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Preferences, the Agenda Setter, and the distribution of power in the EU

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Abstract In this paper, we present a generalization of power indices which includes the preferences of the voters. Using a Multilinear Extension perspective (Owen in Manage Sci 18:p64–p72, 1972a) we measure the probability of the players' voting "yes" for a particular political issue. Further, we randomize the issues and show the influence that the Agenda Setter can have on a player's power. We demonstrate these results using data from the European Union to show how the power distribution may shift after enlargement and under the new Constitutional Treaty.

1 Introduction

The recent accession of ten countries to the European Union (EU) is part of an enlargement process that will almost double the number of members in the next few years. Presumably, the type of coalitions and the intergovernmental political dynamics within the Council of Ministers (herein the Council) is going to change dramatically as a result of the interplay among the 25–27 Ministers.

The vote reapportionment agreed upon at the Nice Summit in December 2000 assigned proportionally more weight to small- and medium-sized countries. Since the majority of the new members and candidates are small or medium, the usual leadership of the large countries may be weakened. In addition, since the new members are relatively more "Euroenthusiastic," the average country's attitude toward the EU will probably shift the "center" of the European political space

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toward higher Euroenthusiasm, away from the old moderate leaders (such as France and Germany). Moreover, the raising of the thresholds necessary for a majority tends to put Euroskeptics in a better bargaining position, which can jeopardize the integration process.

To replace the Nice agreement, a new voting system, as proposed in the constitutional treaty (CT), offers the possibility that winning coalitions will be more likely to form (Baldwin and Widgrén 2004). However, though the CT concerns the whole legal architecture of the Union, the voting system based on a double majority has been one of the most controversial issues.[1]

In this paper we measure the distribution of power under both the Nice agreement and the proposed CT scenarios. We explicitly consider the attitudes of the member States toward the EU. These attitudes play an important role when considering the likelihood of different coalitions forming. Intuitively, ideologically *close* coalitions that include Germany and France will be a priori more likely than coalitions that include ideologically *far apart* countries, such as Spain and Sweden.

Ultimately, however, the probability of coalition formation depends on two things: (1) how close the countries are in terms of their attitudes, and (2) how likely different issues are to come up for a vote. In the case of the EU, the preferences of the European Commission, which serves as a type of *Agenda Setter*, can influence the probability that certain issues are debated and, consequently, the power distribution among players in the voting system.

This paper is novel in several respects. First we develop a measure of power inspired by the work of Owen (1972a), who discusses how the bargaining solution for coalition-form games can depend on the attitudes of the players. We specifically apply this measure to political games, where the policy positions of the voters are crucial in determining coalition formation. Furthermore, we apply our power index directly to the Council using data from the Eurobarometer (EC 2003a, b). By extracting the first principal component of this data set we are able to measure each country's stance toward the EU in general.

Based on our analysis we find that the distribution of power is influenced by the policy positions of the countries only if their reluctance to vote for "far away" issues is sufficiently high and the issues are not equiprobable. Otherwise only the vote apportionment matters. We find that the double majority system will shift power toward the old, larger member states. If the CT comes into effect, politically "central" countries, such as Germany and France, will be favored, and possibly the pre-enlargement political leadership will be restored. Lastly, we introduce the EU Commission into the cooperative game and show that it can exert a very influential role on the allocation of power. We show that even in the case where the Commission is only moderately biased toward some issues, the distribution of total power can change dramatically.

The rest of this paper is organized as follows. In Sect. 2 we discuss the related literature. Next, in Sect. 3, we present the theoretical model. Sect. 4 considers a single dimensional political space and illustrates the empirical application to the

[1] The CT was signed in Rome by the heads of states in November 2004. In May and June 2005 referenda in France and The Netherlands rejected it. This has stopped the ratification process. As of June 2005, the member states have taken a one year "reflection pause" before deciding how to proceed.

Council. Sections 5 and 6 present the European game and the results. Finally, Sect. 7 provides some concluding remarks.

2 Motivation and related literature

Abstracting away from contingent political contexts, *power indices* in general represent the probability that each voter will determine the outcome of a particular voting game. In Shapley and Shubik (1954) or Banzhaf's (1965) symmetric view, the randomization scheme over the coalitions depends only on the number of voters who have already joined the coalition (Weber 1988). This is justifiable from an a priori perspective in which the political profiles of the players are unknown or considered part of the contingencies that we want to abstract away.

However, in political games, as stands to reason, "The coalitions which will form…depend to a large extent on personal affinities of the players" (Owen 1972b, p. 345). That is, similarly-minded voters are more likely to join together. Owen (1972b) suggests considering the distance between voters's *ideal* points on a political space as a measure of their relative affinities. Building on Owen's intuition, Shapley (1977) provides a randomization scheme over the set of all possible orderings. The players are ordered by the level of support for a random issue. Only the "ideologically consistent" orderings are considered. Thus the probability of a coalition emerging is related to the probability of the policy issues from which it is inspired. Owen and Shapley (O-S, 1989) adopt this framework to analyze the choice of the political location of candidates. The O-S method represents an important attempt to build a political power index in an ideological perspective. In terms of applications of the O-S spatial method, Grofman et al. (2004) find relationships between the O-S spatial value, the Copeland winner and the Copeland values.[2] Barr and Passarelli (2004) provide a probabilistic characterization of the O-S method, and show how the occurrence of an issue can depend on the Agenda Setter's preferences. Other valuable theoretical contributions to the analysis of preference based power measures are in Napel and Widgrén (2004b, 2005).

Although the O-S technique is analytically elegant, it suffers from two major drawbacks. First, it tends to assign zero probability to a huge fraction of possible orderings, and this results in excessive concentration of power measures. Moreover, the probability of an alignment does not depend on the distance between two players, but only on the projections of the players' locations on a rotating axis, which measures the political content of the bill; thus, power values are highly sensitive to the positions of the players. However, given any issue, what is important is not only *when* a player says "yes," but also *how likely* she is to say "yes." Here we argue that the distance between a player's ideal point and the proposed issue can yield the player's probability of voting "yes." Simply put, for a given issue, the coalitions that include ideologically close voters and exclude far away ones should be assigned a higher probability than the coalitions that include far away voters, while excluding the closer ones. Being pivotal for a highly likely coalition should give the player more power than being pivotal in a relatively unlikely coalition.

[2] The Copeland winner is the bill that is preferred to the highest proportion of alternative bills. The Copeland value of a bill is the proportion of all other points to which that bill is majority preferred.

