

**MONETARY POLICY IN EMU:
A VOTING-POWER ANALYSIS OF
COALITION FORMATION IN THE EUROPEAN CENTRAL BANK***

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Abstract:

On January 1st, 1999, the European Central Bank (ECB) has started operating a common monetary policy on behalf of the 11 founding members of the European Monetary Union (EMU). There is a legitimate concern about the practicalities and the effectiveness of the decision-making process inside the ECB. This paper addresses this concern by using standard measures of voting power (as well as some of their extensions) to quantify what is likely to be the relative influence of individual EMU members on common monetary-policy decisions. Postulating the *a priori* formation of certain voting coalitions, it shows, among others, that the 6-member Executive Board (EB) can claim, in certain circumstances, voting power of up to 66%, but policy impact of only up to 25%, i.e. respectively much more and much less than its number of votes would imply (6 out of 17, i.e. 35.3%). Also, it is not at all clear that the 6 countries which managed to elect one of their nationals at the EB have an interest in pressing the 6 EB members to vote along national rather than EMU-wide lines, or that EMU member countries with no representative at the EB are necessarily worse off (from a voting-power perspective) when each EB member focuses on his or her own country's developments, rather than on EMU-wide aggregates..

KEYWORDS: Central Banks, Monetary Policy, Voting Power, European Monetary Union

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I. INTRODUCTION

On January 1st, 1999, the European Central Bank (ECB) has duly started operating a common monetary policy on behalf of the 11 members of the European Monetary Union (EMU). Some financial commentators have already realised that the specificity of the ECB's decision-making process may affect the effectiveness of its monetary policy. W. Münchau contends in *Financial Times* (1998b) that “one of the potential weaknesses of the new arrangements is the possibility of national coalition building. Like-minded central bank governors might collude to push their national interests”, and in particular that “the national governors' majority could make collusion tactics feasible”.

A number of researchers have also expressed some concern about the details and practicalities of the decision-making process inside the ECB, or about whether it is likely to satisfy the “median” voter in the EMU (Alesina & Grilli, 1991; Dornbusch, Favero & Giavazzi, 1998; Eichengreen, 1991; Von Hagen, 1998). Others have constructed theoretical models of monetary policy under EMU which capture the specific features of collective decision-making by committee members faced with heterogeneous incentives (De Grauwe, Dewachter & Aksoy, 1998; Tarkka, 1997; Vaubel, 1999; Von Hagen, 1995 and 1998; Von Hagen & Süppel, 1994).

There is clearly a legitimate worry about the extent to which, given the ECB's institutional structure, the potentially conflicting interests of EMU member countries may adversely influence the inflationary performance of their common monetary policy. This paper addresses this concern by using standard measures of voting power (as well as some of their extensions) to quantify each EMU member-country's theoretical “power” to influence a given vote on monetary policy, such as the ones which periodically take place inside the ECB to set the level of its policy instrument.

Such an approach makes it possible, for a number of plausible patterns of coalition formation among EMU members, to quantify explicitly the *a priori* influence of each EMU member country on monetary-policy decisions. That influence is made dependent, first, on whether members of the ECB's Executive Board (EB) are assumed to care for EMU averages or about national variables, and second, in the latter case, on whether or not a given EMU member has managed to have one of its nationals elected as an EB member, as well as on the identity of all other EB members.

This analysis of EMU-wide monetary policy in terms of voting power allows us to cast new light on a number of important empirical questions, among which:

- how desirable is it, for EMU member countries, to encourage EB members to adopt a European perspective in their monetary-policy deliberations, and is there any difference in this respect between the 6 countries with one of their nationals at the EB and the 5 other countries ?
- how justifiable is the claim that “big” countries (e.g. in terms of relative GDP) have significantly more influence on common European monetary-policy decisions than “small” countries, in particular when they shift their *a priori* stance ?
- what are the most-desirable and least-desirable patterns of *a priori* coalition formation for each EMU member country, and in which way are they influenced by the most- and least-desirable patterns of coalition formation for all other EMU members ? ¹

The paper is structured as follows: some essential features of the measures of power used in the computations are outlined in section II; those institutional characteristics of the ECB which are relevant for the analysis are described in section III; section IV introduces some working assumptions, and constructs the scenarios on which the simulations are to be based; simulation results are presented and analysed in section V; section VI concludes.

II. MEASURES OF POWER

An abundant theoretical literature exists on how to measure a voter’s “power” in a group where decisions have to be taken collectively². The purpose of this section is only to describe the main defining characteristics of “voting power” in general, and to introduce the various concepts which will be used in section V to analyse the influence of EMU member countries on the ECB’s monetary-policy decisions.

¹ A companion paper (Mangano, 1999) extends the analysis to future EMU enlargement(s), and discusses, among others, the voting-power consequences (hence the relative desirability) of various potential EMU enlargement(s) on current EMU members, which may determine the latter’s relative enthusiasm or reluctance to accept some candidates rather than (or together with) others.

² The interested reader is referred to Banzhaf (1965), Deegan and Packel (1983), Holler (1982), Holler and Packel (1983), W. Lucas (1983, 1988), Packel and Deegan (1980), Shapley and Shubik (1954) or Straffin (1983, 1988) for more detailed considerations.

Contrary to preliminary intuition, voting shares are generally a poor indicator of voting power, or to put it in W. Lucas's (1983) words, "the ability to cast more ballots does not in itself necessarily increase one's power nor does it so in a directly proportional way"³. Instead, what matters in a collective voting body is the *a priori* influence of a member on decisions to be taken by vote; accordingly, that member's "voting power" is measured by the *a priori* probability that he will be "crucial" in the determination of the outcome of an arbitrary binary vote⁴. That measure of power tries to answer the question: How likely is each member of the voting body to "make a difference" to a voting outcome?⁵

The main practical distinction between the three indices presented below lies precisely in their interpretation of what "crucial" means, with their different definitions being dependent on the concepts of Minimum Winning Coalition (MWC) and Winning Decisive Set (WDS).

II.1. THE SHAPLEY & SHUBIK INDEX (SSI)

The Shapley-Shubik Index (SSI) abstracts itself from the two concepts of MWC and WDS. It simply considers all possible permutations of voters in a voting game, and counts towards a member's voting power those permutations where he is "pivotal", i.e. where he turns them from losing into winning ones when he joins them. For the SSI, "crucial" is therefore taken as meaning pivotal.

Consider a simple majority voting game $M_n = (N, W)$, where N is the set of n players $\{1, 2, \dots, i, \dots, n\}$ and W is the set of "Winning Coalitions", those (unordered) groupings S of s players ($s \leq n$) whose combined votes sum up to at least the quota needed for a decision to be taken. Voter i 's power according to the SSI is then given by:

³ W. Lucas (1983), p. 184. See the discussion on "weak monotonicity" below (subsection II.3).

⁴ The probabilistic approach to measuring voting power is advocated by Widgrén (1994b) on the grounds that "although it does not model the players' behaviour, it does measure each player's potential abilities to change the result alone" (p. 1154). It can also be interpreted as yielding the equilibrium distribution of power in an infinitely-repeated voting game, where the identity of the voters (and hence their number) is constant, but where the subject of the vote is random.

⁵ For obvious reasons, and whatever the index used, if the case arises where a voter (or an indivisible group of voters) has enough votes to reach (or exceed) the required majority on its own, it is described as a "dictator"; by extension, when a voter (or an indivisible group of voters) turns out to have enough votes for a quota to be unattainable without its participation, it is said to have "veto power". See W. Lucas (1983), p. 188.

$$SSI_i = \sum_{s: S-\{i\} \notin W} \frac{(s-1)!(n-s)!}{n!}, \quad (1)$$

or the total number of his “pivots” divided by the total number of permutations⁶.

One of the SSI’s potentially unpleasant characteristics is that to calculate each participant’s power, it takes into account the specific order in which they cast their vote; another is that it relies on the assumption that the individual probability distributions over all voting outcomes are homogeneous across voters. The meaning and consequences of the latter assumption are discussed, and a relaxation of it suggested, in subsection II.4.

II.2. THE STANDARDISED BANZHAF INDEX (SBI)

The Standardised Banzhaf Index (SBI) restricts its attention to MWCs. Consider again the simple majority voting game $M_n = (N, W)$ described in subsection II.1. MWCs are then defined as Winning Coalitions where at least one voter is “essential”, i.e. where that voter would “swing” them from winning to losing ones if she left them. Formally, for an arbitrary coalition S to belong to the set \mathbf{m} of MWCs requires:

$$\{S \in \mathbf{m}\} \Leftrightarrow \{S \in W, \exists i \in S : S - \{i\} \notin W\}.$$

The SBI then counts towards a player’s voting power those MWCs where she is “crucial”, in the sense of being essential; accordingly, voter i ’s power as measured by the SBI is given by the number of MWCs where she is essential divided by the sum of these numbers over all voters, i.e.:

$$SBI_i = \frac{|\mathbf{m}_i|}{\sum_{j=1}^n |\mathbf{m}_j|} \quad (2)$$

(where $|\cdot|$ denotes the cardinality), or in other words, voter i ’s share of all possible critical “swings”⁷.

⁶ The formula takes into account the fact that there are $(s-1)!$ orders in which the other $s-1$ players belonging to S can enter S before i , and $(n-s)!$ orders in which the remaining $n-s$ players can be added to S to form N .

It is again worth mentioning two of the SBI's defining features. First, in a symmetric way to the SSI, it assumes that the voters' individual probability distributions over all voting outcomes are independent from each-other (also see subsection II.4). Second, as the next subsection illustrates, it is likely to overestimate a voter's influence on voting outcomes because of its reliance on MWCs.

II.3. THE HOLLER & PACKEL INDEX (HPI)

By definition, a coalition can be a MWC for one or several of its members, but not necessarily for all of them. Those voters for whom the coalition is not a MWC are called “dummy voters”, or “free riders”⁸; the Holler-Packel Index (HPI) precisely eliminates the MWCs in which there are free riders by only considering the subset $\mathbf{m}^D \in \mathbf{m}$ of W where all voters are essential (they can then each be described as “decisive”), which is the set of WDSs.

Formally, for S to belong to \mathbf{m}^D requires:

$$\{S \in \mathbf{m}^D\} \Leftrightarrow \{S \in W, S - \{i\} \notin W \forall i \in S\}.$$

For the HPI, a voter is thus considered as “crucial” when he is decisive, and his power is given by:

$$HPI_i = \frac{|\mathbf{m}_i^D|}{\sum_{j=1}^n |\mathbf{m}_j^D|}, \quad (3)$$

i.e. his share of the total number of “swings” in the subset \mathbf{m}^D of all W .⁹

Widgrén (1994a) points out that the HPI is a more accurate indicator of the policy impact of each particular voter¹⁰. The SBI, instead, is likely to overestimate a voter's influence on policies by potentially counting towards her voting power several coalitions in which she is essential, but which all lead to an identical policy outcome, since they differ only by the addition of one or more dummy voter(s).

⁷ When discussing two other potentially interesting indices (Coleman's “initiative” and “blocking” power indices), Nurmi (1981) points out that the SBI is a “proportional transformation of either one of [them]” (p. 206).

⁸ These coalition members are described as such because, although their vote is not decisive for the outcome, they still get a positive share of the payoff, since they are of the same opinion than the MWC on the issue at stake.

⁹ For original axiomatic properties of the HPI, see Deegan & Packel (1979) and Holler & Packel (1983).

¹⁰ The discussion of the simulations' results in section **Erreur! Source du renvoi introuvable.** will take into consideration this property of the HPI.

As a matter of fact, the following relationship can be shown to hold between SBI and HPI:

$$SBI_i = (1-p)HPI_i + p \cdot FRI_i, \quad (4)$$

where FRI is a Free Rider Index given by:

$$FRI_i = \frac{|m_i| - |m_i^D|}{\sum_{j=1}^n (|m_j| - |m_j^D|)}, \quad (5)$$

and p ($0 \leq p \leq 1$) expresses the fixed proportion of outcomes in which voters are essential (exert voting power), but not decisive (do not exert any policy power), i.e.:

$$p = \frac{\sum_{j=1}^n (|m_j| - |m_j^D|)}{\sum_{j=1}^n |m_j|}. \quad (6)$$

Furthermore, Peters (1996) stresses that, when voting power is measured through HPI, it is perfectly possible for players with fewer votes to exert more power than players with more votes, while both the SSI and SBI are “always weakly monotonic in the voting weights”¹¹.

It is difficult to determine whether or not one of the discussed indices is “more appropriate” than the others for the purposes of this paper; however, their axiomatic and probabilistic interpretations offer a few suggestions¹². Intuitively, the homogeneity assumption sustaining the SSI looks a little extreme, but for games with a relatively large number of players, it approximates the case in which each player has a fair chance of convincing other players of its point of view, or in which players have a relatively homogeneous background. On the other hand, while for larger games, the SBI and HPI approximate situations where convincing each-other is very difficult (or where the players have relatively different backgrounds), for smaller games, the independence assumption they depend upon seems more realistic. As for the SSI's reliance on the order in which voters cast their vote, and thus its use of permutations (in contrast to the SBI's and HPI's use of combinations), Straffin (1988)

¹¹ Peters (1996), p. 228. See Brams & Fishburn (1994) for an illustration [and Fishburn & Brams (1994) for a theoretical justification] of the possible inverse relationship between (relative) weight and “bargaining power”, in a context where only Winning Decisive Sets are formed.

¹² See Straffin (1983), section 3, or Straffin (1988) for a detailed argument.

argues that “the permutation–combination distinction between the indices is illusory, because both [the SSI and SBI] indices can be derived from a simple probability model of voting in which order plays no part”, so that “the important distinction between the indices has to do with the degree of statistical independence among the voters” (p. 74)¹³.

As far as those basic indices of voting power are concerned, therefore, an opinion on their appropriateness ultimately seems to rest, first, on whether we are modelling a “large” EMU or a more restricted one; second, on whether we think that *a priori*, the Central Bankers involved in each of those scenarios are more likely, when discussing the course of European monetary policy, to be easily swayed or not by their colleagues’ views; and third, on whether we wish to measure each country’s actual impact on EMU monetary-policy decisions, rather than its theoretical voting power. In section V, numerical results will anyway be presented for all of these three indices (including their extensions discussed below), taking into account these theoretical considerations.

II.4. EXTENSIONS OF BASIC INDICES

Some of the specific features of monetary-policy voting in the ECB are not properly captured by the underlying assumptions of the original indices; a few refinements may help to correct this inadequacy.

Both the assumptions of perfect homogeneity (SSI) and of perfect independence (SBI and HPI) of individual probability distributions over all voting outcomes imply that, in the computation of the standard measures of voting power presented above, each coalition is considered as likely to occur as any other¹⁴. This, however, does not seem to satisfy our modelling requirements accurately: given the specific subject of voting we are attempting to analyse (the general direction of European monetary policy), the probability of each coalition forming itself is instead very likely to depend on a number of endogenous or exogenous factors (further discussed in section IV) which affect the

¹³ Another way of gauging voting-power indices is devised by Felsenthal & Machover (1995), who propose a number of “intuitively compelling postulates that any reasonable index of voting power ought to satisfy” (p. 195), leading to three “paradoxes” with respect to which each index can be evaluated. Their results suggest that the SSI is the most theoretically-rigorous (since none of the paradoxes applies to it), while the SBI and HPI should, on theoretical grounds, be respectively “regarded as seriously flawed” and “disqualified as a reasonable measure of relative voting power” (p. 225). Turnovec (1997) also examines the compliance of these 3 indices (plus 2 related others) with 5 axioms, and finds that the SSI satisfies all of them, while the SBI and HPI fail to satisfy one, respectively two of these axioms.

¹⁴ For a proof and an illustration, see Straffin (1983), pp. 298-300.

preferences of each of its potential members. We therefore need to relax those assumptions slightly, and introduce “partial” homogeneity into the computation of those 3 indices¹⁵.

A flexible way of differentiating between various potential coalitions with respect to their probability of forming is by using the concept of “policy distance”. Assume that all n voters can be distributed along j sequential partitions ($j > 2$)¹⁶ according to their expected stance on the policy to be adopted or rejected by vote (e.g. $j = 5$, with the partitions being “strongly against – against – neutral – in favour – strongly in favour”)¹⁷. The (absolute value of the) number of partitions between any two voters a and b , $|j_a - j_b|$, is taken as a measure of the “policy distance” separating them; it thus ranges from a minimum of 0 if the two are in the same partition, to a maximum of $j-1$ if the two are at opposite extremes of the partitions spectrum, i.e. $0 \leq |j_a - j_b| \leq j-1$. If that distance is below (or equal to) a pre-defined threshold, a and b are said to be “mutually acceptable” as partners in a joint coalition, and thus any coalition in which they both appear (as well as any other voter who is acceptable to all the other coalition members) is given a positive *a priori* probability of forming; by contrast, a coalition in which the distance between any two voters is above the threshold will carry a zero *a priori* probability of forming¹⁸.

¹⁵ The refinement discussed below—and subsequently used in this paper's computations—is based on suggestions by Rattinger (1981); another refinement, mentioned in footnote 18 but not introduced in this version of the paper, is advocated by Widgrén (1994a).

¹⁶ $j = 2$ is ruled out because it would be meaningless unless a threshold of 0 is imposed, and this would yield identical results to the case of 2 voting groups; the latter are discussed in footnote 18. Note, however, that it is not necessary to restrict j to a value smaller than or equal to n .

¹⁷ In the context of monetary-policy voting, an intuitive partitioning would be given by $j = 3$, with the partitions being “contractionary – neutral – expansionary”; this will be the option chosen in subsection IV.2.

¹⁸ A second refinement, similar to that suggested by Kirman & Widgrén (1995), consists in postulating the existence of m exogenously-predetermined voting group(s) of s_k like-minded players ($0 < m < n$, $\sum_{k=1}^m s_k \leq n$), again based on each voter's expected stance on the specific issue to be resolved. In this set-up, all n voters need not belong to a group, but those who do are assumed to show greater commitment to their fellow group members than under the voters-partitioning assumption: whenever any player which belongs to group k enters (or leaves) a coalition, all other $s_k - 1$ players belonging to group k enter (or leave) the coalition with her. Given that such rigid commitments are unlikely to hold in the context of European monetary policy-making, the simulations based on this set of assumptions are not discussed in section V, although their results are available from the author upon request. For another application of such “bloc” voting to decisions related to the Stability and Growth Pact, see Sutter (1999).

The application of this extension will be crucial in section V to quantify the effect, on each EMU member's voting power, of the scenarios discussed in subsection IV.2. Before that, however, it is necessary to have a very accurate understanding of how decisions on monetary policy are supposed to be taken by the ECB. The next section examines what EMU's founding treaties have to say on the ECB's operational structure in the area of monetary policy-making.

III. STRUCTURAL FEATURES OF THE ECB

Given the focus of the paper, this section only examines those features of the ECB's statutes which determine the institutional framework for the day-to-day conduct of monetary policy under EMU¹⁹. The provisions of the Treaty and Protocol (European Commission, 1991a and 1991b) concerning the ECB's role in banking supervision and exchange-rate policy will not be detailed here, since they are outside our direct concern²⁰.

