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RATIONAL CHOICE THEORY AND VOTING

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Political economy

Political economy, in studies of voter and party behavior, usually refers to a specific method: the economic or rational choice method. Sometimes termed "positive political theory," because its aim is to explain political behavior rather than tell us how we should run our political regimes (which is the job of normative political philosophy), it nevertheless has a strongly normative bent. Underlying political economy models are axiomatic principles that enable deductive model building and formally derived hypotheses. These principles – usually called "rationality assumptions" – can be considered normative desiderata for consistent behavior. They actually have very little to do with "rationality" or reasonableness as normally understood. We might be able to predict the behavior of an agent, be it a person or an institution, without considering that behavior to be in the least reasonable, prudent or sensible. Normatively an agent can be consistently irrational or unreasonable, but as long as they are consistent then their behavior can be modeled.

The tenets of "methodological individualism" are also usually associated with rational choice models. Karl Popper (1957: 136) was probably the first to link methodological individualism with economic methods, mis-citing Friedrich Hayek as his source (Hayek was actually saying that economics ought to be methodologically individualist, not that it is). In fact, the modern critics of classical economic methods, behavioral economists, are the true methodological individualists, with the claim that human agents do not behave with the consistency that classical economics assumes. In fact, as we shall see, whilst we can interpret political economy models in behavioral terms, they can more plausibly be seen as providing structural constraints or incentives for agents to behave within certain bounds. They provide structural explanation as much as methodologically individualist explanation.

The axioms of rational choice or revealed preference under certainty include reflexivity, completeness and transitivity (Austen-Smith and Banks 1999). The first ensures that someone is indifferent between two identical items; the second that all items enter into a person's preference function; and the third ensures the consistency that enables prediction. The idea of revealed preference is that we can observe behavior under some conditions in order to predict behavior under other conditions. The final continuity assumption is more technical, but is designed to convert ordinal preferences into cardinal utility functions.

The point of the assumptions of revealed preference is prediction. The idea is that if we can construct a utility function for an agent in one situation, we can then use the utility function to predict how they will behave in a different situation. Utility functions can include any type of argument. So individual utility functions do not need to be composed of material self-interest, but can include the welfare of the family, the group, society at large, refugees or the foreign needy. Adding any sort of social benefit can, within individual applications, provide trivial predictions but the idea of revealed preference theory is to take a utility function constructed in one situation and apply it to other situations to provide predictions there. This can work in practice if the situations are not too dissimilar. In fact, political science models are rarely if ever applied to "an" agent, but rather to sets of agents defined by their type, and so the assumption is that the important elements of the utility function are those that refer to the endogenous interests of that type. The important point is that the rationality assumptions are used for predictive and hence explanatory purposes. What we find – and this is not unimportant in applications to voting and party behavior – is that for collectives sometimes we cannot make a prediction, at least for single events, for it turns out there are no pure equilibrium strategies and/or there are multiple equilibriums.

Applications to voting

The two classic texts of political economy in relation to voters and elections are Kenneth Arrow's (1951) *Social Choice and Individual Values* and Anthony Downs' (1957) *An Economic Theory of Democracy*. Duncan Black's (1948) median voter theorem (often misattributed to Downs) was also seminal, though his argument for a similar conclusion takes an importantly different form.

Arrow is important normatively. He shows that there is no such thing as a social welfare function. In terms of elections, we can interpret this as saying that the result of any preference-aggregation mechanism (any voting system) depends upon the mechanism itself as well as on the preferences of the voters: same mechanism, different preferences: (potentially) different outcome; same preferences, different mechanism: (potentially) different outcome. Arrow's result can be considered a generalization of the Condorcet cycle with at least three alternatives and three voters – x beats y, y beats z and z beats x in pairwise votes. So every alternative loses to another alternative in a simple majority vote (see also Iain McLean's chapter in this volume).

