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**VOTING POWER AND DECISION MAKING
CONTROL IN THE COUNCIL OF MINISTERS
BEFORE AND AFTER THE ENLARGEMENT
OF THE EC**

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ABSTRACT: In this paper, we study the voting power and decision making control in the Council of Ministers of the EC. The analysis is based on power and satisfaction indices of simple cooperative games. The purpose of this paper is, first, to analyse the change in the balance of power and decision making control after the accession of the new members and, second, to investigate what kind of effect the enlargement would have on pursued policies in the Community.

KEY WORDS: cooperative games, decision making, EC, voting power

SUMMARY

In this paper we investigated the change in the balance of power and national control in the EC Council of Ministers when it is expanded by EFTA countries and when the voting rules are altered. Also the new entrants' effects on pursued policies are analysed. It has been assumed that four EFTA countries, Austria, Sweden, Finland and Norway, join the Community.

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The decision-making process in the EC strongly favours small countries. It was shown in this paper that the new entrants would get 15 per cent of the total power in the EC Council of Ministers. Relative to their share of the population in the EC of 16 members the share of power is remarkably higher, which implies that the new members would have a strong position in the decision making of the EC. The loss of power for the current members is, however, smaller than in the enlargements of the Community in 1973 or in the 1980s. Also it can be argued that the Mediterranean enlargement in the 1980s changed the EC decision making more than would the current set of new entrants. In the 1980s the need for compromises increased remarkably. Strengthening the role of qualified majority voting was a necessary reform to reach the balance between compromises and competition.

The conclusion concerning control was twofold: first, it seems to be very difficult to accomplish decisions, while for preventing decisions the reverse seems to hold and second, accomplishing seems to be the more difficult in an expanded EC the more independently the voters act. Current members do not lose their control in the expansion of the Community but there will, nevertheless, be four new members with remarkable control positions regarding preventing decisions. Also it can be argued that high national control over decisions implies more power for the officials in preparatory bodies. Remarkable decisions will need a deep homogeneity between the member states. It can be reached by negotiating and by preparing proposals properly. This implies that there is a danger that decision making is ineffective. The national control and need for deep homogeneity together constitute life insurance for the subsidiarity principle.

To avoid the problem of easy prevention of decisions and inefficiency simple majority should be used for decisions. This would decrease member states negative control over decisions remarkably. It is surprising, however that the balance of voting power remains almost unchanged if the decision-making rule is lowered from qualified to simple majority.

The decision making in the EC is likely get little slower after the enlargement. European integration has the best possibilities in issues where homogeneity is high or it can be bought by using side-payments. However, either the power or control measures do not support the increase of the need for institutional reform when the Community enlarges by four EFTA countries. The balance between competition and compromises will remain. The decision

making is already ineffective and there will be no remarkable change in this feature. For more effective and competing decision making the need for reform already exists.

It was shown that negative control is the main element for new entrants' to wield influence on pursued policies. Thus it is not likely that there will be a remarkable policy change. The Mediterranean countries maintain their key role and it is profitable for them to deepen their cooperation. The Northern members' incentive to try to push through proposals that they prefer will, however, also increase.

TIIVISTELMÄ

Tässä tutkimuksessa tarkastellaan kansallista vaikutusvaltaa ja kontrollia EY:n päätöksenteossa. Analyysi kohdistuu sekä nykyiseen että neljällä jäsenyyttä hakeneella maalla laajennettuun yhteisöön. Vallan ja kontrollin lisäksi tutkimus tarkastelee uusien jäsenmaiden vaikutusta EY:n politiikan sisältöön.

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Osallistumisoikeus päätöksentekoon on yksi tärkeimmistä eduista, jonka jäsenyys Euroopan yhteisössä Suomelle tuo. Nykyisessä vapaakauppasopimuksessa tai ETA-ratkaisussa emme kykene vaikuttamaan sellaisiin eurooppalaisiin päätöksiin, jotka koskevat meitä olimmepa jäseniä tai emme. Kolmen tai neljän EFTA-maan liittyminen Euroopan yhteisöön merkitsee myös huomattavaa vaikutusvallan painopisteen siirtymistä pohjoiseen.

Hyvään määrävähemmistösuojaan perustuva päätöksentekojärjestelmä kannustaa alueellisia yhteenliittymiä tiivistämään yhteistyötään erityisesti, kun tavoitteena on päätösten estäminen. Päätösten aikaansaaminen edellyttää entistä enemmän laajoja kompromisseja. Asiakokonaisuuksien sitominen toisiinsa hankaloituu.

Euroopan yhteisön päätöksenteon keskeinen piirre on jäsenmaiden kyky estää päätöksiä eli niin sanottu *negatiivinen kontrolli*. Tämä pätee tutkimuksen mukaan niin suurille kuin pienillekin jäsenmaille. Päätösten saneleminen ei ole mahdollista edes kahden-kolmen maan yhteenliittymille.

Päätöksenteon toimivuuden kannalta nykyinen mekanismi voi olla tehoton. Se korostaa myös päätöksiä valmistelevien virkamiesten asemaa. Oman aseman turvaaminen vaatii kiinnitettyä tehokkaan kansallisen virkamieskunnan.

Päätöksenteon tehostaminen edellyttäisi siirtymistä yksinkertaisen enemmistön käyttöön. Tällöin jäsenmaiden kansallinen kontrolli vähenisi huomattavasti ja aloitteiden välinen kilpailu lisääntyisi. Eri maiden suhteellinen valtasapaino säilyisi kuitenkin nykyisellään.

EY:n päätöksentekojärjestelmä kykenee tuottamaan merkittäviä päätöksiä vain, jos jäsenmaiden mielipiteet ovat riittävän yhdensuuntaiset (homogeeniset). Tällöin tarvittava kompromissi on mahdollista luoda menettämättä aloitteen alkuperäistä tarkoitusta.

Koska EY:n päätöksentekojärjestelmä on muussa tapauksessa tehoton, nykyinen mekanismi johtaa luonnostaan subsidiariteettiperiaatteeseen. Jäsenmaissa kyetään päättämään tehokkaammin niistä kysymyksistä, joissa EY:n tasolla ei kyetä löytämään riittävän homogeenisia linjoja. Muista kysymyksistä tehokkuusargumentti vie päätöksentekoa kansalliselle tasolle.

Kolmen-neljän uuden jäsenmaan liittyminen EY:hyn ei luo päätöksenteon tehottomuutta. Ongelma on osa EY:n päätöksentekoa jo nyt. Suurimman riskin päätöksenteon toimivuudelle uudet jäsenmaat aiheuttavat, jos pohjoinen-etelä tai jokin muu vastakkainasettelu kärjistyy. Tällöin päätöksenteko hidastuu, koska riittävän laajojen kompromissien aikaansaaminen on työlästä.

Korkea negatiivinen kontrolli johtaa toisaalta myös siihen, että uudet jäsenmaat eivät saa aikaan mitään kovin merkittävää politiikan muutosta EY:n päätöksissä. Yksittäistapauksissa myös tämä on kuitenkin mahdollista. Poliitiikan suunnanmuutokset ovat jatkossakin pääasiassa pakettiratkaisujen tuloksia, joissa tietyille ryhmille tärkeitä asioita viedään läpi antamalla vastapuolelle tuki muissa vähemmän tärkeissä kysymyksissä.

1 Introduction

National aspects and the balance of national voting power in the EC play an important role as long as the governments have a direct influence in the decision making process. In the EC most of the decision making takes place in the Council of Ministers where 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 2 votes. Decisions are made mainly by the qualified majority for which 54 votes out of 76 is needed.

The Council of Ministers offers a nice example for cooperative game theory since it is a weighted majority game with an asymmetric decision making rule. The Maastricht Treaty increased the role of qualified majority voting particularly in social regulation, (i.e. environmental, health and consumer protection policies). Also there has been a pressure towards simple majority voting in the Council of Ministers since it has been widely argued that the functioning of the decision making process will suffer from the new entrants.

In this paper, it has been assumed that Austria, Sweden, Finland and Norway become members of the EC. It has been argued in Widgrén (1991, 4) that the relationship between the votes and population is logarithmic¹. From among the EFTA countries Austria and Sweden would likely to get 4 votes and Finland and Norway 3 votes. The qualified majority in an expanded EC would increase to 64 out of 90 votes.

The purpose of this paper is to analyse national influence in the EC. The influence is divided to one's direct effect on outcomes of votings and to control (see Section 2). Particular attention is paid on the impact of the new entrants. The analysis can be divided into three parts. First, we analyse the national influence from the current member's point of view. Thus we intend to investigate the loss of current member's power both in absolute and relative terms. Second, we analyse the control of the new

entrants over decisions and their possibilities to change the direction of pursued policies. Third, our purpose is to give measures concerning the rules of the decision making game. Thus we investigate the effects of changes in voting rules².

The analysis in this paper is based on power and satisfaction indices of cooperative games (see Section 2). Power indices have been mostly applied to institutions where voting takes place. Voting power in the EC Council of Ministers has been analysed earlier in Johnston (1982), Brams - Affuso (1985a, 1985b), Brams - Doherty - Weidner (1991), Widgrén (1991, 1993a, 1993b, 1993c) and Nurmi (1992).

The rest of the paper is organized as follows. In section 2 we present the measures of voting power and control. The results obtained for the current Community and for an expanded EC with four new EFTA countries as members are summarized in sections 3, 4 and 5 and, finally, conclusions are presented in section 6.

