The allocation of power in the enlarged ECB governing council: an assessment of the ECB rotation model

by

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SUMMARY

This study analyses the allocation of power in the Governing Council of the European Central Bank (ECB) as it enlarges to accommodate new members of the economic and monetary union. For this purpose, classical power indices that have their origin in solutions of cooperative games are applied. First, an assessment is made of the effects of enlargement on the voting power of different subgroups of the Governing Council that arise in the wake of a continuous accession process. Second, a systematic comparison is carried out of the status quo rule ("one member, one vote") with respect to the voting power of the ECB Executive Board and the representatives of European monetary policy, along with the potential for its re-nationalisation.

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1. Introduction

At the end of a quite secretive discussion process the ECB Governing Council finally published its proposal for a reform of the ECB Council's decision making process in early 2003. The Heads of State of the EU member countries approved the proposal made by the ECB on the rotation model on March 21, 2003, in Brussels. For some analysts this unanimous decision came rather as a surprise in view of the heavy resistance to the proposal which was virulent until the middle of March in countries like Finland and the Netherlands, whose parliaments felt they had been treated at a disadvantage. However, political acceptance of the proposal is by no means certain as all the 15 national parliaments must still ratify the modification of the EU Treaty.

As is well-known, the ECB's reform proposal consists of a "minimum representation model" combining elements of rotation as applied by the Federal Reserve's Board of Governors and elements of representation, i.e. the formation of country groups with group representatives following the example set by the IMF, the World Bank or the Bundesbank Council after German unification (see, e.g., ECB 2003). In this context it is important to note that enhancing efficiency was not the main motivation for the introduction of the rotation principle in the Federal Open Market Committee (FOMC). Instead, the voting power of regional governors was restricted in order to be able to run a common monetary policy for a common region instead of a monetary policy driven by regional interests. Most remarkably, the delegation of decision-making competences in the ECB to a small committee with only a few national representatives ("delegation" and/or "centralization") was not regarded as an option at all. It was consistently argued by the former President of the ECB, Wim Duisenberg, but questioned by the European jurisprudence, that the wording of Art. 5 of the Treaty of Nice, Art. 10.2 and Art. 10.6 (the so-called "enabling clause") of the ESCB Statute prohibited a delegation or centralization solution and limited the scope of the Council reform to a mere change in the voting procedures. Supporting this view would imply accepting that the "blueprint" of the Treaty of Nice was flawed and that the present "lopsided construction" was due to the lack of political power to correct the mistake.

By speeding up the process of passing the reform, the ECB Governing Council met two own strategic targets at once. First, its own proposal could be completely discussed before the new members participated in the decision. Second, the ECB itself took the initiative for a proposal and

did not leave it, for instance, to the EU Commission. But how should the ECB proposal be assessed?

- Without any doubt, the coming expansion of the euro area requires a reform of the highest decision-making body of the European Central Bank because without reform the ECB Governing Council is going to comprehend more than 30 members. This will raise efficiency problems in the body that is responsible for the stability of one of the most important world currencies ("numbers problem", see e.g. Berger 2002).
- Unfortunately, according to a plethora of authors like, e.g., Bofinger (2003), Gros (2003) and Meade (2003b) the ECB proposal seems to be even less preferable than the current decision-making procedure in the ECB Governing Council which itself is by no means optimally prepared for the euro-zone enlargement. The rotation model suggested by the ECB violates the fundamental principle of "one member, one vote" that is intended to ensure that ECB Governing Council members participate in the Council's meetings personally as well as independently and not as national stakeholders. The rotation model cultivates thinking in national categories, reduces the responsibility of the rotating members for monetary decisions and heightens intransparency. Furthermore, the limitation of the total number of rights to vote to 21 is far too generous by international standards and will cause additional inefficiencies in the decision-making process. In addition, the rotation model is inconsistent and contains arbitrary elements, such as the fact that the frequency of the voting rights' rotation is not explained and that a very small country like Luxembourg will have a similar number of voting rights to Poland.

The outline of the paper is as follows. Section 2 presents the ECB reform proposal for the decision making process in an enlarged euro zone, i.e. the minimum representation model. The next parts of this contribution contain empirically assess the resulting shifts in power between the euro area member states. For this purpose, section 3 introduces the power index concept and explains how to apply it to the new rotation model. Section 4 presents some algorithm-based results and compares them to the respective power indices prevailing in the status quo. Moreover, this section assesses whether the new rotation model serves the important property of representativeness. Section 5 concludes and discusses further directions for research.

2. Minimum representation: the ECB reform proposal

A (price) stability oriented European monetary policy represents a collective good for the euro countries because a low and stable rate of inflation is the best precondition for investment, growth and employment. By contrast, a monetary policy prone to inflation may bring unemployment down in the short term but reduces medium and long-term growth and employment. It is the central task of any monetary policy constitution to assure that a central bank like the ECB is not tempted to jeopardize a reasonable stabilization policy due to short-run demands by governments or well-organized lobbyists. In Europe, this constitution comprises, firstly, the anchoring of the goal of price stability in the EU Treaty, secondly a concept of monetary policy that allows a viable policy of price stability as well as the documentation and verification of the ECB's willingness to maintain stability, and thirdly the organization of the monetary decision-making. Particularly the latter item is of central importance, because this is where the framework for daily decisions is laid down.

The necessity of reforming the decision-making process in the ECB Governing Council is beyond question (see, e.g., Berger 2002). Under the prevailing body of rules, an expanded euro area would lead to a large ECB Governing Council which is hardly capable of acting. Including the six members of the Executive Board, the Governing Council would consist of more than 30 members. Guided by national interests, the latter would as a rule tenaciously struggle to arrive at day-to-day decisions. This absolute increase in the number of members of the ECB Council would in the end lead to efficiency problems. Another dimension of the problem is that coalition formation among smaller euro member countries could lead to interest rate decisions which are not optimal for the euro area as a whole. The period of natural coalition between the governors of the larger member countries and the Executive Board, which in the first four and a half years of monetary union enabled consensus decisions, would be terminated.

Finally, the discrepancy between the economic and the political weight of the euro member countries in the Council would even increase due to the fact that the new members tend to be (in economic terms) smaller in size. A too strong representation of the acceding countries, which are characterized by higher inflation due to the Samuelson-Balassa effect, might lead to additional economic costs for the euro-zone. According to some critics, these costs would consist either of higher inflation in the euro area (although the latter should not be rated to be very high, i.e. above 0.2 percentage points of total euro area inflation) or of higher nominal and real interest rates in

the euro-zone than otherwise (if the ECB reacts to this inflationary bias). Of course, this argument heavily depends on whether there really are differences in motivation between the old member countries of the euro-zone and the newcomers. However, one should not be so confident that the EMU core countries endanger the stability mandate of the ECB to a lesser extent than the CEECs will do later on (see, for example, the erosion of the Stability and Growth Pact by Germany itself). The central question raised in this contribution reads as follows: is the ECB's reform proposal able to handle and dissolve these future problems?

Based on the assumption of a future euro area with 27 member countries (the current twelve members, plus the United Kingdom, Sweden and Denmark, plus the ten Central and Eastern European countries which joined the EU in 2004 and Bulgaria and Romania) the ECB's Governing Council would consist of 27 national central bank governors and 6 directors. According to the ECB's rotation model the voting rights would then in the end be divided as follows (see Table 2).

- The six directors would possess a permanent right to vote.
- The representatives of the five biggest countries (Germany, France, Italy, the UK and Spain according to the criteria 5/6 share of euro GDP at market prices and 1/6 share in the aggregated balance sheet of the euro-zone Monetary Financial Institutions (MFIs) share four votes, i.e. these national central bank governors have to suspend their voting right in 1/5 of the meetings.
- Eight votes are assigned to the central bank governors of 14 middle-sized member countries. Thus, the participants of this group are entitled to vote only in 57 per cent of all decisions.
- The remaining eight central bank governors only account for three voting rights which implies that these representatives are suspended from 62.5 per cent of the voting dates.
- Irrespective of their specific voting right all national central bank governors always participate in the discussions on monetary policy of the ECB Governing Council.
- The problem that countries will not join the euro area at the same date was solved by forming two groups until the accession of the 22 member (see Table 1) when first three groups are built.

