INTERNATIONAL ORGANISATION ANALYED WITH THE POWER INDEX METHOD

By

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Abstract

The period of globalisation has seen more and more of international and regional organisation. Setting up an organisation with a group of state entails a resolution to the following two questions: (1) How are votes to be allocated? (2) What aggregation rule is to be employed? International and regional organisations display some interesting differences in how they have approached these two questions choosing a regime. The power index framework offers a convenient method for analysing these constitutional differences.

Key words: international organisation, EU, group decisiveness, blocking power, absolute voting power, Penrose-Banzhaf framework.

INTRODUCTION

Global governance can take place through international organisations covering most of the countries of the world or through regional organisations covering a continent like Europe, South East Asia and Latin America. International and regional organisations display a multiplicity of objectives and organisational structures. One common element in all the organisational variety that international and regional organisations display is power, meaning how decisions are made and who can influence these.

The purpose of this paper is to identify a few principles guiding the distribution of voting power within international and regional organisations. These groups of states are looked upon as playing n-person games and the power index scores offer the general solution to such games. The power index method has become highly popular in recent years, as it allows for the derivation of unique solution numbers to highly complex games with several players having different voting weights. Here the emphasis is upon the interpretation of the basic parameters that the power index method calculates, and not the calculations themselves.

The players in international and regional organisations are the states of the world, represented by their governments. They have to decide on how much power they wish to hand over to these organisations. And international and

regional organisations in turn have to reflect upon how its power is to be distributed onto its member states. The first perspective upon power – from member states to the organisation (*von unten – oben*) refers to the capacity of the group to take decisions: group decisiveness. The second perspective upon power – from the organisation to the member states (*von oben – unten*) – refers to how power is allocated onto member states and whether they have different power weights: the individual capacity to enact and to block decisions.

THE STARTING POINT: Revising Wicksell's Theory

In rational choice the key principle for analysing group decision-making is the Wicksell principle of unanimity. Swedish economist Knut Wicksell argued early that unanimity is the best decision rule for a group of players when coordinating their actions towards a common goal, or set of goals. Wicksell claimed that unanimity is the "just" rule of aggregating individual preferences to a social choice. The Wicksell idea that unanimity is – so to speak – the normal decision rule for a group was employed as one basic principle in the public choice approach, especially constitutional economics (Buchanan and Tullock, 1962; Buchanan, 1989). Thus, international and regional organisations would endorse unanimity, if special circumstances do not force them to choose otherwise. However, the veto principle is not endorsed in all of these organisations, as a matter of fact. Is this accidental?

Wicksell suggested somewhat *ad hoc* that transaction costs play a role at the constitutional stage when decision rules are framed, referring to opportunistic strategies of the last coalition members to say YES. Obviously, the concept of transaction costs were not known at the time of Wicksell, but it has later on been formalised into a general theory of costs linked with decisions rules – see the literature on the distinction between internal and external decision costs (   ). In constitutional economics, one still maintains the idea that unanimity is the most fundamental decision rule, because it connects well with the notion of Pareto optimality. One may actually argue that Pareto optimality in economics is the same as the veto principle in a democracy.

Yet, only the UN Security Council employs the veto principle, although in a limited version where only the five permanent members can exercise a veto. And among the regional organisations one observes that the EU has abandoned the Luxembourg comprise and moved towards an endorsement of qualified majority (QM). I will to argue that voting is necessary in groups larger than 10-15 players. What is wrong with the unanimity principle is that it makes voting superfluous. And this is in reality not the case. Voting is a rational method for

deciding how to aggregate individual preferences into one social outcome. It matters both directly and indirectly.

It is often claimed that the Council of the European Union does not vote explicitly but merely confirms with a unanimous decision what has been negotiated among the member states. Thus, bargaining is the key technique for deciding common matters, and not voting. However, this standpoint confuses explicit voting with implicit voting or direct with indirect voting. Bargaining is done on the basis of the voting scheme handed down in the various treaties. Thus, Germany has more bargaining power than e.g. Sweden or Lithuania, and it may always demand a vote to show what the basic regime facts are. Thus, something is wrong with the classical Wicksell approach, stating that veto is the key rule in group decision-making.

