ETLA ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
Lönnrotinkatu 4 B 00120 Helsinki Finland Tel. 609 900 Telefax 601753

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Mika Widgrén

VOTING RULE REFORMS IN THE EU COUNCIL: NEEDS, MEANS AND CONSEQUENCES

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ABSTRACT: The European Union has planned reform its institutions in 1996. This paper examines the pressures for a voting rule reform in the EU Council and the implications of three kinds of reforms, namely changes in majorities, changes in voting weights and the combination of the two. The needs are defined and the consequences are analysed with the aid of the power and control measures of cooperative games. The paper shows that the concentration of voting weights does not improve Union's abilities to operate. To increase efficiency lower majority rules should be used. This would be a neutral reform as it would not have any redistributional effects on national influence.

KEY WORDS: European Union, decision making, game theory, voting power

SUMMARY

This paper deals with question of national voting power and control in the EU decision making. The analysis concentrates on the Union's abilities to operate and possible needs for institutional reforms, particularly, when the Union enlarges by the four EFTA countries.

As far as the EFTA entrants are concerned the loss of power for the current Union members is smaller than in previous enlargements in 1973 and in the 1980s. The new entrants would get 15 per cent of the total power in the EU Council of Ministers. Relative to their population or economic weight their share of power in the EU Council of Ministers is much higher. The new entrants have a strong position in the Union's decisions.

The control of decisions in the EU is based on blocking proposals (negative control). As regards the current members of the EU the enlargement does not create an inefficiency problem. It already exists. The decision-making process is likely, however, to get slower due to the new entrants since wider compromises are needed. A possibility to solve problems with "package deals" reduces. The nature of decision making turns from slightly competing to slightly conciliatory.

As far as the efficiency of decision making is concerned the qualified majority rule gives too much negative control to the member states. In this sense, strengthening the role of majority voting in the 1980s was the least that the Union had to do in order to avoid the consequences of increased heterogeneity after the Iberian enlargement. The control effects of the EFTA-countries' entry could be eliminated similarly by reducing the majority rule to 50 votes out of 76 in the current Union and thus 60 out of 90 in an expanded EU.

During the EFTA countries' entry talks Spain and the UK have claimed that the number of votes needed for a blocking minority should be retained in 23 when the four applicant countries join the Union. It is easy to see that this kind of reform would strenghten the move towards a more conciliatory decision making. The decision making of the EU would thus face two effects both increasing the negative control of national governments and making the deepening of the European integration more complicated. All in all the choice between 23 and 27 votes as a requirement for a blocking minority has not remarkable implications. It proofs, however, how difficult it is for the member states to give up their national negative control over the future of the Union.

To increase efficiency in the sense of decision-making speed the Union should use a simple or the double majority rule. The former would not affect the power figures, but the latter would increase small countries' power. As far as negative control is concerned a simple majority reduces it slightly more than the double majority rule.

The decision-making speed cannot be improved by giving more voting weight to the largest members at the expense of the smallest countries. This kind of reforms would lead to similar 'package deal' decision making as in the current Union.

Regarding the efficiency it should be remembered, however, that each step towards a faster decision making system increases the power of the EU Commission. As a general rule, this could centralise the decision-making powers too much. In this respect the current system, while requiring homogeneity of member states, could define the Union's real competence in a more balanced manner. As regards efficiency the only way to improve it is to limit the Union's competence to the issues in which the member states can reach homogeneity.

If the member states would like to secure the role of the subsidiarity as a general principle, the current system is, indeed, a safe bet. With the current qualified majority rule, not to mention the recent suggestions concerning even a higher majority requirement, article 3b in the Maastricht Treaty is more or less useless. The current system does not give much chances for the Union to proof its efficiency - even if when competent - since the qualified majority rule itself is a watch-dog for the subsidiarity principle.

If common policies create positive externalities for member states lower majority rules should be used to improve efficiency of the Union and to create incentives to competition of proposals. As regards the national influence improving efficiency is not a matter of power distribution since it remains the same regardless of the majority rule. The double majority is an exeption by increasing the influence of Germany and the small countries, although the reason for such a proposal is, without any doubt, based on entirely different arguments. Since in the current context the lower majority rules gives more weight to the supranational Commission (centralisation) and less weight to the national interests (decentralisation) the improvement of the EU efficiency is a matter of centralisation not a matter of distribution of national influence.

TIIVISTELMÄ

Euroopan unionin päätöksentekomekanismiin on alettu kohdistaa muutospaineita viime vuosina. Tavoitteena on ollut tehostaa EU:n päätöksentekoa. Keinoina on esitetty siirtymistä yksinkertaisen enemmistön käyttöön nykyisen määräenemmistökäytännön sijaan. Toisena mahdollisuutena on esitetty jäsenmaiden äänimäärien muuttamista niin, että pieniä maita suosivaa järjestelmää purettaisiin.

Seuraavassa käsitellään Euroopan unionin ministerineuvoston päätöksentekokykyä, kun unioni laajenee. Päätelmät perustuvat peliteorian valtaindekseihin ja arvioihin jäsenmaiden kansallisesta kontrollista EU:n päätöksenteossa.

EU-jäsenyydestä neuvottelevat neljä EFTA-maata vievät 15 prosenttia nykyisten jäsenmaiden vaikutusvallasta. Suhteessa taloudelliseen kokoonsa uusien jäsenmaiden osuus vallankäytöstä on suuri.

Uusien jäsenmaiden - kuten kaikkien muidenkin EU-jäsenmaiden - valta-asema perustuu niin sanottuun negatiiviseen kontrolliin, kykyyn estää päätöksiä. Koska samanaikaisesti laajojen kompromissien tarve päätöksenteossa kasvaa, on todennäköistä, että uudet jäsenmaat hidastavat EU:n päätöksentekoa. Ne eivät kuitenkaan välttämättä heikennä päätösten sisältöä, sillä mahdollisuus sitoa tärkeimpiä kansallisia etuja toisiinsa vähenee. Tällöin päätösten on perustuttava keskeisemmin nimenomaan niihin kysymyksiin, joissa jäsenmailla on yhteisiä unionitason intressejä.

Päätöksenteon tehokkuuden kannalta nykyinen määräenemmistösääntö antaa liian suuren negatiivisen kontrollin jäsenmaille. 1980-luvulla EU:n Välimeren laajenemisen vaikutukset torjuttiin siirtymällä entistä enemmän yksimielisistä päätöksistä määräenemmistöön. Samanlainen laajennuksen neutralisointi on mahdollista toteuttaa EFTA-laajennuksen yhteydessä pudottamalla määräenemmistöön vaadittavan äänimäärän rajaa neljällä äänellä.

Päätöksenteon tehostaminen on mahdollista ensisijaisesti päätössääntöä muuttamalla. Tällöin voidaan siirtyä joko yksinkertaisen enemmistön tai niin sanotun kaksoisenemmistön käyttöön. Näistä kumpikin lisää huomattavasti jäsenmaiden sitoutumisen riskiä, mutta vaikutusvallan jakaumaan niiden vaikutukset ovat vähäiset. Kaksoisenemmistön käyttö parantaa hieman pienten maiden asemaa.

Jos suurten jäsenmaiden ääniosuuksia kasvatetaan, päätöksenteon tehokkuus ei oleellisesti parane. Päätöksenteko säilyttää paljolti sidottujen päätösten luonteensa. Alentamalla päätöksiin vaadittavaa enemmistöä päätöksenteko tehostuu, mutta vaikutusvallan jakauma ei muutu.

Päätöksenteon tehokkuutta tavoiteltaessa on muistettava aina myös komission ja ministerineuvoston välinen jännite. Hyvin tehokas päätöksentekojärjestelmä EU:ssa merkitsee komission vallan kasvua ja ministerineuvoston vallan heikkenemistä. Tämä saattaa keskittää vallankäyttöä tarpeettomasti. Nykyisen päätöksentekomekanismin

vahvuutena voidaan pitää sitä, että se karsii unionin kompetenssista tarpeettomia kysymyksiä.

Toisaalta keskitetympi päätöksentekojärjestelmä voi tuottaa myös etuja esimerkiksi kysymyksissä, joissa päätöksiin liittyy positiivisia ulkoisvaikutuksia. Tämän vuoksi läheisyysperiaatteen soveltamista tulisi harkita tarkemmin. Nykyisellä päätöksentekojärjestelmällä sen kirjaaminen Maastrichtin sopimuksen artiklaan 3b on paljolti tarpeetonta. Koska päätössäännössä tehtävät muutokset eivät vaikuta vaikutusvallan jakaumaan, päätöksenteossa voitaisiin siirtyä käyttämään useita enemmistösääntöjä. Tällöin kriteerinä matalammalle enemmistölle voisivat toimia esimerkiksi positiiviset ulkoisvaikutukset.

1. Introduction

The EU decision making process has faced pressures for an institutional change in the recent years. A need for higher efficiency has been recognised. It has been suggested that simple majority voting should be used, in the EU, at least for routine decisions.[1] Also there have been calls to change the determination of votes in a way that gives more weight to the large members of the Union.

In the European Union the decisions are made in the Council of Ministers. As long as the member states' governments have influence in the Union's decision making process national aspects and the balance of national power will play an important role in the decision making process and in the EU's abilities to operate.

In the Council of Ministers, decision making is based on weighted voting. Member states' votes are weighted such that Germany, Italy, France and the UK have 10 votes each; Spain 8 votes; the Netherlands, Greece, Portugal and Belgium 5 votes each; Denmark and Ireland 3 votes each and Luxembourg has 2 votes. Most questions are solved by the qualified majority for which 54 votes out of 76 is needed.

True, it is easy to see that the determination of votes favours small countries. Luxembourg has a vote for each 200 000 inhabitants, while in Germany there are 8 million people sharing one vote. It is, however, common knowledge in political analysis that voting weights are poor measures for influence. That is why we need more sophisticated analysis.

The institutional reform has become more relevant also due to the new entrants. For the Union's decision making process they mean shifts in the balance of power. Austria and Sweden get 4 votes and Finland and Norway 3 votes each in the Council of Ministers. Hence the total number of votes increases to 90 and the qualified majority to 64 when the Union enlarges.

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[1] During the accession talks of the four EFTA countries Spain and the UK have, however, claimed higher majority requirements.

Our goal is to analyse national influence in the EU. Particular aim of this paper is to investigate the pressures that the EU decision making will face after the entry of new members, what their impact to the decision making is and how does it change if the rules of the decision making (e.g. required majority, voting weights) are altered. Besides the enlargement of the Union by the four EFTA countries we intend to analyse previous enlargements of the EU and compare the observed evolution to the future.

