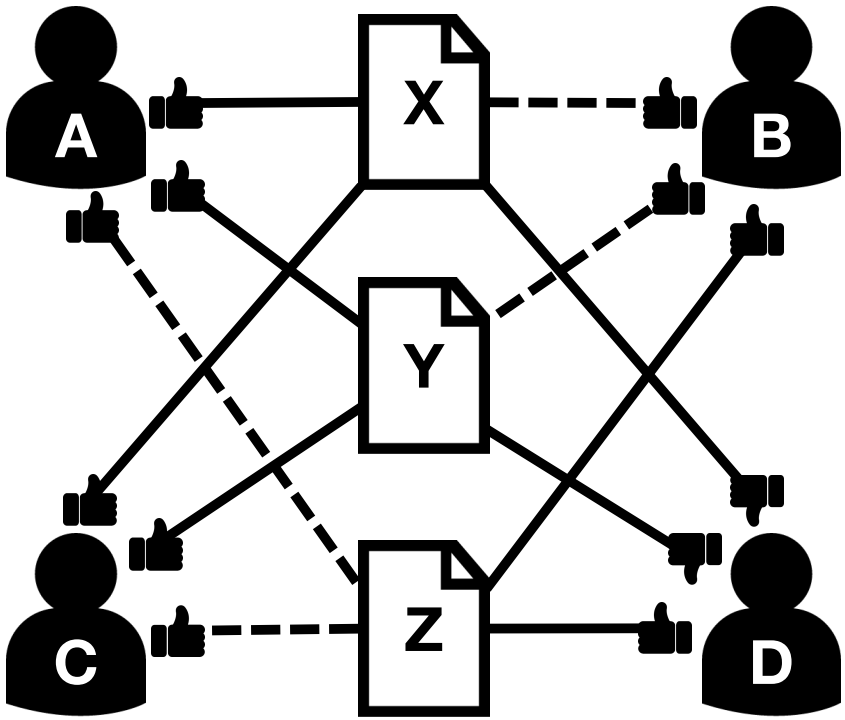
Methodology

Step 1

1. Use observable $\mathbf{X}$ to estimate a simple econometric model that aims to explain voting decisions in $\mathbb{V}$ in narrow outcomes.
2. Use the estimated model to predict the legislators' propensity to vote Yes in each of the roll calls.
   - Results in $\mathbb{Q}$, where $\mathbb{Q}_{ik}$ is the estimated propensity of legislator i to vote Yes in roll call k.
3. Detect *deviations* as all entries $\mathbb{Q}_{ik} \leq \tau$, given that $\mathbb{V}_{ik} = 1$.