Yet, the veto principle may receive backing from outside of economics. Thus, if states were looked upon as sovereign actors, then it would be logical to suggest that the veto principle must be the most fundamental decision rule. States bind themselves in international and regional organisations. However, this position bypasses that states would enter supra national organisations in order to get things done, not only to block matters they do not like. Thus, states would also care for the group capacity to act, which is not high with the unanimity rule. A state would not become member of an international or regional organisation only to insist upon the veto, because if one state gets the veto, then all the others must also be provided with the same powers, except in an exceptional organisation like the Security Council. The ideal situation for a state – veto for itself and simple majority status for all the others – does not exist in any international or regional organisation. Now, why create multi-lateral coordination mechanisms in the first place?

States may regulate their common matters either bilaterally or multilaterally. Globalisation has resulted in more and more of international and regional organisation. A variety of motives push governments to enter the states they represent into international organisations and regional groups of states. States may decide to coordinate their actions from political (peace) economic (trade and affluence) or environmental reasons (externalities, resource depletion). Thus, they set up groups of states with some form of common organisation and the definition of a set of rules. Culture may also play a role as with the Arab League or the Muslim Conference.

The Wicksell theory about group decision-making entails that the members would prefer for rational reasons or out of considerations for justice that the group employs the unanimity decision rule. Under unanimity it does not matter whether the choice participants have one vote or dispose of several votes. The

ensuing behaviour is veto based. But why would states set of coordination mechanisms only with a view to be able to say NO?

The preference given to the unanimity regime in constitutional economic and the public choice school is not shared among most political scientists, focussing upon effectiveness and the risk of deadlock. However, recently a theory has been suggested, which in a similar spirit gives precedence for unanimity, namely the veto player hypothesis (Tsebelis, 2002). He defined a "veto player" in the following way:

> In order to change policy – or. as we will say henceforth, to change the (legislative) status quo – a certain number of individual or collective actors have to agree to the proposed change. (Tsebelis, 2002:2).

This amounts to a too broad definition of a choice participant with veto. The concept of the veto should be linked with one regime: unanimity. When Tsebelis speaks about so-called veto players:

> Veto players are specified in the constitution of a country (the president, the House, and the Senate in the United States) or by the political system (the different parties that are members of a government coalition in Western Europe) (Tsebelis, 2002: 2)

then he is actually referring to power or influence in general. In the analysis of international and regional organisation, it is vital to maintain the legal concept of the veto, meaning an unconditional capacity to block a group decision by merely casting a vote NO. Power or policy influence can be exercised with unanimity, as will be shown below.

When states enter international or regional organisations, then their governments will be motivated by a variety of interests or preferences. The key principle of state sovereignty would guide them towards a priority for unanimity, but they know that this implies the recognition of vote for all players. If states want decisive international or regional organisations, then they may be hesitant about unanimity and in stead try to maximise voting power. Let me explain what all this entails. I will launch a theory of group decision-making below which challenges the Wicksell preference for unanimity by suggesting instead that it is the maximisation of voting power that is the normal motivation with unanimity as a special case.

THE VOTING POWER APPROACH: The Calculus

Much work has been devoted towards the elaboration of a contradiction free calculus of voting power (Felsenthal and Machover, 1998, 2004; Leach, 2002,a,b,c). It has given certain key parameters, which will be introduced below in an informal fashion (Lane and Maeland, 2000). After the key parameters β, δ, θ and η have been introduced, I will raise the contested issue of the interpretation of these parameters.

Given a set of players, $N = \{1,...,n\}$, formal decision-making in a group can be modelled as a *simple game, (a voting game)*, where subsets, $S \subseteq N$, of players form winning coalitions (or so-called win sets). These winning coalitions are assigned the total value of the game, normalised to one, while the losing coalitions get nothing. The gain in a simple game is given by a characteristic function $v : 2^N \rightarrow \{0,1\}$,

$$v(s) = \begin{cases} 1 & if \quad is \quad winning, \\ 0 & otherwise, \end{cases}$$

with $\upsilon(\varnothing) = 0$ and $\upsilon(N) = 1$. The characteristic function combined with the set of players, the pair (N, υ), will then be a proper definition of a simple game.

