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Overconfidence, monetary policy committees and chairman dominance

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Overconfidence, Monetary Policy Committees and Chairman Dominance*

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Abstract

We suggest that overconfidence among policymakers explains why formal decision power over monetary policy is given to committees, while much of the real power to set policy remains with central bank chairmen. Overconfidence implies that the chairman underweights advice from his staff, increasing policy risk if he alone decides. A committee with decision power reduces this risk, because it induces moderation from the chairman. Overconfidence also yields disagreement and dissent in the committee, consistent with evidence from monetary policy committees. As the chairman is on average better informed, through his wider access to the staff, this would give him a suboptimal influence if policy is set through simple majority voting. Giving the chairman extra decision power, through e.g. agenda-setting rights, restores his influence. A monetary policy committee with a strong chairman balances the risks and influence distortions that occur if policymakers are overconfident.

Keywords: Central Bank Governance, Monetary Policy Committees, Overconfidence, Agenda-setting.

JEL Classification: D02, D71, E58.

1 Introduction

An important trend in practical monetary policy is the move from individual decision making to committee decision making. The main explanation for this trend in the literature is simple: "two heads are better than one". Monetary policy committees improve decisions by pooling members' information and knowledge (see e.g. Blinder 2007).

Although information pooling within the committee is relevant to understand the transition from individual decision making, it cannot alone explain the use of MPCs. To see this, it is useful to distinguish between two types of information pooling, which we will denote 'pooling by talking' and 'pooling by voting'. 'Pooling by talking' refers to the sharing of views and information among MPC members during deliberations. 'Pooling by voting' refers to the implicit pooling that takes place after deliberations when the MPC votes, or use some other aggregation mechanism, to aggregate the different proposals into one decision. Following Condorcet's famous jury theorem, a huge literature on 'pooling by voting' ('Condorcet effects') has emerged. This literature describes under what conditions voting improve on decisions, see e.g. Koriyama and Szentes (2009) and references therein. Gerlach-Kristen (2006) use a theoretical macroeconomic model to study Condorcet-effects in MPCs when there is uncertainty and disagreement about the size of the output gap.[1]

If there are no frictions in 'pooling by talking', each member should take the other members' information and arguments into account, and full agreement would result.[2] As Blinder (2007) also points out, then you do not need a decision-making committee to achieve the pooling benefits. The pooling gains can be achieved by having independent board members serving as mere advisors to the chairman (as is the arrangement at the Reserve Bank of New Zealand). Alternatively the pooling benefits can be captured by the central bank staff on behalf of the central bank governor.

If there are frictions in 'pooling by talking', the MPC members may end up disagreeing also after the deliberation round. We observe extensive disagreement among MPC members in practice, suggesting that 'pooling by talking' is not frictionless. This creates a potential role for 'pooling by

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[1] Blinder and Morgan (2005, 2008) and Lombardelli et al. (2005) provide experimental support for pooling by talking and pooling by voting in MPCs.

[2] We assume that the differences in preferred policy decisions before 'pooling by talking' reflects different judgments and information and not different preferences. This is a reasonable assumption, as most MPCs today consist of economic experts and not (former) politicians.

voting'. MPC members are distinguished from central bank staff members is that they have *decision power*, whereas staff members have only *advisory power*. The staff can contribute to decisions through 'pooling by talking', while MPC members can contribute through both 'pooling by talking' and 'pooling by voting'. The common institutional setup in central banks is that there is an MPC where each member has decision power, but where the chairman (and other internal members) has access to a staff.[3] An additional stylized fact is that the chairman is almost always in the majority coalition.[4]

In this paper, we provide a theory for a monetary decision structure that explains (i) why MPC members do not reach full agreement after 'pooling by talking', (ii) why the MPC members are given decision power, and (iii) why the chairman is (almost) never on the losing side of the vote.

The central assumption explaining these stylized facts is that economic experts are characterized by *overconfidence*. There is ample and well-known experimental evidence for this psychological trait among decisionmakers in general. People tend to "...over-estimate their performance in tasks requiring ability, including the precision of their knowledge" (DellaVigna, 2009, p.341).[5] We will review some of the evidence for overconfidence among decisionmakers below and argue that this evidence strongly suggests that the phenomenon is relevant in the domain of monetary policy. This motivates our theory of the design of decision structures in central banks, which is based on the assumption that monetary policymakers may be subject to overconfidence. The typical decision structures in contemporary central banks can - according to our model - be seen as an example of "Behavioral Institutional Design" (DellaVigna, 2009). The structures are designed to counteract the effects of judgment biases and thereby improve welfare.[6]

How can overconfidence help explain the use of MPCs? Consider a central bank chairman who receives information and judgments from his staff,

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[3]Ordinary MPC members may also have some access to the staff, or have a small private staff, but staff resources are generally unequally distributed between the chairman and the ordinary members.