Table 1: ECB rotation model: voting shares and frequencies of governors (2 groups)

		Number of governors in the Governing Council					
		16	17	18	19	20	21
Group 1	Voting shares	5/5	5/5	5/5	4/5	4/5	4/5
	Frequency of voting	100%	100%	100%	80%	80%	80%
Group 2	Voting shares	10/11	10/12	10/13	11/14	11/15	11/16
	Frequency of voting	91%	83%	77%	79%	73%	69%
	Sum	15	15	15	15	15	15

Source: ECB (2003), p. 78. Voting shares are defined as the number of voting rights/number of governors.

Table 2: ECB rotation model: voting shares and frequencies of governors (3 groups)

		Number of governors in the Governing Council					
		22	23	24	25	26	27
Group 1	Voting shares	4/5	4/5	4/5	4/5	4/5	4/5
	Frequency of voting	80%	80%	80%	80%	80%	80%
Group 2	Voting shares	8/11	8/12	8/12	8/13	8/13	8/14
	Frequency of voting	73%	67%	67%	62%	62%	57%
Group 3	Voting shares	3/6	3/6	3/7	3/7	3/8	3/8
	Frequency of voting	50%	50%	43%	43%	38%	38%
	Sum	15	15	15	15	15	15

Source: ECB (2003), p. 79.

The implication of the ECB proposal in terms of the distribution of the voting rights between the Executive Board on the one hand and the big, medium-sized and small euro member countries on the other hand can be best analyzed (though rarely enacted up to now) using the game-theoretical concept of power indices which will be presented from a theoretical perspective in section 3 and will be applied empirically to the ECB decision-making process in section 4. In this sense, this paper reaches beyond the early more narrative-style discussions of the adjustment of voting modalities in the ECB Governing Council (see, e.g., Belke (2003) and Gros (2003)).

3. How to apply the power index concept

The classical power indices which have their origin in solutions of cooperative games are often used to observe and to quantify the allocation of power in a voting system. The distribution of power which is roughly defined as the influence of players on a voting outcome usually differs from the purely formal distribution of voting rights as has been shown in different studies (Owen 1995, p. 460, Holler/ Kellermann 1978 and Leech 2001a and 2001b).

In this context, simple games are used to study the distribution of power in different voting situations. These types of games are usually defined as a conflict in which the only objective is winning and the only rule is an algorithm to decide which coalitions are winning. Weighted voting games which are frequently used in voting schemes represent an important subclass of these simple games. Two power indices, the Shapley-Shubik index[1] and the Banzhaf index[2] have recently received the most attention in both the theoretical literature and the application to political structures. Hence, we will apply both indices to study the allocation of power in the Governing Council of the ECB in section 4. However, both indices and the way how to apply them to the problem of assessing the voting power resulting from the rotation model will be explained briefly in the following.

The Shapley-Shubik index ϕ_i of the player *i* can be written as:

$$\phi_i(N,v) = \sum_{i \in C; C \subseteq N} \frac{(|C|-1)!(n-|C|)!}{n!}[v(C) - v(C-\{i\})], \qquad (1)$$

where $|C|$ is the number of the members of the coalition *C*, *n* the general number of players, $v(C)$ the return of coalition *C* and $v(C-\{i\})$ the payoff of the coalition *C* after the exit of player *i*. Hence, the expression $[v(C) - v(C-\{i\})]$ defines the appreciation of the value of coalition *C* by the player *i*. To obtain the Shapley-Shubik value of player *i*, the marginal contributions of player *i* to all possible coalitions are summed up and weighted with the probability that the player *i* is the last player who enters the coalition of the strength $|C|$.

In the calculation of the Banzhaf index the order in which a player accedes to a coalition is not taken into account. Here the assumption of a simultaneous game is made and the number of coalitions for which a player is crucial for winning is of central importance without considering if he is the last to enter the coalition. This requires knowing the number of swings for every player *I*, where a swing for player *i* is defined as a pair of coalitions $(C, C-\{i\})$ such that C is winning and $C-\{i\}$ is losing.

According to the Banzhaf concept, all coalitions are of equal probability. The players are indifferent with respect to their choice of the coalition partners. Hence, the calculation of the

[1] See Shapley (1997, p. 69-79).
[2] See Banzhaf (1965, pp. 317ff.).

Banzhaf index results in dividing the number of swings that player *i* has, by the numbers of coalitions including player *i*.

$$\beta_i^* = \sum_{C \subseteq \Omega} \frac{[v(C) - v(C - \{i\})]}{2^{n-1}}. \qquad (2)$$

The concept of power indices has been frequently used to study the distribution of a-priori voting power in different national and international voting systems. Dreyer/ Schotter (1980) and Leech (2001a) published a study of power distribution in the IMF, Owen (1995, p. 460) analyzed the security council of United Nations. Also the voting power of European Institutions has been the subject in many studies. Bilbao et al. (2002), Sutter (2001) and Widgrén (1994) estimated the power of member states in the Council of the EU, while the European Parliament was subject to a power index application in Lane/ Maeland (2000). However, the distribution of power in the ECB Council has been the subject of only a few studies, probably mainly due to the triviality of the analysis of the "one member - one vote"-rule. Actually, the reform of this decision body following the proposition of the ECB results in a change of the equal distribution of the votes. Hence, the consideration of power distribution has become an important source of further insight into the impacts of the recent reform of voting rights within the ECB Council.

Throughout the paper we will present the results of calculations based on *both* of the classical power indices with the aim of checking for robustness of our results. However, we will base our conclusions mainly on the results derived from the Shapley index, closely following the approach of Widgrén (1994) in this respect. He has argued that the Shapley power index is more applicable to voting bodies in which there is considerable communication among the voters and coalition formation is active. This condition is surely met by the ECB Governing Council, due to e.g. the informal meetings in the eve of the official sessions and the collegial definition of the voting body.[3]

In the following calculations, the decision making in the ECB Governing Council will thus be assumed to be a weighted voting game. Each of the NCB Governors as well as the Governing Board will be considered as one player. Furthermore, the following three assumptions are crucial.

[3] On the contrary, it might be argued that the application of the Banzhaf index is more appropriate because of its interpretation as an I-power index. An I-power index concerns voting behavior motivated by "policy-seeking", while a P-power index (e. g. the Shapley index) presupposes "office-seeking" behavior. See Fahrholz/ Mohl (2004, p. 6). We give the importance of the considerable communication a higher weight, but at the same time still also refer to the Banzhaf index which in almost all cases supports the results given by the Shapley index.

First, it is assumed that all present members of the Governing Council cooperate over several meetings. After the reform of the ECB Council according to the rotation model, the members of the Council will not be allowed to vote at every session. Nevertheless, all of them will still be present in each session. Hence, it seems plausible that the members will form coalitions which persist during several meetings. In decision-making, it is not decisive if a vote is formally taken. Of much greater importance is the possibility to use a vote on an average of several meetings. This leads to an active formation of inter-temporal coalitions, when decision-making is prepared. For this reason, the decision-making within the ECB Governing Council is considered as an inter-temporally cooperative game in our approach.

The second assumption refers to the preferences and the voting behavior of the players. The NCB Governors are regarded as representatives of their countries, thus voting with a national bias. This assumption refers to the classical analysis by Meade (2003a, 2003b, p. 131 and 2003c, p. 2) who has shown that a national bias in decision making of the ECB Council cannot be excluded.[4] As long as the members of the Council are regarded as representatives of their countries because of their heritage, an incentive strengthened by the new rotation model, the suspicion persists that national aspects play an important role.

Finally, the third assumption defines the role of the Executive Board. In the following calculations the Board will be considered as one player with six votes. The reason for this assumption is that we focus on the allocation of power between the national representatives. As the Executive Board is frequently assumed to represent the interests of the whole euro area, this unanimity assumption appears to be highly plausible. However, there is no a priori restriction in coalition forming between the National Central Bank Presidents.