The rest of this paper is organised as follows. In section 2 we introduce the concepts that we need in our analysis. Our aim is to give mainly the basic ideas behind the measures we use. A reader who is interested in more technical definitions can find them in the Appendix. Section 3 summarises the results concerning the national power and the functioning of the decision making with the current rules. In Section 4 we change the rules and investigate the consequences. Finally, in Section 5, the conclusions and policy implications are presented.

2. About the Concept of Influence[2]

2.1 Power and Control

While the intuitive meaning of influence is easy to understand its formal quantitative definition is more difficult. Perhaps the most important question to be posed is "What kind of elements of influence we can take into account?" In each voting body – like also the EU Council of Ministers – there are formal and informal ways to influence an outcome. The former is based on voting weights that each member state has in votings and the latter is based on personal contacts, ministers' support groups, officials, lobbyists, etc. In this sense the measurable part of power is restricted only to the formal part. This kind of approach can be criticised since the measures do not take into account that voter A has, for example, a wider range of important personal contacts of better information channels than voter B. However, the formal analysis of influence can also be easily defended since we may always ask, "Can we really say anything about the informal contacts in measurable sense?" To

[2] We interprete the measures of influence throughout this paper as member states' assesments of their positions in the voting game of the Council. That also explain why we concentrate on the probabilistic approach of these indices.

elaborate on this question more it is worth stressing that for a formal measure of influence we need something that is observable and longlasting enough. For the informal ways to influence it is typical that are neither observable nor longlasting since, for example, the governments change. The formal analysis of influence assumes that each voter has unlimited possibilities to make personal contacts, to get information, etc. After all, this sounds quite reasonable because the ways to get informal powers are not restricted – as they remain in legal limits.

In this paper we distinguish between two different aspects of influence (see Appendix) in EU decision making. First, we analyse the question of *power*. We define power as the probability that a member state affects the voting outcome, (i.e. the probability to make a difference in the group decision).

Our second question concerns *control* of decisions. We investigate control by estimating probabilities for so-called *group-individual agreement* (i.e. the probability that the group decision will agree with one's decision and it will block a decision if an individual votes 'against' and ensure acceptance of a proposal if an individual votes 'for'). We call the former *negative* and the latter *positive* control. With these control measures we can analyse the risk of being outvoted, which is an essential question for every member state when unanimity is not needed for decisions.

The method we intend to apply in this paper is the theory of power and satisfaction indices of cooperative games. These measures have been applied earlier mostly to institutions where voting takes place, e.g. regarding parliaments (Holler 1982, Laakso and Taagepera 1982), the UN Security Council (Laakso 1977), presidential elections of the US. (Owen 1982) and shareholders' meetings of large companies (Leech 1985, 1987a, 1987b, 1987c, Pohjola 1988, Rydqvist 1987). Voting power in the EU has been analysed earlier by Brams and Affuso (1985a, 1985b), Brams, Doherty and Weidner (1991), Widgrén (1991, 1993a, 1993b, 1993c, 1993d), Winkler (1991, 1993) and Nurmi (1992).

2.2 The Cooperative Game Model

Cooperative game theory is based on comparisons of voting outcomes. It is worth stressing that it does not make a difference between the outcomes of a vote and coalitions. In a simple

voting games with n voters we can divide the 2^n possible yes-vote coalitions to either winning (majorities) or losing (minorities). Consider an example of a voting body where there are four countries A, B, C and D having 3, 3, 3 and 1 votes respectively. Let us assume that decisions are made by using a simple majority voting. There are 16 possible outcomes (and yes-vote coalitions) in this body (∅, A, B, C, D, AB, AC, AD, BC, BD, CD, ABC, ABD, ACD, BCD, ABCD). Particularly, there are 8 winning yes-vote coalitions - or 8 outcomes - where a proposal is accepted, namely AB, AC, BC, ABC, ABD, ACD, BCD and ABCD. The picture would be quite different if we change the majority rule to a two-thirds majority. The number of yes-vote majorities would decrease to 5, namely ABC, ABD, ACD, BCD and ABCD.

To answer to the question how powerful a certain country i is we have to define the coalitions (or outcomes) in which it is *crucial.* It should be intuitively clear that a country is crucial to the outcome exactly when it can swing a majority to a minority. We call the group of these coalitions *minimum winning coalitions* with respect to i. In our example above we see that in a simple majority voting country A is crucial in coalitions AB, AC, ABD and ACD and in two-thirds majority voting in coalitions ABC, ABD and ACD. An interesting feature in this example is that country D is not crucial for any coalition in simple majority voting but in two-thirds majority voting it can swing majorities ABD, ACD and BCD to minorities. To answer the question of positive control we simply pick out the majorities where a certain country is a member and to analyse negative control we need the minorities where country i is not a member (i.e. it votes 'no' and the yes-vote coalition can not form a majority). In our simple example country A has positive control in outcomes AB, AC, ABC, ABD, ACD and ABCD when a simple majority rule is used and negative control in outcomes ∅, B, C, D, BD and CD. Changing the majority to 2/3 would change the control figures significantly. This should be intuitively clear since the higher the required majority the smaller the possibility to ensure the acceptance of proposals. In our example country A has positive control in outcomes ABC, ABD, ACD and ABCD when the majority rule is 2/3 and negative control in outcomes ∅, B, C, D, BC, BD and CD.

2.3 Voting Probabilities

To calculate the probabilities that 'a voter has power or control' we need a probability distribution for outcomes. To define a probability distribution for the occurrence of outcomes

we need a probability model for each voter's behaviour (i.e. a probability distribution for the probability that i votes 'yes' or 'no'). There are two possible ways to define such a distribution, namely to estimate statistically the joint probability distribution for the voting behaviour of each voter by using historical data or to work with reasonable a priori assumptions. In the EU Council of Ministers the choice is simple because voting is secret and there is no historical data available. Yet, it is worth stressing that even if we had a voting data for a certain period it is not necessarily reasonable to use it because of the fact that governments change and thus national interests could change over time. Historical data does not necessarily contain enough information to make conclusions about the future or it might lead to biased conclusions about future votings (see Straffin 1988). That is why a priori types of assumptions are usually used in formal analysis of power.

Perhaps, the simplest a priori assumption is to suppose that each outcome occurs with equal likelihood. Actually, this very simple assumption is a consequence of so-called *independence* assumption whereby it is supposed that each voter i independently chooses the probability p_i to vote 'yes' from a uniform distribution (see Appendix). On average they are *indifferent* whether to vote 'yes' or 'no'. Each voter's behaviour can be interpreted as a Bernoulli experiment with a probability of 1/2 and the number of voters giving a yes-vote is binomially distributed, as we know from the basics of probability calculus. Thus independence indicates that each voter tosses a coin to choose whether to vote 'yes' or 'no'.

The independence assumption can also be characterised with the concepts of information and communication. Choosing a probability from a uniform distribution illustrates that we do not know anything about the voting proposal. Voters' independent behaviour illustrates that they do not try to communicate to make compromises. The former property seems to be reasonable for any formal measure of influence unless there is information about the issues. The latter suits, at least intuitively, well to characterise the early phases of decision making where the voters haven't sought compromises and the draft proposal is not amended. Straffin (1988) argues that due to this interpretation independence is an appropriate assumption for voting bodies where there is no appreciable communication between voters.

Supposing the occurrence of each outcome to be equally likely is not the only possibility to model the voting behaviour in a general and reasonable way. Moreover, investigating only

the possible outcomes does not give us enough information about the voting process to reveal the voter who actually makes the difference. In yes-vote majorities, as can be seen in our example above, there are several crucial voters. Let us call a voter who makes the difference a *pivot.*

If we think about the coalition formation - or merely voting behaviour - it should be, at least in principle, possible to order the voters according to their propensity to vote 'for' a proposal. Intuitively it sounds quite reasonable that voters differ from each other according to their willingness to give their support to a proposal. By assuming that the occurrence of each of these orderings of voters is equally likely we also assume that there are n! different voting questions and they occur with equal probability. In the literature this assumption is usually referred to as *homogeneity.*

At first sight, the homogeneity, interpreted as above, may sound odd. The usual criticism of homogeneity assumption concerns the interpretation of voters' permutations and it has been argued that their connection to power is weak. However, as the equal probability of each outcome was an implication of a certain probability model for each individual's voting behaviour, the same holds for the permutation illustration of the homogeneity assumption either. Thus the interpretation that is based on permutations is illusory, a consequence rather than the reason.

The probability model behind the homogeneity can be characterised as follows. Let us assume that the probabilities p_i that a voter i supports a proposal are somehow equalised to t for each i and let us also assume that this t is chosen from a uniform distribution. Heuristically, homogeneous voters have agreed about the general acceptance (the probability t) of a proposal and it is then allowed to vary randomly on the interval from zero to one. Thus we take into account also the proposals that are rejected or never voted on. When assuming homogeneity the outcomes with any number of yes-voters occur equally likely and each coalition with a fixed number m=1,...n of voters is equally likely.

Homogeneity gives us more information about the voters than the assumption of independence. The basic idea is that the probabilities that voters support a proposal are correlated. Voters have a common coin that draws the general acceptance among voters in

each question. Hence there has been a considerable communication between the voters and they have possibly amended a proposal somewhat. While independence characterises the early phases of decision making, homogeneity tries to model the whole decision making process as it takes into account all questions of voting between the earth and heaven. In particular, it stresses the late phases of decision making because an agreement on the value of a "common standard" t usually requires negotiations.

It is interesting that the homogeneity assumption is the only possible assumption that indicates consistent distribution of power. Thus the measures of power sum up to unity. This is due to the property of homogeneity that it defines a unique pivot in each voting. It is a necessary condition to define a consistent distribution of power (Dubey, Neyman and Weber 1981). Assuming independence implies that we have several pivotal voters in each vote. Assuming independence, the probability that a voter is crucial is referred to as the *Banzhaf index (BI)* and assuming homogeneity it is referred to as the *Shapley-Shubik index (SSI).* Similarly the measures of control are often referred to as *Rae* and *Straffin* index respectively (see Appendix).

Keeping the above mentioned interpretations in mind we may think that BI is a measure of voters' abilities to exert influence before the decision making has actually started and the SSI gives one possible consistent distribution of power in this process. Another possibility is to normalise the BI, but then its probabilistic interpretation is destroyed and it is purely a measure of distribution. In this paper we do not, however, analyse the question of fair division of power.

