Uncovering Vote Trading Through Networks and Computation

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Anecdotal evidence & qualitative studies

“This will be sort of a buddy vote. I know cigarettes are harmful and I wouldn't touch them myself. But a lot of my friends are concerned about this, because tobacco means a lot to the economy of their areas. They do things for me when I need it, and I'll do this for them. Frankly, it's just a matter of helping out your friends.”

(Anonymous Member of Congress on vote trading in the context of a bill deregulating cigarette advertisement; Kingdon 1989:100)

A simple theory of vote trading

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 and existing evidence

Literature

- Large theoretical literature in political economics and political science (e.g., Buchanan and Tullock 1962, Tullock 1970, Bernholz 1973).
- Very few empirical studies with a reasonable test to identify logrolling. (Stratmann 1992, Stratmann 1995, Cohen and Malloy 2014)
- A lot of open questions:
 - How prevalent is vote trading?
 - How does it evolve?
 - How stable is it?
 - What are its driving factors?

Previous econometric 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.*”

“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 novel approach to detect vote trading

Consistence with theory

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***.

Three ingredients

- i. How did legislators vote on various bills?
→ Roll call matrix
 V
- ii. Information on legislators and bills.
→ X
- iii. Who has strong preferences for which bill?
→ 'Signaling' matrix
 S

1) Detect deviations from 'usual voting behavior'

- a. Estimate a simple econometric model that aims to explain voting decisions in $\mathbb{V}$
- b. Use the estimated model to predict the legislators' propensity to vote Yes in votes with *narrow* outcomes.

Q

1) Detect deviations from 'preferred' positions

$$\mathbb{V}_{ik} = 1 \text{ and } \mathbb{Q}_{ik} \leq \tau$$

A 4x4 matrix representing a voting record. Red arrows point to the first column and the second column, labeled 'Legislators' and 'Votes' respectively.

	0	1	0	0
1	0	0	0	1
0	0	0	0	0
0	0	0	0	0

2) Draw the directed deviation network (DDN)

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W

3) Reciprocity in directed weighted networks

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

$$f_i(\mathbb{W}) = \begin{cases} 1 & \text{if } \sum_{j \neq i}^N w_{ij}^{\leftrightarrow} > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$R = \sum_i^N f_i(\mathbb{W})$$

$$W = \sum_i^N \sum_{j \neq i}^N \mathbb{W}_{ij}$$

$$t = \frac{2R}{W}$$

4) Null hypothesis, logrolling index, VTN

a. Compare t with the expected value of t under the null hypothesis.

- Null network has same properties as the DDN based on real data.
- Legislators' deviations, however, are drawn randomly.

$$\ell = \frac{t - \bar{t}_0}{1 - \bar{t}_0} \quad (\text{Squartini et al. 2013, } \textit{Sci. Rep.})$$

b. Compute jackknife standard errors by removing edges
(Newman 2003, *Phys Rev E*)

c. Extract the Vote Trading Network (VTN)

A first application

The anatomy of vote trading in the U.S. Congress

Senate

House of Representatives

Conclusions

- Limitations
 - Other forms of logrolling
 - Limits of validation
 - 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

Questions? Thank you!

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