Another way of thinking about this is that, just given the preferences of the collective alone, we cannot predict the result. Normatively this suggests that there is no perfect electoral system; in practice it entails that one can construct results from any electoral system that somehow seem paradoxical or wrong. More importantly, however, corollaries of Arrow's theorem show that electoral systems are manipulable (Gibbard 1973; Satterthwaite 1975). We sometimes see in legislatures that agenda setters can manipulate the order of votes to affect outcomes and enable heresthetic politicians to break up winning coalitions to form a new voting bloc (Riker 1982, 1986; McLean 2001). Voters can also vote strategically in order to scupper what would otherwise be winning alternatives. Such manipulation is usually considered to be normatively bad, some claiming that it means electoral results are arbitrary (Riker 1982), though others suggest that manipulation is just the game of politics (Dowding and van Hees 2008), not so different from behavior in market and other social situations. These essentially normative results are important in models of voter behavior only because they demonstrate the strategic possibilities and show the basic unpredictability of politics *even when we have full information*.

Black's median voter theorem is from the same academic stable as Arrow. It demonstrates that in one-dimensional ideological space, where voters have single-peaked preferences, the

ideal point of the median voter is a Condorcet winner (Black 1948). Since a Condorcet winner is the alternative that beats all other alternatives in pairwise votes, the conditions of the proof discount the Arrow problem. As a Condorcet winner is a simple majority winner against each of the other alternatives, the median voter theorem can be given the normative praise that it truly defines a democratic result. Thus any voting system that picks a Condorcet winner will provide winners that satisfy the median voter.

In fact, few voting systems used in major elections ensure that winners are Condorcet winners, though any direct voting system will do so where there are only two candidates. Nevertheless, the median voter theorem is used in many contexts in political economy. Where issues are democratically decided and can be reasonably represented in one dimension, political economy models often assume that the median voter theorem will hold and that, accordingly, in committees, cabinets, parliaments, courts, and so on, the median voter can force a result that reflects their ideal point. Of course, conditions might not allow this to obtain. Votes are often not taken, for example, in cabinets. In parliaments with strong party systems, agenda setters (the government or prime minister) can ensure that the alternatives do not coincide with the ideal point of the median voter. But we can model the dynamics of what agenda setters can get away with given the ideological makeup of backbenchers of vying parties. So the median voter theorem is used to see how agenda setting and other strategic manipulation are constrained under democratic conditions. It becomes a structural condition or incentive constraining the possible maneuvers of powerful agents.

Spatial models

The Downsian model of voter and party behavior is rather different, and is confused with the median voter theorem simply because it utilizes the result that if there are only two parties then the winning party must secure the vote of the pivotal voter. Assuming a single ideological dimension, that voter will be a median voter. Downs' argument is based on the Hotelling model, which explains why similar businesses, such as shoe shops or electrical goods stores, tend to abide in the same location. The answer lies in competition for the best location – where most people will find it convenient to shop. A business that occupies the second-best location, assuming its products are no better, will always competitively be second. Translated to party competition, the party that will do best is the party that locates in ideological space closest to where most voters are also located – assuming, that is, that voters vote for the party closest to them in ideological space. Parties that locate elsewhere would always do worse.

Downs applied his model with most effect to the then contemporary two-party situation in the USA and the UK. Where there are two parties, each vying to become the majority party that controls the government or legislature, Downs argues that there is a logic for candidates or parties to converge on the center of the ideological spectrum if that center is understood as the median voter (Downs 1957; Hotelling 1929). This entails that if the median voter shifts ideological position over time, the ideological spectrum will also shift over time. But in a multiparty setting, especially when taking into consideration more proportional systems, whilst parties must be aware of the ideological shifts in parties close to them, such dynamic forces can lead to almost any set of shuffling up and down the single dimension. No long-term or point predictions are thus possible.

From that simple informal model, many more formal results have developed. In plurality systems, Palfrey (1984) demonstrates that two-party systems could deter third-party entrants by keeping away from the median voter, thus explaining non-convergence. The possibility of third-party entry can mean neither of the original two parties will locate at the median.

He demonstrates equilibrium where both parties locate away from the median, giving third parties no incentive to enter the contest. In more proportional systems, a third party can be guaranteed representation in parliament and possibly a share of power. Here again divergence is likely. Electoral systems do have determinative effects on party systems (Cox 1997; Grofman 2006), though not straightforwardly. In other words, we do not have to change the structural conditions very much to generate very different predictions. One of the strengths of formal modeling is that we can often see how robust conclusions are to the specific assumptions of the models. And where those assumptions do not hold, we can see why the conclusions of models do not follow. The models here provide a normative or ideal standard by which to judge reality.