The frequency of voting will be interpreted as the inter-temporal weight. It enters the calculations as the voting weight of a player. Furthermore a simple majority rule has been assumed for the calculations of the inter-temporal voting power, closely following the approach by Gruener (1998, p. 4). The numerous calculations have been enacted based on an algorithm originally developed by Bräuninger and König (2001), namely the Indices of Power IOP 2.0 program. The figures presented in the following section are constructed in a coherent fashion: the x-axis

[4] The assumption of a national biased voting behavior of National Central Bank Presidents has also been applied in Bindseil (2001) und de Grauwe (2003, pp. 21ff.).

displays the number of euro area member countries while the y-axis shows the relative voting right and/or the respective power index of the respective player.

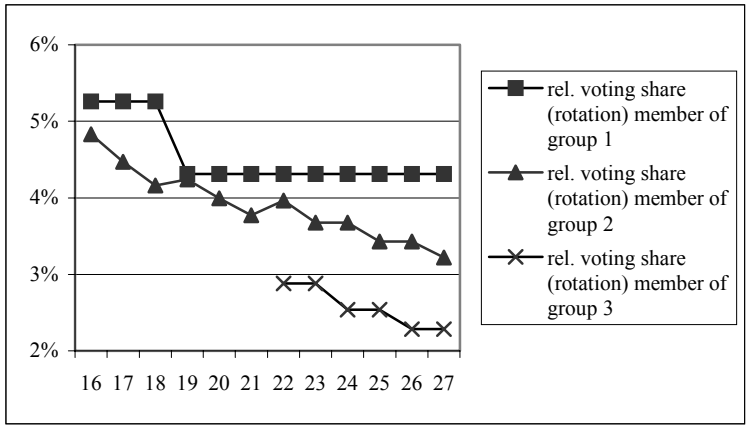
4. Results

4.1. Relative voting share and power in the reformed ECB-Council

The relative voting weights usually allow a first view of the allocation of power in the ECB Council. However, these numbers also form the basis for the calculation of the more elaborated power indices. The numerical derivation of the voting shares and the resulting power indices can serve as the main ingredient of a detailed description of the characteristics of each of both voting rules to be compared in this paper, i.e. the "one person - one vote" rule and the new rotation model. As a first step, the shifts of voting shares during the accession in a reformed ECB Council is investigated. As a second step, the results of the calculation of voting power for this case are discussed. In section 4.2., the results are compared to those derived for the status quo "one person - one vote" rule. This comparison will finally allow a comparative judgment about the usefulness and applicability of the new rotation model.

Under the rotation model, the relative voting weights do not change proportionally with each enlargement of the euro area. The relative voting weight of the Executive Board is stabilized at 6/21 and the voting weights of the National Central Bank Presidents depend on the group to which the considered member of the ECB Council can be counted, as can be seen in Figure 1. While the relative voting weight of a National Central Bank Governor who is a member of the fist group falls only once as the Union is enlarged to 19 members, the relative weight of the members of the other groups changes almost with every accession. As a consequence of the euro area enlargement, the relative voting weights of all groups as a trend fall, but for the members of group 2 a sudden rise in voting weight can be observed, i.e. when the 19th and the 22nd member accesses. Figure 1 also clearly reveals the discrepancy between the relative voting weights of members of different groups. The graph of group 1 is always located above the graphs for the other groups. Only once the curves of group 1 and 2 get closer to each other, whereas the relative voting share of group 3 is always visibly smaller.

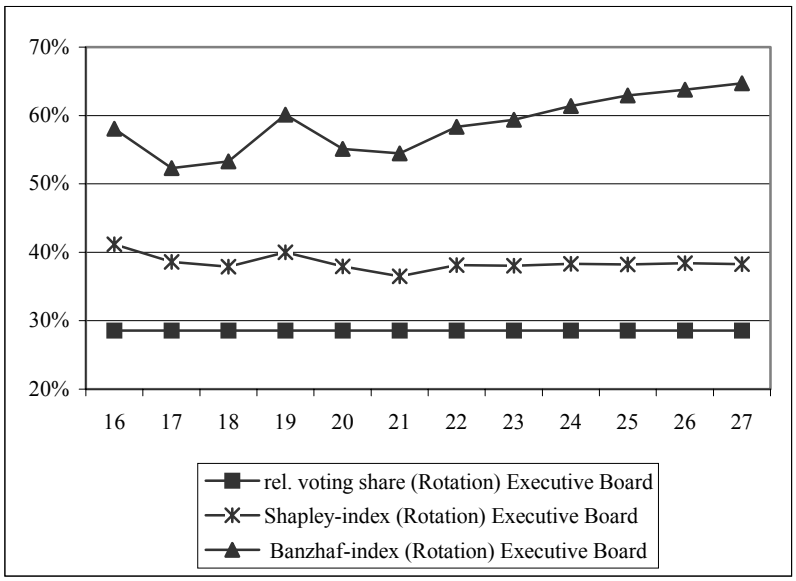
Figure 1: Voting shares of National Central Bank Presidents under the rotation model



Source: Own calculations.

Which consequences does this allocation of voting rights have on the distribution of power among the different members of the Governing Council? One important characteristic feature of this reform proposition is the division of the Presidents of National Central Banks in two or three groups with different frequencies of voting. The other important implication of the rotation model is the stabilization of the voting share of the Executive Board. The allocation of power that results in the wake of this reform under the assumption that the Council members cooperate over several meetings is summarized in Figure 2.

Figure 2: Power and voting shares of the Executive Board under the rotation model



Source: Own calculations.

As shown in Figure 2, the power index of the Executive Board is much less stable in time as could been expected after examination of the relative voting shares. After accession of the 17th member country a sudden reduction of both power indices can be observed. The accession of the 17th country leads to an opposite reaction of power associated to the Executive Board: i.e. it rises. During the following accession both indices decrease. This trend is reversed after the accession of the 22nd member. During the forthcoming euro area enlargement rounds, the Banzhaf index is rising whereas the Shapley index persists to be relatively stable during the enlargement process. Why do these changes occur? In the first case, the power of the Executive Board decreases because the size of the Council rises without a reduction of voting shares of group one members. But the accession of the 19th member country (second case) leads to a cut in the voting share in group one from 1 to $4/5$. The influence of the executive Board thus rises because the members of the first group cannot be decisive for coalitions as frequently as before. But the voting share of group one never shrinks below this mark of $4/5$. Hence, the power of the Executive Boards drops until it is stabilized (in terms of the Shapley index) by the introduction of group three (after the 22nd accession), due to a reduction of the voting shares in group two.

Before we will discuss the results of the calculation for each group, Table 3 displays the relation between the power indices of the Executive Board and of each of the NCB Governor groups 1 to 3. It becomes obvious that the power of the Executive Boards exceeds the power of the National Central Bank Presidents by a factor between 8 (in relation to group one) and 24 (in relation to group three).[5]

Table 3: The relative power of the Executive Board under the rotation model

Member countries of the euro area:	16	17	18	19	20	21	22	23	24	25	26	27
Shapley-Index Governing Board/ Shapley-Index Group 1	11.2	7.9	9.6	12.7	9.0	11.7	11.2	11.1	11.9	12.2	11.6	12.0
Shapley-Index Governing Board/ Shapley-Index Group 2	11.2	12.5	11.6	12.7	13.9	12.2	12.7	13.8	13.9	15.2	15.6	16.1
Shapley-Index Governing Board/ Shapley-Index Group 3							19.2	19.5	21.4	19.9	23.6	24.3

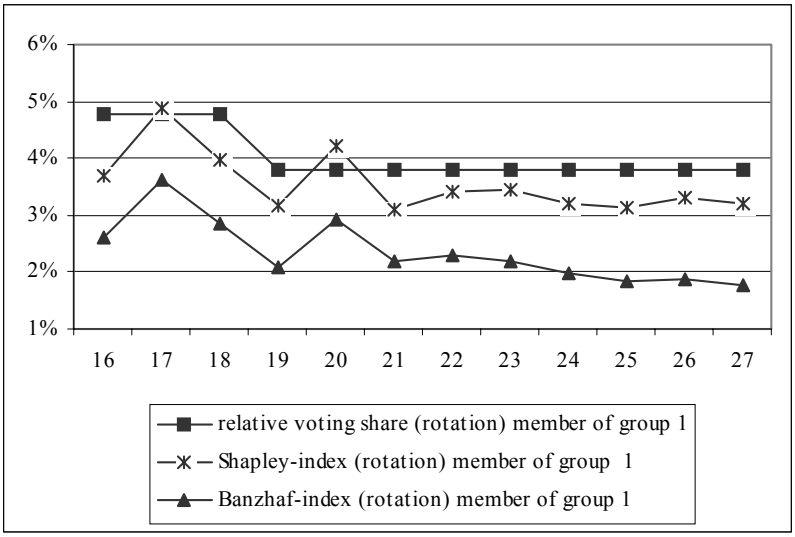
Source: Own calculations.