2 Measuring the National Influence in the EC

While the basic notion of influence is understood by everyone, it turns out to be quite tricky to define formally. For instance, in the EC Council of Ministers, while most would agree that Germany has more influence than does Luxembourg it is not obvious how one would quantify such a statement. We know that Germany has more votes than Luxembourg and it is intuitively acceptable that it should have more - or at least as much - influence as Luxembourg. As the following example illustrates, however, voting weights alone are poor proxies for influence and hence what we would need is a more appropriate measure of influence.

As it turns out three separate measures have been explored in the literature. The first measure of influence, which we call *power*, answers the question "How likely is it that a particular country's weighted vote will be essential to the passage of a proposal?" A second natural measure, which we call *negative control* answers a related but different

question: "How likely is it that a proposal will be rejected when a particular country votes 'no'?" Finally a third measure, *positive control*, answers the question, "How likely is a proposal to be adopted when a country votes 'yes'?"

Having defined measures of influence, we are still a long way for quantifying them for current and potential EC members. The outcome of a weighted vote on a specific issue depends upon three things: the majority rule adopted (e.g. simple majority or qualified majority), the weights assigned to the various countries and the voting behaviour of the countries. Of these three, modelling the voting behaviour poses the greatest conceptual problems³. For instance on a certain issue before the Council of Ministers a very small country like Luxembourg might be absolutely crucial to obtaining a qualified majority. In such a situation one could say Luxembourg had a lot of power. On many other issues, however, Luxembourg's votes might be quite irrelevant, so one might say that Luxembourg had no influence. This issue by issue approach, while appealing at first sight, is impractical. To make a general statement about how much influence Luxembourg has under certain voting rules would require us to predict each country's position on every conceivable issue. This sort of judgement would be far too subjective.

The approach adopted in the literature (and in this paper) is to describe countries' voting behaviour in a more abstract way. Namely, we say that country i will vote 'yes' on a randomly selected issue by the probability p_i . Thus the voting behaviour of n countries can be described by the so-called *acceptability vector*, which is an n -dimensional vector of the p_i -probabilities. These probabilities help us to quantify specific measures of power. To see how, we consider a simple example. Using this simple example we illustrate how power and control indices in order to fix ideas and introduce terminology.

Suppose that there are three countries - A, B and C - whose voting weights are 49%, 49% and 2% respectively. Moreover suppose that we were absolutely certain, for some reason, that each country is equally likely to vote for or against a randomly chosen issue, implying that the correct acceptability vector is $(1/2, 1/2, 1/2)$. Finally suppose that the voting is

conducted according to the simple majority rule. Obviously there are 8 possible outcomes in the voting (that is $8 = 2^3$): $YYY, YYN, YNY, YNN, NYY, NYN, NNY, NNN$ using the notation that the first, second and third letters reflect the votes of A, B, and C respectively and Y indicates a yes vote while N indicates a no-vote. Given the acceptability vector each outcome occurs with an equal probability of $1/8$ th.

Careful inspection of the outcomes (keeping the weights in mind) shows that C's yes-vote is crucial to passage of a proposal whenever A and B disagree. This occurs in 4 of the 8 possible outcomes: YNY, YNN, NYY and NNY . The total probability that C's vote is crucial is the sum of the probability of YNY, YNN, NYY and NNY . Given the acceptability vector assumed, each of these occur with $1/8$ th probability, so the total probability is 0.5. Clearly 0.5 could be taken as a formal measure of country C's power. Country C's negative control is measured by the probability that the outcome of voting agrees with its no vote. This occurs in 3 out of 4 outcomes⁴, so C's negative control could be measured as 0.75. Likewise, its positive control is $3/4$. One would measure power and control for A and B in a similar fashion. It turns out that they have exactly the same power and control figures as C. Thus the distribution of votes can indeed be a poor measure for influence.

Furthermore, maintaining the assumed acceptability vector we would see how the power and control measures of the three countries change when we altered the majority rule to say a two thirds majority rule, or changed the weights of the three countries, or added a fourth country. For each of these change the voting system would get different power and control indices for each of the three countries.

The trouble with the primitive power and control indices introduced in this example is that they are sensitive to the exact acceptability vector we assumed⁵. To get around this problem we would want indices that describe power and control for a wide range of acceptability vectors. The literature addresses this problem by calculating the indices, assuming a joint probability for the various p_i ⁶. In particular the literature has focused

on two standard joint probability distributions (jdp's) for p_i . The first assumption is called *independence*. This assumes that the probabilities p_i are independently and uniformly distributed on the closed interval between zero and one. The second is called *homogeneity*. It assumes that all of the probabilities p_i in a given acceptability vector equals a fraction, which we call t , but the value of t is uniformly distributed over $[0, 1]$.

To define the power and control indices that will be used to investigate the impact that EC enlargement has on various countries' influence in the Council of Ministers, it is useful to adopt a more structured approach than was taken in the simple example.

First, following the terminology of cooperative game theory we consider the outcomes in the simple example above equal to coalitions. The list of outcomes in the simple example above can be written as a list of yes-vote (or no-vote)⁷ coalitions as follows: $\{A, B, C\}; \{A, B\}; \{A, C\}; \{A\}; \{B, C\}; \{B\}; \{C\}; \emptyset$. It can be easily seen that there are different coalitions. For our analysis three different types of coalitions are essential. First, a country is crucial for the outcome and has power when it belongs to a minimum majority with respect to itself (i.e. it can swing the majority yes-vote coalition to minority by voting 'no'). In our example C is crucial in coalitions $\{A, C\}$ and $\{B, C\}$ (or outcomes YNY and NYY). Second, a country has negative control when it does not belong to a yes-vote coalition and only a minority yes-vote coalition is formed. In our example coalitions \emptyset , $\{A\}$ and $\{B\}$ (or outcomes NNN, YNN and NYN) are such. Finally, a country has positive control when it belongs to a majority yes-vote coalition.

Let N be the set of n ministers in the Council of Ministers. Supposing that they vote 'yes' or 'no' independently of each other, we can write for any coalition $S \subset N$ (or any particular array of yes and no votes), the probability that it will be formed is as follows

$$P\{\text{'coalition } S \text{ is formed'}\} = \prod_{i \in S} p_i \prod_{i \notin S} (1 - p_i) \quad (1)$$

which is no more than a binomial probability with varying p_i -probabilities. In our example above they were constant and that is why the number of yes-votes in the outcomes were binomially distributed as we can see by having a closer look upon the outcomes

and their probabilities of occurrence in the example. The sum of the probabilities in (1) over all possible 2^n coalitions (or outcomes) is always 1⁸. Thus (1) defines formally a probability distribution over all possible outcomes. If we take the sum of these probabilities over the chosen classes⁹ of coalitions (minimum majorities with respect to each voter, majorities where a particular voter is a member and blocking coalitions where a particular voter is a member), we will have the probabilities that we need for our measures of influence.

The assumptions that we made about the p_i -probabilities and a large number of coalitions in the EC make the calculation more difficult than in our simple example above. In an enlarged EC of 16 members there are $65536 = 2^{16}$ coalitions (i.e. there are as many possible outcomes) while there were 8 of them in the example. In addition, independence and homogeneity share the property that we are working with the mathematical expectations of an infinite number of acceptability vectors. It is not difficult to imagine what kind of process it would be to calculate the measures of influence for all 16 countries by classifying the 65 536 outcomes even with a single acceptability vector. The latter problem is easy to handle by using the standard methods of probability calculus but for the former we need cooperative game theory.

In the "yes or no" type of voting the basic classification of coalitions is to divide them to majorities and minorities. If we take a sum of probabilities in equation (1) over the class of required majority we have a probability that a winning coalition is formed. This sum is usually referred to as a *power polynomial* since all the three measures of influence can be calculated by using it. Let us denote the power polynomial with a given acceptability vector by $f(p_1, \dots, p_n)$.

Intuitively the easiest measure to understand is positive control, which can be calculated for country i simply by setting $p_i = 1$ (i votes 'yes' for sure) in the power polynomial. The negative control of country i can be calculated by setting $p_i = 0$ (i votes 'no' for sure) and taking the complement probability of power polynomial (i.e. $1 - f(\cdot)$), the

probability that a coalition is not winning). The most difficult measure to calculate is power. Again it is possible to go through all majorities and count the ones where i is crucial. A much simpler method is to take partial derivatives of the power polynomial $f(p_1, \dots, p_n)$. Namely, it turns out that the partial derivatives are measures of power as defined in the beginning of this section. To clarify these ideas we may write the power polynomial for our example (keeping the voting weights in mind) as follows: $f(p_A, p_B, p_C) = p_A p_B p_C + p_A p_B (1 - p_C) + p_A p_C (1 - p_B) + p_B p_C (1 - p_A) = p_A p_B + p_A p_C + p_B p_C - 2p_A p_B p_C$. Using the primitive acceptability vector we can now check the calculations in the example. Positive control ($p_A = 1$) for C is simply $1/4 + 1/2 + 1/2 - 2(1/4) = 3/4$ and negative control ($p_A = 0$) is $1 - (0 + 0 + 1/4) = 3/4$. Derivating the power polynomial with respect to p_C yields $f_C(p_A, p_B, p_C) = p_A + p_B - 2p_A p_B$, and assuming the acceptability vector $(1/2, 1/2, 1/2)$ we have 0.5 power for C.

