Flexible Majority Rules for Central Banks*

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Abstract

We propose a flexible majority rule for central-bank councils where the size of the majority depends monotonically on the change in interest rate within a particular time frame. Small changes in the interest rate require a small share, whilst larger changes require a larger share of supporting votes. We show that flexible majority rules are superior to simple majority rules.

Keywords: Central bank, Voting, Majority Rule, Flexible Majority Rules.

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1 Introduction

This paper proposes a flexible majority rule for central banks. The flexible majority rule works as follows: Within a prespecified time frame, the size of the majority necessary for adopting a interest-rate change depends on the size of the interest-rate change itself. For small changes in the interest rate, only a small share of the votes is required. For large interest-rate changes, a larger majority is necessary, tending towards unanimity.

We consider a model where N central bankers, representing countries, regions, or different constituencies within a country, decide on monetary policy. The central bank loss function is composed of the weighted loss functions of countries, regions, or constituencies. This is the typical case for the European Central Bank (ECB), but also applies to the Federal Reserve. In our example, we consider the ECB when the monetary union is hit by a shock dividing the union into two parts. After this shock, one part desires a change in monetary policy, while the other part wants to retain the status quo. For instance, some countries may be affected negatively by a supply or demand shock, and concern for their own country's welfare makes them want to ease monetary policy through interest-rate cuts. Other countries, not affected by the shock, will prefer no change in the interest rate. Under simple majority rule, a change in interest rate will occur if and only if a simple majority desires a change. Under flexible majority rule, small changes in the interest rate will only require a small share of supporting votes and hence a small number of countries to agree, whereas large changes in the interest rate require large majorities.

The key advantage of the flexible rule is that a number of countries hit by negative shocks can partially ease the consequences by a small interest-rate cut. Larger changes in the interest rate, however, require larger majorities, which can only be achieved if a larger number of countries is affected by the shock. The flexible majority rule majority rule represents a compromise between the countries affected by the shock and the other countries. The drawbacks of simple majority rules and unanimity rules (possible exploitation of minorities, unanimity rules creating extreme veto power) can be overcome by flexible majority rules.

We compare the simple majority rule with the flexible majority rule. Our main result is that the flexible majority rule leads to lower social losses than the simple majority rule. Welfare-enhancing flexible majority rules enable minorities or small majorities – either a few large countries or a number of small countries – to bring about small interest rate changes. For large interest-rate changes a large fraction of supporting votes is required. The main intuition for our results is that flexible majority rules of the kind described above can approximate aggregate social loss minimization, which calls for small interest-rate changes when shocks are small and affect only a few countries and large interest-rate changes when shocks are larger and affect many countries. In the last section of this paper, we discuss conceptual and practical issues of our proposal.

2 Relation to the Literature

2.1 Regional Bias in Central Bank Decisions

A socially desirable procedure for making decisions in central bank committees has been the focus of a substantial body of recent literature.

Three areas have been investigated. The debate about optimal institutional design of the ECB had focused on its degree of centralization. Von Hagen and Süppel (1994), Lohmann (1997), and Bindseil (2001) have highlighted the advantages of a stronger role for the centrally-nominated ECB.[1] Berger (2006) suggests several ways of improving the organization of the ECB Governing Board. We suggest that flexible majority rules may partially function as a substitute for lack of centralization at the ECB.

Second, regional considerations appear to play a substantial role in central banks' decision-making, as has been suggested by Heinemann and Hüfner (2004) for the ECB. Meade and Sheets (2005) have highlighted the fact that the policymakers of the Federal Reserve System of the United States take into account developments in regional unemployment when casting votes on monetary policy. We suggest that flexible majority rules promise efficiency gains for such central banks.