The development of the Shapley index of group one dependent on the euro area enlargement seems to be nearly opposite to that of the Executive Board, as can be seen also in Figure 3. The

[5] If the Banzhaf index is considered instead, the differences are even larger. In this case, the Executive Board disposes of 14 to 70 times more power.

Shapley index rises suddenly as the 17th member accedes. Hence, it can be assumed that the members of the first group win the power lost by the Executive Board at this stage of enlargement. As could have been expected, the power of the representative member of group one decreases sharply after the 19th accession, because here the voting rights are cut for the first time during the enlargement process.

Figure 3: Power and voting shares of a member of group one under the rotation model



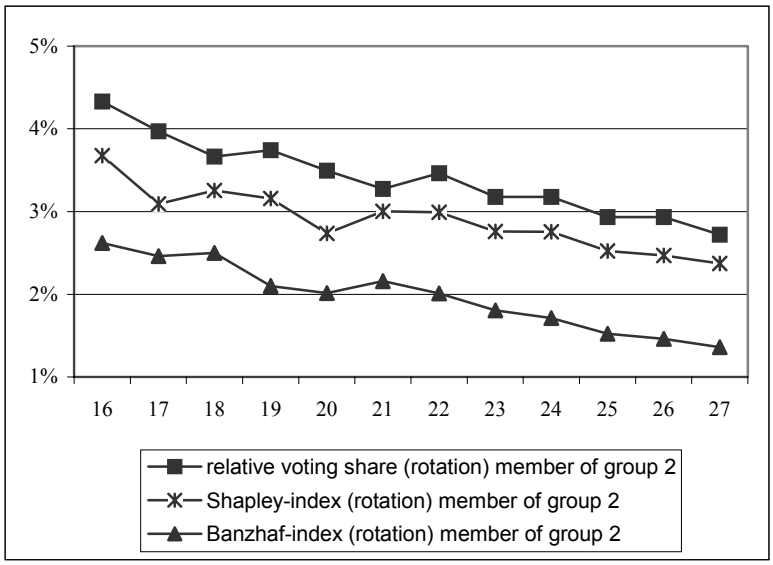
Source: Own calculations.

However, it proves to be more difficult to explain the surprising rise of the Shapley index after the accession of the 20th euro area member. At this step of enlargement, power even exceeds the relative voting weight. As the votes of the Executive Board and of the considered group do not change at this point, the shift in the distribution of power can only be explained through the decrease of the voting weights of the members of group two. This shift in the allocation of voting rights changes the number of possibilities to be decisive in voting situations for group one members and raises their power in this specific scenario. After the next accession, the power of group one returns to the initial level again. The division of the NCB Governors into three different groups does not affect the power of group one to a larger extent, it rests on a relatively stable level.

The development of the Banzhaf index experiences significant breaks at similar stages of the euro area enlargement process as the Shapley index (Figure 3). But the calculated Banzhaf values are lower throughout. This explains why the curve appears to be a parallel shift of the Shapley curve.

Only after the 21st accession both curves seem to depart from each other. While the Shapley value stays stable, the Banzhaf index decreases from now on with each following accession.

Figure 4: Power and voting shares of a member of group two under rotation model

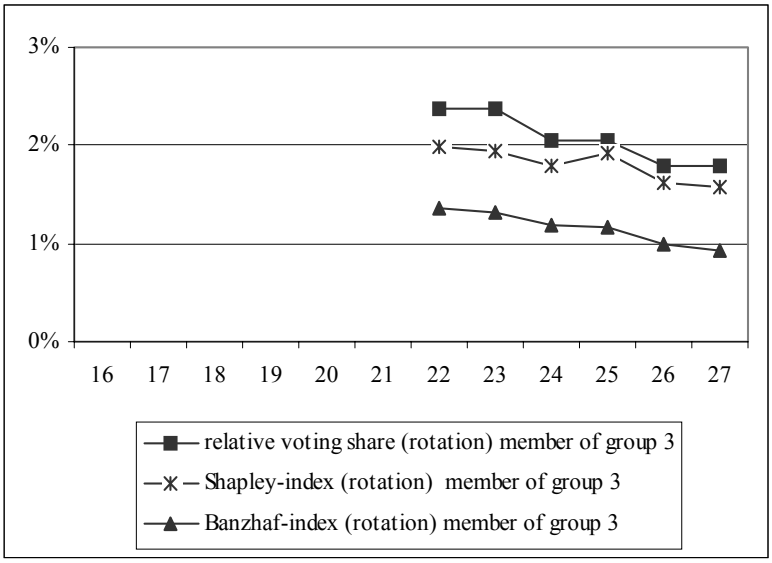


Source: Own calculations.

When discussing the allocation of power to group two (Figure 4), changes observed until the 22nd accession can be explained in a similar way. The only surprising change is the sudden rise in power after the accession of the 18th country. Despite the decreasing voting share, the power as indicated by both indices rose. Hence, this stage of enlargement can be interpreted as a favorable constellation of voting shares which abets group two. This reminds us of paradoxes like "the paradox of redistribution" or "the paradox of size" typically discussed in the literature of power indices.[6] After the accession of the 22nd country, the members of the second group lose power continuously, their Shapley index decreases from 0.042 for a euro area comprising 20 member states to a realization of 0.032 in the case of 27 members.

[6] For a review of such kind of paradoxes see Holler/ Kellermann (1978), pp. 107ff.

Figure 5: Power and voting shares of a member of group three under the rotation model.



Source: Own calculations.

Also for group three a negatively shaped curve can be observed (Figure 5). It is noteworthy that this group three emerges from the accession of the 22nd country. The members of this group dispose about a lower share of the voting rights than members of other groups, and the power assigned to them is even lower than the voting share. During the enlargement process, their Shapley index decreases from 0.02 to 0.015 at the final scenario of the accession process. The power index of a representative member of group two exceeds the power of his counterpart in group three two times in the final stage of a euro area consisting of 27 members.

Have the observed voting shares thus been good indicators of the distribution of power within the reformed ECB Governing Council? The first hypothesis was that the power of the Executive Board is stabilized by the reform. Our numerical application of the power index concept has shown that the position of this "sub-Council" is not only stabilized but also possibly strengthened. (This will also be approved by the comparison to the power indices resulting under the status quo rule.) The Shapley index of the Executive Board amounts under all scenarios to approximately 0.4. This means that after the reform of the ECB decision-making process, 40 percent of the voting power devolves upon the Governing Board.[7] Our second hypothesis concerning the discrepancy between the power values of members of different groups can be confirmed clearly. The five in economic terms biggest countries in the euro area have between 19 and 24 percent of the power at their disposal. The medium group with eleven to 14 members

disposes of between 30 and 40 percent of the power, while group three with six to eight members disposes about 11 to 13 percent of the available voting power. But the consideration of the allocation of power has also revealed a new and unexpected property of the rotation model. Especially in the sequential enlargement scenarios before the constitution of three groups, surprising shifts of the power between the groups have been observed.

4.2. Comparison to the status quo – "One person – one vote"

In the previous section, the voting shares and power indices for all members of the Governing Council have been presented under the assumption of the rotation model being already in place. However, the following comparison to the status quo ("one person – one vote") will be helpful in order to assess which changes are generated by the projected reform. For this purpose, the voting shares and power indices in the non-reformed Governing Council are reported briefly first. To check for robustness of our results, both the Shapley as well as the Banzhaf indices will be indicated in some figures.[8] Nevertheless, our discussion will preponderantly refer to the Shapley index.

