

## Voting in the EU Council – A Scientific Approach

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In this note we propose a voting system for the EU Council of Ministers which is based on the assumption that every citizen of the EU should have equal influence on the Council's decisions regardless of his or her home country ("One person, one vote"). The tool used in this note to quantify this influence is the voting power index introduced by Penrose and Banzhaf.

The voting system we propose gives each member state a voting weight proportional to the square root of its population and fixes the quota – the threshold for approving a proposed act – at 62% of the total votes. One might add the requirement, that a majority of the states support the decision. Such an additional voting criterion would give more power to the smaller states ("One state, one vote"), but would cause only a moderate deviation from the principle of equal power of all citizens. It is a political issue whether or not one wants to do so.

There are several advantages to our system. First, it is based on the principle that all citizens should have equal voting power, and on a scientific approach to fulfilling this requirement. Second, it is readily applicable in case of any further extension of the Union. Third, this system may serve as a compromise between states favouring the procedure presented by the Treaty of Nice and those who give the preference to the draft Constitution.

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## 1) THE CURRENT STATE OF AFFAIRS

The decision-making rules in the European Union's Council of Ministers are hotly contested among the member states. It is one of the main obstacles to the adoption of the European Constitution as proposed by the European Convention. The decision-making rule in the Council should be based on a simple transparent procedure that gives equal power to every citizen of the EU. Moreover, there is a need for an easy and unambiguous way to extend that rule whenever new members join the union.

The first attempt to establish new decision-making rules in an extended Union was made in the Treaty of Nice. The procedure prescribed there consists of a complicated voting system based on three conditions. The first one requires a majority of states. The second and most important is a weighted voting system with qualified majority. The voting weights assigned to the member states were the result of nightlong negotiations rather than the consequence of a rational procedure. For example, Germany with a population exceeding 82 million, was assigned the same number of votes (29) as Italy with a population of about 57 million, while Poland (38 million citizens) received 27 votes. Mainly to appease Germany, a third condition, based on the country's population, was introduced in the Nice Treaty. This condition stipulates that the supporters represent at least 62% of the population of the EU.

However, an analysis of the three conditions shows that the last one had virtually no effect on Germany's power in the Council.<sup>1,2</sup> In fact, for the Union with 25 members the third voting criterion has no effect at all. Since the voting weights fixed in the Treaty of Nice appear somewhat arbitrary, any extension of the Union would require additional bargaining in order to agree upon new voting weights.

The draft Constitution contains an entirely different decision-making rule for the Council. It is based on two conditions: 1) any decision of the Council needs the consent of a majority of the states (as in the Nice Treaty) and 2) it requires that the citizens of the consenting states must constitute at least 60% of all EU citizens. The first criterion strengthens the small states, while the second one gives more power to the big countries. In fact, it turns out that Germany and the other three big countries gain considerable power, while e.g. the relative position of Poland and Spain is worse compared to the Nice treaty. It did not, therefore, come as a surprise that Poland and Spain objected to this proposal, while Germany, France, the United Kingdom and Italy favoured the draft Constitution.

At first sight it might appear plausible that voting weights proportional to the respective country's population, as proposed by the draft Constitution, give every citizen equal influence. It is likely that the European Convention had this in mind when tailoring the above decision rules for the Council of Ministers. However, it can be proven mathematically that this reasoning is based on false assumptions! It ignores the fundamental law governing fair representation of citizens in bodies such as the Council of Ministers of the EU, discovered and proved as early as 1946 by the British physician, geneticist and mathematician Lionel Penrose. It is Penrose's law which constitutes the foundation of our approach.

## 2) THE CONCEPT OF VOTING POWER AND PENROSE'S SQUARE-ROOT LAW

Voting power is a mathematical concept that expresses the influence of the members in a decision-making body and it can be traced back to the works of Penrose and Banzhaf. A member of the body has some power if the vote of this member can occasionally change the decision. The voting power of a member can be defined as the probability that a configuration of votes cast in the council is such that the vote of the member in question is decisive, that is, the resolution is passed if the member votes for the proposal, and rejected otherwise.<sup>3</sup>

In general, the voting *power* of a member is not proportional to the voting *weight*. Suppose, for example, that a body has two members, one with 51 votes and one with 49 votes. If this body decides with simple majority rule the outcome will be totally unaffected by the second member's vote. It is clear that this member, while having 49% of the votes, has 0% of the power. In contrast, if proposals could only be adopted unanimously by the body, the two members would have the same share of power (namely 50%), even if the second member had only voting weight of 1%.

