The Role of the Chairman in Setting Monetary Policy: Individualistic vs. Autocratically Collegial MPCs*

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This paper models the role of the Chairman in the decision making of individualistic and autocratically collegial monetary policy committees, assuming that uncertainty about the optimal interest rate causes policymakers' views to differ and that they are unable to communicate their opinions perfectly. The Chairman's ability to moderate the discussion and his economic skills—and, in an autocratically collegial committee, the authority arising from his position—impact the path of interest rates and the distribution of votes. Simulations suggest that his influence on the quality of policy itself is limited and that interest rate setting is only slightly worse in an autocratically collegial setup. The Chairman's main impact is to help build consensus in the committee, which enhances the credibility of monetary policy.

JEL Codes: D81, E52.

1. Introduction

In a growing number of countries, monetary policy is set by committee.[1] It is sometimes argued, certainly in the case of the Federal Open Market Committee (FOMC) in the United States, that the Chairman of the committee exerts a disproportionate influence on the

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[1] Fry et al. (2000) study the policy frameworks of eighty-eight central banks across the world and report that in seventy-nine, policy is set by committee.

interest rate decision (see, e.g., former Vice Chairman of the Board of Governors Blinder 1999 and former Governor Meyer 2004). There are at least three potential reasons for this. First, the Chairman may be particularly capable in the monetary policy area—as, e.g., Paul Volcker or Alan Greenspan have been argued to be (see Blinder and Reis 2005 and Goodfriend and King 2005). Of course, it would be optimal for such Chairmen to exert a large influence on policy decisions. Second, the Chairman guides the discussion and summarizes the different views in the committee, and may thereby help shape the outcome of the deliberations. We refer to these two sets of skills as the Chairman's "economic" and "moderating" abilities. Third, the Chairman's position per se may in certain institutional setups lend his views extra weight.[2]

Blinder (2004, 2007) distinguishes between three types of monetary policy committees (MPCs): individualistic, genuinely collegial, and autocratically collegial. In an individualistic committee, members vote according to their views and communicate their opinions to the public, so that the Chairman's views carry no special weight. Blinder argues that the Bank of England's MPC fits this description. A genuinely collegial committee, of which Blinder argues the ECB's Governing Council is an example, reaches a consensus decision and talks with one—the Chairman's—voice to the public.[3] While the Chairman's position does not make him more influential than any other committee member in the interest rate decision, he gets the most public attention. In an autocratically collegial committee, such as (according to Blinder) the FOMC under Chairman Greenspan, the committee as a rule adopts the level of interest rates preferred by the Chairman.[4] However, the committee "serve[s] as a kind of check on the [C]hairman" (Blinder 2007, 115) in that it may block interest rate proposals that deviate much from the majority's view.

[2]Kuttner and Posen (2007) show that financial markets react to the appointment of new central bank heads, which suggests that it matters for policy who the Chairman is.

[3]The Statute of the European System of Central Banks and of the European Central Bank allows the Governing Council to reach decisions by vote. (The Statute is available at http://www.ecb.int/ecb/pdf/orga/escbstatutes_en.pdf.)

[4]The *International Herald Tribune* refers to Chairman Greenspan's style of decision making as "strong-arm[ing] his colleagues" (Uchitelle 2008, 1).

The Chairman tries to avoid this outcome, since it could be damaging to his and the committee's credibility, and therefore only makes proposals that can gain a clear majority of committee members.[5] Searching to achieve consensus in this way matters for monetary policy: Janet Yellen, former Governor and currently President of the Federal Reserve Bank of San Francisco, emphasizes that consensus in the committee is crucial for "the credibility, legitimacy, and likely effectiveness of monetary policy" (Yellen 2005, 2–3).[6]

The present paper provides a first model for the Chairman's impact on interest rate setting by committee. Section 2 discusses the empirical, experimental, and theoretical literature on MPCs. Section 3 describes the model, which assumes that policymakers are uncertain about the level of the optimal interest rate. During their deliberations, committee members signal their private information on the optimal rate, subject to communication errors. We assume that the importance of these depends on the Chairman's moderating skills.[7] Section 4 simulates the model and assesses the Chairman's impact on policy decisions in individualistic and autocratically collegial committees. We show that the baseline specifications for these two types of committee fit the outcomes of the MPC's voting at the Bank of England and of the FOMC, respectively. We then compare the two committees and vary the key parameters in the model to assess their effect on the path of interest rates and the distribution of votes. The Chairman's impact on the path of interest rates is found to be smaller in an individualistic committee than in an autocratically collegial committee, which renders the latter's interest rate setting inferior. However, while the exact path of monetary

[5]Meyer (2004, 50) refers to the phenomenon of "musical chairs" in the FOMC—i.e., the committee members' understanding that more than two dissents represent a rebellion against the Chairman—and states that "the Chairman is expected to resign if the Committee rejects his policy recommendation." For simplicity we do not model any strategic behavior arising from this tradition, nor do we take into account that there are governors and Bank presidents on the FOMC and that the former are arguably more likely to agree with the Chairman.

[6]See also Blinder and Wyplosz (2004) and Chappell, McGregor, and Vermilyea (2004). Sager and Gastil (2006) discuss the advantages of consensus over majority decisions from a psychological perspective.

[7]Since genuinely collegial committees make decisions by consensus, there is no voting record that would allow us to test the performance of our model. We therefore do not consider this type of MPC.

policy chosen by the two kinds of committee differs frequently, the difference in quality as measured by the deviation from the optimal interest rate is small. Independently of the type of committee, the more skilled as a moderator and as a monetary policy expert the Chairman is, the more there is agreement in the committee. Agreement is most common in autocratically collegial committees in which the Chairman attaches great importance to consensus and in which policymakers are keen to adopt his views. Section 5 concludes.