A general form of simple games is the weighted majority game which is the basic model used to study power distributions among players (voters) when individual amounts of votes may differ. A player i ε *N* thus casts w_i votes, while a decision *rule c* decides the quota of votes needed to pass a bill. In other words, in a weighted majority game $(c, w) = [c; w_1 \,......\, w_n]$, the characteristic function has the form:

$$v(S) \begin{cases} 1 \sum w_i \geq c \\ 0 \quad otherwise \end{cases}$$

Simple games have no equilibrium, as no coalition can prevail against all the others. Thus, the search for a one equilibrium solution to the simple game is an abortive effort. Simple games have empty cores when simple majority is employed, but when unanimity is used then the core is extremely large. Yet, a plausible solution concept to simple games is offered by the power index. A power index measures several aspects of voting power such as group decisiveness δ as well as the individual capability of a player (voter) to be decisive in a voting session, making so-called swings η or using his/her

blocking power θ. It is an a priori measure that summarises the results of all possible rounds of play of a game, that is, the index considers all 2^N possible coalitions, which are checked for win sets and decisive players.

There are actually two ways of calculating power index scores: the Shapley-Shubik and the Penrose-Banzhaf indices. I will concentrate here upon the Penrose-Banzhaf index, as it models the voting procedure as involving the casting of both YES and NO votes. It is based upon the entire set of all equally probable coalitions, derived from the characteristic function of the game. The coalitions considered by the Penrose-Banhzaf index may include several decisive players making the index an absolute power measure, which only in exceptional cases sum to one.

A formal presentation of the Penrose-Banzhaf index is obtained by considering the power set 2^N of all possible and by assumption *equally likely* coalitions $S \subseteq N$, the empty set $\{ \emptyset \}$ included. From these 2^n coalitions the Banzhaf score of the player i is the number of coalitions in which i is critical, that is, the number of coalitions that player i is able to swing. There are two types of swings η, on the one hand type (a) swings where player i turns a winning coalition into losing by leaving it, and, on the other hand, type (b) swings where player I turns a losing coalition into winning by joining it. Given the set of winning coalitions

$$W_{(N,\upsilon)} = \left\{ S \subseteq N \mid \upsilon(S) = 1 \right\},$$

the type (a) and type (b) swings are represented by $(S \in W_{(N,\upsilon)}, S \setminus \{i\} \notin W_{(N,\upsilon)})$ respectively $(S \notin W_{(N,\upsilon)}, S \cup \{i\} \in W_{(N,\upsilon)})$. However, because of symmetry, the number of the two types of swings will be equal and one may thus focus upon the count of type (a) swings. Now, assume equally likely coalitions $S \subseteq N$ then the Banzhaf power index of player i - β - is defined by the ratio:

$$\beta_i = \frac{\eta_i}{2^{n-1}},$$

Using the commonly used characteristic function form, one gets:

$$\beta_i = \frac{\eta_i}{2^{n-1}} \sum_{\substack{S \subseteq N \\ i \in S}} [\upsilon(S) - \upsilon(S \setminus \{i\})]$$

An interesting implication is that the sum of the individual Banzhaf indices diminishes with increasing decision rule, c. Moving from simple majority rule

via qualified majority rules to the strictest unanimity rule has a substantial negative effect on this sum. A unanimity game, U_N, has only one winning coalition, the grand coalition N, which all players are able to swing, that is, η_i equals one for all i. Note, the counterpart type (b) swing, player i is able to turn a losing coalition N \ {i} into winning by joining. Thus, the (minimised) unanimity Banzhaf index simplifies to:

$$\beta_i \mid U_N = \frac{1}{2^{n-1}}.$$

The individual unanimity power will be small for even a modest number of players. A question one may now ask is if it is possible to find some general (collective) effect that the decision rule has on the Banzhaf index. We want a number that, given a certain decision rule, *c*, measures the capability of an assembly to form winning coalitions. A simple indicator of this capability is just a simple count of the winning coalitions of a game, $d = \mid W_{(N, v)} \mid$, which is obtained by:

$$d = \sum_{S \subseteq N} \upsilon(S)$$

Relating this number to the total number of possible coalitions of a game we obtain the *probability of decisiveness* of a game,

$$\delta = \frac{d}{2^n}.$$

With no restrictions on *c*, absolute decisiveness, $\delta = 1$, is obtained by the improper game of a zero decision rule. In this uninteresting case all proposals will be automatically accepted. The class of *improper games* are simple games where at least two sets may simultaneously form winning coalitions thus implying a decision rule less than ½. A *decisive game*, on the other hand, can only have one winning coalition at the time. In this class of games, δ has a maximum value of ½ as with the simple majority decision rule. Not surprisingly, a minimum level of decisiveness obtains with the unanimity decision rule. With only one winning coalition minimum δ is equal to $1/2^n$, and, as the number of player increases, the probability of decisiveness is reduced quickly with the increase in the number of players:

$$\lim_{n \to \infty} \{\delta \mid U_N\} = 0$$

The apparently high relative power connected with unanimity decision rule actually leaves players quite powerless when the probability of decisiveness is considered.

The number of individual swings, $\eta_{\text{I, is}}$ a crucial factor in this index and relating this number with the total number of winning coalitions, d, we obtain what we define as the *individual probability of blocking* θ:

$$\theta_i = \frac{\eta_i}{d}$$

The Penrose-Banshee index can be factorised into the product of the probability of decisiveness, δ, and twice the individual probability of blocking, θ_{I}:

$$\beta_i = 2\delta\theta_i$$

The doubling of the individual probability of blocking reflects that the Banshee index is based on the two symmetric swings in a game, YES or NO. A slightly different interpretation is given by the dual game approach to the type (*b*) swings, where a dual to the probability of decisiveness is interpreted as a collective probability to block, δ^*, where d* then denotes the total number blocking coalitions. The dual to the individual probability of blocking will then become an individual probability to break a blocking coalition, θ_{I}^*. Hence, the Penrose-Banshee index becomes the sum of these two products

$$\beta_i = \delta\theta_i + \delta^* \theta_i^*$$

The voting power of a player i, thus, equals twice the product of the probability of decisiveness, δ, and the individual probability of blocking θ_{I}. The calculus in the Shapley-Shubik index is conceived in an alternative manner. The Banzhaf index gives: a) the voters' probability of being decisive assuming that all possible outcomes have the same probability; b) the voters' probability of being decisive given that the voter is sure to vote YES assuming that all possible outcomes have the same probability; c) the voters' probability of being decisive given that the voter is sure to vote NO assuming that all possible outcomes have the same probability. The Shapley-Shubik index gives: a') the voters' probability of being decisive assuming that all possible outcomes have NOT the same probability. It is assumed that the probability that a voter votes YES is the same that the probability that two voters vote YES. For small groups the two calculi give almost identical numbers, but for large groups with unequal players the numbers can deviate substantially. Below I will use the Penrose-Banzhaf framework. But how are the numbers to be interpreted? Of which world are they true?

THE POWER INDEX APPROACH: Alternative Interpretations

A heated debate has raged in scientific journals during the last decade about the applicability of the voting power approach. It has been argued that there is a fundamental problem in relation to the calculus of voting power, as it is not clear what the derived numbers stand for. One of the key assumptions behind the framework – the axiom of equal probability of all possible coalitions – is what the attack on this solution concept for N-person games targets.

One may conceive of the following alternative interpretations of the key parameters in the voting power framework (β,δ, η, θ). They represent:

1) relative frequencies in a very long run of plays – an empirical interpretation
2) capacities or potentialities – the constitutional interpretation

The first interpretation is called *a posteriori* voting power and may be estimated through an analysis of actual coalition behaviour. However, in reality all games are finite and thus not all coalitions will form, as the preferences of the players rule out certain coalitions or make them little probable. The second interpretation is called a priori voting power and it deals with a constitutional world where players project their future capacities to prevail under alternative regimes.