We propose a randomization scheme based on the Multilinear Extension (MLE) of games (Owen 1972a). Our approach overcomes the problem of Owen-Shapley, since no coalition is impossible; rather, the ideologically "strange" coalitions are just less likely. We further expand our analysis to include the role of the Agenda Setter, who makes political issues more or less probable. Our approach combines random coalition formation with random issue generation. This can be interpreted as an asymmetric value (quasivalue) generated by players "arriving" randomly; the quasivalue of player i is her expected marginal contribution to the random coalition of players who arrived before her (Monderer and Samet 2002). When arrival times are independently and uniformly distributed in the unit interval, the Shapley-Shubik index is the symmetric solution for a simple political game. Owen (1972a) finds that the value can be computed by integrating the partial derivatives of the MLE along random-arrival paths. In political games, the paths yield each player's arrival probability and hence the probability of casting her "yes" vote at any time. In our model, we do not explicitly introduce entry path functions; however, we start from the idea that "yes" probabilities are functions whose domain is the set of policy issues, and the issues are random.

We apply this method to the EU Council of Ministers. We build up a one dimensional political space where the position of each country measures the relative degree of Euroskepticism or Euroenthusiasm of its citizens. There is a large body of literature that has applied power indices to the EU Council (for example,Widgrén 1994; Laruelle and Widgrén 1998; Holler and Owen 2001; Felsenthal and Machover 2001, 2004; Leech 2002). A frequent criticism of these works concerns their a priori nature, which implies that these models do not take into account the players' attitudes, and the factors that influence the political aspect of the issues to be voted on (Garrett and Tsebelis 1999). Rarely, however, have scholars addressed this criticism by differentiating countries by their level of enthusiasm toward the EU. Barr and Passarelli (2004) have computed spatial (ideological) indices showing that after the EU enlargement a complete reversal in the distribution of power can occur in the EU.

In regard to other political applications, Rabinowitz and Macdonald (1986) apply a spatial approach to the U.S. presidential election. Rapoport and Golan (1985) use the spatial pivotal approach to the parties in the Israeli Knesset. Recently, Grofman et al. (2004) propose a model in which the states' differences determine their influence on the outcome of the U.S. presidential elections. Napel and Widgrén (2004a)) apply non-cooperative solution concepts to the interinstitutional game between the Council and the Parliament.

3 The theory

Let $\Theta \subseteq \Re^m$ be a political m-dimensional space, and $\theta \in \Theta$ be the random political issue. Suppose issues are distributed according to $\Pi(\theta)$, which we assume is absolutely continuous over Θ. Call $p(\theta)$ the probability density function of θ, where $p(\theta) : \Theta \longrightarrow \Re$, and $\int_\Theta p(\theta)\mathrm{d}\theta = 1$.

Consider a set $N = \{1, 2, \ldots, n\}$ of players and denote by 2^N the collection of all subsets (*coalitions*) of N. A game is a real-valued function $v : 2^N \longrightarrow \Re$ that measures the worth of each coalition. Suppose v is a simple game, which takes

on only the values 0 and 1. When $v(S) = 1$ (with $S \subseteq N$), then S is a *winning* coalition, otherwise S is a *losing* one.

Suppose a coalition S has to be formed at random. Let $q_i(\theta)$ be a function that assigns for every issue a probability that player i will participate in $S(\theta) \subseteq N$. In a political game where player i is assigned $w_i \in \{1, 2, \ldots\}$ votes, one can interpret $q_i(\theta)$ as the probability of voting "yes"; conversely, $(1 - q_i(\theta))$ is the probability of voting "no" and therefore casting zero votes. We assume that each player i has a single ideal (most preferred) point P_i in the political space: $P_i \in \Theta$. This P_i represents the relative sentiment or attitude of the voter. For all i, $q_i(\theta)$ is single peaked in P_i. Furthermore, we assume that $q_i(P_i) = 1$. These assumptions reflect the idea that, in the context of imperfect information, for any issue other than her most preferred one, there is a chance that voter i prefers the *status quo* to θ. This chance increases as we move away from the ideal issue. In addition, $q_i(\theta)$ can be seen as the probability that side payments from other players are not sufficient to convince i to cast her vote. The P_i's are common knowledge, and, as we show below, players use all the available information to compute probability distributions over the set of all possible coalitions. Further, we assume they do not exploit imperfect information strategically.[3]

Consider the multilinear extension (MLE) of the game v (Owen 1972a),

$$f(q_1, \ldots, q_n) = \sum_{S \subseteq N} \prod_{i \in S} q_i \prod_{i \notin S} (1 - q_i) \cdot v(S). \tag{1}$$

Since $\prod_{i \in S} q_i \prod_{i \notin S} (1 - q_i)$ is the probability of coalition S emerging, one can interpret equation (1) as the expected worth of the game.

Once player i knows θ with certainty, she observes her and the other players' propensity to enter every possible coalition, i.e., $\{q_1(\theta), \ldots, q_n(\theta)\}$. Following Owen's intuition on the MLE, the player's prospect from playing a game, is given by

$$f_i(q_1(\theta), \ldots, q_n(\theta)), \tag{2}$$

where f_i denotes the partial derivative of the MLE function of v with respect to q_i:

$$f_i(q_1(\theta), \ldots, q_n(\theta)) = \sum_{\substack{S \subseteq N \\ i \notin S}} \prod_{j \in S} q_j(\theta) \prod_{\substack{j \notin S \\ i \neq j}} (1 - q_j(\theta)) \cdot [v(S \cup i) - v(S)]. \tag{3}$$

Denote $S(\theta)$ as a random coalition, which is a function of θ. If θ was known and equal to θ_0, Eq. (3) would yield player i's expected worth from playing the game, $E(v(S(\theta_0) \cup i) - v(S(\theta_0)))$. Recall that for simple games if S in (3) is such that $v(S \cup i) - v(S) = 1$, then player i has a *pivotal* role in $S \cup i$. This means that player i's reward is just given by the quota of winning coalitions that swing from losing to winning thanks to her vote. Since the political issue is random, we take

[3] In this paper our goal is to compute preference-based power indices. However we believe that with a set of stronger assumptions, a non-cooperative stage in which players try to maximize their bargaining position could be added to this model.

the expected value of (3). This yields an *Ideological MLE Power Value* for player i, defined as:

$$\psi_i = \int_{\Theta} E(v(S(\theta) \cup i) - v(S(\theta)))\mathrm{d}\Pi(\theta). \tag{4}$$

ψ_i yields the likelihood that player i casts the swing vote, given the other players' attitudes to participate in any coalition inspired by a random policy issue. This probability emerges from a randomization scheme in which the probability of each coalition depends upon the probabilities of voting "yes" by all the other players, and upon the probability of any possible issue.