We note from the outset that the paper abstracts from strategic behavior that may arise if the policy goals differ between individuals or if information is costly. Under such circumstances, coalitions may be formed, the composition of which may depend on political considerations or the state of the economy. However, while there is a growing literature on strategic behavior in MPCs, policymakers themselves do not seem to believe that such strategic considerations matter much. To quote Yellen again: "In fact, I think FOMC members behave far less individualistically and strategically than assumed in some of the models" (Yellen 2005, 1).[8]

2. Brief Survey of the Literature

Next we provide a brief and highly selective overview of the empirical, experimental, and theoretical literature on MPCs. The empirical literature focuses on evidence from the FOMC. Belden (1989) analyzes the voting pattern of the twelve FOMC members and finds that Bank presidents dissent more frequently than Board members by favoring tighter policy.[9] Chappell, Havrilesky, and McGregor (1997) estimate reaction functions for individual FOMC members and also find that some systematically voted for tighter (looser) monetary policy than others. This evidence suggests that policymakers may hold different views of the optimal level of inflation and/or potential output that make them disagree about the desirable level of

[8]In private communication with the author, Alan Blinder stated that there is very little strategic behavior in the FOMC. Bank of England Governor Mervyn King argues that the MPC members in the United Kingdom share the same policy objective and that "it makes no sense" to label them "doves" or "hawks" (King 2002, 5). He moreover sees little evidence for the formation of voting blocks.

[9]See also Havrilesky and Gildea (1991).

interest rates. Meade and Sheets (2005) establish that regional economic conditions impact the voting pattern of members, which indicates that policymakers display a "home bias" that may arise either because they care more about local than national economic conditions or because they rely overly on regional data in interpreting the countrywide economy.

The empirical literature on other MPCs is limited. Bhattacharjee and Holly (2006), Gerlach-Kristen (2004), and Harris and Spencer (2007) study the voting record of the committee at the Bank of England and detect differences in the voting patterns of internal and external members. Andersson, Dillén, and Sillen (2001) examine the voting record of the Bank of Sweden and find that the votes of dissenting policymakers are informative about future changes in policy, whereas Fujiki (2005) shows that the voting record in Japan does not forecast policy changes well.

A number of descriptive empirical papers study the role of the Chairman. Blinder (1999) states that the Chairman is "more equal" than the other FOMC members, and Chappell, McGregor, and Vermilyea (2004) estimate that his impact on policy decisions corresponds to a voting weight of 40 to 50 percent. Romer and Romer (2003) analyze minutes and transcripts of FOMC meetings and find that even Chairmen who are not necessarily seen as especially able monetary policymakers are influential. Chappell, McGregor, and Vermilyea (2005) document that Chairman Greenspan spoke longer in FOMC meetings than the other members, and Meyer (2004) describes Chairman Greenspan's habit of summarizing the staff's analysis and giving his policy recommendation at the beginning of the policy discussion.[10]

The experimental literature on interest rate setting by committee is limited. Blinder and Morgan (2005) and Lombardelli, Proudman, and Talbot (2002) find that committees make better decisions than individual policymakers. They also present evidence indicating that deliberation before voting improves monetary policy. More interestingly for the paper at hand, Blinder and Morgan (2006) study the impact of committee size and the role of the Chairman in interest rate setting. They find that larger groups perform slightly better

[10]Chairman Bernanke, by contrast, tends to speak last (*Wall Street Journal* 2006).

than smaller groups and that monetary policy does not appear to improve if there is a designated leader. The latter result clearly surprises the authors, but it is compatible with the finding below that the Chairman, both in an individualistic and an autocratically collegial committee, hardly affects the quality of monetary policy. Unfortunately, Blinder and Morgan did not record whether there was a difference in the frequency of dissents, which this paper argues should be the case.

The theoretical literature on MPCs focuses on why policymakers disagree about the level of interest rates. Four arguments have been advanced. First, policymakers may disagree because they have different views about the inflation objective (see Mihov and Sibert 2002 and Waller 1989 and the related popular discussion on "hawks" and "doves"). Second, members might hold different views because some are more skilled than others and therefore have a better sense of the appropriate level of interest rates (see Gersbach and Hahn 2001). Gerlach-Kristen (2006) shows that in this situation it is optimal to attach a greater weight to the more skilled members' views. Third, different opinions regarding the appropriate stance of policy may arise because members rely on different data sets. Aksoy, De Grauwe, and Dewachter (2002) and von Hagen and Süppel (1994) discuss how a national perspective in analyzing data in the Governing Council of the ECB can lead to disagreement about optimal policy. Fourth, members may disagree for strategic reasons, such as to raise their profile with the public. Sibert (2006) discusses the fact that information cascades, in which the views offered early on in the deliberation have a disproportionate impact on the final decision, occur only if the exchange of information is costly or if members hold different preferences.[11]

Policy discussions in the committee and the Chairman's role in them have only recently started to attract attention in the theoretical literature. Gerlach-Kristen (2006), Spencer (2005), and Weber (2007) model policy deliberations in an MPC but disregard the role of the Chairman. Berk and Bierut (2007) consider a Chairman whose economic skills are greater than those of the rest of the committee. Favarque, Matsueda, and Méon (2007) and Riboni and Ruge-Murcia

[11]The literature on strategic voting has been growing rapidly; Fujiki (2005) and Gerling, et al. (2005) provide comprehensive surveys.

(2007) present a strategic voting game in which the Chairman makes interest rate proposals. A committee member accepts this proposal if it is closer to his own view of optimal policy than the current level of the interest rate. A major weakness of these models is that they do not capture the idea that in an autocratically collegial committee policymakers go along with the Chairman's proposal—rather than voting for the rate they personally favor—as long as it is not too different from their own view.

