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Barbara von Schnurbein

European Monetary Policy and the ECB Rotation Model

Voting Power of the Core versus the Periphery

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Technische Universität Dortmund, Department of Economic and Social Sciences
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics
Universitätsstr. 12, 45117 Essen, Germany

Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI)
Hohenzollernstr. 1-3, 45128 Essen, Germany

Editors

Prof. Dr. Thomas K. Bauer
RUB, Department of Economics, Empirical Economics
Phone: +49 (0) 234/3 22 83 41, e-mail: thomas.bauer@rub.de

Prof. Dr. Wolfgang Leininger
Technische Universität Dortmund, Department of Economic and Social Sciences
Economics – Microeconomics
Phone: +49 (0) 231/7 55-3297, email: W.Leininger@wiso.uni-dortmund.de

Prof. Dr. Volker Clausen
University of Duisburg-Essen, Department of Economics
International Economics
Phone: +49 (0) 201/1 83-3655, e-mail: vclausen@vwl.uni-due.de

Prof. Dr. Christoph M. Schmidt
RWI, Phone: +49 (0) 201/81 49-227, e-mail: christoph.schmidt@rwi-essen.de

Editorial Office

Joachim Schmidt
RWI, Phone: +49 (0) 201/81 49-292, e-mail: joachim.schmidt@rwi-essen.de

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Ansgar Belke and Barbara von Schnurbein[1]

European Monetary Policy and the ECB Rotation Model – Voting Power of the Core versus the Periphery

Abstract

We analyze the ECB Governing Council's voting procedures. The literature has by now discussed numerous aspects of the rotation model but does not account for many institutional aspects of the voting procedure of the GC. Using the randomization scheme based on the multilinear extension (MLE) of games, we try to close three of these gaps. First, we integrate specific preferences of national central bank presidents, i.e. their desired interest rates. Second, we address the agenda-setting power of the ECB president. Third, we do not simulate an average of the decisions but look at every relevant point in time separately.

JEL Classification: D72, D78, E58

Keywords: Euro area; European Central Bank; monetary policy; rotation; voting rights

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1 Ansgar Belke, University of Duisburg-Essen and IZA Bonn; Barbara von Schnurbein, University of Duisburg-Essen. *– We thank Francesco Passarelli and Jason Barr for providing us with the algorithm to deal with the multilinear extension of games, Agnès Benassy-Quéré for making her calculations of National Central Bank Governors' desired interest rates available to us.* *– All correspondence to Ansgar Belke, University of Duisburg-Essen, Campus Essen, Department of Economics, 45117 Essen, Germany, e-mail: ansgar.belke@uni-due.de.*

1. Introduction

In the ECB Governing Council (GC), the monetary policy decision body of the ECB, each of the currently 22 (6 members of the Executive Board and 16 Presidents of the Central Banks of the euro area) members is treated equally in voting situations according to the "one member-one vote" rule. Although the decisions are supposed to be made following a simple majority rule, until today they are said to be taken unanimously (Servais, 2006). But the growing heterogeneity of an ever enlarging euro area could well put an end to this tradition. The perspective of a euro area enlargement to the current border of the EU countries and of the GC to 33 members has enforced the necessity of a reform of its voting modalities, aiming to enable the GC to decide timely and efficiently about ECB's monetary policy. The European Council of 21 March 2003 has modified the relevant Article 10.2 of the statutes of the Eurosystem in favour of an ECB's reform proposal, the so-called rotation model. According to these changes (and later decisions), the rotation of voting rights in the CG model will set in with euro area enlargement to 19 members. Then, the number of votes allotted to national representatives will be reduced to 15, while leaving 6 votes to the Executive Board.

Any assessment of the rotation model comes along with the question whether it ensures that the ECB's main decision body can act efficiently and in the interest of the whole currency area. It has frequently been claimed that the exchange of opinions among 21 members might already be too time-consuming for a monetary policy decision body that meets twice a month, especially if all 33 members are allowed to be present and to speak in the meetings (Belke, 2003; Gros, 2003). However, this caveat shall not be central in this study. The second question concerning the effectiveness of GC's monetary policy relates to a fear of renationalisation of ECB's monetary policy due to the heterogeneity of its growing number of members. The latter question is frequently linked to the assessment of the role of the Executive Board (EB) in a reformed GC. Its members are elected as European experts on the European but not on the national level. While there is some theoretical evidence for a national bias in the voting behaviour of the National Central Bank (NCB) governors,[1] the members of EB are frequently supposed to take a purely European perspective.[2] Nevertheless, some studies support the view that the charges for the rotation model are to the account of the Executive Board (Widgrén, 2008; Fahrholz/ Mohl, 2006), whereas other studies identify a

[1] For instance, Meade/ Sheets (2005) show that there exists some regional bias in the voting pattern of the members of the Federal Open Market Committee.
[2] See, for instance, Belke/ Styczynska (2006) and Bénassy-Quéré/ Turkisch (2009).

strengthening of its role (Belke/ Styczynska, 2006; Bénassy-Quéré/ Turkisch, 2009; Kosior et al., 2008). In the present study, we re-examine this question in the context of a power index analysis. We construct a model which is novel in several aspects. First, we are able to consider the details on the precise form of the rotation published only recently (ECB, 2009). Thanks to them, we avoid the *average* view taken in several game theoretical studies and report power indices for *separate* voting events. Second, we will explicitly model the preferences of all members of the GC. Finally, we will account for the role of the ECB president as the agenda-setter.

In our analysis, we use the preference-based power index approach originally proposed by Passarelli/ Barr (2007). In general, power indices measure the potential influence of a player on the outcome of a game or, expressed differently, the probability that a player determines its outcome. This is usually formalised by the expected marginal contribution of the player to a random coalition of players established before his arrival. While symmetric values like the Shapley-Shubik index only account for the number of players in the random coalitions, quasi-values like the preference-based index by Passarelli/ Barr (2007) accommodate alternative randomization schemes. Based on the *multilinear extension of games* (Owen, 1977), Passarelli/ Barr (2007) develop a power measure based on two assumptions: (1) the distance between a player's political position and the discussed issue determines his probability of voting "yes"; (2) the swinging votes of players in votes about highly likely issues are weighted higher in the power index than those in less likely issues. The resulting value enables the consideration of the players' and an agenda-setter's preferences.

With this approach we further pursuit and even extend the way taken in Belke/ Styczynska (2006) and analyse the GC's voting as a cooperative game. We feel legitimized to argue that this view displays the characteristics of the voting situation in this monetary committee in an appropriate way, which accounts for both the collegial character as well as some degree of partisan behaviour. By the collegial character, we mean the claim that NCB governors take part in GC meetings as equal experts who do not focus on the national but on the European perspective. This point of view is always emphasized by the official statements by ECB officials but is also reflected in the tradition of informal meetings (on the eve of every GC meeting), as well as in the "one member-one vote" principle (which is still in force today and will remain so until the accession of the 19th euro area member). At the same time, most studies consider a regional bias in the governors' voting behaviour as a not too unrealistic scenario (Bindseil 2001; Heinemann/ Hüfner 2004; Fahrholz/ Mohl 2008; Ullrich 2004; Schulze 2005; Bénassy-Quéré 2009). Starting from a study by Meade/ Sheets (2005), some other studies also consider a regional bias in the voting behaviour of the EB's members (Ullrich 2004; Kosior et al. 2008). Because of the contradictions between the ECB's wording and the results of the studies, a cooperative modelling of the "voting game" which explicitly accounts for individual preferences is highly indicative and should come to interesting results.

As far as the preferences of national central bank presidents (NBPs) are concerned, we have decided to go beyond many studies and to consider a broader measure of macroeconomic divergence than merely regarding inflation preferences of the member states. This is made possible by the approach of Bénassy-Quéré/ Turkisch (2009). The authors simulate desired interest rates of NBPs by the Taylor rule and, thus, enable us to take different country-specific preferences for inflation into account. This method can be seen as a good approximation of future preferences of NBPs, and represents the future macroeconomic developments better than past inflation rates. In the approach of Bénassy-Quéré/ Turkisch (2009), the median voter concept is used to simulate the decision making. One of the results is an outstanding influence of the Executive Board. The authors observe that the EB always takes a median position in the political space. This pattern increases its measured influence as compared to the influence measured by classical power indices. In our analysis, we fully account for the position of all actors in the political space. We are also able to consider a further important characteristic of the EB, i.e. its agenda-setting power. It will be shown that the advantageous position of the EB on the policy space together with its agenda-setting power results in an outstanding position of the EB in the GC in terms of power indices.

The remainder of the paper proceeds as follows. In section 2, we review the relevant literature. In Section 3, the new ECB rotation model is described in detail. In section 4, the theoretical model and the setup of our calculations are presented. We come up with our empirical results in Section 5. Section 6 finally concludes.

2. Review of the relevant literature

Decision making in monetary policy committees is subject of a fast growing branch of literature. There exist approaches that develop optimal designs from a theoretical point of view as well as assessments of existing decision rules. The optimal design of a monetary policy committee includes a definition of the optimal size, composition and voting rule

(Gerling et al. 2003). As it is out of question by now that the rotation model will not be modified, and our analysis concentrates on an assessment of this rule, we will focus on the studies that also analyse the rotation model with the power index concept.

Until today, there exist only a few studies that analyse the power allocation in the ECB GC (e.g. Belke/ Styczynska, 2004 and 2006; Fahrholz/ Mohl, 2006 and Ullrich, 2004, Kosior et al., 2008). While Belke/ Styczynska (2004 and 2006) and Fahrholz/ Mohl (2004, 2006 and 2008) pursuit different ways of analysis, Ullrich's (2004) research is based upon the method presented in the firstly noted publication. There, an inter-temporal approach has been chosen in order to visualise the effect of the planned reform of the ECB GC, without any knowledge of the precise rotation modalities, which have been announced in December 2008.[3] One of the important assumptions there is that NBPs form coalitions that are persistent over time. These coalitions are not necessarily identical with the groups that define the voting frequencies. The intuitive idea is that NBP tend to agree upon a voting in which the interest of each coalition member is represented even though only some hold the voting right in a precise moment of time. Then, relative voting frequencies can be interpreted as voting weights in an inter-temporal game.[4] As a consequence the resulting power indices are not values of players in an exact moment of time, but average values over time.[5] This aspect of the study has been frequently criticised (e.g. Bénassy-Quéré/ Turkisch, 2009; Kosior et al., 2008) because the average consideration always leads to a loss of information. We will fully account for this critique in this study and only analyse single points of time and base our conclusions on a comparison of single voting situations rather than on averaging.

Ullrich (2004) also chooses the inter-temporal view in her voting power analysis. Using this method, she analyses the discrepancy between the political weight of NBPs and the economic weight of their countries of origin. In contrast to these two analyses, Fahrholz/ Mohl (2004, 2006 and 2008) choose other possibilities to apply the power index concept to

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[3] ECB (2009).

[4] We do not follow Fahrholz/ Mohl (2006 and 2008) in their negative assessment of the inter-temporal approach. They construct an example which is supposed to demonstrate the disutility of, for instance, the approach taken by Belke/ Styczynska (2006). For this purpose, they include a player in the game who has some minor voting power (he can be pivotal in few coalitions) but is a dummy as far as the frequency of voting is concerned. Unfortunately, this example has a major drawback. Every player that is pivotal in at least one permutation needs to take part in the voting game, and consequently has a strictly positive voting frequency. In this case, the addition of such a player would lead to a shift in the relative voting weights of all other players already by definition of these weights and hence result in a re-apportionment of power indices. If, on the contrary, a player was a dummy in terms of frequency voting, he would never take part in the game and could never exert pivotal influence on a coalition. Consequently, Fahrholz/ Mohl's conclusions are internally inconsistent.