There is a growing literature on the importance and effects of having monetary policy devised by a committee rather than by individuals. In her excellent survey, Sibert (2006) suggests that an ideal monetary policy committee should not have more than five members. Other recent papers provide specific arguments suggesting that monetary policy conducted by a committee is preferable to a single policy-maker. Gerlach-Kirsten (2006) derives this conclusion in a theoretical study on interest-rate-setting in monetary policy committees, and Blinder and Morgan (2005) provide support with an experimental study. We suggest that flexible majority rules might further enhance the efficiency of committee decision-making on monetary policy.[2]

2.2 Efficient Collective Decision-Making

On a broad conceptual level, our paper addresses the optimal design of majority rules, which has a long tradition in economic and political science. One of the most widely employed decision rules is the simple majority rule, where a proposal is accepted if it obtains more than 50% of the votes. From a utilitarian perspective however, fixed majorities can very often lead to inefficiencies. Consider, for example, a collective decision problem where two groups have preferences located at two extremes. If one group is at least as big as the fixed majority required in this decision problem, it can always overrule the other group. This may lead to serious dissatisfaction on the part of the minority (see for instance Guinier (1994)) and may not be optimal from a utilitarian perspective.

Furthermore, in the recent past there has been renewed interest in new decision rules. Casella (2005) suggests a system of storable votes, where voters can choose between the possibility of voting now or storing the vote and having an additional vote in the future. Erlenmeier and Gersbach (2001) have suggested that one might use flexible majority rules for public good provision. When a community has to decide whether to accept a new project and thus faces a simple yes/no decision, the authors show that it can be welfare-enhancing to make the required majority for the adoption of the project proposal depend on the share of individuals taxed under the proposal. In this paper we design flexible majority rules for monetary policy, where a committee has to choose an element, i.e. a short-term interest rate, from a one-dimensional policy space , i.e. from a continuum of possible alternatives.[3]

3 The Model

We consider a monetary union consisting of $N \in \mathbb{N}$ ($N \geq 2$) countries, which make joint decisions on monetary policy in a single central bank such as the ECB. Countries are denoted by k ($k = 1, 2, ..., N$). The monetary policy is decided in a central bank council where each country k delegates a central banker representing the interest of country k. We assume that the social loss function[4] for every single country is given by

$$L^k = (\hat{i} - i^k)^2 \ . \tag{1}$$

The variable $\hat{i}$ denotes the interest rate adopted by the central bank, and i^k is the interest rate that is optimal for country k ($\hat{i}, i^k \in \mathbb{R}$). Overall social losses, based on a weighted-utilitarian welfare criterion, are assumed to be given by

$$\mathcal{L} = \sum_{k=1}^{N} g_k L^k \ , \tag{2}$$

with $g_k \in (0, 1)$ and the normalization $\sum_{k=1}^{N} g_k = 1$, where g_k are the weights of the countries representing, for example, differences in GDP or in population.

We assume that in the past, the union has been in long-term equilibrium with an optimal interest rate, which w.l.o.g is normalized to zero. Given this status quo, we assume that the monetary union is hit by a supply or demand shock ϵ dividing the union into two parts. One part is affected by the shock, while the other part is not. We use the subset $\mathcal{K}$ to denote the countries affected by the shock, with $\mathcal{K} \subseteq \mathcal{N} = \{1, 2, ..., N\}$. W.l.o.g., we will analyze positive realizations of shocks and thus possible increases in the interest rate, as negative realizations lead to corresponding declines in the interest rate.

We illustrate the working of flexible majority rules in a simple setting. First, we assume that if a shock occurs, every affected country is hit by the same aggregate shock.

Second, we assume that the larger the aggregate economic weight of the countries affected by a shock, the more sizable the shock is. This idea is illustrated by a banking crisis (see Elsinger et al. (2006)). Suppose that a regional banking crisis occurs, caused by a regional negative supply or demand shock and that this crisis triggers defaults of borrowers at banks. If the banking crisis is moderate, other banks in other countries might not be affected much, as only a limited number of loan defaults in the European interbank market connecting all banks will occur. If the regional banking crisis is more severe and many banks have to default on their interbank loans, banks in other regions may not be able to repay their outstanding debts and may default as well, so that a larger fraction of the monetary union is hit by the banking crisis.