Methodology

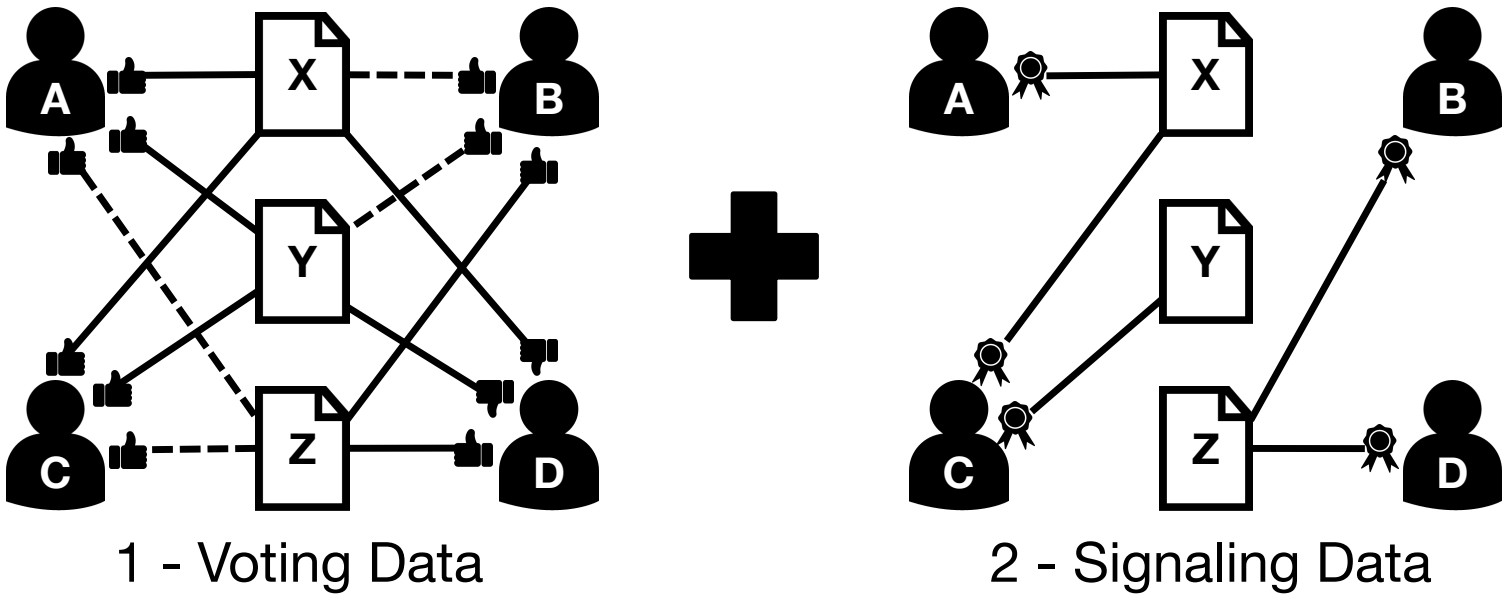
Step 1



1 - Voting Data

Methodology

Step 2

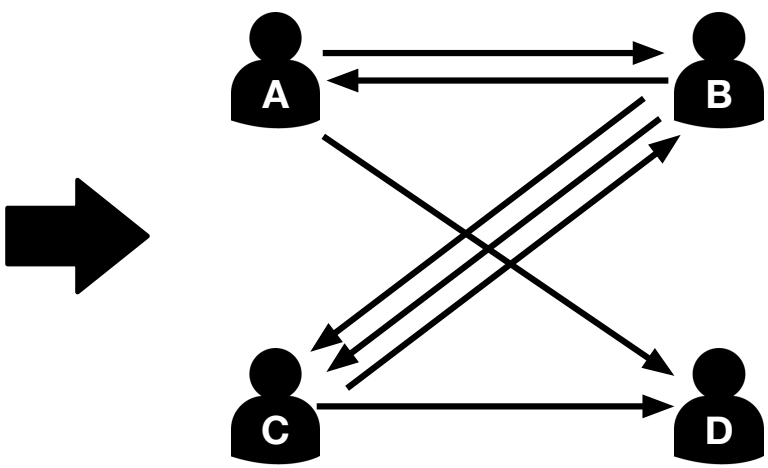


1 - Voting Data

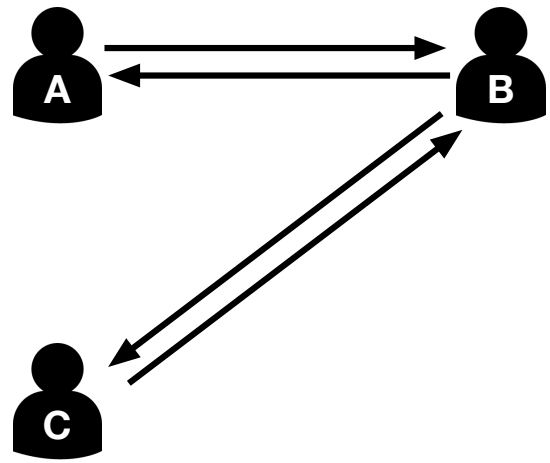
2 - Signaling Data

Methodology

Step 3



3 - Directed-Deviation Network (DDN)



4 - Vote-Trading Network (VTN)

Methodology

Step 3: Test for reciprocity

- Directed Deviations Network (DDN): adjacency matrix $\mathbb{W}$.
- **Reciprocity** between legislators i and j:

$$w_{ij}^{\leftrightarrow} = \min\left[\mathbb{W}_{ij}, \mathbb{W}_{ji}\right] = w_{ji}^{\leftrightarrow}.$$

  (Squartini et al., 2013)
- Extent of reciprocity in the DDN:

$$\phi = \frac{\sum_i \sum_j (w_{ij}^{\leftrightarrow})^c}{\sum_i \sum_j \mathbb{W}_{ij}}$$

Methodology

Step 3: Test for reciprocity

What level of ϕ would we observe if directed deviations *were not intended* to benefit anybody?

- Generate T null networks based on $\mathbb{Q}$ and $\mathbb{S}$.
  - Deviations are the outcomes of Bernoulli trials.
- Compute expected ϕ under the null (no intention in reciprocating deviations)