Let us give an example where we compute the voting power. Suppose voters in your country decide upon an issue by referendum. The proposal of the referendum is approved if more than half of the voters cast an affirmative vote. Your own vote will change the outcome of the referendum (i.e. it will be decisive) only if the other voters are split into equal parts on that matter. In this case the proposal will be approved if you vote in favour of it, otherwise it will be rejected. A split vote of all other voters is quite unlikely. It is not hard to compute that this happens with probability approximately proportional to the inverse of the square root of the number of citizens. So, if your country has  $N$  citizens, then your influence on your country's decision is proportional to  $1/\sqrt{N}$

If we want to give all citizens in the EU the same influence on the Council's decisions, we obviously have to assign more weight to bigger states. The probability a citizen has to change his or her country's decision (either directly in a referendum or indirectly through general elections) is proportional to the  $1/\sqrt{N}$  ( $N$  is the population of that country). So, to compensate for this, the country should have a voting power in the Council proportional to  $\sqrt{N}$ . This is Penrose's square root law. It says that the citizens of the countries have equal influence in the Council if the voting powers of the countries in the Council is proportional to  $\sqrt{N}$ . It follows, in particular, that voting power proportional to  $N$ , as contained in the draft Constitution, gives citizens of big countries much more power than citizens of smaller countries.

## 3) A FAIR VOTING SYSTEM FOR THE COUNCIL

We have seen that a fair voting system for the Council of Ministers, i.e. one that gives every citizen the same power, should give voting power to each state that is proportional to the square root of the population of that state. To design such a system we start by giving the states a voting weight proportional to the square root of their population. However, this

does not automatically give them a voting power of the same size since voting power is a more sophisticated concept than voting weights.

However, it turns out that this (square root) choice of the voting weights does give the states a voting power proportional to the square root of their population, if the “quota” (i.e. the threshold for a proposal to pass) is fixed at a specific level. It was computed by two of us<sup>4</sup> that the quota set at 62% is the one that meets this condition.

As a result, our suggestion for the voting rules in the Council is to give all states a voting *weight* proportional to the square root of their population and to set the quota at 62%. Table below shows that with extremely high accuracy the voting *power* of each country will then be proportional to the square root of its population.

<b>Distribution of votes on the Council of Ministers: A compromise solution</b>				
<b>Member State</b>	<b>Population (in m)</b>	<b>Population square root</b>	<b>Weight (in %)</b>	<b>Power index (in %)</b>
Germany	82.54	9.09	10.36	10.35
France	59.63	7.72	8.81	8.82
U.K.	59.09	7.69	8.77	8.78
Italy	57.07	7.55	8.62	8.63
Spain	40.68	6.38	7.27	7.28
Poland	38.21	6.18	7.05	7.06
Netherlands	16.19	4.02	4.59	4.59
Greece	11.02	3.32	3.79	3.79
Portugal	10.41	3.23	3.68	3.68
Belgium	10.34	3.22	3.67	3.67
Czech Rep.	10.20	3.19	3.64	3.64
Hungary	10.15	3.19	3.63	3.63
Sweden	8.94	2.99	3.41	3.41
Austria	8.06	2.84	3.24	3.24
Denmark	5.38	2.32	2.65	2.65
Slovakia	5.38	2.32	2.65	2.65
Finland	5.21	2.28	2.60	2.60
Ireland	3.96	1.99	2.27	2.27
Lithuania	3.46	1.86	2.12	2.12
Latvia	2.33	1.53	1.74	1.74
Slovenia	2.00	1.41	1.61	1.61
Estonia	1.36	1.17	1.33	1.33
Cyprus	0.80	0.89	1.02	1.02
Luxembourg	0.45	0.67	0.76	0.76
Malta	0.40	0.63	0.72	0.72

The proposed procedure has a number of advantages:

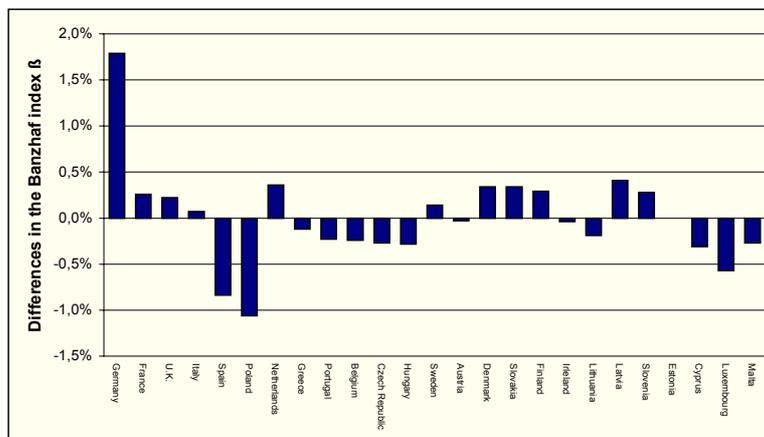
- 1) Every citizen of the EU would have the same influence on decisions of the Council.
- 2) Once established, the method is simple.
- 3) The method can be justified by scientific reasoning.

- 4) It can be extended to a bigger union without ambiguity whenever new states decide to join the Union.