Our assumption results in a strictly monotonically increasing shock function $\epsilon(G_{\mathcal{K}})$, with $G_{\mathcal{K}}$ representing the aggregate economic weight of the affected countries, given by $G_{\mathcal{K}} = \sum_{k \in \mathcal{K}} g_k$ and $\epsilon(0) = 0$. For a country $k \in \mathcal{K}$, we assume that its desired interest-rate change i^k is an increasing function of the shock size $\epsilon(G_{\mathcal{K}})$, whilst an unaffected country does not desire any interest-rate change. The desired interest-rate change of country $k \in \mathcal{N}$ can then be written as

$$i^k = \begin{cases} i(\epsilon(G_{\mathcal{K}})) & k \in \mathcal{K} \\ 0 & \text{otherwise} \end{cases} , \tag{3}$$

with $i(.)$ monotonically increasing and $i(0) = 0$. As a short-cut we use $i_{\mathcal{K}} := i(\epsilon(G_{\mathcal{K}}))$ in the following and $\hat{i}_{\mathcal{K}}$ denotes the interest-rate change adopted by the central bank in shock scenario $\mathcal{K}$. Now we can rewrite the aggregated social loss function of the union for a given shock scenario $\mathcal{K}$ as

$$\mathcal{L}_{\mathcal{K}}(\hat{i}_{\mathcal{K}}) = G_{\mathcal{K}}(\hat{i}_{\mathcal{K}} - i_{\mathcal{K}})^2 + (1 - G_{\mathcal{K}})(\hat{i}_{\mathcal{K}} - 0)^2 = (\hat{i}_{\mathcal{K}} - G_{\mathcal{K}} i_{\mathcal{K}})^2 + G_{\mathcal{K}}(1 - G_{\mathcal{K}})(i_{\mathcal{K}})^2 \ . \tag{4}$$

We observe that for fixed $\mathcal{K}$, aggregated social losses $\mathcal{L}_{\mathcal{K}}(\hat{i}_{\mathcal{K}})$ are represented by a quadratic equation in $\hat{i}_{\mathcal{K}}$. Social losses are minimized by

$$\hat{i}_{\mathcal{K}} = i^*_{\mathcal{K}} = G_{\mathcal{K}} i_{\mathcal{K}} = G_{\mathcal{K}} i(\epsilon(G_{\mathcal{K}})) \ , \tag{5}$$

where $i^*_{\mathcal{K}}$ is increasing in $G_{\mathcal{K}}$ and $i^*_{\mathcal{K}} < i_{\mathcal{K}}$ if $0 < G_{\mathcal{K}} < 1$.

To examine decision rules for central banks, we consider a constitutional design problem where governments of the monetary union decide which decision rule the central bank will use. The selection of the decision rule is governed by the unanimity rule and occurs under a veil of ignorance, i.e. at a time when shocks are not yet known and no conflicts of interest are present. The remaining process is as follows:

Stage 1: Central bankers in the council observe which countries are affected by the shock.

Stage 2: The council decides on the change in the interest rate in accordance with the decision rule.

We will restrict rules to democratic decision processes where each central bank has one vote. In the following, we introduce two different decision rules: Simple majority (SM) and flexible majority (FM) decision rule.

SM: The interest rate will be changed if and only if a change receives a majority of more than 50% of the votes. The central bank implements the maximum interest-rate change that receives a majority of 50% of the votes.

FM: The interest rate will be changed if the proposed interest-rate change denoted by $\tilde{i}$ ($\tilde{i} \in \mathbb{R}_0^+$) obtains a share of $\alpha^{FM}(\tilde{i})$ votes with $\alpha^{FM}(.)$ increasing and $\alpha^{FM} \in [0, 1]$. The central bank implements the maximum interest-rate change $\tilde{i}$ that receives a share of $\alpha^{FM}(\tilde{i})$.

Practically, the FM-rule can be applied as follows: The council votes about interest-rate changes in ascending order: $0 \leq \tilde{i}_1 < \tilde{i}_2 < ...$. As soon as an interest-rate change does not obtain the required share of votes, the last but one interest-rate change (that has been adopted) will be implemented by the central bank. The important feature of flexible majority rules is that the size of the majority α depends on the proposed interest-rate change $\tilde{i}$.