Generally, if we calculate the probability that a country is crucial in the sense that it swings the coalition from losing to winning we have two following well-known formulas. Let f_i be the i^{th} partial derivative of a power polynomial f and \mathcal{M}_i the class of minimum winning coalitions with respect to i (i.e. coalitions where i is crucial with respect to the outcome) and let S be a randomly chosen coalition. The independence assumption yields

$$\begin{aligned}
 P_{ind}\{\text{Voter } i \text{ is crucial to passage of a proposal}\} &= \int_0^1 \dots \int_0^1 f_i(p_1, \dots, p_n) dp_1 \dots dp_n \\
 &= f_i(p_1, \dots, p_n) \\
 &= \sum_{S \in \mathcal{M}_i} \left(\frac{1}{2}\right)^{n-1} \\
 &= \beta'_i,
 \end{aligned} \tag{2}$$

where the subscript "ind" stands for independence. The second equivalence is interesting. It shows that after all the independence assumption implies our primitive acceptability vector in the example above. That is why independence is often referred to as indifference. This property can be easily checked by taking a double integral of the formula $p_A + p_B - 2p_A p_B$ in the example above. The third equivalence can be easily understood intuitively by thinking how one becomes crucial. We need an outcome

where a minimum majority coalition is formed and i belongs to that coalition. The sum formula in (2) is the probability that such event will occur. What is important in the term $(1/2)^{n-1}$ describing the probability that a randomly chosen outcome will materialize is that it is independent of the number of yes-votes (or no-votes) in the outcome. Thus each outcome has an equal probability of occurring. In literature equation (2) is referred to as the Banzhaf power index (BI). Let n and s denote the cardinal numbers (cardinalities) of sets (coalitions) N and S respectively. The homogeneity assumption yields

$$\begin{aligned}
 P_{hom}\{\text{'Voter } i \text{ is crucial to passage of a proposal'}\} &= \int_0^1 f_i(t, \dots, t) dt \\
 &= \sum_{S \in \mathcal{M}_i} \frac{(s-1)!(n-s)!}{n!} \\
 &= \Phi_i \tag{3}
 \end{aligned}$$

where the subscript "hom" stands for homogeneity. Equation (3) is referred to as the Shapley-Shubik power index (SSI). It is a more complicated measure than the BI. Intuitively speaking - as can also be seen in the second row of (3) - the homogeneity assumption turns the combinations (outcomes or coalitions) into permutations. The second row of (3) can be interpreted as a probability that the voters form a yes-vote coalition in the order of their probability of acceptance in each question (i.e. we choose a random order of voters) and i is the one who turns the yes-vote coalition into a winning one (see Shapley 1953).

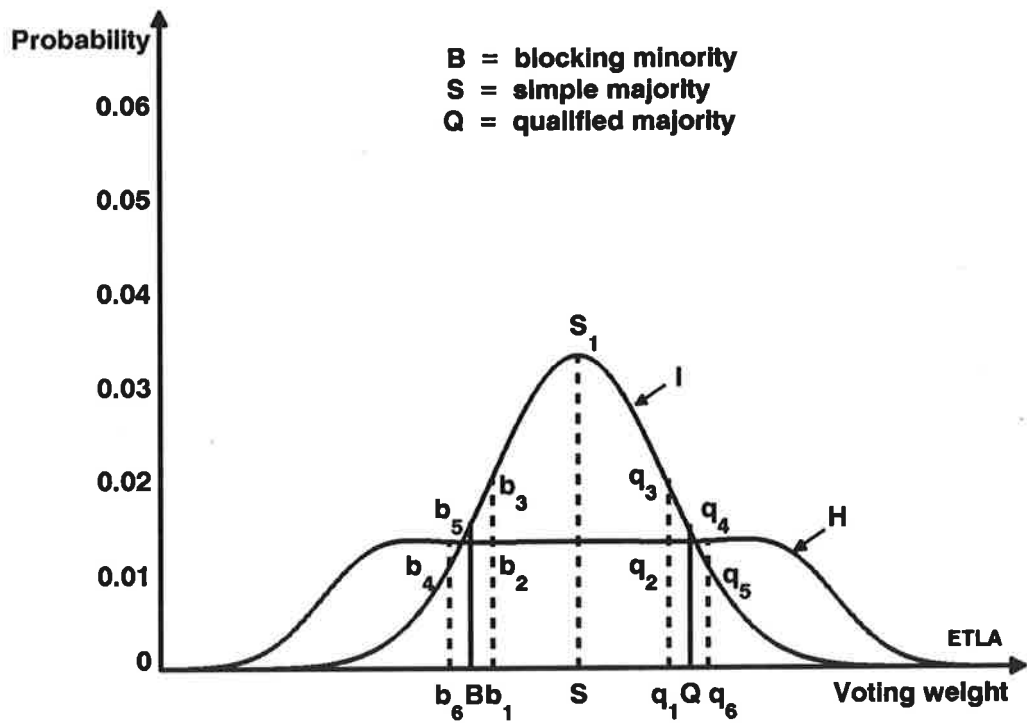
Probabilistically the main difference between the two indices is that under the homogeneity assumption there is a common standard t by which the ministers evaluate the Commission proposal and thus the probabilities of the voters' decisions are correlated in a specific way (Straffin 1988). For example the event that 'voting behavior of two independent voters is similar' has a probability $1/2$ while it increases to $2/3$ if the voters are homogeneous. When assuming independence we suppose that on average each voter tosses a coin to decide whether to vote 'yes' or 'no'. When assuming homogeneity only a single coin is tossed. It determines whether a group of homogeneous voters accepts

a proposal or not. However, knowing the result (i.e. will the majority of yes-votes to be formed) does not tell anything about individuals' voting behaviour. It is in certain respect like a necessary condition for certain kind of behaviour. The sufficient condition is that we know each voter's willingness to support the proposal. It defines an order of voters and thus in general we take into account all possible orders of voters.

One important difference, which also enlightens one of the basic differences between the independence and homogeneity assumptions, is that when assuming the former the number of yes-votes (or no-votes) is binomially distributed and when assuming the latter it is uniformly distributed. This implies that under the independence assumption it is more probable to get an approximately "50-50" result than under the homogeneity assumption which gives equal probability to all numbers of yes-votes (or no-votes) between zero and n , the number of voters.

Let us call the coalition of yes-votes *the supporting coalition*. Figure 1 presents density functions for the size of a yes-vote coalition measured by the voting weight under independence, denoted by I, and under homogeneity, denoted by H. The sum of voting weight in the supporting coalition is presented along the horizontal axis and the probability along the vertical axis. The figure has been plotted by using the weights etc. in an expanded EC(16). Also the density functions have been plotted by applying normal distribution approximations¹¹. According to the central limit theorem the distribution of the sum of random variables (here voting weights) converges to a normal distribution if the variance of the variables does not exceed a certain limit. The smaller the variance the faster the convergence. In the EC it can be shown that the convergence is very fast and the approximation errors are no more than 10^{-3} in the EC of 16 members (see Widgrén 1991 and for the method Owen 1982). The power measures and most of their properties can be illustrated by using figure one. Assuming qualified majority voting the SSI is the probability bordered by the rectangle (q_1, q_2, q_4, q_6) and the BI is the area (q_1, q_3, q_5, q_6) . Naturally the voting weight that a country has affects the distance between q_1 and q_6 . The figure also tells us what we should wait for our results in sections

Figure 1. Homogeneity, independence and the size of the yes-vote coalition



3 and 4. It is easy to see that the power when measured assuming independence should increase while the majority rule decreases. Under the qualified majority there should not be remarkable differences between the indices.

The difference between the independence and homogeneity assumptions can also be characterized by using conceptualization of the communication among the voters (Straffin 1988). According to Straffin the homogeneity assumption is more appropriate for the analysis of the voting bodies where there is considerable communication among the representatives. Interpreted in another way it can be said that homogeneity (a common standard in voting behaviour) can be reached by amending the original proposals and thus they are likely to be more or less compromises after the bargaining process, which also increases the homogeneity between the originally heterogeneous voters. In other words homogeneous voters negotiate whether a proposal is acceptable (t is high) or not (t is low). Thus homogeneity takes into account also the proposals for which the voting will never be taken. Naturally, one has power also in these questions. It may be, however, that there are groups of voters who are originally more homogeneous than the others and thus there is a partition of the representatives to different homogeneous groups which are independent of each other. The independence assumption, in contrast, implies that there is no communication of any significance to speak of among the voters and thus they do not negotiate to amend the proposal and the common standard is not likely to be reached. Roughly speaking one can imagine that the voters are independent when the draft proposal is given and their homogeneity increases if they do have a possibility to bargain and revise proposals. It is worth noting, however, that the increased homogeneity can be reached by compromises between the member states and thus the draft proposal may change remarkably during the process.

This kind of illustration can also be used to characterize the different voting groups. It can be assumed that there is a group of voters, denoted by S , supporting the proposal in the sense of homogeneity, i.e. they have reached a compromise about the voting standard t , and another group, denoted by R , which opposes the proposal, i.e. having

a voting standard $1 - t$. In addition to this there is a group of voters, denoted by U in which the voters are independent of each other and also of the homogeneous groups. This kind of setting is a special case of the partial homogeneity and it yields

$$\begin{aligned}
 & P_{\text{par}}\{\text{'Voter } i \text{ is crucial to passage of a proposal'}\} \\
 &= \underbrace{\int_0^1 \int_0^1 \dots \int_0^1}_{u+1} f_i(\overbrace{t, \dots, t}^s; p_{s+1}, \dots, p_{s+u}; \overbrace{(1-t), \dots, (1-t)}^r) dp_{s+1} \dots dp_{s+u} dt = \pi_i,
 \end{aligned} \tag{4}$$

where n , s , u and r denote the cardinal numbers of sets N , S , U and R respectively and $f_i(\cdot)$ is the i^{th} partial derivative of function (probability) f defined earlier. It is worth noting that the sum of BIs or any partial homogeneity indices is not one as it is for SSIs. That is why these indices are often normalized by forcing their sum to unity but we do not intend to do that in this paper because it ruins the probabilistic interpretation of the indices used in this paper. The so-called inconsistency property mentioned above is due to the permutations and combinations. For example, if the order in which the voters form a yes-vote coalition is known, also the voter who is crucial can be defined uniquely whenever a majority is formed, but if only the outcome is known, there can be several crucial voters. Also for partially homogeneous voters, forming a majority may become more difficult and this status quo solution implies that there are no crucial voters. In particular, when assuming a partial homogeneity with oppositions as in (5), the distribution of yes-vote coalition's size in figure 1 would concentrate more around the simple majority. Intuitively speaking we may imagine that there is a "cake" of total power which should be divided among the voters. Homogeneous voters can always share the whole cake while partially homogeneous or independent voters may hope too much (the sum of power indices exceeds one) or suffer from the inefficiency losses (the sum of power indices is below one). We call voters who share the "cake" properly *group – consistent*.

