# Divided Committees and Strategic Vagueness

**Abstract**

Recent work in political science suggests a number of reasons for the strategic use of vagueness in committees: vagueness can lubricate disputes, ensure legitimacy, and allow for future flexibility. Missing from this literature is that disagreements among differently biased committee members may produce lower levels of strategic vagueness due to committee-member bargaining. In this paper, we examine monetary policy-making committees and present a simple agenda setting model. Counter to previous theories, we show that delegating decision making to a committee with heterogeneous biases is associated with more precise language than committees with alike biases. Using data from the U.S. central bank committee (FOMC) during Arthur Burns' tenure (1970-1978), we test our theory and find evidence that the FOMC uses more certainty language in committee meetings when the committee chair and median member are opposed.

# Introduction

What kinds of committees produce more transparent communications? Does the composition of committee members' preferences matter for communications? The U.S. central bank, the Federal Reserve, frequently makes unanimous monetary policy decisions that seem to support the policy preferences of its chair. Yet, the chair does not hold formal control and indeed the members of the Federal Open Market Committee (FOMC) share decision making powers with the chair. Previous research suggests that the chair's preferences have a larger weight on FOMC decisions compared to other FOMC members, with the chair acting as an agenda setter (Riboni and Ruge-Murcia, 2020; Chappell, McGregor, and Vermilyea, 2004). An interesting question is whether the chair is always able to dominate or whether some types of FOMC committees are better able to constrain the chair?

So as to explain why and when some committee members cast dissents to the chair's proposal publicly, there is a relatively large and growing literature examining the relationship between transparency and members' private information (Meade and Stasavage, 2008; Hansen, McMahon, and Prat, 2017). Much of this literature explores committee members' behavior and external sources of accountability. External accountability relationships may include national governments in oversight hearings (Jensen, 2002; Cheryl Schonhardt-Bailey and Chapman, 2020), a strategic mass public (Stein, 1989), or even private investors (Del Negro and Eusepi, 2011). Less explored is whether *internal* constraints from other committee members also affect the chair's power. Can committee members' themselves use private meetings to constrain the chair's agenda setting?

Furthermore, to our knowledge, no literature examines this in the context of central bank communications. This is an unfortunate omission as evidence in other fields shows mixed empirical results. On the one hand, scholars find that judges increase strategic vagueness to appease conflicting views among justices on the court (Owens and Wedeking, 2011). On the

other hand, other research finds that partisan conflict is associated with an increase rather than a decrease in communicated clarity in public postings on Wikipedia (Shi et al., 2019).

The public has a deep interest in delegating authority to monetary policy committees that will hold its members accountable (Jansen, 2011). This is especially true for institutions where members are appointed rather than elected, like central bank committees. As suggested above, one expectation is that a more diverse group of committee members leads to greater disagreements. Disagreements can be assuaged by appealing to vaguer language. According to this logic, strategic vagueness is a byproduct of accommodating conflicting views. On the other hand, a more heterogeneous committee might lead committee members to ask for greater clarifications. Rather than be assuaged, strategic vagueness may be lower as members hone in on what exactly they want to say, holding one another to account (O'Donnell, 1998; Mainwaring and Welna, 2003; Schillemans, 2008).

To uncover whether committee structure and committee composition is associated with strategic vagueness, we develop a simple bargaining model that depicts group members discussing how precisely (or how vaguely) to transmit information. We construct a simple model in the tradition of an agenda setter model by Romer and Rosenthal (1978) and Romer and Rosenthal (1979). Different from this model, however, is that instead of bargaining directly over interest rates, committee members instead focus on the level of distortion in policy.[1] We assume that all committee members have an incentive to communicate with some uncertainty *for their own gain* and that this strategic vagueness is different from fundamental uncertainty about the true state of the world. Personal gains from being vague may include shirking responsibility or ensuring future flexibility (Aragones and Neeman, 2000; Alesina and Cukierman, 1990; Meirowitz, 2005). We show that delegating to a committee where the chair and the median member of the committee have opposing preferences or biases

[1]See, for instance, the models of gatekeeping in Denzau and Mackay (1983) and Crombez, Groseclose, and Krehbiel (2006).

is associated with *lower* levels of strategic vagueness than when committee members are aligned. Another important finding is that appointing committee members with less extreme bias results in *lower* strategic vagueness. For example, electing an highly biased central bank governor will result in more vague communications. Knowing this, those responsible for appointing the central bank governor can protect against vagueness by appointing oppositely biased committee members. To our knowledge, these findings are new to the literature on monetary policymaking.

By investigating the implications of delegating to groups of experts with policy interests, our model outlines exactly those institutional features that can contribute to more transparent policymaking. Second, we show how competing interests on committees can help guarantee higher quality public information, which is essential for transparency (Jensen, 2002; Hollyer, Rosendorff, and Vreeland, 2011; Berliner, 2014). Finally, our paper also speaks to the literature on agent selection and optimal appointments. While our empirical investigation examines only one specific institution, the FOMC, it is our view that our findings are broad enough to speak to a larger set of institutions which are tasked to govern by committee.

## Previous Literature

The literature on the strategic determinants of vagueness broadly identifies three keys reasons for vagueness by political agents. The first reason is that vagueness can help lubricate disagreement (Ulmer, 1971). Given a committee of differently biased actors, vagueness can be used opportunistically by committee members to ensure compromise among disagreeing factions. Empirically, this argument implies that group size and group heterogeneity should be positively associated with strategic vagueness. Second, in a principal agent setting, vagueness may also be positively related to non-compliance. Vagueness can be used to try to

garner support from external actors or may indicate a lack of expertise about a particular topic (Staton and Vanberg, 2008). For example, a court not knowing detailed information about a topic may be purposely vague so as to ensure compliance. Third, in a dynamic context, vagueness may be used so as to increase flexibility of future choices (Aragones and Neeman, 2000; Alesina and Cukierman, 1990; Meirowitz, 2005). By not committing to a specific action today, agents can (hopefully) use strategic vagueness as a means to negotiate a better deal tomorrow or to evade accountability.

Recently, legislative and judicial scholars have identified a number of reasons for and the effects of vagueness. To our knowledge, however, these have not been tested in the context of monetary policy. The party politics literature, for example, shows that political parties make strategic choices on their party position as well as on the level of ambiguity in their party platforms (Bräuninger and Giger, 2016). Other research finds that vagueness relates to how political parties are constrained by coalition members (Fortunato, 2019) as well as when campaigning (Eichorst and Lin, 2019). In judicial politics, Staton and Vanberg (2008) find that judges are sometimes more or less vague so as to manage their court's relationship with the mass public and the government and Owens and Wedeking (2011) show that committee members' preferences also matter for vagueness. In findings consistent with Ulmer (1971), Owens and Wedeking (2011) argue that ideological cohesion on the court limits the need for appeasement and therefore reduces incentives for members to be vague. Finding the opposite effect, recent research shows that politically polarized teams with ideologically diverse editors produce articles that are more precise compared to those produced by more politically homogeneously groups (Shi et al., 2019).