[5] This holds because of the additivity property of the Shapley-Shubik index.

the rotation model. In their first attempt to calculate the power indices in the GC under rotation, they model each group of players as a coalition (Fahrholz/ Mohl 2004)[6]. This assumption unfortunately neither accounts for the influence of a single player nor for the typical characteristics of rotation where time is one of the relevant variables. Behind this modelling, the strong assumption of every group acting like a coalition is hidden, which can be doubted especially in the most heterogeneous group two. In a further attempt to assess the rotation model (Fahrholz/ Mohl 2006 und 2008) the authors construct a game in which every NBP has one vote while the EB is considered as one player with 6 votes. They compute so-called preliminary Banzhaf indices for this game and weight the result with the absolute voting frequencies. Already from this description, it can be followed that this approach does not account for the characteristics of the rotation either. This voting game which forms the basis of further calculations will never take place as such. Consequently, the voting dynamics captured by the Banzhaf indices are misleading as they neither represent a concrete allocation of voting power nor the average over several meetings like in the approach of Belke/ Styczynska (2006).

A recent study in this field has also been published by the Polish National Bank (Kosior, et al. 2008). The authors come to the result that the rotation model strengthens the power of the EB, but that this gain in power is lower if preferences of the members of the GC are taken into account. This study is similar to the present approach in two important aspects: first, like Kosior et al. (2008), we also consider single voting situations as basis for the analysis; second, both studies consider the preferences of the members of the GC. Nevertheless, both aspects are treated in a different way. While Kosior et al. (2008) report an average power index for a large number of meetings, we will consider the power distribution for several single points of time. Furthermore, the authors use the information of interest rate preferences in order to define pre-coalitions in the GC and calculate the Shapley-Shubik-index for a committee with several pre-coalitions and single players. Whereas in our approach the preferences of the players determine the probabilities for coalition forming. Any coalition is defined to be ex ante impossible, “strange” coalitions only have a very low probability. This may represent the voting situations of the GC in a way that is closer to reality, especially if we consider future developments. Further, Kosior et al. (2008) could not have considered the rotation details that have been published in 2009 (ECB, 2009) and make wrong assumption about them.

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[6] They take an approach similar to Haubrich/ Humpage (2001).

We concede that the inter-temporal view chosen in Belke/ Styczynska (2006) despite the interesting results only represents a simplified view on the rotation model. We already agreed that some expansion of this approach is needed in order to analyse the rotation model as closely as possible. The discussion of the relevant literature has further shown that there is still scope and need for further research in this area. In this paper, we will account for three important aspects and present a novel and realistic model of the voting in the ECB's central decision body. First, we will account for the preferences of NBPs. We will consider different desired rates of the NBP in dependence of their home economies. Second, we will account for the agenda-setting power. And finally, we will take into account the time axis and calculate the indices for voting situations that will actually take place.

3. The rotation model

The organisation of decision making in the ECB is of great importance for its ability to achieve its most important goal: price stability. The number of members of monetary decision making bodies has to be balanced between the need of *efficient* and *effective* decision making and an adequate representation of regions. The first requirement is better fulfilled by a smaller, the second by a larger committee, especially in the case of the ECB. Successful central banks such as the US Fed and the Bundesbank have frequently decided to have smaller decision making bodies at the cost of a full representation of the regions; but not so the ECB, where once the rotation model comes into force, 15 regional representatives and 6 members of the EB have a right to vote, while all (up to 27) NCBs attend the meetings. We summarise some further characteristics of the rotation model below.

- The reduction of voting rights from "one member-one vote" to the rotation model is carried out by means of an indicator of economic importance.[7] After ranking the countries according to this indicator, their representatives are assigned to one of three groups.[8] The voting rights rotate among the members of each group, while the voting frequencies are highest for the members of group 1 and lowest for the members of group 3.

[7] This indicator consists of a five-sixth share of euro GDP at market prices and a one-sixth share in the aggregated balance sheet of the euro area monetary financial institutions (MFIs).

[8] There is a transition phase in which only 2 groups are formed, as long as the euro area consists of 19 to 21 members.

- In a euro area of 27 the ECB's Governing Council would consist of 27 NCB governors and six directors. According to the ECB's rotation model, voting rights would in the end be divided as follows (see Table 2):
- The six directors would possess a permanent right to vote.
- The five biggest countries (Germany, France, Italy, the UK and Spain) would represent the first group and be allocated a total of four votes, i.e. the respective national central bank governors would have to suspend their voting right in one-fifth of the meetings.
- A total of 8 votes would be assigned to the NCB governors of 14 middle-sized member countries. Thus, the participants of this group would be entitled to vote in only 57% of all decisions.
- The remaining 8 NCB governors would only be allocated 3 rights to vote, which implies that they would be suspended from 62.5% of the voting dates.
- Irrespective of their specific voting rights, all NCB governors would be able to participate in the discussions on the monetary policy of the ECB Governing Council.

It is important to incorporate some further details of the rotation model that have been published only recently by the ECB (ECB, 2009) in any game-theoretic analysis of ECB voting behaviour. According to these newly available details, rotation (i.e. a change in the allocation of voting rights) will take place monthly. In contrast to earlier speculations in the literature (e.g. Kosior et al., 2008), not every NCB governor who was suspended from voting in the previous period will regain his voting right in the following month. The number of the so-called rotating NCBs will be determined by the difference between the number of national representatives in the GC and the number of votes allocated to each group minus two, taking the absolute value in case of a negative number. The ECB claims that this mode of rotation guarantees the highest level of stability in the composition of the GC combined with only short periods of absence. This statement is somehow supported by Tables 1 and 2 in which two examples of the rotation mode for 6 months are presented. Visibly, the changes in the composition of the committee are relatively gentle. The starting point of the rotation will be a random point in an alphabetically ordered[9] list of the euro area members. We will consider

[9] The listing of the countries follows the standard of the EU, where countries are listed alphabetically according to their names using the Latin alphabet, see e.g. Table 4.

exactly the scenarios in Table 1 and 2 (22 versus 27 euro area members) in our calculations of the preference-based power measure in section 5 and take one possible starting point and succeeding 6 months into account. The observed stability, i.e. the absence of strong month-to-month shifts, as shown later does hold for the allocation of voting power within certain limits.

Table 1 - *Rotation of voting rights (6 months, 22 euro area members)*

22	number of players	votes	members without voting right	rotating player	t1	t2	t3	T4	t5	T6	Exerted voting rights in 6months
group 1	5	4	1	1							
a1						0	0	0	0		4
a2					0		0	0	0	0	5
a3					0	0		0	0	0	5
a4					0	0	0		0	0	5
a5					0	0	0	0		0	5
group 2	11	8	3	1							
b1						0	0	0	0	0	5
b2							0	0	0	0	4
b3								0	0	0	3
b4					0				0	0	3
b5					0	0				0	3
b6					0	0	0				3
b7					0	0	0	0			4
b8					0	0	0	0	0		5
b9					0	0	0	0	0	0	6
b10					0	0	0	0	0	0	6
b11					0	0	0	0	0	0	6
group 3	6	3	3	1							
c1						0	0	0			3
c2							0	0	0		3
c3								0	0	0	3
c4					0				0	0	3
c5					0	0				0	3
c6					0	0	0				3
sum:	22	15		3							

Source: Own calculations, based on ECB (2009).

Note that Tables 1 and 2 reveal one further important characteristic of the rotation model: even if it allocates voting rights equally between the members of each group on average, this is not the case at single periods in time. The exerted frequency of voting after 6 months can vary for the members of group 2 between 3 and 6 times, *ex post*. In other scenarios and time perspectives this interval might even be higher.

Another example could be a snapshot after 12 months. With 24 NBPs, each member of the second group would have voted 8 times, a member of the first group between 9 and 10 times. In this case, the frequency of votes ex post also varies substantially for the members of the third group. In this time period, members of this group would vote between 4 and 6 times. The ex post inequality resulting from these intervals is even higher in the case of 21 NBPs in the GC where the members of the first group have exerted their voting rights 9-10 times, while a NBP contained in the second group has voted between 6 and 10 times after one year.

Table 2 - *Rotation of voting rights (6 months, 27 euro area members)*

27	number of players	votes	members without voting right	rotating player	t1	t2	t3	t4	T5	t6	Exerted voting rights in 6months
group 1	5	4	1	1							
a1						0	0	0	0		4
a2					0		0	0	0	0	5
a3					0	0		0	0	0	5
a4					0	0	0		0	0	5
a5					0	0	0	0		0	5
group 2	14	8	6	4							
b1						0	0		0	0	4
b2						0	0		0	0	4
b3						0	0			0	3
b4						0	0			0	3
b5							0	0		0	3
b6							0	0		0	3
b7					0		0	0			3
b8					0		0	0			3
b9					0			0	0		3
b10					0			0	0		3
b11					0	0		0	0		4
b12					0	0		0	0		4
b13					0	0			0	0	4
b14					0	0			0	0	4
group 3	8	3	5	3							
c1						0		0			2
c2						0			0		2
c3						0			0		2
c4							0		0		2
c5							0			0	2
c6					0		0			0	3
c7					0			0		0	3
c8					0			0			2
sum:	27	15		8							

Source: Own calculations, based on ECB (2009).

Obviously, the date of enlargement of the Governing Council will never be defined by questions of a just entitlement with voting rights but by the moment of accession of a country to the euro area which is determined by the Maastricht criteria. This is why the transformation from one rotation schedule to a new one will occur only by chance specifically in a moment where the NBPs of a group have exerted their votes equally frequently. Moreover, there exists nearly no possibility of this occurring for all concerned groups at the same time,[10] whereas the differences resulting in a randomly chosen point of time might even be large. This kind of unequal treatment of members of one group has been considered by the ECB only in so far as it considers the case that a NCB has to sustain its vote always in the same periods of the year. Then, discretionary changes in the composition of the GC can be decided upon.[11]

We take into account this new piece of information about the rotation procedure and explicitly consider the preferences of NCB governors in our model. This enables us to assess which consequences on the allocation of power result from the introduction of the rotation model. In the following, we introduce the preference-based power measure (Passarelli/ Barr, 2007) which we will use later on in our analysis.

4. The theoretical model

4.1. The preference-based power measure of Passarelli/ Barr (2007)

Classical power indices focus on effects of formal rules on the individual power of single players. Hereby, they abstract from possible preferences players could have in coalitions building and only consider information about voting rules and weights. These indices are useful if preferences are unknown or variable, or if a study concentrates on the effects of the formal voting rules. However, if information about preferences of the players is available, it can be used to generate a more detailed view of the voting body. Passarelli/ Barr (2007) consider a voting body whose members have preferences that can be mapped on a policy space and where the set of voted issues is random. They construct a power measure based on a randomization scheme with the following appealing characteristics. First, the distance between the ideal point of a player and the voted issue determines the probability of this player to vote “yes” to the concerning issue. The larger this distance, the lower this

[10] The period of time after which each NBP in GC has exerted his voting right exactly as often as each NBP in his group is lower than the product of the equalisation frequencies only in cases where one frequency is an exact multiple at least one other, like in the case of 20 NBPs.