Power indices measure an individual's direct influence on outcome. In addition to this voters have control over decisions as members of different coalitions. In analysing the

voting bodies with asymmetric majority rule it is interesting to decompose the idea behind the control, since as it was noted earlier in this paper preventing and accomplishing decisions differs considerably in bodies like the Council of Ministers of the EC. Assuming homogeneity the probability that the proposal is accepted on the condition that one votes 'yes' can be written as follows:

$$P\{a\ proposal\ is\ accepted\ | i\ votes\ 'yes'\} = \int_0^1 f(\underbrace{t, \dots, t}_{i-1}, 1, \overbrace{t, \dots, t}^{n-i}) dt \quad (5)$$

where i is a positive integer smaller than n and assuming independence respectively by using the indifference - an implication of independence assumption as noted earlier in this paper - and letting $t = 1/2^{12}$. To analyse one's possibilities to pursue negative control, i.e. the probability that a group decision rejects a bill one votes against, we use the complement probability of (5) under the condition that $p_i = 0$ (see the example on page 4) as follows:

$$P\{a\ proposal\ is\ rejected\ | i\ votes\ 'no'\} = \int_0^1 f(\underbrace{t, \dots, t}_{i-1}, 1, \overbrace{t, \dots, t}^{n-i}) dt \quad (6)$$

where i is a positive integer smaller than n and assuming independence $P\{\cdot\}$ can be written respectively by letting $t = 1/2$. Turning back to figure 1 gives us a graphical illustration of control measures. Assuming qualified majority positive control can be defined to be the area right from q_1 between the distribution (H or I) and horizontal axis. It is the probability that i gets enough support and the majority is formed when its sure yes-vote is added. Similarly the negative control is the area to the left of q_6 between the chosen distribution and the horizontal axis. It is the probability that the no-vote coalition can block the decision with i 's sure no-vote.

When analysing power one crucial questions is, "How concentrated is the power?". To analyse the concentration of power the control measures are often used to make

conclusions. The leading coalition is defined in cooperative game theory as an alliance of m largest players (countries). The coalition is said to be weakly controlling if it can control the decisions by the probability higher than 0.95 and it is said to be controlling if the probability exceeds 0.99¹³.

3 The Balance of Voting Power

In this paper, it has been assumed that the member candidates Austria, Sweden, Finland and Norway become members of the European Community. In this section the analysis concentrates on the balance of voting power. Also we compare the change in the balance of power to the earlier one in the 1980s, when Greece, Spain and Portugal joined the Community.

The new entrants' share of the population in the EC of 16 members would be 6 per cent but they would get 16 per cent of votes when we assume that Sweden and Austria would get 4 and Finland and Norway 3 votes. This is due to the apparent logarithmic relationship between the votes and population which favours the smallest members of the EC. Thus the expansion of the Community by the EFTA countries could potentially have remarkable consequences to the balance of power.

In weighted voting, however, the relationship between power and voting weights is not necessarily straightforward. Let us define a concept which elaborates on this feature. We refer the ratio between normalized power index and voting weight to as *the power coefficient* (PC) which can be interpreted as a measure for one's relative power. It tells us how effectively a voter can use her/his votes to get power. The PC also elaborates how important a certain voter is strategically. It has values over one if a voter has higher voting power than voting weight. the voter has then effectively more votes than the actual number would show. The usual well-known result is that voters with a large number of votes tend to have higher PCs than the voters with a small number of votes.

Table 1: Voting Power in the Council of Ministers of the EC(9) and EC(12) and the Voting Weight Elasticities of Power

Member state	Shapley-Shubik index			Banzhaf index		
	EC(9)	EC(12)	$\epsilon_{\Phi,w}$	EC(9)	EC(12)	$\epsilon_{\Phi,w}$
GERMANY	0.179	0.134	1.07	0.207	0.139	1.39
ITALY	0.179	0.134	1.07	0.207	0.139	1.39
UK	0.179	0.134	1.07	0.207	0.139	1.39
FRANCE	0.179	0.134	1.07	0.207	0.139	1.39
SPAIN	..	0.111	..	..	0.118	..
NETHERLANDS	0.081	0.064	0.89	0.113	0.073	1.50
PORTUGAL	..	0.064	..	..	0.073	..
GREECE	..	0.064	..	..	0.073	..
BELGIUM	0.081	0.064	0.89	0.113	0.073	1.50
DENMARK	0.057	0.042	1.12	0.082	0.049	1.71
IRELAND	0.057	0.042	1.12	0.082	0.049	1.71
LUXEMBOURG	0.010	0.012	-0.84	0.020	0.019	0.21

This phenomenon can be illustrated by calculating the effective number of votes which can be defined to be the actual number of votes multiplied by the PC.

When analysing the consequences of an enlargement of the EC (or any other institution where voting takes place) it would be interesting to investigate the changes in voters' relative positions. For this we may use ordinal elasticities. Let us define a voting weight elasticity of power to be the ratio between the relative change in the power index and relative change in voting weight. Intuitively the elasticities should be positive (i.e. loss of voting weight implies loss of power). As usual, it can be said that power is elastic if it exceeds one and inelastic if it lies below one. A voter loses relative power if the elasticity exceeds one and gains relative power if the elasticity is smaller than one. Negative elasticities indicate that a voter gains absolute power while her/his voting weight decreases. This phenomenon is often referred to as a paradox of new members.

Table 1 presents the Shapley-Shubik and Banzhaf power indices for qualified majority voting in the EC(9) and for the current Community and the voting weight elasticities of

Table 2: The Distribution of Voting Power in the EC Council of Ministers when Austria, Sweden, Finland and Norway become Members and the Voting Weight Elasticities of Power for the Current Community Members

Member state	Shapley-Shubik index	$\epsilon_{\phi,w}$	Banzhaf index	$\epsilon_{\beta,w}$
GERMANY	0.116	0.86	0.101	1.76
ITALY	0.116	0.86	0.101	1.76
THE UK	0.116	0.86	0.101	1.76
FRANCE	0.116	0.86	0.101	1.76
SPAIN	0.090	1.21	0.082	1.96
THE NETHERLANDS	0.054	1.00	0.053	1.76
PORTUGAL	0.054	1.00	0.053	1.76
GREECE	0.054	1.00	0.053	1.76
BELGIUM	0.054	1.00	0.053	1.76
SWEDEN	0.043	..	0.043	..
AUSTRIA	0.043	..	0.043	..
DENMARK	0.032	1.53	0.032	2.23
FINLAND	0.032	..	0.032	..
NORWAY	0.032	..	0.032	..
IRELAND	0.032	1.53	0.032	2.23
LUXEMBOURG	0.020	4.28	0.022	-1.02

voting power in the enlargement of the 1980s. Table 2 shows the respective figures for an expansion of the EC by the EFTA countries. It seems that both measures of power (SSI and BI) have approximately the same level in the current Community and in the EC(16) scenario, but before the accession of the Mediterranean countries the Banzhaf index gave higher estimates.

In the current EC Council of Ministers it seems that there is no clear relationship between PCs and voting weights, but the new entries turn the PC to be an increasing function of voting weight¹⁴. The countries with the largest power coefficients lose most in relative terms and the reverse holds for the small countries. The slope of the relationship between voting power and voting weight do not differ remarkably, however, from one. Thus it

Table 3: The Power Coefficients, the Effective and Actual Numbers of Votes Before and After the Expansion of the Community by the EFTA Countries

Member state	the EC(12)			the EC(16)		
	PC	Effective votes	Actual votes	PC	Effective votes	Actual votes
GERMANY	1.02	10.2	10	1.05	10.5	10
ITALY	1.02	10.2	10	1.05	10.5	10
THE UK	1.02	10.2	10	1.05	10.5	10
FRANCE	1.02	10.2	10	1.05	10.5	10
SPAIN	1.06	8.5	8	1.02	8.2	8
THE NETHERLANDS	0.98	4.9	5	0.97	4.9	5
PORTUGAL	0.98	4.9	5	0.97	4.9	5
GREECE	0.98	4.9	5	0.97	4.9	5
BELGIUM	0.98	4.9	5	0.97	4.9	5
SWEDEN	..	..	..	0.97	3.9	4
AUSTRIA	..	..	..	0.97	3.9	4
DENMARK	1.07	3.2	3	0.96	2.9	3
FINLAND	..	..	..	0.96	2.9	3
NORWAY	..	..	..	0.96	2.9	3
IRELAND	1.07	3.2	3	0.96	2.9	3
LUXEMBOURG	0.44	0.9	2	0.90	1.8	2

can be argued that the enlargement of the Community by the EFTA countries equalizes the fluctuations in the PC and the effective number of votes does not differ remarkably from the real number of votes despite of the slightly increasing relationship. Table 3 shows us the PCs, the actual and effective numbers of votes for each member state. It can be seen that there are no differences higher than 0.5 votes between the actual and effective votes. After all, in the EC Council of Ministers voting weights seem to be at least satisfactory proxies for member states' power. This is, indeed, exceptional for a body where weighted voting takes place.