Distinct from the literature on vagueness, the literature on delegation identifies two key advantages for delegating authority to committees.[2] First, committees act as a forum to

[2]Holmstrom (1978) and Holmstrom (1982) are classic references in the delegation literature. Alonso and Matouschek (2008) are more recent examples.

aggregate the private information and represent preferences of its members (Gilligan and Krehbiel, 1987; Ladha, 1992; Ali et al., 2008; Chen and Eraslan, 2014). Second, group decision-making, and particularly the various voting rules they employ, can tailor the trade-off between a commitment to future policy and the flexibility to react to new circumstances (Dal Bo, 2006; Riboni and Ruge-Murcia, 2010). Third, committees, and especially monetary policymaking committees, can pool members' expertise and knowledge, creating more efficient decision-making (Blinder, 2007).

In our model, we combine the literature on vagueness and delegation and study the relationship between committee design, committee composition, and the strategic use of vagueness by members on the committee. The incentive for the committee member to be vague in our model derives from members' incentives to distort the actions of external, non-committee members. In the case of monetary policymaking, central bank communications have been shown to affect the public's inflation expectations (Baerg, 2020; Ehrmann and Fratzscher, 2013; Binder, 2017), interests rates, (Hansen, McMahon, and Tong, 2019), and asset markets (Haldane and McMahon, 2018). Such motivations for strategic vagueness are distinct from appeasement, (non)compliance, or flexibility, which the previous literature focuses on. Crucially, we assume that lower amounts of strategic vagueness always improves public welfare.

To preview the results, we show that a monetary policymaking committee with a single actor (or single expert) can more easily distort the beliefs or actions of non-committee members by transmitting vague information. Interestingly, we also find that the median member of a committee without an agenda setting chair can also more freely shape beliefs or actions by transmitting vague information. Yet, we also find that a committee with an agenda setting chair is more constrained in his ability to be vague. Furthermore, we find that a heterogeneous committee structure is especially effective when a positively (negatively) biased chair is paired with a negatively (positively) biased median committee member – which

we term a committee with *opposing biases*. In summary, if we rank our findings in terms of the level of precision expected by committee composition, we find first that committees with *opposing biases* deliver the highest quality information, committees with chairs are second, and committees without chairs or those with only a single expert are the most strategically vague.

# Model

With the help of a simple formal game-theoretic model, we investigate how committee composition affects the level of strategic vagueness produced by a monetary policy committee. To do so, we study a committee made up of $N \geq 1$ members. One of these members is the committee chair, labeled $C$.[3] When, $N > 1$, policy decisions, such as changes to interest rates or changes to the official central bank statement, are passed by a simple majority rule. For simplicity, we assume that $N$ is odd.[4] In our model, the chair has proposer power. The other committee members can either vote to accept or reject the chair's proposal. Either the chair's proposal is accepted by a majority or it is voted down. If voted down, a default option is enacted.

The committee is assumed to have privileged access to information about an area of policy.[5] In the case of a central bank committee, this might be information regarding the true state of the economy or about the future intentions of the committee with regards to interest rate policy. For simplicity, we assume that the cost of verification at the time of the

[3]Delegation to a single agent is covered by the $N = 1$ case. In this case, the single member, $C$, has total power to make public policy statements.

[4]This assumption does not substantively affect our results if we incorporate an appropriate tie-breaking rule when $N$ is even.

[5]One reason for being vague is that the committee simply does not have enough information to be more precise. The vagueness studied here is vagueness that goes beyond any informational limits faced by the committee.

public policy announcement is prohibitive, but will become freely available at some future date. Moreover, we assume sufficient reputation costs to make lying about information prohibitively expensive. Such an assumption requires the public to repeatedly receive signals which distort the true information and continue to condition their behavior on this distorted information, even though they can freely observe the true information after the fact and presumably therefore back out the nature of the policymakers' biases. One interesting question which results from this assumption is whether monetary policy committees that allow for public dissent by committee members (such as the Bank of England) are therefore less able to use strategic vagueness compared with those monetary policy committees that present a unified policy statement (such as the Fed). We leave this important question to future research and assume that the public is sufficiently naive.

All else being equal, we assume that the chair and committee members have a small, unmodelled aversion to vagueness. If two potential equilibria give identical utility to the chair, we assume that the chair acts to bring about the less vague equilibrium. This assumption might reflect a disutility to the public of guessing over larger ranges that is then passed on to the chair and committee members through external disapproval.

While information that the committee sends to the public must be truthful, the committee may be vague. All committee members receive the same information, represented by $\theta \in [0,1]$. They then must decide how precisely to convey $\theta$ to the public, $P$. A perfectly precise transmission of information would simply pass on $\theta$ to $P$. Vague transmissions imply a range of values, $\left[\underline{\theta}, \overline{\theta}\right]$, which are truthful and therefore contain $\theta$. We call a statement's *degree of vagueness*, $v$, the size of the range implied or $v = \overline{\theta} - \underline{\theta}$.

Our key assumption is that by making vague statements, a committee is able to manipulate $P$'s response. Whatever actions $P$ will take in response to a committee statement, they must incorporate expectations over $\theta$ that are based on the information transmitted by the committee. We call the absolute difference between the true $\theta$ and $P$'s expectations, $\theta^e$, the

*degree of distortion* or $d$.[6][7] We say a statement is biased upwards or to the right if $\theta^e > \theta$, that it is biased downwards or to the left if $\theta^e < \theta$, and unbiased if $\theta^e = \theta$.

For a particular $\theta$, a distortion, $y$, is *feasible* if $y \in \left[\frac{-\theta}{2}, \frac{1-\theta}{2}\right]$ . The limitations on the feasibility of a distortion is partially a function of assuming $\theta \in [0, 1]$ and that messages must specify a range with a uniform distribution. While these assumptions have implications for feasibility, they are not critical to the substantive conclusions we draw. The *distortion*, $y$, is just the degree of distortion as well as the direction (positive or negative). We assume a sufficient flexibility of language such that any feasible distortion is possible. Hence, the audience, $P$, is freely manipulated and does not enter the model as a strategic actor but is assumed to be naive. Note here that we make an explicit assumption that the central bank has control over the inferences the external actors draw about monetary policy. While external actors in the aggregate may be strategically important for the crafting of central bank messages, any given individual actor does not think that she is pivotal for the conduct of monetary policy and so she enters into the model as a non-strategic actor (Morris and Shin, 2002).

Since the committee can transmit a statement that produces any feasible level of distortion, we allow the committee to directly bargain over the distortion, $y$ in the committee meeting. However, we also assume that there is a default distortion, $x$ that results if the committee fails to agree on a bargain. $x$ is feasible if $x \in \left[\frac{-\theta}{2}, \frac{1-\theta}{2}\right]$. That is, $x$ is feasible only if it is a feasible distortion for the committee.