For an illustration, consider a simple weighted majority game, $(q; w_1, \ldots, w_n)$ in which a coalition S is winning if it collects a sum of votes equal to or greater than the majority threshold, q; i.e., $\sum_{j\in S} w_j \geq q \Leftrightarrow v(S) = 1$,

$$f_i(q_1(\theta), \ldots, q_{i-1}(\theta), q_{i+1}(\theta), \ldots, q_n(\theta)) = \Pr\{q - w_i \leq Y_i(\theta) < q\}, \tag{5}$$

where $Y_i(\theta) = \sum_{\substack{j\in N \\ j\neq i}} Z_j(\theta)$ and $Z_j(\theta)$ is a discrete random variable such that $\Pr\{Z_j(\theta) = w_j\} = q_j(\theta)$ and $\Pr\{Z_j(\theta) = 0\} = (1 - q_j(\theta))$.

In words, Eq. (5) states that once the political issue is known and equal to θ, player i's a priori chance to be pivotal is given by the probability that the sum of votes cast by all the other players is lower than the majority threshold by at most player i's votes.

Since the political issue θ is random, the probability expressed by (5) is also random. Thus player i's pivotal power becomes the expected value of Eq. (5):

$$\psi_i = \int_{\Theta} f_i(\theta) \cdot p(\theta)\mathrm{d}\theta, \tag{6}$$

where $f_i(\theta)$ is defined by (5). Note the equivalence between (4) and (6).

In Sect. 5 we will compute *normalized* Ideological MLE power indices, derived from (6):

$$\phi_i = \frac{\psi_i}{\sum_{j=1}^{n} \psi_j}. \tag{7}$$

The normalized index given by Eq. (7) can be interpreted as the percentage of the total pivotal power that is assigned to each voter.

Since, in political games, enthusiasm or reluctance toward participation in coalitions can determine the influence of the pivots, the MLE power index can say more than the symmetric indices about the effects of vote apportionments on the political interplay among the voters. Moreover, if one assumes that in the political arena there are logrolling opportunities and spoils transfers, then the MLE index can be taken as a prediction of how the "pie" will be split among the voters. In other words, if side payments are possible, the MLE index is a bargaining solution in which a relatively favorable (unfavorable) political position of one player can result in additional (less) bargaining power.

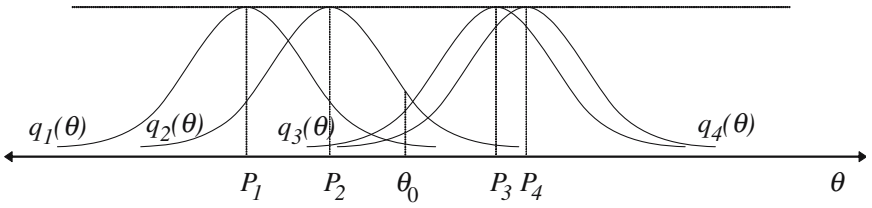

Fig. 1 Probability "generating" functions for different players

4 The one dimensional case

In this section we restrict our attention to a one dimensional political space, $\Theta \subset \Re$, to elucidate the empirical application in Sect. 5 below, where we create a one-dimensional political space for the EU.

The motivation, in this case, for the $q_i(\theta)$ (the q_i-functions) is straightforward. For example, an elected representative (the voter i) is voted into office in order to represent the will of the people. This will or political profile is given by $P_i \in \Theta$. In particular, if an issue to be voted on should arise that perfectly corresponds to this will, the representative will vote "yes" with certainty. However, if issues emerge that are further away from the popular will, then the probability of voting "yes" will decrease as the issues get further from P_i. How "quickly" the probability decreases as a function of the distance is related to how "tough" the populace wants the representative to be. In addition, as mentioned above, an alternative interpretation is as follows. As the probability that the current bill is superior to the status quo decreases, the probability that side payments can be sufficient to compensate the voter is decreasing as well.

Figure 1 shows a graphical representation of the relationship between "yes" probabilities and the political issues. The horizontal axis represents the political space, and the $q_i(\theta)$'s are given for four players. In order to conduct the empirical analysis below we introduce some additional assumptions. The "yes" probability functions are bell-shaped with unit global maxima at the ideal points. We further assume that the bell-shaped functions are the same for all the players. In sum, the political asymmetry among the players arises only by their different ideological positions in the political space. We show below that this can have important consequences for the EU if the distribution of issues is not uniform.[4]

For example, the bill proposal θ_0 will generate higher enthusiasm by voter 2, and lower enthusiasm by players 3, 4 and 1, in that order. These differing levels of affinity to that political issue are captured by the values $q_i(\theta_0)$, with $i \in \{1, 2, 3, 4\}$. These probabilities affect the probability of coalition formation. In general, coalitions that include ideologically close players with high affinity toward the issue θ_0 (such as players 2 and 3) and exclude less enthusiastic players (1,4) will be given higher probability.

[4] The additional assumptions in this section are designed to simplify the empirical implementation. We leave the weakening of the assumptions for future extensions. Further, we expect that other sources of asymmetry (such as different shapes for the "yes" functions) would distort power even more.

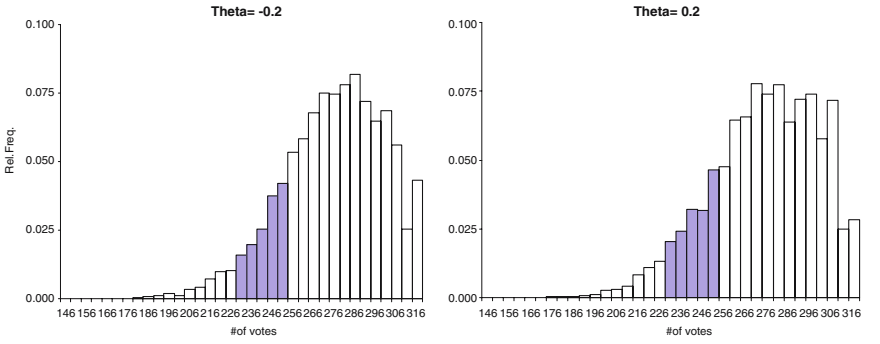

Fig. 2 Histograms in five vote intervals, EU 27, Post-Nice. The majority threshold equals 250/345 votes

4.1 Given θ

Suppose θ_0 is given and known. Once the n players' probabilities of voting "yes" are determined, we can compute the probability of any possible coalition $S \subseteq N$. Following Shapley and Shubik's intuition, the power of the voter i can be measured as the probability of being pivotal in any possible coalition she joins. As noted above, this is equivalent to analyzing all the possible sum of the votes cast by the other $(n-1)$ players, and computing the probability of that sum to be in the range $[q - w_i, q)$, as specified by Eq. (5).