In sum, the empirical literature shows that MPC members hold different views regarding the appropriate path of monetary policy and that the Chairman is seen as having a disproportionate influence on the interest rate decision. The experimental literature suggests that committee decisions are superior to those of a single policymaker and that discussions in the committee prior to the vote improve policy outcomes, but that appointing a Chairman does not. The theoretical literature, finally, provides explanations for differences in views in the committee and explores the agenda-setting power of the Chairman. However, it does not capture the committee's role as a "check on the Chairman." This is the gap we attempt to fill.

3. The Model

3.1 Basic Assumptions

We assume that there is an optimal interest rate, i_t^*, which is observed only imprecisely. The goal of monetary policy is to set the interest rate, i_t, as close as possible to i_t^*. We let the optimal rate follow an autoregressive process of second order since empirical estimates of reaction functions of the Taylor type suggest that monetary policy reacts to inflation and the output gap, and since there is broad evidence that the output gap follows an autoregressive process of second order (see, e.g., Watson 1986). Thus,

$$i_t^* = c + \rho_1 i_{t-1}^* + \rho_2 i_{t-2}^* + u_t, \tag{1}$$

with $u_t \sim N(0, \sigma^2)$. As is common in the empirical literature estimating output gaps using state-space models, we let $\rho_1 > 1$, $\rho_2 < 0$, and $\rho_1 + \rho_2 < 1$.

The model assumes that there are n policymakers who are rational, share the same goals, and do not behave strategically. We furthermore assume that policymakers have difficulties observing i_t^*—for instance, because inflation and output-gap data are measured imprecisely (see Orphanides 2001) or because members interpret the same data differently. To capture these difficulties in a simple way, we assume that policymaker j's perception or "observation" of i_t^* is given by

$$i_{j,t} = i_t^* + v_{j,t}, \tag{2}$$

with $v_{j,t} \sim N(0, s^2)$. Each policymaker thus receives the sum of a common signal, i_t^*, and private information, $v_{j,t}$, which is white noise. We assume that these observation errors are uncorrelated across policymakers and over time, and that the variance s^2 is identical for all policymakers except possibly for the Chairman.

3.2 Interest Rate Setting by Committee

We now turn to the question of how the committee sets policy on the basis of the individual observations of i_t^*. We first examine an individualistic committee and then turn to an autocratically collegial committee.

3.2.1 An Individualistic Committee

In all committees, policymakers deliberate before deciding on the level of interest rates and thereby pool the private information available to them. As in practice, we assume that in the deliberations members reveal their general impression of economic conditions but do not state their views of the exact, numerical level of the optimal interest rate. Since there is consequently some uncertainty about committee member j's view of the optimal rate, we assume that his signal of i_t^* is received by policymaker k subject to noise, so that policymaker k's understanding of $i_{j,t}$ is given by

$$\widetilde{i}_{kj,t} = i_t^* + v_{j,t} + \widetilde{w}_{kj,t},$$

where $\widetilde{w}_{kj,t}$ is the communication error, with $\widetilde{w}_{kj,t} \sim N(0, \alpha s^2)$ and $\alpha > 0$. We assume that $v_{j,t}$ and $\widetilde{w}_{kj,t}$ are uncorrelated, so that the variance of their sum is given as $(1 + \alpha)s^2$. Thus, policymaker k's

perception of $i_{j,t}$ is distributed around the optimal interest rate with a variance that is by α larger than that of his own. Below we refer to α as a measure of the committee's "communication difficulties."

Since the optimal interest rate is serially correlated, policymaker j's best assessment of i_t^* draws not only on his own $i_{j,t}$ and his understanding of his colleagues' current observations of i_t^* but also on past observations. The optimal way to assess the current value of i_t^* involves a signal extraction mechanism based on the Kalman filter (see, e.g., Hamilton 1994). We derive policymaker j's assessment of i_t^* formally in the appendix.

Differences in view persist even after deliberation since information aggregation in the committee is imperfect.[12] We assume that the committee sets interest rates in steps of 25 basis points, so that each policymaker j votes for the step of the policy interest rate i_t that is closest to his assessment of the optimal rate. The level of i_t favored by the majority of members is adopted as policy.

We assume that the Chairman's special status in an individualistic committee arises from two sources. The first is his role as a moderator of the policy discussions: he may be able to reduce the communication difficulties within the committee by structuring the discussions, by asking clarifying questions if a member's statements are difficult to interpret, and by summarizing the different views in the committee. Formally, the Chairman reduces the variance of the communication error, so that policymaker k's understanding of policymaker j's observation changes to

$$i_{kj,t} = i_t^* + v_{j,t} + w_{kj,t}, \tag{3}$$

with $w_{kj,t} \sim N[0, (\alpha/\beta)s^2]$ and $\beta \geq 1$, where β captures the Chairman's "moderating skills."

The second source of the Chairman's influence is his ability as a monetary policymaker. We model this by assuming that his observation error of the optimal interest rate is smaller than s^2. Thus,

$$i_{C,t} = i_t^* + v_{C,t},$$

where C denotes the Chairman and where $v_{C,t} \sim N(0, s^2/\gamma)$, with $\gamma \geq 1$. We let γ capture the Chairman's "economic skills." The larger

[12]This notion is supported by the empirical fact that there are dissents in monetary policy votes.

γ is, the better the Chairman is at judging i_t^*, which increases the optimal weight attached to his view on i_t^* (Gerlach-Kristen 2006).

3.2.2 An Autocratically Collegial Committee

To model an autocratically collegial committee, we assume that the Chairman discusses (perhaps individually, perhaps in premeetings) with the other committee members before the policy decision their views regarding the optimal stance of policy. This allows him to form a view of what level of the interest rate the individual members prefer and how large a deviation from that interest rate they are willing to accept.