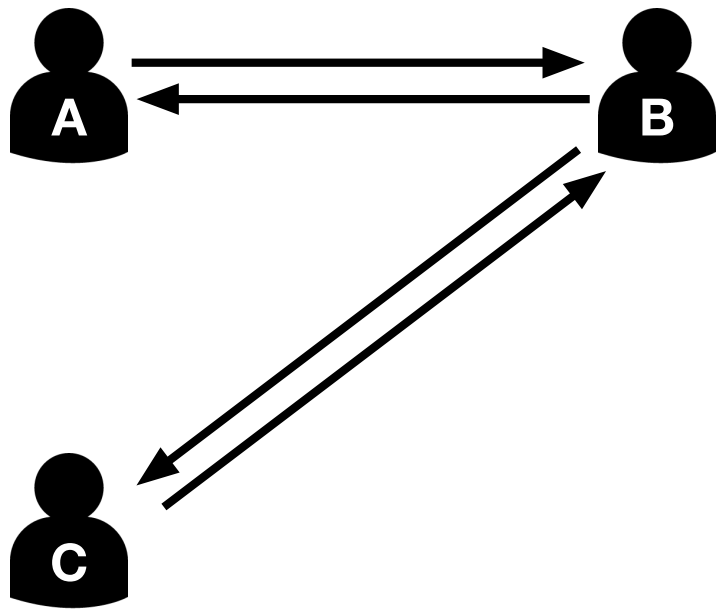
$$\bar{\phi}_0 = \frac{1}{T} \sum_{i}^{T} \phi_{0,i}.$$

- Finally, compute the **'logrolling index'** ℓ

$$\ell = \frac{\phi - \bar{\phi}_0}{1 - \bar{\phi}_0}.$$

Methodology

Step 4: Extract and analyze the VTN



Vote-Trading Network (VTN)

Application: Vote Trading in the US House

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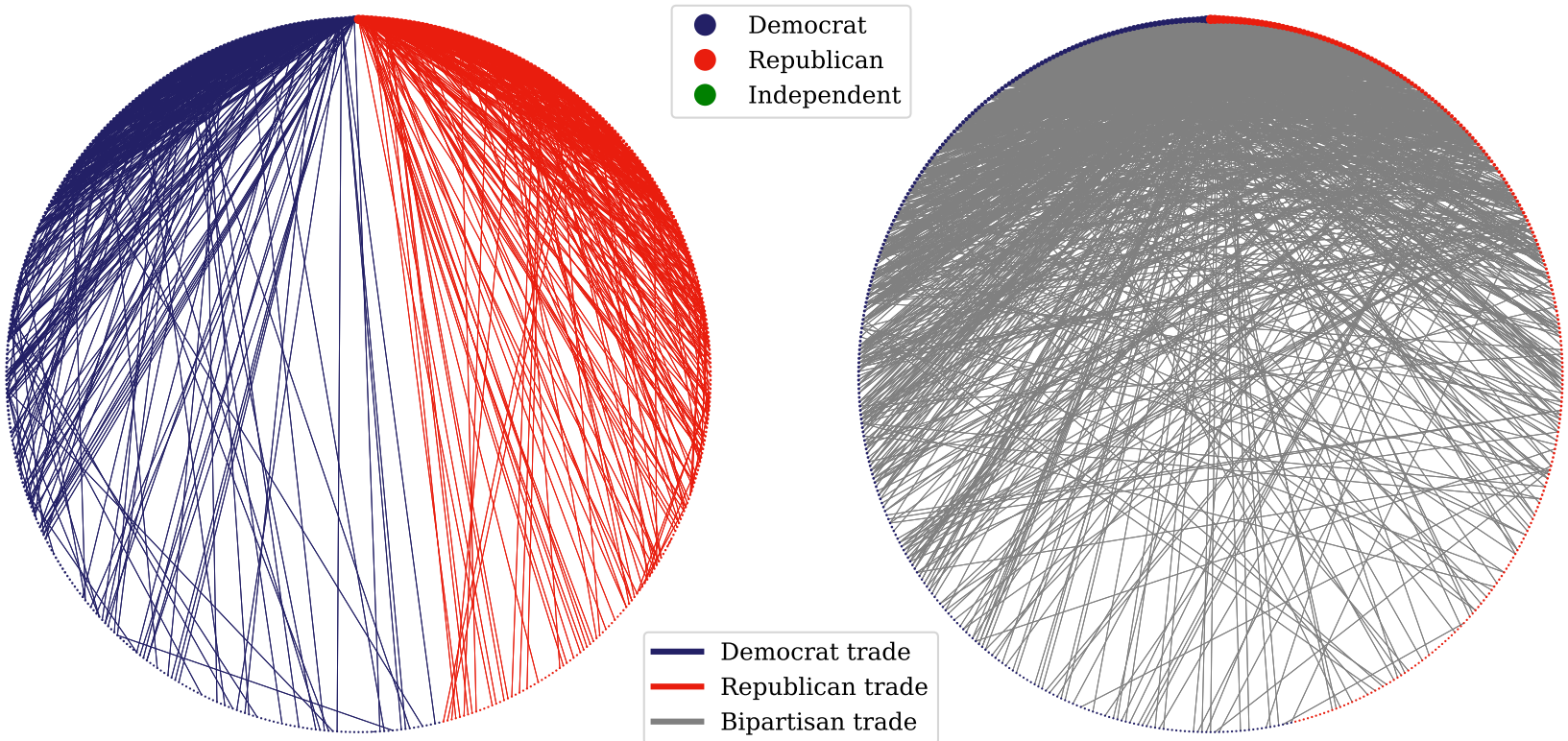
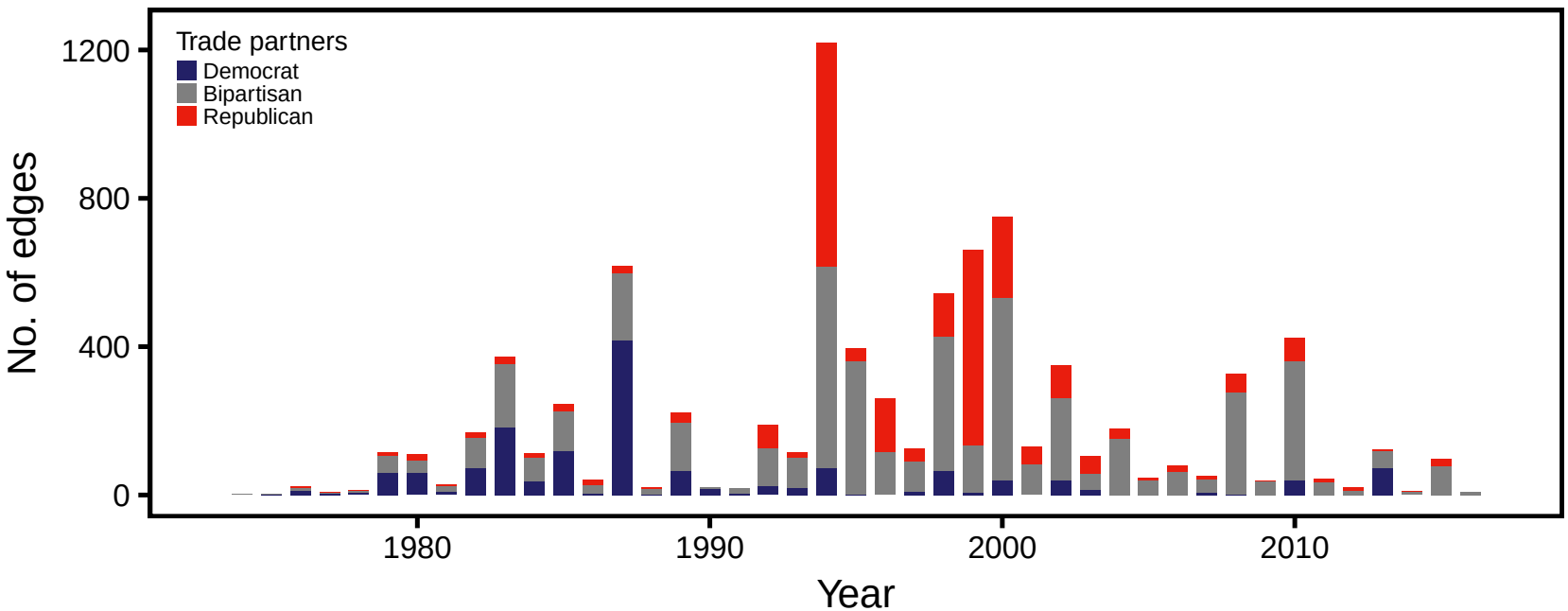
VTN