In our analysis of the Council of EU Ministers, we generate country i's chance of being pivotal by the Monte Carlo method. For a given θ, we first "remove" country i and then randomly generate 15,000 possible coalitions for the EU 27 countries (from none vote "yes" to all vote "yes"), given each country's probability of voting "yes": $q_j(\theta)$, $j \in \{N \setminus i\}$. From this we get an estimated probability for the number of votes in the "yes" coalitions (without distinguishing the composition of these coalitions). We then determine for which outcomes i will be pivotal. To get the power value we then sum the probabilities of each of these coalition outcomes.

As an example, consider, the allocation of votes decided at Nice (the Post-Nice scenario) and the enlarged Council with 27 members.[5] Since, for example, Germany has 29 votes and the majority threshold has been fixed at 250 votes, Germany will be pivotal for all coalitions that have between 221 and 249 "yes" votes. In Fig. 2, we present a histogram of the number of votes achieved by all possible coalitions in the Council that exclude Germany, when $\theta = -0.2$ and $\theta = 0.2$. Germany's chance to swing the outcome for $\theta = -0.2$ is 0.140 (the area of the shaded histograms on the left-hand graph), and for $\theta = 0.2$ it is 0.155 (right-hand graph). When $\theta = 0.2$ it is more likely that Germany will be pivotal since there is a greater probability of coalitions forming in the "pivotal region."

How can this be interpreted? Evidently Germany is more likely to be pivotal in coalitions where some Euroenthusiasts are in and some Euroskeptics are not.

[5] The analysis for a larger set of θ's and all the countries will be presented below.The voting system agreed at Nice is based on three majority thresholds (votes, population, number of member countries). We concentrate here on the first threshold, since we find that the proportion of the winning coalitions (and the power estimates) are only marginally affected by the second and third thresholds.The current majority thresholds have been fixed in the Accession Treaty for the current 25 members. We apply the same vote majority threshold (72.3%) to the future scenario of 27 members.

Shifting the issue from -0.2 to 0.2 causes Euroenthusiasts to increase their "yes" probability and the Euroskeptics to reduce theirs. As a consequence, those coalitions in which Germany is pivotal are simply more likely. This increases Germany's power. Note how our framework can capture the change of each player's power as a result of the other players' differing attitudes toward different political issues (see also the following section).

4.2 Random θ

Given θ, coalitions that include politically close players will be more likely to occur. This seems reasonable in political games when some information about the voters' political profiles is available. Moreover, if a player is the pivot in a highly probable coalition, then she will be assigned more power; and this is the general interpretation of the MLE application to our spatial perspective.

However, some issues can be more likely than others, and we should reasonably expect that being pivotal in a coalition that is inspired by an unlikely issue does not give the pivot substantial power. In sum, power is the result of two random factors:

1. The probability of being pivotal in all the possible coalitions:

$$\sum_{\substack{S\subset N\\ i\notin S}} \prod_{j\in S} q_j(\theta) \prod_{\substack{j\notin S\\ i\neq j}} (1-q_j(\theta)) \cdot [v(S\cup i) - v(S)]$$

and

2. The probability of the issue that inspires the coalition formation: $\Pr\{\theta\}$.

This is the idea of measuring the power by using Eq. (4) or equivalently Eq. (6).

4.3 The role of the Agenda Setter

The probability that a particular bill will be brought up for a vote can be thought of as capturing the effect of the "political winds" (Shapley 1977, p. 20), which is the influence exerted by the institution that has the monopoly of the political initiative (Agenda Setter), or any other random, relevant circumstance that can characterize the political content of the bills on which players expect to vote.

The reasoning for the inclusion of the Agenda Setter in the calculation of power is straightforward. If the players share common knowledge about the Agenda Setter's preferences (type), they will be able to compute the probability of any possible issue. Within the EU, the Commission has the monopoly over the proposals for a large portion of issues, playing the role of de facto Agenda Setter.[6] A pro-centralization Commission will induce the Ministers to expect more integrationist proposals rather than con-centralization ones. This would assign more power to those countries whose pivotal power increases when pro-centralization

[6] More precisely, the Commission is not a pure Agenda Setter: amendments by the legislatures are always possible. The Commission is obliged to propose legislation when prompted by the Council or Parliament. The Council can amend the proposal by unanimity under the Consultation Procedure. While, under the Co-decision Procedure, the Council and the Parliament can amend the proposal by qualified majority and by simple majority respectively. Nevetheless, we consider that the preferences of the Commission can be strongly reflected in the final outcome of these voting procedures.

issues are to be voted on. The Commission is not a player per se. It influences the game among countries just by the way the players perceive how the "political wind" will blow. Any information about the Commission's type will be exploited by the players to generate expectations about the likelihood of any coalition. In our cooperative game framework we have a very loose set of hypotheses concerning the preferences of the players. In general, we assume that these preferences are independent of the Agenda Setter's. Moreover, we abstract away from short run contingencies regarding specific issues and assume that the Agenda Setter is always able to propose bills that can be preferred to the status quo by the winning coalition: i.e., on every bill proposed by the Commission, a winning coalition is always possible.

On the one hand, this can be justified in the framework of our a priori approach, aimed at analyzing the "pivotal" role of the countries before knowing how much each voter is interested in specific issues. On the other hand, the Commission is frequently invited by the Council to propose bills under given guidelines; this should imply that in a large majority of cases the proposals represent an improvement of the aggregate utility of the voters. However we cannot exclude the possibility that some voters who are needed to reach a majority could lose from the passage of the bill. This raises the issue of the Pareto improvement originated by the voting outcome. In fact, frequently, a majority can be reached only as a result of side payments to these voters. The assumption that side payments are possible, i.e., the cooperative game allows for transferable utility, is not an unrealistic hypothesis for the EU bargaining game, since side payments can be ensured to countries by privileged funding from the central budget.

5 Measuring power in the EU

5.1 Preferences

To empirically determine each country's preference (attitude) toward the EU, we use factor analysis to extract the first principal component from our data set, which comes from the Eurobarometer, a survey of EU citizen's attitudes toward EU policies (EC 2003a,b).

