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**VOTING POWER IN TRADE POLICY AND
SOCIAL REGULATION OF AN EXPANDED EC:
A Partial Homogeneity Approach**

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ABSTRACT: In this paper, we study the voting power in the EC Council of Ministers regarding trade policy and social regulation. It has been assumed that member states' attitudes towards a liberal external trade policy or tighter regulation norms vary. Member states have therefore been divided into three groups and the partial homogeneity assumption of cooperative games is applied. The purpose of this paper is threefold: first, to evaluate the voting power in mentioned issues compared to the situations where voters act similarly in the sense of voting distributions; second, to analyse what kind of decisions the Council of Ministers can make in these issues; and third, how does an expansion of the Community by the EFTA countries change these possibilities.

KEY WORDS: European Community, game theory, power indices, weighted voting

1 Introduction

National aspects and the balance of national voting power in the EC play an important role as long as the governments have direct influence in the decision making process, see Widgrén (1991). In addition to this member states have different preferences on different issues of voting and these cooperation structures give an interesting additional dimension to the analysis of national influence. In this paper we analyse trade policy and social regulation of the EC. The latter encompasses issues like environmental, health and consumer protection policies (Dehousse 1992).

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. After the Single European Act, which came into force in January 1987, also the decisions concerning the substance of the single market have been made mainly by the qualified majority for which 54 votes out of 76 is needed. It has been argued in Widgrén (1991, 4), that the relationship between the votes and population is logarithmic and from among the EFTA countries Austria and Sweden would get 4 votes and Finland and Norway 3 votes. Coalition formation is essential in the Council of Ministers, since most of the questions are resolved by a qualified majority.

There are remarkable differences between the two issue groups analysed in this paper. Trade policy is a part of the single market program and that is why the decisions are taken mostly by qualified majority. It is said in article 113 of the Maastricht Treaty that "The common commercial policy shall be based on uniform principles, particularly in regard to changes in tariff rates, the conclusion of tariff and trade agreements, the achievement of uniformity in measures of liberalization, export policy and measures to protect trade such as to be taken in the event of dumping or subsidies." The fourth paragraph of the article continues: "In exercising the powers conferred upon it by this article, the Council shall act by qualified majority."

In the social regulation issues the qualified majority voting is not as widely used. In the Treaty of Maastricht the role of the qualified majority was, however, strengthened particularly in environmental policy issues. In the environmental policy field the EC makes decisions both on the minimum and maximum, i.e. harmonization, basis. In the latter type of questions the Commission will strive for a high level of protection in its proposals and in the former type of questions the Council will set minimum standards

of protection while the member states may introduce more stringent national provisions. The decisions concerning the maximum standards could have been made by qualified majority since the Single European Act came into force. The aim of these maximum standards is twofold: first, to harmonize the laws concerning the environmental protection in member states and second, to prevent the formation of new barriers of trade concerning the environmental protection in the single market. The interpretation of the maximum standards is not, however, straightforward since also in this case member states can apply national more stringent provisions on grounds of major needs.

The decisions concerning the minimum standards laid down in Article 130s in the Single European Act have had to be passed unanimously. The Maastricht Treaty changed, however, the situation. Unanimity is required when the Council of Ministers adopts provisions primarily of a fiscal nature, measures concerning town and country planning and measures significantly affecting a member state's energy sources and the structure of its energy supply (Treaty on European Union, Article 130s). In other areas the minimum requirements concerning the environment the Council can act by qualified majority on the condition that there is no prejudice to Article 100a of maximum standards. This change introduced in the Treaty of Maastricht has been interpreted as a remarkable increase in the potential role of the Community in the EC-wide environmental protection. It also widened Community competence into the field of consumer protection and health policies.

In Widgrén (1991, 1992) the sub-systems of the EC, i.e. the coalitions which cooperate more or less permanently within the Community (see Schoutteete 1990), were analysed by using the methods of games with coalition structures (CS games). In the theory of CS games it is assumed that the coalition structure exists and the voting power is defined with respect to this condition. Typically in the analysis like this the sub-systems define a permanent issue-independent coalition structure, i.e. the analysis does not concentrate on any particular question of voting and the coalitions across the union lines are not possible.

In this paper we assume that the coalition structures are not formed independently of the issue under consideration but rather the preferences of the member states can vary. That is why we study two different coalition structures. To make the analysis more realistic we do not suppose the coalition structures to be binding. Thus it is possible to form alliances across the union borders. We call this kind of partition of voters a semi(coalition)structure (SCS).

It is assumed that there will be two groups: the first one is for the proposals concerning a certain issue and the second one is against. Also there lies a group of unclear voters between the 'for' and 'against' groups. Hamilton (1991) analyses a similar setting by comparing the status, i.e. winning, blocking minority or losing coalition, of the three groups in different issues of voting. In his study, however, the groups are assumed to be binding and the nature of his analysis is qualitative. In this paper we try to integrate the qualitative issue-dependent a priori information about the voters used by Hamilton and the probabilistic voting power approach by using the so-called partial homogeneity assumption (Straffin 1988, see also section 2). Thus we use qualitative data on member states to produce quantitative measures of voting power in different issues of voting.

It has been assumed that Austria, Sweden, Finland and Norway become members of the EC. Thus the analysis concentrates on the current Community (EC12) and on an expanded Community denoted by EC16. Particularly the analysis concentrates on two questions: "What kind of decisions can be made?" and "Will new entrants chance the direction of trade policy or social regulation in the Community?".

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, 1992a, 1992b) and Nurmi (1992). The coalition structures are one part of the analysis in Widgrén (1991, 1992a) and in Brams et al.(1991). Partial homogeneity haven't been applied to the decision making of the EC. Straffin (1988), however, has analysed the U.S. Congress using a similar method we intend to do in this paper; see also Straffin - Davis - Brams (1982) for more on partial homogeneity.