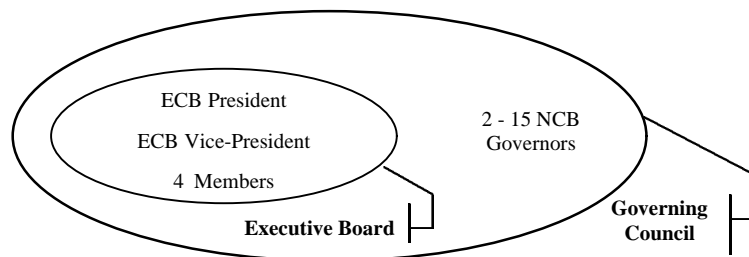
When entering EMU, each EU member country delegates its monetary-policy responsibilities to the ECB's two decision-making bodies (Treaty Art. 106(3), 109a(1) and 109a(2)(a), reproduced as Protocol Art. 9.3, 10.1, and 11.1), schematically represented in Figure 1:

- an Executive Board (EB), comprising the ECB's President, its Vice-President and 4 other EB members;
- a Governing Council (GC), consisting of all EB members plus the Governors of EMU member countries' Central Banks (National Central Bank, or NCB, Governors)²¹.

¹⁹ What the ECB's exact *operational* framework will be is still unclear, despite efforts by the ECB to clarify its strategy (European Central Bank, 1998); see Bini Smaghi (1996), European Commission (1997a, 1997b) and European Monetary Institute (1997), as well as the references therein, for detailed considerations on the topic.

²⁰ For a discussion of these and other issues directly related to the ECB's Statutes, see Giovannini (1992).

²¹ Two other bodies, with essentially advisory or consultation functions, are also created at the start of Stage 3 of EMU (January 1st, 1999): an Economic and Financial Committee (Treaty Art. 109c(2)), and a General Council (Treaty Art. 109l(3); Protocol Art. 45-47); see also Goodhart (1993). These bodies will not, however, be involved in the monetary-policy decisions of the ECB.

Figure 1

Protocol Art. 12.1 formally defines the respective duties of these two concentric decision-making bodies. It unambiguously attributes strategic responsibilities to the GC (it “shall adopt the guidelines and make the decisions necessary to ensure the performance of the tasks entrusted to the ESCB”), while the EB’s tasks are merely of an operational kind (it “shall implement monetary policy in accordance with the guidelines and decisions laid down by the Governing Council”).

Since, still in the words of Protocol Art. 12.1, it falls on the GC to “formulate the monetary policy of the Community”, it is this body’s composition and formal decision-making procedures which will be the object of this paper’s scrutiny. In particular, its voting rules are determined by Protocol Art.10.2: decisions are to be taken by simple majority on a one member – one vote basis, except when the vote is tied, in which case the ECB’s President has a casting vote. In terms of voting power, the ECB’s Vice-President will therefore have no particular advantage over other GC members, while the President may, in certain circumstances, find himself in a very powerful position²²; this may shed new light on the insistence of some EMU member countries at having one of their nationals elected as ECB President²³.

²² This requires, of course, an even number of GC members, a situation which is likely to arise only when EMU accepts new entrants (since there are 11 EMU founders, and thus 17 current GC members); see Mangano (1999) for a discussion of the voting-power effect on current EMU members of the UK’s, Sweden’s, Greece’s and/or Denmark’s entry into EMU.

²³ This insistence could also be linked to Knott’s (1986) description of the Fed (and FOMC) Chairman as “the gatekeeper and spokesman for the system, which gives him great advantage over other members” (p. 199) (although it is not clear how, in practice, this advantage would materialise), or to Krause’s (1996) observation that “control of the agenda enables the chair [...] to influence decision making to a large extent” (p. 85). These contentions, however, seem to be empirically contradicted by Chappell, Havrilesky & McGregor (1995), who find they “cannot reject the hypothesis that the weight of the Chairman [in policy deliberations] is identical to that of other FOMC members” (p. 123).

Formally, given the simple-majority rule, each of the GC's monetary policy decisions (on whether to increase, decrease or leave unchanged the ECB Funds rate) can be described by a weighted voting game of the form²⁴:

$$M_n = \begin{cases} \left[\left[\frac{\sum_{i=1}^n w_i + 1}{2}; w_1, w_2, \dots, w_i, \dots, w_n \right] & (n \text{ odd}) \\ \left[\left[\frac{\sum_{i=1}^n w_i}{2} + 1; w_1, w_2, \dots, w_i, \dots, w_n \right] & (n \text{ even}) \end{cases},$$

where the first term in the square brackets is the quota (majority) needed for a decision to be taken, and the w_i s are the weights (number of votes) of each player, in our case, of each country represented in the GC (see next section for a discussion of what the value of those w_i s can be)²⁵.

It is one thing, however, to say that each GC member has one vote in the regular deliberations on monetary policy, but quite another to speculate on how that vote will be used in practice. Outside observers may be entitled to ask, Will some GC members vote systematically with some others? Are those potential alliances likely to shift across time? Will EB members' attitude in this respect differ from that of all other GC members? This paper is not directly interested in the relative likelihood of these (and related) conjectures; its main objective is instead to examine what can be the effect of those various patterns of voting behaviour on each member-country's (theoretical) voting power. The next section introduces (and briefly justifies) what are considered as plausible assumptions about GC members' voting behaviour, and constructs a number of conceivable voting scenarios. The distribution of voting power in those scenarios will be computed and compared in the following section.

²⁴ See W. Lucas (1983).

²⁵ The expression for the quota in this weighted voting game is specific to the game being considered; more generally, the quota can be any number q which satisfies $(\sum_{i=1}^n w_i) / 2 < q \leq \sum_{i=1}^n w_i$; see e.g. part 2 of Felsenthal & Machover (1995).

IV. ASSUMPTIONS AND SCENARIOS

In order to calculate what might be the theoretical power of each current EMU member over common monetary-policy decisions, it is necessary, first, to define a few operating assumptions, based on the ECB's structural characteristics outlined in section III, and second, to characterise a number of plausible voting patterns, based on EMU's current membership and on those members' expected preferences over monetary policy.

IV.1. ASSUMPTIONS

The computations of section V will contrast the voting-power consequences of two sets of basic assumptions. First, EB members will be considered as an entirely separate entity, caring exclusively about (GDP-weighted) EMU-wide averages, while all other GC members, regardless of their previous anti-inflationary credentials, will be seen as defending their own country's interests at the ECB. EB members will be described as "non-partisan", in the sense that their position will not necessarily conform with the specific needs of their country of origin; their voting power will be (collectively) attributed to a supranational entity, to be called "EMU-11". By contrast, every NCB Governor will be supposed to embody his nation's preferences when voting on EMU-wide monetary policy, and the voting power he exerts will be counted towards his country's relative influence. Under that set of assumptions, there will thus effectively be 12 players in the game, one for each EMU member country (carrying a single vote), and one for EMU-11 (carrying 6 votes)²⁶.

In the second set of assumptions, all GC members, including EB members (who will then be described as "partisan"), will be deemed to behave in the same way: they will all care exclusively for their country of origin, and their vote will directly be attributed to that country. For voting-power calculation purposes, this simply boils down to analysing a game of 11 players, with each EMU member country having 2 votes when one of its representatives sits on the EB (1 through that representative, 1 through its NCB Governor)²⁷, and 1 vote when it has no such representative²⁸.

²⁶ This set of assumptions seems to conform with the view adopted by a number of outside commentators; see e.g. *Financial Times* (1998b).

²⁷ With an even number of EMU members, infinitesimally more than 2 votes would have to be given to the country whose representative is the ECB President (in order to account for the ECB President's casting vote in case of a tie). However, this case may only arise with future EMU enlargements; see Mangano (1999).

There are a number of intuitive reasons to assume that the CB Governors of EMU member countries will push for the monetary policy which most favours their region. First, an analogy with the US Federal Reserve seems to support this intuition. Knott (1986) contends that “the presidents’ [NCB Governors’, in ECB’s case] preferences tend to reflect the regional, industrial and commercial interests in their constituencies” (p. 205); he is echoed by Gildea (1992), who produces convincing evidence that “presidents [...] are seemingly influenced by [...] their primary constituency” (p. 224). Krause (1996) relies on past research to suggest that “Board of Governors and Regional Bank Presidents [...] are fundamentally different since they serve different contractual principals” (p. 90), a statement which is documented by Chappell, Havrilesky & McGregor (1995).

Earlier studies of the ECB seem to concur. Dornbusch, Favero & Giavazzi (1998) find it “plausible to assume that [the] bank presidents would respond to local conditions either in a direct partisan way or else because local conditions, beyond the numbers, shape their perception” (pp. 26-27). De Grauwe, Dewachter & Aksoy (1998) assume throughout their simulations that “the presidents of [national] central banks [...] use the national values of output and inflation to determine their position on the interest rate” (p. 18). Von Hagen (1998), comparing their appointment procedure with that of EB members, contends that “NCB [National Central Bank] Presidents will feel strong ties to their home countries and a need to bring their national monetary policy interests to bear in council meetings” (p. 3-4). Von Hagen & Süppel (1994) build their model of monetary policy-making in a monetary union around the presumption that “country representatives [in the Council] consider inflation and employment in their home countries as relevant targets” (p. 777). Alesina & Grilli (1991) seem to agree that national CB Governors will faithfully represent their home country at the ECB when they write that “the ECB policy will be decided by a Council that is composed [among others] by the national central bank governors. Therefore, *each country* has the opportunity to participate and affect the policy choice through its central bank governor” (p. 22, emphasis added)²⁹.

²⁸ Such a procedure is implicitly supported by De Grauwe, Dewachter & Aksoy (1998), according to whom the fact that “in the ECB there will be [...] a President, a Vice-President and four Directors who will also cast their vote [...] implies that some countries will have more than one vote in the [Governing] Council” (p. 3). Brueckner (1997) also recognises the validity of the procedure by stating that “it might be assumed that the members of the [Executive] Board have the same utility function as the [Central Bank] governor of their country of origin. This implies that countries with members in the Board have accordingly more voting weights” (p. 6).

²⁹ Note, however, the different opinion of Bini Smaghi (1996), according to whom the fact that “each member of the ECB Governing Council has the same vote [...] creates a strong presumption for the members of the governing bodies to take their decisions in the interest of the whole Union” (p. 15). Bruni (1996) also contends that “the statute

The national-bias assumption may seem less realistic in the case of EB members, and in particular of the ECB President³⁰. However, in view of the political intrigue that surrounded the appointment of the first such President³¹, and given the considerable amount of national prestige involved in the appointment of the remaining EB members, the governments of EMU members are likely not to refrain from seeking to press their national representative in the EB (if they have one), despite the fact that they are formally forbidden to do so by the ECB's Statutes (Treaty Art. 107, reproduced as Protocol Art. 7)³². Furthermore, one can reasonably expect EB members themselves to be particularly sensitive to their home country's economic prospects, whatever their claims to impartiality and euro-mindedness. This point of view is shared by Vaubel (1999), in whose simulations "each member of the Executive Board is assumed to share and represent the inflation preferences of the government which has appointed her" (p. 4), and by Dornbusch, Favero & Giavazzi (1998), according to whom "when an issue of difference arises, a French appointee would vote in the style of France, and a German, as predictably, in the way of the Bundesbank" (p. 26). Bindseil & Hantke (1997), in their discussion of power in all of the EU's decision-making institutions, also assume that "all individual members of the different EU organs always vote in the national interest of their home country", and stress that "even if this were not always the case [...], this would not systematically change the power distribution, if such 'disloyalty' occurred equally among all member states and was not too frequent" (pp. 173-174). Practically, therefore, assuming a domestic bias for all GC members, as is done in the second set of assumptions, should not be too far

of the ECB has been organised in such a way as to favour the making of decisions in the 'supernational interest' ", and that "the role of the Governors of the NCBs should not be to represent their national interests and form coalitions to this end" (p. 22).

³⁰ This presumption seems to be turned on its head by Chappell, McGregor & Vermilyea (1997) who, in their introduction to a study of the FOMC during the 1970-1978 period, contend that "Bank presidents are not direct political appointees and may therefore be less responsive to political pressures than Governors [EB members, in ECB's case]" (p. 4).

³¹ *Pour mémoire*, France pushed for one of its nationals to get the ECB President job instead of everyone else's Dutch favourite, and finally got a loose commitment from the latter to retire in favour of the former approximately half-way through his 8-year legal term; see, for instance, *Financial Times* (1998a).

³² Whether the lack of transparency in the GC's decision-making process (notably, its refusal to publish the minutes of its fortnightly meetings) is likely to reinforce or weaken the incentive for national governments to do so is still disputed; see Svensson (1998) for a convincing argument in favour of transparency, as well as the contrasting opinions of O. Issing (EB member at the ECB) and W. Buiter (member of the Bank of England's Monetary Policy Committee) in *Financial Times* (1988c).

of the mark; but it will be interesting to contrast in section V the voting-power outcomes of the two competing sets of hypotheses.

IV.2. SCENARIOS

As of January 1st, 1999, the 11 NCB Governors at the ECB have had to agree, together with the 6 EB members (whether or not the latter are seen as additional country representatives), on a single monetary policy for the whole EMU area. As time goes by, occasional (even regular) disagreements between them are almost certain to surface, most likely for two types of reasons: either macro-economic developments in some of the member countries will conflict with those of others³³; or purely geo-political motives will induce some member countries to side with—or against—some others.

This subsection suggests two plausible voting scenarios where, unlike in the “baseline” case, each member state’s voting power is not simply based on its number of votes in the GC; instead, in these scenarios, the identity of those fellow voters with whom it is, *a priori*, expected to collude also matters. Such partitioning of voters in the GC is assumed to be influenced by one of the two motives discussed above.

Consequently, the first scenario, the “Macro” (or “M”) scenario, draws on available forecasts³⁴ of the variables which are most likely to affect the preferences of each member country on monetary policy, namely “price” indicators (i.e. forecasted variations in implicit GDP & private-consumption deflators)³⁵. Schematically:

Scenario M: NL + FI + SP + IR _____ IT + PL _____ D + F + BE + LX + Ö (+ EMU-11)

³³ Brueckner’s (1997) comparison of different voting mechanisms inside the ECB’s GC is based on the same assumption; for a formal treatment of the possible mechanism sustaining it, see, among others, Giovannetti & Marimon (1998).

³⁴ Extracted from OECD (1998).

³⁵ Computations resulting from scenarios based on other macro-economic variables, namely “production” indicators (forecasted variations in real-GDP growth rates, relative output gaps and unemployment rates) and “fiscal” indicators (forecasted variations in government debts and budget deficits) are not included in the text, but are available from the author upon request.

The second scenario, the “Geo-Political” (or “G”) scenario, divides member countries more or less according to their geographical or ideological distribution, implicitly relying on the intuition that “neighbours”, both for strategic (fear of retaliation) and historical (similar industrial structure) reasons, are likely to vote with each-other, sometimes even regardless of their own specific needs. Schematically:

Scenario G: **NL + D + BE + LX + Ö** _____ **FI + IR (+ EMU-11)** _____ **F + IT + SP + PL**

In these two scenarios, the eleven EMU member countries (plus EMU-11, when applicable) are distributed along 3 partitions according to their (assumed) preferred monetary-policy stance: rather contractionary for countries on the left-hand-side (Partition No 1), rather neutral for countries in the middle (Partition No 2), and rather expansionary for countries on the right-hand-side (Partition No 3). In this context, the threshold for “policy distance” (see subsection II.4) can be logically set to 1, implying that all voters in partition No 1 will refuse to share a coalition with any voter in partition No 3 (and vice-versa), while voters in partition No 2 will agree to enter any coalition, and will be accepted by all other players in any coalition.

The purpose of the partitions postulated in these two scenarios is to illustrate the potential voting-power consequences of the *a priori* formation of coalitions inside the GC. Although they were constructed to reflect as realistically as possible the conflicts which could arise in the foreseeable future between EMU members³⁶, these partitions should not be considered as the only possible alternatives, but rather as constituting reasonably credible working assumptions³⁷. In order to better illustrate the potential impact, on each member’s voting power, of some members’ tendency to switch preferences, and to take into account the flexible nature of these preferences, 3 more “sub-scenarios” will be examined, each based on scenario M, but with one country “shifting” from its original partition to another:

Scenario M+S1: **D** becomes contractionary (leaves Partition 3 to join Partition 1);

³⁶ The “Macro” partitioning, in particular, was realistic at the time of writing the first draft of this paper, and may not necessarily be so at the time of reading this draft.

³⁷ As Sutter (1999) puts it in a similar context, “for a true assessment of actual (*a posteriori*) voting power one would need reliable, mostly empirical, data on actual voting behaviour, the cohesiveness of coalitions or their probabilities of being formed” (p. 11), which is obviously not available at this early stage of EMU’s existence.

Scenario M+S2: **NL** becomes expansionary (leaves Partition 1 to join Partition 3);

Scenario M+S3: **PL** becomes expansionary (leaves Partition 2 to join Partition 3).

In the next section, 18 voting-power distributions are therefore computed, one for each of the 3 indices (SSI, SBI and HPI) in each of the 6 selected (sub-)scenarios (including the “baseline” case, where no *a priori* partitioning of voters is postulated); furthermore, this process is repeated for the 2 sets of assumptions on EB-members’ voting behaviour discussed in subsection IV.1. Appendix 1 offers a schematic structure of these 36 simulations.

V. RESULTS AND ANALYSIS

Table 1 presents all 36 voting-power distributions, while Appendix 2 illustrates these distributions. A few general things can be said from the outset about these results.

First, while the first 2 computed indices, SSI and SBI, generally yield fairly similar distributions across all scenarios, HPI often produces a markedly different distribution from the two others. If we accept that the latter gauges “policy impact” more accurately (see subsection II.3), there seems to be quite frequently a difference, in this particular monetary-policy game, between a member’s relative contribution to a decision which conforms to his or her preferences (something the SSI and SBI tend to capture), and such a member’s actual impact on that policy decision (which is better measured by the HPI). Throughout this section and the next, therefore, a distinction will regularly be drawn between each voter’s voting power (when referring to the SSI and SBI) and policy impact (when referring to the HPI).

Second, at the risk of stating the obvious, it may be worth stressing that, contrary to what some informal discussions of European monetary policy-making seem to assume³⁸, it definitely does not matter for an EMU member’s *a priori* voting power whether it is “small” or “big” (e.g. in terms of relative real GDP); Table 1 clearly shows that this holds under any set of assumptions, even when no voter partitioning is postulated. All that matters is whether EB members adopt a non-partisan or partisan perspective, and in the latter case, whether a country has 1 or 2 of its nationals at the GC.

³⁸ See among other *Financial Times* (1998e), and my reply in *Financial Times* (1998f).

