The Multidimensionality of Political Polarization in the U.S. Congress: Topic Networks

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Abstract

Computational social science research has been focusing on depicting the salient inter-party heterogeneity between Democrats and Republicans, but there is a lack of quantitative research in assessing **the level of ideological heterogeneity within each party**. We propose a new approach to study this inner-party ideological factions in Congress from a social network analysis perspective. We web-scraped the information and content of 316,921 bills from 1973 (93rd Congress) to the present (116th Congress). Based on this dataset, we constructed a network with each node representing a bill topic and the weight of each edge representing the number of legislators who support bills addressing connected topics. For example, if there are three legislators who co-sponsor certain bills about health and certain bills about national security, then there is an edge (weight = 3) between the two topic nodes. **The level of inner-party heterogeneity in the Congress co-sponsorship network can therefore be identified by** measuring how closely topic nodes cluster in this network throughout different congress periods; that is, by **measuring modularity of each network graph.**

We show that while Republican House Representatives tend to cooperate in several core policy areas, they have divisive interests in economic and social affairs. This observation corresponds to existing qualitative studies which indicate a historical tension between social and economic conservatives within the Republican party. On the contrary, with Democrats, there is not a clear distinction in either house between those who focus on economic affairs and those who focus on social affairs. Furthermore, from the 93rd Congress to the present, senators have statistically significantly increased their cooperation beyond individual policy preferences and have been more frequently setting policy agenda based on partisanship.

Introduction

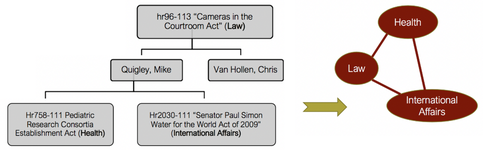
How do people make political decisions opposite to their ideology preference?

- **Identity and local politics matter.** For example, about thirty percent of all voters have both enthusiasm for improving Social Security and reducing economic inequality, and the opposition to immigration and free trade (Drutman 2019). Instead of accepting the whole bag of positions offered by a single party, individual voters have their autonomy in deciding their priorities and may, therefore, have heterodox position combos.
- **Sub-party ideologies matter.** Historically, the conservative movement is a mixture of three strands: economic conservatism, traditionalist conservatism, and anti-communism (Busch 2011). While the coalition between the three strands of conservatives was proved strong in the victory of President Reagan, the inner-coalition tensions have been persisting and developing. George W. Bush alienated some economic conservatives when he failed to limit the size of the government and instead increased the size of Medicare and the other domestic spending. Also, the free-market conservatives who support economic globalism sometimes find that some social conservatives have placed an overly high premium on American sovereignty.

Methodology

1. Network Construction

I construct a network of which nodes are bill topics and edges represent whether there exist legislators who support bills of both topics. The weight of an edge represents the number of senators who support both topics that the edge connects. However, politicians may cosponsor bills in exchange for political support they need to promote their agenda. Therefore, instead of counting all topics, I only count the top 5 topics that a legislator sponsors the most. An alternative option is to set a threshold of frequency, say, 5%. But because some senators focus on only one or two topics and some have lots of interests, I choose the former method so that each legislator can have equal influence on the network structure.



2. Community Detection and Modularity Measure

- ***The Walktrap Algorithm*** (Pons, 2006)

I identify network clusters, that is, densely connected community structures, through the Walktrap algorithm. The algorithm assumes that random walks on a tend to "get trapped into densely connected parts," and considers larger edge weights as higher probability that an edge is selected by the random walker. I choose the Walktrap algorithm because it matches the most to the intuition of how legislators cooperate through diverse topic interests. A legislator (a random walker) may be trapped to his or her topic cluster when promoting an agenda and fails to cooperate with legislators in other topic clusters (other random walkers trapped in their corresponding clusters).

- ***Modularity*** (Glauset and Newman, 2004)

Modularity measures how modular is a given division of a graph into subgraphs (Glauset and Newman, 2004). It measures how separated are the different communities from each other. The higher the modularity is, the larger inter-community and smaller inner-community differences the network has. It is defined as

$$Q = \frac{1}{2m} * \sum \frac{A_{ij} - k_i * k_j}{2m} * \nabla(c_i, c_j)$$

where m is the number of edges, A is the weighted adjacency matrix of the graph, i and j are two nodes in the graph, k is the degree of nodes, c is the type of nodes, and $\nabla(c_i, c_j) = 1$ if $x = y$ and 0 otherwise.

Data Collection

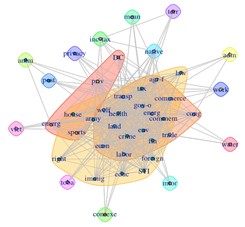
I web-scrapped bill information from Govinfo (since 1993) with the help of existing code scripts (Mill, 2016). The authors posted data online for bills before 1993, scraped from THOMAS.gov. With both datasets, I obtained 316, 921 bills from 1973 (93rd Congress) to the present. I focus only on bills that have been introduced in the Senate and House and discard all resolutions. The final dataset includes information about the committee that receives the bill, the bill status, the names and states of the senators who sponsor and cosponsor the bill, the policy areas and subjects the bill covers, as well as the bill's title and raw text.