4 Results

4.1 FM-Rule

We introduce a flexible majority rule that will prove to be welfare-enhancing. In particular, we define the FM-rule as follows:

$$\alpha^{FM}(\tilde{i}) = \begin{cases} 0 & \tilde{i} = 0 \\ \frac{1}{N} & 0 < \tilde{i} \leq I(1) \\ \frac{2}{N} & I(1) < \tilde{i} \leq I(2) \\ \vdots & \\ \frac{N-1}{N} & I(n-2) < \tilde{i} \leq I(n-1) \\ 1 & I(n-1) < \tilde{i} \end{cases}, \tag{6}$$

where $I(n)$ is given by

$$I(n) = \begin{cases} \min_{\mathcal{K}}\{G_{\mathcal{K}} i_{\mathcal{K}}\} & \text{s.t. } |\mathcal{K}| = n \quad \text{if} \quad n \leq \frac{N}{2} \\ \max_{\mathcal{K}}\{(G_{\mathcal{K}} i_{\mathcal{K}}\} & \text{s.t. } |\mathcal{K}| = n \quad \text{if} \quad n > \frac{N}{2} \end{cases}, \tag{7}$$

with n the number of countries affected. Note that $\alpha^{FM}(\tilde{i})$ is monotonically increasing in $\tilde{i}$, since $I(n)$ is monotonically increasing in n. The flexible majority rule has the following property: Small interest-rate changes require a small share of votes, while large interest-rate changes require a large share of supporting votes.

4.2 Main Result

In this section, we state our main result. For a given shock scenario $\mathcal{K}$, we define by $\hat{i}_{\mathcal{K}}^{SM}$ the interest-rate change under the SM-rule and by $\hat{i}_{\mathcal{K}}^{FM}$ the interest-rate change under the FM-rule .

In the following proposition we show that the flexible majority rule increases welfare compared to the simple majority rule.

Proposition 1 *For all shock scenarios $\mathcal{K}$ the FM-rule defined by α^{FM} is never worse than the SM-rule and there exists a $\mathcal{K}$ such that the FM-rule is better than the SM-rule.*

Proof: First, for $\mathcal{K} = \emptyset$ or $\mathcal{K} = \mathcal{N}$ both decision rules implement the same interest-rate change, so that aggregate social losses are the same. Second, from equation (4) we obtain, $\mathcal{L}_\mathcal{K}$ is strictly monotonically decreasing for $\hat{i}_\mathcal{K} \leq G_\mathcal{K} i_\mathcal{K}$ and strictly monotonically increasing for $\hat{i}_\mathcal{K} > G_\mathcal{K} i_\mathcal{K}$.

(i) Suppose $\mathcal{K}$ is fixed, $|\mathcal{K}| = n$ and $\frac{N}{2} \geq n > 0$. Then $\hat{i}^{SM}_\mathcal{K} = 0$, since the unaffected countries have the majority of votes. For the FM-rule we obtain $\hat{i}^{FM}_\mathcal{K} = I(n) = \min_\mathcal{K}\{G_\mathcal{K} i_\mathcal{K}\}$, since the affected countries desire an interest-rate change of $i_\mathcal{K}$ but they can only change the interest rate up to $I(n) < i_\mathcal{K}$. As $0 < I(n) \leq G_\mathcal{K} i_\mathcal{K}$ we obtain $\mathcal{L}_\mathcal{K}(\hat{i}^{FM}_\mathcal{K} = I(n)) < \mathcal{L}_\mathcal{K}(\hat{i}^{SM}_\mathcal{K} = 0)$.

(ii) Suppose $\mathcal{K}$ fixed, $|\mathcal{K}| = n$ and $\frac{N}{2} < n < N$. Then $\hat{i}^{SM}_\mathcal{K} = i_\mathcal{K}$, since the affected countries have the majority of votes. For the FM-rule we obtain $\hat{i}^{FM}_\mathcal{K} = I(n) = \max_\mathcal{K}\{G_\mathcal{K} i_\mathcal{K}\}$ if $I(n) < i_\mathcal{K}$ and $\hat{i}^{FM}_\mathcal{K} = i_\mathcal{K}$ if $I(n) \geq i_\mathcal{K}$, since the affected countries desire to implement $i_\mathcal{K}$ and can change the interest rate up to $I(n)$. Therefore, they choose $I(n)$ if $I(n) < i_\mathcal{K}$ and implement their desired interest-rate change $i_\mathcal{K}$ if $I(n) \geq i_\mathcal{K}$. Then we obtain $\mathcal{L}_\mathcal{K}(\hat{i}^{FM}_\mathcal{K} = I(n)) < \mathcal{L}_\mathcal{K}(\hat{i}^{SM}_\mathcal{K} = i_\mathcal{K})$ if $I(n) < i_\mathcal{K}$, because $I(n) \geq G_\mathcal{K} i_\mathcal{K}$ and $\mathcal{L}_\mathcal{K}(\hat{i}^{FM}_\mathcal{K} = i_\mathcal{K}) = \mathcal{L}_\mathcal{K}(\hat{i}^{SM}_\mathcal{K} = i_\mathcal{K})$ if $I(n) \geq i_\mathcal{K}$.