Table 1:
Voting-Power Distributions under Alternative Scenarios

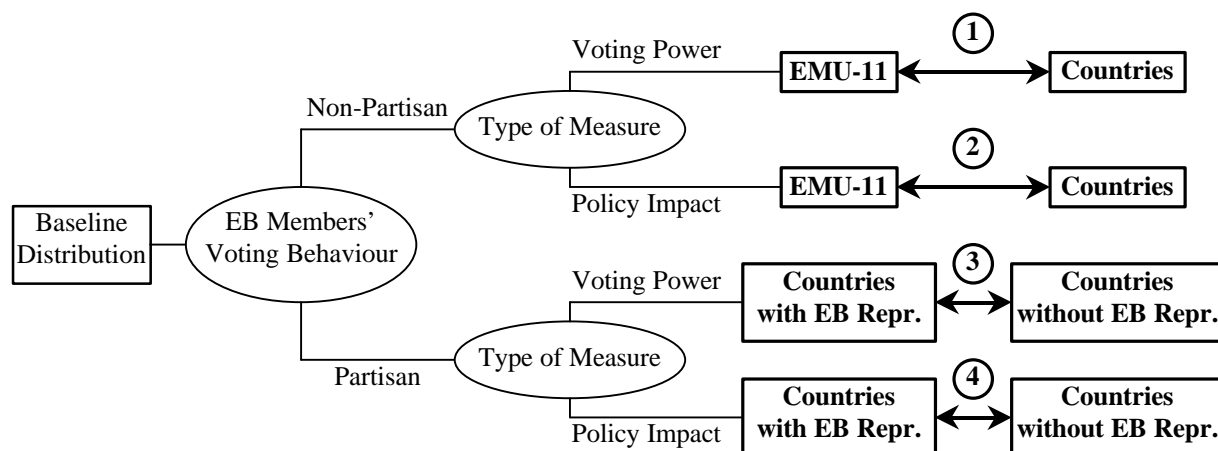
A. Non-Partisan EB Members														
		NL	D	F	FI	IT	SP	IR	BE	LX	Ö	PL	EMU-11	SUM
Baseline	SSI	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	4.55%	50.00%	100%
	SBI	3.10%	3.10%	3.10%	3.10%	3.10%	3.10%	3.10%	3.10%	3.10%	3.10%	3.10%	65.91%	100%
	HPI	7.79%	7.79%	7.79%	7.79%	7.79%	7.79%	7.79%	7.79%	7.79%	7.79%	7.79%	14.29%	100%
Sc. M	SSI	0.00%	8.93%	8.93%	0.00%	8.93%	0.00%	0.00%	8.93%	8.93%	8.93%	8.93%	37.50%	100%
	SBI	0.00%	7.35%	7.35%	0.00%	7.35%	0.00%	0.00%	7.35%	7.35%	7.35%	7.35%	48.53%	100%
	HPI	0.00%	10.71%	10.71%	0.00%	10.71%	0.00%	0.00%	10.71%	10.71%	10.71%	10.71%	25.00%	100%
Sc. M + S1	SSI	0.00%	0.00%	11.11%	0.00%	11.11%	0.00%	0.00%	11.11%	11.11%	11.11%	11.11%	33.33%	100%
	SBI	0.00%	0.00%	9.80%	0.00%	9.80%	0.00%	0.00%	9.80%	9.80%	9.80%	9.80%	41.18%	100%
	HPI	0.00%	0.00%	12.50%	0.00%	12.50%	0.00%	0.00%	12.50%	12.50%	12.50%	12.50%	25.00%	100%
Sc. M + S2	SSI	7.14%	7.14%	7.14%	0.00%	7.14%	0.00%	0.00%	7.14%	7.14%	7.14%	7.14%	42.86%	100%
	SBI	5.43%	5.43%	5.43%	0.00%	5.43%	0.00%	0.00%	5.43%	5.43%	5.43%	5.43%	56.59%	100%
	HPI	9.38%	9.38%	9.38%	0.00%	9.38%	0.00%	0.00%	9.38%	9.38%	9.38%	9.38%	25.00%	100%
Sc. M + S3	SSI	0.00%	8.93%	8.93%	0.00%	8.93%	0.00%	0.00%	8.93%	8.93%	8.93%	8.93%	37.50%	100%
	SBI	0.00%	7.35%	7.35%	0.00%	7.35%	0.00%	0.00%	7.35%	7.35%	7.35%	7.35%	48.53%	100%
	HPI	0.00%	10.71%	10.71%	0.00%	10.71%	0.00%	0.00%	10.71%	10.71%	10.71%	10.71%	25.00%	100%
Sc. G.	SSI	5.81%	5.81%	3.88%	9.69%	3.88%	3.88%	9.69%	5.81%	5.81%	5.81%	3.88%	36.05%	100%
	SBI	4.90%	4.90%	3.27%	8.17%	3.27%	3.27%	8.17%	4.90%	4.90%	4.90%	3.27%	46.08%	100%
	HPI	6.82%	6.82%	4.55%	11.36%	4.55%	4.55%	11.36%	6.82%	6.82%	6.82%	4.55%	25.00%	100%

B. Partisan EB Members													
		NL	D	F	FI	IT	SP	IR	BE	LX	Ö	PL	SUM
Baseline	SSI	11.98%	11.98%	11.98%	11.98%	11.98%	11.98%	5.63%	5.63%	5.63%	5.63%	5.63%	100%
	SBI	11.88%	11.88%	11.88%	11.88%	11.88%	11.88%	5.75%	5.75%	5.75%	5.75%	5.75%	100%
	HPI	9.36%	9.36%	9.36%	9.36%	9.36%	9.36%	8.77%	8.77%	8.77%	8.77%	8.77%	100%
Sc. M	SSI	7.80%	11.93%	11.93%	7.80%	19.72%	7.80%	2.75%	6.88%	6.88%	6.88%	9.63%	100%
	SBI	7.32%	12.20%	12.20%	7.32%	19.51%	7.32%	2.44%	7.32%	7.32%	7.32%	9.76%	100%
	HPI	5.88%	11.76%	11.76%	5.88%	17.65%	5.88%	2.94%	8.82%	8.82%	8.82%	11.76%	100%
Sc. M + S1	SSI	17.21%	17.21%	0.00%	17.21%	17.21%	17.21%	6.98%	0.00%	0.00%	0.00%	6.98%	100%
	SBI	17.33%	17.33%	0.00%	17.33%	17.33%	17.33%	6.67%	0.00%	0.00%	0.00%	6.67%	100%
	HPI	16.36%	16.36%	0.00%	16.36%	16.36%	16.36%	9.09%	0.00%	0.00%	0.00%	9.09%	100%
Sc. M + S2	SSI	16.67%	16.67%	16.67%	0.00%	16.67%	0.00%	0.00%	8.33%	8.33%	8.33%	8.33%	100%
	SBI	16.45%	16.45%	16.45%	0.00%	16.45%	0.00%	0.00%	8.55%	8.55%	8.55%	8.55%	100%
	HPI	13.79%	13.79%	13.79%	0.00%	13.79%	0.00%	0.00%	11.21%	11.21%	11.21%	11.21%	100%
Sc. M + S3	SSI	3.57%	15.48%	15.48%	3.57%	19.05%	3.57%	3.57%	8.93%	8.93%	8.93%	8.93%	100%
	SBI	3.13%	15.63%	15.63%	3.13%	18.74%	3.13%	3.13%	9.38%	9.38%	9.38%	9.38%	100%
	HPI	3.45%	13.79%	13.79%	3.45%	17.24%	3.45%	3.45%	10.34%	10.34%	10.34%	10.34%	100%
Sc. G.	SSI	11.93%	11.93%	7.80%	19.72%	7.80%	7.80%	9.63%	6.88%	6.88%	6.88%	2.75%	100%
	SBI	12.20%	12.20%	7.32%	19.51%	7.32%	7.32%	9.76%	7.32%	7.32%	7.32%	2.44%	100%
	HPI	11.76%	11.76%	5.88%	17.65%	5.88%	5.88%	11.76%	8.82%	8.82%	8.82%	2.94%	100%

Third, even the case where voter-partitioning is excluded from the computations (the “baseline” case) has some interesting implications. When EB members are considered partisan, the baseline voting power (or policy impact) measured by a given index is obviously identical within each group of countries (those with and those without an EB representative), while it is identical across all

countries when EB members are considered non-partisan³⁹. But the magnitude of the 4 relationships illustrated in Figure 2 deserves some comments:

Figure 2



1. The 6-member EB can claim between 50% and 66% voting power, while the equivalent for each country individually is only 3.1% – 4.6%. Therefore, when no *a priori* partitioning of voters is postulated, the EB, although neither a “dictator” nor a holder of “veto power” (see footnote 5), enjoys significantly more voting power than its number of votes would imply (6 out of 17, i.e. 35.3%), while each member country finds itself with only half to three-quarters as much voting power as its individual number of votes would imply (1 out of 17, i.e. 5.9%)⁴⁰. This may reassure some people who are inclined to believe in this set of assumptions (i.e. a non-partisan EB defending EMU-wide interests against nationally-minded NCB Governors), and who may fear that national interests are over-represented with 11 votes out of 17⁴¹.
2. The 6-member EB enjoys only 14.3% policy impact, while each country claims as much as 7.8%. Therefore, when no coalition formation can be *a priori* expected, the 6-member EB enjoys significantly less policy impact than its number of votes would imply, in sharp contrast with the

³⁹ This is simply a consequence of the “symmetry” property of the basic versions of the three indices examined, i.e. $w_i = w_j \Rightarrow I_i = I_j$ for $i \neq j$ and $i, j \in N, \forall I \in \{SSI, SBI, HPI\}$.

⁴⁰ Even when *a priori* voter partitioning is allowed, a non-partisan EB can still claim, depending on the scenario, to be crucial in about 33% – 57% of all decisions, and only once (SSI, scenario M + S1) does it have less voting power than its voting share would imply.

⁴¹ Von Hagen (1998) wonders: “How powerful will the ECB [Executive] Board be relative to the NCB Presidents on the ECB [Governing] Council, where monetary policy decisions are made ?” (p. 2).

conclusions reached when examining voting power⁴². Even more strikingly, while in such conditions it takes all 11 NCB Governors to match the EB's voting power, merely 2 such NCB Governors put together have more policy impact than the whole EB (although the dynamics of coalition formation are discussed in further detail below).

3. The ratio between the voting power of those EMU members with an EB representative (11.9% – 12%) and that of those without one (5.6% – 5.8%) is relatively close to their relative number of votes in the GC. In this baseline case, therefore, having an EB representative does not seem to have a disproportionate effect on a country's voting power; voting shares are in these circumstances a fairly good indicator of voting power.
4. Even EMU members with no representative at the EB can have a non-negligible impact on common monetary-policy decisions, since on average, they are estimated to be “crucial” in 8.8% of all policy decisions, while that figure for other EMU members is only slightly higher at 9.4%. In these circumstances, each country's respective voting share in the GC is thus a poor indicator of its policy impact, again in contrast with the conclusions reached when examining voting power.

Fourth, even at this early stage, one can draw interesting conclusions by identifying the country (or countries) which has the largest voting power (or policy impact) in each scenario, and trying to determine whether a marked predominance of some countries with respect to others appears across all scenarios. In this respect, the following 3 observations are worth mentioning:

- With non-partisan EB members, whichever country finds itself in the opposite partition from that which contains EMU-11 ends up with no voting power (or policy impact) at all: this indicates that when EMU-11 represents average EMU preferences, those countries whose preferences are incompatible with that average end up with no influence on common monetary-policy decisions.
- In each “Macro” scenario (including the shifts discussed below and introduced in subsection IV.2), Italy is always at least among those countries with the highest voting power (and policy impact); with partisan EB members, in scenarios M and M + S3, it is even the only one with a voting power of close to 20% (policy impact: close to 18%). This is obviously due to the fact that, given its “neutral” *a priori* monetary-policy stance in those scenarios, it is acceptable as a coalition partner to countries of both other partitions, and with partisan EB members, it has more power than its fellow “neutral” (Portugal) because it has 1 more vote (thanks to its EB representative).

⁴² Curiously, the EB's share of policy impact is constant across all postulated scenarios, at 25%.

- In the “Geo-Political” scenario, whatever the behaviour of EB members, it is always Finland who claims the highest voting power (and policy impact): with non-partisan EB members, jointly with Ireland at close to 10% each (policy impact: more than 11%), and with partisan EB members, on its own at close to 20% (policy impact: close to 18%). This is also explained by both countries’ “neutral” *a priori* monetary-policy stance, and their respective number of votes when EB members are partisan.

The remainder of this section discusses the consequences of coalition formation in more detail. It is organised around the three aspects of the monetary-policy voting game on which this paper seeks to get a better perspective, namely:

- what is the effect, on each EMU member-country’s voting power, of the two competing sets of assumptions on the voting behaviour of EB members ?
- how sensitive is each EMU member-country’s voting power to variations in some of these members’ preferences over the course of European monetary policy ?
- how can we describe each EMU member-country’s preferences across all postulated patterns of coalition formation (scenarios), and in particular, what is their “most-” and “least-preferred” option ? ⁴³

V.1. PARTISAN VS NON-PARTISAN EB MEMBERS

This subsection focuses on the effect, on each EMU-member’s voting power, of the two assumptions outlined in subsection IV.1. More specifically, it aims to explore the sign and magnitude of the change in power experienced by each EMU member country when all EB members switch from an EMU-wide perspective to an individual-country focus⁴⁴.

⁴³ As indicated in footnote 1, an analysis of the effect on each member’s voting power of future EMU enlargement(s) (i.e. how much influence they stand to gain or lose by widening the group of initial participants, which candidates are most likely to be favoured by incumbent members on voting-power grounds, the extent to which enlargement can encourage some current members to enter or switch alliances, etc.) is provided by a companion paper, Mangano (1999).

⁴⁴ For simplicity, EB members are assumed to reach a collective behavioural decision: either they *all* are EMU-minded, or they *all* vote according to the evolution of variables in their country of origin. An interesting extension would be to examine the consequences of such focus-switching by only *some* EB members.

The results of this scenario-by-scenario, country-by-country comparison are given in Tables 2 and 3. They clearly indicate that, when *a priori* voter partitioning is factored in, the distribution of voting power between countries with and without EB representatives can change dramatically.

When each EB member is assumed to vote according to his or her nationality rather than for EMU-wide averages, the six EMU member countries with one of their nationals at the EB can count on 2 votes at the GC; it appears from Table 2 that this, however, is not a guarantee of proportionately larger voting power (or policy impact), and some of those countries (France, Finland or Spain) can in certain cases find themselves with no voting power at all.

Although in that group of countries, positive voting-power (or policy-impact) variations greatly outnumber negative (or nil) ones (99 against 9), these gains are not systematically significant. On the one hand, the Netherlands, Germany, Finland and Spain can see their voting power boosted from 0% to 17% (policy impact: 0% to 16%) in scenario M + S1; Italy, in scenario M, can even enjoy a voting power of close to 20% (SSI). But on the other hand, having an additional vote can sometimes have no effect at all on those countries' voting power (France, scenario M + S1, Finland and Spain, scenario M + S2), or it can add anything between 1.6 percentage points (all 6 countries, HPI, baseline scenario) and 12 percentage points (Italy, SBI, scenario M). Perhaps more surprisingly, the only voting-power loss in that group (France, scenario M + S1) wipes off all of that country's voting power (and policy impact), depriving it of 10 to 12 percentage points.

When comparing the top half of each page in Appendix 3, it even seems that the aggregate policy impact of the 6 EMU countries with an EB representative is not as much expanded by EB members' partisanship as their collective voting power (although as a group, those countries always see an improvement in their voting power or policy impact). It is therefore not clear that all EMU member countries with one of their nationals at the EB always have a clear interest in seeing those EB members vote along national rather than EMU-wide lines.

In a symmetric way, Table 3 shows that even countries with no EB representative do not necessarily lose some of their influence when the other 6 countries get one more vote (i.e. when EB members become partisan); on the contrary, positive voting-power (or policy-impact) variations outnumber negative (or nil) ones in that group of countries (54 against 36)⁴⁵. Ireland's voting power, in particular, is adversely affected in only one case (scenario G, SSI), and very slightly so (a voting-power loss of a mere 0.06 percentage points); in all other case, it either gains from (up to 9 policy-

⁴⁵ No particular difference appears in this respect when policy impact is considered separately from voting power: the ratio of positive to negative (or nil) voting-power variations is 16 to 14 for SSI and 21 to 9 for SBI, while the ratio of positive to negative (or nil) policy-impact variations is 17 to 13.

impact percentage points), or is indifferent to, EB members' partisanship. On the other hand, Belgium, Luxembourg and Austria face in scenario M + S1 the steepest potential decline in their voting power and policy impact, with a loss of 11 and 12.5 percentage points, respectively, i.e. a total forfeiture of the influence they enjoyed with non-partisan EB members.

Table 2:
Effect of EB Members' Partisanship
On Voting Power of Countries with EB Representative

	Measured by SSI			Measured by SBI			Measured by HPI			
	Non-Partisan EB Members	Partisan EB Members	Gain/Loss (perc. pts)	Non-Partisan EB Members	Partisan EB Members	Gain/Loss (perc. pts)	Non-Partisan EB Members	Partisan EB Members	Gain/Loss (perc. pts)	
NL	Baseline	4.55%	11.98%	7.43	3.10%	11.88%	8.78	7.79%	9.36%	1.57
	Sc. M	0.00%	7.80%	7.80	0.00%	7.32%	7.32	0.00%	5.88%	5.88
	Sc. M+S1	0.00%	17.21%	17.21	0.00%	17.33%	17.33	0.00%	16.36%	16.36
	Sc. M+S2	7.14%	16.67%	9.53	5.43%	16.45%	11.02	9.38%	13.79%	4.41
	Sc. M+S3	0.00%	3.57%	3.57	0.00%	3.13%	3.13	0.00%	3.45%	3.45
	Sc. G	5.81%	11.93%	6.12	4.90%	12.20%	7.30	6.82%	11.76%	4.94
D	Baseline	4.55%	11.98%	7.43	3.10%	11.88%	8.78	7.79%	9.36%	1.57
	Sc. M	8.93%	11.93%	3.00	7.35%	12.20%	4.85	10.71%	11.76%	1.05
	Sc. M+S1	0.00%	17.21%	17.21	0.00%	17.33%	17.33	0.00%	16.36%	16.36
	Sc. M+S2	7.14%	16.67%	9.53	5.43%	16.45%	11.02	9.38%	13.79%	4.41
	Sc. M+S3	8.93%	15.48%	6.55	7.35%	15.63%	8.28	10.71%	13.79%	3.08
	Sc. G	5.81%	11.93%	6.12	4.90%	12.20%	7.30	6.82%	11.76%	4.94
F	Baseline	4.55%	11.98%	7.43	3.10%	11.88%	8.78	7.79%	9.36%	1.57
	Sc. M	8.93%	11.93%	3.00	7.35%	12.20%	4.85	10.71%	11.76%	1.05
	Sc. M+S1	11.11%	0.00%	-11.11	9.80%	0.00%	-9.80	12.50%	0.00%	-12.50
	Sc. M+S2	7.14%	16.67%	9.53	5.43%	16.45%	11.02	9.38%	13.79%	4.41
	Sc. M+S3	8.93%	15.48%	6.55	7.35%	15.63%	8.28	10.71%	13.79%	3.08
	Sc. G	3.88%	7.80%	3.92	3.27%	7.32%	4.05	4.55%	5.88%	1.33
FI	Baseline	4.55%	11.98%	7.43	3.10%	11.88%	8.78	7.79%	9.36%	1.57
	Sc. M	0.00%	7.80%	7.80	0.00%	7.32%	7.32	0.00%	5.88%	5.88
	Sc. M+S1	0.00%	17.21%	17.21	0.00%	17.33%	17.33	0.00%	16.36%	16.36
	Sc. M+S2	0.00%	0.00%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	0.00
	Sc. M+S3	0.00%	3.57%	3.57	0.00%	3.13%	3.13	0.00%	3.45%	3.45
	Sc. G	9.69%	19.72%	10.03	8.17%	19.51%	11.34	11.36%	17.65%	6.29
IT	Baseline	4.55%	11.98%	7.43	3.10%	11.88%	8.78	7.79%	9.36%	1.57
	Sc. M	8.93%	19.72%	10.79	7.35%	19.51%	12.16	10.71%	17.65%	6.94
	Sc. M+S1	11.11%	17.21%	6.10	9.80%	17.33%	7.53	12.50%	16.36%	3.86
	Sc. M+S2	7.14%	16.67%	9.53	5.43%	16.45%	11.02	9.38%	13.79%	4.41
	Sc. M+S3	8.93%	19.05%	10.12	7.35%	18.74%	11.39	10.71%	17.24%	6.53
	Sc. G	3.88%	7.80%	3.92	3.27%	7.32%	4.05	4.55%	5.88%	1.33
SP	Baseline	4.55%	11.98%	7.43	3.10%	11.88%	8.78	7.79%	9.36%	1.57
	Sc. M	0.00%	7.80%	7.80	0.00%	7.32%	7.32	0.00%	5.88%	5.88
	Sc. M+S1	0.00%	17.21%	17.21	0.00%	17.33%	17.33	0.00%	16.36%	16.36
	Sc. M+S2	0.00%	0.00%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	0.00
	Sc. M+S3	0.00%	3.57%	3.57	0.00%	3.13%	3.13	0.00%	3.45%	3.45
	Sc. G	3.88%	7.80%	3.92	3.27%	7.32%	4.05	4.55%	5.88%	1.33

Even when considering the aggregate voting power (or policy impact) of the 5 EMU countries with no EB representative, similar observations can be made. The bottom half of each page in Appendix 3 shows that in 13 charts out of 18 (3 indices for 6 scenarios), those countries are actually better off, on the whole, when EB members are partisan than when they are not. Again, the simulations do not support the intuition that EMU member countries with no EB representative are necessarily worse off (from a voting-power perspective) when EB members focus on their own country's

developments rather than on EMU-wide aggregates. It appears that this intuition does not take into account the potential coalition-formation tendency of GC members, and the voting-power consequences of this tendency.