[4]The only known example of the chairman being outvoted is the MPC at the Bank of England where the chairman has been in minority twice (out of 138 meetings, see Section 2).

[5]Researchers have documented many other biases in information processing (see e.g. the surveys by Rabin, 1998 and DellaVigna, 2009), but according to DeBondt and Thaler (1995, p.389) overconfidence is perhaps the most robust finding in the psychology of judgment.

[6]Note, however, that even if overconfidence can be seen as a "friction" which reduces the quality of 'pooling by talking', overconfidence may also be advantageous in a dynamic setting, as discussed in Section 2.

but who also has a private signal about the unknown "optimal" interest rate. If he is an unbiased information aggregator, he will optimally weigh the staff's advice and his own signal. To the extent that more people should be involved in the monetary policy decisions, these can be hired as advisors because the chairman will take their views properly into account. If, however, the chairman is overconfident, he will place a too high weight on his own signal and underweight the advice from his staff. Thus, an overconfident chairman does not extract all potential pooling gains inherent in his staff's advice. This increases the risk of bad policy decisions if he alone decides. An MPC with decision power can reduce the risk induced by overconfidence partly because it can intervene against extreme policy proposals, but also because a chairman who has to bring his views to a committee will moderate his proposals. Giving decision power to the MPC is a necessary condition for such moderation to take place. These results hold even though all committee members are subject to the same overconfidence bias. Our approach suggests a different understanding of the role of MPC members: Rather than thinking of MPCs primarily as tools for information pooling, we interpret them primarily as insurance mechanisms against extreme actions from a single policymaker.

Overconfidence precludes agreement about policy in a committee, and it has consequences for the optimal allocation of decision power in the MPC. Through the chairman's unique access to the central bank staff (and perhaps superior competence), the chairman's policy view should on average carry a higher weight than rank-and-file members'. However, overconfidence gives him a suboptimal influence on policy if it is set through simple majority voting. Giving the chairman an extra layer of decision power, e.g. through agenda-setting rights, is a mechanism for restoring (or approaching) his optimal influence.

In addition to the papers mentioned above, our model is related to work by Lohmann (1992), Rigoni and Ruge-Murcia (2008), and Gerlach-Kristen (2008), but as we discuss below it differs in important respects. The most closely related contribution is Gerlach-Kristen (2008), who study a model with communication errors between MPC members which also yield disagreement among MPC members after deliberations. Although we have another microfoundation and our model of voting and agenda setting is less reduced form, it shares with her model the property that the chairman adjusts his proposal so as to achieve a majority in the MPC. Also in contrast to Gerlach-Kristen (2008) we study normative implications with regard to agenda setting power.

The remainder of the paper is organized as follows: In Section 2 we

review the evidence on leader dominance and dissent in MPCs. We also briefly discuss the evidence for overconfidence among decisionmakers, and make the case for its relevance in monetary policy making. In Section 3 we develop a simple model of policy opinions. We show how overconfidence leads to suboptimal use of other people's views and how it precludes agreement among policymakers. With disagreement about policy also after deliberations, there is need for a mechanism to aggregate individual judgments into a policy decision. In Section 4, we explore such a mechanism by developing an agenda-setting model for monetary policy. In Section 5, we discuss normative implications that our model has for the optimal power of the chairman in MPCs. Section 6 concludes.

2 Motivating evidence

Our theory is motivated by two strands of evidence. The first set of facts shows that disagreement about policy is common in MPCs where voting records are available, yet chairmen's views have a strong tendency to prevail. The second line of evidence is the prevalence of overconfidence among decisionmakers. We now briefly review both set of evidence, and also discuss why overconfidence is relevant for monetary policymaking.

2.1 Leader dominance and dissent in monetary policy committees

The best known case of leader dominance in MPCs is probably the FOMC under Alan Greenspan's leadership. According to Blinder (2007, p.111), FOMC members under Greenspan's tenure had only one real choice: "to go on record as supporting or opposing the chairman's recommendation, which was certain to prevail." Greenspan chaired the FOMC for over 18 years and was never on the losing side of a vote. The Greenspan period is not unique in the history of the Federal Reserve System. Chappell et al. (2004; 2005 ch. 7) empirically analyze the power of Arthur Burns in his period as chairman of the FOMC. They conclude that Burns' opinion counted about as much as the 18 other committee members put together. An important source of this policymaking weight is reluctance among FOMC members to challenge the proposal offered by an agenda-setting chairman (Chappell et al., 2005, p.101). Like Greenspan, Burns was never on the losing side of a vote in the FOMC. In general, the historical records of the FOMC, as documented by Chappell et al. (2005), indicate a tradition of a strong chairman in the FOMC.