Stephen Ansolabehere (2006: 35) suggests that the median voter theorem performs for political scientists the role of the Hardy–Weinberg model for evolutionary biologists. Hardy–Weinberg shows that allele and genotypic frequencies in a population will remain constant over generations in the absence of other evolutionary forces. However, other forces *are* always present, so the model acts as a reference point for measuring their effects. Ansolabehere's point is that the assumptions of the median voter theorem are rarely if ever satisfied, but we can examine what departures from those assumptions mean for voter and party behavior. In that sense, the median voter theorem is a reference point for comparative analysis to explain why it is that the parties are not at the median or the winning party did not capture the median voter.

Almost none of the conditions of the median voter theorem standardly hold. Not every person's preference is single-peaked and, whilst some divergence does not entail that Hotelling/Black forces cannot operate, it can lead to cycling. Increasing the number of dimensions also brings problems of predictability. If preferences over issues cannot be summarized into a single ideological dimension, then voters might choose parties or candidates by the basket of policies each offers. The basket can be thought of as a vector product across n-dimensions. The McKelvey–Schofield theorem demonstrates that, as the number of dimensions increases and with relatively small numbers of voters, any basket of policies can be beaten by at least one other basket (McKelvey 1976; Schofield 1978). Whilst this theorem suggests that politics can be unpredictable, empirical research suggests that most voting decisions seem to be reducible to one or two dimensions and often, whilst the major issues can shift across elections, one or two issues tend to dominate (Poole 2005; Poole and Rosenthal 2007). However, perhaps a bigger problem for the assumptions of spatial models is valence issues (Stokes 1963).

Valence and trust

A valence issue is one where all voters want the same thing – less crime, lower inflation, peace, and so on. So the candidates will not differ much in their promises over valence issues, though they might disagree on how to go about, for example, reducing crime rates. In that case, there will be little ideological divergence over the policies that matter in an election, so voters must select their candidates on other grounds. They are likely to choose on the basis of how much they trust them. Trust can mean several things in this context. It could be an issue of competence or it could be related to how the voter thinks the candidate will respond to unforeseen contingencies.

On the first, voters might choose candidates or parties based on how competent they are on valence issues, and that might depend on how well the candidates have fared in the past. So a lot of voting depends upon rewarding or punishing past behavior, thinking about the future, how much they trust candidates. This can lead to votes of a personal nature for known candidates. Valence issues thus also affect the prediction that candidates or parties will converge on the

median voter. If the candidates are close together, then the personal vote should count for more than when candidates are ideologically separated. If one candidate in a two-candidate contest has valence advantage, then his opponent has an incentive to move further away ideologically to reduce that advantage. That still holds, even though the candidate with valence advantage can locate at the median and so win with certainty (Ansolobehere and Snyder 2000; Wittman 2005).

These models all assume that voters know where in ideological or policy space the parties are located, and that the parties know where the electorate is situated. Even with certainty, we do not necessarily get convergence on the median voter; but with uncertainty we can also get divergence. If parties locate too close to each other, voters might not be able to distinguish them; this will reduce turnout and voting can be random (Hinich and Munger 1994). Such uncertainty can, as Downs (1957) first suggested, open up a role for ideology. Rather than striving to get voters to understand in detail their policy positions, the party creates a brand name associated with a particular ideological position, from which voters can estimate its likely policies. Meanwhile the parties target groups of voters whose policy positions they can best estimate, which means that some groups are left out of the competition for votes.

This leads to the second issue of trust. Ideology can serve as a signal as to how a candidate or party is likely to respond to some issue that has not arisen. One feature of the success of Donald Trump's bid for the Republican candidacy that has puzzled many commentators is why his many wild, implausible and false claims do not seem to damage him. Perhaps by making these claims, wild and false as they might be, he is providing a strong signal to a particular constituency that he thinks as they do on these issues, and so as president will behave as they would like to do if they had that role. The signal is one of political or social disposition, rather than of competence or actual policy preference. What he is saying is, "whatever the constraints, I am like you, so I will do the best that you could do if you were president."

Information

Uncertainty over spatial location shows the need for campaigning to provide information and provide such signals. However, given uncertainty about what voters want, candidates have incentives to try to create variance in their rivals' position by mud-slinging and character assassination, trying to make opponents seem more extreme. This predicts that negative campaigning will be more effective than positive (Hinich and Munger 1994: 216–219). On the other hand, the more ideological the groups, the less likely they are to be swayed. This implies that the battle, at least in two-party systems, will revolve around swing voters, those most likely to shift their votes. These will be the most ideologically neutral, so parties will concentrate their attention on those voters, who might not be the median as defined. Such voters might be swayed more by valence issues, particularly economic issues (Persson and Tabellini 2000: 52–58).