[11] Article 1.1 of the implementing decision runs as follows: “The Governing Council may decide to change the order of rotation for the second and third groups to avoid the situation that certain governors are always without a voting right at the same periods of the year.”

probability will be. Second, being pivotal in a highly likely voting amplifies a player's power measure to a larger extent than being pivotal in a less likely voting. An agenda-setter can be modelled by a distortion of the distribution of the voted. This preference-based power measure is applicable to the GC because the preferences of its members can be mapped on a policy space. It enables us to consider the preferences of the GC members and to introduce the ECB's President as agenda-setter.[12]

In the following, we consider a *weighted majority game* with the player set N={1,2,…,n}. S is called a coalition if $S \subseteq N$. The characteristic function v ($2^N \rightarrow \Re$) assigns *1* to a winning coalition *(v(S)=*1*)* and 0 to a losing coalition *(v(S)=*0*)*. A coalition is a winning one if its members dispose of the required majority of votes *m*: $\sum_{i \in S} w_i \geq m$, with w_i being the voting weight of player *i*.

The multilinear extension of games presented by Owen (1972) makes it possible to introduce randomization in the coalition formation. Then, a player *i* is not necessarily either member or outsider of a coalition *S*, but joins this coalition with a certain probability. Consider as an example a 3-players game and the coalition S={1,2}. A coalition can be written as a vector with $x_i = 1(0)$ if *i* is a member of the coalition (is not a member of the coalition). In our example, we write for S=(1,1,0). If $0 \leq x_i \leq 1$, then x_i can be interpreted as the probability that player i participates in coalition S $(\ni i)$. The probability for coalition S to occur is then given by: $P(S) = \prod_{i \in S} x_i \prod_{i \notin S} (1 - x_i)$.

The multilinear extension (MLE) of a game v (Owen, 1972) enters the following expression:

$$f(x_1, ..., x_n) = \sum_{S \subseteq N} \left\{ \prod_{i \in S} x_i \prod_{i \notin S} (1 - x_i) \right\} v(S),$$

which represents the expected value of the game in this setting.

[12] This is also possible with the Owen-Shapley method (Owen and Shapley, 1989). The Passarelli/ Barr method has the advantage that, contrary to the Owen-Shapley method, the probability of zero is not assigned to any coalition a priori. Rather, very unlikely coalitions are assigned a very low probability (Passarelli/ Barr, 2007, p. 43). Further contributions to the literature of preference-based power measures can be found in Napel/ Widgrén (2004 and 2005).

The expected marginal contribution by player *i* is given by the partial derivative of the MLE function with respect to x_i and can be interpreted as a power measure in simple games (Owen, 1972):

$$f_i(x_i,\ldots,x_n) = \sum_{\substack{S\subset N \\ i\notin S}} \prod_{j\in S} x_j \prod_{\substack{j\notin S \\ i\neq j}} (1-x_i)[v(S\cup\{i\}) - v(S)].$$

Let us now consider some additional assumptions within the Passarelli/ Barr (2007) model framework. Let $\Theta \subseteq \Re^m$ be a political m-dimensional space, and $\theta \in \Theta$ a random political issue. $p(\theta)$ is the density function of θ, with $\int_\Theta p(\theta)d\theta = 1$.

Coalitions are formed at random. $q_i(\theta)$ describes the probability that *i* will participate in the coalition $S(\theta) \subseteq N$. This function is single-peaked in P_i and P_i describes the ideal point of player *i*. Player *i* joins S(P_i) with the probability 1 ($q_i(P_i) = 1$). In the setting of voting games the probability $q_i(\theta)$ can also be interpreted as the likelihood that player *i* votes "yes" to issue θ. If his ideal point is discussed, player *i* always votes "yes".

The preference-based power measure ψ_i (Passarelli/ Barr 2007) of player *i* is defined as the expected value of f_i given the above randomization structure:

$$\psi_i = \int_\Theta f_i(\theta)p(\theta)d\theta.$$

We will consider the normalized version of this measure:

$$\phi_i = \frac{\psi_i}{\sum_{j=1}^{n} \psi_j}.$$

The preference-based power measure has originally been applied by Passarelli/ Barr (2009) to analyse the distribution of voting power within the European Commission, where the respective empirical realisation of an indicator of eurosceptism (Eurobarometer) is interpreted as the Commission members' preferences. Analogously, we interpret the country-specific empirical realisations of an indicator of the future economic development (here: the inflation rate) as preferences of the members of the euro area.[13] Such an indicator has been developed by Bénassy-Quéré/ Turkisch (2009). In their case, the latter represents an estimation of interest rate preferences of the euro area member states. We will describe it briefly in the following.

4.2. Preference-based power measure for the GC

Interest rate preferences

The aim of the approach taken by Bénassy-Quéré/ Turkisch (2009) is to study the "core-periphery" balance of interest rate preferences within the GC. The authors apply the median voter concept to the GC by explicitly modelling the interest rates preferences of its members. The latter are calculated for the GC members referring to simple Taylor rules and based on a convergence assumption relying on a specific set of assumptions (among others, linear convergence of price levels within 30 years) concerning the convergence of the economies towards the euro-12 aggregate.[14] It is well over a decade since John B. Taylor set out what has become part of the current orthodoxy of monetary economics by now. In his seminal paper, John B. Taylor (1993) shows that the monetary policy decisions of central banks can be described reasonably well by a simple reaction equation. The latter is usually modelled as a function of, among others, inflation and the output gap. Despite its simplicity, the Taylor reaction function has been shown to have a high degree of reliance in explaining monetary policy.[15]

Bénassy-Quéré/ Turkisch (2009) start with four versions of the Taylor rule. We have finally have decided to strictly follow Bénassy-Quéré/ Turkisch (2009) and to omit those considering shocks in the output gap, because it is rather arbitrary to calibrate future shocks and the estimation of the output gaps heavily relies on variance-covariance matrices of the past. The latter might prove critical especially if one takes into account that even the euro-22 scenario (not to mention the euro-27 scenario) will become reality rather far away in the future.[16] Hence, we either stick to the *truncated version of the Taylor rule* or assume that *inflation*

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[13] Remember that Bénassy-Quéré/ Turkisch (2009) derive some estimates of the future inflation rate and, thus, also the future preferred Taylor interest rate. We follow their approach because the scenarios of 22 and 27 members of the euro area which we focus on are also located in the future. In order to analyze these scenarios, we have to consider an indicator for future monetary policy preferences.

[14] This aggregate refers to the area of the EU between 2000 and 2006.

[15] This has been shown, for instance, for the countries of the EMU in 1990-1998 by Gerlach/ Schnabel (2000).

[16] Technically, it is also possible to apply the other versions as well. Our results do not change dramatically in this case and are available on request.

targets equal the actual country-specific inflation rates. We feel legitimized to proceed like that with an eye on the limits in forecasting business cycle convergence and the fact that the remaining two scenarios map the interest rate preferences in a sufficiently accurate fashion for our purposes.[17]

The *first* scenario is the *truncated version of the Taylor rule* in which no output gap is considered and a $\tilde{\pi}_k = 2\%$ inflation target is assumed. Consequently, the short-term nominal interest rate of country *k* is derived from its "neutral" interest rate r_k, its inflation rate π_k and its target inflation rate $\tilde{\pi}_k$:

$$i_k = r_k + \pi_k + 0.5(\pi_k - \tilde{\pi}_k). \qquad \textit{(truncated Taylor rule)}$$

In the *second* scenario, calculated as a robustness check, we assume country-specific inflation targets. Here the *inflation targets equal the actual inflation rates*. In this case, the Taylor rule boils down to the Fisher equation:

$$i_k = r_k + \pi_k\,. \qquad \textit{(Fisher rule)}$$

The preferred interest rates apply to the future performance of the economies of the euro area. Bénassy-Quéré/ Turkisch (2009) choose to forecast the inflation rate based on the assumption of a linear convergence of the price levels to the euro-12 aggregate in 2007 within 30 years.[18] Assuming linear convergence allows disregarding the exact moment of enlargement and is also of special interest for our approach. The "neutral" levels of real interest rates are set equal to the long-run real GDP growth.[19] The preferred interest rates are reported together with the results in section 5, for instance, in Table 4. There, it can be observed that countries in group 3 are relatively hawkish as compared to the Board or the members of group one, while group 2 unsurprisingly turns out to be the most heterogeneous as it concerns the preferred interest rates.[20] This is due to the central influence of inflation in the Taylor-rule.[21]

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[17] Nevertheless, we have recalculated our main results using the interest rate preferences calculated by Bénassy-Quéré/ Turkisch (2009) for the scenarios of positive and negative output shocks. These results are in line with those presented later in this paper and are available from the authors upon request.

[18] The euro-12 aggregate relates to the euro area perimeter from 2000 to 2006.

[19] For further details on the calculations and data sources, see Bénassy-Quéré/ Turkisch (2009, pp. 46-51).

[20] This observation is equally valid if the output gap is considered (positive/ negative shocks). The remaining variations between the preferred interest rates due to different calculations have only a minor influence on our calculations, because we are interested in the balance between the European and the nationalistic view in the GC and the position of the European view is very stable over all possible calculations.

[21] Similar results concerning preferred interest rates are presented in Berger/ de Haan (2003).

Bénassy-Quéré/ Turkisch (2009) use their results to simulate the GC's decision by means of the median voter approach. Hereby, they assume the NCB governors to vote as nationalist representatives of their home countries ("home bias") and the EB as a representative of the "euro view". Nevertheless, the authors do not question the applicability of this assumption, but claim to design a worst case scenario which reveals the ability of the rotation model to cope with nationalistic preferences. We strictly follow this approach in our study. As will be shown in the following chapter, we also consider scenarios in which the EB is not homogeneous but consisting of national representatives. As we focus on the balance of power between the national and euro-wide preferences, we always model at least one representative of each view.

Euro area enlargement - considered scenarios

In this study, we focus on the scenario of euro area enlargement up to 22 members. As opposed to a scenario of 27 members, the opt-out countries (United Kingdom, Sweden, Denmark) as well as Romania and Bulgaria[22] are not considered here as members of the euro area. This is just to account for a realistic medium-term scenario, given the fact that all enlargement scenarios have become very fragile due to the financial crisis. This would eventually represent a "big bang" scenario, according to which a great number of central and middle European countries would access the euro area at once. The voting behaviour of a GC comprising the maximum possible number of 27 euro area member states is calculated only in the basic scenario - just for comparative purposes.

The pattern underlying our scenarios is represented in Table 3. In the basic scenario, we consider nationalistic NCBs and a homogeneous EB voting as one player with 6 voting rights and preferences referring to the euro area. This is the most common assumption in the literature (Belke/ Styczynska, 2006, Bindseil, 2001, Bénassy-Quéré/ Turkisch, 2009). Additionally, we calculate scenarios in which the EB is considered as heterogeneous. Hence, the euro view is represented by the president of the ECB while the other members act as additional representatives of their countries of origin. Hereby, we consider three possible alternatives: the actual composition of the Board[23] and two polar compositions. In the extreme scenarios, the members of EB except the ECB President come from the 5 countries with the

[22] According to any serious forecast, it is not very realistic that these countries will fulfil the Maastricht criteria in the medium term.
[23] Currently, the EB comprises members from Greece, Italy, Spain, Germany and Austria.

lowest (Netherlands, Finland, Ireland, Austria, Germany), respectively highest interest rate preferences (Hungary, Slovakia, Latvia, Lithuania, Poland).