One may argue that the phenomenon of a strong chairman is special for the FOMC; after all Blinder (2004) classified the (Greenspan) FOMC as an *Autocratically-collegial committee*, where "the chairman came close to dictating the committee's decision". At the other side of the central bank spectrum in terms of chairman influence is the Bank of England's MPC, labeled by Blinder as an *Individualistic committee*. And indeed, the minutes from this MPC reveal a great deal of dissent about monetary policy actions. Between June 6, 1997 and September 10, 2009, the Bank of England had 138 MPC meetings, and there was dissent on the interest rate decision at 92 (62 percent) occasions. But even so, the Governor (Mervyn King) lost the vote at two meetings only. A reasonable interpretation is that the Governor carries a big policyweight also at England's MPC. Minutes from other central banks' MPC meetings strengthen the impression of strong chairmen.[7] The Bank of Japan's MPC, for instance, held 192 meetings from March 3, 1998 to August 11, 2009. There was dissent on policy on 97 occasions (51 percent), but the chairman was never on the losing side of the vote. Sweden's central bank (The Riksbank) has available minutes from 93 MPC meetings covering January 4, 1999 to September 2, 2009. It was dissenting votes about policy at 32 meetings (34 percent of the time), but again the chairman's proposal always prevailed.[8]

This mixture of anecdotal and more careful empirical evidence (as in Chappell et al. 2005) points to the chairman's agenda-setting power as a key source of his heavy policy influence. In the MPCs discussed above, as in many others, the chairman typically proposes a policy decision that the other members must accept or reject. The other members are often reluctant to challenge the chairman's proposal, and this gives him an extra layer of decision power.

2.2   The case for overconfidence in monetary policymaking

A substantial literature in cognitive psychology establishes that individuals tend to be overconfident about the accuracy of their information (Lichten-

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[7]Most MPCs suppress internal dissent from public view. The Governing Council at the European Central Bank, for example, claims to make decisions by consensus, but offers no voting records against to which assess this claim (Crowe and Meade, 2007).

[8]On the face of it, the degree of dissent appears smaller at the FOMC than at the other three MPCs discussed here. Chappell et al. (2005) report that dissents represent 7.8 percent of voting observations over the 1966-96 period. According to Meade (2005), however, the FOMC's internal rates of disagreement are quite similar to dissent rates at the Bank of England, if one looks at opinions expressed during the discussion of policy proposals.

stein et al., 1982 reviews this calibration literature).[9] Such overconfidence has been observed in many professional fields. A non-exhaustive list includes physicians, investment bankers, engineers, lawyers and managers (see Odean, 1998 p. 1892, for references to studies of these and other professions). To our knowledge, there are no studies on overconfidence among monetary policymakers, even though, as we argue below, the nature of monetary policy suggests that it is likely to be important in this field.[10]

Overconfidence is especially pronounced when individuals try to answer questions that are difficult and, in performing repetitive tasks, when feedback is slow and ambiguous. Monetary policymakers try to assess the appropriate interest rate in a complex and often fluid environment. It is precisely in such difficult tasks that people exhibit the greatest overconfidence (Odean, 1998). Griffin and Tversky (1992) report that when predictability is low, as is often the case in monetary policy, experts may even be more prone to overconfidence than novices, since monetary experts have theories and models of how the economy works which they tend to overweight.

The macro economy is, moreover, a slow arena in which to calibrate one's confidence. Learning is fastest when feedback is quick and clear, but in monetary policy the feedback is in nature slow and noisy. There are "long and variable lags" of monetary policy changes, and always difficult to assess to what degree the macroeconomic situation is a consequence of policy or of unforeseen shocks. These are circumstances that tend to exacerbate overconfidence.

While an extensive experimental literature documents the tendency of overconfidence, there is less research on *why* individuals might be overconfident. Bénabou and Tirole (2002) apply elements from psychology within an economic analysis, and show that various seemingly 'irrational' features of human beings, including overconfidence, can be explained by various 'rational' factors. They focus in particular on the *motivation value* of self-confidence. Being self-confident enhances the ability to undertake difficult tasks. For example, the decision to do a Ph.D. degree implies high costs in terms of time and effort during the process, but with the potential of

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[9]Miscalibration of probabilities is only one manifestation of overconfidence. Others include overestimation of own ability to do well on a task, unrealistic optimism about pure chance events, and overestimation of own contributions to past positive outcomes. See Odean (1998, Section II) for an overview and discussion. Malmendier and Tate (2005) is an excellent recent example of how overconfidence can shed light on economic phenomena.