Since the Chairman would like to set the policy rate equal to $i_{C,t}$ (rounded to the closest 25 basis points) but does not have the statutory power to do so, he assesses how many committee members would vote for or against him if he proposed $i_{C,t}$ as the policy rate. We assume that policymakers display a certain tolerance toward the Chairman's views in the sense that they dissent only if their own view differs considerably from his proposal (see Blinder 2007 and Meyer 2004). More technically, we assume that policymaker j dissents if the Chairman's proposal lies outside a tolerance interval around j's own assessment of i_t^* that is given by

$$\pm\Phi^{-1}_{1-(1-\tau)/2} * \sqrt{P_j(1,1)},$$

where Φ^{-1} denotes the inverse cumulative normal distribution, τ denotes policymaker j's tolerance level, and $P_j(1,1)$ denotes the first element of his forecast error variance matrix, which is derived in the appendix and which in the steady state corresponds to the mean squared error of policymaker j's assessment of i_t^*. We assume that all committee members have the same tolerance level τ. In the baseline simulation we set $\tau = 99$ percent, so that, given the other parameter assumptions, policymaker j votes with the Chairman if the latter's proposal lies within a range of ± 23 basis points of j's assessment of i_t^*. Committee members' tendency to go along with the Chairman's proposals implies that his influence on interest rate decisions is larger than optimal.

We furthermore assume that the Chairman would like to achieve a majority $\mu > 0.5$ to capture the fact that he values the "appearance of unity" (Blinder 2007). If he expects a majority of μ or larger to support the rate he personally thinks optimal, he proposes this rate. If he expects a smaller majority, he adjusts his proposal toward, but not necessarily all the way to, the rate preferred by the majority.

To clarify this mechanism, assume that there are three MPC members: the Chairman and members J and K. Suppose that the Chairman thinks i_t^* equals 1.70 percent, that J thinks it is 2.15 percent, and that K thinks it is 2.30 percent. Let J's and K's tolerance interval be equal to ± 20 basis points and assume for simplicity that the Chairman knows all this with certainty. In an individualistic committee, the Chairman votes for 1.75 percent, J and K vote for 2.25 percent, and the policy rate is set equal to 2.25 percent. In an autocratically collegial committee, if the Chairman proposes a rate of 1.75 percent, J and K vote for 2.25 percent, so that the policy rate is again set equal to 2.25 percent. If the Chairman proposes 2.00 percent instead, this value lies within J's tolerance interval of [1.95%, 2.35%] but outside K's. Thus, the Chairman and J vote for 2.00 percent and K votes for 2.25 percent. The policy rate is set equal to 2.00 percent.

We next assess the impact on monetary policy of the Chairman's moderating and economic skills and the effect of an individualistic versus an autocratically collegial setup by simulating the model.

4. Simulations

The assumption that interest rates are set in steps renders the model difficult to handle mathematically. We therefore simulate it using 10,000 draws. To choose realistic parameters, we attempt first to match the pattern of the monthly UK repo rate between June 1997, when the MPC began setting interest rates, and August 2007. Over that period, the policy repo rate followed an autoregressive process of second order with coefficients 1.35 and -0.37. The first column of table 1 presents the voting pattern for the Bank of England's MPC and the FOMC over the period. In 66.1 percent of all meetings, at least one of the nine MPC members in the United Kingdom cast a dissenting vote. On average, the majority was 85.5 percent, which corresponds to roughly eight MPC members. In the United States

Table 1. Characteristics of Interest Rate Decisions

	Actual Voting		Baseline Simulation	
	MPC	**FOMC**	**Individualistic**	**Autocratically Collegial**
Fraction of Meetings Ending with Disagreement	66.1%	23.2%	66.1%	23.3%
Average Size of Majority	85.5%	97.7%	84.2%	95.4%

Note: UK and U.S. voting patterns for June 1997 to August 2007. Results take fluctuations in committee size into account. Simulations (10,000 draws) assuming $\rho_1 = 1.95$, $\rho_2 = -0.98$, $\sigma^2 = 0.001$, $s^2 = 0.05$, $n = 9$, $\alpha = 2.7$, $\beta = 1$, $\gamma = 1$, $\mu = 0.6$, and $\tau = 0.99$.

in the same period, only 23.2 percent of all FOMC decisions were not unanimous, and the average majority was 97.7 percent—much larger than in the United Kingdom.

In the baseline simulation, we set the autoregressive coefficients of the optimal interest rate equal to $\rho_1 = 1.95$ and $\rho_2 = -0.98$.[13] The variance σ^2 of the shocks affecting i_t^* is assumed to be 0.001, which implies that 95 percent of all monthly innovations lie in a range of ± 6 basis points. The variance s^2 of the observation error is given as 0.05, so that policymaker j's observation of the optimal rate lies with 95 percent probability in a range of ± 45 basis points of the true value of i_t^*. Discussions in the committee reduce this range to ± 18 basis points. We assume that $n = 9$ and that the committee's communication difficulties are captured by $\alpha = 2.7$. The Chairman is assumed not to possess special moderating or economics skills ($\beta = \gamma = 1$) and to aim for a majority of 60 percent ($\mu = 0.6$). Finally, we let committee member j cast a dissenting vote only if the interest rate proposed by the Chairman lies outside j's 99 percent tolerance interval.

[13]We choose (in absolute terms) large autoregressive coefficients because i_t^* is observed with an error, which biases the coefficient estimates for the policy rate toward zero. The autoregressive coefficients of the simulated policy interest rate are 1.31 and -0.34 for the baseline setup of an individualistic committee.