In general, given a data set of variables that have high correlations among them, there is the possibility of reducing the dimensionality of the data set in order to capture a general, yet concise, relationship among the variables. Because, in this case, a country's position on a particular issue toward the EU (represented by the percentage of citizens who are in favor of the EU government having jurisdiction over that issue) tends to be similar across policy issues, we can measure the degree to which a country is pro or con EU centralization by creating a new variable – a latent factor – that is, in effect, a linear combination of the sentiments across 25 different issues. We use principal component analysis to generate this single latent factor, which measures how pro or con a particular country is toward the EU.[7] In

[7] For the sake of brevity, we do not provide the mathematical derivation of principal component extraction. For more information, see Lawley and Maxwell (1971) and Kachigan (1991). The principal components analysis was done with Stata 8.0. The data and Stata commands are availabe upon request. Appendix A provides details, and lists the "factor loadings" which are the correlation coefficients of each variable with the latent factor. As can be seen in Table 4, they are all relatively large and positive.

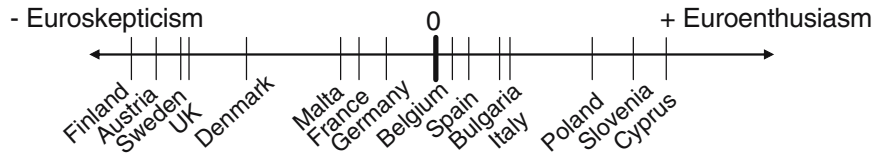

Fig. 3 Ranking of country's preferences from most con to most pro, EU 27

our case, this new composite variable (factor) accounts for approximately 70% of the variation of sentiments across the EU.[8]

Large positive values for the latent factor indicate a relative pro-EU stance, values close to zero reflect a neutral stance toward the EU, and large negative values reflect a general opposition to relinquishing national decision making to the EU. The values of the preferences are given in standard deviation units, i.e., each preference value is the number of standard deviations away from the mean value, which in this case is zero. In sum, the method of factor analysis generates a composite variable for each country which summarizes the average degree of pro or con sentiment across policy issues. Since, for example, Finland's average pro response for the Eurobarometer is only 38%, it has the most negative factor value; Cyprus, on the other hand, has an average of 71% pro response, and thus has the largest positive factor value.

The one dimensional political space is shown graphically in Fig. 3 ; and Table 1 presents the numerical values of each country's ideal point P_i, which is the scored latent factor. In Fig. 3, for clarity we list only some of the 27 actual and potential members. We assume that the voters in the Council (the Ministers) have exactly those preferences. We do not consider any discrepancy between the representatives' private objectives and the citizens' views or, in other words, any agency problem.

The assumption that each Minister's "yes" probability is a function of the Eurobarometer results deserves a further comment. Though it can be argued that if a member country has a solid government majority, say, against integration, then the percentage of citizens who are in favor of more integration, be it 10 or 40%, does not make any difference in terms of the acceptance probability of that country. We claim, however, that our analysis is valid from an a priori perspective: the countries that have only 10% internal opposition are just more likely to vote repeatedly against pro-integrationist measures since the Minister is seen as incurring a lower internal political cost with respect to the case of a stronger opposition of 40% of the citizens. Moreover, the representatives of countries in which citizens are moderately anti-EU (the 40% case) are less likely to adopt strong anti-EU attitudes if they want to increase their probability to be re-elected; accordingly, we translate this into acceptance probabilities. Lastly, we do not exclude that small changes in the national public opinion can result in quick and sudden jumps in the representative's position in the Council; however this seems to be more likely to occur in contingent situations, to which our analysis does not apply.

[8] The residual variation of 30% reflects the fact that countries have some deviations in their sentiment from their averages. These deviations may reflect specific political or cultural sentiments about certain issues.

Table 1 Ideal points of each country, EU27

Country	Preferences
Finland	−1.941
Austria	−1.784
Sweden	−1.527
UK	−1.522
Denmark	−1.126
Malta	−0.594
France	−0.440
Ireland	−0.429
Netherlands	−0.419
Luxembourg	−0.380
Germany	−0.329
Portugal	−0.237
Estonia	−0.041
Belgium	0.142
Czech	0.261
Spain	0.296
Bulgaria	0.349
Italy	0.367
Hungary	0.403
Greece	0.630
Latvia	0.651
Lithuania	0.688
Slovakia	1.137
Poland	1.165
Romania	1.381
Slovenia	1.539
Cyprus	1.760

5.2 "Yes" probabilities

In order to determine the probability of each country voting "yes," as a function of θ and P_i, $i = 1, \ldots, n$, we use the function:

$$q_i\,(P_i; \theta) = \mathrm{e}^{-\pi (P_i - \theta)^2}. \tag{8}$$

Equation (8) is bell-shaped, as depicted in Fig. 1. The bells are the same function, but are centered on different ideal points. We implicitly assume that the players have different ideological positions, but their reluctance to vote for bills that are equally distant from their most preferred issue is the same. Again this is a strong assumption that can be appropriate only in an a priori perspective in which the player ignores the specific nature of the bills to vote on; then for bills that are far from the most preferred one there is only a small chance that the benefits are higher than the costs. As a consequence, she will vote "yes" with a given probability that is lower for far away bills.

5.3 Power values

We generate two hundred and one θ values in equal intervals from -1 to 1; i.e., $\theta \in \{-1, -0.99, \ldots, 0, \ldots, 0.99, 1\}$.[9] Given the set of "yes" probabilities for each country and each θ, we then calculate the probability of being pivotal for each country using the Monte Carlo method discussed above. We analyze two alternative scenarios: (1) the enlarged EU-27 with the allocation of votes decided at Nice; and (2) the CT system with a double majority threshold (i.e., at least 55% of member states and 65% of the total EU population). The Ideological MLE indices are shown in Table 2, where the S-S indices are also listed.

5.4 Agenda Setter

In order to analyze the influence of the EU Commission's type we need a distribution of θ's in the range of possible values. In this paper we use four different density functions, which imply four different attitudes of the Commission. These functions are:[10]

1. Unknown Agenda Setter:

$$\theta \sim U\,[-0.2, 0.2] \tag{9}$$

2. Pro-centralization Agenda Setter:

$$p\,(\theta) = \left\{ \begin{array}{c} 2.5 + 12.5 \cdot \theta \quad \text{if } -0.2 < \theta < 0.2 \\ 0 \qquad \text{otherwise} \end{array} \right\} \tag{10}$$

3. Con-centralization Agenda Setter:

$$p\,(\theta) = \left\{ \begin{array}{c} 2.5 - 12.5 \cdot \theta \quad \text{if } -0.2 < \theta < 0.2 \\ 0 \qquad \text{otherwise} \end{array} \right\} \tag{11}$$

4. Balanced-EU Agenda Setter

$$p\,(\theta) = \left\{ \begin{array}{c} 5 + 25 \cdot \theta \quad \text{if } -0.2 < \theta < 0 \\ 5 - 25 \cdot \theta \quad \text{if } \quad 0 \leq \theta < 0.2 \\ 0 \qquad \text{otherwise} \end{array} \right\} \tag{12}$$

The triangular distributions above are ad hoc functions aimed at analyzing if any distortion in the distribution of power may occur because of the voters' expectations regarding the Agenda Setter's type. These equations are inspired by the idea that the Commission never proposes issues that are substantially less "integrationist" than Finland's most preferred issue and substantially more "integrationist" than the most Euroenthusiastic country, Cyprus. Thus we restrict the support of $p(\theta)$ to $[-0.2, 0.2]$, which is divided in 200 intervals.