Whilst voting is often portrayed as irrational in terms of collective action, since a single vote is unlikely to be pivotal, the broader problem, and the one Downs (1957) first recognized, was rational ignorance. Again, the fact that many voters know little about the specific policy positions of candidates shows that ideology or signals about dispositions can take on great importance. Most of the models assume that politicians enter politics in order to win. Indeed, contestation is the heart of political economy models. Nevertheless, we should expect that candidates, like voters, have policy preferences. The fact that candidates have policy preferences also explains policy divergence (Besley and Coate 1997; Wittman 1983).

Parties should act as gatekeepers for candidates. On the one hand, parties, at least in strong party systems, should ensure that party leaders follow the ideology of the party, whilst keeping in check candidates who are likely to be electorally unsuccessful. To the extent that the

procedures for choosing leaders are democratic, we should expect new leaders to win by gaining the votes of the median party voter. May's law of curvilinear disparity suggests the most ideological members of a party are the sub-leaders with ordinary members and those at the top, due to electoral consideration, the most moderate (May 1973). Whilst evidence on the claim is mixed (Kitschelt 1989; Norris 1995), we can know that the median member of left parties will be to the left of the median voter in the electorate, and the median member of a right party to the right of the median in the electorate. Given ideological divergence across parties, we should expect party leaders to take up divergent policy positions. However, once elected, new leaders have incentives to maximize their appeal across the broader electorate. We should expect therefore that new leaders will seem more radical than the outgoing incumbents, since they had to appeal to a more radical electorate, but over time they will soften their stance to appeal to the electorate more broadly. However, where a party has suffered a major electoral setback, the need to appeal more broadly might lead it to choose a leader more in keeping with the electorate's policy preferences.

We should also expect parties whose parliamentarians choose their leader to be more aware of electoral contingencies than those whose leadership electoral base is much broader. A major problem in US presidential elections, for example, is that the choice of candidate is broad-based, and occurs only a few months prior to the presidential campaign itself. Candidates must first appeal to their partisan base, but then do not have enough time to moderate their positions without seeming hypocritical when facing the national electorate.

Constructing utility functions

We saw that the rationality assumptions provide consistency that enables prediction, but utility functions must be constructed from behavior. When the four conditions hold, we can represent agents' preferences by a utility function unique up to a positive monotonic transformation. Roughly speaking, this means that two different mathematical functions can both represent the same choice behavior, as long as one increases whenever the other does. The precise interpretation of those functions might not matter for the behavior under analysis, but might do so under different structural incentives.

"Utility" in this formulation is a completely empty concept. It does not represent anything "experienced," such as "happiness," or "satisfaction," or "desire." It simply represents the behavior of the person. We assume that the behavior is going to be consistent – that is, when a person strictly prefers x to y, they will always choose x from the opportunity set $\{x, y\}$. In other words, "utility" does *not* provide a *reason* for choosing x over y. Someone might vote for a conservative party rather than a radical one for all sorts of reasons – they fear radicalism, they trust the conservative leader, distrust the radical leader, and so on. These are the person's *reasons* for voting for the conservative and not the radical party. But the fact they have those reasons means that when they vote conservative (they choose x over y), they maximize their utility. A person's reasons for choosing x over y are arguments in the person's utility function; the function itself simply represents the conclusion of those arguments.

Prediction is a necessary but not a sufficient condition for explanation; and explanation of behavior requires inputing an interpretation on to that behavior. Such interpretations can go astray. Again, though, this is no greater a problem for formal methods than for non-formal ones that also have to make these interpretative moves. For interpretation, further assumptions about the nature of preferences are required. Standard assumptions include material self- or group-interest and knowledge of the policy positions of the candidates or parties. Political economy models standardly assume that voters vote for parties or candidates whose policy positions are

closest to the voter's own position. The models assume thereby that voters vote in their own interests, though those interests can be broadly defined not only in personal but also in family, group or class terms. Material self-interest, even understood broadly, brings the first oft-noted challenge to political-economic models of voter behavior. Of course, such assumptions are not simply those of classic political economy. Many social psychologists also work with such group-oriented self-interest. Weeden and Kurzban (2014) reconstruct party support in the USA across diverse subsets of voters, arguing that interest is what motivates all ideological and partisan support.