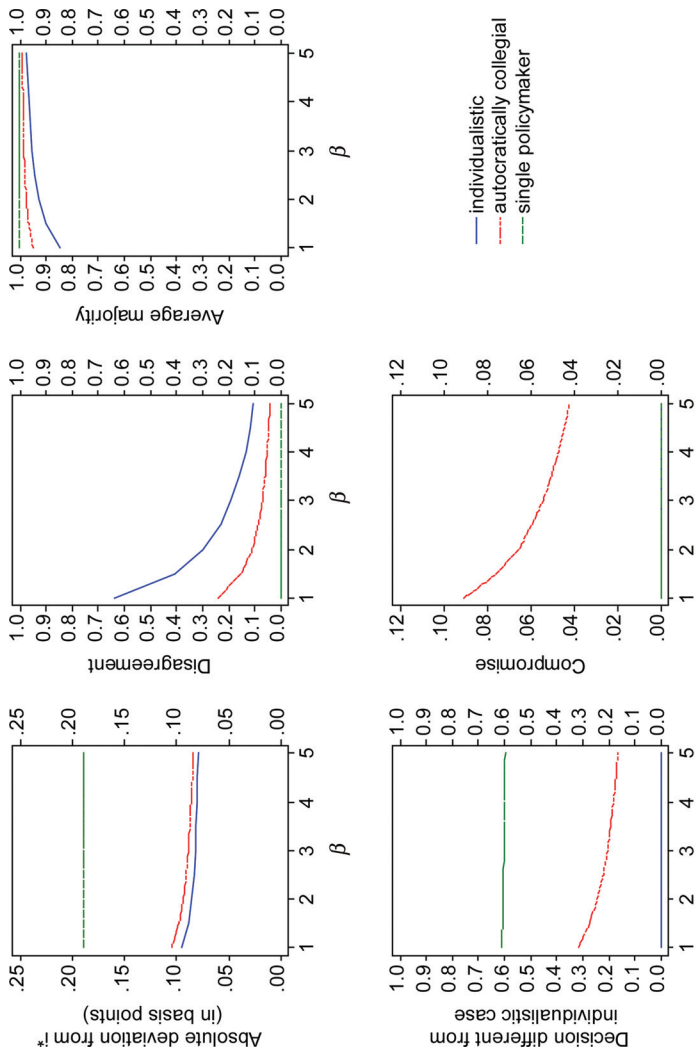
The second column of table 1 reports that under these assumptions, policy meetings of an individualistic committee end with at least one dissent in 66.1 percent of all cases and that the average majority is 84.2 percent. For an autocratically collegial committee, there is disagreement only in 23.3 percent of all cases, and the average majority is 95.4 percent. These values are very close to their empirical counterparts.

Next we study the impact of the Chairman's moderating and economics skills, his preferred majority, and policymaker j's tolerance toward the Chairman's proposals on five characteristics of interest rate setting: the quality of monetary policy, as measured by the average absolute deviation (in basis points) of the interest rate set by the committee from i_t^*; the frequency of dissents; the average majority by which decisions are taken; the frequency with which an autocratically collegial committee chooses a different interest rate than an individualistic committee; and the frequency with which the Chairman proposes a compromise, i.e., a rate that lies between his and the committee's view.

Figure 1 assesses the effect of the Chairman's moderating skills on these characteristics by varying β between 1 and 5. The first plot indicates that the interest rate deviates from i_t^* on average by roughly 10 basis points. The deviation decreases as the Chairman's moderating skills improve, since he helps committee members communicate their views more clearly. Consequently, their decision is based on better data and is therefore superior. It should be noted that the average absolute deviation from i_t^* is only about 1 basis point smaller for an individualistic than for an autocratically collegial committee, which is compatible with the experiments discussed in Blinder and Morgan (2006), who report no significant improvement in policy if a Chairman is appointed.[14] The second plot shows the frequency with which there is disagreement in the committee. The better the Chairman moderates the discussion, the less disagreement there is in both types of committee, and the third plot correspondingly indicates that the average majority increases. Since policymakers in an autocratically collegial committee cast dissenting

[14] We also plot the average absolute deviation of policy from i_t^* if policy is set by a single policymaker. This deviation equals 19 basis points and thus is roughly twice as large as for a committee.

Figure 1. Impact of Chairman's Moderating Skills (β between 1 and 5)



Note: Simulations (10,000 draws) assuming $\rho_1 = 1.95$, $\rho_2 = -0.98$, $\sigma^2 = 0.001$, $s^2 = 0.05$, $n = 9$, $\alpha = 2.7$, $\gamma = 1$, $\mu = 0.6$, and $\tau = 0.99$.