[10]Angner (2006) argues that economists in general are likely to be victims of significant overconfidence, when acting as experts in matters of public policy (e.g. monetary policy). He base his case on the nature of the task facing economists and on the institutional constraints under which they operate.

high return when the degree has been awarded. The student is relatively certain about the costs, while the return depends on the student's ability, on which the student is uncertain. The more self-confident the individual is, the higher is the expected return, and the more motivated is the student for finishing the degree. An implication of this is that experts that have invested much effort in accumulating human capital, are likely to be more self-confident than others. The complementarity between confidence and ability has long been recognized in pedagogics. Moreover, from a demand-side perspective, experts that are self-confident are often more highly valued than experts that appear uncertain. (Politicians want "one-handed economists".) Mechanisms as described above may lead to an equilibrium selection where experts, including monetary policy experts, are overconfident.

In our analysis we allow monetary policymakers to be overconfident, not because they are different from others, but because they are just like others, and because they operate in an environment where such traits can easily prevail.

3   A simple model of policy opinions

3.1   The loss function

The aim of monetary policy is to set the key interest rate r_t to minimize the loss
$$L_t = L(W_t),$$
where W_t is a vector of target variables dependent on r_t. For example, we could have that $W_t = (\pi_t, y_t)$ where π_t and y_t are the inflation gap and the output gap respectively, and $L(\pi_t, y_t) = (\pi_t^2 + \lambda y_t^2)$ as is usual in many models of monetary policy. In order to keep the analysis simple we assume that the decision problem is static so that we can focus on the period loss function and disregard expected future losses. This would, for example, be the case within a standard New Keynesian model without persistence, and where the central bank follows a time-consistent (discretionary) policy. We drop the time subscripts in rest of the paper.

Monetary policy is conducted in an environment of uncertainty where the interest rate that minimizes L is unknown. Denote this (unobservable) interest rate r^*. Using a second order Taylor approximation of the loss we have that the excess loss by setting a sub-optimal interest rate can be written

as $L - L^* = (r - r^*)^2$ where r is the (sub-optimal) interest rate.[11] In the following we let the expected excess loss $E(L - L^*)$ as given by

$$E(\widehat{L}) = E(r - r^*)^2 \tag{1}$$

be the normative criterion and call (1) the loss function. We assume that those involved in monetary policy decisions share this loss function so that there is no disagreement about the goal of policy.

3.2 Timing of events

Our set-up assumes the following timing of events:

1. Those involved in the monetary policy decision receive an individual noisy signal on the optimal interest rate.

2. Those involved in the monetary policy decision exchange information and form a revised individual signal on the optimal interest rate.

3. The interest rate is decided according to the institutional setting in place (e.g. majority voting).

To proceed we thus need to specify who are involved in monetary policy, how they receive their individual signal on the optimal interest rate, and how they revise their signal when they interact with others. In turn, the mapping from this information and communication process to the actual interest rate depends on the decision rule, which is where institutional design enters the analysis.

3.3 Policy opinions

MPC members' task is to form a judgment on the optimal interest rate given by (1). Each member j receives a (noisy) independent signal of optimal interest rate:

$$r_j = r^* + \varepsilon_j, \tag{2}$$

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[11] Let $L^* = L(W_t(r^*)) \equiv M(r^*)$. A second-order Taylor approximation of $M(r)$ gives

$$L = L^* + M'(r^*)(r - r^*) + \frac{1}{2}M''(r^*)(r - r^*)^2 = L^* + \frac{1}{2}M''(r^*)(r - r^*)^2,$$

where the second equality follows from the first-order condition for minimizing the loss. In linear-quadratic models, $M''(r^*)$ will be constant, and depend of the parameters of the model. For the purpose of this paper, we may, without loss of generality, normalize the second derivative by setting $\frac{1}{2}M''(r^*) = 1$.

where ε_j is the judgment error, which is characterized by

$$\varepsilon_j \sim N(0, 1/\alpha), \quad \text{all } j = 1, ..., n+1.$$

There are $n+1$ members of the committee and α measures the precision of the members' signals, which may also be interpreted as the competence of the MPC members.

3.3.1 Bayesian updating

We will first see that the benchmark case of perfect information updating makes the interest rate decision particularly simple, and that it has a straighforward implication for institutional design.

Symmetrical case. If all MPC members are equally competent and they have no prior information about the distribution of r^*, their best linear unbiased estimate of the optimal interest rate is:

$$r = \frac{1}{n+1} \sum\nolimits_{i=1}^{n+1} r_i. \tag{3}$$

It follows from (3) that if all members have the correct perception of their own and others competence, and if they share their individual signals, all members will combine the signals equally and thus end up with the same judgment on r^*. In other words, they will always agree. The institutional aggregation rule from individual opinions to the actual policy decision is irrelevant. Delegating decision power to more than one person in a group will not affect policy.

The precision (inverse of the variance) of the estimate (3) is

$$(n+1)\alpha.$$

The more members of the committee, the better the quality of policy. This is the pooling (Condorcet) argument for committees discussed in the Introduction. Note that in this benchmark case, pooling of policy judgments does not imply that decisions can be improved by delegating decision power to more than one person - advisory power is sufficient.