Let us now elaborate more on voting assumptions and interpret the ratio of individual power indices, namely BI_i/SSI_i, as a measure which gives information about how competing a certain voting body is. Thus we may call a voting body *competing* if this ratio exceeds one (i.e. BIs exceed SSIs) for more than half of the voters since they have an incentive to behave independently and *conciliatory* (compromise seeking) if the ratio falls below one for more than half of the voters since they have incentive to make compromises.

If BIs exceed one the voters actually overestimate their average prospects to influence the outcomes of a vote. Thus the distribution is not feasible. Here this phenomenon is interpreted

as a driving force for competition of ideas because a single voter does not know in which questions she overestimates her prospects and they try to get the ideas through by forming small coalitions.[3] In contrast, if the ratio falls below one a voter has an incentive to cooperate since on average she can gain power by seeking compromises.

It is worth stressing that the comparison of power measures does not tell anything about whether a conciliatory or a competing voting body is more desirable. A voting body which is very conciliatory suffers from efficiency losses if voters have heterogeneous views. On the other hand, for a homogeneous group of voters very a competing voting body could be harmful because there is always a risk that somebody will break up the peaceful homogeneity by refusing to negotiate about the compromises. To make deeper conclusions about the nature of a voting body we need to combine the power and control analysis, as is done in the next section.

3. On the Relation between Voting Power and Control in the EU

In this section, we integrate the power analysis to the control measures. This gives us a possibility to make conclusions about the nature of the decision making in the EU and elaborate on what kind of decisions the Union is able to take.

3.1 The Evolution of Power Measures in the EU: Towards a Conciliatory Decision Making

Table 1a shows the Banzhaf power indices (BIs) in qualified majority voting for the EC(6), the EC(9), the EC(10), the current Union and the EU(16) scenario. Table 1b shows the corresponding Shapley-Shubik indices (SSIs). The figures show clearly that the BI converges

[3] In the games with more than two players independent voters are strategic risk averse. In coalition formation games they have a certain equivalent of the form $(1/2)^{r-1}$ where r is the number of members negotiating for the cooperation as a coalition. An independent voter is thus indifferent of receiving $(1/2)^{r-1}$ for certain and of playing the strategic position in a coalition formation game with r-1 other voters. Independent voters prefer small coalitions to the large ones (see Roth 1988) since their prospects of their own bargaining ability reduce proportionally in larger coalitions.

Table 1a. The Banzhaf Power Indices in Qualified Majority Voting for Different Compositions of the EU, Relative Power Presented in Parentheses

Member state	EC(6)	EC(9)	EC(10)	EU(12)	EU(16)
Germany	0.313 (1.01)	0.207 (0.97)	0.195 (0.99)	0.139 (0.98)	0.101 (0.97)
Italy	0.313 (1.01)	0.207 (0.97)	0.195 (0.99)	0.139 (0.98)	0.101 (0.97)
United Kingdom		0.207 (0.97)	0.195 (0.99)	0.139 (0.98)	0.101 (0.97)
France	0.313 (1.01)	0.207 (0.97)	0.195 (0.99)	0.139 (0.98)	0.101 (0.97)
Spain				0.118 (1.04)	0.082 (0.99)
Netherlands	0.188 (1.22)	0.113 (1.06)	0.102 (1.04)	0.073 (1.02)	0.053 (1.02)
Portugal				0.073 (1.02)	0.053 (1.02)
Greece			0.102 (1.04)	0.073 (1.02)	0.053 (1.02)
Belgium	0.188 (1.22)	0.113 (1.06)	0.102 (1.04)	0.073 (1.02)	0.053 (1.02)
Sweden					0.043 (1.04)
Austria					0.043 (1.04)
Denmark		0.082 (1.28)	0.051 (0.86)	0.049 (1.24)	0.032 (1.03)
Finland					0.032 (1.03)
Norway					0.032 (1.03)
Ireland		0.082 (1.28)	0.051 (0.86)	0.049 (1.24)	0.032 (1.03)
Luxembourg	0.000 (0.00)	0.020 (0.47)	0.051 (1.29)	0.019 (0.67)	0.022 (1.06)
EU total	1.315 (1.00)	1.238 (1.00)	1.239 (1.00)	1.083 (1.00)	0.934 (1.00)

to the SSI while the Union expands from the EC(6) to the current situation and for the largest countries it even falls below the SSI when the Union is enlarged by the EFTA countries. Thus the enlargements of the EU have deteriorated member states' ability to pursue independent policies when measured by the power indices (see Widgrén 1993b). This result indicates that the need for compromises has increased since member states' prospects to

Table 1b. The Shapley-Shubik Power Indices in Qualified Majority Voting for Different Compositions of the EC/EU, Relative Power presented in Parentheses

Member state	EC(6)	EC(9)	EC(10)	EU(12)	EU(16)
Germany	0.233	0.179	0.174	0.134	0.116
	(0.99)	(1.04)	(1.09)	(1.02)	(1.05)
Italy	0.233	0.179	0.174	0.134	0.116
	(0.99)	(1.04)	(1.09)	(1.02)	(1.05)
United Kingdom		0.179	0.174	0.134	0.116
		(1.04)	(1.09)	(1.02)	(1.05)
France	0.233	0.179	0.174	0.134	0.116
	(0.99)	(1.04)	(1.09)	(1.02)	(1.05)
Spain				0.111	0.090
				(1.06)	(1.02)
Netherlands	0.150	0.081	0.071	0.064	0.054
	(1.27)	(0.94)	(0.90)	(0.98)	(0.97)
Portugal				0.064	0.054
				(0.98)	(0.97)
Greece			0.071	0.064	0.054
			(0.90)	(0.98)	(0.97)
Belgium	0.150	0.081	0.071	0.064	0.054
	(1.27)	(0.94)	(0.90)	(0.98)	(0.97)
Sweden					0.043
					(0.96)
Austria					0.043
					(0.96)
Denmark		0.057	0.030	0.042	0.032
		(1.10)	(0.63)	(1.07)	(0.96)
Finland					0.032
					(0.96)
Norway					0.032
					(0.96)
Ireland		0.057	0.030	0.042	0.032
		(1.10)	(0.63)	(1.07)	(0.96)
Luxembourg	0.000	0.010	0.030	0.012	0.020
	(0.00)	(0.29)	(0.94)	(0.44)	(0.90)
EU total	1.000	1.000	1.000	1.000	1.000
	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)

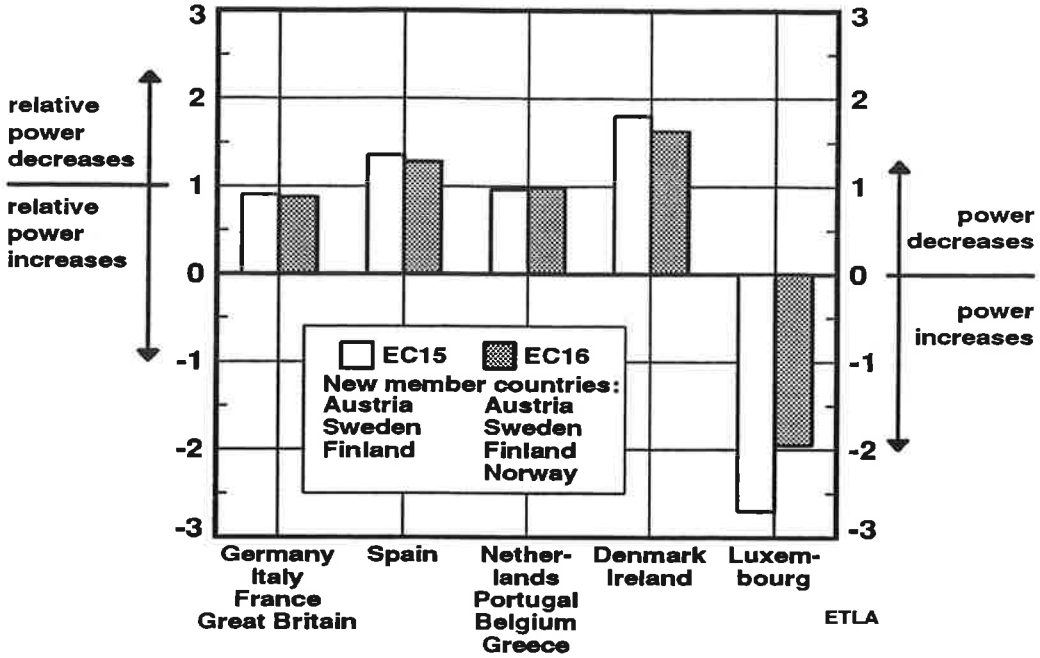
influence on decision making without compromises has decreased considerably. The expansion of the EC by the UK, Ireland and Denmark did not have significant implications for the nature of EC decision making. The first remarkable step on the way to greater compromises was the Mediterranean enlargement, which almost equalised the indices and decreased the BIs by 13 per cent on average. Thus in the 1980s the Union turned from

competing to more conciliatory decision making body. The second remarkable step would be the enlargement of the EU by the four EFTA countries since it would turn the decision making to be conciliatory (the BIs fall below the SSIs for the nine largest members). Particularly, the 10-vote countries seem to lose their independent power most significantly.

The important difference between the two indices – or voting assumptions – can be seen by comparing their behaviour in unanimous voting. Then there is only one winning coalition and thus despite the voting weights the game is symmetric (i.e. each country has equal power). For the EC(9) the SSI gives 0.111 for each country, 0.083 in the current Union and 0.0625 for the expanded EU with the EFTA countries. The respective Banzhaf indices are 0.0039, 0.0004, 0.000031. The simple heuristic explanation for the difference is that in unanimous voting a single country cannot wield power without compromises. Thus a voting body where unanimity is needed for decisions is very conciliatory.

Tables 1a and 1b also present the measures for relative power. The relative power is here defined as the power index divided by the voting weight. The more relative power differs from one, the poorer a measure the voting weight is for power. Since BIs do not sum up to unity the relative power measures are normalised by dividing them with the sum of BIs. It is not surprising that the largest countries have more power than the smallest in absolute terms. Both the SSI and BI are monotone with respect to the voting weights. What is much more surprising is that proportionate to the voting weights the power measures do not tend to depend very much on voting weight, as often happens in weighted voting. Hence relative power seems to be independent of member states' size before the accession of the four EFTA countries. The entry of those EFTA candidates has very different consequences according to the assumption concerning the voting behaviour. When assuming homogeneity the relative power seems to be a slightly increasing function of voting weight while for independent voters almost the reverse seems to hold true. The results in Tables 1a and 1b indicate that the small EFTA countries make it more difficult to try to pursue independent policies successfully in the Union. Also, the independent power is more equally distributed than the homogeneous power. Regarding the relative position the small countries have an incentive to behave independently and thus maintain the status quo. Making compromises increases their absolute power but their relative position worsens. Hence the small countries gain by seeking for cooperation but at the same time the largest members gain even more because they are

Figure 1. The Elasticity of the SSI with Respect to the Voting Weight when the Community Enlarges



needed for decisions anyway.