Result I: Case Studies

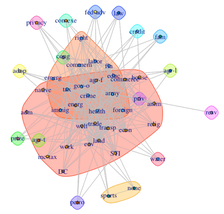
Case Study 1: Republicans in the House from the 93rd Congress to the 115th Congress – Is there a clear-cut separation among policy topics?

- Republicans interested in economic, technological, and social topics do cooperate frequently and diversely. The network shows that topics like Health, Taxation, as well as Armed Force and National Security are so central to the party agenda that, Republican representatives with diverse interests and preferences tend to work together to counter the opposite party.
- There are mainly three topic clusters in this network. One of the clusters is related to varies aspects of economic development: production capital (Agriculture and Food, Public Lands and Natural Resources, Energy, Labor and Employment), infrastructure (Transportation and Public Works), as well as public finance and international trade. The other cluster corresponds to the issue interests of the traditionalists who emphasize the preservation of social values and national defense advocators who emphasize law and order as well as border control. The final cluster is, from my perspective, largely random.
- Admittedly, there are some blurred areas between the two clusters: Social welfare is in the economic cluster while Finance and Financial Sector and Taxation are in the social cluster. But this mixture is understandable: Social welfare and Taxation are almost related to all topics and thus may influence their original categories. The Finance and Financial Sector is less connected to other fields, but unlike Economics and Public Finance, many bills in Finance and Financial Sector are associated with housing and student loans, and therefore have a strong social implication.

Graph 3: Topic Network for Republicans in the House, 93rd-115th Congress



Graph 4: Topic Network for Democrats in the House, 93rd-115th Congress

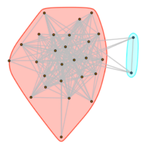


Case Study 2: Democrats in the House from the 93rd to the 115th Congress

- The separation of economic and social topics is less salient for Democrats.
- Abortion and Women's right are two topics central to liberal Democrat's political agenda and they do exist in our available topic list. However, they are so marginalized in the House that none of the representatives prioritize any of the two topics in their top five topic interests. This is probably because most of the significant achievements in defending these civil rights happened in local and Federal courts instead of Congress. Therefore, the interpretation of the topic network structures cannot go beyond the scale of Congressional legislation.

Graph 7: Senate Democrats 93rd-115th Congress

Graph 8: Senate Republicans 93rd-115th Congress

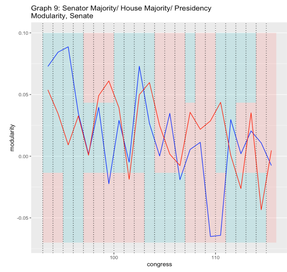


Case Study 3: Senate from the 93rd Congress to the 115th Congress

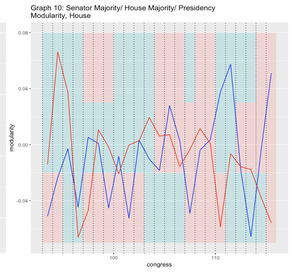
- While the topics that Senate Democrats focus on still converge into about two to three clusters, the topics that Senate Republicans focus on unify all together without any sub-party cluster structure.
- This difference in network structure might be related to multiple factors. For example, compared to House legislators, Senators represent a more diverse population of voters and thus may focus less on particular policy topics. Also, the Senate only has the power to amend or reject bills that impose taxes but may not introduce any of it, and therefore economic topics are not much discussed. The distinct Senate rules such as filibuster and more flexible committee settings may also push Senators to unite along party lines to reach 2/3 majority votes.

Result II: Time-Variant Observations

Graph 9: Senator Majority/ House Majority/ Presidency Modularity, Senate



Graph 10: Senator Majority/ House Majority/ Presidency Modularity, House



- Blue lines represent Democrats and red lines represent Republicans. The background colors show the parties that control the Senate, House, and White House for each two-year Congress period, from up to bottom.
- House Democrats have an average modularity of -0.009, House Republicans -0.009, Senate Democrats 0.017, Senate Republicans 0.021.
- The Senate networks tend to have higher modularity than the House networks over time, and the average modularity for both parties in the House is negative.
- While the Senate topic networks tend to be less partisan compared to the House topic networks, they have seen a persistent pattern of increasing polarization over time.

Conclusion

As a conclusion, I propose a new, quantitative approach to study the inner-party ideological fractions in Congress from a social network analysis perspective. With this approach, I confirm the hypothesis that the tension between economic and social conservatives affect the agenda of the Republicans party, especially in the House. While fractions do exist in the topic networks for Democrat as well, there is not a clear cut between economic and social liberals. Besides, from the 93rd Congress to the 115th Congress, legislators in the Senate have significantly increased their cooperation beyond topic clusters and increasingly tend to set agenda based on partisanship. In other words, the Senate has seen a trend of polarization in agenda.

Acknowledgements and References

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