[6] As an example, consider the following. If the true value is $\theta = 0.81$ and the committee sends a message that effectively communicates that "$\theta$ is distributed with uniform probability between 0.8 and 0.9," then the public sets expectations at $\theta^e = 0.85$. Consequently, the degree of distortion is $d = |\theta^e - \theta| = |0.85 - 0.81| = 0.04$. Meanwhile, the degree of vagueness is $v = \overline{\theta} - \underline{\theta} = 0.9 - 0.8 = 0.1$. For simplicity, we will assume throughout that statements must be of the form "$\theta$ is distributed with uniform probability between $\underline{\theta}$ and $\overline{\theta}$." However, this can be generalized considerably.

[7] For example, a message might imply "$\theta$ is distributed with uniform probability between 0.8 and 0.9 with a mass of 0.5 probability on 0.9." In this case, $\theta^e = 0.5\,(0.85) + 0.5\,(0.9) = 0.875$. In cases where the message is distributed with non-uniform probability, message variance may be used to determine the degree of vagueness.

The default distortion can be thought of in at least three ways. First, $x$ can represent a status quo message that will be implemented in the case of disagreement. In the case of central bank communications, this may be the status quo message from the previous meeting. Second, $x$ can also be thought of as the result of an unmodelled continuation game where the degree of distortion is the result of central bank communications after any amendments are made by committee members. If we assume that the end result of this game is known at the time of initial bargaining through backward induction, then $x$ is the crafted communications after amending. Third, $x$ can also be thought of the equilibrium outcome of an umodelled cheap talk game where the chair and committee members do not coordinate their speech in a unified message. In this case, outside actors attempt to infer information from multiple committee members who make separate, uncoordinated transmissions. As mentioned above, this might better fit the Bank of England compared to the Fed as it allows for public dissent. If we assume that committee members can predict the end result of this cheap talk game at the time of initial bargaining through backward induction, then $x$ can be interpreted this way as well.

Committee members have an incentive to distort external actors expectations and behaviors because each committee member $i$ is assumed to possess a known (to other committee members) bias, $b_i$. We assume that the bias is known to other committee members as committee members meet regularly. This bias may be interpreted as preferences (Dove vs. Hawk) or it may reflect different interpretations of objective information, $\theta$, about the true state of the world or "expertise." We assume each committee member derives utility from the degree to which external actors form expectations in line with the true state of the world and the committee member's bias. It is important to note that in our model, a committee member's ideal point is dependent both on the true state of the world and on the member's bias. So member $i$ has the ideal point $\theta + b_i$. The fact that the truth matters in the utility function of the committee member is what makes the committee member an "expert." If all

committee members have exactly the same bias, then this is covered by the $N = 1$ case. For simplicity, we model member's utility with a quadratic loss function:

$$u_i = -\left(\theta^e - (\theta + b_i)\right)^2.$$

Alternatively, we can write this in terms of the level of distortion:

$$u_i = -\left(y - b_i\right)^2.$$

Finally, the timing of the game is as follows:

1. The chair and committee members observe $\theta$.
2. The chair proposes $y$ to the committee.
3. The committee and chair vote simultaneously to accept or reject the chair's proposal.
4. If the committee accepts, $y$ is transmitted to $P$ and $P$ forms expectations $\theta^e_y$.
5. If the committee rejects, $x$ is transmitted to $P$ and $P$ forms expectations $\theta^e_x$.

We assume that the committee can only make credible threats about rejecting a proposal, hence we restrict attention to subgame perfect equilibria (SPE).

# 1 Equilibrium Cases

We are primarily interested in uncovering the level of strategic vagueness, $v$, transmitted to external, non-committee members in equilibrium. As mentioned above, such external non-committee members may be members of the general public, investors, or perhaps even government officials that scrutinize the monetary policy committee. We focus on finding messages that are what we call *minimally vague messages*. Minimally vague messages produce a distortion $y$ while minimizing $v$. Let $\underline{v}(y, \theta)$ be the degree of vagueness associated with a minimally vague message. Since we assume, all else being equal, that the chair and

committee members prefer lower levels of strategic vagueness, any equilibrium message will be minimally vague. The rest of the theoretical section examines the two features that we care about and their effects on vagueness. The first examines the effects of committee design on vagueness and the second examines the effects of committee composition on vagueness.

## Committee Design and Strategic Vagueness

In this section, we focus on how a committee with an agenda setting chair provides institutional constraints on strategic vagueness versus an individual or a committee without an agenda setting chair. Proposition 1 presents our main result. Without loss of generality, we assume that the chair's bias is $b_C \geq 0$. Denote the degree of vagueness and distortion that results when the chair is the sole committee member (i.e. $N = 1$) as $v_C$ and $y_C$ respectively. Let $M$ be a committee member with the median amount of bias, $b_M$. Let $v_M$ and $y_M$ respectively, be the amount of vagueness and distortion that would result if $M$ was the sole committee member.[8, 9]

### Proposition 1

*Let $N > 1$ and assume that $x$ is feasible so that $\frac{\theta}{2} \leq \theta + x \leq \frac{1+\theta}{2}$. The following statements characterize equilibrium message vagueness, $v^*$:*

1. *If $b_C = b_M$, then $v^* = v_C = v_M$. We call this the "Median chair" case.*
2. *If $b_C < |b_M|$, then $v_M \geq v^* \geq v_C$ . We call this the "Constrained Committee" case.*
3. *If $b_C > |b_M|$ and either (a) $x \geq b_C$ or (b) $x \leq 2b_M - b_C$, then $v^* = v_C > v_M$. We call this the "Dominant chair" case.*

[8] We suppress in our notation the dependence of $v_C$ and $v_M$ on $\theta$ for brevity.

[9] This is also the level of vagueness that would also result if a perfectly patient committee voted up or down on all possible vagueness levels (without a strategic proposer) until one passed.

4. *If* $b_C > |b_M|$ *and* $b_C > x > 2b_M - b_C$*, then* $v_C > v^* \geq v_M$ *. We call this the "Constrained chair" case.*

Proposition 1 highlights the way chair-committee structure constrains the vagueness that would result if messages were alternatively made by a single agent or a committee where the median member was unconstrained by a chair with proposer power. Ex-post, external actors will always prefer either the chair acting alone as a single agent or a committee without an agenda setting chair, whichever has bias closer to zero. However, ex-ante, the institutional structure of a committee with an agenda setting chair can work to reduce distortionary vagueness, acting like insurance against agents or committees with high bias levels. Intuitively, the chair and median committee members represent two distinct sources of power over strategic vagueness. This separation of power potentially reduces vagueness since both players must agree to coordinate their message or the default option (status quo, $x$) is implemented.[10]

When a separation of power between the chair and median member does not exist, the chair-committee structure fails to reduce strategic vagueness. This is highlighted by the situation where the chair is also median. In this case, the committee provides no additional constraints. Example 1 illustrates this case.