I believe that the *a priori* interpretation is the only tenable one. Against it has been claimed that it makes players act under a veil of ignorance, voting in coalitions without any preferences. This is not correct, because under a constitutional interpretation the players would wish to know their general capacity to prevail whatever the issues involved may be. The preferences of the players will change from one issue to another, and so will the coalitions. It would be incorrect to exclude certain coalitions at the constitutional stage, as opportunistic strategies and logrolling make the most unlikely coalitions possible.

It is at the constitutional stage that the players will display their preferences when choosing between alternative regimes. If the players are afraid of ending up in more loosing coalitions than winning ones, or if they fear the losses more than they value the gains, then they will opt for qualified majority or unanimity schemes. At the constitutional stage the players also have to come to an understanding of the weights that are to be allocated to them. Either one employs qualitative or quantitative voting. The choice of a regime governing

decision-making in a group is intimately linked with the preferences of the players involved.

THE DIVERSITY OF INTERNATIONAL AND REGIONAL ORGANISATIONS

There are so many regimes in operation for a variety of international and regional organisations. The voting power framework offers a convenient method for stating their similarities and differences. Thus, the key parameters in the voting power approach will be determined by alternative ways of framing the following two rules:

1) The number of votes cast by a player. Here there is huge variation from one player - one vote (qualitative voting) to immense differences in votes (quantitative voting).

2) The decision rule employed for aggregating votes into a group decision: simple majority, various forms of qualified majority and unanimity.

In order to state the differences between all conceivable regimes for international and regional organisations in a systematic fashion – the participating players would certainly wish to be able to do so at the constitutional stage, one can only employ the power index approach. It offers a technique for calculating the power implications of alternative regimes, existing ones as well as reforms suggested.

Regimes can be compared systematically in terms of the parameters of the power index calculus. The following aspects of voting power are relevant for constitutional deliberations and choice:

1) δ = The decisiveness of the group, which is the same efficiency;
2) βi = the absolute power of a player i;
3) θi = the power of a player to block.

Values for each of these parameters are derivable for each regime from the power index framework. One may regard these numbers as constituting values on a ratio scale meaning that one may calculate the differences in group decisiveness, absolute power and blocking power between alternative regimes in terms of percentages.

Voting power has one collective aspect – group decisiveness, which is shared by all. In addition, voting power has two individual components, namely the power

to act and the power to block. Generally, it holds that group decisiveness is inversely related to the power of any player to block. Moreover, it also holds that the capacity of a player to act is positively related to both group decisiveness and the absolute power of a player. Thus, I will concentrate upon the following three parameters:

a) Group decisiveness,
b) Blocking power,
c) Absolute voting power.

Blocking power and absolute power will differ substantially from one player to another when they have different voting weights. I will pay special attention to these differences under quantitative voting. Now, which are the main types of regimes? Without any claim to comprehensiveness I wish to differentiate between the following types:

- Simple Majoritarian Constitution: One state – One vote, Simple Majority. No international or regional organisation employs this dispensation fully. One could mention the EU Council as concerns procedural matters, but they are not really the essence of EU decision-making. A telling example of this dispensation is the EU Parliament, where however the players organise themselves in party families, which sometimes vote as one player – quantitative voting in real although not formal terms. One could also mention the ECB.
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- Qualified Majoritarian Constitution: One state – One Vote, but 2/3rds or 3/4ths majority. The WTO is one example of this dispensation; the EU under the Dublin constitution is another example. One may also mention the International Whaling Commission and the ILO as examples as well as the WHO.

- Qualified Majority Constitutions, Quantitative Voting: One state – several votes, 2/3rds or 3/4ths majority. Here there are numerous examples in the period of globalisation: the IMF, the WB, and the EU Council under the Nice Treaty.

- Unanimity Constitution: veto for several or all players. Here the most telling example is the UN Security Council, but all the regional coordination mechanisms except the EU employ unanimity.