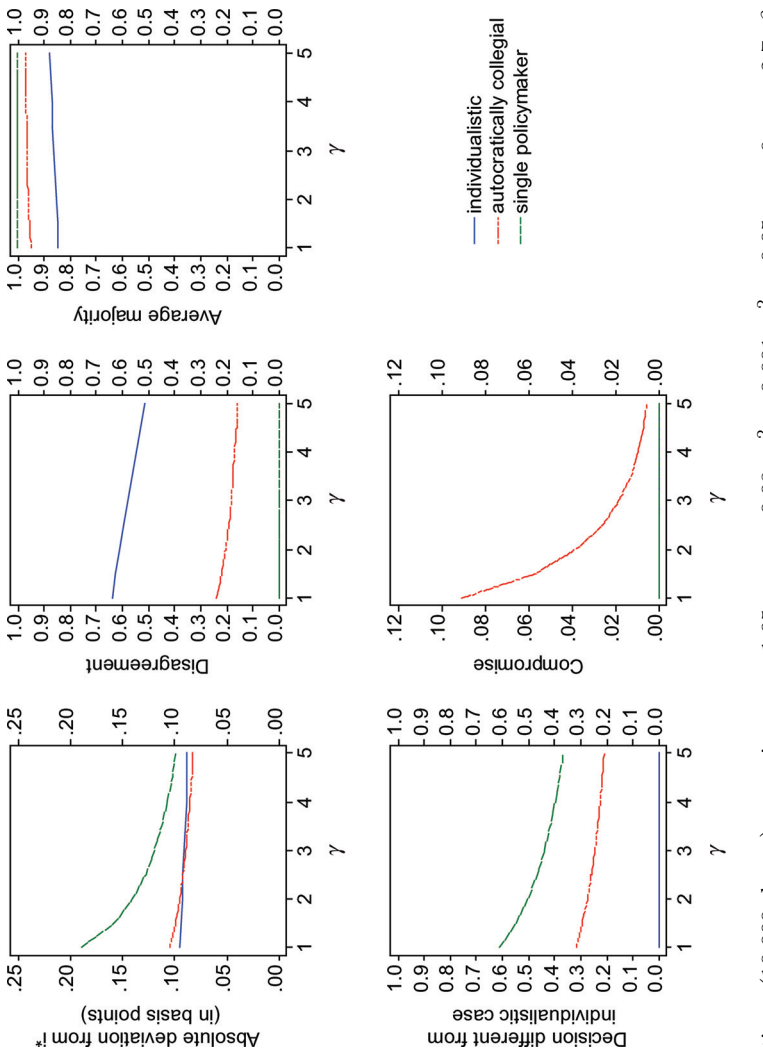
votes only if they disagree strongly with the Chairman, unanimity is, in this framework, more common. The fourth plot shows that the better a moderator the Chairman is, the more the decisions of an autocratically collegial MPC become similar to those of an individualistic committee. The reason for this is that the larger β is, the more clearly committee members understand one another's views and trust them. They are therefore less willing to accept any extreme position the Chairman may take, which forces him to propose more frequently the rate an individualistic MPC would set. The fifth plot shows that the Chairman's move toward the majority view also reduces the frequency with which he proposes a compromise.

Figure 2 assesses how monetary policy and the voting pattern change if the Chairman's economics skills improve. As we increase γ from 1 to 5, interest rate setting by an autocratically collegial committee comes closer to i_t^* than that by an individualistic committee. It thus appears that it is optimal to choose a framework in which the Chairman dominates if he is a much better monetary policymaker than the other committee members.[15] Nevertheless, the difference in performance between the two committee types is rather small for any γ. As γ rises and thus uncertainty about i_t^* diminishes, fewer policy meetings end with disagreement and the average majority increases. Decisions by an autocratically collegial committee become more similar to those of an individualistic MPC because an especially skilled Chairman also exerts a great influence in an individualistic committee. With his rising influence, there are also fewer compromises since the committee reaches virtually the same assessment of the optimal interest rate as the Chairman.

Figures 3 and 4 concentrate on the impact of μ and τ, which are parameters that matter only in an autocratically collegial committee. Figure 3 shows that as the Chairman's preferred majority μ is varied from 0.5 to 0.9, the quality of monetary policy, again, hardly is affected. As μ rises, policy by an autocratically collegial committee approaches that of an individualistic MPC, and there is less disagreement and a larger average majority since the Chairman attempts to meet the committee's preferences. Initially, there are, for the same reason, fewer compromises. For $\mu = 0.9$, however, the

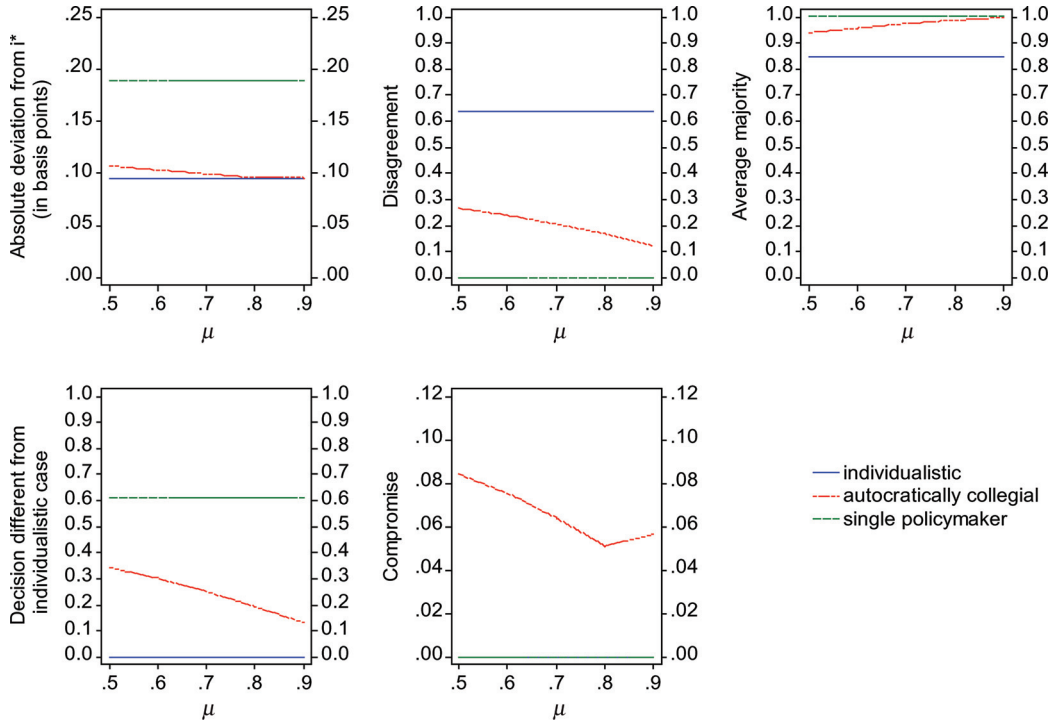
[15]This finding disappears if there are no communication difficulties, i.e., if $\alpha = 0$.