The results of this paper reveal interesting consequences implied by the ideological semi-structure in the EC Council of Ministers. It is shown that the setting could change the balance in voting power remarkably. Also it seems that if the resolve of the group of 'for' voters to push a proposal through increases, their voting power decreases more than in the group of voters 'against' the proposal. This result together with increasing stability in the semi-coalition structure supports the hypothesis that decisions in the EC Council of Ministers are compromises of a high degree, even through unanimity is not required. Remarkable changes towards a more liberal trade policy or tighter norms in social regulation can not be expected after an expansion of the Community. However, the new entrants ensure that there will be no changes towards the opposite direction either.

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

2 Measuring the National Influence in the EC when Assuming Partial Homogeneity

Measuring the influence in a voting body is a difficult question. In addition to the ultimate vote every single question has its own background, i.e. the preparatory work which is needed for the creation of proposals and the bargaining process which is needed for amending the draft proposals before they pass or are rejected. When measuring a single voter's influence in a voting body by using the cooperative game approach, the preparatory work, i.e. the bargaining for forming coalitions, is not modelled. We simply assume that the voters' resources in the final voting define a limiting condition for the bargaining and thus the decision making is modelled as a simple cooperative voting game. This approach can well be criticized but it also can be defended since the monumental preparatory work both in the formal and informal level needed for a decision in the EC cannot be modelled properly, i.e. move by move.

A simple voting game can be characterized as follows: $u = [q; w_1, \dots, w_n; p_1, \dots, p_n]$, where $q \in [0, 1]$ is the voting weight which is needed to attain a certain end, i.e. to win or to block, w_i 's are the voting weights and p_i 's are the probabilities that voter i votes for a random bill. The vector p of these probabilities is called an acceptability vector (Straffin 1988). Hence in cooperative games the status of a coalition, i.e. winning, losing, etc., is defined on the basis of voting weights, i.e. voters' resources, and the decision making rule and the voters' behavior is modelled by using the probability vector $p = (p_1, p_2, \dots, p_n)$. These probabilities are essential since the rest of the analysis concentrates only on the status of a coalition.

Let W be a winning coalition, i.e. an alliance where the members together have a voting weight larger than q . Let \mathcal{W} be the class of winning coalitions. An interesting subclass of \mathcal{W} is a class of minimum winning coalitions \mathcal{M} . A minimum winning coalition M is here defined as a coalition which does not have a winning coalition as a proper subset (Bolger 1979). Let W_i denote winning coalition where i is a member and \mathcal{W}_i denote the

class of these coalitions and let \mathcal{M}_i denote the class of minimum winning coalitions M_i with respect to i .

In a cooperative game approach it is possible to suppose that there exists qualitative or quantitative differences of voters' behavior. For the quantitative differences we could use, for instance, historical data and estimate the components of the acceptability vector. When analysing the EC Council of Ministers this is, however, impossible, since the votings are secret. Also this kind of method can be criticized since the Council is only theoretically a single body. In practise it does meet in different compositions. For the Council, see Nicoll - Salmon (1990). Also it is worth noting that a certain government does not reign forever and the political opinions in the Council of Ministers change over time. The more instable the composition of the voting body is the more improper the statistical estimates of voting behavior are (cf. Straffin 1988).

Straffin (1988) argues that rather than using quantitative data we could use qualitative information about the voters. Also it can be well argued that qualitative differences between the voters are more stable in the sense that they can be observed on a national rather than a governmental, i.e. political, basis. In this paper we separate the voters (ministers) in each issue to three different groups with respect to their a priori attitude towards the issue. The basis for this separation is made according to the newspaper articles, statements of the national representatives, etc. (see Hamilton 1991). It is worth noting that this division is subjective and it can be interpreted as an example which gives light to the balance of voting power in the two analysed issues. However, examples can be found to argue that this kind of settings are quite realistic in the decision making process of the EC.

When measuring the individual influence in a certain voting body the first natural question to ask is, "What is the difference that one can make to the decision with his/her votes?" (Straffin 1988). It can be easily seen that for voting games one's vote makes a difference when i turns a coalition from loser into a winner, i.e. when i is crucial to winning coalition W_i , and thus the power indices of this type can be defined as probabilities that a coalition $S \subset N$ will be formed and coalition S belongs to the class of minimum winning coalitions with respect to player i . To answer the question of individual effect generally in all coalitions in $\mathcal{P}(N)$, we need to specify a probability model for the voting process, i.e. the distributions of the components in the acceptability vector.

Supposing that each player votes 'yes' or 'no' independently of each other, we can write

for any fixed $S \subset N$, the probability $P\{\mathcal{S} = S\} = \prod_{i \in S} p_i \prod_{i \notin S} (1 - p_i) = f(x_1, \dots, x_n)$ which is often called a power polynomial ¹ (see Straffin 1988). If we take the sum of these probabilities over the different classes of coalitions, we will have the probabilities $P\{\mathcal{S} \subset \mathcal{W}\}$, $P\{\mathcal{S} \subset \mathcal{M}\}$, $P\{\mathcal{S} \subset \mathcal{W}_i\}$, $P\{\mathcal{S} \subset \mathcal{M}_i\}$. The probability $P\{\mathcal{S} \subset \mathcal{M}_i\}$ which is essential for the answer to the question mentioned above is slightly more difficult to calculate. It can be defined as a difference between two probabilities as follows: $P\{\mathcal{S} \subset \mathcal{M}_i\} = P\{\mathcal{S} \subset \mathcal{W}_i\} - P\{\mathcal{S} - \{i\} \subset \mathcal{L}\}$. It can be easily shown that this difference is equal to the i^{th} partial derivative of power polynomial $f(\cdot)$ (see Owen 1982).

For calculation purposes we have to define the p_i probabilities or the coefficients of the multilinear extension explicitly. In the literature there are the two following standard assumptions of the joint probability distribution for p_i s. There is the *independence assumption* whereby probabilities p_i are independently uniformly distributed on $[0, 1]$ and *homogeneity assumption* : each $p_i = t$ and t is uniformly distributed on $[0, 1]$ (Straffin 1988). It is worth noting that the independence assumption implies so-called indifference where we simply assume that $p_i = 1/2 \forall i$. ²

Probabilistically the main difference between the two above-mentioned assumptions is that under the homogeneity assumption there is a common standard 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 homogenous. Voting power and satisfaction in the EC Council of Ministers before and after the enlargement of the EC by the entrants from among the EFTA countries have been analysed under these assumptions in Widgrén (1991, 1992a, 1992b and Nurmi 1992). It is, however, common for these assumptions that the voters are supposed to behave similarly regarding the distribution of voting for the proposal and that is why they are not proper for our purposes in this paper ³.