The elasticities in Tables 1 and 2 also show this interesting difference between the analysed enlargements. It seems that old members' voting power is more elastic with respect to the voting weight in both enlargements when we assume independent voters than when

we assume homogeneous voters. Intuitively this can be interpreted by arguing that the Mediterranean countries made it more necessary for the Community to reach compromises since the independent power (Banzhaf index) decreased almost to the same level as the homogeneous power but the slightly competing nature remained. If the independent power is higher than the homogeneous power a country has a higher probability to be crucial without any need for the communication with other countries (see Section 2). A country has an incentive to push its own views through without remarkable concessions. Since, however, the independence assumption does not necessarily yield feasible outcomes for all voters, they prefer small coalitions to large ones. In contrast, if the homogeneous power is higher, there is an incentive to seek cooperation and wider compromises. While we may call a voting body where independent power is high competing the one with high homogeneous power could be called consiliatory. The results in Tables 1 and 2 show that the enlargement of the Community with EFTA-countries is crucial since it turns the decision making in the EC conciliatory. Hence a single country's prospects¹⁵ of influencing on decision making without wider compromises decreases remarkably. In the current Community the slightly competing nature makes narrow compromises, i.e. package deals of small coalitions, likely (Widgrén 1993d).

In the enlargement of the EC by the EFTA countries The loss of power for the current Community members would be 15 per cent when measured by the SSI. In the 1980s the expansion of the Community by Greece and Iberian countries yielded a 24 per cent loss of voting power for the members of the Community before that. For remarkable decisions unanimity was needed more often in the 1970s than in the latter half of the 1980s. It is interesting, however, that the loss of voting power for the members in the EC(9) is almost exactly the same disregardless to whether we compare the majority or unanimity voting in the EC(9) to the majority or unanimity voting in the current Community. This does not hold for the step from the current Community to the EC(16) scenario since the loss of power in unanimity voting would be one fourth for the current members, which is due to the small size of the potential new members.

Table 4: Voting Power in the EC Council of Ministers Before and After an Expansion by EFTA Countries when Assuming Simple Majority Rule

Member state	Shapley-Shubik index		Banzhaf index	
	EC(12)	EC(16)	EC(12)	EC(16)
GERMANY	0.135	0.116	0.336	0.365
ITALY	0.135	0.116	0.336	0.365
THE UK	0.135	0.116	0.336	0.365
FRANCE	0.135	0.116	0.336	0.365
SPAIN	0.107	0.091	0.268	0.285
THE NETHERLANDS	0.063	0.055	0.160	0.174
PORTUGAL	0.063	0.055	0.160	0.174
GREECE	0.063	0.055	0.160	0.174
BELGIUM	0.063	0.055	0.160	0.174
SWEDEN	..	0.043	..	0.138
AUSTRIA	..	0.043	..	0.138
DENMARK	0.038	0.032	0.100	0.103
FINLAND	..	0.032	..	0.103
NORWAY	..	0.032	..	0.103
IRELAND	0.038	0.032	0.100	0.103
LUXEMBOURG	0.023	0.021	0.061	0.069

Table 4 presents the power indices for the current Community and the EC(16) scenario when assuming a simple majority rule. It is surprising that the SSI gives almost exactly the same distribution of power in a simple majority voting as in a qualified majority voting. In contrast, the independence assumption gives much more power to each member in simple majority game. If we normalize the BI, the distribution is, however, almost identical to the distribution of the normalized index in qualified majority game.

We can base our interpretation of this phenomenon on subjective probabilities and on the phases of the decision-making process. In the first phase a draft proposal is given and voters can be considered independent since there has been no remarkable communication between them. As noted earlier in this paper, power indices can be interpreted as players' prospects from participating in voting games. The result in Table 4 shows that a decrease in the voting rule implies that independent prospects (i.e. without compromises) become

more optimistic but also that they become unrealistic in the sense of group-consistency (see Section 2). Hence on the basis of Table 4 we may argue that voting power increases but also that voters seem to overestimate their abilities during the early phases of the decision-making process. This leads to more stringent competition since the decision making moves to the direction of "may the best proposal win" while the independent power increases. In the EC Council of Ministers the independent power seems to exceed the homogeneous power when voting rule is larger than blocking minority and smaller than a qualified majority (see Figure 1). Another question which arises is a question of increased risk of being outvoted in the case of simple majority voting (see Section 4).

The results concerning the loss of power do not support the hypothesis that the increased role of majority voting in the 1980s would have been a consequence of fear of power losses for the members of the EC(9). Also it seems that the distribution of power does not give reason to claim a move from qualified to simple majority rule for any of the current Community members. Although the move from a qualified to a simple majority increases voting power for each member, it also increases remarkably the risk of losing. It also seems that the current qualified majority rule is chosen such that the independent and homogeneous power are in balance.

4 Decision Making Control

Tables 5 and 6 show the probabilities to block decisions and to ensure acceptance of proposals for the leading coalition (i.e. a coalition with the m largest countries) when assuming a qualified majority. It can be seen that the decision making can be weakly controlled by the five largest countries assuming independence and when assuming homogeneity a qualified majority is needed to control decisions.

Negative control can be pursued by small coalitions with 2-3 members¹⁶. The probabilities in Tables 5 and 6 show two basic characteristics of the decision-making process in

the EC. First, the proposals have hurdles to pass without remarkable compromises and second, national control in the negative sense is high. The immediate consequence of these properties is that they limit the competence of the EC to the issues where member states can reach high homogeneity and make compromises. Also while maintaining the current decision-making rules (i.e. voting weights and majorities) the high national control indicates that the Community can not take new members with very different views from the average "Community standard". To get homogeneous ministers member states have to be similar enough. The third consequence of a high national negative control is that the decision making can be ineffective. There is a danger that remarkable decisions cannot be made before the sufficient homogeneity is reached (see Section 5). Very important consequence of the third implication is that the decision making-system in the EC secures the functioning of the subsidiarity principle in practise. The decision making process makes it too difficult and above all too ineffective to make decisions concerning the areas where there is not enough homogeneity between member states.

It can be seen in Tables 5 and 6 that after certain limit the measure of control increases faster under the independence assumption than under the homogeneity assumption. The technical explanation for this lies in the probability model behind the indices. Assuming independence implies that the support for the leading coalition exceeds the limit needed for a blocking minority more readily than under the homogeneity assumption.

Intuitively it is quite clear that negative control decreases when voters negotiate and amend proposals. The conclusion that the control increases faster under the independence assumption than under homogeneity implies that the negative aspect of control dominates. For compromises member states have to give more of their negative control than they gain positive control. For the EC Council of Ministers it seems that the dominance of the negative control holds true for the coalitions of more than the three or four largest members.

Another side of this phenomenon is shown in Figures 2 and 3. They present positive

Figure 2. Leading coalition's share of majority and control in the current community

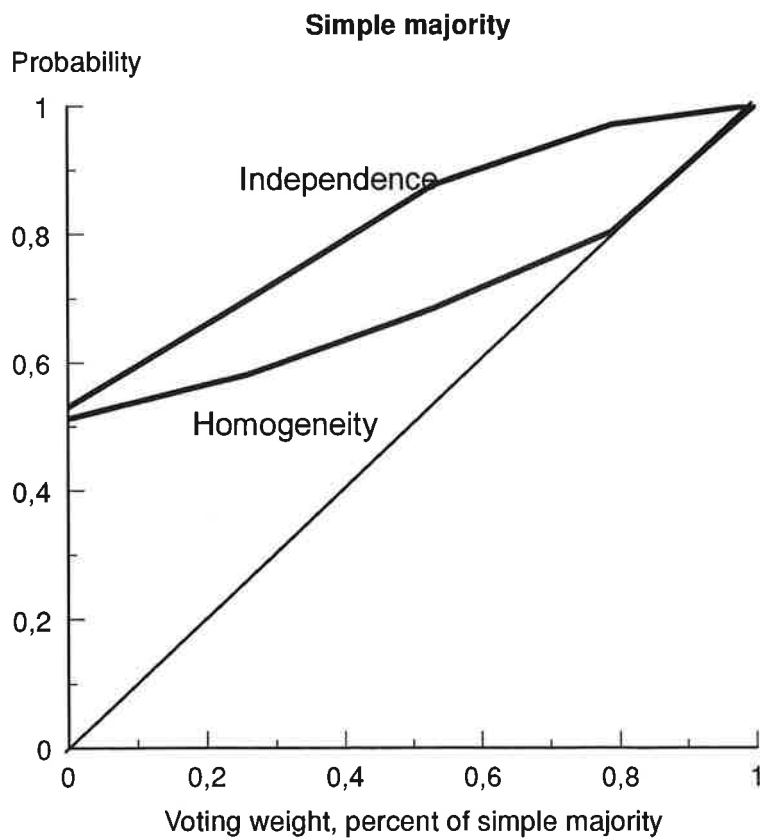
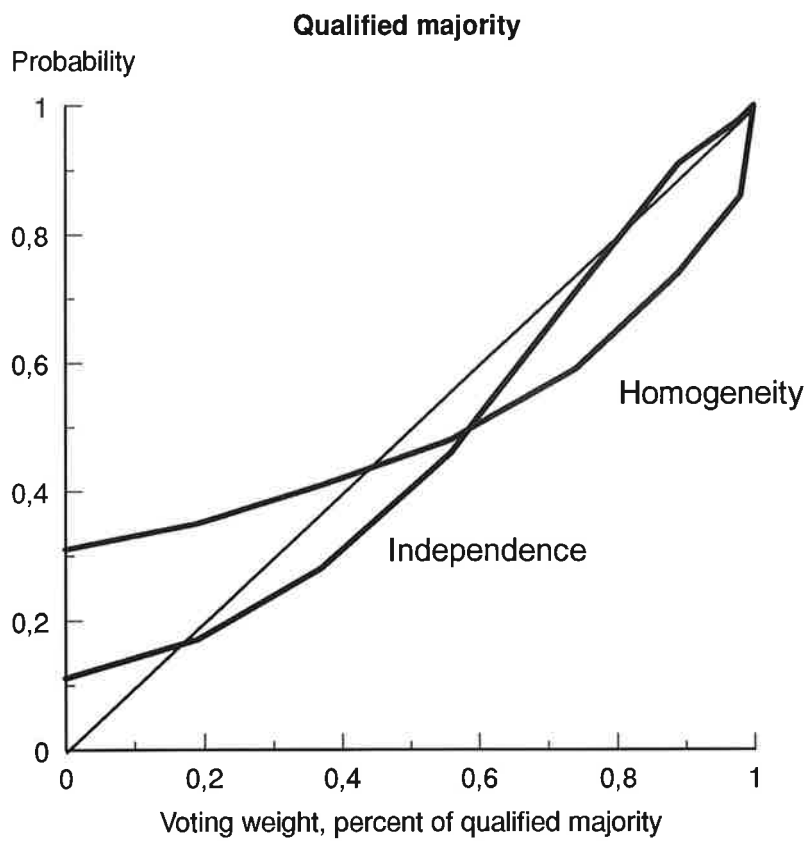