For the not reformed Governing Council, under the "one member - one vote" rule, each of the NCB Governors has one vote. Hence, their relative voting weight consequently amounts to 1/N, with N as the number of all members of the Governing Council. As discussed before, the Executive Board is regarded as one player; consequently the voting weight of this specific player is 6/N. If a continuous enlargement of the Government Board is assumed, N increases and the relative voting shares of every player fall. Figure 6 shows the power indices for the Executive Board and additionally its relative voting weight. It becomes obvious that all displayed curves reveal negative slopes. But both indices show a higher power index of the Executive Board than could have been expected after the examination of the allocation of relative voting weights.[9] The voting power that is attributed to the Executive Board by the Shapley index exceeds the relative voting rights less than the respective power expressed by the Banzhaf index. The first index is between 20 and 30 percent higher than the voting share, and the Banzhaf index between 45 and 60. In both cases, the distance to the relative voting weights is reduced by each accession.

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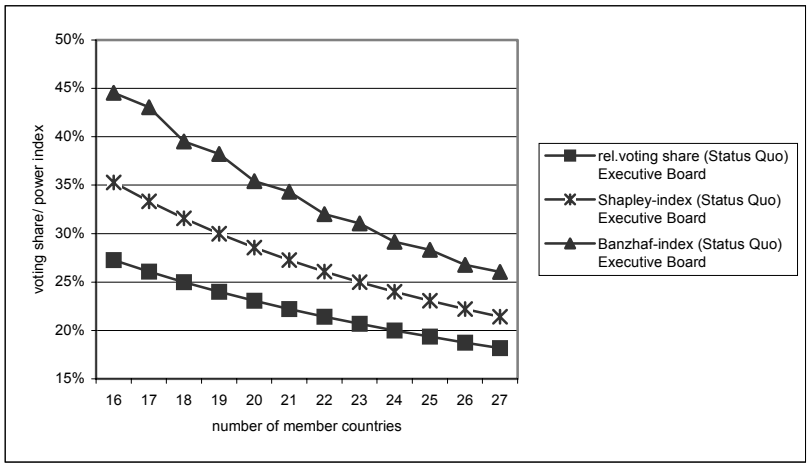
[7] The numbers refer to the calculated Shapley values.
[8] The exact results are summarized in Table III (Annex).
[9] The Shapley index is normally closer to the voting rights as the Banzhaf index, as discussed in Sutter (2001, p. 341).

Figure 6: Power of the Executive Board under the "one member – one vote" rule

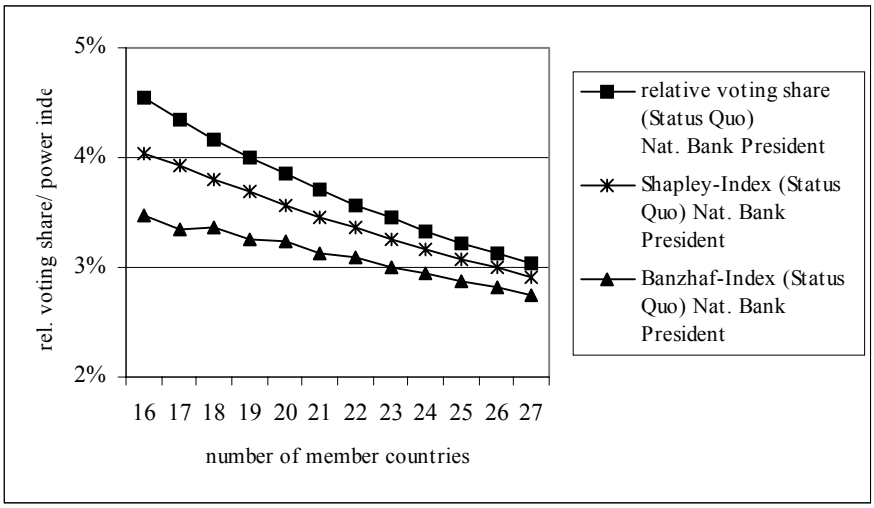


Source: Own calculations.

But which impacts does this allocation of voting rights have on the distribution of power among the NCB Governors? The presentation of the voting power and voting weights of the National Central Bank Presidents in Figure 7 is very similar to Figure 6 at first glance but a closer inspection immediately reveals that the curves have a different order. The NCB Governors have a smaller influence on the voting result than expected if relative voting weights are examined. Contrary to the results for the Executive Board, the Shapley indices now exceed the Banzhaf values.[10] However, this result does not come as a surprise because a number of empirical applications confirms that the voting power of the "largest" player often tends to be higher than his voting share. The opposite is true for the "smallest" player, as discussed in Widgrén (1994, p. 1154). Here the Executive Board with 6 votes is the "largest player" and his power is several times higher that the corresponding power values of an individual NCB Governor. Under the status quo rule, the voting weights of the Executive Board are always six times higher than the voting share of a single NCB Governor, while the difference between the respective power indices is even more considerable.

[10] The explanation is that the indices can always be summed to 1 and the Banzhaf indices were higher for the Executive Board.

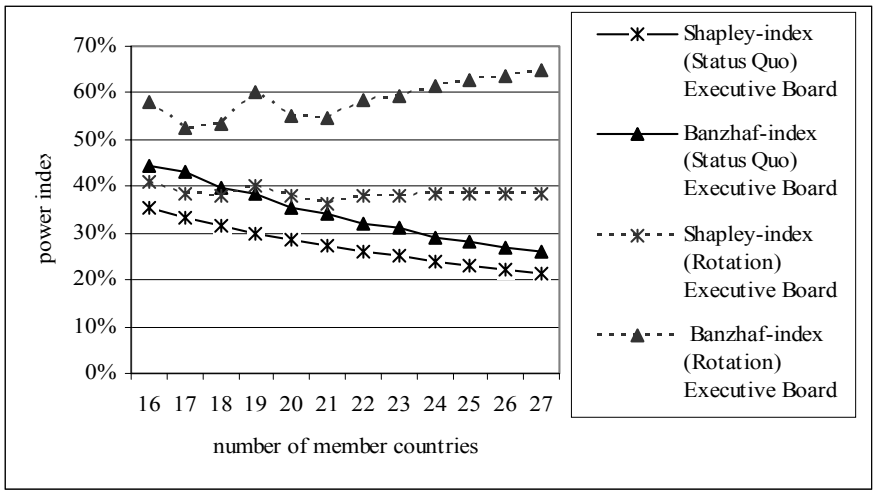
Figure 7: Power of National Central Bank Presidents under the "one member – one vote" rule



Source: Own calculations.

Figure 8 to 11 present a comparison of power indices resulting for each considered group of the ECB Council. In Figure 8, the realizations of the power indices of the Executive Board under the rotation model are compared to those under the status quo ante. It is clearly visible that the rotation model not only stabilizes the power of this group. The Executive Board even gains power after the reform proposed by the ECB; its Shapley-index is nearly doubled on the longer term.

Figure 8: Power of the Executive Board (status quo and rotation)

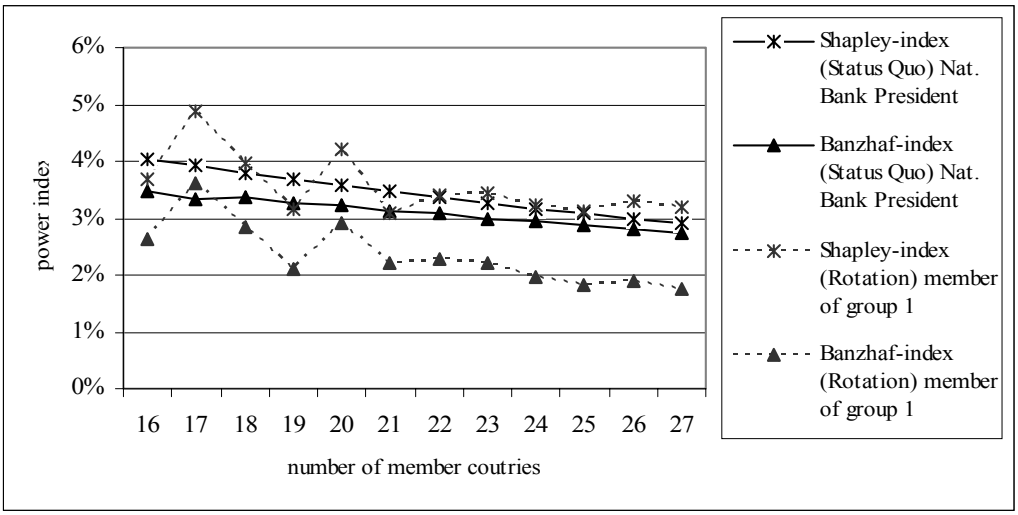


Source: Own calculations.