Table 3:
Effect of EB Members' Partisanship
On Voting Power of Countries with No EB Representative

	Measured by SSI			Measured by SBI			Measured by HPI			
	Non-Partisan EB Members	Partisan EB Members	Gain/Loss (perc. pts)	Non-Partisan EB Members	Partisan EB Members	Gain/Loss (perc. pts)	Non-Partisan EB Members	Partisan EB Members	Gain/Loss (perc. pts)	
IR	Baseline	4.55%	5.63%	1.08	3.10%	5.75%	2.65	7.79%	8.77%	0.98
	Sc. M	0.00%	2.75%	2.75	0.00%	2.44%	2.44	0.00%	2.94%	2.94
	Sc. M+S1	0.00%	6.98%	6.98	0.00%	6.67%	6.67	0.00%	9.09%	9.09
	Sc. M+S2	0.00%	0.00%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	0.00
	Sc. M+S3	0.00%	3.57%	3.57	0.00%	3.13%	3.13	0.00%	3.45%	3.45
	Sc. G	9.69%	9.63%	-0.06	8.17%	9.76%	1.59	11.36%	11.76%	0.40
BE	Baseline	4.55%	5.63%	1.08	3.10%	5.75%	2.65	7.79%	8.77%	0.98
	Sc. M	8.93%	6.88%	-2.05	7.35%	7.32%	-0.03	10.71%	8.82%	-1.89
	Sc. M+S1	11.11%	0.00%	-11.11	9.80%	0.00%	-9.80	12.50%	0.00%	-12.50
	Sc. M+S2	7.14%	8.33%	1.19	5.43%	8.55%	3.12	9.38%	11.21%	1.83
	Sc. M+S3	8.93%	8.93%	0.00	7.35%	9.38%	2.03	10.71%	10.34%	-0.37
	Sc. G	5.81%	6.88%	1.07	4.90%	7.32%	2.42	6.82%	8.82%	2.00
LX	Baseline	4.55%	5.63%	1.08	3.10%	5.75%	2.65	7.79%	8.77%	0.98
	Sc. M	8.93%	6.88%	-2.05	7.35%	7.32%	-0.03	10.71%	8.82%	-1.89
	Sc. M+S1	11.11%	0.00%	-11.11	9.80%	0.00%	-9.80	12.50%	0.00%	-12.50
	Sc. M+S2	7.14%	8.33%	1.19	5.43%	8.55%	3.12	9.38%	11.21%	1.83
	Sc. M+S3	8.93%	8.93%	0.00	7.35%	9.38%	2.03	10.71%	10.34%	-0.37
	Sc. G	5.81%	6.88%	1.07	4.90%	7.32%	2.42	6.82%	8.82%	2.00
Ö	Baseline	4.55%	5.63%	1.08	3.10%	5.75%	2.65	7.79%	8.77%	0.98
	Sc. M	8.93%	6.88%	-2.05	7.35%	7.32%	-0.03	10.71%	8.82%	-1.89
	Sc. M+S1	11.11%	0.00%	-11.11	9.80%	0.00%	-9.80	12.50%	0.00%	-12.50
	Sc. M+S2	7.14%	8.33%	1.19	5.43%	8.55%	3.12	9.38%	11.21%	1.83
	Sc. M+S3	8.93%	8.93%	0.00	7.35%	9.38%	2.03	10.71%	10.34%	-0.37
	Sc. G	5.81%	6.88%	1.07	4.90%	7.32%	2.42	6.82%	8.82%	2.00
PL	Baseline	4.55%	5.63%	1.08	3.10%	5.75%	2.65	7.79%	8.77%	0.98
	Sc. M	8.93%	9.63%	0.70	7.35%	9.76%	2.41	10.71%	11.76%	1.05
	Sc. M+S1	11.11%	6.98%	-4.13	9.80%	6.67%	-3.13	12.50%	9.09%	-3.41
	Sc. M+S2	7.14%	8.33%	1.19	5.43%	8.55%	3.12	9.38%	11.21%	1.83
	Sc. M+S3	8.93%	8.93%	0.00	7.35%	9.38%	2.03	10.71%	10.34%	-0.37
	Sc. G	3.88%	2.75%	-1.13	3.27%	2.44%	-0.83	4.55%	2.94%	-1.61

V.2. ALLEGIANCE-SWITCHING

This subsection temporarily abstracts from the “baseline” (no voter-partitioning) and “Geo-Political” scenarios, to focus instead on the “Macro” scenario and its 3 sub-scenarios described in subsection IV.2. It illustrates and quantifies the potential impact, on each EMU member’s voting power, of some countries’ tendency to switch allegiances, “shifting” from their original partition (i.e. *a priori* monetary-policy stance) to another.

Each of the 3 shifts is examined individually in Tables 4 to 6, while Appendix 4 illustrates the evolution of each member country’s voting power (and policy impact) across all shifts. In the quantification of the results of these shifts, a distinction is made between the 4 types of voters

affected: the shifting country itself, those in the partition that the shifting country leaves, those in the partition that the shifting country joins, and those in the partition whose membership doesn't change.

Table 4 indicates that, within the limits of this paper's assumptions and *ceteris paribus*, it is in Germany's interest to adopt a contractionary stance (rather than an expansionary one) only when it can claim 2 votes in the GC, i.e. when EB members are partisan: it then increases its voting power (or policy impact) by about 40%, to more than 17% (policy impact: 16.4%). The countries it joins also benefit from this shift: on average, they more than double their voting power, and even treble their policy impact. On the other hand, the countries which stay in the partition Germany leaves suffer dramatically, since they all lose the whole of their voting power and policy impact; even those countries which are in neither of the 2 partitions directly affected by the shift end up worse off, losing between 10% and 30% of their voting power or policy impact.

When EB members are not partisan, instead, Germany stands to lose all its voting power if it chooses to switch from partition 3 to partition 1: this is simply due to the fact that in this case, it leaves a partition which represents average EMU preferences (in which the 6 votes of EMU-11 have a significant weight) to join another which does not. In this case, the countries in the partition joined by Germany are indifferent to its shift (they still can claim no power at all), while all other voters (except EMU-11) benefit from it (increasing their voting power by up to a third).

For the Netherlands instead, the behaviour of EB members is irrelevant, as far as the sign of the effect on its own power of adopting (*ceteris paribus*) an expansionary monetary-policy stance is concerned: Table 5 shows that with partisan EB members, the Netherlands's voting power more than doubles as a results of its shift, while it goes from nil to 5 – 7% (policy impact: 9.4%) with non-partisan EB members (the latter effect being, symmetrically to the case discussed above, a consequence of joining a partition which represents average EMU preferences, whose members thus include the 6 votes-strong EMU-11). However, the voters it joins only gain from its shift when EB members are nationally-minded: they then increase their voting power by 20% – 40% (policy impact: +17% – +27%), while their voting power drops by 20% – 26% (policy impact: -12%) when EB members are not partisan (except EMU-11). The effect of this shift on the countries whose partition the Netherlands leaves also depends on the behaviour of EB members: those countries are indifferent when EB members are non-partisan (wielding no power at all before and after the shift), but they lose all of their power when EB members are partisan. For their part, the 2 countries who form the partition not affected by the shift end up with less voting power and policy impact, whatever the stance of EB members.

Table 4:
Effect of Germany's Shift from Partition 3 to Partition 1
On Voting Power of EMU Member Countries

(A) Measured by SSI

Non-Partisan EB Members						Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)			Before Shift	After Shift
Shifting Country	D	8.93%	0.00%	-8.93	-100%	11.93%	17.21%	5.28	44%
Voters	NL	0.00%	0.00%	0.00	0%	7.80%	17.21%	9.41	121%
Joined by	FI	0.00%	0.00%	0.00	0%	7.80%	17.21%	9.41	121%
Shifting Country	SP	0.00%	0.00%	0.00	0%	7.80%	17.21%	9.41	121%
	IR	0.00%	0.00%	0.00	0%	2.75%	6.98%	4.23	154%
Voters	F	8.93%	11.11%	2.18	24%	11.93%	0.00%	-11.93	-100%
Left by	BE	8.93%	11.11%	2.18	24%	6.88%	0.00%	-6.88	-100%
Shifting Country	LX	8.93%	11.11%	2.18	24%	6.88%	0.00%	-6.88	-100%
	Ö	8.93%	11.11%	2.18	24%	6.88%	0.00%	-6.88	-100%
	EMU-11	37.50%	33.33%	-4.17	-11%	--	--	--	--
Other	IT	8.93%	11.11%	2.18	24%	19.72%	17.21%	-2.51	-13%
Voters	PL	8.93%	11.11%	2.18	24%	9.63%	6.98%	-2.65	-28%

(B) Measured by SBI

Non-Partisan EB Members						Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)			Before Shift	After Shift
Shifting Country	D	7.35%	0.00%	-7.35	-100%	12.20%	17.33%	5.13	42%
Voters	NL	0.00%	0.00%	0.00	0%	7.32%	17.33%	10.01	137%
Joined by	FI	0.00%	0.00%	0.00	0%	7.32%	17.33%	10.01	137%
Shifting Country	SP	0.00%	0.00%	0.00	0%	7.32%	17.33%	10.01	137%
	IR	0.00%	0.00%	0.00	0%	2.44%	6.67%	4.23	173%
Voters	F	7.35%	9.80%	2.45	33%	12.20%	0.00%	-12.20	-100%
Left by	BE	7.35%	9.80%	2.45	33%	7.32%	0.00%	-7.32	-100%
Shifting Country	LX	7.35%	9.80%	2.45	33%	7.32%	0.00%	-7.32	-100%
	Ö	7.35%	9.80%	2.45	33%	7.32%	0.00%	-7.32	-100%
	EMU-11	48.53%	41.18%	-7.35	-15%	--	--	--	--
Other	IT	7.35%	9.80%	2.45	33%	19.51%	17.33%	-2.18	-11%
Voters	PL	7.35%	9.80%	2.45	33%	9.76%	6.67%	-3.09	-32%

(C) Measured by HPI

Non-Partisan EB Members						Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)			Before Shift	After Shift
Shifting Country	D	10.71%	0.00%	-10.71	-100%	11.76%	16.36%	4.60	39%
Voters	NL	0.00%	0.00%	0.00	0%	5.88%	16.36%	10.48	178%
Joined by	FI	0.00%	0.00%	0.00	0%	5.88%	16.36%	10.48	178%
Shifting Country	SP	0.00%	0.00%	0.00	0%	5.88%	16.36%	10.48	178%
	IR	0.00%	0.00%	0.00	0%	2.94%	9.09%	6.15	209%
Voters	F	10.71%	12.50%	1.79	17%	11.76%	0.00%	-11.76	-100%
Left by	BE	10.71%	12.50%	1.79	17%	8.82%	0.00%	-8.82	-100%
Shifting Country	LX	10.71%	12.50%	1.79	17%	8.82%	0.00%	-8.82	-100%
	Ö	10.71%	12.50%	1.79	17%	8.82%	0.00%	-8.82	-100%
	EMU-11	25.00%	25.00%	0.00	0%	--	--	--	--
Other	IT	10.71%	12.50%	1.79	17%	17.65%	16.36%	-1.29	-7%
Voters	PL	10.71%	12.50%	1.79	17%	11.76%	9.09%	-2.67	-23%

The effect of Portugal's shift, *ceteris paribus*, from a neutral monetary-policy stance to an expansionary one is detailed in Table 6. When EB members are non-partisan, this shift is simply neutral for all voters, including Portugal itself: before the shift, it already benefited (just like Italy) from potential associations with any voter in the expansionary partition, and given the number of weights claimed by the voters in that partition (including EMU-11), all the neutral-minded and expansionary-minded voters already shared total voting power (and policy impact) between themselves. Instead, when EB members are partisan, the situation is paradoxical: all countries with an expansionary stance would prefer Portugal to switch from neutral to expansionary, since that would increase their individual voting power by 30% (policy impact: +17%); but Portugal itself, as well as all other EMU countries (except Ireland), would lose out as a result of that shift.

On the whole, therefore, the simulations seem to support the intuition that, when EB members are partisan (i.e. vote along national rather than EMU-wide lines), if a country with 2 of its nationals sitting at the GC (like Germany or the Netherlands) shifts its *a priori* monetary-policy stance, those EMU member countries which share that country's new stance (and the country itself) are systematically better off, and those which either used to share that country's stance, or do not share its stance both before and after the shift, are systematically worse off (in voting-power terms). However, when EB members are not partisan, it may not even be in the country's own interest to shift its stance, and the countries who share its new stance may end up losing some power, while the countries who used to share its preferences could see their power increase. Furthermore, even when EB members are considered partisan, a country with no EB representative (i.e. with only 1 vote, compared to 2 for those with an EB representative) and a neutral *a priori* monetary-policy stance can, by shifting that stance, have a non-negligible effect on the voting power of its fellow-EMU members, although paradoxically, this may not be in its own interest.

V.3. PREFERRED COALITION PATTERNS

The first subsection provided us with a first few suggestions as to which type of coalition each EMU member country would prefer, in terms of voting power; at least, it allowed us to determine the cases (i.e. the scenarios) in which a country's power was increased or reduced by the partisanship of EB members. This subsection examines each country's "most-" and "least-preferred" situations, i.e. the coalition pattern(s) which endow(s) each of them with, respectively, the largest and smallest voting power (or policy impact).

Table 5:
Effect of the Netherlands's Shift from Partition 1 to Partition 3
On Voting Power of EMU Member Countries

(A) Measured by SSI

Non-Partisan EB Members						Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)			Before Shift	After Shift
Shifting Country	NL	0.00%	7.14%	7.14	NA	7.80%	16.67%	8.87	114%
Voters	D	8.93%	7.14%	-1.79	-20%	11.93%	16.67%	4.74	40%
Joined by	F	8.93%	7.14%	-1.79	-20%	11.93%	16.67%	4.74	40%
Shifting	BE	8.93%	7.14%	-1.79	-20%	6.88%	8.33%	1.45	21%
Country	LX	8.93%	7.14%	-1.79	-20%	6.88%	8.33%	1.45	21%
	Ö	8.93%	7.14%	-1.79	-20%	6.88%	8.33%	1.45	21%
	EMU-11	37.50%	42.86%	5.36	14%	--	--	--	--
Voters	FI	0.00%	0.00%	0.00	0%	7.80%	0.00%	-7.80	-100%
Left by	SP	0.00%	0.00%	0.00	0%	7.80%	0.00%	-7.80	-100%
Shifting	IR	0.00%	0.00%	0.00	0%	2.75%	0.00%	-2.75	-100%
Country	IT	8.93%	7.14%	-1.79	-20%	19.72%	16.67%	-3.05	-15%
Other	PL	8.93%	7.14%	-1.79	-20%	9.63%	8.33%	-1.30	-13%
Voters									

(B) Measured by SBI

Non-Partisan EB Members						Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)			Before Shift	After Shift
Shifting Country	NL	0.00%	5.43%	5.43	NA	7.32%	16.45%	9.13	125%
Voters	D	7.35%	5.43%	-1.92	-26%	12.20%	16.45%	4.25	35%
Joined by	F	7.35%	5.43%	-1.92	-26%	12.20%	16.45%	4.25	35%
Shifting	BE	7.35%	5.43%	-1.92	-26%	7.32%	8.55%	1.23	17%
Country	LX	7.35%	5.43%	-1.92	-26%	7.32%	8.55%	1.23	17%
	Ö	7.35%	5.43%	-1.92	-26%	7.32%	8.55%	1.23	17%
	EMU-11	48.53%	56.59%	8.06	17%	--	--	--	--
Voters	FI	0.00%	0.00%	0.00	0%	7.32%	0.00%	-7.32	-100%
Left by	SP	0.00%	0.00%	0.00	0%	7.32%	0.00%	-7.32	-100%
Shifting	IR	0.00%	0.00%	0.00	0%	2.44%	0.00%	-2.44	-100%
Country	IT	7.35%	5.43%	-1.92	-26%	19.51%	16.45%	-3.06	-16%
Other	PL	7.35%	5.43%	-1.92	-26%	9.76%	8.55%	-1.21	-12%
Voters									

(C) Measured by HPI

Non-Partisan EB Members						Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)			Before Shift	After Shift
Shifting Country	NL	0.00%	9.38%	9.38	NA	5.88%	13.79%	7.91	135%
Voters	D	10.71%	9.38%	-1.33	-12%	11.76%	13.79%	2.03	17%
Joined by	F	10.71%	9.38%	-1.33	-12%	11.76%	13.79%	2.03	17%
Shifting	BE	10.71%	9.38%	-1.33	-12%	8.82%	11.21%	2.39	27%
Country	LX	10.71%	9.38%	-1.33	-12%	8.82%	11.21%	2.39	27%
	Ö	10.71%	9.38%	-1.33	-12%	8.82%	11.21%	2.39	27%
	EMU-11	25.00%	25.00%	0.00	0%	--	--	--	--
Voters	FI	0.00%	0.00%	0.00	0%	5.88%	0.00%	-5.88	-100%
Left by	SP	0.00%	0.00%	0.00	0%	5.88%	0.00%	-5.88	-100%
Shifting	IR	0.00%	0.00%	0.00	0%	2.94%	0.00%	-2.94	-100%
Country	IT	10.71%	9.38%	-1.33	-12%	17.65%	13.79%	-3.86	-22%
Other	PL	10.71%	9.38%	-1.33	-12%	11.76%	11.21%	-0.55	-5%
Voters									

Table 6:
Effect of Portugal's Shift from Partition 2 to Partition 3
On Voting Power of EMU Member Countries

(A) Measured by SSI

		Non-Partisan EB Members				Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)	Before Shift	After Shift	Absolute (perc. pts)	Relative (%)
Shifting Country	PL	8.93%	8.93%	0.00	0%	9.63%	8.93%	-0.70	-7%
	D	8.93%	8.93%	0.00	0%	11.93%	15.48%	3.55	30%
Voters	F	8.93%	8.93%	0.00	0%	11.93%	15.48%	3.55	30%
Joined by	BE	8.93%	8.93%	0.00	0%	6.88%	8.93%	2.05	30%
Shifting	LX	8.93%	8.93%	0.00	0%	6.88%	8.93%	2.05	30%
Country	Ö	8.93%	8.93%	0.00	0%	6.88%	8.93%	2.05	30%
	EMU-11	37.50%	37.50%	0.00	0%	--	--	--	--
Voter Left by						19.72%	19.05%	-0.67	-3%
Shifting Country	IT	8.93%	8.93%	0.00	0%	7.80%	3.57%	-4.23	-54%
	NL	0.00%	0.00%	0.00	0%	7.80%	3.57%	-4.23	-54%
Other	FI	0.00%	0.00%	0.00	0%	7.80%	3.57%	-4.23	-54%
Voters	SP	0.00%	0.00%	0.00	0%	2.75%	3.57%	0.82	30%
	IR	0.00%	0.00%	0.00	0%				