[9] We do not consider values of θ less than -1 or greater than 1 because, for extreme values, the "yes" probabilities are very small for all voters. This makes any coalition very unlikely and, as a consequence, does not assign relevant power to the countries that are pivotal in those coalitions.

[10] In order to avoid approximation problems with high decimals, we divide the preference by 10 when determining the probabilites. This rescaling is computationally innocuous.
Note that the absence of information about the Agenda Setter implies a uniform distribution over the set of possible θ. The other three density functions are assumed to be triangular for computational simplicity.

6 Results

Tables 2 and 3 include, for both voting schemes, the estimates of the Ideological MLE index without and with an Agenda Setter, respectively. In Table 2 we can see that with a uniform distribution (no Agenda Setter) our results are very close to the S-S index. The reason is that the probabilities of voting "yes" yielded by Eq. (8) in $[-1, 1]$ are relatively high and similar for all players.

The ideological MLE index, defined in Eq. (4), is a non-symmetric index constructed to emphasize the role of the ideological differences of the voters. The importance of the ideological positions is negatively related to the willingness of each player to vote "yes" for issues other than the most preferred one. One could expect that larger differences between the ideological MLE index and the S-S index to emerge in cases when countries are more reluctant to vote "yes" as the issue gets further from the ideal point: i.e., the $q_i(\theta)$'s are decreasing rapidly as we move away from P_i's. However, this is not the case. We made other estimates using different specifications for equation (8), and we found that significant differences between the two indices arise when the distribution of the issues is non-uniform.

Table 2 Measures of power, EU 27, Nice and CT[a]

Country	Votes	Pop. (000)	S-S Nice	S-S CT	MLE Nice	MLE CT
Austria	10	8,121	0.028	0.016	0.028	0.016
Belgium	12	10,262	0.034	0.020	0.034	0.020
Bulgaria	10	8,170	0.028	0.016	0.028	0.016
Cyprus	4	671	0.011	0.001	0.011	0.001
Czech Rep	12	10,272	0.034	0.020	0.034	0.020
Denmark	7	5,349	0.020	0.010	0.019	0.010
Estonia	4	1,436	0.011	0.003	0.011	0.003
Finland	7	5,181	0.020	0.010	0.019	0.010
France	29	59,521	0.087	0.125	0.088	0.125
Germany	29	82,193	0.087	0.186	0.088	0.190
Greece	12	10,565	0.034	0.020	0.034	0.021
Hungary	12	10,024	0.034	0.019	0.034	0.020
Ireland	7	3,820	0.020	0.008	0.019	0.007
Italy	29	57,844	0.087	0.121	0.088	0.120
Latvia	4	2,417	0.011	0.005	0.011	0.004
Lithuania	7	3,696	0.020	0.007	0.019	0.007
Luxembourg	4	441	0.011	0.001	0.011	0.001
Malta	3	390	0.008	0.001	0.008	0.001
Netherlands	13	15,983	0.037	0.032	0.037	0.032
Poland	27	38,649	0.080	0.078	0.080	0.077
Portugal	12	10,023	0.034	0.020	0.034	0.020
Romania	14	22,443	0.040	0.045	0.039	0.045
Slovakia	7	5,401	0.020	0.010	0.019	0.010
Slovenia	4	1,989	0.011	0.004	0.011	0.004
Spain	27	39,490	0.080	0.080	0.081	0.080
Sweden	10	8,883	0.028	0.018	0.028	0.017
UK	29	59,832	0.087	0.127	0.086	0.124

[a] Results calculated via the Monte Carlo method

Table 3 Measures of power with agenda setter preferences, EU 27 Nice and CT

Country	Nice				CT			
	Uniform[a]	Con[b]	Pro[c]	Balanced[d]	Uniform[a]	Con[b]	Pro[c]	Balanced[d]
Austria	0.021	0.023	0.020	0.019	0.010	0.009	0.011	0.008
Belgium	0.029	0.028	0.030	0.026	0.015	0.012	0.017	0.012
Bulgaria	0.023	0.022	0.023	0.020	0.011	0.009	0.013	0.009
Cyprus	0.008	0.007	0.009	0.007	0.001	0.001	0.001	0.001
Czech	0.029	0.028	0.030	0.026	0.015	0.012	0.017	0.012
Denmark	0.015	0.015	0.014	0.013	0.007	0.006	0.008	0.005
Estonia	0.008	0.008	0.009	0.007	0.002	0.001	0.002	0.001
Finland	0.014	0.015	0.013	0.012	0.006	0.005	0.007	0.005
France	0.107	0.117	0.098	0.115	0.127	0.146	0.115	0.127
Germany	0.107	0.115	0.101	0.117	0.232	0.283	0.201	0.258
Greece	0.029	0.027	0.030	0.026	0.016	0.012	0.018	0.013
Hungary	0.029	0.028	0.030	0.026	0.014	0.011	0.016	0.011
Ireland	0.015	0.015	0.015	0.013	0.005	0.004	0.006	0.004
Italy	0.108	0.099	0.116	0.120	0.136	0.117	0.148	0.149
Latvia	0.008	0.008	0.009	0.007	0.003	0.002	0.003	0.002
Lithuania	0.015	0.014	0.016	0.013	0.004	0.003	0.005	0.003
Luxembourg	0.008	0.008	0.009	0.007	0.000	0.000	0.000	0.000
Malta	0.005	0.005	0.005	0.004	0.000	0.000	0.000	0.000
Netherlands	0.032	0.033	0.032	0.030	0.026	0.020	0.029	0.022
Poland	0.091	0.070	0.109	0.096	0.087	0.059	0.104	0.090
Portugal	0.029	0.029	0.028	0.026	0.014	0.011	0.016	0.011
Romania	0.034	0.029	0.039	0.031	0.046	0.030	0.056	0.045
Slovakia	0.015	0.014	0.016	0.013	0.007	0.005	0.008	0.005
Slovenia	0.008	0.007	0.009	0.007	0.002	0.002	0.002	0.001
Spain	0.097	0.090	0.103	0.106	0.092	0.071	0.105	0.096
Sweden	0.022	0.024	0.020	0.019	0.011	0.010	0.012	0.009
UK	0.093	0.122	0.069	0.092	0.111	0.159	0.081	0.097