But not only the Executive Board benefits from the adaptation of the rotation model; but also the members of group one are vested with more voting power in the reformed Council in nearly all

accession phases as compared to their power in a non-reformed Council (Figure 9). Hence, there are also groups who lose their possibility to influence the voting outcome. In this case, the losers of the reform are groups two and three, as demonstrated in Figure 10 and Figure 11. Thus, the NCB Governors of group two have to give up less power than the members of the third group. While the second group's members lose 10 to 20 percent of their initial power, the power indices of the NCB Governors from the economically less important member states take values which are between 38 and 45 percent lower than under the "one member - one vote" rule.

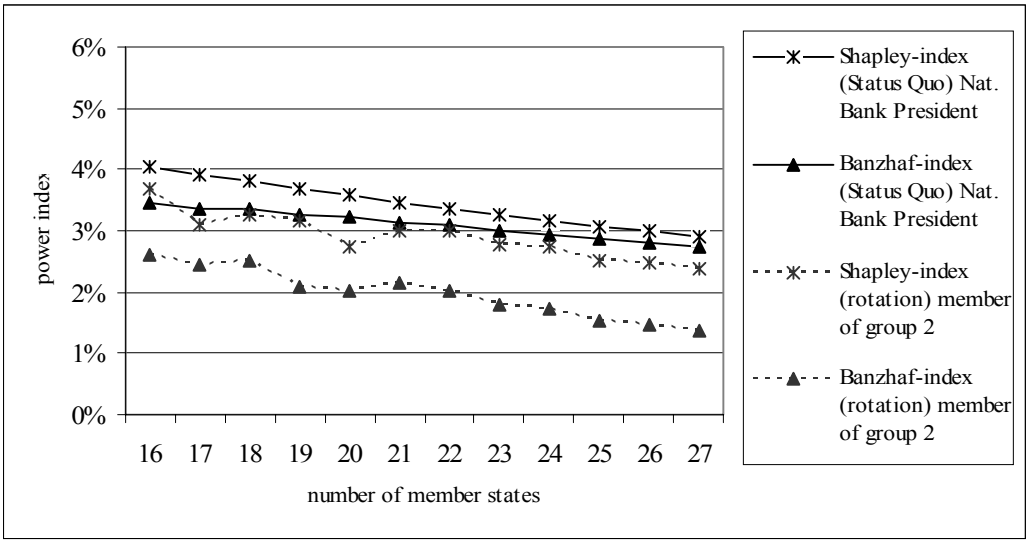
Figure 9: Power of a representative member of group one (status quo and rotation)



Source: Own calculations.

Figure 8, Figure 9, Figure 10 and Figure 11 also show very clearly that in the reformed Council the enlargement of the Monetary Union leads to unexpected shifts in power of groups, as already discussed in the previous section. Here it is visible that this development can not be observed in the case of a non-reformed Council. According to the preceding analysis, the rotation model can not be considered as a robust voting rule, as the accession of new euro area members can lead to unexpected and also probably not intended shifts in the allocation of power. One important implication for monetary policy making is that these unexpected changes make it difficult for the public to form correct inflation expectations as long as the accession process is not completed. The prediction of the actual possibilities for majority formation changes in a way which cannot be extrapolated from a mere visual inspection of the voting shares.

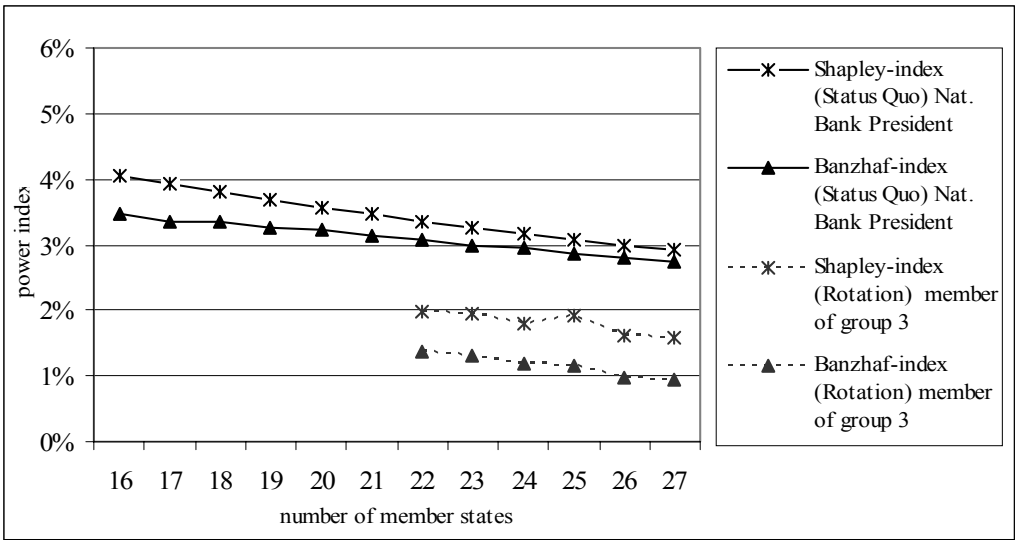
Figure 10: Power of a representative member of group two (status quo and rotation)



Source: Own calculations.

Seen on the whole, thus, both positive and negative properties of the rotation model have been identified in the wake of our systematic comparison with the status quo. The strengthening of the Executive Board can be considered as a benefit. Its influence on the voting outcome is much more important now within the reformed Governing Council. Hence, the representatives of the European perspective which does not have a national bias have a stronger standing in the reformed Council when compared to status quo.

Figure 11: Power of a representative member of group three (status quo and rotation)



Source: Own calculations.

However, the lacking robustness must be seen as a disadvantage of the rotation model. Given the new voting shares, it is impossible to predict how the relations of power will really change. This voting system cannot be judged transparent, because intuition does not enable one to come to similar conclusions as through the relatively complex calculation of power indices. Moreover, the fact that after reforming the Council the members of group three are the only members which considerably loses voting power confirms the suspicion that the present Governing Council wanted to protect its voting influence at the expenses of the accession countries.

4.3. An assessment of the "representativeness" principle

In designing the precise features of the rotation system, the Governing Council was guided by some fundamental principles like "one member - one vote", "ad personam participation", "representativeness", "automaticity" and "transparency".[11] In the following, we only focus on the important principle of 'representativeness'. Its justification by the ECB runs as follows.

The introduction of a rotation of voting rights could lead to situations in which the group of governors with a voting right are from Member States which, taken together, might be perceived as not being sufficiently representative of the euro area economy as a whole. The new voting system, therefore, should be designed in a manner which would safeguard against such outcomes.

In order to achieve representativeness, governors might not be able to exercise the voting right with the same frequency, with governors from the "larger" Member States having the right to vote more frequently than those from "smaller" Member States. At the same time, any reference to the country from which a governor comes should be made exclusively for the purpose of determining the frequency with which each governor exercises the voting right. Although the introduction of considerations of representativeness marks a departure from the existing provisions for voting in the Governing Council, this is solely motivated by the need to accommodate the impact of enlargement on the ECB's decision-making. For all governors exercising the voting right at any point in time, the "one member, one vote" principle should apply. Consequently, this differentiation should not affect actual substantive decision-making but should only be relevant in the process of determining who votes when.