A chairman with staff. Assume now that one MPC member (the chairman) has better access to a group of m advisors (the staff) than the rest of the committee. For simplicity, we assume that the chairman's access to the staff is unique, and that individual staff members have the same competence as MPC members.

The chairman's optimal combination of his individual signal r_c and his staff's signals is

$$\widetilde{r}_c = \frac{1}{m+1} \left(r_c + \sum_{i=1}^{m} r_i \right), \tag{4}$$

while his optimal posterior (i.e. after MPC deliberations) becomes

$$\widehat{r}_c = \frac{1}{n+m+1} \left(r_c + \sum_{i=1}^{n+m} r_i \right).$$

Other members of the MPC can not observe the chairman's individual signal r_c, but only $\widetilde{r}_c$. These members optimal estimate then becomes:

$$\widehat{r}_j = \frac{1}{n+m+1} \left((m+1)\widetilde{r}_c + \sum_{i=1}^{n} r_i \right). \tag{5}$$

By substituting from (4), we can immediately see that $\widehat{r}_j = \widehat{r}_c$. Optimal information aggregation implies that "ordinary" MPC members will take into account that the chairman has (better) access to information from the staff, and end up with the same opinion about optimal policy as the chairman. It is thus still the case that allocation of decision power is inconsequential for policy. One person with advisors will make the same decision as a committee.

3.3.2 Overconfidence

Consider then the case where policymakers are overconfident. Let $\tilde{\alpha}_j$ be MPC member j's perception of the precision of his own signal. Following Odean (1998), we specify overconfidence as follows:

$$\tilde{\alpha}_j = \alpha k, \ k \geq 1.$$

The parameter k characterizes the degree of overconfidence. When $k = 1$ policymaker j is an error-free Bayesian, while $k > 1$ implies that he uses the wrong weights when updating his interest rate judgment after receiving new information.

Symmetrical case. Suppose again the symmetrical case where all MPC members are truly equally competent. Given member j's perception, the subjectively optimal combination of his own and the other members' signals is:

$$\widehat{r}_j = \frac{1}{(n+k)} \left(kr_j + \sum_{i=1}^{n} r_i \right), \ i \neq j. \tag{6}$$

Compared to the case of perfect updating, all members overweight their own signal, $k/(n+k) \geq 1/(1+n)$, and underweights the signals of their peers. Member j's perceived precision of his own posterior estimate is

$$(n+k)\alpha \geq (n+1)\alpha,$$

while the true precision of estimate (6) is

$$\frac{(n+k)^2\alpha}{n+k^2} \leq (n+1)\alpha.$$

Overconfidence deteriorates the quality of policydecisions, in the sense that it lowers the true precision in MPC members judgments.

Equation (6) implies that individual MPC members generally have different posterior judgments on the optimal interest rate; they end up disagreeing even if they share all information.

A chairman with staff. Let us finally look at policy opinions with overconfidence and a staff. The chairman now combines his individual signal and his staff's signals according to

$$\tilde{r}_c = \frac{1}{k+m}\left(kr_c + \sum_{i=1}^{m} r_i\right). \tag{7}$$

Compared to the case of perfect information updating above, the chairman overweights his own signal and underweights the signals (i.e. advice) of the staff. The chairman treats the signals from his staff and from his MPC colleagues symmetrically, implying that his subjectively optimal posterior estimate becomes:

$$\hat{r}_c = \frac{1}{n+m+k}\left(kr_c + \sum_{i=1}^{n+m} r_i\right). \tag{8}$$

As before, the other members of the MPC can only observe the combination of the chairman's individual signal and his advisors' signal, as given in (7). The ordinary members' subjectively optimal estimate then becomes:

$$\hat{r}_j = \frac{1}{n-1+k+\gamma}\left(kr_j + \gamma\tilde{r}_c + \sum_{i=1}^{n-1} r_i\right), \quad i \neq j, \tag{9}$$

where

$$\gamma = \frac{(m+k)^2}{m+k^2} > 1.$$

Comparing (9) to (5), we see that members overweight their own priors and underweight the judgments of their peers.[12] Again, we see how over-confidence lead to disagreement about policy even if decisionmakers share information. MPC members do take into account that the chairman is better informed through his better access to the staff, but put too little weight on this. In addition, the chairman puts too little weight on his staff. For both reasons, the competence of the staff becomes underutilized.

4   Monetary policy decisions

How can an MPC with that disagree after deliberations reach a decision? One possibility would simply be to take the (possibly weighted) average of the members' preferred rates. No central bank does this, and probably for a good reason: an averaging rule will typically be prone to strategic behavior where members do not reveal their actual preferred interest rate. Their best response in such a game is to communicate the interest rate that results in the actual policy being most closely aligned with their preferred policy. For this reason, although averaging works well with truly revealed preferences, it is hard to design the institutional setup in such a manner that revealing preferences constitutes best response for MPC members. In the continuation we thus look at alternative institutional designs to averaging.