(B) Measured by SBI

		Non-Partisan EB Members				Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)	Before Shift	After Shift	Absolute (perc. pts)	Relative (%)
Shifting Country	PL	7.35%	7.35%	0.00	0%	9.76%	9.38%	-0.38	-4%
	D	7.35%	7.35%	0.00	0%	12.20%	15.63%	3.43	28%
Voters	F	7.35%	7.35%	0.00	0%	12.20%	15.63%	3.43	28%
Joined by	BE	7.35%	7.35%	0.00	0%	7.32%	9.38%	2.06	28%
Shifting	LX	7.35%	7.35%	0.00	0%	7.32%	9.38%	2.06	28%
Country	Ö	7.35%	7.35%	0.00	0%	7.32%	9.38%	2.06	28%
	EMU-11	48.53%	48.53%	0.00	0%	--	--	--	--
Voter Left by						19.51%	18.74%	-0.77	-4%
Shifting Country	IT	7.35%	7.35%	0.00	0%	7.32%	3.13%	-4.19	-57%
	NL	0.00%	0.00%	0.00	0%	7.32%	3.13%	-4.19	-57%
Other	FI	0.00%	0.00%	0.00	0%	7.32%	3.13%	-4.19	-57%
Voters	SP	0.00%	0.00%	0.00	0%	2.44%	3.13%	0.69	28%
	IR	0.00%	0.00%	0.00	0%				

(C) Measured by HPI

		Non-Partisan EB Members				Partisan EB Members			
		Voting Power (%) :		Variation :		Voting Power (%) :		Variation :	
		Before Shift	After Shift	Absolute (perc. pts)	Relative (%)	Before Shift	After Shift	Absolute (perc. pts)	Relative (%)
Shifting Country	PL	10.71%	10.71%	0.00	0%	11.76%	10.34%	-1.42	-12%
	D	10.71%	10.71%	0.00	0%	11.76%	13.79%	2.03	17%
Voters	F	10.71%	10.71%	0.00	0%	11.76%	13.79%	2.03	17%
Joined by	BE	10.71%	10.71%	0.00	0%	8.82%	10.34%	1.52	17%
Shifting	LX	10.71%	10.71%	0.00	0%	8.82%	10.34%	1.52	17%
Country	Ö	10.71%	10.71%	0.00	0%	8.82%	10.34%	1.52	17%
	EMU-11	25.00%	25.00%	0.00	0%	--	--	--	--
Voter Left by						17.65%	17.24%	-0.41	-2%
Shifting Country	IT	10.71%	10.71%	0.00	0%	5.88%	3.45%	-2.43	-41%
	NL	0.00%	0.00%	0.00	0%	5.88%	3.45%	-2.43	-41%
Other	FI	0.00%	0.00%	0.00	0%	5.88%	3.45%	-2.43	-41%
Voters	SP	0.00%	0.00%	0.00	0%	2.94%	3.45%	0.51	17%
	IR	0.00%	0.00%	0.00	0%				

Tables 7 and 8 describe, respectively under the assumption of non-partisan and partisan EB members, the circumstances in which each EMU member country maximises its voting power; they also indicate how much voting power these circumstances allow it to gain with respect to the baseline case (both in absolute and relative terms). With a non-partisan EB, it appears that France, Italy, Belgium, Luxembourg, Austria and Portugal all have a clear interest in advocating scenario M + S1: by making them all acceptable as coalition partners to EMU-11 and its 6 votes, this partitioning would allow each of them to multiply their baseline voting power by a factor of 2.5 – 3 (and to increase their policy impact by 60%), providing them with the maximum voting power (and policy impact) under this set of assumptions. Unsurprisingly, the 5 remaining countries would rather see other scenarios in action, since that particular one leaves them with no power at all.

With EB members voting for their country of origin, differences start to appear between the most impressive performances in terms of absolute voting power, and the strongest relative increases with respect to the baseline scenario; 2 scenarios nevertheless stand out. On the one hand, Finland and Ireland would prefer voters to be partitioned according to scenario G: it would endow the former with a voting power of close to 20% (policy impact: 17.7%), an improvement of more than 60% on its baseline power (and almost double its baseline policy impact); and it would allow the latter to increase its voting power by 70% (policy impact: +35%). On the other hand, and with respectively the same arguments and figures, Italy and Portugal would prefer scenario M to prevail. The reasons for these preferences have already been discussed at the beginning of this section.

Tables 9 and 10 list, for non-partisan and partisan EB members respectively, those coalition pattern(s) which would leave each country with the lowest voting power, and also indicate how much voting power each country loses with respect to the baseline case. When EB members rely on EMU-wide averages, the results are simply an extension of the discussion of the most-preferred scenario(s): whenever a country finds itself in the partition opposite to that which contains EMU-11 (most often Finland, Spain and Ireland, but depending on the “shifts” discussed above, also the Netherlands and Germany), it loses all of its baseline voting power (or policy impact), since its preferences are incompatible with average EMU preferences. With partisan EB members, countries with 2 of their nationals sitting at the GC have more to lose than countries with only their NCB Governor; but apart from the Netherlands, Italy, Portugal and in particular Germany, whose worse scenarios never imply a total loss of power with respect to the baseline case (and virtually no loss for Germany), all other countries’ worse scenarios leave them with no power at all.

Table 7:
Preferred Outcome by Country
With Non-Partisan EB Members

(A) Measured by SSI

	Voting Power (%) :		Gain w. r. to Baseline :		Scenario(s) Leading to Preferred Outcome
	Baseline	Preferred Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	4.55%	7.14%	2.59	57%	M + S2
Germany	4.55%	8.93%	4.38	96%	M ; M + S3
France	4.55%	11.11%	6.56	144%	M + S1
Finland	4.55%	9.69%	5.14	113%	G
Italy	4.55%	11.11%	6.56	144%	M + S1
Spain	4.55%	4.55%	0.00	0%	Baseline
Ireland	4.55%	9.69%	5.14	113%	G
Belgium	4.55%	11.11%	6.56	144%	M + S1
Luxembourg	4.55%	11.11%	6.56	144%	M + S1
Austria	4.55%	11.11%	6.56	144%	M + S1
Portugal	4.55%	11.11%	6.56	144%	M + S1

(B) Measured by SBI

	Voting Power (%) :		Gain w. r. to Baseline :		Scenario(s) Leading to Preferred Outcome
	Baseline	Preferred Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	3.10%	5.43%	2.33	75%	M + S2
Germany	3.10%	7.35%	4.25	137%	M ; M + S3
France	3.10%	9.80%	6.70	216%	M + S1
Finland	3.10%	8.17%	5.07	164%	G
Italy	3.10%	9.80%	6.70	216%	M + S1
Spain	3.10%	3.27%	0.17	5%	G
Ireland	3.10%	8.17%	5.07	164%	G
Belgium	3.10%	9.80%	6.70	216%	M + S1
Luxembourg	3.10%	9.80%	6.70	216%	M + S1
Austria	3.10%	9.80%	6.70	216%	M + S1
Portugal	3.10%	9.80%	6.70	216%	M + S1

(C) Measured by HPI

	Voting Power (%) :		Gain w. r. to Baseline :		Scenario(s) Leading to Preferred Outcome
	Baseline	Preferred Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	7.79%	9.38%	1.59	20%	M + S2
Germany	7.79%	10.71%	2.92	37%	M ; M + S3
France	7.79%	12.50%	4.71	60%	M + S1
Finland	7.79%	11.36%	3.57	46%	G
Italy	7.79%	12.50%	4.71	60%	M + S1
Spain	7.79%	7.79%	0.00	0%	Baseline
Ireland	7.79%	11.36%	3.57	46%	G
Belgium	7.79%	12.50%	4.71	60%	M + S1
Luxembourg	7.79%	12.50%	4.71	60%	M + S1
Austria	7.79%	12.50%	4.71	60%	M + S1
Portugal	7.79%	12.50%	4.71	60%	M + S1

Table 8:
Preferred Outcome by Country
With Partisan EB Members

(A) Measured by SSI

	Voting Power (%) :		Gain w. r. to Baseline :		Scenario(s) Leading to Preferred Outcome
	Baseline	Preferred Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	11.98%	17.21%	5.23	44%	M + S1
Germany	11.98%	17.21%	5.23	44%	M + S1
France	11.98%	16.67%	4.69	39%	M + S2
Finland	11.98%	19.72%	7.74	65%	G
Italy	11.98%	19.72%	7.74	65%	M
Spain	11.98%	17.21%	5.23	44%	M + S1
Ireland	5.63%	9.63%	4.00	71%	G
Belgium	5.63%	8.93%	3.30	59%	M + S3
Luxembourg	5.63%	8.93%	3.30	59%	M + S3
Austria	5.63%	8.93%	3.30	59%	M + S3
Portugal	5.63%	9.63%	4.00	71%	M

(B) Measured by SBI

	Voting Power (%) :		Gain w. r. to Baseline :		Scenario(s) Leading to Preferred Outcome
	Baseline	Preferred Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	11.88%	17.33%	5.45	46%	M + S1
Germany	11.88%	17.33%	5.45	46%	M + S1
France	11.88%	16.45%	4.57	38%	M + S2
Finland	11.88%	19.51%	7.63	64%	G
Italy	11.88%	19.51%	7.63	64%	M
Spain	11.88%	17.33%	5.45	46%	M + S1
Ireland	5.75%	9.76%	4.01	70%	G
Belgium	5.75%	9.38%	3.63	63%	M + S3
Luxembourg	5.75%	9.38%	3.63	63%	M + S3
Austria	5.75%	9.38%	3.63	63%	M + S3
Portugal	5.75%	9.76%	4.01	70%	M

(C) Measured by HPI

	Voting Power (%) :		Gain w. r. to Baseline :		Scenario(s) Leading to Preferred Outcome
	Baseline	Preferred Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	9.36%	16.36%	7.00	75%	M + S1
Germany	9.36%	16.36%	7.00	75%	M + S1
France	9.36%	13.79%	4.43	47%	M + S2 ; M + S3
Finland	9.36%	17.65%	8.29	89%	G
Italy	9.36%	17.65%	8.29	89%	M
Spain	9.36%	16.36%	7.00	75%	M + S1
Ireland	8.77%	11.76%	2.99	34%	G
Belgium	8.77%	11.21%	2.44	28%	M + S2
Luxembourg	8.77%	11.21%	2.44	28%	M + S2
Austria	8.77%	11.21%	2.44	28%	M + S2
Portugal	8.77%	11.76%	2.99	34%	M

Table 9:
Least-Favourite Outcome by Country
With Non-Partisan EB Members

(A) Measured by SSI

	Voting Power (%) :		Loss w. r. to Baseline :		Scenario(s) Leading to Least-Pref. Outcome
	Baseline	Least-Pref. Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	4.55%	0.00%	-4.55	-100%	M ; M + S1 ; M + S3
Germany	4.55%	0.00%	-4.55	-100%	M + S1
France	4.55%	3.88%	-0.67	-15%	G
Finland	4.55%	0.00%	-4.55	-100%	M ; M + S1 ; M + S2 ; M + S3
Italy	4.55%	3.88%	-0.67	-15%	G
Spain	4.55%	0.00%	-4.55	-100%	M ; M + S1 ; M + S2 ; M + S3
Ireland	4.55%	0.00%	-4.55	-100%	M ; M + S1 ; M + S2 ; M + S3
Belgium	4.55%	4.55%	0.00	0%	Baseline
Luxembourg	4.55%	4.55%	0.00	0%	Baseline
Austria	4.55%	4.55%	0.00	0%	Baseline
Portugal	4.55%	3.88%	-0.67	-15%	G

(B) Measured by SBI

	Voting Power (%) :		Loss w. r. to Baseline :		Scenario(s) Leading to Least-Pref. Outcome
	Baseline	Least-Pref. Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	3.10%	0.00%	-3.10	-100%	M ; M + S1 ; M + S3
Germany	3.10%	0.00%	-3.10	-100%	M + S1
France	3.10%	3.10%	0.00	0%	Baseline
Finland	3.10%	0.00%	-3.10	-100%	M ; M + S1 ; M + S2 ; M + S3
Italy	3.10%	3.10%	0.00	0%	Baseline
Spain	3.10%	0.00%	-3.10	-100%	M ; M + S1 ; M + S2 ; M + S3
Ireland	3.10%	0.00%	-3.10	-100%	M ; M + S1 ; M + S2 ; M + S3
Belgium	3.10%	3.10%	0.00	0%	Baseline
Luxembourg	3.10%	3.10%	0.00	0%	Baseline
Austria	3.10%	3.10%	0.00	0%	Baseline
Portugal	3.10%	3.10%	0.00	0%	Baseline

(C) Measured by HPI

	Voting Power (%) :		Loss w. r. to Baseline :		Scenario(s) Leading to Least-Pref. Outcome
	Baseline	Least-Pref. Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	7.79%	0.00%	-7.79	-100%	M ; M + S1 ; M + S3
Germany	7.79%	0.00%	-7.79	-100%	M + S1
France	7.79%	4.55%	-3.24	-42%	G
Finland	7.79%	0.00%	-7.79	-100%	M ; M + S1 ; M + S2 ; M + S3
Italy	7.79%	4.55%	-3.24	-42%	G
Spain	7.79%	0.00%	-7.79	-100%	M ; M + S1 ; M + S2 ; M + S3
Ireland	7.79%	0.00%	-7.79	-100%	M ; M + S1 ; M + S2 ; M + S3
Belgium	7.79%	6.82%	-0.97	-12%	G
Luxembourg	7.79%	6.82%	-0.97	-12%	G
Austria	7.79%	6.82%	-0.97	-12%	G
Portugal	7.79%	4.55%	-3.24	-42%	G

Table 10:
Least-Preferred Outcome by Country
With Partisan EB Members

(A) Measured by SSI

	Voting Power (%) :		Loss w. r. to Baseline :		Scenario(s) Leading to Least-Pref. Outcome
	Baseline	Least-Pref. Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	11.98%	3.57%	-8.41	-70%	M + S3
Germany	11.98%	11.93%	-0.05	0%	M ; G
France	11.98%	0.00%	-11.98	-100%	M + S1
Finland	11.98%	0.00%	-11.98	-100%	M + S2
Italy	11.98%	7.80%	-4.18	-35%	G
Spain	11.98%	0.00%	-11.98	-100%	M + S2
Ireland	5.63%	0.00%	-5.63	-100%	M + S2
Belgium	5.63%	0.00%	-5.63	-100%	M + S1
Luxembourg	5.63%	0.00%	-5.63	-100%	M + S1
Austria	5.63%	0.00%	-5.63	-100%	M + S1
Portugal	5.63%	2.75%	-2.88	-51%	G

(B) Measured by SBI

	Voting Power (%) :		Loss w. r. to Baseline :		Scenario(s) Leading to Least-Pref. Outcome
	Baseline	Least-Pref. Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	11.88%	3.13%	-8.75	-74%	M + S3
Germany	11.88%	11.88%	0.00	0%	Baseline
France	11.88%	0.00%	-11.88	-100%	M + S1
Finland	11.88%	0.00%	-11.88	-100%	M + S2
Italy	11.88%	7.32%	-4.56	-38%	G
Spain	11.88%	0.00%	-11.88	-100%	M + S2
Ireland	5.75%	0.00%	-5.75	-100%	M + S2
Belgium	5.75%	0.00%	-5.75	-100%	M + S1
Luxembourg	5.75%	0.00%	-5.75	-100%	M + S1
Austria	5.75%	0.00%	-5.75	-100%	M + S1
Portugal	5.75%	2.44%	-3.31	-58%	G

(C) Measured by HPI

	Voting Power (%) :		Loss w. r. to Baseline :		Scenario(s) Leading to Least-Pref. Outcome
	Baseline	Least-Pref. Outcome	Absolute (perc. pts)	Relative (%)	
Netherlands	9.36%	3.45%	-5.91	-63%	M + S3
Germany	9.36%	9.36%	0.00	0%	Baseline
France	9.36%	0.00%	-9.36	-100%	M + S1
Finland	9.36%	0.00%	-9.36	-100%	M + S2
Italy	9.36%	5.88%	-3.48	-37%	G
Spain	9.36%	0.00%	-9.36	-100%	M + S2
Ireland	8.77%	0.00%	-8.77	-100%	M + S2
Belgium	8.77%	0.00%	-8.77	-100%	M + S1
Luxembourg	8.77%	0.00%	-8.77	-100%	M + S1
Austria	8.77%	0.00%	-8.77	-100%	M + S1
Portugal	8.77%	2.94%	-5.83	-66%	G

VI. CONCLUSIONS

This paper was focused on the implications of the ECB's structural characteristics for the relative voting power of EMU member countries, and hence on the effectiveness of a common European monetary policy. Its main conclusions are as follows.

When the structural features of monetary policy-making in EMU are appropriately examined, it becomes obvious that, contrary to what some informal discussions of European monetary policy-making seem to assume, it definitely does not matter for an EMU member's *a priori* voting power whether it is "small" or "big" (e.g. in terms of relative real GDP). Furthermore, the theoretical power that each such member country can expect to exert on common monetary-policy decisions is generally very poorly related to the number of votes it can claim to hold in the ECB's Governing Council, in particular when *a priori* coalition formation is taken into account.

According to this paper's simulations, it is not at all clear that the 6 countries which managed to elect one of their nationals at the ECB's Executive Board always have a clear interest in pressing these 6 members to vote along national rather than EMU-wide lines. These simulations do not support either the intuition that EMU member countries with no representative at the Executive Board are necessarily worse off (from a voting-power perspective) when each Executive Board's member focuses on his or her own country's developments, rather than on EMU-wide aggregates. It seems that these intuitions do not take into account the potential coalition-formation tendency of Governing Council members, and the voting-power consequences of this tendency.

When the 6-member Executive Board is assumed to vote on the course of European monetary policy with EMU-wide averages in mind, and even when no *a priori* partitioning of voters is postulated, it can claim between 50% and 66% voting power (depending on the index used), while the equivalent for each country individually is only 3.1% – 4.6%. Therefore, relying on appropriate measures of voting power, it is possible to show that in those circumstances, national interests are not over-represented at the ECB, even with 11 votes out of 17, since a euro zone-oriented Executive Board enjoys significantly more voting power than its number of votes would imply (6 out of 17, i.e. 35.3%), while each member country finds itself with only half to three-quarters as much voting power as its individual number of votes would imply (1 out of 17, i.e. 5.9%). However, in the same circumstances but using a measure of "policy impact", the influence of the Executive Board falls to just 14.3%, while each country claims as much as 7.8%, which, in sharp contrast with the conclusions reached when examining voting power, is respectively significantly less and significantly more than their respective number of votes would imply.

On the whole, the simulations do seem to support the intuition that, provided that Executive Board members vote along national rather than EMU-wide lines, when a country with 2 of its nationals sitting at the Governing Council shifts its *a priori* monetary-policy stance, those EMU member countries which share that country's new stance (and the country itself) are systematically better off in voting-power terms, while those which either used to share that country's stance, or do not share its stance both before and after the shift, are systematically worse off. However, under the same set of assumptions, even a country with no Executive Board representative (i.e. with only 1 vote, compared to 2 for those with an Executive Board representative) and a neutral *a priori* monetary-policy stance can, by shifting that stance, have a non-negligible effect on the voting power of its fellow-EMU members. Furthermore, when Executive Board members focus on EMU-wide aggregates, it may not be in a country's own interest to shift its *a priori* stance, and the countries who share its new inclinations may end up losing some power, while the countries who used to share its preferences could see their power increase as a result of the shift.