Luxembourg has an interesting position. In the early days of the EU it had no power at all in qualified majority voting (i.e. it was a dummy voter as it could not contribute anything to any coalition). In the EC(10) Luxembourg had as much power as the three-vote countries but the membership of Spain and Portugal decreased its voting power. However, Luxembourg has more power in the current Union than in the EC(9) or in the EC(6). In the literature this phenomenon is referred to as the paradox of new members (Brams - Affuso 1985a, 1985b).

The four EFTA countries would yield a 15 per cent power loss for the current members. The relative loss of power is smaller than in 1973 when the UK, Ireland and Denmark joined the Union or in the 1980s when three Mediterranean countries became members. With this respect the enlargement has no dramatic consequences. Figure 1 summarises both the absolute and relative changes of voting power for each of the current members. The vertical axis presents the elasticity of power with respect to the voting weight, (i.e. relative change in

Table 2. Decision Making Control in Different Compositions of the EU

(A = Homogeneity, B = Independence)

Member state		EC(9)		EU(12)		EU(16)	
		Positive	Negative	Positive	Negative	Positive	Negative
Germany	A	0.379	0.800	0.351	0.783	0.344	0.775
	B	0.250	0.957	0.168	0.972	0.122	0.979
Italy	A	0.379	0.800	0.351	0.783	0.344	0.775
	B	0.250	0.957	0.168	0.972	0.122	0.979
United Kingdom	A	0.379	0.800	0.351	0.783	0.344	0.775
	B	0.250	0.957	0.168	0.972	0.122	0.979
France	A	0.379	0.800	0.351	0.783	0.344	0.775
	B	0.250	0.957	0.168	0.972	0.122	0.979
Spain	A	..	..	0.344	0.767	0.336	0.756
	B	..	..	0.157	0.961	0.113	0.970
Netherlands	A	0.351	0.730	0.330	0.734	0.326	0.731
	B	0.203	0.910	0.134	0.939	0.098	0.955
Portugal	A	..	..	0.330	0.734	0.326	0.731
	B	..	..	0.134	0.939	0.098	0.955
Greece	A	..	..	0.330	0.734	0.326	0.731
	B	..	..	0.134	0.939	0.098	0.955
Belgium	A	0.351	0.730	0.330	0.734	0.326	0.731
	B	0.203	0.910	0.134	0.939	0.098	0.955
Sweden	A	..	..	..	..	0.322	0.723
	B	..	..	..	..	0.093	0.950
Austria	A	..	..	..	..	0.322	0.723
	B	..	..	..	..	0.093	0.950
Denmark	A	0.343	0.714	0.323	0.719	0.319	0.715
	B	0.188	0.895	0.123	0.927	0.087	0.945
Finland	A	..	..	..	..	0.319	0.715
	B	..	..	..	..	0.087	0.945
Norway	A	..	..	..	..	0.319	0.715
	B	..	..	..	..	0.087	0.945
Ireland	A	0.343	0.714	0.323	0.719	0.319	0.715
	B	0.188	0.895	0.123	0.927	0.087	0.945
Luxembourg	A	0.323	0.683	0.314	0.697	0.315	0.708
	B	0.156	0.863	0.107	0.912	0.082	0.940

power index proportionate to relative change in voting weight). Since the enlargement decreases voting weight, negative values represent increase in absolute power (i.e. the paradox of new members). For the relative power the values between zero and one indicate an increase because then the absolute power decreases less than a voting weigh. The values exceeding one indicate a loss in both absolute and relative terms. Figure 1 shows that

Luxembourg is, again, a paradoxical case. It gains power, when the Union enlarges. Intuitively one reason behind this phenomenon is that as the number of small countries increases the difference between 2 and 3 votes decreases. What is interesting is that the paradox remains also when only Sweden, Austria and Finland join the Union. Another feature that can be seen in Figure 1 and Table 1b is that those who have the highest relative power in the current Union lose the most in relative terms[4].

3.2 Decision Making Control

In 1986 the Single European Act introduced an institutional reform that increased the usage of majority voting. Two different explanations for the acceptance of this reform can be given. The first one stress the functioning and efficiency of the decision making process and the need for wider range of majority votings to complete the single market program before the end of 1992 (see Wallace 1990). As far as the effective consequences are concerned, neither empirical results nor the power measures, however, lend much support to this popular hypothesis although, without any doubt, it was a main impetus to carry out the reform. For example, it has been argued in Sloot & Verschuren (1991) that there was no remarkable difference between the decision making speed in the EC regarding whether the decisions were made by unanimity or qualified majority voting.

The second possible explanation for the majority rule reform is simply based on power and control figures. Table 2 shows the control figures for member states in qualified majority voting. They show that effectively the increased usage of majority voting was to avoid the Mediterranean veto concerning the single market program with small enough a risk of Mediterranean dominance. It was argued above that the Mediterranean enlargement maintained decision making of a slightly competing nature in the EC. By strengthening the role of majority voting the members of the EC(9) faced a risk that the small and homogeneous Mediterranean coalition would become too dominating since in the sense of power the incentive to push their independent policy through remained. Despite the possible risks the institutional reform was easy to push through because member states maintained the national negative control to almost as great an extent as in unanimity voting. To increase the Community's abilities to operate, or efficiency of the EC decision making, the move from

[4] For a more detailed discussion about the changes in relative power, see Widgrén (1991).

unanimity to qualified majority was far too moderate a reform. Moreover, even when comparing qualified majority voting figures between EC(9) and EC(12) in Table 2, there are significant losses in positive control but not in negative control. Thus members of the EC(9) preferred the Community's weaker abilities to operate to the risk of Mediterranean hegemony in decisions.[5]

Table 2 reveals two comprehensive features of the EU decision making. The first is the above mentioned high negative control. The second is the relation between the homogeneous and independent control. It seems that the negative control is higher for independent voters than for the homogeneous voters while for the positive control the reverse seems to hold. Thus compromises lead to higher probabilities of ensuring the acceptance of a proposal and independent behaviour is likely to maintain the status quo. It seems that the member states can secure their national interests by acting independently. In particular, each country can defend their most important national interests. Should this happen, it is possible that the only way to make decisions is to link them.

Let us assume that voters are likely to behave according to their prospects of having an effect on an outcome, i.e. power[6]. In the EU Council of Ministers this leads to independent behaviour and to the competition of ideas. Thus there are numerous potential proposals. Independent behaviour leads, however, to difficulties in making decisions since it is not likely that a proposal will pass. The independent positive control figures vary within the range from 10.7 to 16.8 per cent in the current Union and from 8.2 to 12.2 per cent in the EU(16). In the current Union, the combination of incentive to behave independently in terms of power and need for homogeneity to make decisions is likely to lead to linked decisions as mentioned above. This is due to the fact that small homogeneous coalitions (cooperation groups) can not gain much power even in the case of permanent cooperation and thus none of the small

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[5] Slighly different calculations show, however, that when joining their forces, the Mediterranean coalition had significant implications to the power distribution and also to the pursued policies (Widgrén 1991, 1993d).

[6] Figure 5 in section 4 summarizes the trade-off between power and control. It shows a field with four quadrants where the vertical axis presents the nature of power and the nature of positive control (independent or homogeneous). The nature of negative control is opposite that of positive control. Hence independent positive control indicates homogeneous negative control and homogeneous positive control indicates independent negative control.

coalitions with 3-4 members can not dominate decision making in the Council (see also Widgrén 1991, 1993c for a more detailed discussion).

In the EU(16) the new entrants change the trade-off balance since homogeneous power begins to dominate. Thus there is a combination of incentives to make compromises to be powerful and need for homogeneity to make decisions. As an indication, the decision making is likely to get slower, since there is a greater need for compromises than before. On the other hand, contrary to the current situation, member states also have an incentive to cooperate in a more general manner to find solutions that speed up the decision making process in questions where countries are homogeneous enough. It seems that in the EU(16) member states have, at least, an incentive to affect other members' interests rather than trying to buy them with package deals. Of course, the need for a wide compromise makes the decision taking more difficult.

3.3 The Concentration of Power

One of the most important questions to answer in power and control analysis is how concentrated they are. The absolute power figures do not give a straightforward answer to the question. There are numerous ways to investigate the concentration. In this paper we have chosen two quite different approaches. First, we intend to analyse the number of effective members in the EU and the share of their voting weight. To define the effective number of voters we use a simple formula which is closely related to the Herfindahl index as follows,

$$E = \left(\sum_{i=1}^{n} \Phi_i^2 \right)^{-1}, \tag{1}$$

where E is the effective number of votes, n the actual number of voters and Φ_i the SSI for country i. It is easy to see that E=n when each country has equal power of 1/n or that E=1 if there is a dictator in a voting body (see Laakso & Taagepera 1982). Thus E measures the effective number of voters and its inverse measures the concentration of power. Second, we intend to use the positive control measures (see section 2 above).

As noted earlier, positive control measures the ability to ensure the acceptance of a proposal by voting 'yes'. For our purposes we define this measure for a so-called leading coalition that is

Table 3. The Concentration of Power in Different Compositions of the EU

	EC(6)	EC(9)	EC(10)	EU(12)	EU(16)
Effective number of members	5	7	7	10	12
Effective number of votes	34*	43	45	61	69
Effective share of votes	80	74	72	80	76

* Actually the total number of votes in the EU(6) was 17 of which 14 effective. For the sake of comparability we have transformed the total number of votes to the current system.