Application: Vote Trading in the US House

VTN statistics: Extract variation over time



Conclusions

- Limitations
  - Other forms of logrolling
  - Small samples
- Potential
  - Scalable (different legislatures, different time frames, ...)
  - It is flexible (specification of matrix S, deviation detection, ...)
  - Combination with qualitative research and previous econometric approaches

Thanks a lot for your attention!
Questions?

`http://umatter.github.io`

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References I

Bernholz, P. (1974). Logrolling, arrow paradox and decision rules – a generalization. *Kyklos*, 27(1):49–61.

Buchanan, J. and Tullock, G. (1962). *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. University of Michigan Press, Ann Arbor, MI.

Cohen, L. and Malloy, C. J. (2014). Friends in high places. *American Economic Journal: Economic Policy*, 6(3):63–91.

Esteves, R. and Geisler, G. (2017). The rise of new corruption: British mps during the railway mania of 1845. CEPR Discussion Paper 12182, Centre for Economic Policy Research.

Squartini, T., Picciolo, F., Ruzzenenti, F., and Garlaschelli, D. (2013). Reciprocity of weighted networks. *Scientific Reports*, 3(2729).

Stratmann, T. (1992). The effects of logrolling on congressional voting. *American Economic Review*, 82(5):1162–1176.

Stratmann, T. (1995). Logrolling in the U.S. Congress. *Economic Inquiry*, 33(3):441–456.

Tullock, G. (1970). A simple algebraic logrolling model. *American Economic Review*, 60(3):419–426.