Earlier literature has commonly assumed that the MPC aggregate by a simple majority vote (e.g. Blinder and Morgan 2005; Gerlach-Kristen 2006). The policy decision then corresponds to the interest rate preferred by the median MPC member. Although this median-voter perspective on monetary policy decisions is consistent with disagreement in the committe, and thus the need for voting, it is not consistent with the pattern we observe in the outcomes of these votes. In particular, as we discussed in Section 2, MPC chairmen is almost never on the losing side of the vote. To account for this we need to specify an institutional structure where the chairman has the agenda setting power and specify what happens if he is voted down.

With an agenda-setting chairman, the role of the other MPC members is somewhat different compared to the standard majority voting model. Instead of proposing their own preferred interest rate decisions, as is implicitly assumed in models with majority voting, their role is to assess the chairman's proposal and vote in favor or against it.

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[12]The condition for members' overweighting their own opinion is given by $\frac{k}{n-1+k+\gamma} > \frac{1}{n+m+1}$. After straightforward calculations and inserting for γ this reduces to $(k-1)n(m+k^2) + m(k(m+k^2-2) - m + 1) > 0$, which is always fulfilled for $k > 1$.

As Riboni and Ruge-Murcia (2008), we thus apply an agenda-setting approach to the interest rate decision. However, we depart from Rigoni and Ruge-Murcia by assuming that the *reversion point* is not the *status quo*, but the value preferred by the majority of the MPC (the median judgment). We argue that the *status quo* is not a realistic reversion point for monetary policy decisions, although it can be so for some political decisions, such as voting on economic reforms. To illustrate our point, consider the FOMC meeting in February 1994, where, according to Blinder (2007, p.111), the transcripts clearly indicated that a majority of the FOMC members wanted to raise the funds rate by 50 basis points, while Greenspan proposed a 25 basis point increase. Since Greenspan used his power to get his will through, we will never know what would have happened if his proposal was rejected. Nevertheless, if the chairman proposes a 25 basis point interest rate cut which is voted down because the MPC members see this as too little, it unlikely that the effect of voting down the chairman would be to leave the interest rate unaltered. Since the FOMC formally reaches decisions by majority voting, it is more reasonable to believe that the FOMC, if rejecting Greenspan's proposal, would have voted for a 50 basis point rise.

The argument against *status quo* as the reversion point in monetary policy decisions is also clear if we assume that the majority of the committee wants an increase in the interest rate, while the chairman proposes an unchanged interest rate. If the reversion point is the *status quo*, it is impossible for the majority of the committee to achieve their preferred decision, which implies that the chairman has unlimited voting power in all situations where he prefers an unchanged interest rate. We will thus argue that the common assumption of *status quo* as the reversion point in traditional agenda-setting models reflects the type of decisions these models were applied to, while interest rate decisions are of a somewhat different character.

In this sense our model is more closely related to Gerlach-Kristen (2008), who assume that MPC members oppose the chairman if they disagree sufficiently with his proposal. In her model the power of the chairman arises from two sources: First, the chairman chairs the discussions to facilitate the communication between the other members, which may limit the disagreement within the MPC. Second, the chairman is more skilled, so it is optimal for the members to place a higher weight on the chairman's judgment when updating the priors. The chairman thus improves information pooling in the deliberation process. Although we have a different reason for disagreement between MPC members and a specified agenda setting procedure, we find an interest rate decision that closely resembles monetary policy in what Gerlach-Kristen (2008) (due to Blinder, 2004) labels Auto-

cratically Collegial Committee. The different sources of disagreement in our model and in Gerlach-Kristen's model - overconfidence and communication errors respectively - has, however, implications for the interpretation of the agenda-setting mechanism. In both cases the chairman adjusts his proposal in order to get the median voter indifferent between accepting the chairman's proposal and voting against the chairman. This is unproblematic when the reason for disagreement is overconfidence, since the chairman then can observe the median voter's preferred interest rate. When the reason for disagreement is communication errors, as assumed by Gerlach-Kristen, it is not clear how the chairman can observe the median voter's preferred interest rate and thereby adjust his proposal optimally towards the median voter.

Our agenda-setting model also has similarities with the model of the central bank and the government in Lohmann (1992). She assumed that the government could override the central bank's decision, but had to pay a fixed cost. The cost of overriding the central bank could be interpreted as the degree of central bank independence. The focus in Lohmann's paper was to show that Rogoff's (1985) solution to the time-inconsistency problem by delegating monetary policy to an independent but 'conservative' central bank could be improved upon by limiting the degree of independence. Her point was that a 'conservative' central bank works well for moderate supply shocks, but when sufficiently large shocks occur, the cost of having a 'conservative' central bank dictating monetary policy becomes larger than the gain, because a 'conservative' central bank stabilizes output too little relative to what the society prefers. By having the opportunity to override the central bank when large shocks occur, the game between the central bank and the government acts as an insurance against bad monetary policy when extreme shocks occur.

