The Utility of the Voting Power Approach

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Abstract:

This paper argues that the voting power approach is much more general than is portrayed by Albert ("The Voting Power Approach: Measurement without Theory", *European Union Politics*, 4:3, 2003) and is therefore capable of generating important insights about voting systems, such as qualified majority voting in the EU Council. The voting power approach focuses on understanding the properties of voting systems by analysing outcomes and thereby is able to generate empirical facts that are not otherwise obvious. That the approach is so general has not previously been pointed out in the relevant literature; it has usually been taken as coinciding with power indices. Albert's criticism is directed at one aspect of the theory of voting power indices: the assumption of probabilistic voting that underlies conventional power indices. It is argued that he fails to take account of the different uses of power indices and that the probabilistic voting assumptions he derides may or may not be useful depending on this. It is necessary to emphasise the key distinction between *a priori* power indices and measure of empirical voting power. Albert misrepresents the voting power approach and is not willing to allow that it encompasses a diversity of methods as well as a research agenda.

I. The Voting Power Approach and Power Indices

From the foundation of the European Economic Community in 1958 until its first expansion in 1972 its six member countries used a system of qualified majority voting (QMV) for certain types of decisions. The voting weights were as follows: France, West Germany and Italy had four votes each, Belgium and the Netherlands two votes and Luxembourg one. From these figures one might assume that the smaller countries had a disproportionately large amount of influence in the Council of Ministers. For example, Luxembourg must have been over represented compared with West Germany because it had a quarter of its voting power with just over half of one percent (0.57%) of its population. Alternatively, Luxembourg had one vote for its whole population of 310,000 people while West Germany had only one vote for every 13,572,500. Of course this disproportion was justified at the time on the grounds that Luxembourg was one of the six member states constituting the community and the system of weighted voting in the Council of Ministers was chosen to ensure the representation of both states and populations.

In fact, however, Luxembourg had no voting power whatsoever over any decision taken by QMV. Since the threshold was set at 12 votes that were required to make a decision, it was mathematically impossible for Luxembourg's one vote to be decisive. No matter how the other five voted, their combined total would never be equal to eleven. Luxembourg therefore had zero voting power. This is a finding of much importance - not least to the citizens and government of Luxembourg, those of the other member countries, as well as political scientists studying the European

Community. Moreover it is not immediately obvious from a casual inspection of the weights. It can only be understood by using the voting power approach, which requires an analysis of the possible voting outcomes that can theoretically occur in terms of the capacity of each voter to decide the issue.

This example is well known in the voting power literature. The result was first pointed out by Brams and Affuso (1985) in a paper about power indices. However it does not actually depend on the use of power indices, requiring no more technical equipment than simple arithmetic. It is sufficiently important and serious that a real institution could commit such an apparent error that I suggest this example alone demonstrates the utility of the voting power approach. That a sovereign member of the EEC was disenfranchised by the rules of qualified majority voting, despite all appearances to the contrary, should be widely known, if only out of historical interest. But the point is widely ignored in the literature on the Council of Ministers; a recent example is the important book by Hayes-Renshaw and Wallace (1997) which does not mention the point despite containing a discussion of power indices.

It is easy to construct other examples of hypothetical voting systems which have similarly unfortunate properties by suitable choice of weights and decision rule. But there are also others in real institutions, not so well known as the EEC example, perhaps, which produce striking results. I will give two from the IMF, another body where QMV is the constitutional basis of its decision making. Member countries have weighted votes that are determined by their IMF quotas. The rules require that a country must cast all its votes in a bloc and therefore the system is one of weighted majority voting. The Executive Board has 24 members, some of whom are appointed

by their governments (currently these are USA, Japan, Germany, UK, France, Saudi Arabia, Russia and China). The other directors are elected by groups of member countries arranged in so-called constituencies. Elected directors are able to cast a bloc of votes equal to the combined weights of the countries who elected them; in fact they are required to do so and cannot split them and therefore the system formally resembles one of winner-take-all. In many constituencies the weights are such that one member country (whose representative is invariably elected the director) has more than half the weight and is therefore formally in voting terms a dictator while the other members in the constituency are powerless. This is the case in the constituencies represented by Canada, Brazil, India, Italy and Switzerland. The power analysis in these cases is obvious. However in two constituencies, each with eight members, the structure of power is not immediately obvious and a voting power analysis reveals some surprising results.[1] See Table 1.