In the other cases, either the chair or median committee member prefers more strategic vagueness. In Example 2, the median committee member has a higher bias than the chair. In this case, adding an agenda setting chair to a committee works to constrain the committee and reduce strategic vagueness. Example 3 investigates the case where the chair is more biased than the committee. This can also be thought of as comparing delegating to a single

[10]Another way to think about the committee's role in our model is that the committee functions as a collective veto player in relation to the chair's proposal. If we reverse the model and give the committee proposal power, than we would get symmetric results if the "chair" was imbued with veto power. It's also possible to imagine multiple veto players. For instance, an executive might have proposer power, but two committees (perhaps the United States Senate and House) must separately pass the proposal.

agent to delegating to a chair that must receive approval from a committee. When the default option is very bad for the committee, the committee fails to constrain the chair leading to the Dominant chair case. When the default option is not so bad, the committee can effectively constrain the level of vagueness preferred by the chair leading to the Constrained chair case.

In all of our illustrative examples, we label the committee members 1 through $N$ in order of least bias to most bias.

**Example 1**

*(Median chair):*

*Let $N = 3$ and assume the following vector of biases $(-0.1, 0.1, 0.2)$ where $b_c = b_2 = 0.1$. Let the truth be $\theta = 0.5$. $C$'s most preferred message is $\theta \in u[0.5, 0.7]$ which induces $\theta^e = 0.6$, $y_C = 0.1$, and $v = 0.2$. Since $C$ is also the median committee member, this is also $M$'s most preferred message. Proposition 1 implies that this message will be proposed and accepted for all status quo distortions, $x$.*

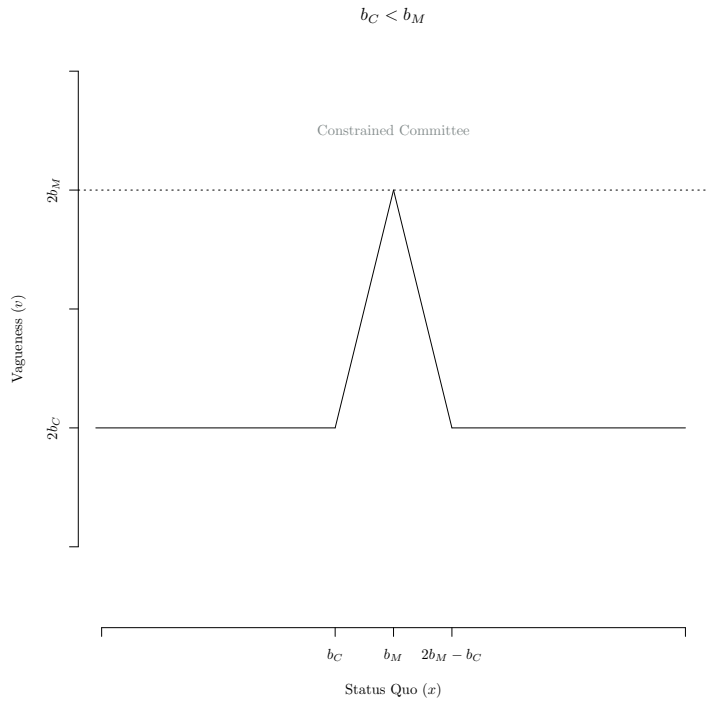
*To see this, first consider the committee member with $b_3 = 0.2$. This committee member only weakly prefers the status quo distortion, $x$, if $x \geq y_C = 0.1$. If this is the case, $b_1 = -0.1$ weakly prefers $y_C$ to $x$ and votes for the proposal. Alternatively, if $x < y_C$, then 1 prefers the status quo while 3 prefers $y_C$. Either way, $y_C$ passes and since it is $C$'s most preferred distortion, it is proposed. Hence $v^* = v_C = 0.2$.*

When $b_C \neq b_M$, then $C$ and $M$ must contend with each other over the level of message vagueness. The two main questions of interest are: One, when $b_C < |b_M|$, to what degree can $C$ reduce the level of vagueness preferred by $M$ acting alone? Two, when $b_C > |b_M|$, to what degree can $M$ reduce the level of vagueness preferred by $C$ acting alone?

In the first case, $C$'s proposer power allows her to constrain $M$'s desired level of vagueness. In fact, whenever $x \notin (b_C, 2b_M - b_C)$, $C$ is able to reduce vagueness to his most preferred level. $C$ is able to constrain the equilibrium level of vagueness by proposing values that are

at least weakly preferred by $M$ to the status quo, $x$. Strikingly, even when $x > b_M$ and hence more vague than either $C$ or $M$'s most preferred value, $C$ can still reduce vagueness away from $M$'s ideal point and closer to her most preferred value. Effectively, $x$ is sufficiently vague that $C$ threatens $M$ with a very unattractive, high level of vagueness if $M$ were to reject $y$. So, even though the status quo may be worse for both $C$ and $M$, $C$ can leverage his proposer power to take advantage of the threat. Figure 1 illustrates this case in general, while Example 2 works it out for particular values.

Figure 1: Constrained Committee




**Example 2**

*(Constrained Committee):*

*Let* $N = 5$ *and assume the following vector of biases* $(-0.1, 0.1, 0.2, 0.25, 0.25)$ *where* $b_c = b_2 = 0.1$. *Let* $\theta = 0.5$. *First note that M's most preferred message is* $\theta \in u[0.5, 0.9]$ *which induces* $\theta^e = 0.7$, $y_M = 0.2$, *and* $v = 0.4$. *C's most preferred message is* $\theta \in u[0.5, 0.7]$

*which induces* $\theta^e = 0.6$, $y_C = 0.1$, *and* $v = 0.2$.

*By varying* $x$, *we can divide Example 2 into five cases:*

***First****, let* $x \leq 0.1$. *In Figure 1, this corresponds to the portion of the graph to the left of* $b_C$.

*In this case,* $C$ *proposes* $y^* = y_C = 0.1$ *and the proposal is accepted. To see that this is true, simply note that members* $b_C$, $b_3$, $b_4$, *and* $b_5$ *always weakly prefer* $y_C$ *to* $x \leq 0.1$ *hence* $y_C$ *will pass and since it is* $C$*'s most preferred distortion, it is proposed. Hence* $v^* = v_C = 0.2$.

***Second****, assume that* $x \in (0.1, 0.2)$. *In Figure 1, this corresponds to the portion between* $b_C$ *and* $b_M$.

*Consider the strategy where* $C$ *proposes* $y^* = x$. *All players are indifferent between* $y^*$ *and* $x$, *so it is accepted. This proposal is preferred by* $C$ *to* $y' > x$ *while any proposal* $y' < x$ *will be rejected. Since* $x < 0.2$, *the distortion and vagueness is less than the most preferred distortion of the median committee member and the committee is constrained from what it would pass in the absence of a designated member* $C$ *with proposer power. Hence,* $v^* = 2x$.