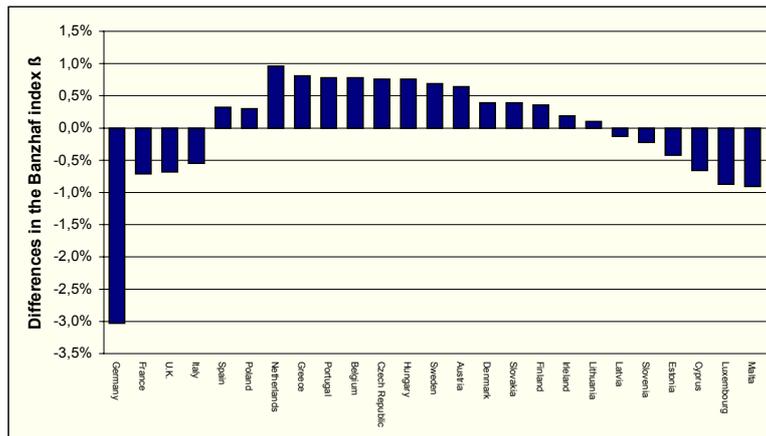
Moreover, the Treaty of Nice sets a very high threshold for approving decisions, making it very hard to establish new laws in the EU. On the other hand, the draft Constitution makes it relatively easy to come to a positive decision. This makes it too difficult for member states to block decisions that they consider highly undesirable. Moreover, it gives great weight to the European Commission, whose role it is to propose such laws. The decision rule proposed here also seems to be a good compromise in this respect.

#### 4) A COMPROMISE BASED ON A SCIENTIFIC METHOD

The voting procedure we proposed above is based on scientific reasoning. In addition to this advantage there is also a significant political advantage to our suggestion: the voting powers resulting from this method are intermediate between the prescription of the Nice treaty and the one of the draft Constitution (see Diagrams 1 and 2). These new rules could therefore serve as a compromise between the diverging interests of the bigger states Germany, France, UK and Italy, who favour the Constitution's rules, and states such as Spain and Poland, who are slightly smaller and favour the Nice procedure. They also do justice to all other member states.



**Diagram 1. Differences in relative share of voting power in the EU Council between our proposal and the rule prescribed in the Treaty of Nice**



**Diagram 2. Differences in relative share of voting power in the EU Council between our proposal and the proposal put forward in the Draft Constitution**

Currently, two suggestions for a compromise are under discussion. Both adopt the voting weights of the draft Constitution, but suggest to change the quota, either to 55% both, i.e. a proposal would require 55% of the states and 55% of the population in order to pass, or to 55% for the “state” vote and 65% for the “population” vote. There is some belief that this might be an acceptable compromise, e.g. to the four big states as well as to Spain and Poland. However, computation of the voting powers shows that for Poland and Spain both these proposals are even worse than the draft Constitution’s rules.<sup>5</sup> There is therefore no doubt among experts that the 55-55 rule or the 55-65 are not at all a reasonable compromise.

### 5) A DOUBLE MAJORITY RULE

The European Union is not only a union of individuals, it is also a union of states. Thus, instead of the rule “One person, one vote” one might also advocate the rule “One country, one vote” at least in a mild form. In fact, both the Treaty of Nice and the draft Constitution contain the requirement that the consent of the majority of the states is necessary for a proposal to pass. This rule was reportedly added to avoid a domination of the small states by the bigger states. Ironically, the rule has no effect at all for the 27-member Union under the Treaty of Nice.<sup>2</sup>

Adding this rule to the voting system of the Council is a matter for political decision, if one wants to give more power to the smaller states and, of course, this can be done within the system we suggest above as well. Whenever such an additional rule has any effect at all it causes a deviation from the rule of “One person, one vote”. In fact, this is its purpose. In the case of the voting rules proposed by us the additional “majority of the states” requirement indeed gives more power to the smaller states. However, the deviation from the ideal square root law is moderate.

## 6) CONCLUSION

We suggest a weighted voting system for the Council of Ministers of the EU with weights proportional to the square root of the populations of the states and a quota of 62%. This voting rule has the advantage of giving equal influence to all citizens of the EU regardless of their home country. It is based on scientific reasoning and can be extended in a simple way whenever new members join the Union.

Moreover, in the present situation, it can serve as a good compromise between the Treaty of Nice and the draft Constitution suggested by the European Convention.

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<sup>1</sup> Felsenthal and Machover: "Social Choice and Welfare", 8 (2001)

<sup>2</sup> Kirsch: "Die Zeit", 12 (2001)

<sup>3</sup> for the mathematical theory of power, see the books: Felsenthal and Machover, Measurement of Voting Power, (1998) or Taylor: Mathematics and Politics, (1995)

<sup>4</sup> Słomczyński, Życzkowski, "Rules Governing Voting in the EU Council", Preprint, 2004

<sup>5</sup> see also: Pukelsheim, "Neue Züricher Zeitung", April 27, 2004