¹Owen (1972, 1982) calls this expression a multilinear extension of the function which defines a status for the coalition. Owen's terminology refers to linear algebra where the components of the acceptability vector can be interpreted as coefficients rather than probabilities. Graphically a coalition can be illustrated as a corner of the unit hyper-cubic, i.e. a point where the coordinates are either one or zero, where one stands for voting 'for' and zero for voting 'against'. It can be easily seen that the unit cubic has 2^n corners and thus defines the class of all possible coalitions in the game of n players. The multilinear extension is a mapping from this set of the corners to the whole cubic.

²Geometrically, when assuming indifference, the multilinear extension maps the set of the cubic's corners to a single point, i.e. the middle point of the cubic, and when assuming homogeneity, to the line from the origin to the point $(1, 1, \dots, 1)$ in the n -dimensional linear space.

³If we calculate the probability that one is crucial and hence swings the coalition from losing to win-

Heuristically the difference between the independence and homogeneity assumptions can be characterized by using Straffin's (1988) conceptualization of the communication among the voters. This difference can also be used to separate the voters qualitatively and that is why the combination of the two assumptions can be used to our purposes in this paper. According to Straffin (1988) 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 (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. Also it can be thought 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 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.

ning we have two following well-known formulas. Let f_i be the i^{th} partial derivative of power polynomial f . The independence assumption yields

$$P_{ind}\{\mathcal{S} = S, S \in \mathcal{M}_i\} = \int_0^1 \int_0^1 \dots \int_0^1 f_i(p_1, \dots, p_n) dp_1 \dots dp_n = \sum_{S \in \mathcal{M}_i} \left(\frac{1}{2}\right)^{n-1} = \beta'_i, \quad (1)$$

which is referred to as the Banzhaf power index and the homogeneity yields

$$P_{hom}\{\mathcal{S} = S, S \in \mathcal{M}_i\} = \int_0^1 f_i(t, \dots, t) dt = \sum_{S \in \mathcal{M}_i} \frac{(s-1)!(n-s)!}{n!} = \Phi_i \quad (2)$$

which is referred to as the Shapley-Shubik power index.

This kind of setting is a special case of the partial homogeneity and it yields

$$P_{par}\{\mathcal{S} = S, S \in \mathcal{M}_i\} = \underbrace{\int_0^1 \int_0^1 \dots \int_0^1}_{u+1} f_i(\overbrace{t, \dots, t}^s; p_{s+1}, \dots, p_{s+u}; \underbrace{(1-t), \dots, (1-t)}_r) dp_{s+1} \dots dp_{s+u} dt = \pi_i, \quad (3)$$

where n , s , u and r denote the cardinalities 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 can be shown that the Shapley-Shubik power index is the only one which has the consistency property, i.e. the sum of individual indices is always one in the voting games (Dubey, Neyman and Weber 1981). The Banzhaf index or any partial homogeneity index do not have this property. Neither independence nor partial homogeneity can reveal an unique pivotal voter and hence the sum of individual values for these indices differ from one. When assuming independence or partial homogeneity the events 'i is pivotal' and 'j is pivotal' are not separate since they can not order the voters uniquely regarding the p_i 's. In this paper we do not normalize the partial homogeneity indices since the probabilistic interpretation behind them is then destroyed.

For the calculation purposes we defined the multilinear extension for the voting game in the current Community and the EC of 16 members. The latter is a sum of 65 536 probabilities each one of which stand for one coalition. Since in simple voting games we do not need losing coalitions we separated all qualified majorities to a sum of 5564 probabilities that a random coalition is winning. For this function we applied the methods described in this section.

3 Results

In trade policy the qualified majority voting has a longer tradition than in the social regulation issues. According to Hamilton (1991) there are remarkably stable differences between the attitudes of the member states in the formulation of the Community's external trade policy. In this paper we have applied Hamilton's division of member states to three groups. Hence we have assumed that Germany, the United Kingdom, the

Netherlands, Belgium, Denmark and Luxembourg (35 votes) from among the current member states favour a liberal policy and they stand in an opposition to the "sun-belt protectionists" formed by Italy, France, Spain and Portugal (33 votes). The rest of the member states, Greece and Ireland, form a group of 'unclear' voters (8 votes).

It has been assumed in this paper, as in Hamilton (1991), that the new entrants favour a liberal policy. The number of votes in the 'For' group increases to 49. However, it can be easily seen that both the countries that are in favour and the countries that are against the liberal external trade policy form a blocking minority coalition (see Tables 1 and 2). Thus the countries in the former group do not reach the limit for a qualified majority together with the 'unclear' voters either.

As noted in section 2, the role of the Community wide environmental, health and consumer protection policies has been recently strengthened. According to the Treaty of Maastricht a remarkably wider group of decisions can be made by qualified majority than before. Again we divided the member states into three groups. We assumed that in addition to the new entrants Germany, the Netherlands, Denmark and Luxembourg (20 votes) favour tighter health, environmental and consumer protection policies and the Mediterranean countries, i.e. Italy, Spain, Portugal and Greece form together with Ireland (31 votes) a group which is against this. The group of 'unclear' voters is larger than in trade policy (25 votes). It is formed by the United Kingdom, France and Belgium. In the EC of 12 members the number of votes in the 'for' group falls below the limit for a blocking minority but the new entrants increase it to 34.

In social regulation it is worth noting that the poorest countries are against the higher level of protection or security. Thus it is possible for the richest countries to "buy" their votes by side-payments, i.e. cohesion which is allocated through the Community budget to the poorest members (see Hamilton 1991).