***Third****, assume that* $x = 0.2$. *In Figure 1, this corresponds to the apex of the graph at* $b_M$.

*Now the strategy in the first case leads to* $y^* = x = y_M$. *Hence, in this knife-edge case, the committee is effectively unconstrained so that the distortions and vagueness is not mitigated by the presence of the chair. Hence,* $v^* = v_M = 2x = 0.4$.

***Fourth****, assume that* $x \in (0.2, 0.3)$. *In Figure 1, this corresponds to the portion of the graph between* $b_M$ *and* $2b_M - b_C$.

*First, note that* 1 *will vote for any proposal such that* $y < x$. *Next note that* $M$ *will vote*

*for a proposal so long as* $|y^* - y_M| \leq |x - y_M|$. *Therefore,* $C$ *proposes* $y_M - (x - y_M)$ *and* $M$ *votes for the proposal. For instance, if* $x = 0.25$*, then* $y^* = 0.2 - (0.25 - 0.2) = 0.15$ *and* $v^* = 0.3$. *Or more generally,* $v^* = 2(2y_M - x) < v_M = 2y_M$ *with the inequality holding since* $x > y_M$ *by definition here.*

***Fifth****, assume that* $x \geq 0.3$. *In Figure 1, this corresponds to the portion of the graph to the right of* $2b_M - b_C$.

*In this case* $C$ *proposes* $y^* = y_C = 0.1$ *and the proposal is accepted. Hence,* $v^* = v_C = 0.2 < v_M = 0.4$. *Note that throughout this case the committee is again constrained and vagueness is reduced from the case where the committee votes without a designated proposer.*

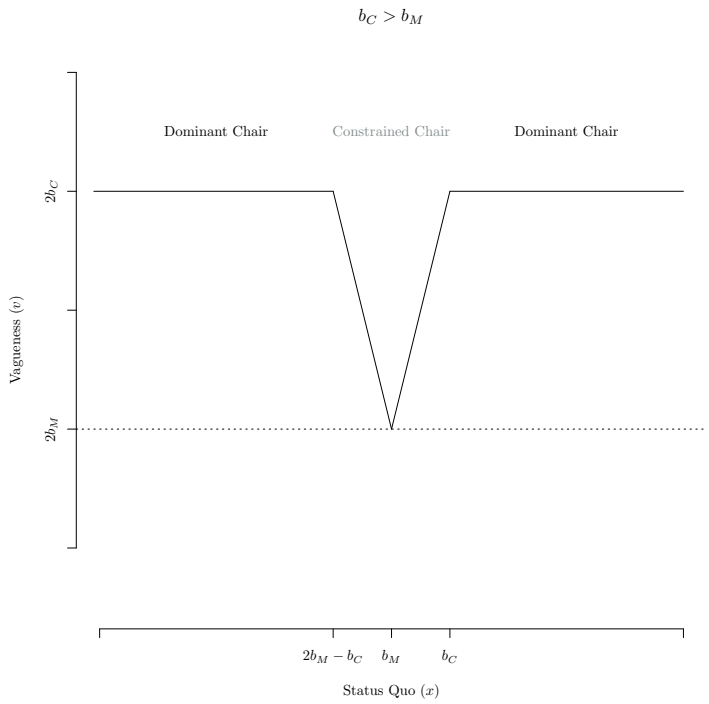
In the second case, $C$ now prefers greater levels of vagueness and the committee works to constrain $C$. However, the committee is only able to do so when $x \in (2b_M - b_C, b_C)$. Still, this can be quite a large range if $b_M$ and $b_C$ are far apart. Since $C$ has proposer power, $M$ can only effectively threaten rejection of $C$'s most preferred value when the status quo is relatively close to $M$'s ideal point. This is the inverse of the logic in the first case where the committee is effectively constrained for all status quo values with the exception of a single point. Figure 2 illustrates this case in general, while Example 3 works it out for particular values.

**Example 3**

*(Dominant chair and Constrained chair): Let* $N = 5$ *and assume the following vector of biases* $(-0.2, -0.1, 0.1, 0.2, 0.25)$ *where* $b_c = b_4 = 0.2$. *Let* $\theta = 0.5$. $C$*'s most preferred message is* $\theta \in u[0.5, 0.9]$ *which induces* $\theta^e = 0.7$*,* $y_C = 0.2$*, and* $v = 0.4$. $M$*'s most preferred message is* $\theta \in u[0.5, 0.7]$ *which induces* $\theta^e = 0.6$*,* $y_M = 0.1$*, and* $v = 0.2$.

*Depending on* $x$*, there are three cases to consider:*

Figure 2: Dominant chair and Constrained chair




***First***, *when* $x < 0$, *we are in a Dominant chair case. In Figure 2, this corresponds to the portion of the graph to the left of* $2b_M - b_C$. *Here,* $M$ *prefers* $y_C$ *to* $x$, *therefore* $y_C$ *is proposed and passed.*

***Second***, *if* $x \in (0, 0.2)$, *then* $M$ *prefers* $x$ *to* $y_C$ *which is the Constrained chair case. In Figure 2, this corresponds to the portion of the graph between* $2b_M - b_C$ *and* $b_C$. *In this case,* $M$ *is indifferent between* $x$ *and* $y_M + |y_M - x|$ *which is always greater than* $y_M$ *and therefore preferred by* $C$ *when* $y_C \geq y_M + |y_M - x|$. *Hence,* $C$ *will propose* $y^* = \min\{y_C, y_M + |y_M - x|\}$. *For instance, if* $x = 0.05$, *then* $y^* = \min\{0.2,\ 0.1 + (0.1 - 0.05)\} = 0.15$ *and* $v^* = 0.3 < v_C = 0.4$.

***Third***, *if* $x \geq 0.2$, *we are once again in the Dominant chair case. In Figure 2, this*

*corresponds to the portion of the graph to the right of $b_C$. As in the first case, $M$ prefers $y_C$ to $x$, therefore $y_C$ is proposed and passed.*

## Committee Composition and Strategic Vagueness

The previous section focused on how a committee's structure constrains strategic vagueness. However, vagueness also depends on the *composition* of preferences or biases among the committee members. The most obvious way this happens is that, all else equal, lowering the magnitude of bias for $C$ and $M$, lowers the level of strategic vagueness in equilibrium. In certain cases, we can go further than this to show a less intuitive, but potentially powerful result.

In many applications, it is interesting to consider the possibility of a small status quo or default level of strategic vagueness. For instance, in the case of a status quo statement, it might be that the status quo is simply the truth or if the committee cannot agree on a level of vagueness, individual members may transmit information independently (see e.g. Moschella and Diodati, 2019; Ferrara, 2019). Since all transmissions are truthful by assumption, their intersection may be quite small, especially in cases where members have opposing preferences and bargaining is more likely to break down. Proposition 2 demonstrates how a small status quo impacts equilibrium vagueness. It then looks at the implications for this when the chair and median committee member are biased in the same or opposite directions.