All results were calculated via the Monte Carlo method

[a] The Commission has no preferences over a subset of the political space

[b] The Commission prefers to slow down integration

[c] The Commission prefers pro-integration bills

[d] The Commission has balanced attitudes toward integration

6.1 From Nice to the new constitution

Table 2 below illustrates the relevance of the shift from the Nice system to the double majority for the distribution of power within the Council, as set in the CT. The weights of the Nice system are less than proportional to the population of the countries and reflect approximately the square root of the population. Due to the fact that the recent enlargements include mostly small- and medium-size countries, under the Nice system the political interplay among big and small members changes dramatically. Under the CT, in coalitions with more than 55% of member states, the weights are given by the population. It is not surprising that the double majority ensures the four largest countries more power (i.e., a larger MLE index value). In particular, Germany and France are the most powerful countries. This raises the suspicion that the CT majority proposal is aimed at restoring the political leadership of the Franco–German axis within the EU.

In terms of ideological power the CT is favorable to Romania and to Spain, despite the fact that Spain tends to lose in terms of the S-S index. The reason is their relatively favorable position in the ideological space. Under the CT the most

powerful countries are those that cast the vote needed to reach the 65% threshold; under Nice the threshold is approximately 72%. Thus, under the CT the pivotal country is on average a less reluctant one than under Nice.[11] This explains also why the smaller skeptics (such as Luxembourg or Malta) lose in terms of ideological power. In fact if ideological positions of small countries were disregarded one would expect the contrary, since under the CT the loss of weight should be offset by the gain in terms of minimal number of states.

6.2 The impact of an active Agenda Setter

The role of the Agenda Setter is stressed by the high redistribution of power that takes place as a consequence of different probability distributions over the set of possible issues [Eqs. from (9) to (12)]. A general result is that with an active Commission the ideological positions of the countries become much more crucial in determining the power.

In general, concentration of power occurs when the EU Commission does not play a neutral role. An active Agenda Setter puts the largest EU members in a better position. In particular, Spain, Poland and Italy gain more with a pro-centralization Commission. The story is rather simple: the Commission proposes bills that are more frequently on the right-hand side of the political space; the Euroenthusiasts participate more enthusiastically, or, equivalently, cast their votes first. Since, the Euroenthusiasts are in general small- and medium-size, newly accessing countries, the majority threshold is reached with a vote cast by a moderately Euroenthusiastic country. Italy and Spain, and in some cases Poland, are in such a position, and this gives them more power. The same argument applies to the greater power of Germany, France and the UK in the case of a con-centralization Commission.

Since the majority threshold under Nice is higher (about 72% of votes) than under the CT (65%, provided at least 15 countries vote "yes"), the power concentration effect due to the Agenda Setter in favor of big central countries (Germany, France) is stronger with the CT system, i.e., the double majority restores the Franco–German axis and the Agenda Setter reinforces the axis. Also Nice tends to assign more power to the Euroenthusiasts if the Commission is pro-centralization. This can be a reason for the Polish opposition to the first version of the voting system proposed in the CT. However, this effect is relatively smaller as compared to the CT. A con-centralization Commission under Nice is relatively favorable to the Euroskeptics and to more central large countries. An indifferent Commission is favorable for the five largest members (France, Germany, Spain, Italy, UK).

The impact of a con/pro Agenda Setter on the distribution of power is higher under the CT than Nice. Above we remarked how the Commission's role turns in favor of larger members. The CT assigns more weight to the larger countries, boosting the power concentration effect of the Commission.

[11] Following this argument, one can conclude that Spain's initial strong opposition to the original system proposed by the European Convention (in which the thresholds were lower) is unjustified or preferably motivated by strategical purposes. However, after the March 2004 elections, Spain has radically changed its position in the IGC negotiations for the Constitution. The new position of the Spanish government is more coherent with the real prospects of the new voting system and with the widespread Euroenthusiasm over the Spanish population.

7 Conclusion

In this paper we explore the relationship between the tendency of similar-minded players to form coalitions and their respective power values. Our approach is to use a multilinear extension with ideological specification of the players' probability of participating over the set of all possible coalitions. In this cooperative game, political preferences are modelled without adopting utility functions. Any information about players' attitudes are embodied in the function generating the probability of voting "yes" for given political issues.

In our application we assume bell-shaped functions centered at the player's most preferred point in the political space; the ideological positions of the countries reflect citizens' attitudes toward EU centralization. If the issues are equiprobable this scheme generates values close to S-S index. In addition, we evaluate the consequences of the vote reapportionment proposed in the Constitution. The double majority system shifts the power in favor of the old, larger member states. Our probabilistic ideological approach assigns the CT a political meaning: the double majority is designed to restore the political leadership of the EU-15 within the EU-27.

We then generate distributions for alternative types of Agenda Setters and verify that the EU Commission can exert an influential role on the allocation of power. We introduce ad hoc, simple probability distributions for the issues in order to test the effects of four alternative types of Commissions. A type change can result in a power shift of up to 20%.

We are mindful of several caveats in our work. In real situations, representatives are likely to move slightly away from the electorates' mandate, looking for more favorable positions in the political game, or pursuing private interests. Of course this is more likely to happen in specific voting contexts or decisions, whereas for a wide set of unknown future decisions the representatives should, on average, reflect their electors' preferences.

Another concern is related to the robustness of the power evaluations. They are point estimates that are based on the specific "yes" functions we use [Eq. (8)] and on the ad hoc probability distributions over the set of issues [Eq. from (9) to (12)]. Very large shifts of power are however robust. Different specifications for the acceptance functions yield different point estimates but do not change the "policy dimension" of our findings: the Commission plays a strong role in the allocation of power among countries, and this role is larger with lower majority thresholds.

Furthermore, one could be concerned about the fact that our a priori analysis is based on short run estimates of the citizens' preferences. The political positions of the member countries can change over time. This could be particularly true for newly accessing countries, whose citizens are relatively inexperienced with the EU. We do not believe that such changes will occur rapidly, though. Italy, for example, is typically a Euroenthusiast, and the UK has been Euroskeptic since its accession, and will remain so for a long time to come. France and Germany are widely recognized to be close in the center of the EU political space. However, even if some changes occur, their impact on our evaluations would be relatively minor and should not dramatically challenge the main conclusions of our analysis.