The Spanish-led constituency currently elects the Spanish representative to sit on the Executive Board as the representative of the eight countries in the group. A voting power analysis of the weights (by the author) reveals that five members are completely powerless and the three biggest members, Spain, Mexico and Venezuela, are all equally powerful. That is, it turns out that none of the five Central American members of the group could ever swing a vote to reach the threshold of 46,495 and that the ability of each of the biggest members to do so is equal. The other example is from the

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[1] Four other constituencies have a member whose voting weight is dominant while being just short of an absolute majority. These are the constituencies of Belgium (which has over 41% of the weight), the Netherlands (49%), Australia (45%) and Argentina (49%). These countries are not strictly dictators and the voting power approach does not give exact results without the use of power indices.

so-called Nordic/ Baltic constituency which operates somewhat differently from the others by choosing its executive director on a rota basis rather than by election. However when it comes to a weighted vote being taken in the group, it turns out that one member, Estonia, is found to have zero power: its 902 votes could never be decisive.[2]

Table 1: Voting Weights in Two IMF Constituencies

'Spanish Led' Constituency	Votes	'Nordic/ Baltic' Constituency	Votes
Costa Rica	1,891	Denmark	16,678
El Salvador	1,963	Estonia	902
Guatemala	2,352	Finland	12,888
Honduras	1,545	Iceland	1,426
Mexico	26,108	Latvia	1,518
Nicaragua	1,550	Lithuania	1,692
Spain	30,739	Norway	16,967
Venezuela	26,841	Sweden	24,205
Total	92,989	Total	76,276
Threshold	46,495	Threshold	38,139

These results are of considerable interest in pointing to deficiencies in the current voting arrangements in the IMF and demonstrate again the utility of the voting power approach. Moreover, as with the example of the EEC with which we started, the

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[2] The voting figures are taken from the IMF Annual Report, IMF (2003). I have assumed decisions are taken by simple majority voting – that is, with reference to a threshold of 50% of the total weight plus one - in both these analyses. The results have been obtained by computer search to analyse all possible voting outcomes. The details are available from the author on request, although since the computer program used is accessible from the author's web page, the interested reader can confirm these results for himself.)

results are in the nature of solid mathematical facts and do not rely on any behavioural assumptions whatsoever. In particular they do not rely on power indices or any ideas about probabilistic voting. Alternatively, if we insist on using the language of power indices, we can say that they are the same whatever power index we use: both the Shapley-Shubik and the normalised Banzhaf index would give Spain, Mexico and Venezuela 1/3 each and the other five countries zero. Estonia gets zero on either index.[3]

I have highlighted these examples to illustrate the voting power approach because they are simple in that they give completely unambiguous results that are far from obvious when we look at the data. Whether we wish to call this approach political science or not, the results are empirical facts that are unassailable and cannot be ignored by political scientists. However the voting power approach not only deals in clear cut results such as these; its more common use is in the analysis of weighted voting systems in which there are differences in the influence of different voters arising in complex ways from their different weights and the decision rule. The voting power approach aims to quantify this by means of power indices defined in certain ways for stated purposes and on certain assumptions. These are the subject of Albert's critique.

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[3] Although the powers of the other seven countries will be sensitive to the choice of index, as between the Shapley-Shubik and Banzhaf. I do not consider such matters as the choice of *a priori* power index here since they have been extensively discussed elsewhere. See for example Felsenthal and Machover (1998).

II. Albert's Misplaced Critique: Confusing a Progressive Research Agenda with Intolerable Ambiguity

Professor Albert directs his attack (Albert, 2003) on his own definition of the voting power approach. His proximate target is the paper by Leech and Machover (2003, of which he was the discussant when it was presented at a conference on *European Governance* in Saarbrucken in October 2002) which uses power indices to study the effect of changing the QMV threshold with equitable weights. That paper is an exercise in the use of *a priori* power indices as a tool for analysing the properties of a voting system - and therefore as an aid for designing institutions whose properties conform to intended democratic principles.