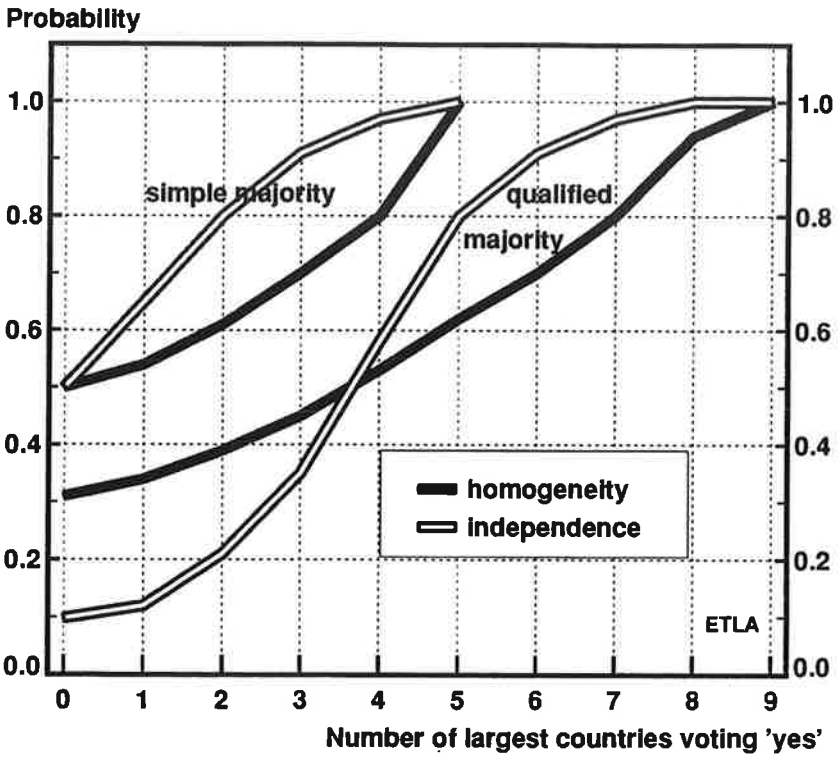
a coalition of the m largest members. Hence it is assumed that the m largest members vote 'yes' and the probability of acceptance is calculated on this condition. The faster the positive control increases with respect to m, the more concentrated the control is. With an aid of this measure we may also make conclusions about the concentration of power[7]. To use the analogy to statistics we may define that a coalition is *weakly controlling* if it can ensure the acceptance of a proposal by 0.95 probability and *controlling* if the probability exceeds 0.99.

Figure 2 shows that the positive control for the leading coalition in the EU(16) when a qualified majority and a simple majority are required. The measure behaves very similarly in the current Union and that is why we do not intend to present it here (see Widgrén 1993b). When assuming homogeneous voters in the positive control stays below the critical values of 0.95 and 0.99 until the majority is reached while the coalition of the seven largest members seems to be weakly controlling and the coalition of the eight largest members controlling when voters are assumed to behave independently. Thus the seven largest members (or approximately 58 votes) can ensure the acceptance of proposals with a very high probability but there is no evidence of positive minority control [8]. According to this measure the power is not concentrated. However, low positive control indicates that member states' negative control is high. Table 2 shows that in the current Union Germany, Italy, the UK, France and Spain are weakly controlling in the sense of negative control. In the EU(16) negative control is even more concentrated since each member with four votes or more can weakly control the decisions by trying to block them. Also, it is worth noting that the negative control is

[7] For previous work on this field see Pohjola (1988) and Leech (1987a, 1987b, 1987c).

[8] Weighted voting does not usually have this property. For example, the largest Finnish manufacturing companies are positively controlled by the coalition of the two largest shareholders (Pohjola 1988).

Figure 2. The Probability to Ensure the Acceptance of a Proposal when n Largest Countries Vote 'Yes'



Source: Widgren (1992 c).

potentially much more concentrated than the positive control. Namely, when voters are assumed to behave independently seven out of nine members (78 per cent) needed for qualified majority can (weakly) control decision making while for the negative control only one out of three (33 per cent) of the largest members are needed for a blocking minority.

Figure 2 reveals also that the relation between the independent and homogeneous positive control changes when the leading coalition has four members (or approximately 40 votes). Thereafter the leading coalition does not increase the probability to ensure the acceptance of a proposal by making compromises but rather by trying to push its independent views through either with or without side-payments. It is worth stressing that the side-payments seem to be necessary since the probability of accomplishing a decision is low for the leading coalition of

the four largest countries. This feature supports the hypothesis that power is not very concentrated since it is easy to imagine how complicated it is even to form a coalition of the four largest members or the one having approximately 40 votes.

Table 3 shows the effective number of member states in each composition of the Union. In the second row the number of member states has been transformed into the number of votes by multiplying the number of countries with the average number of votes. Finally, the third row presents the effective number of votes as a share of total number of votes. The power is more concentrated the lower the share of effective votes is. Table 3 suggests that the three EFTA entrants of 1973, namely the UK, Ireland and Denmark, and Greece in 1981 increased the concentration of power in the EU. The first new members of the Union got 16 actual votes while the increase of effective votes was only 9. Similarly, Greece's 5 actual votes increased the effective number of votes only by 2. In the mid-1980s the concentration of power declined when Spain and Portugal joined the EU. This was mainly due to the Spain's strong position that also decreased the influence of 10-vote countries dramatically (see tables 1a and 1b)[9].

Enlarging the Union by four EFTA countries would increase the concentration of power once again. The new entrants have 14 actual votes while the increase in the effective votes would be 8. The effective share of votes does not, however, decrease very much. In general, it seems that the number of effective votes relative to actual ones has remained and will remain stable. Also, as the positive control for the leading coalition, the conclusions concerning the effective number of voters suggest that power is not very concentrated. In particularly, with respect to voting weights, there do not seem to be any remarkable differences concerning the concentration figures.

Regarding the concentration of power and the EU Council's abilities to operate the most important message of both measures of concentration seems to be the following. In the EU Council of Ministers it is almost impossible to pursue policies that are initiated or supported only by small coalitions of 2-3 members.[10] Yet, every single member state has a good

[9] If we assume that Spain, Portugal and Greece form a coalition, Spain would become the most powerful member of the Union. For a detailed analysis of coalitions, see Widgrén (1991).

[10] For example the so-called sub-systems of the EU, namely the Franco-German axis, the Benelux countries, the Nordic countries or the Mediterranean troika are examples of such coalitions. For a detailed description of

opportunity, and even an incentive, to block proposals that do not agree with its independent policy positions. As the number of members in the leading coalition increases to four members (40 votes) they still have considerable difficulties in ensuring the acceptance of a proposal but making compromises seems to make things even more complicated (see Figure 2). Since an incentive for independent policy occurs with the low probability to accomplish decisions we may argue that the decisions have to be linked. It is likely that this property secures the most important national interests also in the sense of positive control. Thus it is likely that the member states manage to obtain favourable Union-wide policies in good or bad (see Baldwin 1992, Winters 1993).

In the EU(16) the situation is slightly different since member states seem to be more ready to make wider compromises in terms of the ratio between the homogeneous and independent power. Regarding the leading coalition it becomes more difficult to reach a compromise about the package deals with the other countries. Since wider compromises are needed, the decision making could get slower but this does not necessarily the case. If voters are very homogeneous, the decision making in the EU(16) could even be easier than in the current Union. Regarding the efficiency the most important factor is the degree of homogeneity that member states could reach since in all practical purposes the high level of homogeneity becomes a prerequisite for making decisions. In questions where this necessary condition does not hold the decision making is likely to be inefficient.

In general, the conclusion concerning the impact of the new entrants is twofold. First, it seems that they do not change the balance of voting power as much as, for example, Spain and Portugal in 1986. Second, the most fundamental implication of the new entrants is that the need for wider compromises is likely to increase. Thus decision making turns from slightly competing to conciliatory. Linking decisions becomes more difficult since the member states have an incentive to try to affect other countries' policy positions rather than make package deals. However, the new entrants' implications to the pursued policies in the EU are likely to be smaller than in the 1980s when the Mediterranean countries joined the EU.[11]

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these coalitions, see Schoutheete (1990) and for their impact on the balance of power in the EU, see Widgrén (1991).

[11] For a more detailed discussion, see Widgrén (1993d).

Table 4. Voting Power in a Simple Majority Voting of the Current and an Expanded EU

Member state	EU(12)		EU(16)	
	Shapley-Shubik index	Banzhaf index	Shapley-Shubik index	Banzhaf index
Germany	0.135	0.336	0.116	0.365
Italy	0.135	0.336	0.116	0.365
United Kingdom	0.135	0.336	0.116	0.365
France	0.135	0.336	0.116	0.365
Spain	0.107	0.268	0.091	0.285
Netherlands	0.063	0.160	0.055	0.174
Portugal	0.063	0.160	0.055	0.174
Greece	0.063	0.160	0.055	0.174
Belgium	0.063	0.160	0.055	0.174
Sweden	..	..	0.043	0.138
Austria	..	..	0.043	0.138
Denmark	0.038	0.100	0.032	0.103
Finland	..	..	0.032	0.103
Norway	..	..	0.032	0.103
Ireland	0.038	0.100	0.032	0.103
Luxembourg	0.023	0.061	0.021	0.069
EU total	1.000	2.513	1.000	3.198

4. The Impact of Changing the Decision Making Rules

4.1 From Qualified to a Simple Majority

As it was noted in the previous section, the new entrants' main impact on the nature of the EU decision making is that they will increase the need for wider compromises. In this section we intend to analyse the effect of changes in the decision-making rules.

Consider first simple majority voting. Intuitively lowering the required majority should increase positive control on the cost of negative control. Moreover, since the small countries' power could, at least intuitively, be based more on blocking than on accomplishing decisions such reform could induce higher losses of power for the small countries.

Table 4 shows the power indices in a simple majority voting and Figure 2 the positive control for the leading coalition. Figure 2 suggests that concerning the relationship between positive and negative control the above mentioned intuition was right. Thus, indeed, lowering the majority rule will increase the positive control especially for the small coalitions. Figure 2 also shows that in simple majority voting the curve I' which represents the independent positive control seems to lie above the curve H' which stands for the homogeneous positive control. In qualified majority voting this property holds only for the leading coalitions with the four largest members or more.

The latter part of the intuition concerning the small countries, however, does not hold. Surprisingly, the SSIs are almost exactly the same regardless of the required majority (simple or qualified). Hence the usage of a simple majority voting rule does not change the balance of voting power. As regards the BIs the level of the indices is remarkably higher for all members. The distribution of power does not, however, change as much although Spain, Denmark and Ireland do not gain as much as the other countries in relative terms. However, according to the BI the effective number of members decreases from 13.0 to 12.5 in the EU(16). In the current Union the measure E suggests an increase in effective number of members while the decision-making rule is changed.