This completes the proof. ■

The intuition for the result is as follows. With the FM-rule, an interest rate from the interval $[\hat{i}^{SM}_\mathcal{K}, G_\mathcal{K} i_\mathcal{K}]$ or $[G_\mathcal{K} i_\mathcal{K}, \hat{i}^{SM}_\mathcal{K}]$ is adopted. Hence, the FM-rule represents a compromise between countries affected by the shock and the other countries, which is welfare-improving compared to the SM-rule.

4.3 An Example

We illustrate the working of our flexible majority rules with a simple example. Suppose the union consists of three countries with $g_1 = 0.2$, $g_2 = 0.3$ and $g_3 = 0.5$ and

$i(\epsilon(G_{\mathcal{K}})) = 10G_{\mathcal{K}}$. The FM-rule is then given by

$$\alpha^{FM}(\tilde{i}) = \begin{cases} 0 & \text{if} \quad \tilde{i} = 0 \\ \frac{1}{3} & \text{if} \quad 0 < \tilde{i} \leq 0.4 \\ \frac{2}{3} & \text{if} \quad 0.4 < \tilde{i} \leq 6.4 \\ 1 & \text{if} \quad 6.4 < \tilde{i} \end{cases} . \tag{8}$$

In table 1, we provide the actual interest-rate changes using the FM- and SM-rule for all shock scenarios $\mathcal{K}$, and compare the social outcomes.

[table 1: about here]

This shows that for $\mathcal{K} = \{1\}, \{2\}, \{3\}, \{1,3\}, \{2,3\}$, the FM-rule outperforms the SM-rule, while both rules implement the same interest rate changes in the remaining shock scenarios.

4.4 Extensions

We discuss two extensions of the basic model. First, the welfare result can even be strengthened by allowing for weighted flexible majority rules. Suppose we weight the vote of every member k with g_k. Introducing the FM-rule by inverting the minimizer $i^*_{\mathcal{K}} = G_{\mathcal{K}} i(\epsilon(G_{\mathcal{K}}))$ of $\mathcal{L}_{\mathcal{K}}$ with respect to $G_{\mathcal{K}}$ (see equations (4) and (5)), the affected countries represented by $\mathcal{K}$ can only change the interest rate up to $i^*_{\mathcal{K}}$, since now they have a share $G_{\mathcal{K}}$ of the votes. Additionally, $i^*_{\mathcal{K}}$ is implemented since $i^*_{\mathcal{K}} \leq i_{\mathcal{K}}$, which aligns this weighted FM-rule with the first-best outcome. This is shown formally in Gersbach and Pachl (2006).

Second, we can compare our weighted utilitarian welfare criterion with another approach, where the central bank focuses on weighted economic shocks. In our model, this can be incorporated by defining the aggregated social losses of the union by[5]

$$\bar{\mathcal{L}}_{\mathcal{K}}(\hat{i}_{\mathcal{K}}) = \left(\hat{i}_{\mathcal{K}} - i\left(\bar{\epsilon}\left(G_{\mathcal{K}}\right)\right)\right)^2 , \tag{9}$$

where $\bar{\epsilon}\left(G_{\mathcal{K}}\right)$ is the weighted average shock of the whole union given by

$$\bar{\epsilon}\left(G_{\mathcal{K}}\right) = G_{\mathcal{K}}\epsilon\left(G_{\mathcal{K}}\right) + (1 - G_{\mathcal{K}})\epsilon(0) = G_{\mathcal{K}}\epsilon\left(G_{\mathcal{K}}\right) . \tag{10}$$