Figure 3. Leading Coalition's share of majority and control in the EC(16)

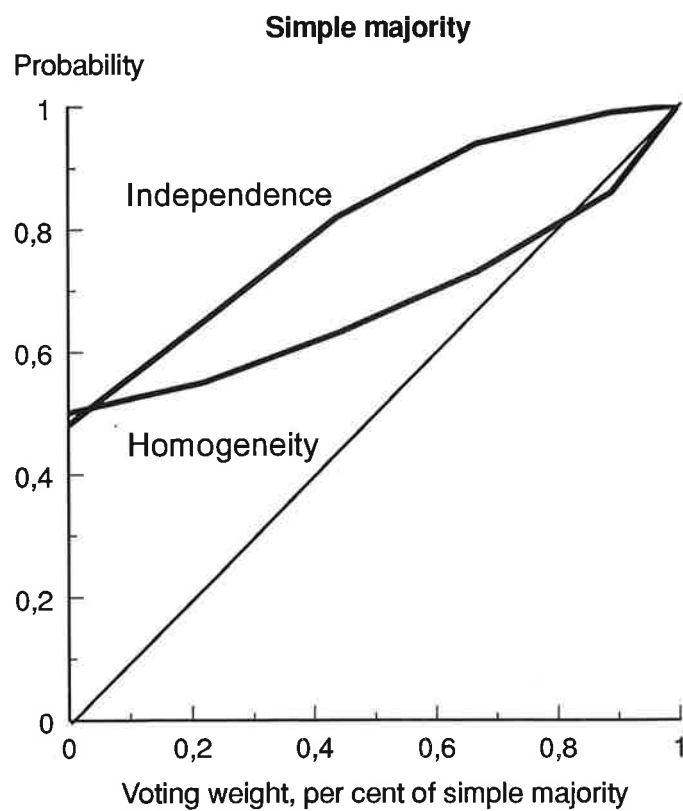
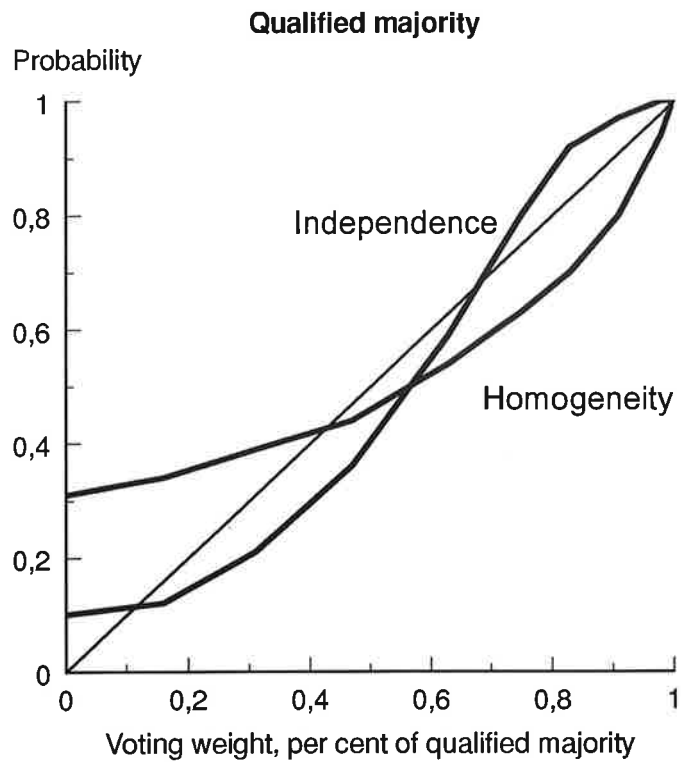


Table 5: The leading coalition’s control over the decision making in the EC12

n	Homogeneity assumption			Independence assumption		
	Prob. of accompl.	Prob. of prevent	Prob. of control	Prob. of accompl.	Prob. of prevent	Prob. of control
1	0.35	0.78	0.57	0.17	0.97	0.57
2	0.41	0.90	0.65	0.28	1.00	0.64
3	0.48	1.00	0.74	0.46	1.00	0.73
4	0.59	..	0.80	0.71	..	0.85
5	0.74	..	0.87	0.91	..	0.96
6	0.86	..	0.92	0.98	..	0.99
7	1.00	..	1.00	1.00	..	1.00

control as a function of leading coalition’s votes as a share of a majority. The figures are quite similar regardless of whether the current Community or the EC(16) scenario is investigated. The first common feature is that in qualified majority voting independent voters have higher positive control if the size of the leading coalition exceeds 60 per cent of that majority. Beyond this limit a leading coalition cannot gain positive control by compromises. Simple majority voting changes the figures remarkably. To gain positive control there is no need for compromises. Also the control is much more concentrated, i.e. the control curve lies above the 45 degree line, and the two largest countries could control decisions by probability of a 0.8.

The main conclusion of the measures concerning the decision making-control is that the qualified majority rule together with a voting weight determination which favours small countries insure high national control for both the large and small members. The control is based on its negative aspect, i.e. on blocking decisions. Moving towards a simple majority, although it has a negligible effect on voting power, would change the control measures remarkably. In simple majority voting the control would be based on its positive aspect and in the sense of higher control the compromises would become useless.

Table 6: The leading coalition’s control over the decision making in the EC16

n	Homogeneity assumption			Independence assumption		
	Prob. of accompl.	Prob. of prevent	Prob. of control	Prob. of accompl.	Prob. of prevent	Prob. of control
1	0.34	0.78	0.56	0.12	0.98	0.55
2	0.39	0.88	0.63	0.21	1.00	0.60
3	0.44	1.00	0.72	0.36	1.00	0.68
4	0.54	..	0.77	0.59	..	0.80
5	0.63	..	0.82	0.80	..	0.90
6	0.70	..	0.85	0.92	..	0.96
7	0.80	..	0.90	0.97	..	0.99
8	0.94	..	0.97	1.00	..	1.00
9	1.00	..	1.00	1.00	..	1.00

5 The Policy Change

The conclusions made in Sections 3 and 4 were based on the assumption that voters behave similarly regarding voting distributions (i.e. they are all either independent or homogeneous). Typically this kind of analysis concentrates on a voting body itself, not on voters or particular questions of voting. The analysis is said to be abstract.

We have argued in this paper (see Straffin 1988) that voting assumptions can be interpreted as consequences of different levels of communication among the voters. This illustration can be used to model certain qualitative cooperation structures in a voting body. The cooperation structures may arise from differences in preferences and thus they may alter from vote to vote, e.g. regarding the voting issue. In this paper, however, we do not intend to analyse different issues of voting¹⁷, but rather a more general setting which also arises from different preferences. On the basis of our analysis we can make conclusions about the possible shifts of policy when four EFTA countries join the EC.

Our analysis in this section is based on partial homogeneity (see Section 2). We simply

assume that the Mediterranean countries (Spain, Portugal and Greece) form one homogeneous group and the new entrants another one. Intuitively it is reasonable to believe that these groups have common interests and thus they are among themselves more homogeneous than all member states. Also it has been assumed that Germany, the Netherlands, Belgium, Denmark and Luxembourg will have deeper cooperation with the group of new entries. The partial homogeneity is used to model this setting so that the Southern and the Northern coalitions are considered as being opposite to each other. This is quite a realistic situation in many issues of voting in the EC (see Widgrén 1993c, Hamilton 1991). It is worth noting, however, that also cooperation across the union borders is possible¹⁸.

Table 7 shows the partial homogeneity power indices for the current Community and the EC(16) scenario. As it was mentioned earlier, it has been assumed that there are two homogeneous groups, the first of which contains the new entrants (case 1) or the new entrants supported by Germany, the Netherlands, Belgium, Denmark and Luxembourg (case 2), and the second of which contains the three Mediterranean countries. Also it has been assumed that there lies a group of individual voters between the opposing groups. In Table 7 F stands for the 'For' group, i.e. members in this group favour a certain proposal with the probability t , A stands for the 'Against' group, i.e. members in this group are in favour of proposals with the complement probability $1 - t$ and finally I stands for an indifferent country.