On the basis of table 4 and figure 2 we may argue that the shift from a qualified to a simple majority rule would increase competition in the EU decision making (see Figure 5). Both power and control would be driven by the independent behaviour of member states. Thus the atmosphere would be more or less like "may the best proposal win". For the small coalitions homogeneous and independent positive control seem to be approximately equal and linked decisions are still likely to be needed.

It is worth stressing that as far as the national control – when measured by the maximum of the positive or negative control – is concerned, it reaches its lowest level in a simple majority voting. Thus, although this reform will not affect the balance of power, it has remarkable consequences for the very fundamental nature of the Union decision making. In a body like the EU where the governments make decisions, the reform would minimise the role of the governments and maximise the role of the EU Commission, which makes the proposals.

Table 5. Number of Votes in Three Different Scenarios of Voting Weights in the EU Council of Ministers

Member state	2.465 base scenario	2.5 scenario A	2.6 scenario B	2.7 scenario C
Germany	10	15	31	79
Italy	10	12	24	58
United Kingdom	10	12	24	58
France	10	12	24	56
Spain	8	10	18	40
Netherlands	5	6	10	17
Portugal	5	5	8	13
Greece	5	5	8	13
Belgium	5	5	8	13
Sweden	4	5	7	11
Austria	4	5	7	10
Denmark	3	4	5	8
Finland	3	4	5	8
Norway	3	4	5	7
Ireland	3	3	4	6
Luxembourg	2	2	2	2
EU total	90	109	190	399

4.2 Changing the Voting Weights

As noted in section 2, the formal measures of voting power depend on the voting probabilities, decision-making rule and voting weights. Section 4.1 described the effects when the decision-making rule was altered. By analysing power with two different indices we try to take into account the effects of voting probabilities. The effects of the remaining factor – voting weights – are analysed in this section. The analysis is concentrated on the EU(16) since the question is more relevant as far as an expanded Union is concerned.

In the previous sections it has been assumed that voting weights are determined by the following regression equation

$$(2) \qquad LogV = 0.0063\,(LogP)^{2.465},$$

where V is the number of votes and P is population in thousands. Of course, they do not have

Table 6. Voting Power in Three Different Scenarios of Voting Weights in the EU Council of Ministers

Member state	2.5 scenario A		2.6 scenario B		2.7 scenario C	
	Shapley-Shubik index	Banzhaf index	Shapley-Shubik index	Banzhaf index	Shapley-Shubik index	Banzhaf index
Germany	0.147 (1.04)	0.116 (0.92)	0.165 (0.97)	0.165 (0.95)	0.221 (1.06)	0.2 (0.93)
Italy	0.114 (1.01)	0.097 (0.97)	0.128 (0.98)	0.133 (0.99)	0.151 (0.98)	0.157 (1.00)
United Kingdom	0.114 (1.01)	0.097 (0.97)	0.128 (0.98)	0.133 (0.99)	0.151 (0.98)	0.157 (1.00)
France	0.114 (1.01)	0.097 (0.97)	0.128 (0.98)	0.133 (0.99)	0.145 (0.98)	0.152 (1.00)
Spain	0.094 (0.97)	0.083 (0.99)	0.094 (0.96)	0.102 (1.01)	0.098 (0.93)	0.110 (1.02)
Netherlands	0.053 (0.94)	0.057 (1.14)	0.056 (1.03)	0.057 (1.02)	0.038 (0.85)	0.048 (1.05)
Portugal	0.044 (0.93)	0.043 (1.03)	0.041 (0.94)	0.046 (1.03)	0.028 (0.81)	0.036 (1.02)
Greece	0.044 (0.93)	0.043 (1.03)	0.041 (0.94)	0.046 (1.03)	0.028 (0.81)	0.036 (1.02)
Belgium	0.044 (0.93)	0.043 (1.03)	0.041 (0.94)	0.046 (1.03)	0.028 (0.81)	0.036 (1.02)
Sweden	0.044 (0.93)	0.043 (1.03)	0.034 (0.90)	0.04 (1.02)	0.025 (0.86)	0.031 (1.04)
Austria	0.044 (0.93)	0.043 (1.03)	0.034 (0.90)	0.04 (1.02)	0.022 (0.83)	0.028 (1.04)
Denmark	0.034 (0.90)	0.034 (1.02)	0.027 (0.99)	0.029 (1.04)	0.018 (0.85)	0.022 (1.02)
Finland	0.034 (0.90)	0.034 (1.02)	0.027 (0.99)	0.029 (1.04)	0.018 (0.85)	0.022 (1.02)
Norway	0.034 (0.90)	0.034 (1.02)	0.027 (0.99)	0.029 (1.04)	0.015 (0.81)	0.02 (1.06)
Ireland	0.025 (0.88)	0.026 (1.04)	0.027 (0.92)	0.023 (1.03)	0.013 (0.82)	0.017 (1.05)
Luxembourg	0.017 (0.90)	0.017 (1.02)	0.013 (1.19)	0.012 (1.07)	0.003 (0.57)	0.006 (1.11)
EU total	1.000	0.907	1.000	1.063	1.000	1.078

a regression equation in the EU to determine voting weights for the new entrants. The equation gives us, however, a neutral base when it is assumed that the determination of votes remains unchanged.

Equation (2) also gives us a general tool to change the determination. In this sense the most important part of the right-hand side of the equation is the transformation factor which is defined to be 2.465 in the current Union and thus also in the EU(16). Let us denote this factor by r. The main effect of this factor is that it gives more weight to the population than the ordinary logarithmic function, which seems to underestimate the number of votes as far as the largest member states are concerned. In this section we use this factor to change member states' voting weights. Here we intend to give three different values for r, namely 2.5, 2.6 and 2.7 and thus intend to give more weight to the population figures in determination of votes.

Another possibility to change the determination of votes is to give up the logarithmic relationship between population and votes. Perhaps the simplest way to determine the votes is to give each country as many votes as it has citizens. Hence Germany would have some 80 million votes while Luxembourg less than 400 000. In this case the relationship between population and votes would be linear. Since the variance of population figures among the member states of the EU is very high, such a reform is not realistic. One interesting possibility is to combine the elements of the above-mentioned linear relationship between votes and population and the number of member states itself. Thus the decision would be made by the majority of citizens of the EU and by the majority of member states. At least Germany and France has called for such a reform. We refer it to as a *double majority* and we intend to analyse its consequences in section 4.3.

Table 5 shows the number of member states' votes in three above-mentioned scenarios when the relationship between votes and population remains logarithmic but the transformation factor is allowed to change from 2.465 to 2.5, 2.6 and 2.7. It is worth noting that the population of the former German Democratic Republic has been taken into account when calculating the number of votes for Germany in these scenarios. Table 6 shows the respective figures for voting power and table 7 for the effective number of voters. It is easy to see in Table 5 that member states' number of votes change significantly with relatively small increases of the transformation factor. The ratio of the largest and the smallest number of votes increases from 6[12] in the current Union to 40 in the Union where a transformation factor

[12] Germany would have 12 votes in the current Union if the population of Eastern Ländern would have been

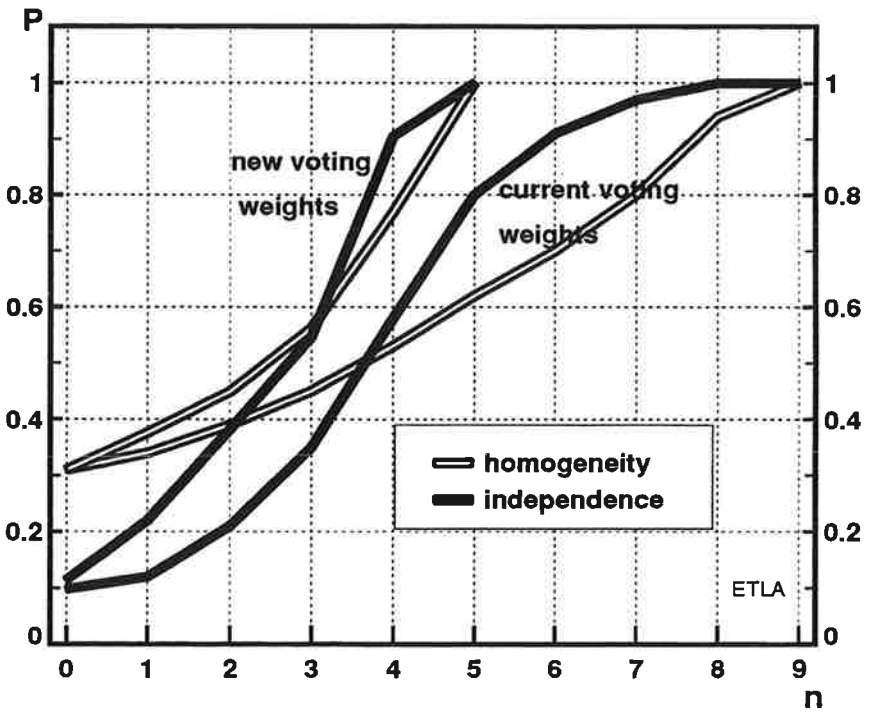
Table 7. The Concentration of Power in Different Scenarios of Voting Weights

	2.5	2.6	2.7
Effective number of members	12	10	8
Effective number of votes	80	86	94
Effective share of votes	76	63	51

of 2.7 is used to determine the votes. The four largest members' share of votes increases from 45 to 60 per cent.

Table 6 suggests that the consequences of the reform of votes are considerable. However, the magnitude of changes is somewhat smaller than could have been imagined. It seems that the change in relative power figures is very moderate even in scenario C. Surprisingly, we may

Figure 3. The Probability that the Largest Member States Can Ensure Acceptance of a Proposal in the EC(16)



conclude that even for the quite remarkable changes in votes, as in scenario C, the relative change of voting weight seems to explain mostly the changes in power measures.

In scenario A the homogeneous power still exceeds the independent power but in scenarios B and C the reverse holds. However, the differences between the indices are not significant. As far as the efficiency of the decision making is concerned, table 6 shows that scenarios A, B and C are very ineffective ways to improve it. The ratio between the independent and the homogeneous power seems to slightly exceed unity, with Germany as an exception, for all countries in scenarios B and C. On average, the relation increases from 0.93 to the current level. Using this criteria leads us to conclude that this reform will not improve decision making efficiency very much, particularly when the reform's effects on the balance and concentration of voting power are also considered.