Figure 2. Impact of Chairman's Economics Skills (γ between 1 and 5)



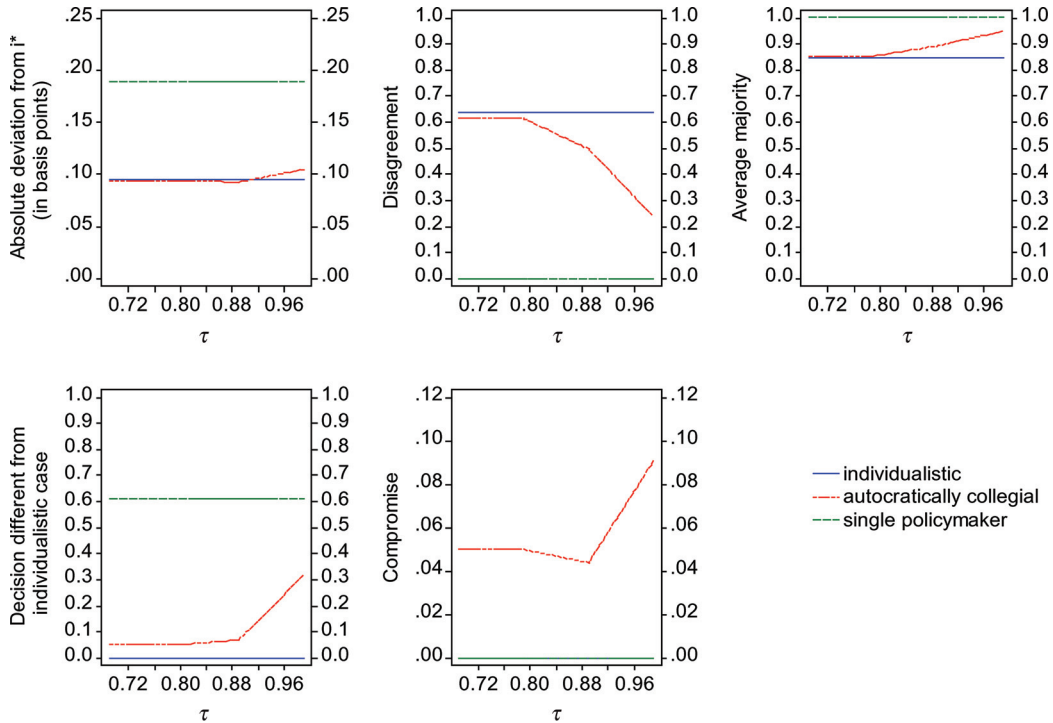
Note: Simulations (10,000 draws) assuming $\rho_1 = 1.95$, $\rho_2 = -0.98$, $\sigma^2 = 0.001$, $s^2 = 0.05$, $n = 9$, $\alpha = 2.7$, $\beta = 1$, $\mu = 0.6$, and $\tau = 0.99$.

Figure 3. Impact of Chairman's Preferred Majority (μ between 0.5 and 0.9)



Note: Simulations (10,000 draws) assuming $\rho_1 = 1.95$, $\rho_2 = -0.98$, $\sigma^2 = 0.001$, $s^2 = 0.05$, $n = 9$, $\alpha = 2.7$, $\beta = 1$, $\gamma = 1$, and $\tau = 0.99$.

Figure 4. Impact of Chairman's Preferred Majority (τ between 0.5 and 0.9)



Note: Simulations (10,000 draws) assuming $\rho_1 = 1.95$, $\rho_2 = -0.98$, $\sigma^2 = 0.001$, $s^2 = 0.05$, $n = 9$, $\alpha = 2.7$, $\beta = 1$, $\gamma = 1$, and $\mu = 0.6$.

number of compromises increases since a majority of more than 90 percent implies a committee with $n = 9$ unanimity. In this case, the Chairman also has to accommodate individuals with extreme views, which occasionally forces him to deviate from the rate preferred by the committee as a whole.

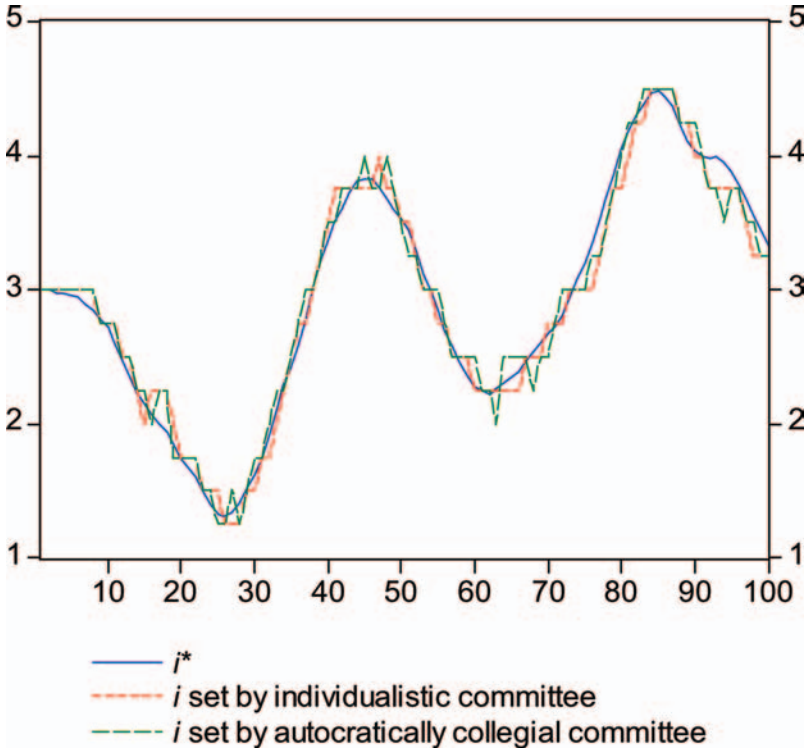
Figure 4 studies how committee members' willingness to accept extreme interest rate proposals affects interest rate setting. We vary τ between 0.69 and 0.99. If policymakers' tolerance level is low, they tend to vote against the Chairman if he proposes a rate that deviates from their view. This situation forces the Chairman to make compromises. If the committee becomes more tolerant toward the Chairman's opinions, there are fewer dissents and he starts proposing rates that he thinks are appropriate. As a consequence, there are fewer compromises at first. As the committee becomes even more tolerant, the number of compromises increases again since the Chairman deviates more often from the rate the committee would like to set. Policy therefore worsens.