Albert takes the *a priori* power indices approach as if it were synonymous with the voting power approach in general. Since, as I have shown in the previous section, these are not the same, he is to an extent attacking a straw man. Moreover, his principal arguments are not new, having been made many times before, as much by advocates of power indices as critics. In doing this he is following in a tradition, mostly associated with the names of Garrett and Tsebelis of attacking the voting power approach by attacking *a priori* power indices. (Garrett and Tsebelis have published several polemics against the use of power indices to study the EU institutions most notably in the *Journal of Theoretical Politics* of which the latest is Garrett and Tsebelis, 2001.)

The substance of Albert's complaint is that voting power indices are calculated on the assumption of what he calls simple random voting: that voters vote randomly,

independently of each other and are as equally likely to vote for as against any proposal. This assumption is, of course, patently false as a general description of any actual voting behaviour. If actual voter behaviour is conceived in probabilistic terms, with respect to randomly selected issues, then simple random voting is an inadequate model which fails to take account of the likelihood that certain voters tend to vote the same way while others tend to oppose each other on average. But this distinction between actual behaviour and simple random voting cannot be the basis of a critique of power indices, let along the voting power approach, since almost every writer on the subject has also made it. I quote below from the seminal works by Shapley and Shubik, Banzhaf and Coleman, to emphasise the point.

Shapley and Shubik (1954), p. 46: "The values … do not take into account any of the sociological or political superstructure that almost invariably exists in a legislature or policy board. They were not intended to be a representation of present day "reality". It would be foolish to expect to be able to catch all the subtle shades and nuances of custom and procedure that are to be found in most real decision-making bodies. Nevertheless, the power index computations may be useful in the setting up of norms or standards, the departure from which will serve as a measure of, for example, political solidarity, or regional or sociological factionalism, in an assembly. To do this we need an empirical power index, to compare with the theoretical."

Banzhaf (1968), p. 308: "It is important to recognise that this technique measures the voting power of the individual which is inherent in the rules governing the voting system and the distribution of population, and does not reflect the actual ability that any given individual voter has in a particular election to affect the

outcome. The latter would depend to some extent on factors which are not inherent in the system, such as the relative power of the political parties in different geographical areas, and conditions which may be peculiar to the voter himself (e.g. whether as a sign of protest he decides to vote for a minority party candidate who has no chance of winning). Thus, a critical distinction must be drawn between inequalities in voting power which are built into the system (e.g. the old county unit system in Georgia or the distribution of votes in the Electoral College) and those which result either from the free choice among citizens as to how they use their voting power (e.g. the political impotence of a Republican in a solidly Democratic state) or from factors outside of the legal rules governing the process (e.g. voter intimidaton, weather, the televised prediction of election results, etc.). Concededly, these and other external factors may affect a citizen's ability to affect the outcome of any particular election. The voting power measure here is that inherent in the system and necessarily represents an average of a voter's effectiveness in a large number of equally likely voting situations. However, it is only with respect to those inequalities which result from the rules of a particular system of voting on which we may properly focus attention in determining the basic "fairness" of the system itself."

Coleman (1971) p. 297: "By the device of counting each partition of the collectivity once, and adding the number of partitions in obtaining measures of power, it is implicitly assumed that each member has equal probability of voting for or against a collective action … This is appropriate for the analysis of formal power as given by a constitution, that is, for an analysis of organisational rules. It does not, however, provide a basis for behavioural prediction of the collectivity's action, when further

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information exists about the members. In particular, the two assumptions made in the analysis of formal power, equal probabilities of positive and negative votes by each member, and independence of votes among members, may be empirically investigated, and the collectivity's action predicted by the use of such information."