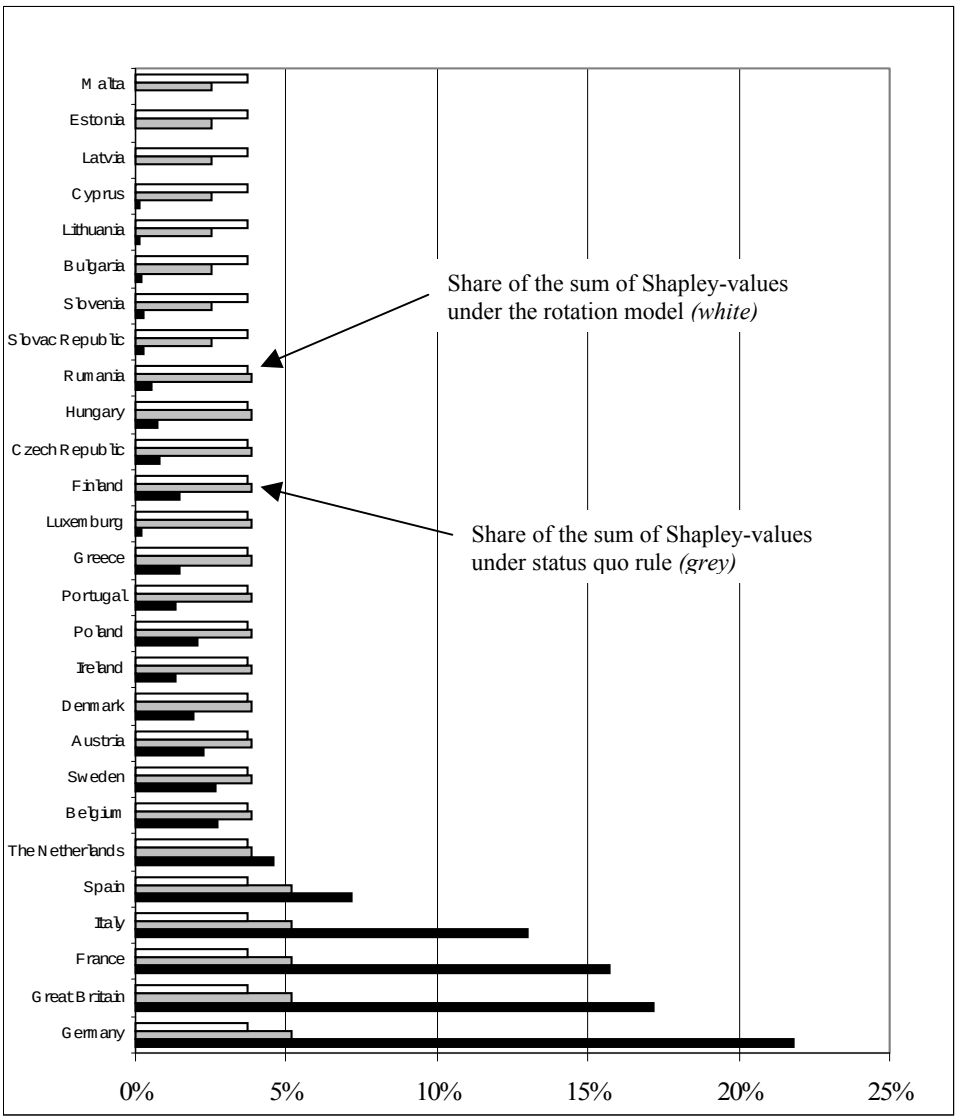
In this section, one important aspect of this guiding principle of 'representativeness' itself will be examined. According to this definition, an ECB Council voting system meets this criterion if it

minimizes the discrepancy between the voting share and the respective economic weight of each of the member countries. As a modification of this definition, the discrepancy between the voting power and the economic weight and its development in the wake of the euro zone enlargement process will be examined here. More concretely, it will be analyzed whether this difference is diminished through the implicit abandonment of the "one member - one vote" principle and its substitution by the rotation model.

For this purpose, two figures shall be compared. The first number expresses the relative voting power of a single National Central Bank Governor for each accession phase as presented in Amend (2003). The relative power will be calculated as the voting power of a National Central Bank Governor divided by the power of all National Central Bank Governors, both expressed through the Shapley value.[12] As the second number, the GDP ratio of the respective country in the euro area GDP has been chosen as an approximation of the relative economic weight.[13] In Figure 12, both figures are compared for each country in the case of a hypothetical euro area consisting of 27 member countries. The order of the countries is chosen to correspond with the ranking that results from the indicators proposed by the ECB. A first inspection allows the non-rejection of the hypothesis that the introduction of the rotation model (grey bars) leads to an improvement of the representativeness because in the status quo (white bars) the difference between the economic weights and the political weights is larger. Nevertheless, the differences between the power and GBP ratios are still large after the reform, especially so for the members of group 1.

[11] See ECB (2003), pp. 75 ff., see also Bofinger (2003), p. 3, and Gros (2003).
[12] See also Table II (Annex). With this definition, we closely follow Berger (2002), p. 12, and Gros (2003b), p. 125.
[13] Table I (Annex) summarizes the GDP data for EU member and candidate countries.

Figure 12: The guiding principle of 'representativeness' – power- and GDP-shares for the euro area-27



Source: Own calculations. The black bars denote the respective GDP-share.

Considering the sum of squared deviations gives access to a more exact way to compare the degrees of representativeness under the status quo and under the rotation model.[14] The sum results from the differences between the GDP-weight and the relative power as measured for each member country. Table 4 shows the sums of squared deviations in four different scenarios of possible accession phases.

[14] See Gros (2003b), p. 125.

Table 4: Differences between the GDP-weight and the relative voting power - Squared deviations

	Squared deviation status quo	Squared deviation rotation
Euro area 17	0.12	0.09
Euro area 22	0.12	0.10
Euro area 24	0.12	0.10
Euro area 27	0.09	0.07

Source: Own calculations.

In each scenario, this sum proves to be smaller under the rotation model than under the status quo. The sum of squares under the status quo in case of an euro area consisting of 27 countries is 0.09. As already supposed after the examination of Figure 12, this sum is smaller under the rotation model with 0.07. Consequently, we feel justified to conclude that the rotation model leads to an improvement compared to the status quo concerning the criterion of representativeness. Nevertheless, even after the reform large differences between the shares in power and in GDP can be found. This result is comparable to the results discussed in the literature (see, e.g. Bofinger 2003 and Gros 2003) where only a slight improvement concerning this criterion is ascertained.

5. Conclusions and potential for further research

Our analysis of the inter-temporal power indices in the context of the Governing Council of the ECB has revealed and highlighted some interesting aspects of both the reformed and non-reformed voting system. One negative feature of the voting reform is given by the sharp shifts of the allocation of power during the early euro area accession phases. This shift could have negative effects on the transparency of the ECB decision making and may result in a bias of inflation expectations. The second property of the Rotation model which comes at a cost consists of the fact that the reform leads to a voting system where especially the acceding countries lose influence on the voting result if compared to their voting power under the status quo. This might lead to a re-nationalization of monetary policy in the euro area. However, one benefit associated with the reform is the higher degree of "representativeness" after the reform. But this effect is numerically very small and should thus not be overvalued. A further more important result is that the voting power of the Executive Board has been considerably strengthened through the reform. Under the quite realistic presumption that the Executive Board represents the interests of the euro

area, this property tends to come as a benefit. In this case, the rotation model might have a stabilizing effect on inflation expectations which alleviates the negative impact of sudden shifts of the power allocation. Moreover, European instead of national aggregates could be more easily accepted by the public as an anchor for the forming of inflation expectations.

However, this is not the first study of the new rotation model based on power indices. We are aware of one other study in the field, namely the recent study by Fahrholz/ Mohl (2004). Despite the methodology which is common to both papers, Fahrholz/ Mohl (2004) and ourselves arrive at different conclusions. In the first mentioned study, the power of the Executive Board diminishes as a result of the introduction of the rotation model whereas in our study the opposite appears to be the case. The assumptions underlying each of the two approaches might be one explanation for this difference. These assumptions build the core basis for the calculations of power indices and, hence, are decisive for the results. In our paper, each National Central Bank Governor is assumed to be a separate player and to follow a national perspective while the Executive Board is modeled as one player due to the assumed common orientation towards European aggregates. In contrast, the analysis by Fahrholz/ Mohl (2004) does not only model the Executive Board but also each of the groups of National Central Bank Presidents which emerge after the reform as one player. However, in our view, there are at least some significant counter-arguments against the view that the National Central Bank Presidents will vote in a common sense fashion only due to the fact of being part of one group (see, e.g., Belke 2003 and Meade 2003a, 2003b and 2003c). For instance, for two large countries which clearly belong to group one under the scenario of a euro area-27, namely Germany and the UK (with its cycle connected more with the US cycle than with the euro area one), the business cycle pattern might not be exactly synchronous. Further potential caveats with respect to the assumption of homogeneity among group members are the following.