We consider this specific array of scenarios just in order to reveal the respective effects on the allocation of power in the GC, even though we are aware of the fact that some of them are hardly realistic from a political point of view. Especially the consideration of the two polar scenarios enables us to show that the composition of the Board has a major influence on the allocation of power to the committee members in the heterogeneity scenario. Expecting that further euro area enlargement will take place not earlier than within the not too close future and that reality will level out at an intermediate scenario, the above results mark limits for the distribution of power for less extreme compositions of the EB that can hardly be estimated today.[24]

In the euro area, NCB governors are generally regarded as representatives of their countries of origin and thus are supposed to be guided by a national bias in their voting behaviour. Many studies in this field are based on this assumption (Belke/ Styczynska, 2006, Bindseil, 2001, Bénassy-Quéré/ Turkisch, 2009). It refers to the classical analysis by Meade (2003a, b, c) and by Meade/ Sheets (2002, 2005) who show that a national bias in the decision-making of the GC is quite probable. As long as the NCBs are regarded as representatives of their home countries and appointed by national governments, the suspicion persists that they also act as national representatives, and vote in favour of their home countries. The introduction of the rotation model should even reinforce this effect.

Many of the studies cited above are also based on the assumption of a *homogeneous* EB. Nevertheless, others have expressed their doubts about the correctness of this assumption (Varela/ Sanchez-Santos, 2003). This is exactly why we consider three scenarios with a *heterogeneous* EB. In these cases, the ECB President is considered as the representative of the euro view.[25] For each scenario, we distinguish two possible settings: with and without an agenda-setter. The agenda-setter is represented by the preferences of a homogeneous EB or of the president himself if the EB is heterogeneous. In a final step, as a robustness check, we repeat the calculations with the inflation rates based on member-specific inflation targets as proposed by Bénassy-Quéré/ Turkisch (2009).

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[24] Bénassy-Quéré/ Turkisch (2009) consider polar scenarios of a homogeneous GC for the calculations of the median interest rates under the rotation model.

[25] We are aware of the fact that some evidence has been presented for nationalist tendencies in the Presidents' voting behaviour (Varela/ Sanchez-Santos, 2003) even though such a scenario would be offended by the ECB itself. Our study is particularly interested in the balance of power between the core and the periphery, this is why we always introduce a representative of the European perspective.

Table 3 – *Number of euro area member countries - investigated scenarios*

	homogeneous EB		heterogeneous EB		
Truncated Taylor	22 members *Basic**	27 members*	22 members *actual**	22 members *highest**	22 members *lowest**
Truncated Taylor, member specific inflation rates	22 members				

Source: Own presentation.

Setup of calculations

For a proper implementation of our theoretical model we have to impose some additional assumptions. The latter concern the probability generating function *q* and the modelling of the agenda-setter and have an impact on the results. Thus, they should be chosen carefully and taken into account when analysing the results. In the first case, we have decided to use the standard function introduced by Passarelli/ Barr (2007) but to adjust the way the desired interest rates enter this function. We calibrate the inputs in order to achieve a relatively strong discrimination between the coalitions and at the same time realistic probabilities in coalition formation. In the resulting functions, the probability of Germany saying "yes" to the euro area's preferred interest rate turns out to be approximately 90% in all scenarios, while the same probability for Poland only amounts to around 10%.

The probability generating function then is:

$$q_i(P_i,\theta)=e^{-\pi(P_i-\theta)^2},$$

while the desired interest rates i_i enter the function as $P_i = 20i_i$.

The preferences of the agenda-setter are always defined as the euro area's preferred interest rate. We assume the agenda-setter to propose only interest rates which lie within a range of $\pm 0.5\%$ around the agenda-setter's own preferences. Because of computational simplicity we have chosen the following triangular probability function:

$$p(\theta)=\begin{cases}10-100P_{EU}+100\theta, & P_{EU}-0.1\le\theta\le P_{EU}\\ 10+100P_{EU}-100\theta, & P_{EU}<\theta\le P_{EU}+0.1\end{cases}$$

In order to calculate the indices, we simulate the coalition formation for 200 values of θ. For each value of θ, each player is excluded from the player set successively. For each player, 15000 coalitions are then formed at random, given the probability generating functions q_i. Average marginal contributions are calculated for each player as the relative frequency of this player being pivotal in the simulated coalitions. The former are then summed up over all values of θ. The details can best be shown referring to the example of a fixed θ. We do this in the following.

One important step of analysis - fixing the thetas

Considering the situation for a fixed θ corresponds to the look at a scenario in which the voted issue is known and the probability for every coalition is, thus, determined by the functions q_i. According to our theoretical model presented above, the power measure of a player *i* results as his probability of being pivotal in any possible coalition. Strictly following Passarelli/ Barr (2007), we calculate this measure by means of a Monte Carlo simulation. For each θ, the considered player is removed from the player set as a first step. As a second step, then, 15000 coalitions are simulated for the remaining n-1 players, given the probability generating functions q_i. This allows us to estimate the probability of coalitions agreeing to the issue at stake, dependent on their size (in terms of votes). Player *i* is pivotal in all losing coalitions that achieve the required majority by his joining. The sum of the probabilities for player *i* being pivotal then gives the preference-based power measure for a given parameter θ.

- Figures 1 and 2 about here -

As an example, we consider the scenario of 22 euro area members and a homogeneous EB. Figures 1 and 2 display the estimation of the coalition formation for two values of θ (1 and 2), we consider the simulation after exclusion of two members of the GC, Germany and the EB respectively as examples.[26] If a player disposes of 6 votes, he can be pivotal in a higher number of coalitions than a player endowed with one vote.[27] For θ=1 (i = 0.05), an issue close to EB's preferences is discussed ($i_{EB} = 0.0454$), while θ=2 (i = 0.1) is further away from the EB's (and also from most NBPs) preferences. This pattern becomes manifest

[26] Of course, choosing Germany with one vote and the EB with six votes underlines the differences of the results as strong as possible in our context.
[27] Remember that the parameter θ amounts to 0.05 and 0.1, respectively, according to section 4.

in the respective relative frequencies: for θ=1 much more players (including the EB) are "willing" to join the "yes"-coalitions than for θ=2. After exclusion of Germany, the mode of the single-peaked frequency distribution is located at a value of 15 for θ=1 and at 4 for θ=2. Apparently, the most frequent coalitions do not include the EB for θ=2. While for θ=1 the 5 most frequent coalitions in terms of size are composed of nearly all NBPs or the EB plus 7 to 11 NBPs. We can observe analogous differences for both values of θ for the coalition formation after exclusion of the EB, too. While the mode for θ=1 is 10, it is much lower for θ=2 (4).

These distributions which result from the probability generating functions q_i determine the power measures for the considered players Germany and EB. Germany has one vote in the GC and can only be decisive for coalitions that collect 10 votes. Their estimated probability amounts to 0.068 for θ=1 and at 0.055 for θ=2 and represents the preference-based power measure for the given values of θ. The influence of a player with one vote is generally low in a committee with majority voting and overall 22 votes, but the classical Shapley-Shubik index would be lower than both preference-based measures with 0.0417. Thus, the position of Germany is more influential in both situations than in the symmetric case. If θ=1, Germany's power index is higher, which shows that for this issue players agree more easily and a coalition of 10 is formed with a higher probability.

The EB can be decisive in a larger number of coalitions, disposing of 6 votes its joining turns all losing coalitions to winning that dispose of 5 to 10 votes. While the (symmetric) Shapley-Shubik-index of the EB would be 0.375, the preference-based power measure discriminates between the two issues dramatically. For θ=1, the empirical realisation of this power index even amounts to 0.6706, whereas it turns out to be very much lower for θ=2 (i.e., 0.2497). This pattern implies that in case of the first value coalitions in the relevant range have a higher probability.

5. Results

The basic scenario

Table 4 summarizes our results with respect to the preference-based power measures for the basic scenario in which we consider a euro area with 22 members and a homogeneous EB. In this case, we consider the homogeneous EB as a group of experts who consistently vote in favour of the euro area. They are represented in our game as one player endowed with six votes and the preferred interest rate which equals the one of the euro area. In Table 4, the preference-based power measures are reported for the scenarios without and with an agenda-setter. At least two observations emerge after a first visual inspection of the results. On the one hand, the power indices of the NBPs differ in both scenarios - with a minimum around 0.02 and a maximum up to 0.032. On the other hand, it is visible that the homogeneous EB has a dominant position in the GC. With an MLE index of around 0.6 in the scenario without an agenda-setter the EB is allotted a higher power index than in the symmetric Shapley-Shubik case (0.375). This observation confirms the results of Bénassy-Quéré/ Turkisch (2009) who have already discussed the EB's favourable position on the policy space in this scenario. However, especially in the scenario in which EB sets the agenda of the voting, it is attributed the bulk part of the influence on the voting outcome with 95% to 96% of power.

- Table 4 about here -

Figures 3 and 4 allow a closer look on the allocation of power in the GC concerning these two observations. In Figure 3, the values of the preference-based power measure for all considered points of time are compared for the EB and the scenarios with and without agenda-setter. In the second scenario, we see the power of the EB stabilised on a very high level. In the first scenario, we observe at least some variations; apparently, the changes in the composition of the GC imposed by the rotation model are once more once less favourable to the EB at the considered points in time. In Figure 4, the changes of the power index of Germany in the scenario without agenda-setter take the opposite direction. In month 2, Germany disposes about 2 percent of the power and 3 percent in month 3. In month 4 this value lies at about 2 and at ca 3 percent in month 5. If the EB takes the part of the agenda-setter, Germany has a power index of 0.2 to 0.3 percent. Even if a downward tendency is visible here it should not be over-interpreted because the power values for all NBPs are lower than 1 percent in the agenda-setter scenario. As a consequence, the differences between the indices can only be very small. Notably, the NBPs have a similarly small influence on the voting outcome, opposite to the EB's dominant position.

- Figure 3 about here -

- Figure 4 about here -

We have seen that Germany's influence has increased in value from month 2 to month 3. In order to analyse possible reasons for this quite dramatic loss of power we also compare the distribution of power across the NBPs for these two months. Figure 5 summarises these values for the scenario without agenda-setter, whereas the ordering of the countries is increasing depending on in their preferred interest rates. In month 3, the NBPs with preferences for lower interest rates have higher shares in power than the countries with higher preferred interest rates. The opposite is the case with respect to month 2, even if the differences are less evident. We feel legitimized to explain this pattern in the following way. In month 3, the rotation model generates a composition of the GC according to which a larger share of NBPs has relatively higher interest rates preferences.[28] While these members with similar preferences can form coalitions quite "easily", they do not possess the required majority. Consequently, the NBPs with preferences for lower interest rates have the potential to be pivotal in a larger portion of coalitions. The opposite is the case for month 5, where 8 NBPs have a preferred interest rate of lower than 5 percent.