Table 1 presents the partial homogeneity indices in trade policy and social regulation for the current Community. For the partial homogeneity indices also the relative power, i.e. power relative to voting weight, has been presented. It can be seen that in trade policy the semi-coalition structure decreases power for members of each group with only minor exceptions when compared to either homogeneity or independence of voters, i.e. the Shapley-Shubik or Banzhaf indices. Heuristically this is due to the fact that under partial homogeneity the potential crucial player can be the one who votes more likely against the proposals concerning a liberal policy. Thus intuitively this result supports the hypothesis of status quo solution.

Table 1: The Partial Homogeneity Power Indices in Trade Policy and Social Regulation of the EC12

Country	Trade policy		Social regulation		Issue independent indices	
	π_i	π_i/w_i	π_i	π_i/w_i	Φ_i	β_i
Germany	0.102	0.775	0.153	1.163	0.134	0.139
Italy	0.107	0.813	0.131	1.000	0.134	0.139
the UK	0.102	0.775	0.130	0.988	0.134	0.139
France	0.107	0.813	0.130	0.988	0.134	0.139
Spain	0.088	0.836	0.100	0.950	0.111	0.118
the Netherlands	0.051	0.775	0.069	1.049	0.064	0.073
Portugal	0.055	0.836	0.068	1.034	0.064	0.073
Greece	0.048	0.730	0.068	1.034	0.064	0.073
Belgium	0.051	0.775	0.079	1.201	0.064	0.073
Denmark	0.038	0.963	0.057	1.444	0.042	0.049
Ireland	0.033	0.836	0.050	1.267	0.042	0.049
Luxembourg	0.013	0.494	0.014	0.532	0.012	0.019
the EC	0.795	0.795	1.049	1.049	1.000	1.083

This property can also be characterized by saying that the potential crucial player - most likely a voter from the 'against' group - does not break the blocking minority coalition formed by Italy, France, Spain and Portugal. It is worth noting that two of these countries are needed for a qualified majority coalition if the countries in the 'for' and 'unclear' groups are in favour of a proposal concerning a liberal policy. In the social regulation issues the situation is slightly different since first, the group of 'unclear' voters is larger and second, both Italy and Spain can alone break the blocking minority formed by the countries in the 'against' group. The status quo solution is not as likely in social regulation as in trade policy.

One interesting question concerning the semi-coalition structure is its stability. In this paper we investigate member states' so-called power profiles, i.e. distributions of member states' own power on $[0, 1]$. Power profile analysis also reveals, what kind of decisions are most likely.

Let us define a *power profile* as a distribution of an individual's voting power with respect to her/his voting behaviour. If we assume homogeneity, power profiles have

a uniform distribution on $[0, 1]$, and if we assume independent voters, power profiles would have binomial distribution on $[0, 1]$. Hence voters are similar in the sense of their distributions of a priori voting behaviour. This property can also be interpreted in another way. It can be argued that assuming homogeneity implies that voters are equally powerful in each question of voting and assuming independence puts more power to the average type of proposals. Roughly this can be characterized by saying that homogenous voters could push any kind of proposals through, while independent voters can only make *ex ante* average types of decisions.

In contrast, the semi-coalition structure (partial homogeneity) implies that power profiles vary from individual to individual. 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 an individual has most of her/his power in questions that she/he supports with a small probability, this can be interpreted as blocking power or as a possibility to sell votes. Thus she/he can maintain the status quo or gain power by trying to sway the opposition with compromise offers. In contrast, if an individual's power is based on questions that she/he supports with a high probability, it can be interpreted as power to promote passage of decisions. If the former type of distribution hold true 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, 'for' countries' low intensity 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 1 and 2 show that for the current Community the power profiles are slightly different in trade policy and social regulation. In trade policy it seems a priori that the status quo solution is likely because both countries 'for' and 'against' have a blocking minority. The power profiles reveal, however, that there is a remarkable pressure towards a protectionist policy because the countries in the 'against' group have an intensity to push protectionist proposals through, while the countries in the 'for' group seems to be more ready to support this than push a liberal policy through. The countries in the 'for' group get over 60 per cent of their power when their common voting standard lies on the interval $t = [0.0, 0.5]$. The countries in the 'against' group get over 70 per cent of their power when their voting standard $1 - t$ lies on the interval $[0.0, 0.5]$ and thus t lies