Table 7 and figure 3 summarise the results concerning the concentration of power. It is shown in table 7 that the effective share of votes decreases to approximately 50 per cent in scenario C. Hence the effects of this reform on concentration of power would be significant. As figure 5 shows, however, the relation between independent and homogeneous control is similar to the current situation. It is not easy – even for the largest members to ensure acceptance of proposals on an independent basis although the positive control increases faster with respect to the number of the largest countries in the leading coalition than in the current situation. In the terms of positive control, the leading coalition seems to gain from compromises until it has reached the size of the three largest members, as the limit was four in the current Union.

4.3 The effects of the double majority

In order to give more weight to the countries with high population, there have been calls for a so-called double majority rule in the Council votings. As the name tells, it consists of two parts. First, it would consider the population figures directly as votes and hence Germany would have almost 80 million votes and Luxembourg under 400 000. Using the notation presented above we may write the determination mechanism by using unity as a transformation

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taken into account. For a more detailed discussion about the consequences of the increment of Germany's number of votes, see Widgrén (1991).

factor and regression coefficient in equation (2), namely as follows: $log\ W = log\ P$, where W denotes voting weight and P denotes population. Not surprisingly, the small countries have opposed such weighting.

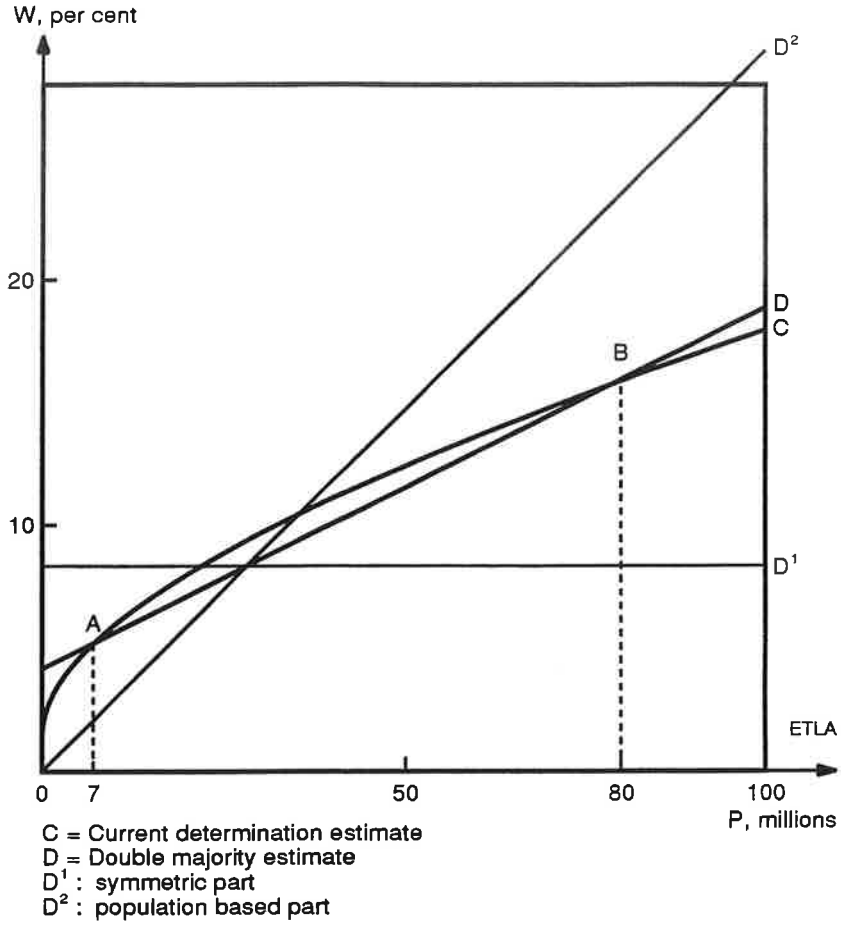
Second, the double majority rule is defined by also requiring a simple majority of EU citizens and a simple majority of member states to take a decision. Thus the voting process is a combination of a symmetric simple majority rule where the voting power is equally distributed and an asymmetric simple majority game where the voting power is very concentrated. The trick behind the double majority is, however, that despite the direct population-based weighting, the two-fold definition of voting rule makes things much more symmetric.

On average the voting weights are, however, even less concentrated than in the current system. A linear combination with 50/50 weights serves as an easy way to approximate the voting weights in a double majority game. Although this is not the correct way to measure power it gives an intuitive idea of how one could expect the actual measures to behave when compared to the current determination of votes. The measures in table 8 are calculated by a two-stage procedure where the class of winning coalitions are defined by using population figures as voting weights and then by applying the two above mentioned majority criterias. As the figures in table 8 and figure 4 show, however, the computational definition of voting weights as an average of population based weights and equal weights gives very good approximations for the actual weights.

In the symmetric part of the game the relationship between voting weight and country size is flat. In Figure 4 the line $W_1 = 1/12$ (denoted by D^1) represents the symmetric part since each country has 1/12 of the votes. In the asymmetric part of the game the relationship between voting weight and population is determined by a function $W_2 = P$ (denoted by D^2.). The average of the two functions is denoted by D and it is defined as $W = (1/12 + P/POP)/2$ where POP is the total population in the EU(12). Figure 4 also shows an estimate for the current determination mechanism of votes (curve C) (see Widgrén 1991).

Figure 4 shows that, in contrast to the intuition in public debate, the small countries should not be worried about the double majority reform. Actually the countries with a smaller population

Figure 4. Estimates for the Determination Mechanism behind the Voting Weights in the EC when Double Majority is used



than 7 million seem to gain voting weight while the largest countries lose. Since voting power is monotone with respect to voting weight, the gains and losses in the latter also materialise in the former.

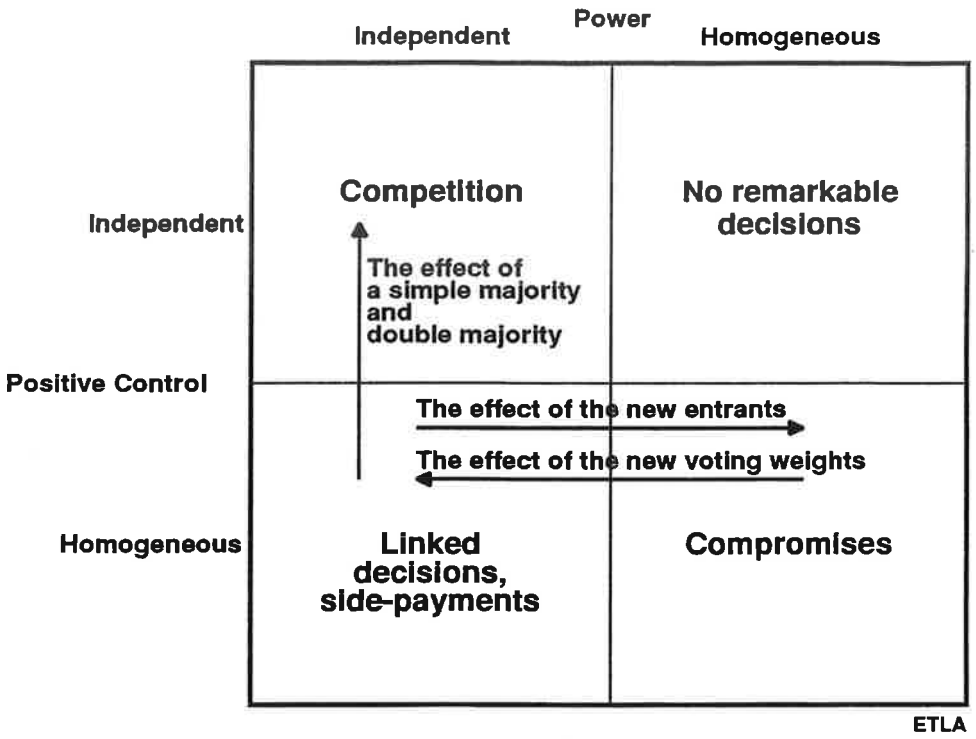
Table 8 shows the actual power indices when a double majority is used for the decision making. It is easy to see that the heuristic explanation that was given in Figure 4 materialises in actual indices. The double majority reform strengthens the small countries' role in the EU decision making. Surprisingly, indeed, the small countries have a stronger role in the double

Table 8. Voting Power in the Current Union and in the EU(16) when the Double Majority Rule is Used, Relative Power Presented in Parentheses

Member state	Current Union		EU(16)	
	Shapley-Shubik index	Banzhaf index	Shapley-Shubik index	Banzhaf index
Germany	0.144 (0.91)	0.298 (0.73)	0.133 (0.96)	0.291 (0.73)
Italy	0.115 (0.92)	0.255 (0.79)	0.106 (0.98)	0.248 (0.79)
United Kingdom	0.115 (0.92)	0.255 (0.78)	0.101 (0.93)	0.235 (0.75)
France	0.115 (0.92)	0.254 (0.78)	0.101 (0.93)	0.235 (0.75)
Spain	0.104 (1.06)	0.235 (0.92)	0.085 (1.01)	0.215 (0.89)
Netherlands	0.061 (0.96)	0.162 (0.98)	0.049 (0.95)	0.141 (0.95)
Portugal	0.059 (1.06)	0.158 (1.09)	0.045 (1.01)	0.134 (1.04)
Greece	0.059 (1.04)	0.158 (1.08)	0.045 (1.00)	0.133 (1.02)
Belgium	0.059 (1.06)	0.158 (1.08)	0.045 (1.00)	0.133 (1.03)
Sweden	..	..	0.043 (1.00)	0.129 (1.04)
Austria	..	..	0.043 (1.03)	0.129 (1.07)
Denmark	0.057 (1.16)	0.152 (1.19)	0.041 (1.07)	0.125 (1.13)
Finland	..	..	0.041 (1.07)	0.125 (1.14)
Norway	..	..	0.041 (1.08)	0.124 (1.16)
Ireland	0.056 (1.20)	0.15 (1.23)	0.041 (1.14)	0.124 (1.19)
Luxembourg	0.055 (1.40)	0.149 (1.36)	0.039 (1.23)	0.121 (1.32)

majority voting also in the terms of relative power. The relationship between power proportionate to voting weight and voting weight shows the largest values for the smallest countries. For weighted majority games this property is very uncommon. In this case it is due to the domination of the symmetric part in the determination of small countries' power. There

Figure 5. The Trade-off between Power and Positive Control when Austria, Sweden, Finland and Norway Join the Community



is no clear difference between Luxembourg and Finland, which has a population over ten times higher than Luxembourg. The difference is quite modest even between Belgium and Luxembourg.