Figures 1–4 suggest that the quality of monetary policy, as measured by the deviation from the optimal interest rate i_t^*, is similar under the two types of MPCs but that the rates set differ frequently. At first glance, this may appear contradictory. To gain an understanding of this finding, we plot in figure 5 the first 100 draws of the two baseline simulations. It can be seen that the rates set by an individualistic and an autocratically collegial committee differ frequently by 25 basis points and that the optimal interest rate tends to lie between these two rates, thus accounting for the fact that the deviations from i_t^* are comparable for both types of committee.

5. Conclusions

This paper models the role of the Chairman in the decision process of the MPCs. We argue that he may help reduce the uncertainty about the optimal level of interest rates and thus bring about larger majorities. We find that interest rate setting is generally worse in an autocratically collegial committee than in an individualistic committee, and that it is the worse, the less able a monetary policymaker the Chairman is, the less he is concerned with gaining the committee's support, and the more tolerant the committee is toward his views. However, the difference in quality is quantitatively small. The main

Figure 5. Simulated Interest Rate Paths



Note: Simulations for an individualistic and an autocratically collegial committee, assuming a mean of i_t^* of 3 percent, $\rho_1 = 1.95$, $\rho_2 = -0.98$, $\sigma^2 = 0.001$, $s^2 = 0.05$, $n = 9$, $\alpha = 2.7$, $\beta = 1$, $\gamma = 1$, $\mu = 0.6$, and $\tau = 0.99$.

advantage of an autocratically collegial committee is that decisions are made by larger majorities, which may contribute to the central bank's credibility.

The model presented in this paper does not address the issue of strategic behavior in MPCs. It is plausible that the voting strategies of inflation "hawks" and "doves" impact policy decisions, as may shifting coalitions of committee members. We also leave for future research the impact of political pressure on committee members' voting and the possibility that the information exchange during deliberation might be costly.

Appendix

To derive policymaker j's assessment of the optimal interest rate, it is useful to rewrite equations (1)–(3) in state-space form. Equation (1) can be written as

$$\begin{bmatrix} i_t^* \\ i_{t-1}^* \end{bmatrix} = \begin{bmatrix} c \\ 0 \end{bmatrix} + \begin{bmatrix} \rho_1 & \rho_2 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} i_{t-1}^* \\ i_{t-2}^* \end{bmatrix} + \begin{bmatrix} u_t \\ 0 \end{bmatrix},$$

with

$$Q = \begin{bmatrix} u_t \\ 0 \end{bmatrix} \begin{bmatrix} u_t & 0 \end{bmatrix} = \begin{bmatrix} \sigma^2 & 0 \\ 0 & 0 \end{bmatrix}.$$

Equations (2) and (3) can be combined to yield member j's observation equation,

$$\begin{bmatrix} i_{j1,t} \\ \cdots \\ i_{j,t} \\ \cdots \\ i_{j(n-1),t} \\ i_{jC,t} \end{bmatrix} = H' \begin{bmatrix} i_t^* \\ i_{t-1}^* \end{bmatrix} + \begin{bmatrix} v_{1,t} \\ \cdots \\ v_{j,t} \\ \cdots \\ v_{n-1,t} \\ v_{C,t} \end{bmatrix} + \begin{bmatrix} w_{j1,t} \\ \cdots \\ 0 \\ \cdots \\ w_{j(n-1),t} \\ w_{jC,t} \end{bmatrix}, \quad (4)$$

where we assume for convenience that the Chairman's view of the optimal interest rate is listed last. H denotes a $2 \times n$ vector with ones in the first row and zeros in the second. The variance-covariance matrix of the last two vectors in equation (4), which we denote by $V_{j,t}$ and $W_{j,t}$, is given by

$$R_j = (V_{j,t} + W_{j,t})(V_{j,t} + W_{j,t})'$$

$$= \begin{bmatrix} (1+\alpha/\beta)s^2 & \cdots & 0 & \cdots & 0 & 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & \cdots & s^2 & \cdots & 0 & 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & \cdots & 0 & \cdots & (1+\alpha/\beta)s^2 & 0 \\ 0 & \cdots & 0 & \cdots & 0 & (1+\alpha/\beta)s^2/\gamma \end{bmatrix}.$$

(For the Chairman, the last element of R_C equals s^2/γ, whereas the other elements on the diagonal are given by $(1+\alpha/\beta)s^2$.)

Following Hamilton (1994), it can be shown that policymaker j's optimal assessment $i_{j,t|t}$ of i_t^* is computed as

$$\begin{bmatrix} i_{j,t|t} \\ i_{j,t-1|t} \end{bmatrix} = (I - K_j H') \left(\begin{bmatrix} c \\ 0 \end{bmatrix} + \begin{bmatrix} \rho_1 & \rho_2 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} i_{j,t-1|t-1} \\ i_{j,t-2|t-1} \end{bmatrix} \right) + K_j \begin{bmatrix} i_{j1,t} \\ \cdots \\ i_{jC,t} \end{bmatrix},$$

with I a 2×2 identity matrix, $K_j = P_j H (H' P_j H + R_j)^{-1}$, and

$$P_j = \begin{bmatrix} \rho_1 & \rho_2 \\ 1 & 0 \end{bmatrix} (P_j - K_j H' P_j) \begin{bmatrix} \rho_1 & \rho_2 \\ 1 & 0 \end{bmatrix}' + Q.$$

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