Figure 1: Power Profiles in Trade Policy of the Current Community

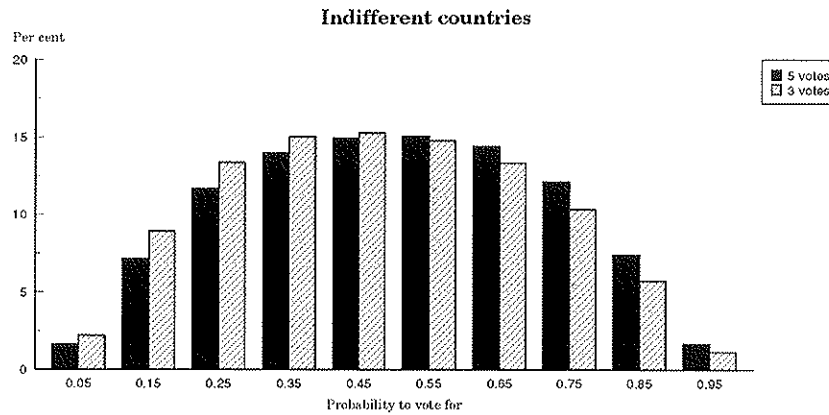
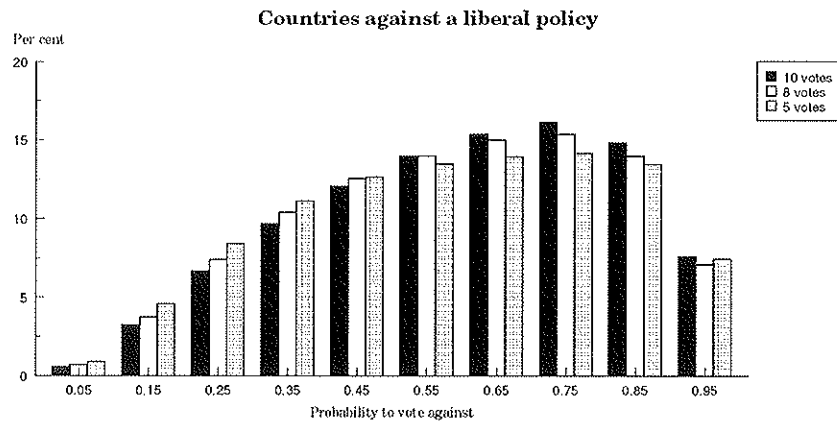
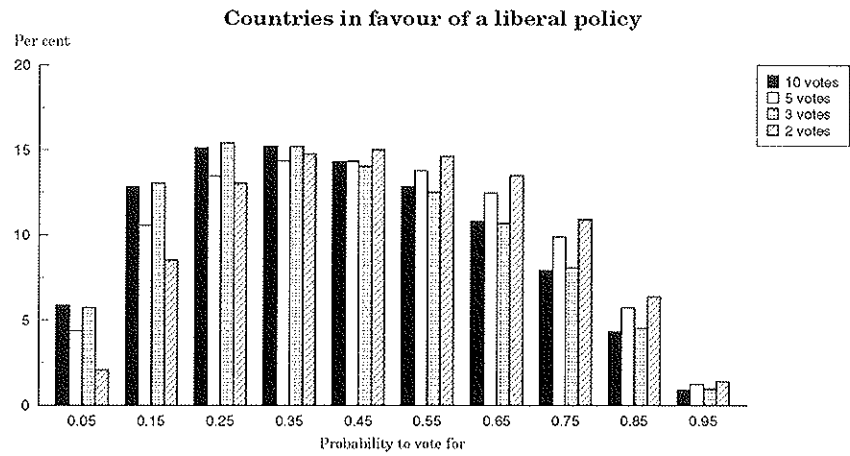
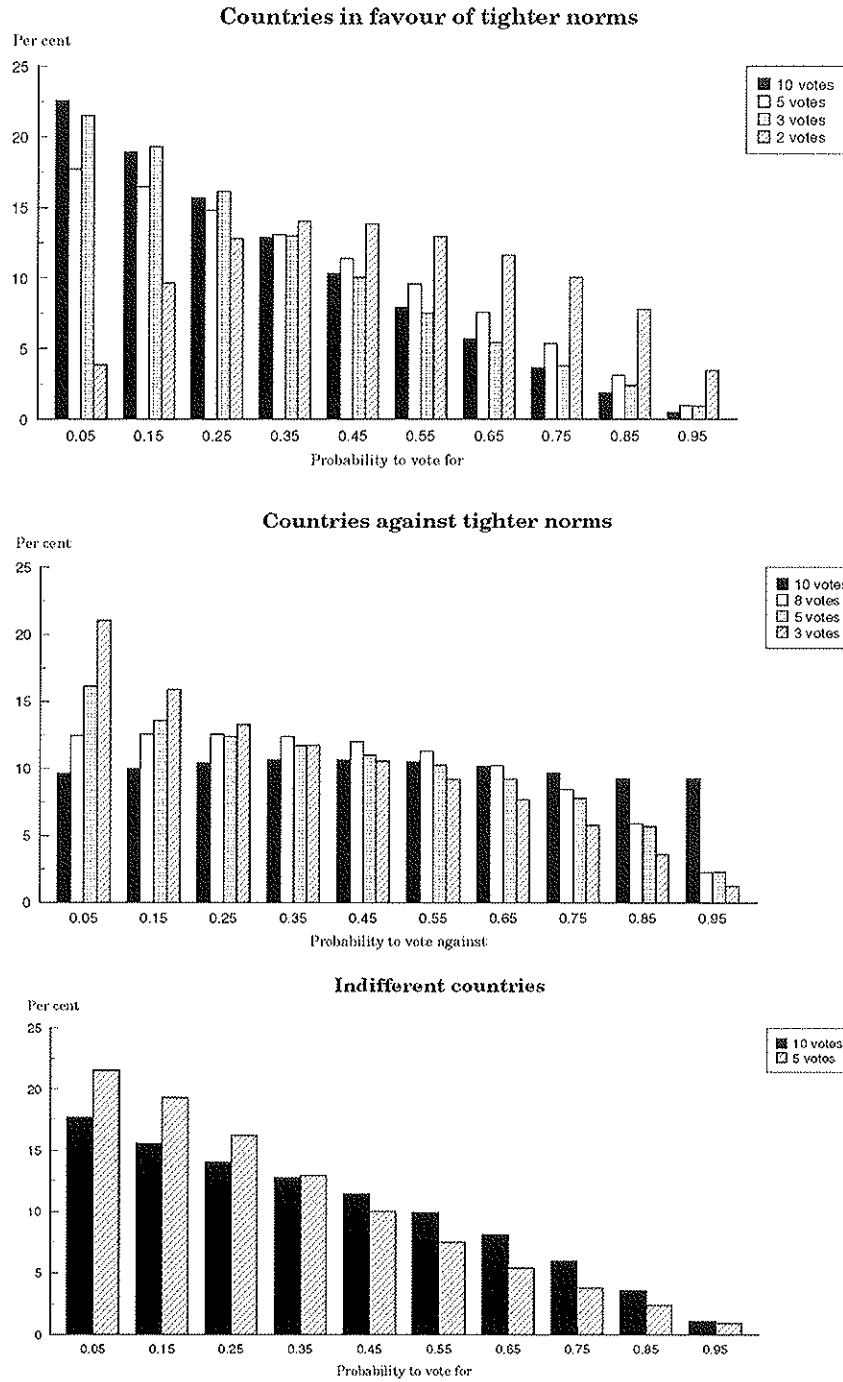


Figure 2: Power Profiles in Social Regulation of the Current Community



on the interval $[0.5, 1.0]$. This implies that it is almost impossible to ensure acceptance of a liberal trade policy but also that decisions for pursuing protectionist policy could be negotiated. In the sense of voting power the member states do not have an intension to pursue a liberal policy.