- Figure 5 about here -

For the scenario with 22 euro area member countries, the power index analysis under consideration of the preferred interest rates (Bénassy-Quéré/ Turkisch, 2009) has revealed the following characteristics of the rotation model. For the scenario without an agenda-setter we observe a strong position of the EB, considerable differences in power indices of single NBPs and perceivable effects of the composition of the GC on power distribution. Especially the first result goes in line with the results of the median voter analysis of Bénassy-Quéré/ Turkisch (2009) and the voting power analysis by Kosior et al. (2008). Consequently, the power of the (homogeneous) EB has been underestimated by the symmetric and average consideration in Belke/ Styczynska (2006). The position of the EB on the political space has a very favourable influence on its power index. Nevertheless, one main result of Belke/ Styczynska (2006), the unexpected shifts in power, has been confirmed by the preference-based power index analysis. In the scenario with an agenda-setter, which has been effected for the first time in a power index analysis of the GC, we see an overall dominating position of the EB and unessential power of the NBPs. This means that if the EB votes homogeneously in favour of the euro area, the rotation model leads to a decision making dominated de facto by a Committee of Experts (EB) in which the NBPs cannot influence the decision. By their presence at the meetings, they more or less only report about regional economic developments. This is a strong argument in support of the rotation model, because it shows that the European perspective is very dominant. This should allow the GC to be capable to act

[28] In month 3, there are eight NBPs with a preferred interest rate of over 5%.

in favour of the whole euro zone, while taking into consideration regional information made available by the regional representatives.[29]

- Table 5 about here -

Such an outcome in terms of voting power is comparable to the strengthening of the position of the EB envisaged by reform proposals presented in the eve of the introduction of the Rotation model by e.g. Gros (2003) where a change in responsibilities between the Board and the NBPs has been suggested.[30] While the GC should meet less frequently, decide about the directions of the monetary policy and inform the EB about the regional economic situation, the Board should be responsible for the daily issues of ECB's monetary policy and meet several times a month. While the rotation model is less radical as it comes to the reform of the institutional setup, it seems to possibly lead to a similar result in terms of influence on the policy outcomes, and nevertheless combine a high degree of representativeness with a sound core-periphery balance. The reason for the choice of a less radical reform might lie in the political process that is central for the composition of all European decision bodies, or in an observation made by Hefeker (2002). Hefeker argues that economic areas with highly heterogeneous member states tend to delegate power to a centrally appointed board less frequently.

These results are confirmed by the consideration of the preferred interest rates deducted from the Fisher Rule by Bénassy-Quéré/ Turkisch (2009) and do not change considerably for the scenario of 27 member states.[31] On the contrary, the consideration of a heterogeneous EB leads to a structural change of the results in several aspects, as will be shown in the next chapter.

The heterogeneity scenarios

In our heterogeneity scenarios we consider different compositions of the EB and assume that, apart from the president, all members of the EB cast their vote according to their home countries' interests. We consider the actual composition of the EB (Greece, Italy, Spain, Germany, Austria), and two extreme scenarios which deviate significantly from the actual

[29] The position of the EB would be weaker in a scenario with 22 members and the "one member- one vote" rule. Without agenda-setting power the EB would be pivotal in less than 30% of potential situations. In the agenda-setting scenario the power of the EB turns out to be 84%. See Table 5.
[30] Berger/ de Haan (2002) also argue that a strengthening of the power of the EB would lead to a better balance between core and periphery in the GC.
[31] See Tables A4 and A5 in the appendix.

one. In our extreme scenarios, we have first five representatives of countries with lowest preferred interest rates (Netherlands, Finland, Ireland, Austria and Germany) and five representatives with the highest interest rate preferences (Hungary, Slovakia, Latvia, Lithuania, Poland).

We establish the above scenarios just in order to assess which potential influence the composition of the EB has in different heterogeneity scenarios. Note again that the respective results are *not* meant to be forecasts of *actual* future voting behaviour within the ECB Governing Council. In all scenarios with the respective results reported in Tables A1, A2 and A3 in the appendix, the ECB President represents the European view. But his position in terms of voting power is not comparable to the position of the EB in the homogeneous scenarios. Not even the consideration of the agenda-setting power of the ECB president can assure his dominant position vis-a-vis the "periphery" as observed in the homogeneous scenarios which we discussed further above.

Figures 3 to 5 display the distribution of power in case of the three heterogeneous scenarios, as an example, for month 1. In each figure, we observe an equalisation of power indices as compared to the homogeneous scenario. Furthermore, non-negligible differences between the allocation of power to different players (and to each player in the successive points of time) still persist. Here, all considered players are endowed with one voting right. All differences are consequently driven by the position of the players in the policy space and by the distortion of the distribution of the issues through the introduction of an agenda-setter.

- Table 6 about here -

In our scenario with the actual composition of members of the EB and the low preference scenario, the situation is relatively favourable to the members of group one and the members of EB. They have relatively high power indices. Here, the ECB President still profits from his agenda-setting power by a rise in his power index of ca. 2%. Table 6 lists the sum of power indices of players with preferences lower (resp. higher) than 5%, for each scenario and month. Here, we see that this sum is always higher for the members with lower preferences in the discussed scenarios. Consequently, the given composition of the EB is favourable to the group of players with lower preferences. The reason for this is that due to the additional representatives of lower preferred interest rates in the EB (as compared to the homogeneous scenario), these players can form winning coalitions on their own. Month 2, in which they collect 13 votes in the scenario with the actual composition of the EB (resp. 14 in the low preferences composition) is an extreme example. The higher indices result from the fact that these players form coalitions more easily and each of them has a high probability of being pivotal in coalitions with other players with similar preferences.

This picture changes dramatically for the high preferences scenario. Here, the members of the GC with higher interest rates preferences can form winning coalitions. Take as an example month 3: there are 13 players with preferences ranging beyond 5%. According to the discussion above, this situation is favourable to this group in the GC, they have a cumulative power of 65%. Furthermore, we can see in Table 6 that the introduction of the President as agenda-setter is profitable to the group of players with lower interest preferences, even though their gain in cumulative power never exceeds 10%. Regarding the individual power indices, this scenario leads to a further equalisation between the players. Especially the President does not take a particular position here. This is the less favourable scenario for the ECB President as representative of the euro area view, as he has the lowest power indices and does not improve his position distinctly as soon as he is the agenda-setter.

6. Conclusions

According to the literature, there exist a couple of possibilities how agenda-setting power can be incorporated into and treated within a theoretical model. In the model of Passarelli and Barr (2004), a shift in the power distribution may depend on changes in the preferences of the agenda-setter. However, Bénassy-Quéré and Turkisch (2009) is one of the few studies which emphasize the role of the Executive Board. They derive and emphasize in their study that the EB always takes a median position in the political space. This increases their real influence beyond the assessment according to classical power indices.

The new randomization scheme based on the multilinear extension (MLE) of games applied by us allows accounting for this pattern. What is more, we show that it is also possible to quantify the effect of agenda-setting power of the EB. As our prior, we expected it to lead to an even higher concentration of power to the EB, and have finally found our view confirmed by the results gained in this paper. However, how to treat the fact that the president decides in the case of a tie is still an open issue. We leave this task for future research.

For illustrative purposes, we would like to explicitly stress our results gained for the homogeneity scenario. In this case, the literature also shows that the rather complex rotation model tends to deliver rather simple output in terms of voting power analysis. Indeed, those studies which explain monetary policy decisions by drawing upon different country-specific preferences, point at a heterogeneous Executive Board. But exactly these studies explain decisions on the policy rates by preferences and we demonstrate explicitly that "strategically favourable" preferences help to enforce more voting power than other preferences. According to our analysis, the ECB Executive Board is stuck „in the middle“ and, hence, has a larger voting power.[32] We would like to argue that conventional studies are not able to take into account these important properties of the game because they tend to focus (solely) on the derivation of Nash-equilibria.

We now come up with a couple of conclusions. Let us first tackle the general ones before we differentiate homogeneity and the heterogeneity scenarios with respect to the composition of the ECB Executive Board. In general we feel legitimized to state that an impact of preferences on monetary policy decisions is clearly visible across the results. An impact of the agenda-setter is corroborated as well - in most cases to the benefit of the agenda-setter. In all scenarios, we establish a difference between the power indices of the different NCB governors and between the power indices with and without agenda-setter. Hence, differences in the allocation of power result from transitions from one month to the next. However, these differences are mitigated by the so-called *(-2)-rule of the ECB* (ECB 2009). According to this rule, not every national central bank governor regains his voting power immediately after having exerted it. Differences in voting power between specific months might well be large, as shown in case of the basic scenario for months 2 and 3.

When we consider the case of a *homogenous* ECB Executive Board, there is a significant impact of the EB even if it is not the agenda-setter. The EB has around 95 percent of the voting power at its disposal if it is endowed with agenda-setting power. Our results closely correspond to those gained by Bénassy-Quéré/ Turkisch (2009) who have shown that the position of the EB is so advantageous that based on a median voter approach the European perspective of the EB tends to dominate the EC voting decisions.

However, if we assume the EB to be heterogeneous, the overall pattern changes dramatically. In this case, the European view is “only one among others”. The euro area countries which have managed to have a representative in the EB improve their situation. This is especially valid in a scenario in which members of the EB have preferences for high interest rates.

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[32] Note that Bénassy-Quéré/ Turkisch (2009) arrive at nearly the same conclusion, i.e. that the homogenous Executive Board takes an especially advantageous position in the policy space.

We admit that there are still some open questions with respect to an analysis of the voting power within the rotation model. For instance, one could draw some parallels to some considerations by Servais (2005, p. 261) who argues that, in practice, "consensus" is reached after searching for majorities in a rather dynamic way. In such a kind of setting, our approach appears to be rather capable of matching the power relations quite well. Moreover, we have construed the notions of "agenda-setting" and "coalition formation" in a rather narrow fashion in order to flesh out the differential impacts as clearly as possible. Of course, this leaves some ample room for additional calculations taking into account, for instance, that "reality" is located in between our scenario with and without agenda-setting power. What is more, a legitimate question would be to ask which one of our scenarios is the most relevant one. In order to be really able to give a sound answer to this question, one would have to take power indices into account if using an approach which explains the ECB monetary policy decisions by preferences. This is because only in this way it can be identified which members of the Governing Council have strategically beneficial preferences which give them more power than visible at first glance.

Generally speaking, we can only hope that the composition of the Executive Board will remain rather homogeneous in the future as well. This would ensure a stable environment for the monetary policy decision-making process even under the new regime of the rotation model.