Table 7 reveals two interesting results. First, it seems that there are no remarkable gainers except the Mediterranean countries in case 2. It is counterintuitive that they gain although their opposition becomes stronger in terms of votes. Deeper analysis shows, however, that this result is intuitively reasonable (see Figures 4 and 5). The second conclusion concerning the indices in Table 7 is, once again, that proposals have remarkable difficulties to pass. The homogeneous cooperation may even decrease the voting power of countries in the 'For' group, while for the opposition the reverse may hold. This is due to the high negative control which has already been noted earlier.

Table 7: Voting Power in the EC Council of Ministers Before and After an Expansion by EFTA Countries when Assuming Two Different Partial Homogeneity Settings

Member state	New entrants vs. Mediterranean countries			New entrants and 5 Northern members vs. Mediterranean countries		
	EC(12)	EC(16)	Group	EC(12)	EC(16)	Group
GERMANY	0.147	0.094	I	0.132	0.095	F
ITALY	0.147	0.094	I	0.112	0.112	I
THE UK	0.147	0.094	I	0.112	0.112	I
FRANCE	0.147	0.094	I	0.112	0.112	I
SPAIN	0.118	0.080	A	0.130	0.108	A
THE NETHERLANDS	0.074	0.050	I	0.074	0.047	F
PORTUGAL	0.074	0.051	A	0.039	0.075	A
GREECE	0.074	0.051	A	0.039	0.075	A
BELGIUM	0.074	0.050	I	0.074	0.047	F
SWEDEN	..	0.044	F	..	0.040	F
AUSTRIA	..	0.044	F	..	0.040	F
DENMARK	0.052	0.029	I	0.051	0.027	F
FINLAND	..	0.030	F	..	0.027	F
NORWAY	..	0.030	F	..	0.027	F
IRELAND	0.052	0.029	I	0.058	0.024	I
LUXEMBOURG	0.019	0.022	I	0.021	0.020	F

When assuming voters are similar as regards their voting behaviour, there is no need to analyse different issues of voting. For example, when assuming homogeneity, it is useless to try to make conclusions varying the value of t . Probabilistically the distributions of each voters' power indices are uniform. Assuming independence simplifies all possible votings to one average type of voting where probabilities p_i are $1/2$ for each voter. In contrast, for the standard assumptions partial homogeneity gives a new dimension to the analysis since it is reasonable to investigate different types of issues (i.e different t -values).

Let us define a distribution of each voter's own power with respect to voting probabilities

and let us call this distribution a *power profile*. The easiest way to calculate the profiles is to take the integrals in equation (4) for separate intervals with equal length. For example we may take integrals from zero to 0.1, from 0.1 to 0.2 and so on to the final interval from 0.9 to 1. The ten integrals should sum up to the partial homogeneity power index. Thus they define a its distribution with respect to t .

The purpose of the profiles is to reveal what kind of power different voters do have under different settings¹⁹. By analysing these profiles we can reveal what kind of voting behaviour an individual needs to be powerful or, less normatively, on what kind of proposals an individual has the best chances to influence. If a country has most of its power in questions that it supports with a small probability, this can be interpreted as blocking power or as a possibility to sell votes. Thus it can maintain the status quo or gain power by trying to sway the opposition with compromise offers. In contrast, if a country's power is based on questions that it supports with a high probability, this can be interpreted as power to promote passage of decisions. If the former type of distribution is valid for both sides, the semi-coalition structure can be, on the other hand, interpreted as an unstable one but remarkable decisions cannot be made. On the other hand, the low intensity of 'for' countries' to push through proposals that they prefer most increases stability. Hence this kind of setting is quite unclear but without remarkable side-payments it can be interpreted as stable. If the latter type of setting holds true for both sides, the semi-coalition structure is stable and the status quo is likely. Remarkable decisions can be made if the profile increases to the right for the countries in the supporting group and to the left for the opposition. Figures 4 and 5 present the power profiles for the EC(16) in case 1 and case 2.

In the current Community it seems that the Mediterranean countries seem to have the more influence the tighter opposition policy they pursue if we assume that the other members behave homogeneously. Although they do not form a blocking minority they seem to have a high enough possibility to have an additional member to support their policy and to form a blocking minority coalition. If, however, the other members

Figure 4. Power Profiles in the EC(16) when the new entrants and the Mediterranean countries vote as opposites

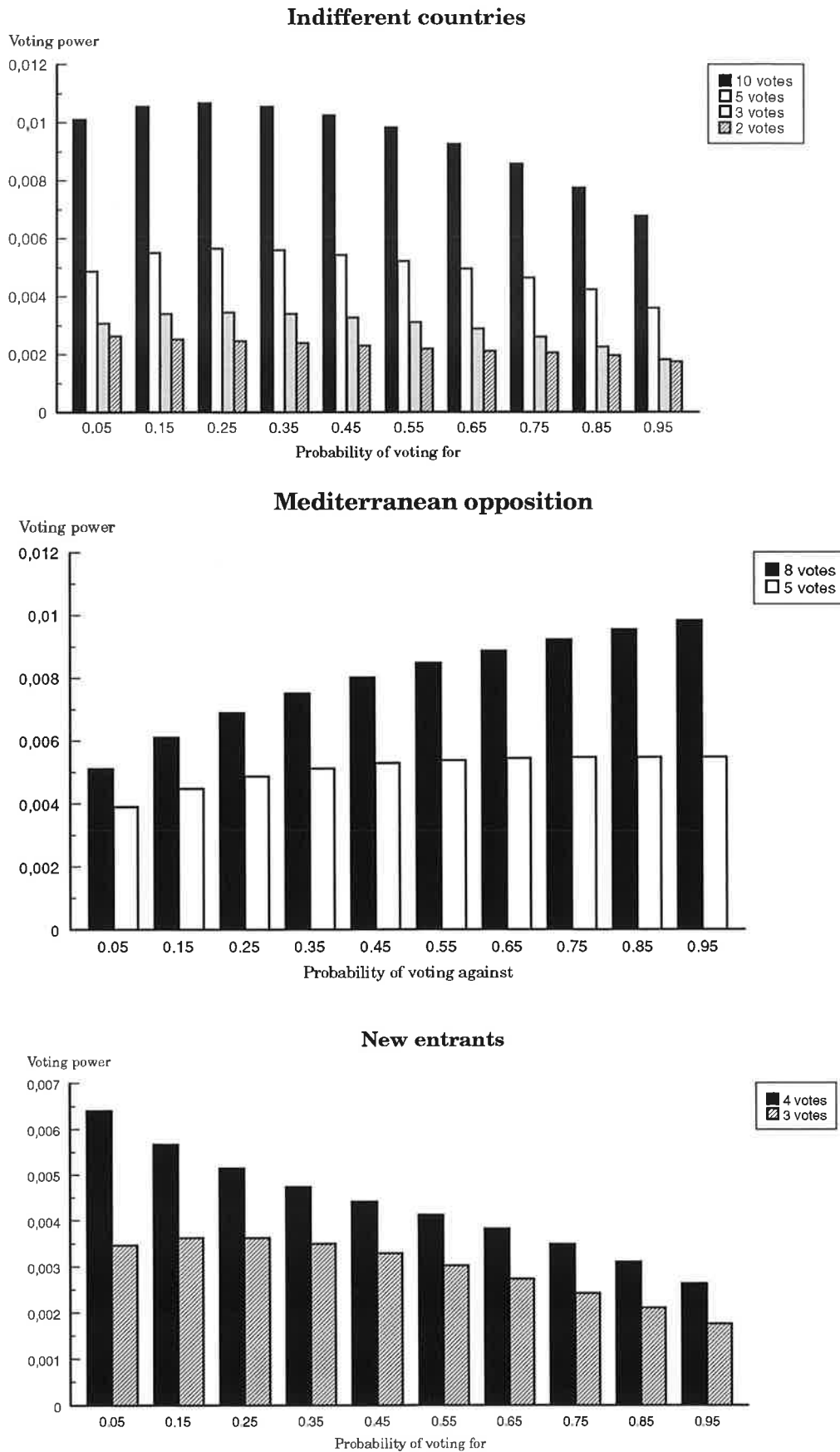
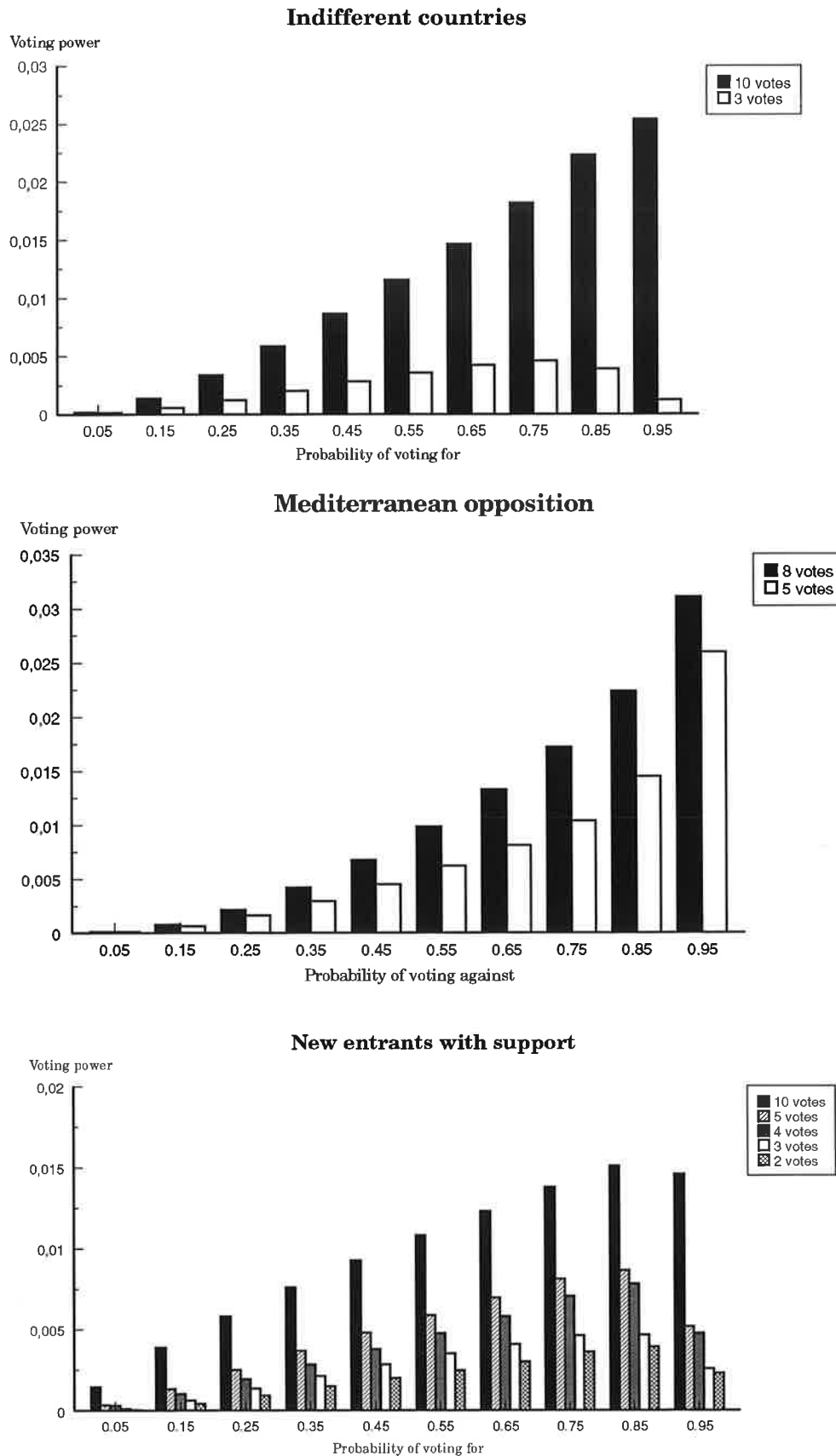