$\bar{\mathcal{L}}_{\mathcal{K}}$ is minimized by

$$\hat{i}_{\mathcal{K}} = \bar{i}_{\mathcal{K}} = i\left(G_{\mathcal{K}}\epsilon\left(G_{\mathcal{K}}\right)\right) \ . \tag{11}$$

If we compare $\bar{i}_{\mathcal{K}}$ with the minimizer $i^*_{\mathcal{K}}$ of the weighted utilitarian loss function, we observe that $\bar{i}_{\mathcal{K}}$ has the same properties as $i^*_{\mathcal{K}}$ (i.e both are increasing in $G_{\mathcal{K}}$ and $\bar{i}_{\mathcal{K}}, i^*_{\mathcal{K}} < i_{\mathcal{K}}$ for $0 < G_{\mathcal{K}} < 1$). Hence, we can again apply our construction and flexible majority rules will also be welfare-enhancing under such circumstances.

5 Discussion and Conclusion

In this section we address a variety of conceptual issues that need to be dealt with in future extensions of the model and in practical applications. First, allowing minorities to initiate a change in the interest rates may invite cycling in a dynamic setting, since interest-rate changes might be revised immediately. Such undesirable cycling can be avoided by restricting flexible majority rules to genuine majorities or by a revision rule. A revision rule stipulates that interest-rate change reversals within a particular time-frame, say a year, require a share of supporting votes larger than the share of opposing votes for the initial interest-rate change.[6]

Second, the construction of flexible majority rules requires only that the preferences of the countries be single-peaked and convex in i_t, and that the maximization problem of the monetary union has a unique optimizer increasing in shock size (see Gersbach and Pachl (2006)). But shock scenarios can be more complicated. For instance, the sign of shocks can be different across countries. In such cases, the direction of the interest-rate change must be determined by the relative size of votes supporting one direction. The actual change of the interest rate is determined by the flexible majority rule.

Third, we have assumed that if the members of the council have registered the overall shock and know whether they are affected, they desire the same interest-rate change. But in a given shock scenario, preferences may be different, and different members may have different opinions about the appropriate change in interest rate. Such a scenario makes the calculation of the FM-rule more complicated. While it is possible to calculate flexible majority rules for such cases, in practice, one might opt for a simple step function to implement flexible majority rules. E. g., one could stipulate the size of the required majority for a sequence of normalized interest-rate changes 0.25%, 0.50%, 0.75%, etc. Further conceptual and practical issues await further research (see also Gersbach and Pachl (2006)).

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Notes

[1]The advantages of centralization have gained renewed interest in the current process of EU-enlargement (Baldwin et al. (2001), and Berger et al. (2003)).

[2]Dixit and Jensen (2000) model the way in which governments could influence the central bank by offering incentive contracts.

[3]There are real-world examples of flexible majority rules, as has been pointed out by Amihai Glazer in personal communication. For instance, when a person buys property in Irvine in Southern California, he signs a contract making him a member of a homeowner association that provides local public goods and has the right to levy annual fees. The share of votes required to implement an increase in the fees depends on the proposed fee change.

[4]See e.g. Woodford (2003). Gersbach and Hahn (2007) show that this functional form of losses can be obtained if supply shocks are normally distributed.

[5]We are grateful to a referee for this suggestion.

[6]Another possibility would be for the flexible majority rule not to be calculated with respect to the former period, but to a long-term equilibrium interest rate. This would lower the likelihood of interest rate reversals.

Tables

$\mathcal{K}$	$\hat{i}_{\mathcal{K}}^{FM}$	$\hat{i}_{\mathcal{K}}^{SM}$	$\Delta\mathcal{L}_{\mathcal{K}} = \mathcal{L}_{\mathcal{K}}\left(\hat{i}_{\mathcal{K}}^{SM}\right) - \mathcal{L}_{\mathcal{K}}\left(\hat{i}_{\mathcal{K}}^{FM}\right)$
$\emptyset$	0	0	0
$\{1\}$	0.4	0	0.16
$\{2\}$	0.4	0	0.56
$\{3\}$	0.4	0	1.84
$\{1,2\}$	5	5	0
$\{1,3\}$	6.4	7	2.16
$\{2,3\}$	6.4	8	2.56
$\{1,2,3\}$	10	10	0

Table 1: Comparision of the social losses for the SM- and FM-rule.