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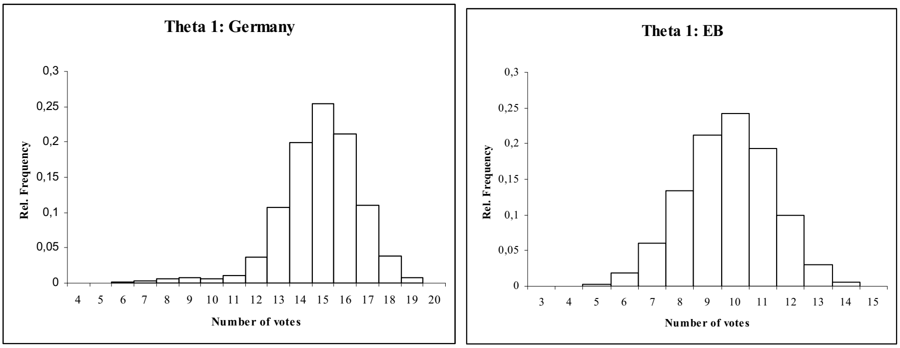
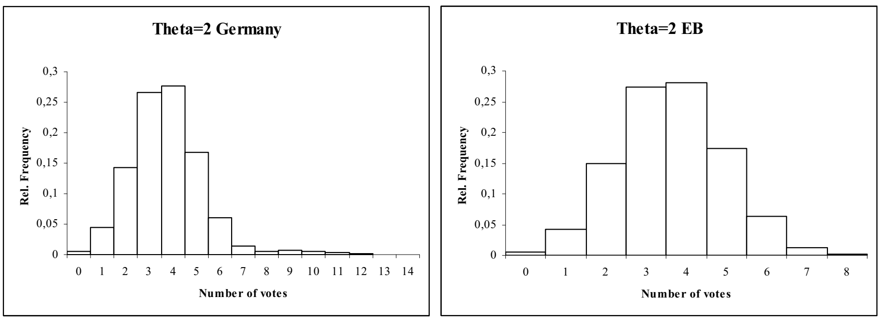
Figure 1 - *Frequency distributions for theta 1*



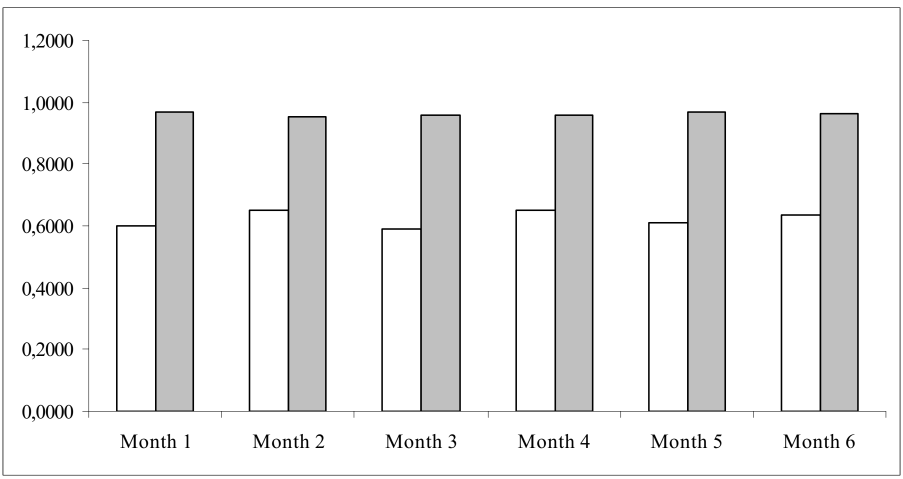
Source: Own calculations.

Figure 2 - *Frequency distributions for theta 2*



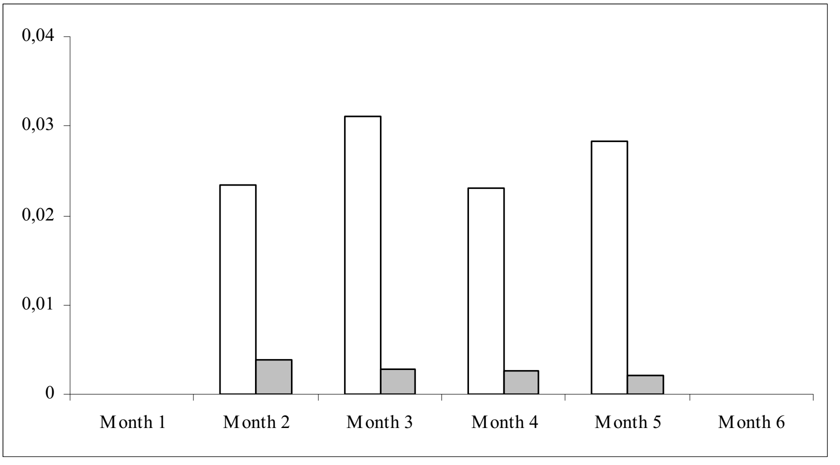
Source: Own calculations.

Figure 3 - *Comparison of the MLE index EB in scenarios without (white) and with an agenda-setter (grey): The case of a homogeneous EB and 22 members of the euro area*



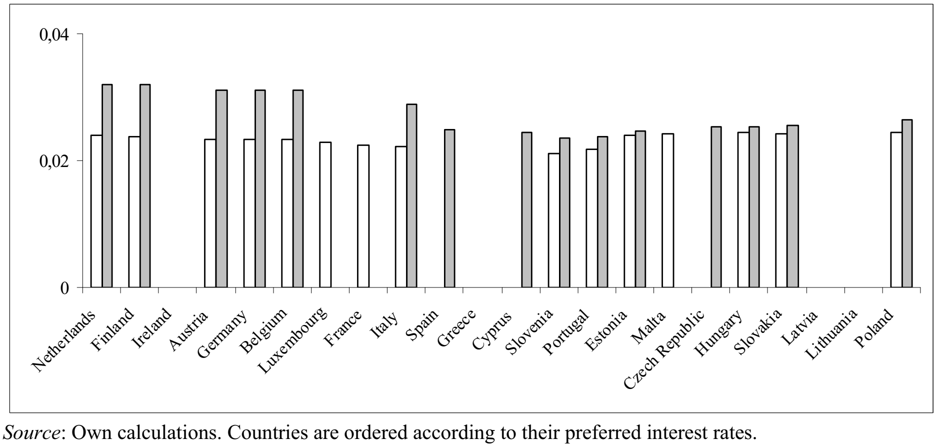
Source: Own calculations

Figure 4 - *Comparison of the MLE index for Germany in scenarios without (white) and with an agenda-setter (grey): The case of a homogeneous EB and 22 members of the euro area*



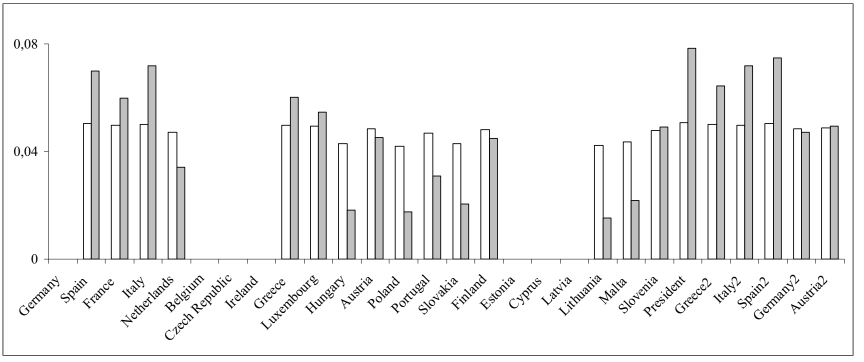
Source: Own calculations

Figure 5 - *Comparison MLE index for two points in time: month 2 (white) and month 3 (grey)*



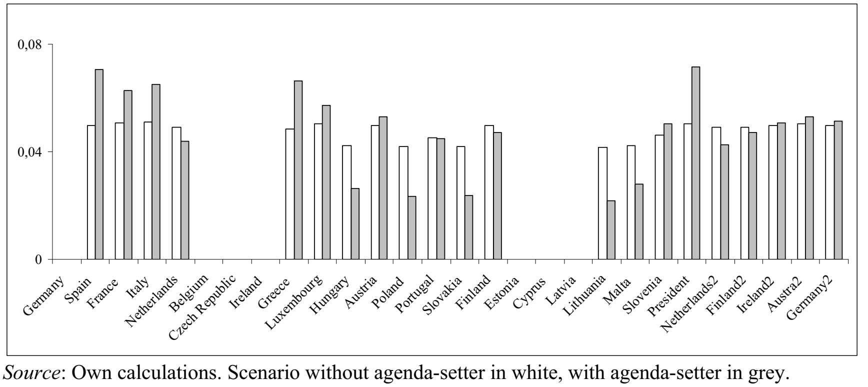
Source: Own calculations. Countries are ordered according to their preferred interest rates.

Figure 6 - *Distribution of power in month 1: The case of a heterogeneous EB in the actual composition*



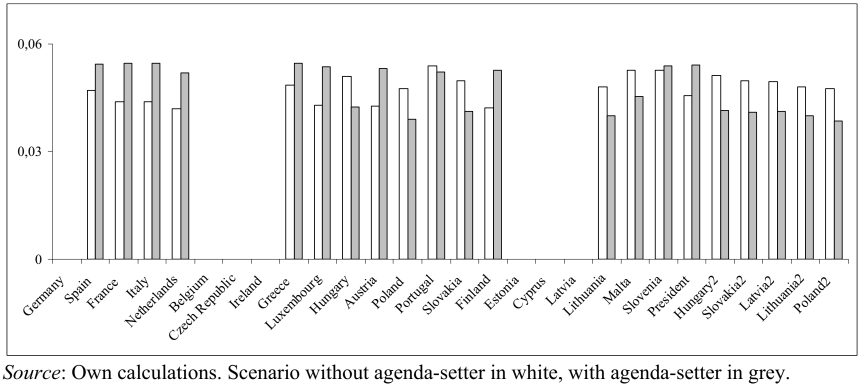
Source: Own calculations. Scenario without agenda-setter in white, with agenda-setter in grey.

Figure 7 - *Distribution of power on month 1: The case of a heterogeneous EB with member countries with low preferred interest rates*



Source: Own calculations. Scenario without agenda-setter in white, with agenda-setter in grey.

Figure 8 - *Distribution of power in month 1: The case of a heterogeneous EB with member countries with high preferred interest rates*



Source: Own calculations. Scenario without agenda-setter in white, with agenda-setter in grey.

Table 4 - *Preference-based power measures: Results for the basic scenario*

EBhom22tt		Month 1		Month 2		Month 3		Month 4		Month 5		Month 6	
Country	Preferences	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS
Germany	3.44%			0.0234	0.0038	0.0311	0.0028	0.0231	0.0027	0.0284	0.0020		
Spain	4.89%	0.0250	0.0028			0.0249	0.0040	0.0205	0.0041	0.0235	0.0021	0.0218	0.0032
France	3.88%	0.0288	0.0025	0.0223	0.0045			0.0223	0.0034	0.0271	0.0022	0.0236	0.0029
Italy	3.98%	0.0282	0.0028	0.0223	0.0044	0.0289	0.0035			0.0264	0.0020	0.0235	0.0022
Netherlands	3.01%	0.0308	0.0021	0.0239	0.0026	0.0320	0.0028	0.0241	0.0026			0.0260	0.0022
Belgium	3.49%			0.0233	0.0033	0.0310	0.0028	0.0232	0.0028	0.0283	0.0020	0.0248	0.0023
Czech Republic	7.47%					0.0252	0.0023	0.0247	0.0028	0.0248	0.0025	0.0252	0.0025
Ireland	3.16%							0.0239	0.0025	0.0288	0.0020	0.0257	0.0021
Greece	5.23%	0.0239	0.0025							0.0231	0.0019	0.0215	0.0032
Luxembourg	3.62%	0.0301	0.0024	0.0229	0.0039							0.0245	0.0025
Hungary	7.80%	0.0253	0.0024	0.0244	0.0030	0.0254	0.0022						
Austria	3.40%	0.0307	0.0025	0.0232	0.0031	0.0311	0.0029	0.0234	0.0032				
Poland	8.65%	0.0255	0.0019	0.0245	0.0027	0.0265	0.0021	0.0247	0.0021	0.0256	0.0023		
Portugal	6.20%	0.0233	0.0019	0.0218	0.0033	0.0238	0.0024	0.0216	0.0029	0.0227	0.0021	0.0223	0.0029
Slovakia	8.04%	0.0255	0.0026	0.0243	0.0026	0.0257	0.0022	0.0247	0.0024	0.0255	0.0020	0.0253	0.0025
Finland	3.11%	0.0308	0.0019	0.0238	0.0033	0.0320	0.0025	0.0236	0.0026	0.0288	0.0020	0.0257	0.0019
Estonia	7.23%			0.0240	0.0029	0.0246	0.0024	0.0245	0.0026				
Cyprus	5.33%					0.0243	0.0035	0.0202	0.0035	0.0230	0.0021		
Latvia	8.15%							0.0248	0.0023	0.0258	0.0026	0.0255	0.0023
Lithuania	8.52%	0.0259	0.0020							0.0256	0.0023	0.0254	0.0024
Malta	7.35%	0.0248	0.0020	0.0243	0.0026							0.0252	0.0020
Slovenia	5.91%	0.0231	0.0020	0.0212	0.0032	0.0235	0.0028						
EB	4.54%	0.5984	0.9656	0.6505	0.9506	0.5901	0.9588	0.6508	0.9576	0.6125	0.9679	0.6340	0.9629

Source: Own calculations.