I have quoted at length from these seminal papers to show that their authors were fully aware of the distinction between *a priori* power indices and measures of empirical power and were at pains to discuss it. Albert claims that the voting power approach is "completely ambiguous between whether it is political science or political philosophy and such ambiguity is not to be tolerated". But the issue here is not ambiguity but the need for more research. All the quotations above show that proponents of power indices conceive of two kinds of measures of power: *a priori* power indices and empirically based power indices that reflect the behaviour or preferences of voters. These two types of indices are fundamentally different entities that serve different purposes. The former enables us to analyse the properties of voting systems in purely constitutional terms and therefore is in a sense a tool of applied political philosophy that can tell us about things like equity. It has a real use in helping to solve normative problems like how to design weighted voting systems such as used by intergovernmental bodies. On the other hand, the latter relies on observed behaviour and belongs to positive political science. The latter has been the subject of much less research than the former.

We can illustrate the point by thinking about the EU Council of Ministers. An understanding of where power lies requires us to take account of many relevant factors: the political complexions of governments, the Paris-Bonn axis, the

commonality among the Benelux countries, the Nordic or Mediterranean members, the small states versus the large states, new Europe versus old Europe, the Eurozone, etc. etc. Such political science would benefit from being able to use empirical power indices that take account of such factors as a tool of analysis.

But from the point of view of the design of the formal voting system in a union that is expanding with the admission of new members being quite a normal process, it would clearly be inappropriate to base constitutional parameters like voting weights on such considerations. That might lead to, for example, allocating France smaller voting weight because otherwise its tendency to vote with Germany would give it more power, and Britain larger weight because of its tendency to independence. That would appear arbitrary and would fail to provide a guide for what the votes of new entrants should be. Far better to allocate the voting weights on the basis of general philosophical principles that can be seen to apply equally to all countries and citizens, to new members as well as old ones.[4] A priori power indices are useful in this.

Thus, the voting power approach gives rise to different power indices for different purposes and there is a substantial research agenda to develop and study them.

The assumption of simple random voting has a different role in the two types of indices, as the quotation from Coleman indicates. It is conventionally a part of the definition of an *a priori* power index - although, in fact, assumptions about probabilistic voting behaviour are not fundamental to them at all. On the other hand,

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[4] It would be interesting to know how Professor Albert thinks this should be done.

an empirical power index must be based on observed behaviour or preferences and the use of simple random voting is merely a convenient but inferior first approximation. Coleman was acutely aware of this point and his work (especially his 1971 paper but also his 1973 paper "Loss of Power") contains several pointers to directions for needed future research into empirical power measurement.

It is not actually necessary to assume simple random voting in order to define a priori power indices. All that is required is a consideration of all possible outcomes that can theoretically occur, taking into account that each voter has the right to choose how to vote. Then, as Banzhaf (1965) explained: "The measure of a legislator's power is simply the number of different situations in which he is able to determine the outcome … The ratio of the power of legislator X to the power of legislator Y is the same as the ratio of the number of possible voting combinations of the entire legislature in which X can alter the outcome by changing his vote to the number of combinations in which Y can alter the outcome by changing his vote." Thus, voting power can be defined in terms of the rights of individual voters: we count up each outcome because each voter has the basic right, as a member of the institution, to exercise choice. There is no need, therefore, to invoke the principle of insufficient reason to justify simple random voting. *A priori* voting power can be defined on a more fundamental level in terms of voter sovereignty.

III. Conclusions

I have argued, first, that the voting power approach is basically a way of thinking about voting systems in terms of outcomes that is capable of discovering important empirical facts about power, of which I have given three examples. Secondly, the neglect

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of the voting power approach by political scientists means that these facts are often missed. Thirdly, the voting power approach is not the same as the use of power indices.

Albert's critique is mistaken in two ways. First, it is actually an attack on power indices though he claims to be criticising the voting power approach in general. Secondly, his insistence that there can only be one type of power index for all purposes leads him to claim that this causes "ambiguity which is not to be tolerated". But there can be different types of power indices which have different uses: *a priori* power indices are used to address normative questions connected with the design of voting systems; empirically defined indices are used to answer positive questions about actual voting power.

The voting power approach is an emerging field of research with its own inherent research agenda. Most serious research in it so far has focused on *a prio*ri power indices but that does not mean that there is not a need for further research on developing empirically valid approaches to the measurement of voting power.

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