

Power and preferences

László Á. Kóczy

Institute of Economics, Centre for Economic and Regional Studies and
Faculty of Economic and Social Sciences, Budapest University of Technology and Economics

Balázs R. Sziklai

Institute of Economics, Centre for Economic and Regional Studies and
Corvinus University Budapest

Abstract: We study the power of voters that are symmetrical except for their position in a policy space. We find that contrary to corresponding results in a one-dimensional spectrum of voters, where the median voter has a key role, voters with a

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1 Abstract

The analysis of voting situations focuses on weighted voting with the objective to link voting weights and the ability to influence decisions. The literature of a priori power measures starts with the assumption that nothing is known about the issues to be voted on or the voters' preferences and therefore any coalition of players is possible.

In practice, this assumption is often violated: some coalitions are simply not likely or possible. We consider convex voting games, players are located on a policy space and their positions do put restrictions on the coalitions that may emerge. A proposal without a majority support may get new “yes” votes by inviting nearby voters – naturally, their support comes at a price: the proposal must be changed slightly to gain their support.

Kóczy and Sziklai [2] and Fertő et al. [1] consider convexity coordinate-wise in a two-dimensional policy space so that strictly internal voters of the rectangles spanned coalitions are necessarily members. On the other hand, those on the borderline of the rectangles are free to join or leave. Power is drawn from the ability to turn a losing coalition into a winning one. We consider the model where players are symmetric except for their position on the policy space. Abstracting away from abstentions [1] one finds a surprisingly uniform pattern. To see this we first transform the policy space into a discrete grid, where each coordinate is replaced by its rank among the corresponding coordinates among the voters. Such a transformation keeps the rectangles where a player may be critical for majority: if a rectangle spanned by some of the voters was such, the rectangle spanned by the transformed images of those voters covers the same voters including the one in question.

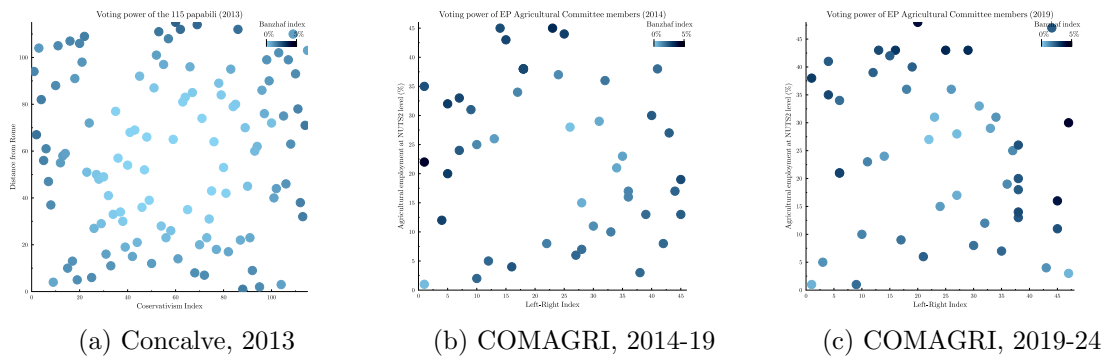


Figure 1: Examples of power distributions with ranked coordinates. Calculations are based on Kóczy and Sziklai [2] and Fertő et al. [1].

In Figure 1 we see examples of such gridplots and one may immediately notice that (1) voters near the centre are weak and (2) voters around the four corners are weak. One may wonder if this is a general property.

We present both simulation and analytical results. We have generated random voters and for these, we calculated the voting power of each voter and then we have taken the average power of the players whenever that particular grid point has been selected. With n players, the chance of being selected is $1/n$, so with already fairly small numbers of n we can have a smooth surface. The randomization made sure that no two points are on the same gridlines – an assumption we kept also for the analytical formula. The latter calculates the expected probability that a grid point is on the borderline of a rectangle of minimal winning size. The calculation is a simple enumeration of such rectangles. Our preliminary model sorts possible rectangles in 6 types each with 4 subtypes facing different directions. When we talk about proper voting games, that is, the quota requires a majority, or course only some of these rectangles may exist. For each case we consider rectangles of different sizes separately. We first calculate the number of ways the spanning voters can be located, then the ways internal points can be arranged then the rest.

What we find is that central voters have little power and so do voters in extreme positions; voters with central in one and extreme in the other coordinate have the highest power.

Our results suggest a number of things:

- Since the one-dimensional version of our model would be a horizontal line with a dip at the median voter, our model suggests that the opening up of political issues in two dimensions may lead to a raise in extremism. Preliminary findings suggest that as the correlation between the two coordinates increases, the relative importance of taking extreme positions diminishes.
- Certainly, such power distribution may lead to a race to extremism: even the same moderate party would delegate a representative who takes an extreme position in one of the aspects.
- Interestingly, voters with totally extreme positions are marginal, although not as much central voters. This may suggest that radical voters may benefit from taking mainstream positions on some issues.

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