In social regulation the setting is slightly different. For the countries in the 'for' group the share of member states' own power decreases while the probability to vote 'for' increases. The opposition seems to be ready for compromises with Ireland as the most ready one. Together this kind of power profiles imply that the semi-coalition structure is more unstable than in trade policy, but it cannot ensure the acceptance remarkable decisions either. Hence there is a potential for tighter norms but there is no remarkable pressure towards them. The setting is in some sense paradoxal. For members in the the 'for' group it is not optimal in the sense of power to try to get through proposals of tighter norms in environmental, consumer protection or health policy, but for the opposition there seems to be little difference between supporting these proposals with a high probability or trying to get through proposals with lower standards. They can ensure their influence on decisions in both cases. Heuristically this can be interpreted by saying that the poorest members intend to sell their votes via side-payments from the countries supporting tighter norms.

Table 2 presents the partial homogeneity indices for an enlarged Community. It can be seen that the results differ from Table 1. First, the power for the largest members in the 'against' group seems to increase remarkably, while for the largest members in the 'for' group the reverse seems to hold true. In contrast, in the EC of 12 members the semi-coalition structure decreased power for all member states except Luxembourg. After the enlargement particularly Italy and France have stronger strategic positions because they both can swing the coalition of 'for' and 'unclear' voters to become winning one. In this sense the current Community need deeper and probably more difficult compromises to ensure liberal external trade policy since at least two countries from the 'against' group are needed to get a proposal through. Second, small countries' position seems to be worse in an expanded Community than in the current one when measured by relative power. Together with an increased number of small countries supporting a liberal policy the obligatory compromises with the opposition decrease individual effect on outcome particularly for the countries in favour of a liberal policy.

Figures 3 and 4 present power profiles in trade policy and social regulation in an expanded EC. It is interesting that in the sense of power it is optimal for the countries in

Table 2: The Partial Homogeneity Power Indices in Trade Policy and in Social Regulation of the EC16

Country	Trade policy		Social regulation		Issue independent indices	
	π_i	π_i/w_i	π_i	π_i/w_i	Φ_i	β_i
Germany	0.070	0.630	0.090	0.810	0.116	0.121
Italy	0.128	1.152	0.102	0.918	0.116	0.121
the UK	0.070	0.630	0.074	0.666	0.116	0.121
France	0.128	1.152	0.074	0.666	0.116	0.121
Spain	0.087	0.980	0.072	0.810	0.090	0.099
the Netherlands	0.040	0.720	0.042	0.756	0.054	0.063
Portugal	0.046	0.828	0.050	0.900	0.054	0.063
Greece	0.045	0.810	0.050	0.900	0.054	0.063
Belgium	0.040	0.720	0.041	0.738	0.054	0.063
Sweden	0.034	0.765	0.034	0.765	0.043	0.048
Austria	0.034	0.765	0.034	0.765	0.043	0.048
Denmark	0.023	0.690	0.023	0.690	0.032	0.039
Finland	0.023	0.690	0.023	0.690	0.032	0.039
Norway	0.023	0.690	0.023	0.690	0.032	0.039
Ireland	0.023	0.690	0.022	0.660	0.032	0.039
Luxembourg	0.018	0.810	0.018	0.810	0.020	0.025
the EC	0.832	0.832	0.772	0.772	1.000	1.108

the 'for' group' to try to push through more liberal external trade policy. However, the opposition seems not to be as ready for compromises as in the current Community. For example, France gets 30 per cent of its voting power by voting for the proposal with a probability in the lowest tenth of the unit interval. What is important for the countries supporting a liberal policy, however, is that the power profile for the 'unclear' voters tends towards the right. Together these profiles suggest that remarkable policy change in the Community's common external trade policy is not likely but there is more potential for a liberal policy than in the current Community. The presented semi-coalition structure is, however, more stable than in the current Community and thus compromises are more difficult to reach. What is worth noting is that the new entrants seems to at least ensure the status quo and more protectionist policy is also less likely in an expanded EC.