Table 5 – *Multi-linear extension (MLE) indices for 22 member states and the "one member-one vote" rule*

Country	Preferences	MLE index	Agenda Setter
Germany	3.44%	3.38%	0.74%
Spain	4.89%	3.61%	0.78%
France	3.88%	3.42%	1.03%
Italy	3.98%	3.43%	1.19%
Netherlands	3.01%	3.33%	0.68%
Belgium	3.49%	3.39%	1.01%
Czech Republic	7.47%	3.29%	0.65%
Ireland	3.16%	3.33%	0.65%
Greece	5.23%	3.64%	0.91%
Luxembourg	3.62%	3.40%	0.87%
Hungary	7.80%	3.26%	0.82%
Austria	3.40%	3.41%	0.60%
Poland	8.65%	3.15%	0.22%
Portugal	6.20%	3.56%	0.68%
Slovakia	8.04%	3.22%	0.55%
Finland	3.11%	3.34%	0.77%
Estonia	7.23%	3.34%	0.60%
Cyprus	5.33%	3.68%	0.94%
Latvia	8.15%	3.22%	0.56%
Lithuania	8.52%	3.18%	0.25%
Malta	7.35%	3.31%	0.40%
Slovenia	5.91%	3.62%	0.77%
EB	4.54%	25.49%	84.32%

Source: own calculations.

Table 6 - *Sum of power indices for players in the heterogeneous scenarios*

		A		L		H	
	Preferences…	lower 5%	higher 5%	lower 5%	higher 5%	lower 5%	higher 5%
Monat 1	MLE index	0.5914	0.4086	0.5998	0.4002	0.3497	0.6017
	Agenda Setter	0.7024	0.2976	0.6448	0.3552	0.4290	0.5164
Monat 2	MLE index	0.6446	0.3565	0.6989	0.3011	0.3921	0.6079
	Agenda Setter	0.7382	0.2635	0.7555	0.2445	0.4815	0.5185
Monat 3	MLE index	0.5919	0.4117	0.5981	0.4019	0.3490	0.6510
	Agenda Setter	0.6887	0.3129	0.6440	0.3560	0.4294	0.5706
Monat 4	MLE index	0.6453	0.3587	0.6490	0.3510	0.3985	0.6015
	Agenda Setter	0.7386	0.2653	0.6857	0.3143	0.4814	0.5186
Monat 5	MLE index	0.5974	0.4088	0.6000	0.4000	0.3542	0.5964
	Agenda Setter	0.6908	0.3171	0.6357	0.3643	0.4377	0.5067
Monat 6	MLE index	0.6475	0.3600	0.6468	0.3532	0.4008	0.5490
	Agenda Setter	0.7424	0.2653	0.6906	0.3094	0.4920	0.4529

Source: Own calculations.

Appendix

Table A1 - MLE *indices for a scenario with a heterogeneous EB in its actual composition*

EBhet22ATT		Monat 1		Monat 2		Monat 3		Monat 4		Monat 5		Monat 6	
Country	Preferences	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS
Germany	3.44%			0.0492	0.0541	0.04887	0.0533378	0.0493	0.0479	0.0489	0.0421		
Spain	4.89%	0.0503	0.0699			0.0500247	0.072985	0.0497	0.0713	0.0496	0.0676	0.0494	0.0760
France	3.88%	0.0497	0.0599	0.0498	0.0587			0.0500	0.0672	0.0498	0.0617	0.0495	0.0662
Italy	3.98%	0.0500	0.0720	0.0501	0.0615	0.0503	0.0632			0.0502	0.0647	0.0498	0.0615
Netherlands	3.01%	0.0473	0.0342	0.0485	0.0440	0.0471	0.0405	0.0483	0.0411			0.0483	0.0385
Belgium	3.49%			0.0494	0.0544	0.0488	0.0501	0.0496	0.0523	0.0487	0.0527	0.0489	0.0555
Czech Republic	7.47%					0.0438	0.0232	0.0432	0.0217	0.0433	0.0194	0.0429	0.0211
Ireland	3.16%							0.0485	0.0423	0.0483	0.0425	0.0481	0.0396
Greece	5.23%	0.0496	0.0602							0.0495	0.0648	0.0494	0.0612
Luxembourg	3.62%	0.0494	0.0547	0.0497	0.0532							0.0491	0.0576
Hungary	7.80%	0.0428	0.0182	0.0426	0.0198	0.0434	0.0212						
Austria	3.40%	0.0484	0.0451	0.0493	0.0534	0.0484	0.0499	0.0492	0.0534				
Poland	8.65%	0.0421	0.0176	0.0421	0.0217	0.0425	0.0171	0.0425	0.0191	0.0425	0.0110		
Portugal	6.20%	0.0470	0.0308	0.0459	0.0394	0.0473	0.0379	0.0464	0.0413	0.0467	0.0395	0.0462	0.0405
Slovakia	8.04%	0.0428	0.0205	0.0425	0.0202	0.0430	0.0193	0.0426	0.0180	0.0428	0.0162	0.0429	0.0191
Finland	3.11%	0.0481	0.0450	0.0487	0.0443	0.0475	0.0414	0.0485	0.0414	0.0479	0.0429	0.0483	0.0381
Estonia	7.23%			0.0440	0.0248	0.0442	0.0234	0.0435	0.0225				
Cyprus	5.33%					0.0500	0.0619	0.0490	0.0601	0.0490	0.0699		
Latvia	8.15%							0.0427	0.0197	0.0428	0.0175	0.0429	0.0202
Lithuania	8.52%	0.0424	0.0154							0.0427	0.0157	0.0427	0.0178
Malta	7.35%	0.0437	0.0216	0.0436	0.0267							0.0439	0.0199
Slovenia	5.91%	0.0479	0.0491	0.0469	0.0472	0.0478	0.0475						
President	4.54%	0.0509	0.0785	0.0503	0.0717	0.0504	0.0754	0.0504	0.0749	0.0504	0.0774	0.0504	0.0721
Greece2	5.23%	0.0502	0.0642	0.0488	0.0637	0.0498	0.0613	0.0488	0.0629	0.0496	0.0632	0.0489	0.0655
Italy2	3.98%	0.0499	0.0717	0.0504	0.0684	0.0495	0.0683	0.0501	0.0658	0.0498	0.0714	0.0500	0.0644
Spain2	4.89%	0.0504	0.0747	0.0497	0.0687	0.0508	0.0704	0.0497	0.0749	0.0504	0.0708	0.0500	0.0681
Germany2	3.44%	0.0484	0.0472	0.0493	0.0549	0.0485	0.0506	0.0490	0.0521	0.0485	0.0416	0.0494	0.0479
Austria2	3.40%	0.0487	0.0495	0.0502	0.0510	0.0517	0.0525	0.0532	0.0540	0.0547	0.0554	0.0562	0.0569

Source: Own calculations.

Table A2 - *MLE indices for a scenario with a heterogeneous EB: Composition with lowest preferences*

EBhet22LTT		Monat 1		Monat 2		Monat 3		Monat 4		Monat 5		Monat 6	
Country	Preferences	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS
Germany	3.44%			0.0501	0.0523	0.050028	0.054673	0.0503	0.0524	0.0501	0.0510		
Spain	4.89%	0.0496	0.0704			0.049814	0.067584	0.0485	0.0692	0.0496	0.0711	0.0487	0.0688
France	3.88%	0.0508	0.0626	0.0507	0.0626			0.0501	0.0616	0.0509	0.0618	0.0506	0.0615
Italy	3.98%	0.0511	0.0650	0.0502	0.0634	0.0508	0.0652			0.0508	0.0637	0.0506	0.0648
Netherlands	3.01%	0.0493	0.0439	0.0496	0.0461	0.0491	0.0444	0.0495	0.0469			0.0495	0.0463
Belgium	3.49%			0.0503	0.0544	0.0500	0.0565	0.0502	0.0568	0.0503	0.0552	0.0500	0.0570
Czech Republic	7.47%					0.0424	0.0274	0.0425	0.0304	0.0425	0.0263	0.0426	0.0288
Ireland	3.16%							0.0496	0.0480	0.0495	0.0491	0.0496	0.0460
Greece	5.23%	0.0486	0.0664							0.0480	0.0637	0.0477	0.0639
Luxembourg	3.62%	0.0503	0.0573	0.0502	0.0561							0.0498	0.0559
Hungary	7.80%	0.0424	0.0262	0.0419	0.0270	0.0423	0.0256						
Austria	3.40%	0.0498	0.0529	0.0500	0.0545	0.0500	0.0527	0.0501	0.0543				
Poland	8.65%	0.0419	0.0233	0.0424	0.0253	0.0419	0.0239	0.0420	0.0241	0.0417	0.0242		
Portugal	6.20%	0.0452	0.0450	0.0445	0.0496	0.0454	0.0451	0.0445	0.0461	0.0450	0.0438	0.0446	0.0460
Slovakia	8.04%	0.0421	0.0236	0.0419	0.0251	0.0420	0.0248	0.0420	0.0251	0.0417	0.0255	0.0424	0.0233
Finland	3.11%	0.0497	0.0470	0.0495	0.0479	0.0494	0.0473	0.0497	0.0470	0.0496	0.0451	0.0496	0.0439
Estonia	7.23%			0.0429	0.0331	0.0430	0.0297	0.0425	0.0322				
Cyprus	5.33%					0.0487	0.0609	0.0470	0.0619	0.0480	0.0636		
Latvia	8.15%							0.0421	0.0254	0.0418	0.0239	0.0421	0.0247
Lithuania	8.52%	0.0417	0.0218							0.0418	0.0222	0.0424	0.0250
Malta	7.35%	0.0424	0.0280	0.0426	0.0308							0.0427	0.0289
Slovenia	5.91%	0.0463	0.0503	0.0449	0.0536	0.0464	0.0511						
President	4.54%	0.0503	0.0715	0.0497	0.0688	0.0504	0.0730	0.0498	0.0701	0.0500	0.0697	0.0496	0.0694
Netherlands2	3.01%	0.0492	0.0426	0.0493	0.0470	0.0493	0.0454	0.0497	0.0472	0.0492	0.0445	0.0494	0.0427
Finland2	3.11%	0.0492	0.0471	0.0494	0.0474	0.0493	0.0485	0.0497	0.0460	0.0496	0.0437	0.0490	0.0456
Ireland2	3.16%	0.0499	0.0509	0.0497	0.0486	0.0495	0.0478	0.0502	0.0479	0.0499	0.0466	0.0494	0.0507
Austra2	3.40%	0.0505	0.0529	0.0503	0.0527	0.0501	0.0538	0.0501	0.0545	0.0499	0.0512	0.0500	0.0549
Germany2	3.44%	0.0499	0.0513	0.0502	0.0535	0.0503	0.0547	0.0498	0.0530	0.0502	0.0540	0.0498	0.0519

Source: Own calculations.