Figure 5. Power Profiles in the EC(16) when the new entrants and the Mediterranean countries vote as opposites and the new entrants have support



behave independently, the need for cooperation to pursue a policy they prefer decreases. It is interesting that in a setting, where Germany, Denmark and the Benelux behave homogeneously, Spain as a member of an opposition with Portugal and Greece has the highest intensity to pursue the policy it prefers. In this setting, Spain becomes as powerful as Germany and the 'for' group is not very stable. Thus the Mediterranean countries have possibilities to change the direction of pursued policies by using their ability to wield negative control.

Figures 4 and 5 show an interesting result concerning new entrants' possibilities to change the direction of pursued policies (see also Widgrén 1993c). It seems that alone the new entrants have remarkable risk to be outvoted when trying to push through policies they prefer. For the opposition it is interesting that Spain seems to have a high intensity to pursue a tight opposition policy against the new entrants, while this does not hold for Portugal and Greece (see Figure 4). The conclusion is that there are possibilities to negotiate compromises but no remarkable decisions could be made. The indifferent countries seem to play a key role. Figure 5 presents a setting where the new entrants communicate with five other members (Germany, the Netherlands, Belgium, Denmark and Luxembourg) and they form a homogeneous group. The profiles change remarkably for all groups. The 'for' group including the four EFTA countries seems to have much higher intensity to pursue a policy they prefer and for the opposition it seems that it would be reasonable to pursue a tight opposition policy. Thus the northern cooperation increases stability although the indifferent voters have an intensity to support the 'for' group. Regarding a change in pursued policies the Mediterranean countries seem to still have a key role.

6 Conclusions

In this paper we investigated the change in the balance of power in the EC Council of Ministers when it is expanded by EFTA countries and when the voting rules are altered.

It has been assumed that four EFTA countries, Austria, Sweden, Finland and Norway, join the Community.

The decision-making process in the EC strongly favours small countries. It was shown in this paper that the new entrants would get 15 per cent of the total power in the EC Council of Ministers. Relative to their share of the population in the EC of 16 members the share of power is remarkably higher, which implies that the new members would have a strong position in the decision making of the EC. The loss of power for the current members is, however, smaller than in the enlargements of the Community in 1973 or in the 1980s. Also it can be argued that the Mediterranean enlargement in the 1980s changed the EC decision making more than would the current set of new entrants. In the 1980s the need for compromises increased remarkably. Strengthening the role of qualified majority voting was a necessary reform to reach the balance between compromises and competition.

The conclusion concerning control was twofold: first, it seems to be very difficult to accomplish decisions, while for preventing decisions the reverse seems to hold and second, accomplishing seems to be the more difficult in an expanded EC the more independently the voters act. Current members do not lose their control in the expansion of the Community but there will, nevertheless, be four new members with remarkable control positions regarding preventing decisions. Also it can be argued that high national control over decisions implies more power for the officials in preparatory bodies. Remarkable decisions will need a deep homogeneity between the member states. It can be reached by negotiating and by preparing proposals properly. This implies that there is a danger that decision making is ineffective. The national control and need for deep homogeneity together constitute life insurance for the subsidiarity principle.

To avoid the problem of easy prevention of decisions and inefficiency simple majority should be used for decisions. This would decrease member states negative control over decisions remarkably. It is surprising, however that the balance of voting power remains

almost unchanged if the decision-making rule is lowered from qualified to simple majority.

The decision making in the EC is likely get little slower after the enlargement. European integration has the best possibilities in issues where homogeneity is high or it can be bought by using side-payments. However, either the power or control measures do not support the increase of the need for institutional reform when the Community enlarges by four EFTA countries. The balance between competition and compromises will remain. The decision making is already ineffective and there will be no remarkable change in this feature. For more effective and competing decision making the need for reform already exists.

It was shown that negative control is the main element for new entrants' to wield influence on pursued policies. Thus it is not likely that there will be a remarkable policy change. The Mediterranean countries maintain their key role and it is profitable for them to deepen their cooperation. The Northern members' incentive to try to push through proposals that they prefer will, however, also increase.

Notes

- 1) The relation between the voting weight w and population p can be described with the regression equation $\log w = 0.0063(\log p)^{2.465}$ with $R^2 = 0.972$. The criteria for this particular equation was to fit the estimates for the numbers of votes to the right ones.
- 2) In this paper we concentrate on a simple and qualified majority. They seem to be the relevant alternatives in the EC Council of Ministers. Thus we do not concentrate on voting power as a function of the voting rule (see Nurmi 1992).
- 3) This approach can also be criticized. It can be argued that voting behaviour should not affect the measures of power (see Holler 1983).
- 4) Note that negative control is a conditional probability. There are four outcomes where C votes 'no' and four outcomes where C votes 'yes'.
- 5) It worth noting, however, that the vector $(1/2, 1/2, 1/2)$ is an implication of a wider range of acceptability vectors, as it is shown later in this paper.
- 6) These joint probability distributions (jdp's) are different from the usual one that assigns probabilities directly to events. Each acceptability vector describes the n probability distributions that assign probabilities to the vote-yes and vote-no events for each of the n voters. The jdp's discussed here assign probabilities to each possible acceptability vector. Thus the jdp's assign probabilities to probability distributions.
- 7) Since we assumed that the voting is simply "yes or no" type the list of no-vote coalitions is the same. That is why, for the measures of influence there is no difference whether to analyse yes-vote or no-vote coalitions.
- 8) See Owen (1982) for a fuller explanation of this. Intuitively it should be quite clear. Also it is interesting that the sum of this kind of terms is always 1 no matter whether p_i terms are probabilities or not. We can even choose complex numbers for p_i and the property remains valid (Owen 1964).
- 9) A class of coalitions is no more than a set of coalitions. In mathematics the sets of sets are usually referred to as classes of sets.
- 10) For an unbiased coin this illustration holds true only for simple majority voting. For weighted majority voting we also need a weighted coin.
- 11) Actually, the exact distributions are unknown since we are analysing weighted voting. In the case of a symmetric voting game (one man one vote) theory tells us that the distributions should be uniform under homogeneity and binomial under independence.
- 12) Slightly modified versions of these probabilities can be used to analyse the concentration of power (Leech 1987a, 1987b, Pohjola 1988). It is then assumed that a coalition of

the m largest players votes for the proposal and the probabilities are calculated for these alliances by letting $m = 1, \dots, p$, where p is the number of the largest players needed for a majority.

13) The choice of these particular limits is, of course, arbitrary. Here, as usual in control analysis, we use the analogy to significance levels in statistics.

14) For a more detailed discussion about the PCs, see Widgrén (1991).

15) Power indices can also be interpreted by using subjective voting probabilities when an individual voter is assessing her/his prospects regarding participation in the game (Weber 1988).

16) For example sub-systems are such coalitions (see Schoutheete 1990). The role of the Franco-German axis, Benelux-countries, Mediterranean and Nordic countries have been analysed in Widgrén (1991, 1993a, 1993b).

17) For voting power in trade policy and social regulation, see Widgrén (1993b, 1993c).

18) Technically the probability model which gives t and $1 - t$ probabilities for the two homogeneous groups to support a random proposal insures that.

19) Partial homogeneity makes profile analysis interesting since they differ from individual to individual. Homogeneity and independence imply similar and symmetric profiles (see Widgrén 1993c).

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