Figure 3: Power Profiles in Trade Policy of an Expanded EC

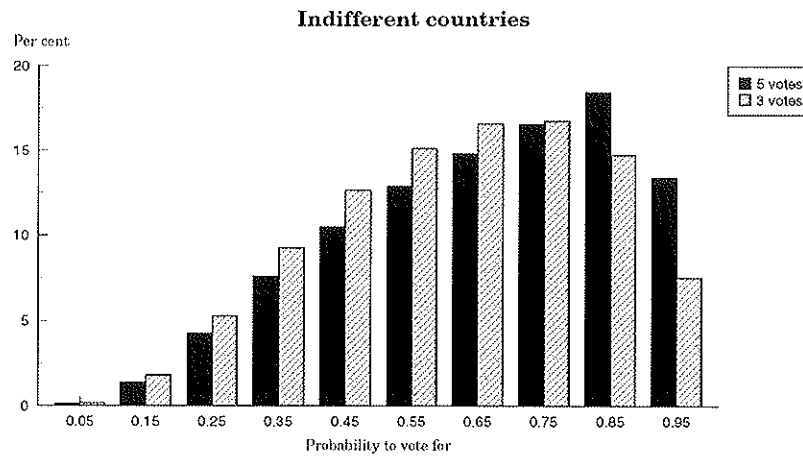
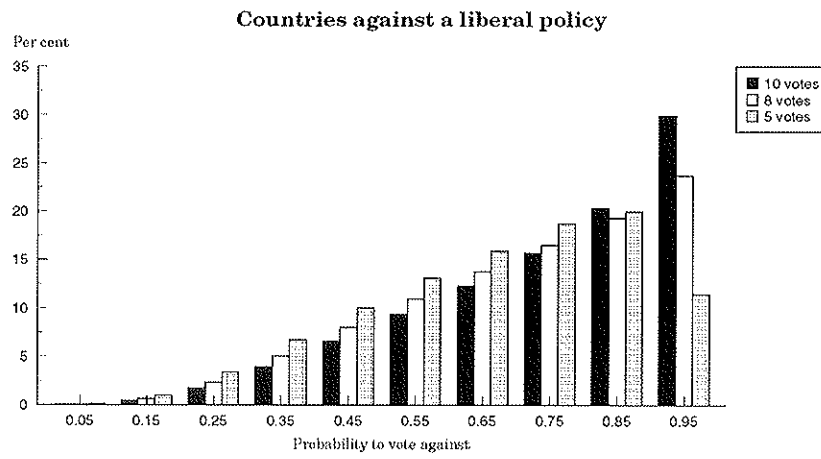
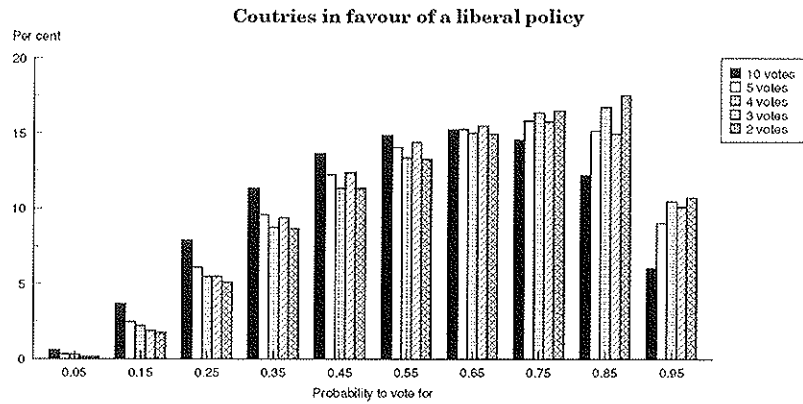
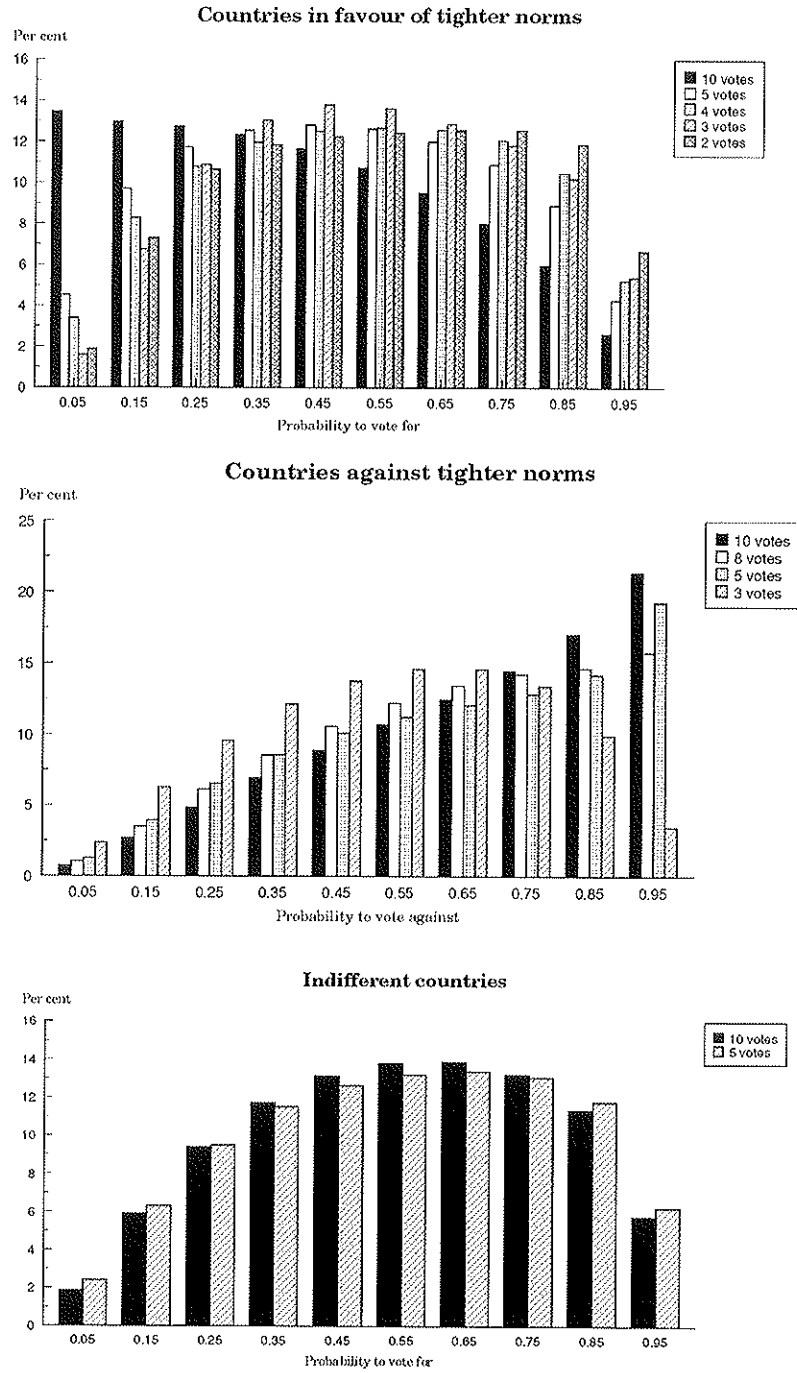


Figure 4: Power Profiles in Social Regulation of an Expanded EC



In social regulation the conclusion concerning the countries in the 'for' group is not as clear. It seems that for the countries supporting tighter norms, the intensity to do so increases slightly but they are still ready for compromises towards the opposite direction. On average, the profiles in the 'for' group seems to have an almost uniform distribution. For the opposition the intension to maintain the status quo increases remarkably and thus more side-payments are needed for decisions. This observation suggests that it is optimal for the opposition to pursue a tighter opposition policy than in the current Community. Together, the profiles can be interpreted by saying that the side-payments needed for decisions seems to decrease the intensity to push proposals through in the 'for' group.