In our model, there is a judgment aggregation problem that calls for an insurance against extreme decisions by the chairman. Similarly to Lohmann's model, the MPC members are expected to override the chairman when they think the chairman tries to force through a bad decision. There is, however, a difference between the two mechanisms. In Lohmann, it always leads to a better policy when the government forces the central bank to adjust policy. In our model, the MPC's influence on the decision can deteriorate the quality of monetary policy, since the chairman, through his staff access, on average is better informed than the other committee members.

Denote the median of the post deliberation opinions $\widehat{r}_1, ..., \widehat{r}_{n+1}$ by $\widehat{r}_{med}$. In the beginning of the aggregation stage the chairman proposes a final decision $r_{proposal}$. If the proposal is not adopted by a majority of the members there will be voting resulting in the interest rate $\widehat{r}_{med}$. We assume that for

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each member there is a cost c of voting down the chairman's proposal. We then have that MPC member j will vote against the chairman proposal if $(\widehat{r}_{proposal} - \widehat{r}_j)^2 > c$. Since for each member i, the expected loss is single peaked around $\widehat{r}_j$, a proposal will not be voted down if $(\widehat{r}_{proposal} - \widehat{r}_{med})^2 \leqslant c$. The chairman will therefore propose his post deliberation proposal $\widehat{r}_c$, as given in (8), if $(\widehat{r}_c - \widehat{r}_{med})^2 \leq c$ or a *modified proposal* $\widehat{r}_{proposal}$ such that $(\widehat{r}_{proposal} - \widehat{r}_{med})^2 = c$ if $(\widehat{r}_c - \widehat{r}_{med})^2 > c$.

The interest rate r_D actually set by the MPC is thus the following

$$r_D = \begin{cases} \widehat{r}_c & \text{if } (\widehat{r}_c - \widehat{r}_{med})^2 \leq c \\ \widehat{r}_{med} + \sqrt{c} & \text{if } (\widehat{r}_c - \widehat{r}_{med})^2 \leq c \text{ and } \widehat{r}_{med} < \widehat{r}_c \\ \widehat{r}_{med} - \sqrt{c} & \text{if } (\widehat{r}_c - \widehat{r}_{med})^2 \leq c \text{ and } \widehat{r}_{med} > \widehat{r}_c \end{cases} \qquad (10)$$

It is easily verified that the chairman will never lose the vote, in the sense that his proposal will always pass. But, this does not mean that the MPC members are without power in the committee. The chairman will modify his proposal if his individually preferred interest rate is sufficiently far from the median view in the MPC, and this clearly gives the other members influence on the decision. The power of the chairman will be higher the higher is c; when $c \to \infty$ the chairman always gets his individually preferred rate through, and the rest of the MPC has advisory power only. At the opposite extreme with $c = 0$ we are back in the standard median voter case.

The predictions of this simple approach is consistent with the actual operation of MPCs that we discussed in the Introduction. Moreover, the approach highlights that a main role for MPCs is to step in if chairman is astray, i.e. to provide insurance against extreme policy errors. What remains is to analyze the trade-offs involved in determining the optimal power to the chairman.

5 Optimal power to the chairman

In designing monetary policy institutions, a key question that has been little studied is what is the *optimal* degree of agenda setting power. It follows from the analysis above that the optimal degree of agenda setting power is decreasing in n and increasing in m. The reason for this is simply that the quality of the signal of the chairman relative to that of the median member of the MPC is decreasing in n and increasing in m.

The effect of the degree of overconfidence on the optimal agenda setting power is less obvious. Naturally, if there is no overconfidence there is no need for agenda setting power. The more overconfidence there is the less the

MPC improves the quality of the decision from the chairman, which viewed in isolation pulls in the direction of allocating stronger agenda setting power to the chairman. On the other hand, the more overconfidence there is, the poorer the chairman utilize the signals from his staff. Therefore, with much overconfidence, the pre-deliberation interest rate the governor prefers has (on average) a poorer quality. Viewed in isolation, this pulls in the direction of allocating less agenda setting power to the governor. The question is therefore not how the degree of overconfidence affects the quality of the preferred interest rate of the chairman or the MPC, but how the *relative* quality of the preferred policy by the chairman and the MPC is affected.

To investigate this question we have to rely on numerical methods. This is because under agenda setting, the interest rate decision involves taking the median of random variables from distributions with different second order moments. There is no explicit mathematical expression for the median in such cases. In the simulations we fix the true precision α to one and impose normally distributed judgment errors ε. We calculate the optimal agenda-setting power of the chairman, measured by c, as a function of overconfidence k for various combinations of committee and staff size, all with $m > n$. Each simulation is based on 10,000 draws.