**Proposition 2**

*If* $\min[|b_C|, |b_M|] > 0$ *and* $x$ *is feasible and small in the sense that* $|x| < \min[|b_C|, |b_M|]$*, then, (1), if the chair and median committee member are oppositely biased, then* $v^* = v_x$*, and (2), if the chair and median committee member are like biased then* $v^* > v_x$*.*

Proposition 2 predicts that vagueness will be higher when the chair is biased in the same direction as the median committee member, than when they are oppositely biased. Strikingly,

as $x \to 0$, then $v^* \to 0$ when the chair and median committee member are oppositely biased. When both have nonzero biases and they are like biased, then $v^*$ remains bounded away from 0 as $x \to 0$. Example 4 presents an instructive case.

**Example 4**

*(Perfectly Precise Status Quo/ Default): Assume that there are two factions labeled "Dovish" or L and "Hawkish" or R. R and L are distinguished in that all members of R are right biased and all members of L are left biased. For simplicity, let the bias of all members of R be* $b_R = 0.1$ *and for all members of party L let* $b_L = -0.1$*. Let* $x = 0$ *so that the status quo or default message is undistorted and perfectly precise.*

*(1): Assume that the chair is from faction R and the median committee member is from faction L. R prefers to distort* $\theta^e$ *upwards, but the committee will vote down any upward bias in favor of the unbiased status quo. C never proposes downward bias since this is worse than an unbiased outcome. Hence,* $v^* = 0$*.*

*(2): Now assume that both the chair and median committee member are from faction L. Then the chair proposes its most preferred distortion* $y = -0.1$ *which is accepted and implies* $v^* = 0.2$*.*

Intuitively, Proposition 2 implies that divided committees are less vague. If the level of vagueness in $x$ is small, than Proposition 2 implies that communicated precision will be higher when committee members are from different factions.[11] This implies that central bank communications will be more precise (less vague) the more heterogeneous the committee members. It is this proposition that we explore empirically in the next section.

[11]This is true up to the qualifier that $\forall\theta$ and $\forall\theta_{b_C,b_M}$ such that $y_C, y_M$ is feasible given $\theta$.

# 2 Vagueness on the FOMC

The Federal Open Market Committee (FOMC) is the decision-making body for monetary policy in the United States. Today 8 and historically 12 times a year, FOMC committee members come together and decide on policy changes to the U.S. economy. Important for researchers, FOMC committee members' deliberations are recorded and made publicly available. Such reports include meeting transcripts, policy statements, public statements regarding the FOMC's policy decisions, Memoranda of Discussions (1967-1976), and records of Policy Actions & Minutes of Actions (1976-1992). Our empirical analyses uses the Records of Policy Actions and Minutes of Actions textual documents to provide an empirical test of our theory.

The sample that we cover is the period under Arthur Burns's tenure (more below). From February 1970 to March 1978, our primary documents are the FOMC's Memorandum of Discussion, which summarizes the FOMC's deliberations on monetary policy in each meeting.[12] The Records of Policy Actions and Minutes of Actions were released after 90 days until 1976, and then expedited. In March 1975, the release was changed from 90 days to 45 days and changed again in May 1976 to a few days after the next scheduled meeting. Despite the variation in the publication records, for the duration of the sample period, there was always at least a one-meeting delay in publication. These documents are the precursor to the modern FOMC minutes.

Starting in 1970, FOMC meetings were tape recorded to help prepare the minutes. Unknown to committee members, committee meetings were transcribed and stored in archives. They were subsequently released during Greenspan's tenure. Both Meade and Stasavage (2008) and Hansen, McMahon, and Prat (2017) use the publication of the historical meeting transcripts, in 1993, as a natural experiment, analyzing the effect of publicity on members'

[12] After March 1976, the FOMC stopped producing the Memorandum of Discussion and started producing the Record of Policy Actions  Minutes of Actions.

behaviors before and after members knew they were recorded. By contrast, in this analysis, we leverage the fact that the transcripts provide an accurate account of committee members' *private deliberations*. The fact that committee members did not know that their deliberations were being recorded means that we can examine the level of expressed uncertainty in the meeting under conditions when committee members assume that their discussions are secret. Indeed what this means is that we can examine the relationship between strategic vagueness and committee composition without being concerned about the strategic behaviour of committee members to outside audiences. The fact that deliberations are private matches the theoretical model more closely than if the minutes were public. Another benefits is that in modern times, the FOMC regularly uses the balance of risks statement to appease potential dissenting members. This practice started in 2000, however, and doesn't apply to this time period, and so we can account for this as well.

In addition to the rich set of documents and transcripts which we use for analysis, the FOMC has a number of interesting institutional features which makes it a good test of our theory. First, the FOMC committee chair is a strong agenda setter, usually speaking first. For example, during Burns' tenure, chair Burns accounted for about 40-50 percent of the voting weight on interest rate decisions (Chappell, McGregor, and Vermilyea, 2004; Riboni and Ruge-Murcia, 2020). Similarly, Burns-member differences in stated interest rates are found to be lower when Burns made recommendations early in the meeting rather than later in the meeting, which is consistent with the hypothesis that the chairman is an Agenda setter (Chappell, McGregor, and Vermilyea, 2007). In the empirical section, as a robustness check, we specifically examine statistical results only for those cases when Burns speaks first.

Second, committee members are appointed by different channels, either through private member banks or through Presidential appointments (Chang, 2001). Variation in the appointment mechanism and appointment timing provides an exogenous sources of variation in committee composition. For example, in the case of those directly appointed by the

President, both Republicans and Democrats tend to appoint members with more similar preferences to their own, conditional on confirmation by the Senate, and appointments are staggered across Presidential terms (Gandrud and Grafström, 2015; Chang, 2001). By the end of Burns' tenure, almost all appointed FOMC members had some loyalty to the Republicans. Committee members from Bank Districts, by contrast, are also more likely to represent their district's local conditions, especially their unemployment levels (Baerg and Lowe, 2018; Chappell, McGregor, and Vermilyea, 2004). Appointment differences, therefore, ensures that members have different policy preferences and that these preferences are independent from the preferences members have over the level of uncertainty language in committee deliberations.

In the following section, we examine whether or not FOMC committee composition, and especially variation in the configuration of the chair and the median member's preferences, is related to the level of strategic vagueness contained in the FOMC's reports between 1970 and 1978. To preview of the results, we find that when the median FOMC voting member and the FOMC chair have opposing preferences, the meeting minutes contain more certainty language than when the median and chair have alike preferences. We find a similar positive and statistically significant relationship when we consider the absolute difference between the chair and the median member's preferences as well.