One may calculate the power index scores for these alternative regimes. Table 1 presents an overview of the key parameters of voting power with regard to these organisations mentioned above. As emphasized above, group decisiveness and blocking power are inversely related and the simple majority regime maximises the absolute voting power of a player.

Table 1. International and Regional Organisations: Voting Power Parameters

	δ	β	θ
UN Security Council	0.026		
a) Perm members		0.052	1.0
b) Non-Perm members		0.005	0.099
UN Reformed Council	0.021		
a) Perm members		0.042	1.0
b) Non-Perm members		0.005	0.123
The IMF	0.053		
a) US		0.106	0.989
b) UK		0.050	0.467
c) Eqa Guinea		0.014	0.135
The WTO	0.000021	0.000015	0.35
The ILO	0.0000065	0.0000045	0.34
The IWC	0.00024	0.00025	0.52
EU COUNCIL(Nice)	0.036		
a) Germany		0.157	0.780
b) Sweden		0.048	0.238
c) Luxemburg		0.037	0.185
EU COUNCIL (Dublin)	0.109		
a) Germany		0.158	0.725
b) Sweden		0.039	0.181
c) Luxemburg		0.026	0.121

The ECB	0.5	
a) President		0.371
b) Exe Board		0.175
c) National Rep		0.175
The EU Parliament	0.5	
a) Germany		0.422
b) Malta		0.019

One observes first, when analysing the voting power parameter scores in Table 1 that some of these organisations face a huge problem with a low efficiency: the UN Security Council, the WTO, the ILO and IWC. These organisations can only operate when there is a large consensus among the preferences of the players. They are likely to become blocked – paralysed institutions. Secondly, a few of these organisations have the opposite characteristic, namely a high degree of group decisiveness: the European Central Bank and the EU Parliament. Thirdly, some organisations achieve a certain level of decisiveness, which is not high but still inexistent, but this is only accomplished through quantitative voting. Finally, one finds in Table 1 evidence to the effect that an international or regional organisation may combine a certain level of power to act with a high degree of blocking power, thus avoiding the decision inertia trap.

If one accepts the assumption that players in collective choice would wish to maximise their total voting power, then the pattern in Table 1 can only be understood by the fact that the players favour the power to block more than the power to act. Since absolute voting power is maximised under simple majority, the use of qualified majority in most international organisation as well as in the EU Council implies that member states have a preference for blocking power but that they realise the decision inertia in the unanimity regime.

CONCLUSION

The normative implication of these findings concerning the voting power implications of alternative regimes is that international and regional organisations should avoid regimes, which result in an extremely low decisiveness – the decision inertia trap. Moreover, international and regional regimes can be devised which combine a certain capacity to act with a high level of blocking power, if one is prepared to allow for the possibility of allocating widely different voting weights to the players.

This would then be the road ahead, empowering international regional organisations through staying away from unanimity, but allowing for a distribution of votes, which takes into account the size of the member state, either in terms of population or in terms financial contribution to the organisation. Probably simple majority is too radical a mechanism for the design of international and regional organisations above the state level, but qualified majority will do well, especially when combined with quantitative voting.

Finally, one may wish to point out that quantitative voting may be done under almost any conceivable scheme that allocates votes differently. Thus, one would have great latitude in deliberating about alternative allocations. One would wish to relate the differences in votes to the differences in some square or cubic root expression of population differences:

$$\frac{\text{Votes (country 1)}}{\text{Votes (country 2)}} = \frac{\sqrt{\text{population (country 1)}}}{\sqrt{\text{population (country 2)}}}$$

Any root expression between the square and cubic root would be possible, depending upon how much vote differential one wants to have between the member states.
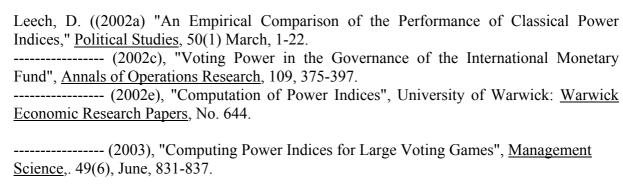
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