Figure 1 here

For all combinations of m and n, the pattern that emerges is as depicted in Figure 1; a hump-shaped relationship between the degree of overconfidence and the optimal cost of going against the chairman's proposal. This pattern occurs because of the channels described above: Overconfidence leads to poor use of staff advice from the chairman, but also to less precise policy opinions among MPC members after deliberations. When overconfidence is mild the latter effect dominates, the optimal agendasetting cost is increasing in the degree of overconfidence. A marginal increase in k from a low level means that the chairman lowers the staff influence, but he still gives it considerable weight; he is significantly better informed than the other MPC members. Meanwhile, these members give less weight to the chairman's opinion as the degree of overconfidence increases. When the distortions due to overconfidence increases from a low level it is optimal to increase the power of the chairman.

When overconfidence is severe, on the other hand, more overconfidence pulls in the direction of less agenda setting power to the chairman. To understand this result, note that the optimal agenda setting power of the chairman goes to zero as k approaches infinity. In the limit the chairman is

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so overconfident that he has no better signal than the other MPC members because he completely ignores the inputs from his staff. Allocating him agenda setting power in such a case reduces the quality of monetary policy, as the policy view of the median MPC member is on average better than that of the chairman. The gradually less influence of staff advice as k increases is the dominating factor along the falling part of the line in Figure 1.

The earlier literature on monetary policy decisionmaking has mainly compared simple majority voting to decisions taken by the chairman alone. Our analysis above shows that as long as there is positive but not an infinite degree of overconfidence, neither of these corner solutions are optimal. This result stands in clear contrast to the conclusion in Gerlach-Kristen (2008). She finds that interest rate setting is worse in committees with heavy chairman influence (autocratically collegial committee) than in individualistic committees. According to our analysis, a committee with a strong chairman is optimal as long as decisionmakers have bounded overconfidence and the chairman has better access to staff advice.

Our model may also shed light on another issue in central bank institutional design. Viewed in isolation a normative implication of the model is that the MPC members should also be able to access information and to interact with the central bank staff in the same way as the chairman does. An 'indoor' MPC will improve the quality of the MPC members' policy view. A possible paradox, however, is that in such a case the model suggests that the optimal agenda setting power of the governor should be lower, while in practice such an arrangement may make it more costly for MPC members to vote against the governor. This is especially relevant if career concerns for the staff members become dependent on how their competence is viewed by the chairman. (Obviously there may also be other counterarguments against such a proposal that is not captured by the model, such as the danger of conformity and group thinking.) Thus if one chooses to have an 'indoor' MPC, it is important with arrangements that makes the governor 'weak' in the sense that MPC members will know that there are low costs of opposing him.

The optimal agenda setting power balances the better access to information by the chairman and the insurance involved in having another look at the governors preferred interest rate. The chairman on average makes a better projection of the optimal interest rate than ordinary MPC members due to his closer interaction with the staff. However, an overconfident chairman may sometimes be terribly wrong even after consulting with the staff. Agenda setting trades off these conflicting arguments because it gives a higher weight to the person with the expected best policy signal at the

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same time as it works as an insurance against letting the possible mistakes of one individual have a too strong impact on policydecisions.

6   Conclusion

In contemporary central banking, the formal decision power over monetary policy is delegated to an MPC rather than a single individual. There is considerable disagreement about policy within MPCs, leading to a great deal of dissent in actual policy decisions. Yet, MPC chairmen almost never lose a vote about monetary policy.

In this paper, we have provided a theory for these stylized facts about the decision structure in modern central banks. Our theory rests on the notion that people are not perfect information aggregators, and in particular that they may be subject to overconfidence. An MPC with decision power reduces the policy risk occurring when an overconfident chairman gives a suboptimal weight to staff judgments. Overconfidence also yields disagreement and dissent among decisionmakers, and this gives the chairman too little influence if policy is set through simple majority voting. Giving the chairman extra decision power through agenda-setting rights restores his influence, but also means that he generally will not lose when there is a vote in the MPC. We emphasize that the MPC still has important, but largely unobservable policy influence by inducing moderation from the chairman (and his staff). Moreover, we have seen that even though overconfidence provides a reason for an institutional setting where the chairman has agenda setting power, the extent of such power should be limited if overconfidence is perceived to be a severe problem. Finally, our analysis shows that neither a chairman deciding alone or an MPC with simple majority voting are optimal as long as there is positive but bounded degree of overconfidence.

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Optimal agendasetting cost c as function of overconfidence k

Legend:
- n=6,m=40
- n=6,m=100
- n=2, m=40

Overconfidence, k