## The Burns Years

The time periods for our first empirical test is from 1970-1978, covering a total of 99 FOMC meetings. This period encompasses meetings presided over by FOMC chairman Arthur Burns, who takes the helm of the FOMC in 1970 and retires in March 1978. Burns' tenure as chairman of the FOMC was remarkable in that it coincided with a number of momentous political and economic events. The U.S. experienced a deep recession, which was associated with rising rather than falling inflation. Following the recession, the economy was subjected

to price controls, international financial shocks, and domestic political turmoil associated with the Vietnam War. It also has some interesting counterparts to today such as Burns presiding under a political administration preoccupied with exerting pressure, both publicly and privately, for more expansionary monetary policy (Pierce, 1979).

Importantly, during this time period, there is also large variation in whether the committee chair proposes a target interest rate close to or far away from the median and mean member's target policy rate. Indeed, and as reported in Chappell, McGregor, and Vermilyea (2004, pp 415-416), in the March 1975 meeting, the adopted funds rate was exactly equal to the median of the desired rates of the Committee's members and the median was also close to the mean. In May 1973, however, the chosen target of 7.56% was less than both the median and the mean. The target rate was instead set equal to the rate advocated by chairman Burns, whose preferred rate was lower than all other voting members. Figure 5 plots the over time preferences of Burns and the mean and median of the voting members. If our theory is correct, there will be a systematic association between vague language in the published meeting Memorandum and Policy Actions & Minutes of Actions and changes in the alignment of committee members' preferences.

We calculate the median and mean members under two assumptions, one which computes the median and mean committee member from those members with voting rights at any given meeting and a second where the median's and mean's preferences are estimated from all committee members of the FOMC.[13] The FOMC committee rotation system enables only a subset of all bank presidents to vote at any given meeting. A maximum of twelve members vote out of a possible nineteen members. Importantly, members cannot self-select into the official voting calendar, with official voting determined by a preset schedule, which means that members cannot self-select into voting.

[13]Arthur Burns faced a total of 63 dissents during his tenure (Thornton and Wheelock, 2014).

### Dependent Variable

Our main dependent variable is *strategic vagueness*. To create this measure, we first downloaded the Memoranda of Discussion (1967-1976) and records of Policy Actions & Minutes of Actions (1976-1978) from the Fed's historical archives.[14] We selected all FOMC meetings between January 1970 and February 1978, for a total of 99 meetings, which completely covers Burns' tenure at the Fed.

From these public record, we transform the records into a document frequency matrix using standard textual analysis techniques with the R package *quanteda* (Benoit et al., 2018). We then apply a certainty and uncertainty dictionary, and keep only those words which are dictionary keys, and their associated word-counts. The dictionary terms that we keep are from the Linguistic Inquiry and Word Count or "LIWC" dictionary (Pennebaker, Francis, and Booth, 2001), and we use the vocabulary from the dimensions "certainty" and "uncertainty." We use this measure because we want to use measures which are used in previous literature but in other contexts. For example, Owens and Wedeking (2011), finds that committee heterogeneity is positively (rather than negatively) associated with vagueness in the judicial context using LIWC. Similarly, Eichorst and Lin (2019) use the LIWC dimensions that we use to study political parties and legislative behavior. While other measures of certainty/uncertainty are possible, by using a well known and previously used measure, we are more confident in drawing comparisons of monetary policy with past research findings. Another benefit of using this dictionary is that it focuses on language associated with psychological uncertainty rather than economic uncertainty. In our model, what we are interested in is strategic vagueness. As we have shown above, strategic vagueness is distinct from other the true state of the world. Indeed, according to our theory, strategic vagueness is the product of the institutional characteristics of decision making in a committee. So as to not

[14] Transcripts and other historical materials

confound these two things, we include measures of both strategic vagueness and economic uncertainty (Bloom, 2014) into our statistical model.

In applying the LIWC dictionary to our corpus, we find significant variation in the number of certainty and uncertainty words used across FOMC meetings over this period. This is shown in Figures 3 and 4. The maximum number of uncertainty words used in any given meeting is 80 and the maximum number of certainty words used in any given meeting is 13. To construct our dependent variable, we transform these certainty and uncertainty word-counts into a proportional response variable. Our dependent variable therefore measures the share of certainty over uncertainty words for any given meeting in our sample. Figures 3 and 4 show the counts of uncertainty words and the share of certainty to uncertainty words in the Fed documents over time. While we can see that there is a positive over time trend in the number of uncertainty words used in the documents, once we transform the counts into a proportional response, we find less evidence of this trend. Because we are modeling the ratio of certainty to uncertainty word counts, the statistical model that we use is a GLMM binomial model.

### Independent Variables

#### Opposing biases

Our main independent variable is the preference alignment of the chair and median member on the FOMC. To measure committee members' preferences, we use the preferred interest rate for the chair, median, and mean member as estimated in Chappell, McGregor, and Vermilyea (2004). To compute members' preferences, Chappell, McGregor, and Vermilyea (2004) examine the FOMC transcripts and, employing human coders, code individual members' announced target rates across meetings. The authors succeed in using the transcripts data for 80% of all cases. For the remaining 20% of cases, the authors use a statistical model to interpolate a member's preferred policy target rate. Rather than being interested in the