First, the rotation procedure violates the central principle of "one person, one vote" as the latter will only apply for those national central bank governors who are allowed to vote. The principle is put into question in two ways. First, the countries are weighted and, second, the rotation takes place with different frequency for each group. Thus, the reform proposal does not meet the ratio of an integrative monetary policy. The renunciation of this tenet at best foments national thinking. In other words, it re-nationalises European monetary policy.

Second, the principle of a personal and independent participation in the Governing Council, the so-called 'ad personam participation', is impeded by the rotation model. Safeguarding this

principle which was eminently successful in case of the "German Landeszentralbanken" was the main motivation and legitimation of the principle "one person, one vote". In this bloated reformed Council, each governor will experience that it is mainly his national provenience what will play a role in the monetary decision making and not his personality as a monetary policy expert. This experience will most probably induce him to decide more from a national perspective. This incentive will finally challenge the independence of the decision making process in day-to-day executions within the ECB. Hence, a rational monetary policy according to the stability goal becomes vastly complicated. Nevertheless, the different approaches taken by the two studies offer a very fruitful field for further research.

It is conceivable to extend the approach taken in this paper also by certain aspects of the decision-making in the Governing Council. First aspect, one could additionally take into account the modalities of decision making. For instance, it is well-known that both the tradition to decide in a consensual fashion and the „agenda setting power" of the Executive Board are main ingredients of the meetings of the ECB Council. Von Hagen (2003, p. 108) has taken these aspects into account in his analysis of the Governing Council before the reform. He essentially applies the median voter model to investigate which impact the traditional terms of decision-making have on the results of the monetary policy. New insights could be gained if the rotation model would be analyzed according to his lines.

As a third possibility of extending our analysis, monetary policy preferences of National Central Bank Presidents could be included. By this, it would be possible to use information about possible coalitions between Governing Council members who represent similar interests. The probability models used in the papers which model the Governing Council could be modified in accordance to information about the probabilities of the formation of certain coalitions. This could be achieved by the definition of subsystems within which coalitions are entered with a higher probability. This approach was first used in Owen (1977) and has been applied to the Council of the EU in Widgrén (1994, p. 1154ff.). In a similar fashion, this approach could be used to register the subsystems inside the Governing Council. Hereby, the Executive Board could be defined as one subsystem. Analogously, those groups of National Central Bank Presidents whose home countries traditionally have similar business cycles, could be modeled as subsystems.

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Annex

Table I: GDP of EU member and candidate countries

Country	GDP in Mill. Euro
Germany	2,108,200.0
Great Britain	1,659,111.9
France	1,520,804.0
Italy	1,258,349.0
Spain	693,925.0
The Netherlands	444,033.0
Belgium	260,744.0
Sweden	255,423.1
Austria	216,830.5
Denmark	182,799.8
Ireland	128,187.4
Poland	200,198.0
Portugal	129,187.6
Greece	141,132.0
Luxemburg	22,340.5
Finland	139,734.0
Czech Rep.	73,874.8
Hungary	69,888.9
Ronamia	48,361.8
Slovakia	25,147.0
Slovenia	23,385.1
Bulgaria	16,583.0
Lithuania	14,649.4
Cyprus	10,762.2
Latvia	8,940.2
Estonia	6,904
Malta	4,096.6

Source: Eurostat (2003a and 2003b).

Table II: Representative National Central Bank Presidents' shares of the sum of Shapley values of all National Central Bank Presidents

	16	17	18	19	20	21	22	23	24	25	26	27
Gruppe 1	0.063	0.079	0.0638	0.0526	0.0678	0.0489	0.0552	0.0554	0.0522	0.0506	0.0536	0.0517
Gruppe 2	0.063	0.05	0.0524	0.0526	0.0441	0.0472	0.0483	0.0445	0.0447	0.0408	0.0401	0.0384
Gruppe 2							0.0321	0.0315	0.029	0.031	0.0264	0.0255

Source: Own calculations.

Table III: Derivation of voting weights and power indices (rotation and status quo)

	16	17	18	19	20	21	22	23	24	25	26	27
Rel. Voting share (Status Quo) Executive Board	0.2727	0.2609	0.2500	0.2400	0.2308	0.2593	0.2143	0.2069	0.2000	0.1935	0.1875	0.1818
Shapley-index (Status Quo) Executive Board	0.3529	0.3333	0.3158	0.3000	0.2857	0.2727	0.2609	0.2500	0.2400	0.2308	0.2222	0.2143
Banzhaf-index (Status Quo) Executive Board	0.4454	0.4305	0.3952	0.3824	0.3541	0.3431	0.3202	0.3106	0.2918	0.2834	0.2677	0.2603
Rel. voting share (Rotation) Executive Board	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857
Shapley-index (Rotation) Executive Board	0.4118	0.3858	0.3788	0.4000	0.3794	0.3647	0.3810	0.3800	0.3832	0.3820	0.3842	0.3826
Banzhaf index (Rotation) Executive Board	0.5807	0.5232	0.5328	0.6013	0.5513	0.5447	0.5834	0.5939	0.6138	0.6291	0.6376	0.6472
Shapley index (Status Quo) Nat. Central Bank President	0.0404	0.0392	0.0380	0.0368	0.0357	0.0346	0.0336	0.0326	0.0317	0.0308	0.0299	0.0291
Banzhaf index (Status Quo) Nat. CB-Pr.	0.0347	0.0335	0.0336	0.0325	0.0323	0.0313	0.0309	0.0300	0.0295	0.0287	0.0282	0.0274
Rel. voting share (Status Quo) Nat. Central Bank Presidents	0.0455	0.0435	0.0417	0.0400	0.0385	0.0370	0.0357	0.0345	0.0333	0.0323	0.0313	0.0303
Frequency of voting group 1	5/5	5/5	5/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
Rel. voting share (Rotation) group 1	0.0476	0.0476	0.0476	0.0381	0.0381	0.0381	0.0381	0.0381	0.0381	0.0381	0.0381	0.0381
Shapley index (Rotation) group 1	0.0368	0.0487	0.0396	0.0316	0.0421	0.0310	0.0342	0.0344	0.0322	0.0312	0.0330	0.0319
Banzhaf-index (Rotation) group 1	0.0262	0.0363	0.0285	0.0210	0.0293	0.0220	0.0228	0.0220	0.0196	0.0184	0.0188	0.0176
Frequency of voting gr. 2	10/11	10/12	10/13	11/14	11/15	11/16	8/11	8/12	8/12	8/13	8/13	8/14
Rel. voting share (Rotation) group 2	0.0433	0.0397	0.0366	0.0374	0.0349	0.0327	0.0346	0.0317	0.0317	0.0293	0.0293	0.0272
Shapley index (Rotation) group 2	0.0368	0.0309	0.0325	0.0316	0.0273	0.0300	0.0299	0.0276	0.0275	0.0252	0.0247	0.0237
Banzhaf index (Rotation) group 2	0.0262	0.0246	0.0250	0.0210	0.0201	0.0216	0.0201	0.0181	0.0171	0.0152	0.0146	0.0136
Frequency of voting group 3							3/6	3/6	3/7	3/7	3/8	3/8
Rel. voting share (Rotation) group 3							0.0238	0.0238	0.0204	0.0204	0.0179	0.0179
Shapley index (Rotation) group 3							0.0199	0.0195	0.0179	0.0192	0.0163	0.0157
Banzhaf index (Rotation) group 3							0.0136	0.0132	0.0118	0.0116	0.0098	0.0093

Source: Own calculations based on the Indices of Power IOP 2.0 algorithm by Bräuninger and König (2001).