Nevertheless, the material self-interest assumption motivates the first important issue for political economy. How do we explain collective action, given underlying material self-interest? The collective action or free-rider problem arises because many actions to attain certain goals that require a large number of people also do not need everyone who would gain from the attainment of those goals to take part. If taking part is costly, then it is in each person's interest to be in the free-riding subgroup that does not actually engage in the collective act. Each person can assume or hope that others, because it is in their interest to secure some outcome, will work to attain it, allowing the individual herself to spend her time on other activities also to her benefit. If all reason in that way, no one will act and the collective interest will not be assured.

Rational turnout

We can easily recast this problem as a strategic game with multiple possible outcomes, some optimal, some sub-optimal. One of the earliest solutions for such collective action problems is the provision of selective benefits giving individuals private as well as collective benefits (Olson 1965, 1971). Such selective incentives need not be positive; much state regulation that, arguably, exists for the collective interest provides punitive incentives. Voting can also be seen as a collective action problem, but one not simply solvable through selective benefits. There are two related questions. First, is relatively high turnout explicable in rational choice terms? Second, are rational choice models consistent with high turnout? The second question enables us to admit that rational choice theory cannot get people to the polls – but once voters are in the polling booth it provides good explanations of their behavior there. Most rational choice scholars want to take on the first question.

So can political-economic models explain why people bother to vote at all? The rational turnout problem has long been associated with rational choice models (Dowding 2005; Fedderson 2004). Given that the chances of being pivotal or decisive in any election are so small and that voting has costs, why would anyone vote (Riker and Ordeshook 1968; Tullock 1967)? Olson's solution for general collective action is selective incentives, but there are few selective incentives on offer for voters.

The problem of getting rational actors to the polls has been tackled on many fronts. Some writers address the calculation associated with the problem, arguing that the probabilities of pivotality are higher than generally thought (Gelman et al. 1998) or that the costs of voting are too low for most people to consider at all (Aldrich 1993; Olson 1965, 1971; Palfrey and Rosenthal 1983). Others suggest that there are potential costs of not voting that can lead some to the polls (Ferejohn and Fiorina 1974). Rather than relying on the decision-theoretic logic of the simple calculation, game-theoretic models suggest that strategic consideration can lead people to vote. After all, if no one votes, then a single individual's voter would be decisive. Following such logic demonstrates that a mixed strategy for voting or not voting is a Nash equilibrium. However, these models predict levels of turnout far below those than actually witnessed (Ledyard 1984).

One early and standard solution is to return to a selective incentive, but an internal rather than an externally provided one. Riker and Ordeshook (1968), among the first to examine the turnout problem, suggest that people believe in a duty to vote. Empirical evidence supports this; and those who say that there is a duty to vote are both more likely to vote and less likely to be deterred by marginal increases in the costs of voting, such as bad weather (Blais 2000). Some believe that adding duty to a utility function trivializes the answer to the question (Barry 1976); however, to the extent that it captures a real factor in a utility function, there is no reason for not so adding it. Taking non-instrumental factors into account is further extended by those who argue that voting brings participation benefits (Brennan and Lomasky 1993). Such models have some important normative implications that I will explore below, but they are perfectly compatible with the spatial models that form the heart of most political-economic modeling.

The turnout problem is in many respects orthogonal to the ways in which political economy models are used to explain voting patterns and party behavior. The models are used for marginal predictions – differences that are made by changing costs and benefits or through shifting party position in ideological space. The strategic considerations are relevant for those concerned about whom to vote for rather than whether to vote at all. The rationale of voting depends in part upon the voter's party or candidate differential: that is, what it would mean for the voter if one or another side won the election. That party differential need not be simply self-interest narrowly understood, but also what the voter understands more broadly for the country as a whole (Weeden and Kurzban 2014). Certainly there is evidence that the greater the ideological divergence amongst candidates in two-horse races, the higher the turnout. Turnout is also higher in elections which matter more, measured by the power of the relevant government; and increases too with the closeness of the expected result (Blais 2000: 58). Conversely, small increases in the cost of voting reduce turnout, again showing that marginal factors matter. Policy makers have tried to reduce the costs of voting with the strategic placement of polling booths, making postal voting easier and so on. Even in countries where voting is compulsory with fines for not voting, such as Australia, turnout is about 80 percent of the voting age population. These suggest that, for at least part of the population, voting costs are not trivial. These considerations suggest that, even if political-economic models cannot explain why people vote, they are useful for helping to explain the way people vote.