Despite its partial reliance on specific assumptions about the future course of European monetary policy, it is hoped that this paper has managed to clarify, and constructively contribute to, the debate on the effectiveness of the ECB's decision-making process.

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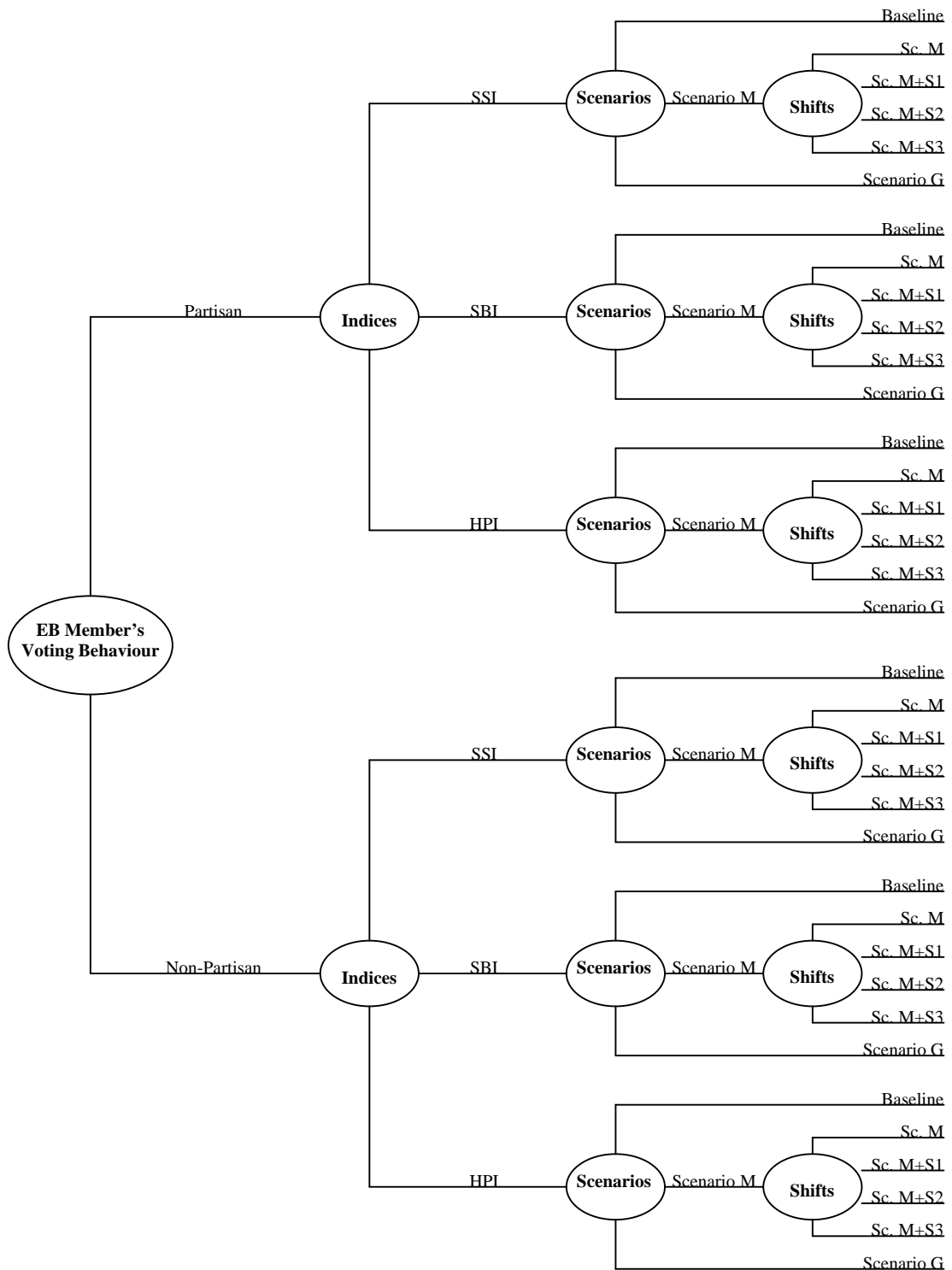
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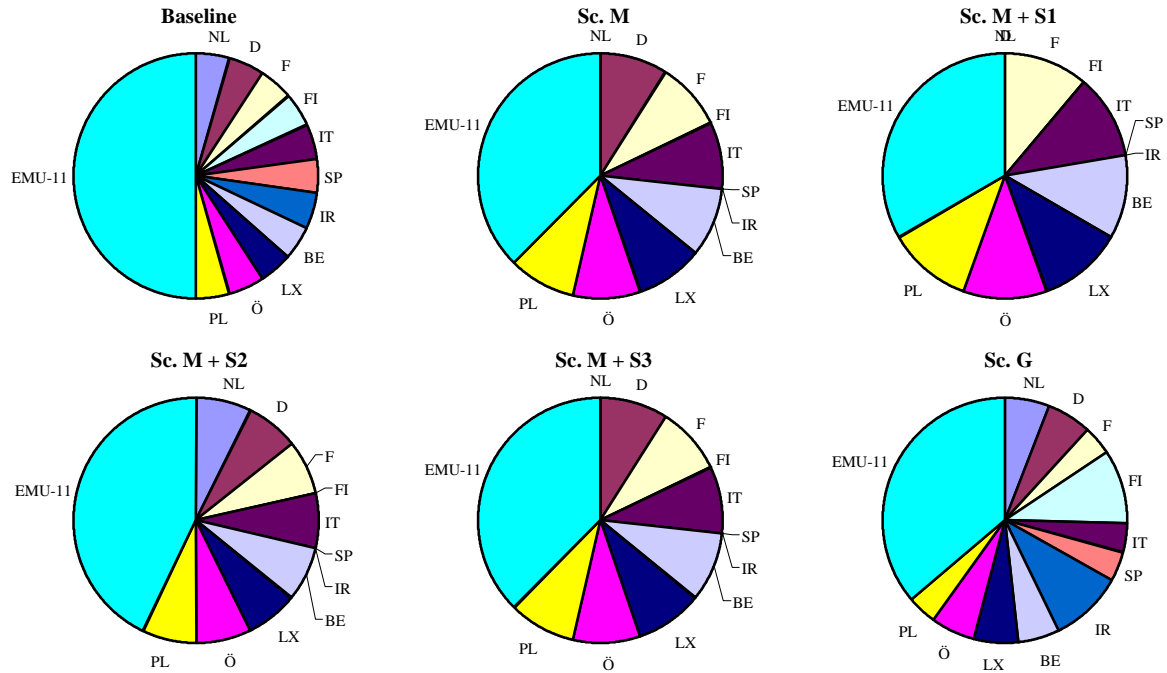
APPENDIX 1



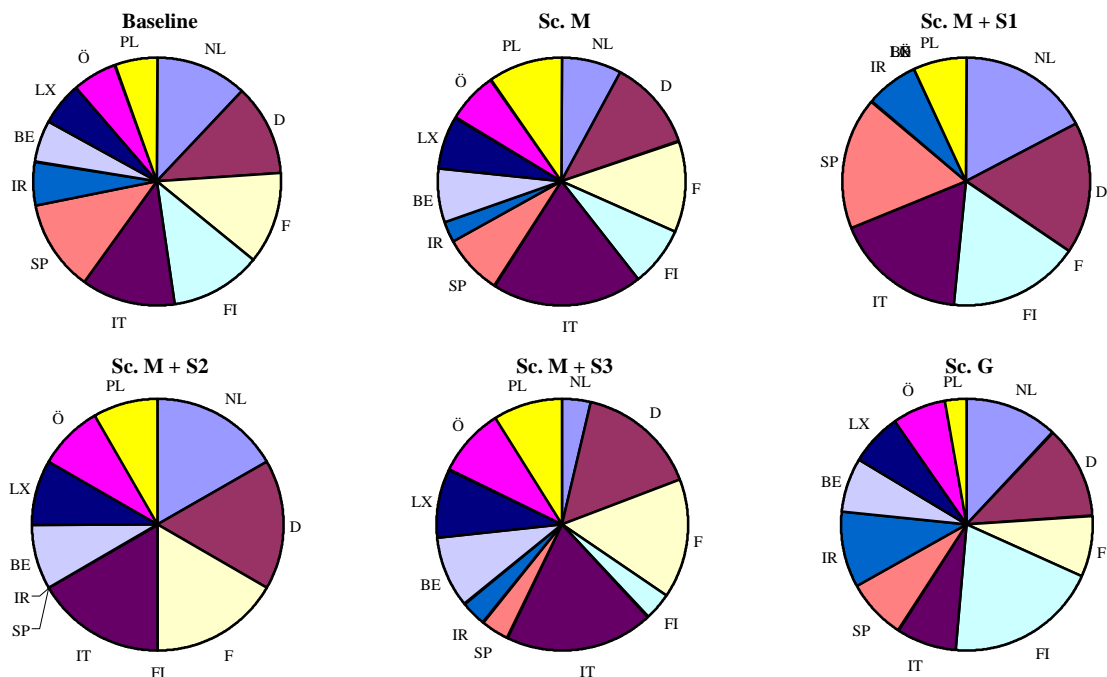
APPENDIX 2

**Voting Power Distributions under Alternative Scenarios
(Measured by SSI)**

Non-Partisan EB Members

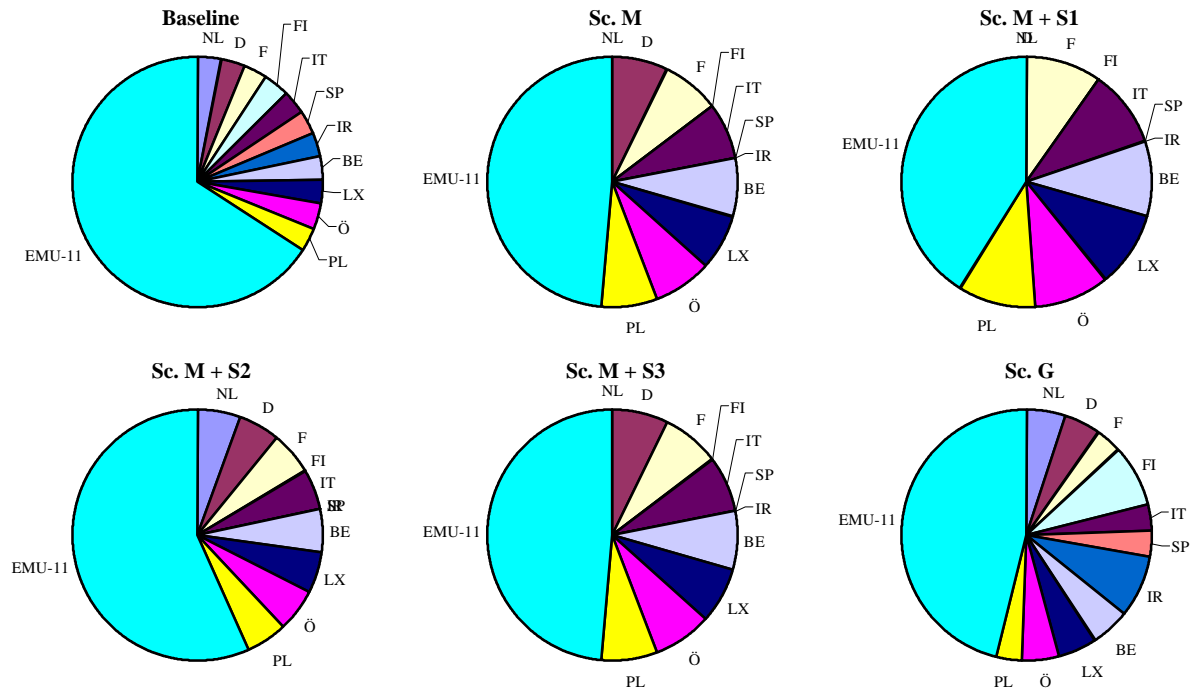


Partisan EB Members

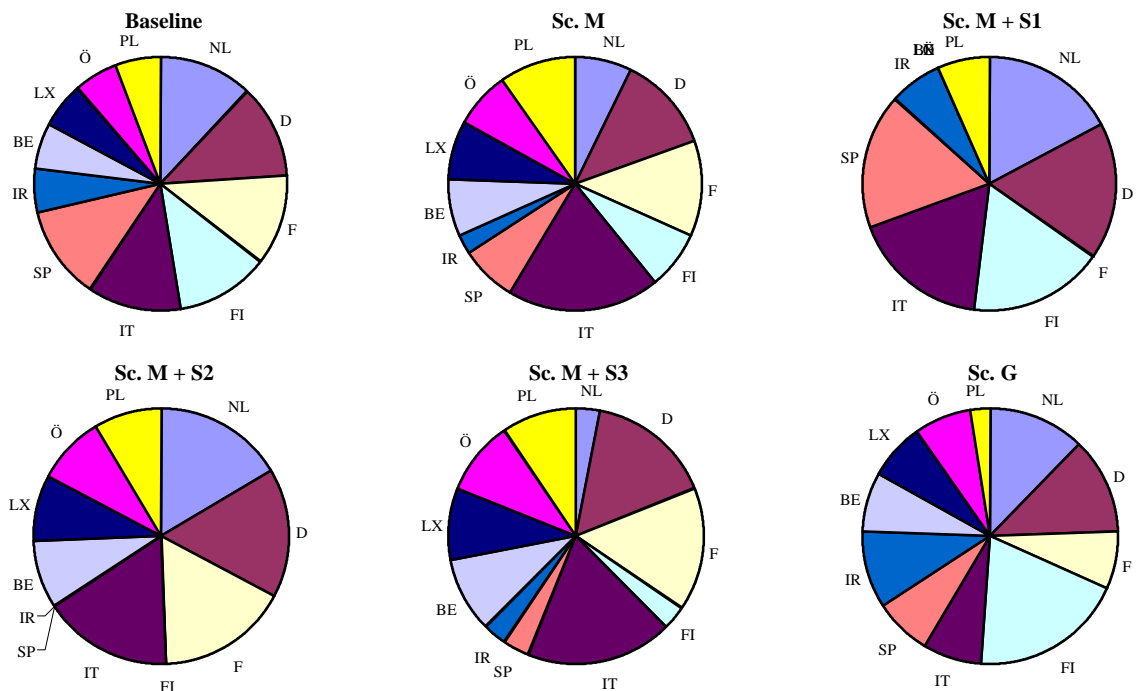


**Voting Power Distributions under Alternative Scenarios
(Measured by SBI)**

Non-Partisan EB Members

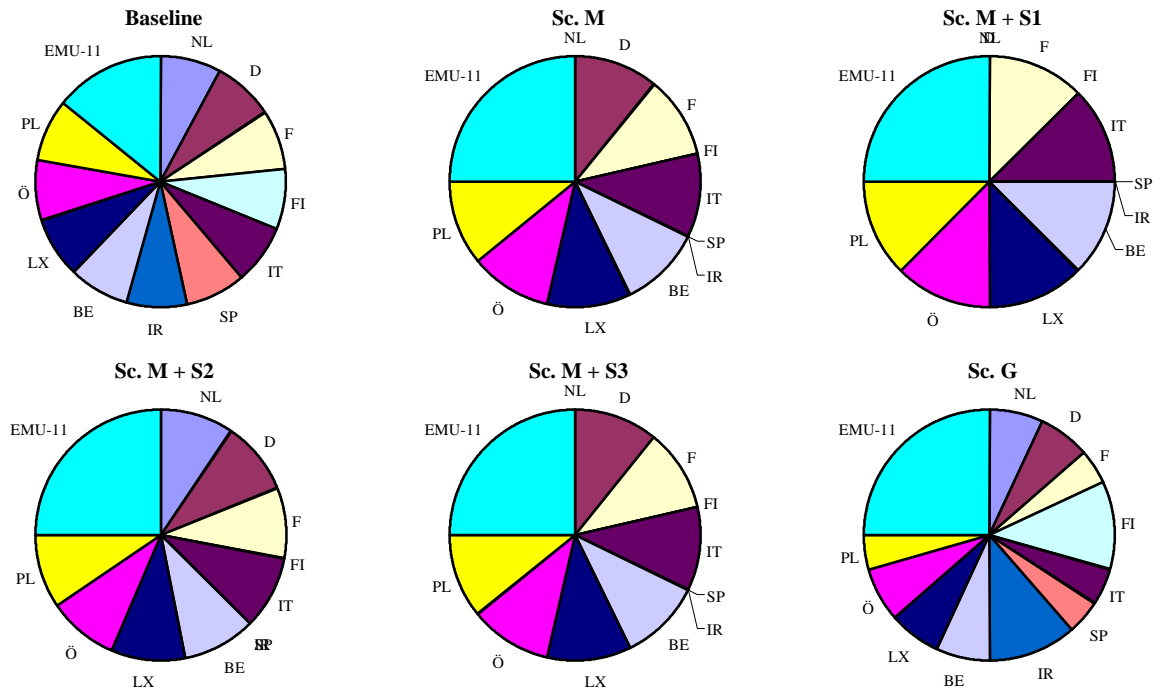


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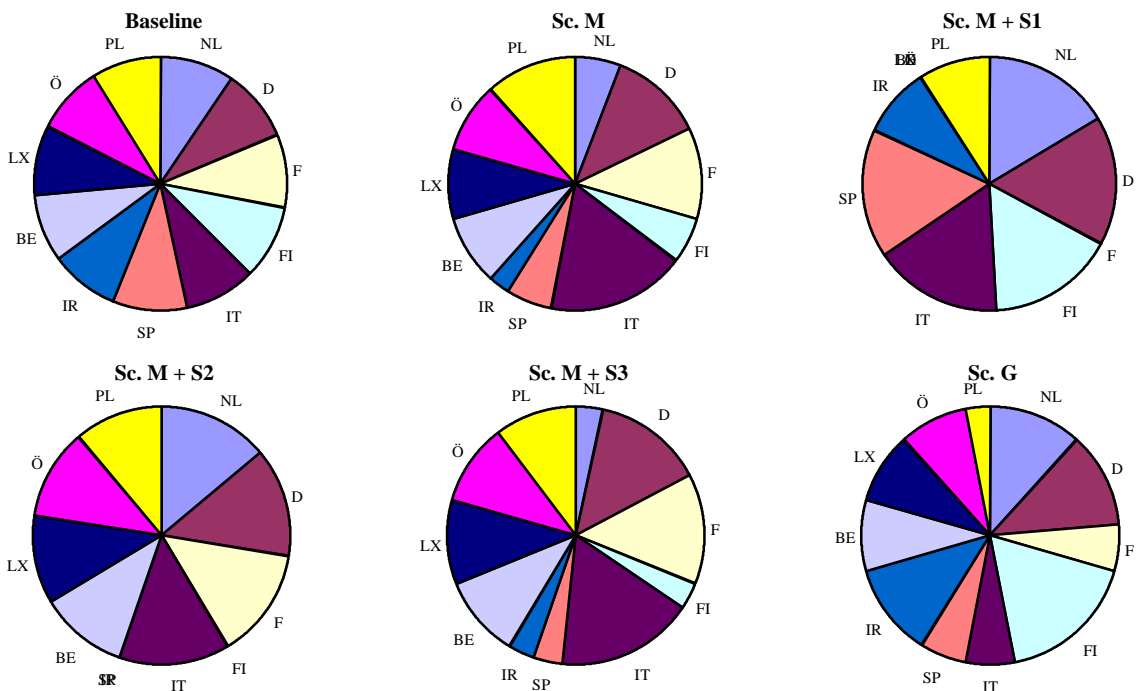


