Concept for Mathematics in Politics and Law

Comparison of Theoretical and Imperial Voting Power

Dominic Steiner

Research Question
Does a high voting power index imply a high number of won votes? Are the assumptions made in the calculation of voting power realistic? Analysis of party voting power in the Swiss National Council.

Motivation
While discussing voting power in the lecture, I wondered how realistic the index really is since the index assumes that all coalitions are equally likely. This assumption does not fit with the model of 'a spectrum of political views' we usually assume when discussing politics. In the spectrum model the centre of a given distribution holds the most power, while in the Banzhaf index it is the party with the most seats which holds the most power. This report intends to answer this contradiction with the help of real-world data.

Connection to Course
The report uses the in the lecture discussed Banzhaf voting power index applied to the Swiss National Council on a party or faction level. I want to show the limitation of the index by using voting data from the National Council.

Literature Review
'Weighted Voting Doesn't Work: A Mathematical Analysis' [1] The Banzhaf voting power index.
'The Mathematics and Statistics of Voting Power' [2] The article discusses the problems with the coin-flip model of voting and considers ways in which votes could be modelled more realistically in the context of the US presidential elections.
'Standard Voting Power Indexes Do Not Work: An Empirical Analysis' [3] Research into voting power using data from US elections and European Union elections.
'A Priori versus Empirical Voting Power in the EU Council of Ministers' [4] The article introduces empirical variants of the Banzhaf index and compares them with it, using data form the councils of the European Union.

Techniques and Contribution
The Swiss parliament publishes data of all votes taken in the National Council [5]. The report is going to use this voting data to count how often each party was pivotal. Meaning the party is part of a winning coalition, that without the given party is no longer a winning coalition. This must consider that a party may not always be unified. So, only members that voted on the side of the winning coalition can determine if a given party is pivotal. With this count I am going to calculate an empirical voting power index, like the Banzhaf index. But instead of considering all possible winning coalitions with equal weight, I am going to weigh the coalitions based on their frequency. This data can then be used to compare the Banzhaf voting power index with empirical winning coalitions to answer the research questions. To efficiently calculate all these indices, I am going to write a program to automatically calculate the voting power for multiple sessions, given the National Council voting data.

References

[1] J. F. Banzhaf, Weighted voting doesn't work: A mathematical analysis, Rutgers Law Review 19 (1963) 317–343.
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[3] J. B. Andrew Gelman, Jonathan N. Katz, Standard voting power indexes do not work: An empirical analysis, British Journal of Political Science 34 (2004) 657–674.
[4] A. Pajala, M. Widgrn, A priori versus empirical voting power in the eu council of ministers, European Union Politics - EUR UNION POLIT 5 (2004) 73–97. doi:10.1177/1465116504040446.
[5] Schweizer parlament, abstimmungs-datenbank.
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