4 Conclusions

In this paper, we analysed decision making in common external trade policy and social regulation of the EC. We divided the voters into three groups according to their attitude towards a liberal trade policy or tighter social regulation norms. We assumed that in each issue there are two groups of members with opposite attitudes and indifferent countries between these groups. Game-theoretically it was assumed that the two opposite groups act homogeneously and the indifferent countries independently. Hence coalitions across the partition borders were possible.

The purpose of this paper was to reveal this kind of setting's consequences to the balance of voting power. Our first question to ask was, "What kind of decisions can the Community take" if we believe in supposed differences in voting behaviour?" and the second, "What effect will the new entrants have onto the policies pursued?"

In the current Community the results reveal that in trade policy all members with an exception of Luxembourg lose power when compared to either Shapley-Shubic or Banzhaf indices of power, both of which assume similar voters in the sense of voting distributions. The analysis of power profiles suggests that in trade policy the a priori partition can be unstable and will produce a protectionist rather than a liberal policy. In social regulation it seems that members against tighter measures are more ready for compromises. With side-payments it seems possible to pursue tighter policy.

The enlargement of the EC by the EFTA countries strengthens the coalition supporting a liberal trade policy or tighter social regulation norms. However, it can be argued

that this change is not enough to spur policy changes. It seems that the new members increase partition's stability. Thus the results of our analysis indicate that we cannot expect a liberal external trade policy or tighter environmental standards in an expanded EC. However, it is also less likely that these policies will change in the opposite direction either.

References:

- Banzhaf John, 1965,: Weighted Voting Doesn't Work: A Mathematical Analysis, Rutgers Law Review 19, 317-343.
- Bolger, E., 1979,: A Class of Power Indices for Voting Games, International Journal of Game Theory 9, 217-232.
- Brams, Steven and Affuso, Paul, 1985a,: New Paradoxes of Voting Power on the EC Council of Ministers, Electoral Studies 4, 135-139.
- Brams, Steven and Affuso, P, 1985b,: Addendum to: New Paradoxes of Voting Power on the EC Council of Ministers, Electoral Studies 4, 290.
- Brams, Steven, Doherty, Ann and Weidner, Matthew, 1991, Game Theory and Multilateral Negotiations: The Single European Act and the Uruguay Round C.V. Starr Center for Applied Economics, Economic Research Reports 91-45.
- Commission of the European Communities, 1986,: Single European Act, Bulletin of the European Communities, Supplement 2/86.
- Dehousse, Renaud, 1992, Integration v. Regulation? On the Dynamics of Regulation in the European Community, Journal of Common Market Studies, Vol. XXX, No. 4, 383-402.
- Dubey, Pradeep, Neyman, Abraham. Weber, Robert, 1981,: Value Theory without Efficiency, Mathematics of Operations Research 6, 122-128.
- Hamilton, Carl, B., 1991,: The Nordic EFTA Countries' Options: Community Membership or a Permanent EEA-accord, in "EFTA Countries in a Changing Europe", Geneva.
- Johnston. R. J., 1982, Political Geography and Political Power, in: Holler, Manfred, ed., Power Voting and Voting Power, Physica-Verlag, Würzburg-Wien.
- Nicol, William and Salmon, Trevor, 1990,: Understanding the European Communities, Philip Allan.
- Nurmi, Hannu, 1992, A Priori Distribution of Power in the EC Council of Ministers, Poliitikka 2/1992 (in Finnish,).
- Owen, Guillermo, 1972, Multilinear Extensions of Games, Management Science 18, 64-79.
- Owen, Guillermo, 1977, Values of Games with A Priori Unions, in: Hein, R. and Moeschlin, O. eds., Essays in Mathematical Economics and Game Theory, 76-88, Springer-Verlag, Berlin.

Owen, Guillermo, 1982, *Game Theory*, Academic Press, New York.

de Schoutheete, Philippe, 1990, *The European Community and its Sub-systems*, in: Wallace, William, ed., *The Dynamics of European Integration*, 106-124, Pinter Publishers, London.

Shapley, Lloyd, S., 1953, *A Value for N-person Cooperative Games*, in: Kuhn, Harold and Tucker A ed., *Contributions to the Theory of Games (Annals of Mathematical Study 28)*, Princeton University Press.

Shapley, Lloyd, S. and Shubik, Martin, 1954, *A Method for Evaluating the Distribution of Power in a Committee System*, in: Shubik, Martin, ed., *Game Theory and Related Approaches to Social Behavior*, Wiley.

Straffin, Philip and Davis M. D. and Brams, Steven, 1982, *Power and Satisfaction in an Ideologically Divided Voting Body*, in: Holler, Manfred J., ed., *Power Voting and Voting Power*, Physica-Verlag, Würzburg-Wien.

Straffin, Philip, 1988, *The Shapley-Shubik and Banzhaf power indices as probabilities*, in: Roth, Alvin E., ed., *The Shapley value, Essays in Honor of Lloyd S. Shapley*, Cambridge University Press.

Stålvant Carl-Einar, 1990, *Nordic Cooperation*, in: Wallace, William, ed., *The Dynamics of European Integration*, Pinter Publishers, London.

Treaty on European Union, Europe Documents N 1759/60, 7 February 1992.

Wallace, Helen, 1990, *Making Multilateral Negotiations Work*, in: Wallace, William, ed., *The Dynamics of European Integration*, Pinter Publishers, London.

Weber, Robert, 1988, *Probabilistic Values for Games*, in: Roth, Alvin E., ed., *The Shapley value, essays in honor of Lloyd S. Shapley*, Cambridge University Press.

Widgrén, Mika, 1991, *Voting Power in the EC and the Consequences of Two Different Enlargements*, forthcoming in *European Economic Review*.

Widgrén, Mika, 1992a, *A Game Theoretic Analysis of the Nordic Coalition's Role in the Decision Making of the EC Council of Ministers*, ETLA Discussion Papers, No. 406.

Widgrén, Mika, 1992b, *National Power in the Decision Making of the EC Council of Ministers (in Finnish)*, licenciate thesis, University of Helsinki.

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