Table A3 - *MLE indices for a scenario with a heterogeneous EB: Composition with highest preferences*

EBhet22HTT		Monat 1		Monat 2		Monat 3		Monat 4		Monat 5		Monat 6	
Country	Preferences	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS
Germany	3.44%			0.0433	0.0540	0.042646	0.054177	0.0433	0.0528	0.0432	0.0548		
Spain	4.89%	0.0471	0.0545			0.047524	0.054838	0.0485	0.0535	0.0478	0.0552	0.0488	0.0563
France	3.88%	0.0438	0.0545	0.0442	0.0539			0.0446	0.0546	0.0440	0.0547	0.0447	0.0554
Italy	3.98%	0.0439	0.0546	0.0442	0.0540	0.0440	0.0543			0.0443	0.0554	0.0451	0.0560
Netherlands	3.01%	0.0418	0.0519	0.0421	0.0522	0.0420	0.0524	0.0426	0.0524			0.0424	0.0527
Belgium	3.49%			0.0431	0.0538	0.0427	0.0533	0.0435	0.0534	0.0432	0.0545	0.0435	0.0548
Czech Republic	7.47%					0.0521	0.0439	0.0518	0.0443	0.0518	0.0438	0.0515	0.0430
Ireland	3.16%							0.0431	0.0534	0.0426	0.0536	0.0429	0.0534
Greece	5.23%	0.0486	0.0546							0.0494	0.0557	0.0502	0.0551
Luxembourg	3.62%	0.0429	0.0537	0.0435	0.0535							0.0438	0.0541
Hungary	7.80%	0.0510	0.0425	0.0508	0.0423	0.0505	0.0420						
Austria	3.40%	0.0426	0.0531	0.0430	0.0536	0.0422	0.0536	0.0433	0.0537				
Poland	8.65%	0.0477	0.0390	0.0479	0.0388	0.0472	0.0387	0.0474	0.0391	0.0477	0.0381		
Portugal	6.20%	0.0538	0.0522	0.0543	0.0513	0.0532	0.0513	0.0551	0.0515	0.0545	0.0532	0.0554	0.0521
Slovakia	8.04%	0.0497	0.0412	0.0499	0.0414	0.0495	0.0407	0.0496	0.0410	0.0496	0.0401	0.0494	0.0398
Finland	3.11%	0.0421	0.0527	0.0423	0.0522	0.0420	0.0530	0.0428	0.0534	0.0427	0.0534	0.0428	0.0540
Estonia	7.23%			0.0528	0.0454	0.0524	0.0455	0.0526	0.0459				
Cyprus	5.33%					0.0494	0.0545	0.0508	0.0538	0.0500	0.0555		
Latvia	8.15%							0.0494	0.0409	0.0493	0.0400	0.0489	0.0390
Lithuania	8.52%	0.0480	0.0399							0.0480	0.0380	0.0477	0.0380
Malta	7.35%	0.0526	0.0453	0.0523	0.0444							0.0523	0.0438
Slovenia	5.91%	0.0527	0.0538	0.0533	0.0529	0.0522	0.0532						
President	4.54%	0.0455	0.0540	0.0464	0.0543	0.0458	0.0539	0.0468	0.0541	0.0464	0.0560	0.0469	0.0553
Hungary2	7.80%	0.0511	0.0414	0.0509	0.0423	0.0504	0.0414	0.0503	0.0423	0.0506	0.0411	0.0501	0.0414
Slovakia2	8.04%	0.0498	0.0411	0.0498	0.0406	0.0495	0.0411	0.0495	0.0407	0.0498	0.0409	0.0493	0.0405
Latvia2	8.15%	0.0496	0.0413	0.0497	0.0403	0.0493	0.0401	0.0493	0.0404	0.0493	0.0399	0.0490	0.0394
Lithuania2	8.52%	0.0481	0.0400	0.0483	0.0394	0.0477	0.0392	0.0480	0.0393	0.0482	0.0381	0.0478	0.0384
Poland2	8.65%	0.0476	0.0386	0.0480	0.0393	0.0476	0.0390	0.0478	0.0393	0.0475	0.0380	0.0475	0.0375

Source: Own calculations.

Table A4 - *MLE indices for a scenario with a homogeneous EB: Robustness check of the basic scenario*

EBhom22RC		Monat 1		Monat 2		Monat 3		Monat 4		Monat 5		Monat 6	
Country	Preferences	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS
Germany	3.49%			0.0315	0.0045	0.036104	0.0054622	0.0318	0.0043	0.0351	0.0042		
Spain	4.70%	0.0327	0.0032			0.0329507	0.0042458	0.0292	0.0038	0.0322	0.0047	0.0307	0.0049
France	4.00%	0.0349	0.0044	0.0304	0.0041			0.0307	0.0047	0.0343	0.0052	0.0322	0.0047
Italy	4.01%	0.0347	0.0046	0.0308	0.0046	0.0349	0.0051			0.0342	0.0040	0.0329	0.0046
Netherlands	3.17%	0.0363	0.0048	0.0324	0.0043	0.0360	0.0041	0.0322	0.0042			0.0339	0.0045
Belgium	3.57%			0.0315	0.0046	0.0356	0.0040	0.0316	0.0040	0.0352	0.0040	0.0333	0.0052
Czech Republic	6.55%					0.0321	0.0039	0.0310	0.0043	0.0315	0.0049	0.0320	0.0046
Ireland	3.44%							0.0319	0.0043	0.0351	0.0048	0.0337	0.0049
Greece	4.91%	0.0319	0.0048					0.0320	0.0042	0.0314	0.0037	0.0308	0.0045
Luxembourg	3.78%	0.0352	0.0045	0.0309	0.0047							0.0328	0.0042
Hungary	7.00%	0.0321	0.0045	0.0317	0.0031	0.0324	0.0038						
Austria	3.44%	0.0359	0.0042	0.0315	0.0039	0.0359	0.0045						
Poland	7.75%	0.0320	0.0031	0.0317	0.0040	0.0326	0.0035	0.0316	0.0035	0.0324	0.0038		
Portugal	5.89%	0.0309	0.0045	0.0297	0.0042	0.0314	0.0042	0.0299	0.0039	0.0311	0.0047	0.0312	0.0048
Slovakia	7.14%	0.0317	0.0045	0.0315	0.0034	0.0322	0.0039	0.0316	0.0037	0.0323	0.0047	0.0326	0.0041
Finland	3.33%	0.0359	0.0040	0.0322	0.0046	0.0364	0.0050	0.0319	0.0039	0.0355	0.0042	0.0338	0.0050
Estonia	6.48%			0.0307	0.0041	0.0325	0.0039	0.0308	0.0044				
Cyprus	5.06%					0.0324	0.0042	0.0291	0.0039	0.0317	0.0048		
Latvia	7.28%							0.0316	0.0037	0.0321	0.0043	0.0321	0.0044
Lithuania	7.50%	0.0324	0.0039							0.0321	0.0042	0.0326	0.0044
Malta	6.68%	0.0317	0.0038	0.0312	0.0035							0.0321	0.0047
Slovenia	5.38%	0.0315	0.0042	0.0290	0.0049	0.0319	0.0038						
EB	4.54%	0.5002	0.9370	0.5333	0.9373	0.4945	0.9362	0.5331	0.9391	0.5037	0.9337	0.5132	0.9306

Source: Own calculations.

Table A5 - *MLE indices for a scenario with a homogeneous EB and 27 members of the euro zone*

EBHom27TT		Month 1		Month 2		Month 3		Month 4		Month 5		Month 6	
Country	Preferences	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS	MLE index	AS
Germany	3.44%			0.0286	0.0031	0.0214	0.0021	0.0255	0.0019	0.0254	0.0019		
Spain	4.89%	0.0212	0.0031			0.0210	0.0028	0.0233	0.0024	0.0223	0.0022	0.0341	0.0043
France	3.88%	0.0229	0.0032	0.0291	0.0029			0.0251	0.0028	0.0240	0.0023	0.0314	0.0045
Italy	3.98%	0.0227	0.0030	0.0293	0.0031	0.0207	0.0027			0.0237	0.0021	0.0313	0.0052
UK	3.41%	0.0239	0.0027	0.0285	0.0026	0.0215	0.0023	0.0258	0.0020			0.0312	0.0050
Belgium	3.49%			0.0285	0.0025	0.0211	0.0027			0.0251	0.0021	0.0307	0.0046
Czech Republic	7.47%			0.0355	0.0028	0.0291	0.0023			0.0256	0.0023	0.0358	0.0035
Denmark	2.12%			0.0283	0.0025	0.0227	0.0021					0.0321	0.0043
Ireland	3.16%			0.0281	0.0028	0.0215	0.0019					0.0311	0.0050
Greece	5.23%					0.0217	0.0029	0.0236	0.0018			0.0358	0.0042
Luxembourg	3.62%					0.0212	0.0024	0.0253	0.0024			0.0312	0.0056
Hungary	7.80%	0.0234	0.0020			0.0291	0.0022	0.0253	0.0016				
Netherlands	3.01%	0.0246	0.0021			0.0218	0.0021	0.0263	0.0017				
Austria	3.40%	0.0238	0.0028					0.0257	0.0022	0.0251	0.0020		
Poland	8.65%	0.0236	0.0023					0.0250	0.0020	0.0255	0.0022		
Portugal	6.20%	0.0219	0.0023	0.0369	0.0026			0.0247	0.0018	0.0234	0.0022		
Romania	9.79%	0.0236	0.0022	0.0325	0.0023			0.0245	0.0016	0.0255	0.0023		
Finland	3.11%	0.0246	0.0024	0.0283	0.0028					0.0254	0.0020	0.0312	0.0045
Sweden	3.07%	0.0246	0.0022	0.0281	0.0024					0.0261	0.0019	0.0309	0.0036
Bulgaria	11.49%			0.0319	0.0024			0.0244	0.0020				
Estonia	7.23%			0.0358	0.0023					0.0259	0.0025		
Cyprus	5.33%			0.0348	0.0040					0.0224	0.0021		
Latvia	8.15%					0.0291	0.0026			0.0257	0.0022		
Lithuania	8.52%					0.0283	0.0028					0.0346	0.0030
Malta	7.35%	0.0234	0.0022			0.0297	0.0022					0.0355	0.0034
Slovenia	5.91%	0.0215	0.0024					0.0243	0.0017			0.0369	0.0054
Slovakia	8.04%	0.0233	0.0023					0.0254	0.0016				
Executive Board	4.36%	0.6510	0.9629	0.5358	0.9590	0.6402	0.9638	0.6258	0.9705	0.6289	0.9677	0.5062	0.9338

Source: Own calculations.