As far as the relation between independent and homogeneous power in concerned the behaviour seems to be rather similar to that when a simple majority rule was applied. Thus it is true also for the double majority that the independent power exceeds the homogeneous power. The decision making becomes competing (see figure 5). This should not be a surprise since the double majority is actually a combination of two simple majority rules. Due to this also the negative control decreases almost as the same extent as in simple majority voting. Thus the double majority rule, as also the simple majority rule, would strengthen the competing nature of the decision making.

Due to the power gains for the small countries the power is less concentrated in the double majority voting than in the current system. The difference is not, however, very remarkable. The concentration measure has a value of 10.5 in the current Union and 13 in the EU(16).

5. Conclusions and Policy Implications

This paper deals with question of national voting power and control in the EU decision making. The analysis concentrates on the Union's abilities to operate and possible needs for institutional reforms, particularly, when the Union enlarges by the four EFTA countries.

As far as the EFTA entrants are concerned the loss of power for the current Union members is smaller than in previous enlargements in 1973 and in the 1980s. The new entrants would get 15 per cent of the total power in the EU Council of Ministers. Relative to their population or economic weight their share of power in the EU Council of Ministers is much higher. The new entrants have a strong position in the Union's decisions.

The control of decisions in the EU is based on blocking proposals (negative control). As regards the current members of the EU the enlargement does not create an inefficiency problem. It already exists. The decision-making process is likely, however, to get slower due to the new entrants since wider compromises are needed. A possibility to solve problems with "package deals" reduces. The nature of decision making turns from slightly competing to slightly conciliatory.

As far as the efficiency of decision making is concerned the qualified majority rule gives too much negative control to the member states. In this sense, strengthening the role of majority voting in the 1980s was the least that the Union had to do in order to avoid the consequences of increased heterogeneity after the Iberian enlargement. The control effects of the EFTA-countries' entry could be eliminated similarly by reducing the majority rule to 50 votes out of 76 in the current Union and thus 60 out of 90 in an expanded EU.

During the EFTA countries' entry talks Spain and the UK have claimed that the number of

votes needed for a blocking minority should be retained in 23 when the four applicant countries join the Union. It is easy to see that this kind of reform would strenghten the move towards a more conciliatory decision making. The decision making of the EU would thus face two effects both increasing the negative control of national governments and making the deepening of the European integration more complicated. All in all the choice between 23 and 27 votes as a requirement for a blocking minority has not remarkable implications. It proofs, however, how difficult it is for the member states to give up their national negative control over the future of the Union.

To increase efficiency in the sense of decision-making speed the Union should use a simple or the double majority rule. The former would not affect the power figures, but the latter would increase small countries' power. As far as negative control is concerned a simple majority reduces it slightly more than the double majority rule.

The decision-making speed cannot be improved by giving more voting weight to the largest members at the expense of the smallest countries. This kind of reforms would lead to similar 'package deal' decision making as in the current Union.

Regarding the efficiency it should be remembered, however, that each step towards a faster decision making system increases the power of the EU Commission. As a general rule, this could centralise the decision-making powers too much. In this respect the current system, while requiring homogeneity of member states, could define the Union's real competence in a more balanced manner. As regards efficiency the only way to improve it is to limit the Union's competence to the issues in which the member states can reach homogeneity.

If the member states would like to secure the role of the subsidiarity as a general principle, the current system is, indeed, a safe bet. With the current qualified majority rule, not to mention the recent suggestions concerning even a higher majority requirement, article 3b in the Maastricht Treaty is more or less useless. The current system does not give much chances for the Union to proof its efficiency - even if when competent - since the qualified majority rule itself is a watch-dog for the subsidiarity principle.

If common policies create positive externalities for member states lower majority rules should be used to improve efficiency of the Union and to create incentives to competition of proposals. As regards the national influence improving efficiency is not a matter of power distribution since it remains the same regardless of the majority rule. The double majority is an exeption by increasing the influence of Germany and the small countries, although the reason for such a proposal is, without any doubt, based on entirely different arguments. Since in the current context the lower majority rules gives more weight to the supranational Commission (centralisation) and less weight to the national interests (decentralisation) the improvement of the EU efficiency is a matter of centralisation and not a matter of distribution of national influence.

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Appendix

Let N be the set of n players, S a random coalition with s players and $\boldsymbol{P(N)}$ the class of all coalitions in N. We simply characterise the voting game by a function v: $\boldsymbol{P(N)} \rightarrow \boldsymbol{R}$ as follows,

$$\text{(A.1)} \qquad v(S) = \begin{matrix} 1, & S \in W \\ 0, & S \notin W \end{matrix}$$

where **W** denotes the class of winning coalitions. (A.1) is referred to as the *characteristic function*: an indicator (random variable) which distinguish the coalitions concerning their status (winning, losing, blocking etc.). Let us also define i's marginal contribution to S in a following way

$$\text{(A.2)} \qquad \Delta_i v(S) = v(S) - v(S - \{i\}), \quad i \in S, \quad S \neq \varnothing$$

which is an indicator variable, as can be easily seen. Characteristic function in (A.1) could be easily extended in as follows,

$$\text{(A.3)} \qquad f(p_1,\ldots,p_n) = \sum_{S \subset W} \prod_{i \in S} p_i \prod_{i \notin S} (1 - p_i)$$

where p_i -terms denote the probabilities that i votes for a random proposal. Let us define a new class of coalitions in a following way

$$\text{(A.4)} \qquad M_i = \{S : S \in W, S - \{i\} \in L, i \in S\}$$

where $\boldsymbol{L}$ is a class of losing coalitions. Let us call $\boldsymbol{M_i}$ the *class of minimum winning coalitions with respect to i.* The extension of (A.2) could now be written

$$\text{(A.5)} \qquad \Delta_i f(p_1,\ldots,p_n) = \sum_{\substack{S \in M_i \\ i \in S}} \prod_{j \in S - \{i\}} p_j \prod_{\substack{j \notin S - \{i\} \\ j \neq i}} (1 - p_j)$$

It can be shown that (A.5) is the first order partial derivate of (A.3). Let us denote it by f_i (.).Equation (A.3) is the probability that a winning coalition is formed and (A.5) is the probability that i is crucial for a winning coalition in the sense that it can swing it into a loser.

Voting power is defined by the probability that a player swings a coalition from loser into a winner:

$$\text{(A.6)} \qquad \Phi_i = P\left\{\underline{S} = S, S \in M_i\right\} = \phi(w_1,\ldots,w_n; q; p_1,\ldots,p_n),$$

where $\underline{S}$ is a random coalition, w_i is i's voting weight, q majority rule, p_i a voting probability (the probability that i votes 'for'). *Positive control* is defined as the probability that a i belongs to a winning coalition on condition that i votes 'for' with unit probability as follows

$$\theta_i = P\left\{\underline{S} = S, S \in W, p_i = 1\right\} = \theta_i(\underline{w}; q; p_1, \ldots, p_{i-1}, p_{i+1}, \ldots, p_n). \tag{A.7}$$

It can be easily seen that $v^*(S) = v(N) - v(N-S)$ is an indicator for blocking coalitions. Hence

$$v^*(S) = \begin{matrix} 1, & S \in B \\ 0, & S \notin B \end{matrix} \tag{A.8}$$

Negative control is defined by using the *dual* v^* as follows

$$\theta_i^* = P\left\{\underline{S} = S, S \in B, p_i = 1\right\} = \theta_i^*(\underline{w}; q; p_1, \ldots, p_{i-1}, p_{i+1}, \ldots, p_n) \tag{A.9}$$

Equations (A.5) and (A.6) define voting power implicitly. For calculation purposes we need information concerning the p_i -terms. In literature there are two following standard assumptions concerning their distributions.

1. independence

$$p_i \sim U(0,1); \quad \forall i \in N \tag{A.10}$$

2. *homogeneity:*

$$p_i = t \quad \forall i \in N \quad t \sim U(0,1). \tag{A.11}$$

Using the fact that the expectation of a probability is a probability and taking the mathematical expectation of (A.3), (A.5) and (A.9) yields the following formulas for the power and control measures

$$\Phi_i = P\left\{\underline{S} = S, S \in M_i\right\} = \int_0^1 \ldots \int_0^1 f_i(p_1, \ldots, p_n) dp_1 \ldots dp_n. \tag{A.12}$$

$$\theta_i = \underbrace{\int_0^1 \ldots \int_0^1}_{n-1} f(p_1, \ldots, p_{i-1}, 1, p_{i+1}, \ldots, p_n) dp_1 \ldots dp_{i-1} dp_{i+1} \ldots dp_n \tag{A.13}$$

$$\theta_i^* = \underbrace{\int_0^1 \ldots \int_0^1}_{n-1} f^*(p_1, \ldots, p_{i-1}, 1, p_{i+1}, \ldots, p_n) dp_1 \ldots dp_{i-1} dp_{i+1} \ldots dp_n. \tag{A.14}$$

where f^* is simply an extension of the dual in (A.8). Now using (A.10) yields the *Banzhaf power index* as follows

(A.15) $$\beta_i = f_i(\tfrac{1}{2}, \tfrac{1}{2}, \ldots \tfrac{1}{2})$$

and similarly the following control measures

(A.16) $$\rho_i = f(\tfrac{1}{2}, \ldots, \tfrac{1}{2}, 1, \tfrac{1}{2}, \ldots, \tfrac{1}{2})$$

and

(A.17) $$\rho_i^* = f^*(\tfrac{1}{2}, \ldots, \tfrac{1}{2}, 1, \tfrac{1}{2}, \ldots, \tfrac{1}{2}).$$

The average of (A.16) and (a.17) is called the *Rae index.*

Using (A.11) yields the *Shapley-Shubik power index* as follows

(A18) $$\Phi_i = \int_0^1 \ldots \int_0^1 f_i(t, \ldots, t)dt$$

and the following control measures

(A.19) $$\sigma_i = \int_0^1 \ldots \int_0^1 f(t, \ldots, t)dt$$

(A.20) $$\sigma_i^* = \int_0^1 \ldots \int_0^1 f^*(t, \ldots, t)dt.$$

The average of (A.19) and (A.20) is called the *Straffin index.*

In this paper we applied equations (A.15)-(A.20) to calculate the presented indices.

ELINKEINOELÄMÄN TUTKIMUSLAITOS (ETLA)
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
LÖNNROTINKATU 4 B, SF-00120 HELSINKI

Puh./Tel. (90) 609 900 Telefax (90) 601 753
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