**Voting Power Distributions under Alternative Scenarios
(Measured by HPI)**

Non-Partisan EB Members



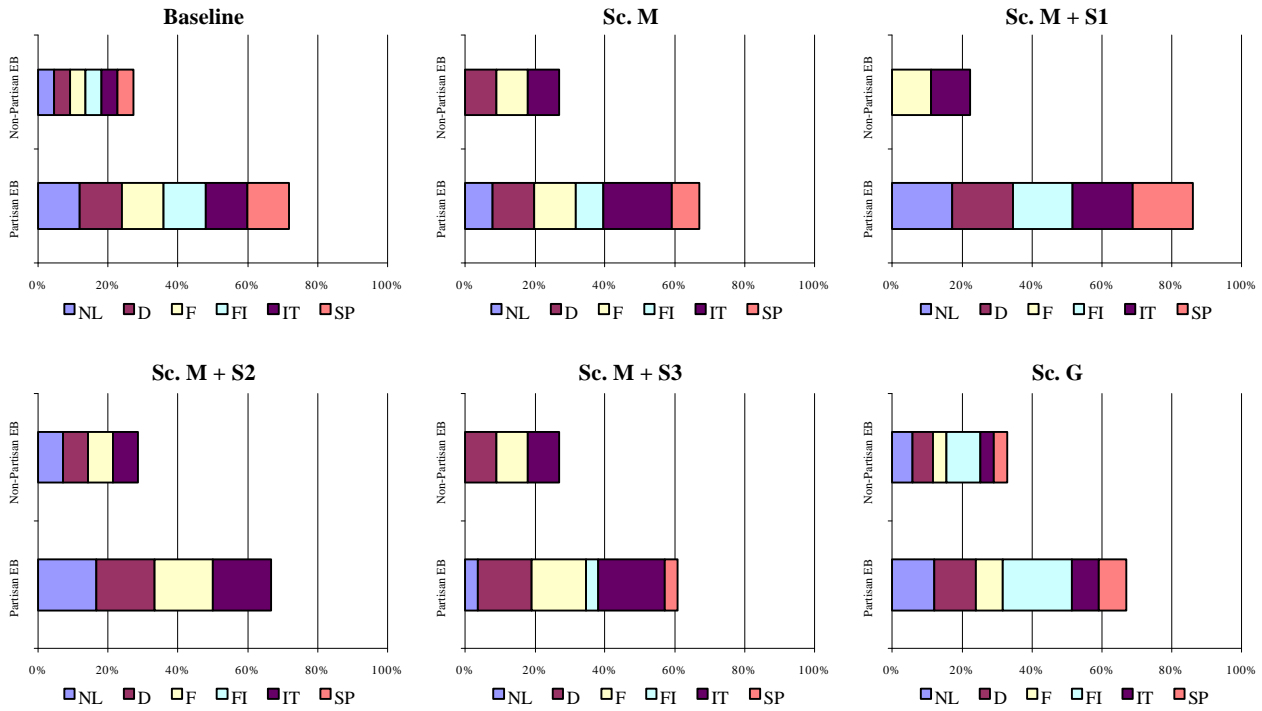
Partisan EB Members



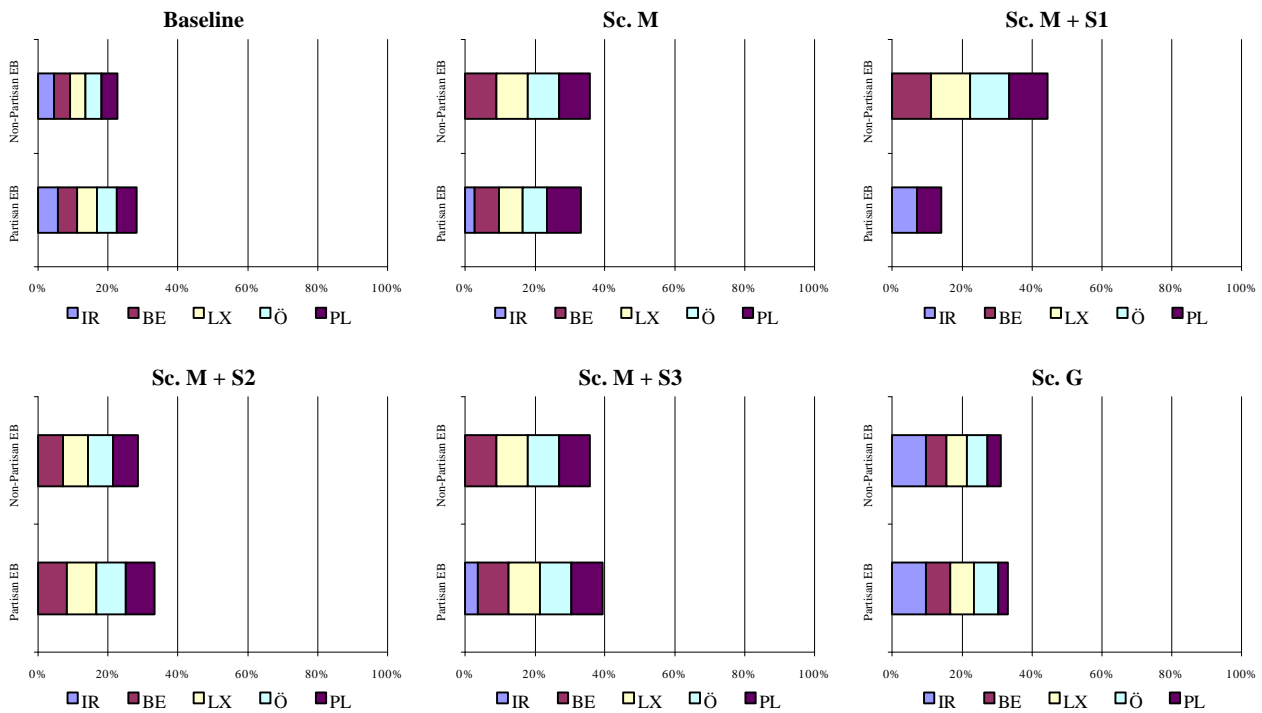
APPENDIX 3

**Effect of EB Members' Partisanship
On EMU Members' Voting Power (measured by SSI)**

Countries with EB Representative

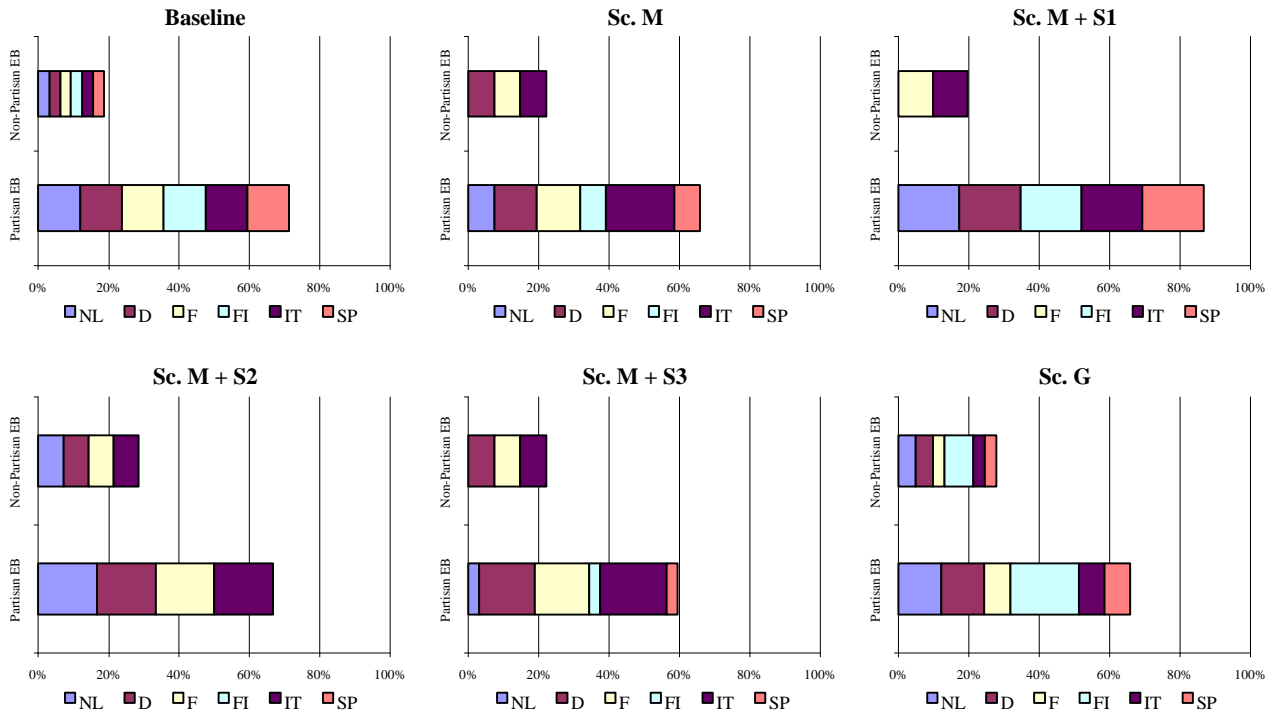


Countries with No EB Representative

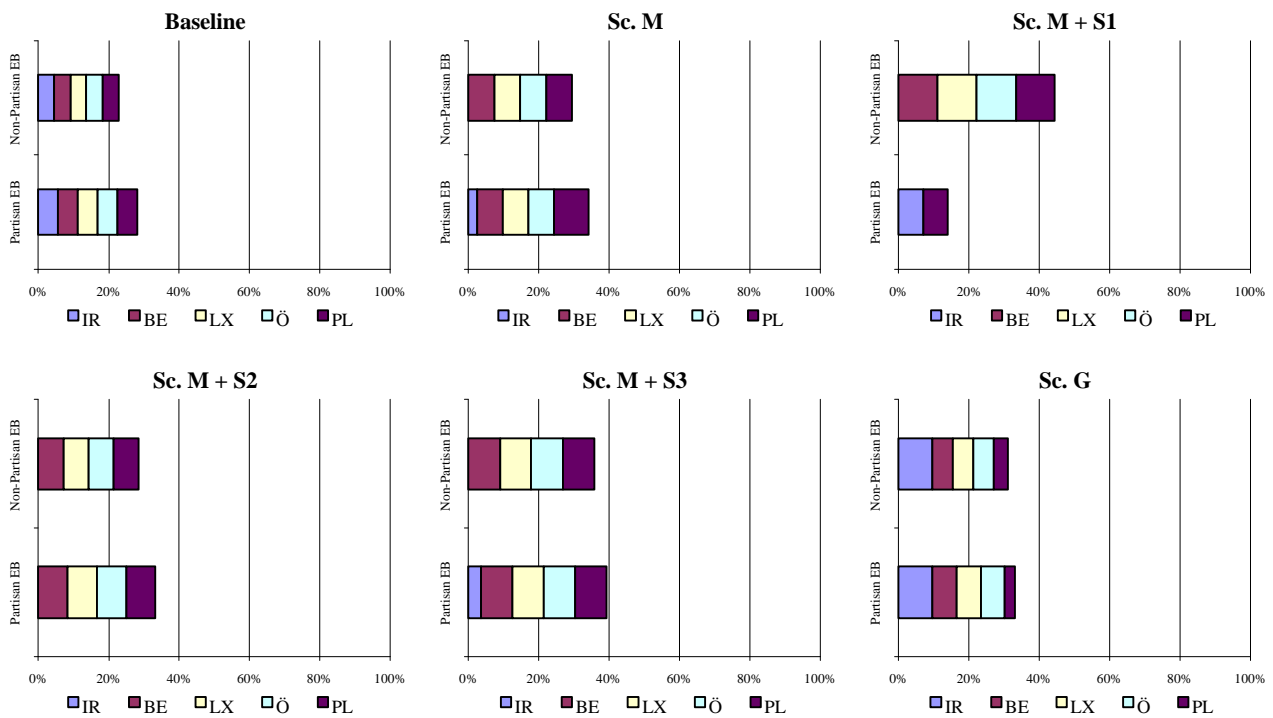


**Effect of EB Members' Partisanship
On EMU Members' Voting Power (measured by SBI)**

Countries with EB Representative

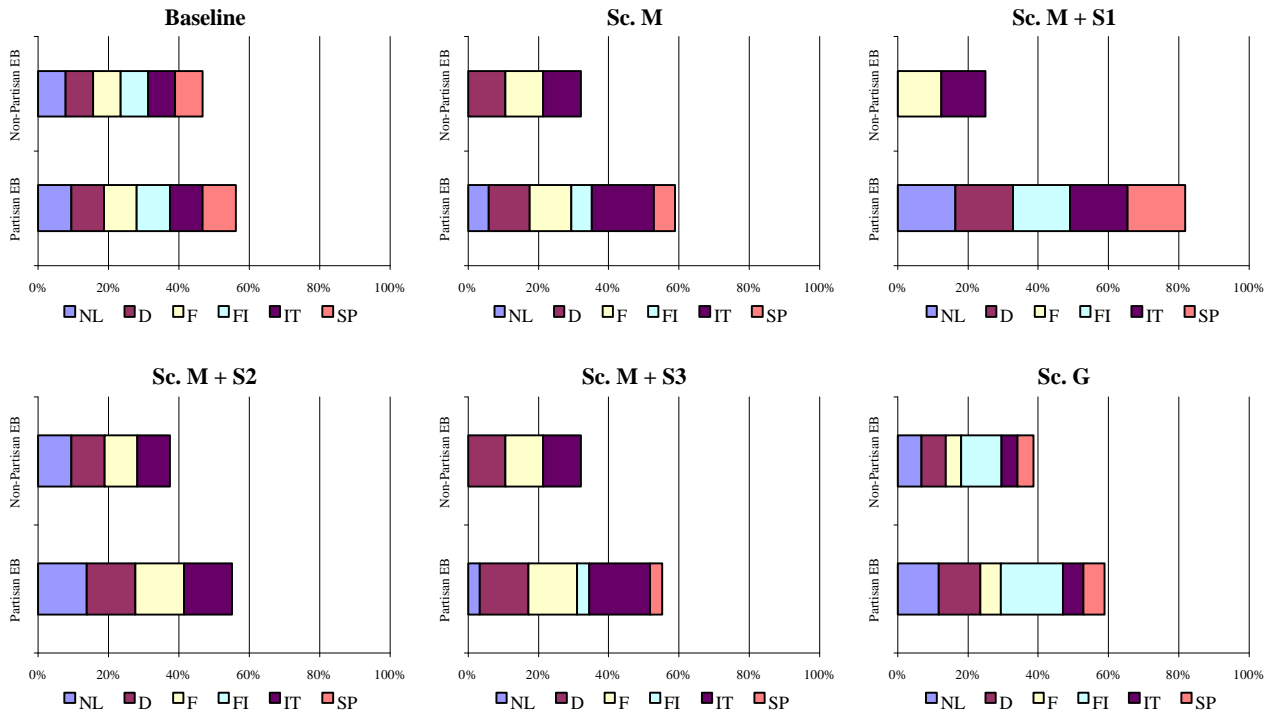


Countries with No EB Representative

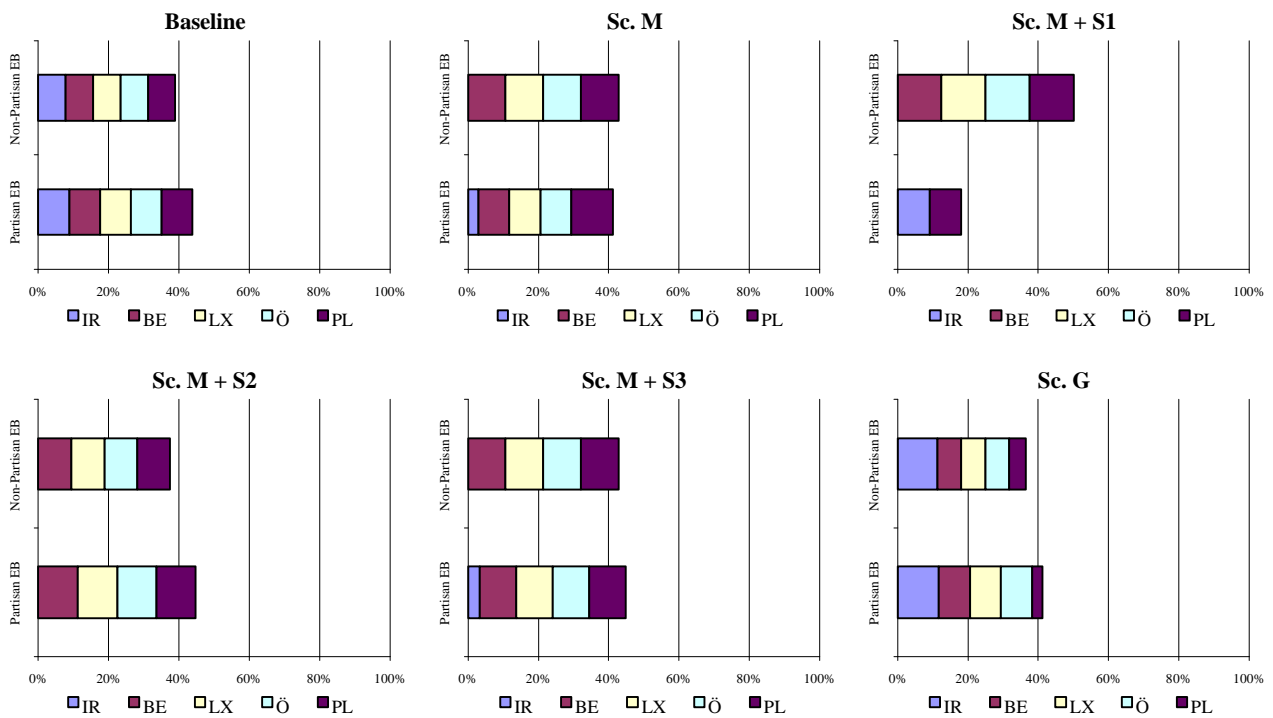


**Effect of EB Members' Partisanship
On EMU Members' Voting Power (measured by HPI)**

Countries with EB Representative

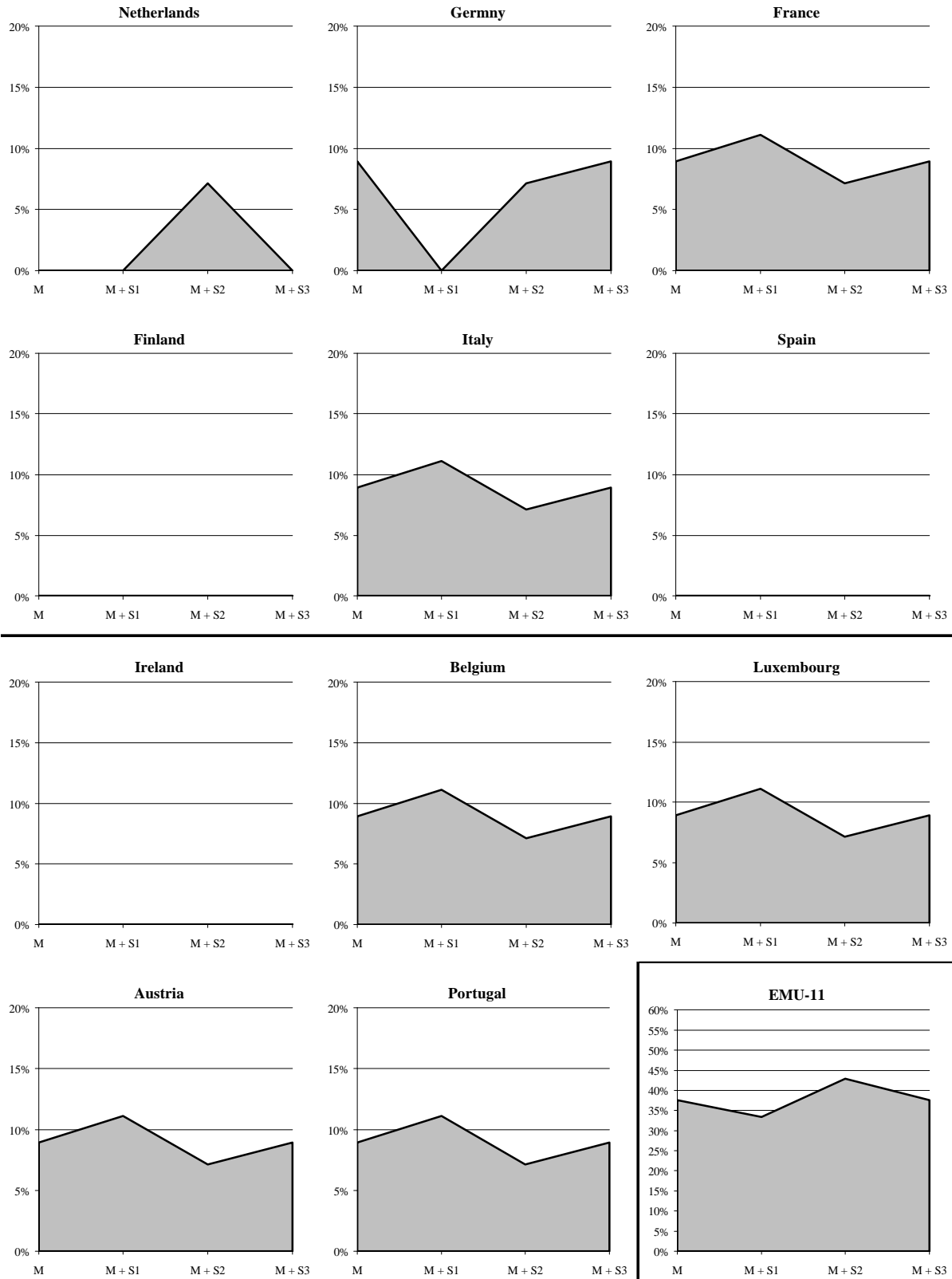


Countries with No EB Representative

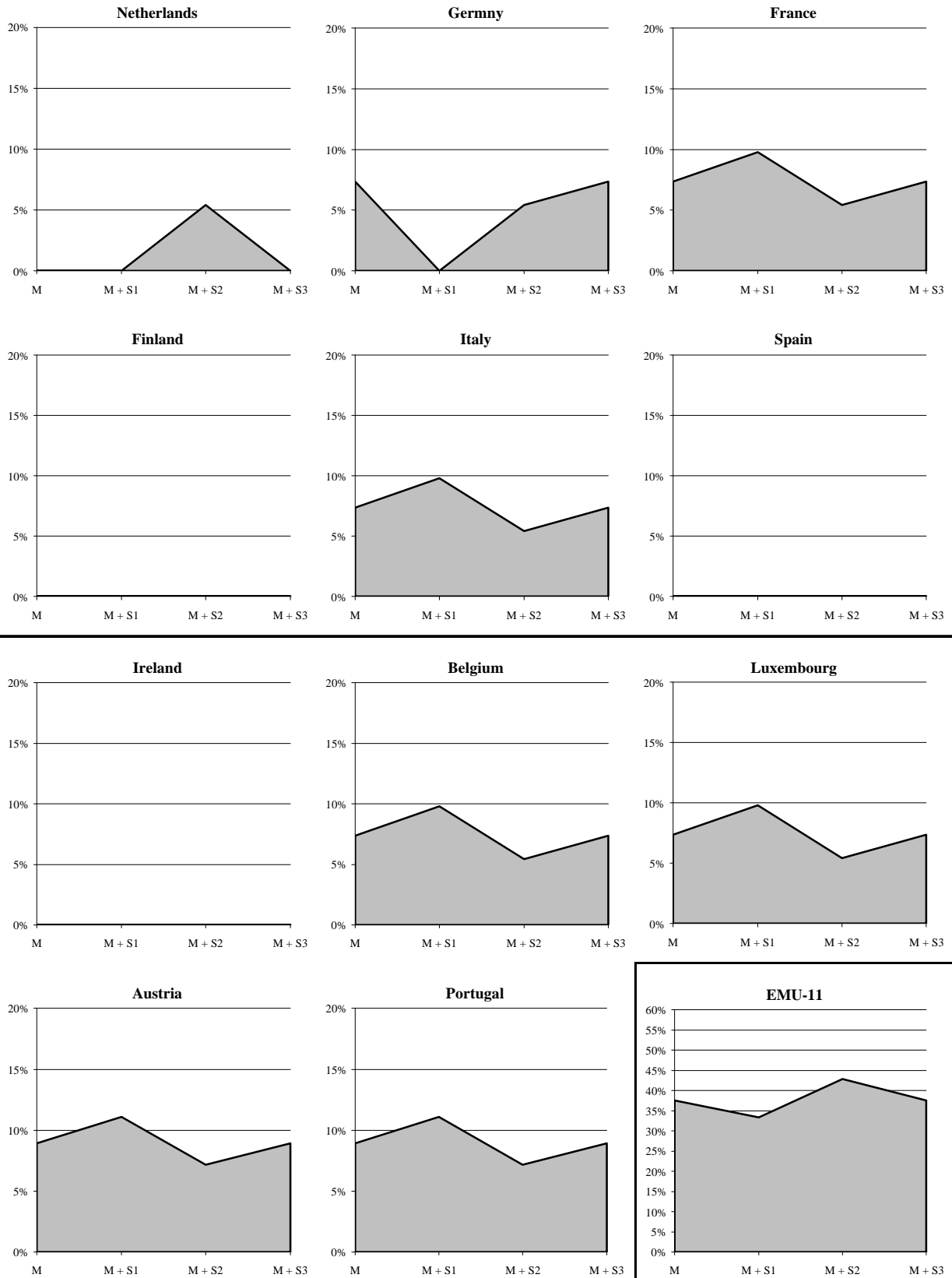


APPENDIX 4

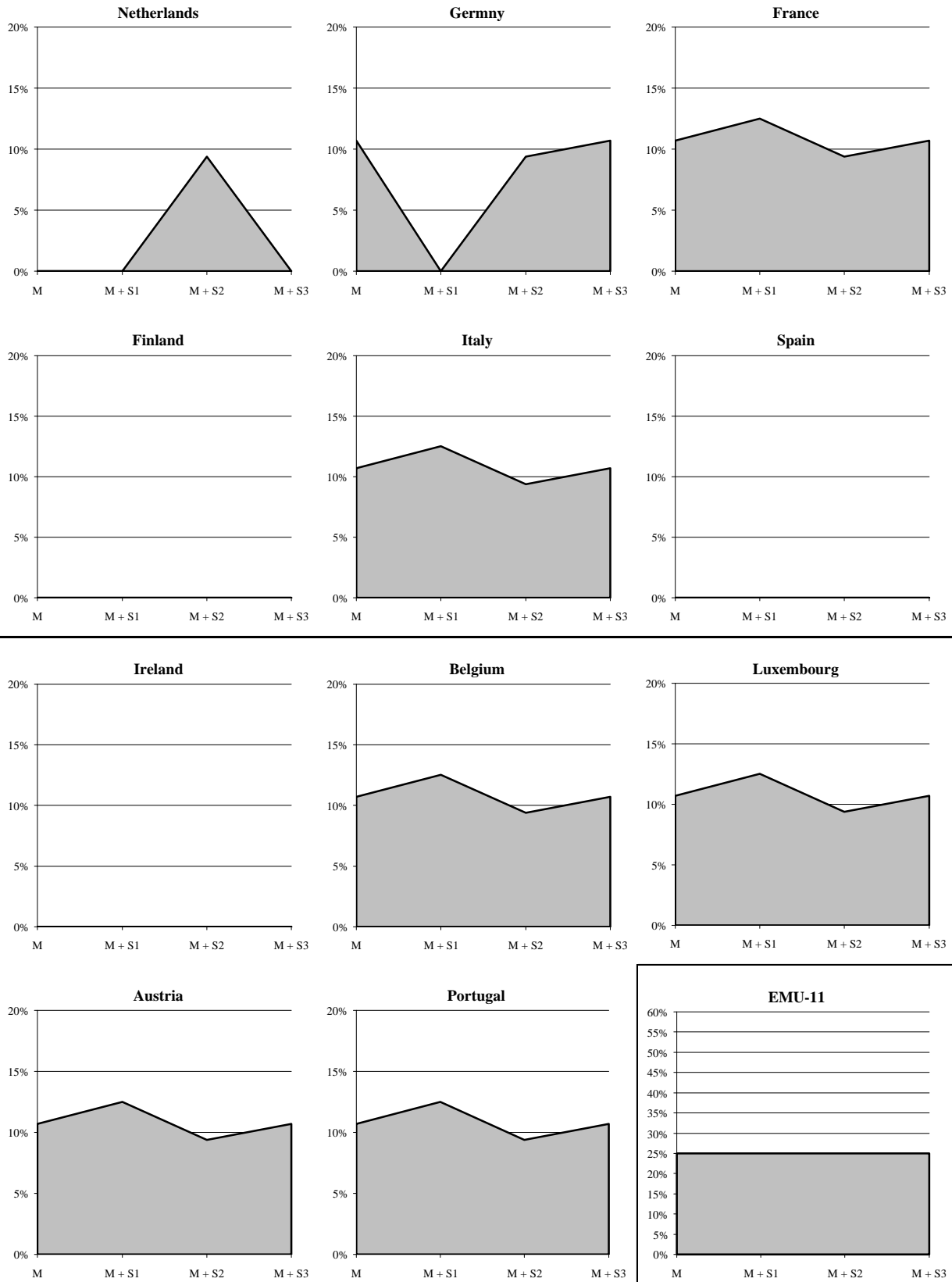