One factor might simply be that people do not much consider the costs if they develop the habit of voting and if they do not really understand the probabilities. It has been shown that, whilst people have a good understanding of high probability estimates, they are very bad at behaviorally distinguishing low probability estimates.[1] Furthermore, parties and candidates do not want to win by a single vote: they want large majorities for both safety and stability and also for legitimacy – and voters might feel the same. The problem with the turnout paradox is that it is set up with the wrong utility function.

Alongside these considerations, for many people voting should be understood less instrumentally than expressively (Brennan and Lomasky 1993; Schuessler 2000). When people vote, they are expressing their views in a public forum. Some take that to mean elections are not necessarily Pareto-efficient signals in the same manner as purchasing in markets (Caplin 2007). This seems to downgrade the legitimacy of democratic decision-making. Whilst republicans, for example, might argue that people have a duty to vote, others suggest that the ignorant have a duty not to vote, since their participation reduces the rationality of the decision (Brennan 2012). However, if some people vote with due consideration and others vote randomly, the random voters will not affect the direction of the decision. Only if the ignorant systematically voted against their own interests could we believe that the quality of voting is reduced by ignorance.

Some simple agent-based models applied initially to turnout decision, but also to informational cascades which lead people to behave simply according to utility post their decision, even if the utility level is not causally determined by their behavior. So one might vote for an incumbent government if one's standard of living has risen during its tenure, but for an opposition party if it has stagnated. Surprisingly, such simple decision models show robust results in terms of more complex decision processes. These models can be considered rival to standard political economy models, as they depart from any assumptions over completeness of preference orderings. However, the utility functions they contain are still well-behaved.

Such considerations do not create problems for spatial modeling, since empirically both voter and candidate locations in policy space are based upon assessments made by voters. The major theoretical results of spatial voting are thus not affected by the nature of voter preferences.

Conclusions

Rational choice or political economy models are often thought to be based upon the idea that voters and politicians act out of material self-interest, and such assumptions do lead to the rational turnout problem. However, most models assume some form of spatial calculation where voters vote for the parties closest to them in ideological space. Where voters located themselves will be based upon considerations of their family interest, but that is not unrelated to the interests of most of the country when it comes to economic interests, and not unrelated to ideology. Indeed ideology is an important fact given the issue of rational ignorance. Voters do not know the detailed policies of candidates or parties and so work out what their views are likely to be over a range of issues based upon signals they receive. Signals over the ideology of the candidates and parties are important for voters. Other signals, for example, over the honesty and consistency of candidates, are important, though if candidates play fast and loose with facts but in a way that mirrors the attitudes of voters, the signal that voters receive is that this candidate thinks like they do. Thus they might be expected to behave in power as the voter would, whatever the facts are. This might explain why personal dishonesty is punished more than dishonesty over general facts about the economy, immigration or other social-economic issues. A bigger problem for the spatial models is valence issues where competence is the key factor in voting decisions rather than spatial position. Where valence issues dominate, spatial position as usually measured will not be predictive of outcomes, and specifically we should not expect candidate or party convergence.

The strength of political-economic models is the clarity of the theory and the prediction that the models produce. Often these models use stylized facts or make assumptions that are much simpler than the complex reality. In doing so, the models are normative comparators providing a standard by which to judge reality, where departures from the model predictions provide the explanations of outcomes as much as the models themselves. Some of the models are normative in a stronger sense revealing problems with basic assumptions in the normative desiderata of democracy and show how strategic manipulation becomes possible. All of these issues suggest that, whilst political economy models are an important explanatory technique in our understanding of electoral and party competition, they constitute a weapon that is best used alongside other methods.

Note

1 The fact that academics cannot agree over the probabilities only serves to reinforce this point (Brennan and Lomasky 1993; Gelman et al. 1998; Mueller 2003; Owen and Grofman 1984; Riker and Ordeshook 1968 – to name but a few).

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