Provided that the "behavioral" consequences of the ideological positions of the voters and the impact of an active Agenda Setter cannot be captured by the classical

symmetric power indices, the numerical estimates from our analysis, though, are clearly just one piece of evidence in regard to power measurement; this method should be considered as one way to assess some relevant aspects of the current and the proposed voting systems after the full enlargement. A specific theory of the repositioning strategies of the representatives could help to design a more sophisticated shape to the "yes" functions. Such a theory would need specific information about the objectives of the players in the long run and would most likely use a non-cooperative structure. This would be an interesting extension of our approach.

Appendix: Eurobarometer survey questions

The Eurobarometer survey covers the population of the EU member states. The basic sample design consists of a number of sampling points that are proportional to the population size and density. In each country almost 1,000 face-to-face interviews are carried out. We use the Eurobarometer surveys from the Spring 2003. The part of the interview which is relevant for our analysis is the one which concerns the opinions of the people whether to centralize some policy domains, which is based on the following question: "For each of the following area, do you think that decisions should be made by the (Nationality) government, or made jointly within the European Union?" (EC 2003a,b).

Table 4 Eurobarometer survey questions and factor loadings for the underlying factor, i.e., the correlation of each variable with the factor, EU 27, Spring 2003

	Issues	Factor loading
1	Defense	0.805
2	Protection of the environment	0.808
3	Currency	0.569
4	Humanitarian aid	0.830
5	Health and social welfare	0.913
6	Basic rules for broadcasting and press	0.634
7	Fight against poverty/social exclusion	0.901
8	The fight against unemployment	0.893
9	Agriculture and fishing policy	0.813
10	The support of regions experiencing economic difficulties	0.696
11	Education	0.865
12	Scientific and technological research	0.897
13	Information about the EU, its policies and institutions	0.832
14	Foreign policy towards countries outside the EU	0.681
15	Cultural policy	0.549
16	Immigration policy	0.826
17	Rules for political asylum	0.771
18	The fight against organized crime	0.785
19	Police	0.918
20	Justice	0.911
21	Accepting refugees	0.743
22	Juvenile crime prevention	0.870
23	Urban crime prevention	0.728
24	The fight against drugs	0.835
25	The fight against the trade in and exploitation of humans	0.784

Note that we exluded the Terrorism variable since there was not a response for all 27 countries

For each question, there were three possible responses: “yes”, “no”, or “don’t know”. For simplicity, we apportioned the “don’t know” responses to the “yes”, or “no”, responses based on the “yes”, or “no”, proportions for each question for each country.

Table 4 gives the factor loadings associated with the factor. The loadings give the correlation coefficients of the variables with the factor. In all cases, each variable is strongly positively related to the underlying factor; in fact, the single factor accounts for roughly 70% of the variation of the data.

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References

Baldwin R, Widgrén M (2004) Winners and losers under various dual-majority voting rules for the EU’s Council of Ministers. CEPS Policy Briefs

Banzhaf JF III (1965) Weighted voting doesn’t work: a mathematical analysis. Rutgers Law Rev, 19:317–343

Barr JM, Passarelli F (2004) Who has the power in the EU? Rutgers University, Newark Working Paper #2004-005

European Commission (2003a) Eurobarometer: public opinion in the European Union. vol 59, pp B103–B105, http://europa.eu.int/comm/public_opinion/index_en.htm

European Commission (2003b) Candidate Countries Eurobarometer. Spring, B119-B121, http://europa.eu.int/comm/public_opinion/cceb_en.htm

Felsenthal DS, Machover M (2001) The treaty of Nice and qualified majority voting. Soc Choice Welf 18(3):431–464

Felsenthal DS, Machover M (2004) Analysis of QM rules in the draft constitution for Europe proposed by the European Convention. Social Choice Welf 23(1):1–20

Garrett G, Tsebelis G (1999) Why resist the temptation to apply power indices to the European Union? J Theoret Polit 11:291–308

Grofman B, Lindner I, Owen G (2004) Modified power indices for indirect voting. mimeo

Grofman B, Owen G, Noviello N, Glazer A (1987) Stability and centrality of legislative choice in the spatial context. Am Polit Sci Rev 81:539–553

Holler MJ, Owen G (eds) (2001) Power indices and coalition formation. Kluwer, Boston

Kachigan SK (1991) Multivariate statistical analysis: a conceptual introduction, 2nd edn. Radius Press, New York

Laruelle A, Widgrén M (1998) Is the allocation of voting power among the EU states fair? Public Choice 94(3–4):317–339

Lawley DN, Maxwell AE (1971) Factor analysis as a statistical method. American Elsevier Publishing, New York

Leech D (2002) Designing the voting system for the council of the European Union. Public Choice 113(3–4):437–464

Monderer D, Samet D (2002) Variations on the Shapley value. In: Handbook of game theory, vol 3, Aumann RJ, Hart S, (eds), Elsevier Science, Amsterdam pp 2055–2076

Napel S, Widgrén M (2004a) The inter-institutional distribution of power in EU Codecision. Soc Choice Welf (in press) [CESifo Working Paper No. 1347, Munich]

Napel S, Widgrén M (2004b) Power measurement as sensitivity analysis – a unified approach. J Theoret Polit 16(4):517–538

Napel S, Widgrén M (2005) The possibility of a preference-based power index. J Theoret Polit 17(3):379–389

Owen G (1972a) Multilinear extensions of games. Manage Sci 18:P64–P72

Owen G (1972b) Political games. Naval Res Logist Q 18:345–354

Owen G, Shapley LS (1989) Optimal location of candidates in ideological space. Int J Game Theory 18:339–356

Rabinowitz G, Macdonald SE (1986) The power of the states in U.S. presidential elections. Am Polit Sci Rev 80:65–87
Rapoport A, Golan E (1985) Assessment of political power in the Israeli knesset. Am Polit Sci Rev 79:673–692
Shapley LS (1977) A comparison of power indices and a nonsymmetric generalization. The Rand Corporation, Santa Monica, Paper P-5872
Shapley LS, Shubik M (1954) A method for evaluating the distribution of power in a committee system. Am Polit Sci Rev 48:787–792
Straffin PD (1977) Homogeneity, independence, and power indices. Public Choice 30:107–118
Weber RJ (1988) Probabilistic values for games. In: Roth AE (ed) The Shapley Value: essays in honor of Lloyd S. Shapley. Cambridge University Press, Cambridge, pp 101–119
Widgrén M (1994) Voting power in the EC and the consequences of two different enlargements. Eur Econ Rev 38:1153–1170