**Non-Partisan EB Members:
Evolution of Voting Power across "Shifts" (measured by SSI)**



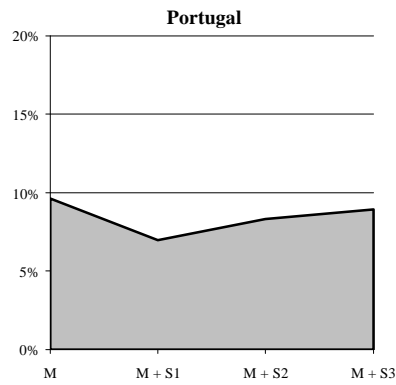
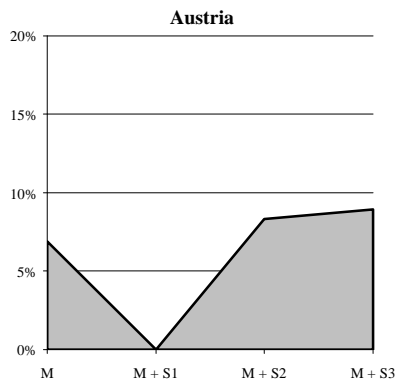
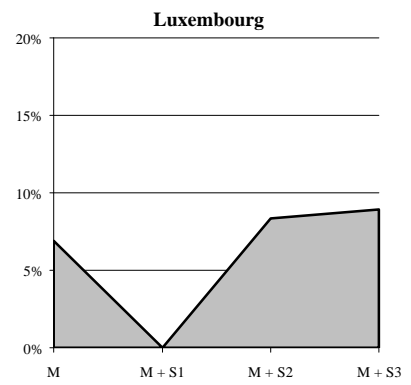
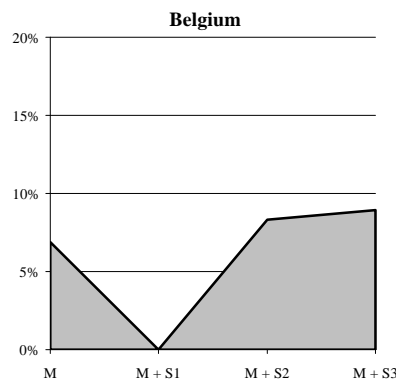
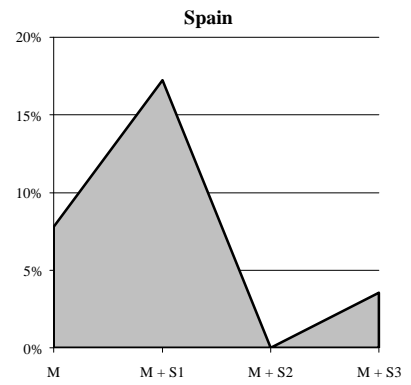
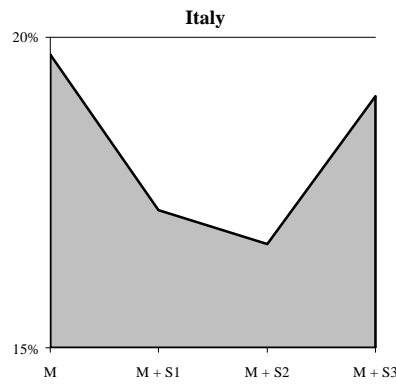
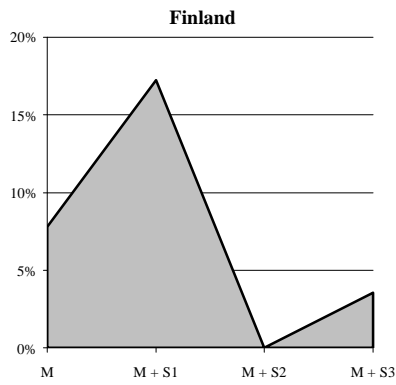
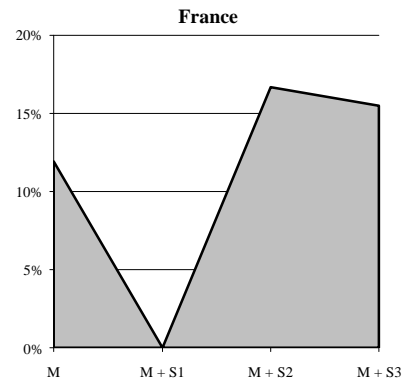
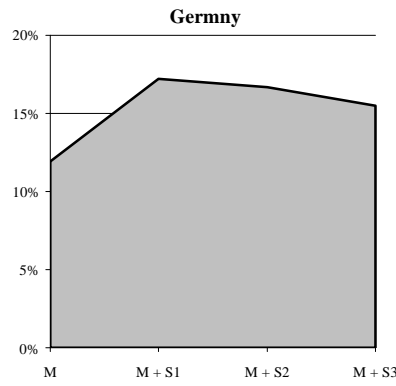
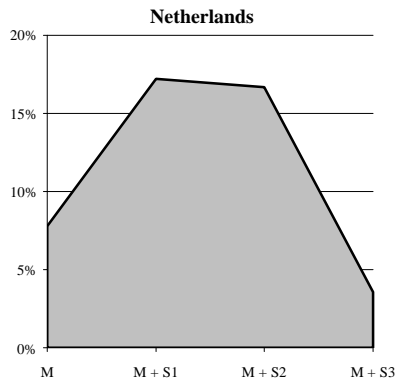
**Non-Partisan EB Members:
Evolution of Voting Power across "Shifts" (measured by SBI)**



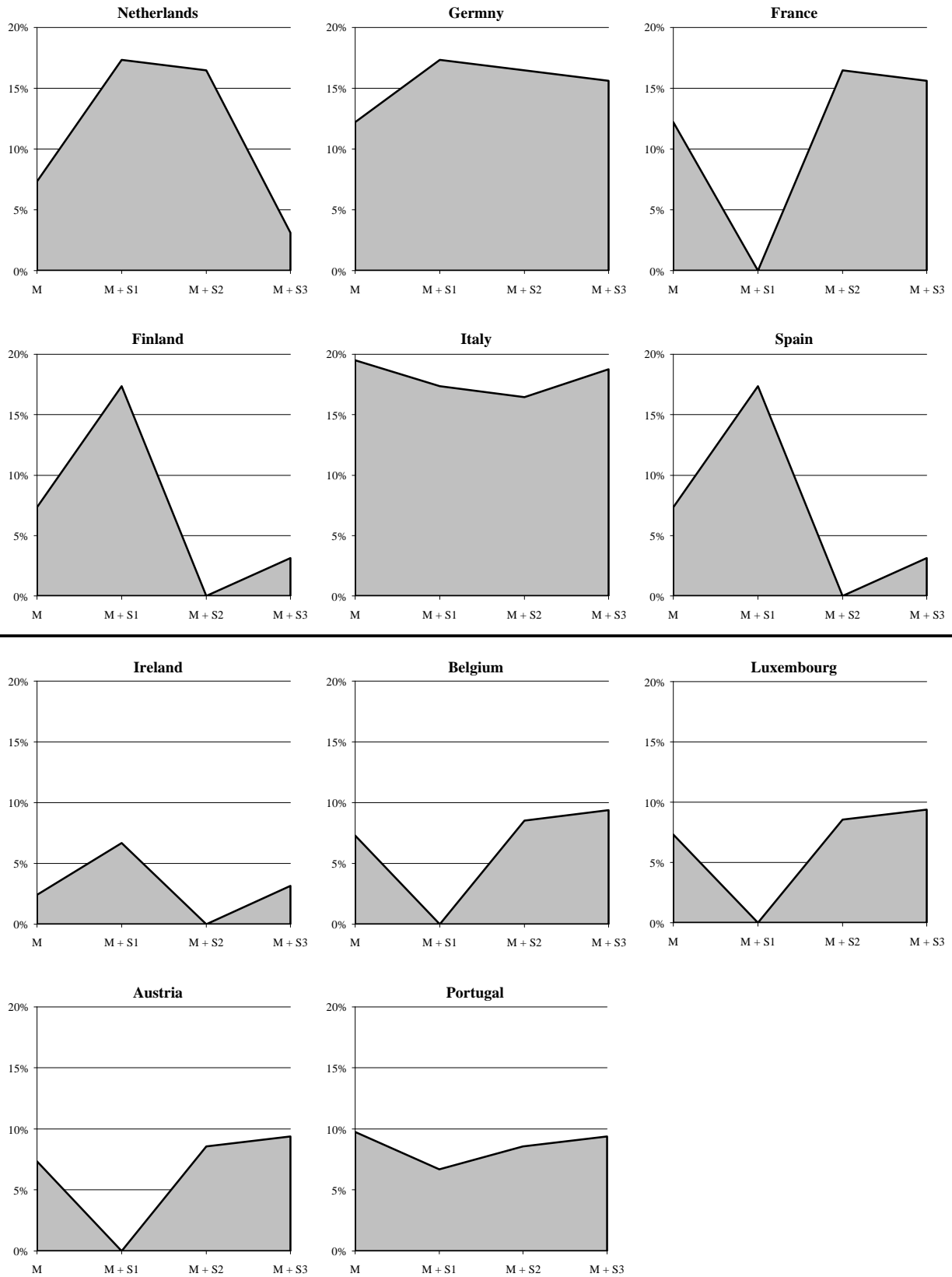
**Non-Partisan EB Members:
Evolution of Voting Power across "Shifts" (measured by HPI)**



**Partisan EB Members:
Evolution of Voting Power across "Shifts" (measured by SSI)**



**Partisan EB Members:
Evolution of Voting Power across "Shifts" (measured by SBI)**



**Partisan EB Members:
Evolution of Voting Power across "Shifts" (measured by HPI)**