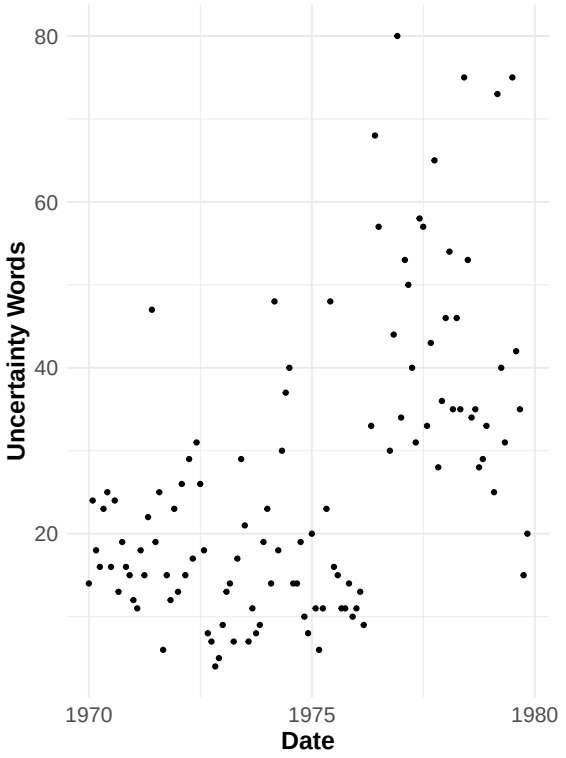



Figure 3: Number of Uncertainty Words

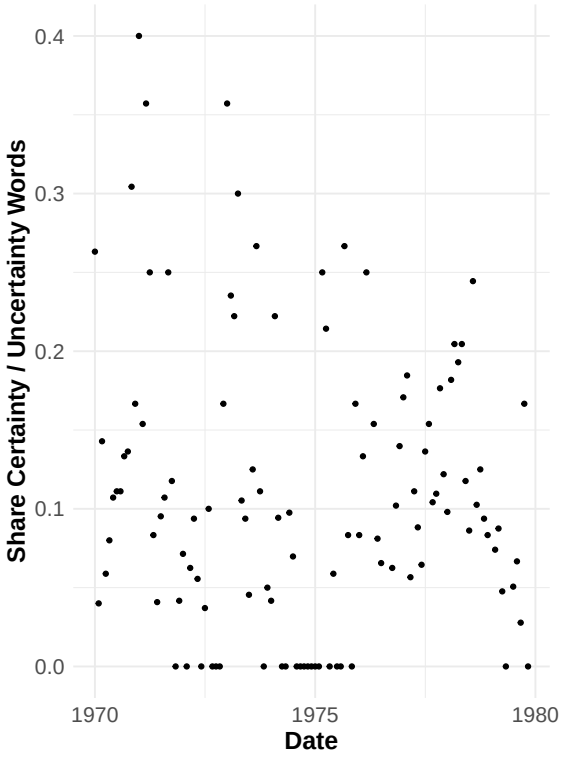



Figure 4: Share of Certainty Words

preferences of all members, we are interested in the alignment of the chair and the median member. We therefore generate a new variable *Opposing biases* to capture this.

We code first code *Opposing biases* as 1 when the mean FOMC member is spatially located between the chair and the median member such that the median member is located farther away from the chair than the mean and we code *Opposing biases* as 0 when the median is located between the mean and the chair. In those cases where the median and the mean have the same preference, we also code this as 1. In the sample of voting members, this measure yields 73 cases where the median and chair have aligned preference and 26 cases where the median and chair have opposing preferences. We also repeat the coding procedure a second time, however, now we use the median from those both on and not on schedule to vote in the roll-call. As before, we code *Opposing biases* as 1 when the committee median is farther from the chair than the mean and 0 if not.

As an alternative measure, we also measure the absolute distance between the chair and the median's preferred interest rate and call this *Absolute Distance*. As above, we also repeat the coding procedure a second time, taking into consideration the median from those both on and not on schedule to vote in the roll-call.

### Control Variables

In addition to preferences and voting status, we also want to account for important characteristics about the U.S. economy, which are independent from strategic vagueness produced by deliberations on the committee. To do this, we control for the *target interest rate* at any given meeting. By including the policy interest rate, we account for month to month variation in economic conditions.

Secondly, we also account for fundamental economic uncertainty using the *Economic Policy Uncertainty Index* by Baker, Bloom, and Davis (2016). These authors construct this measure by combining news coverage, tax code expiration data, and Economic Forecaster

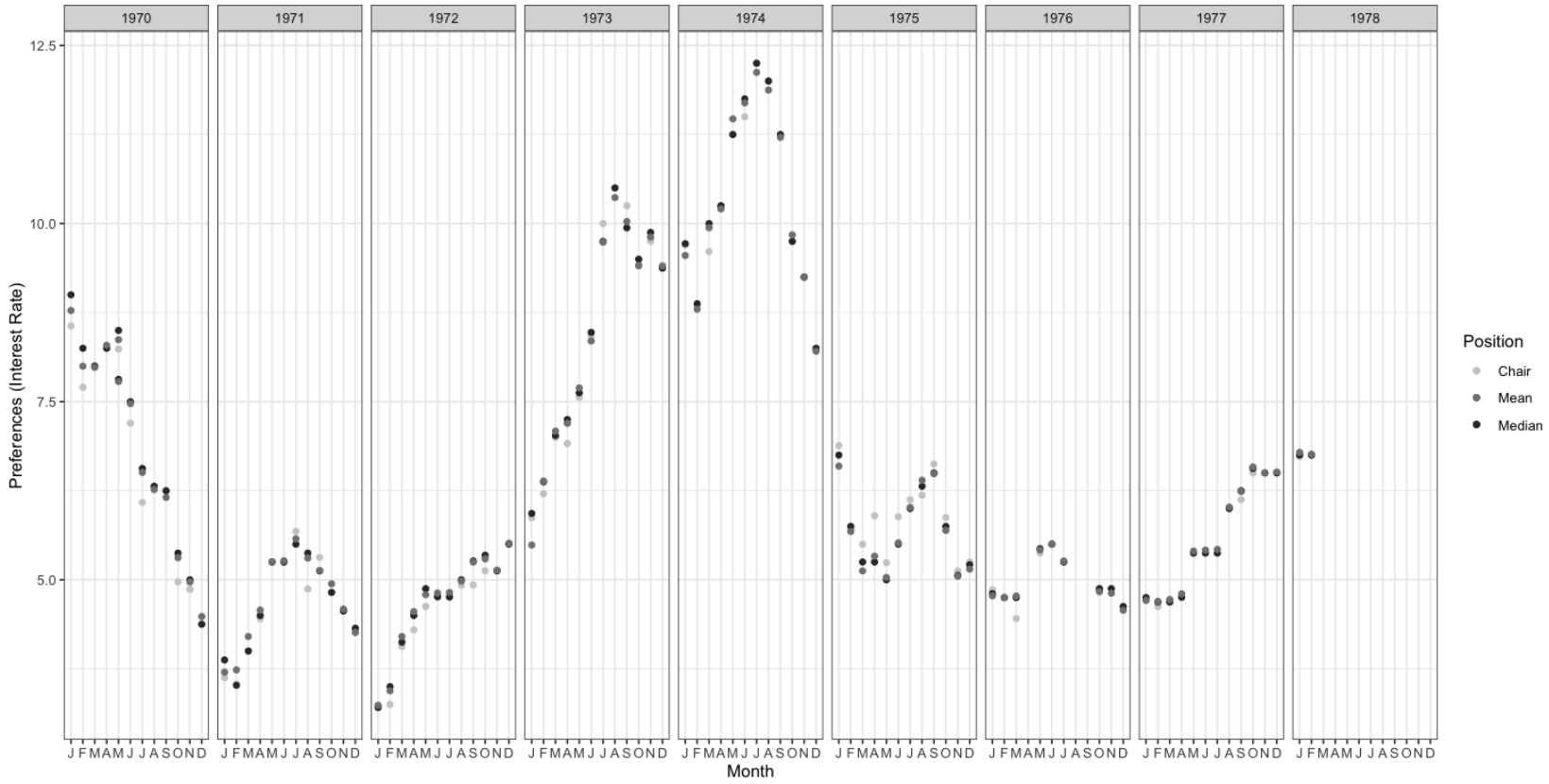



Figure 5: Interest Rate Preferences by Position

Disagreement. This data is available monthly for the U.S. and covers the entire period.

Additionally, we also account for year random effects. Accounting for year characteristics, we can be sure that variation in preferences are associated with members' inter-committee behavior rather than economic conditions. As the committee chair stays the same throughout the period so we do not include chair effects. In a separate analysis (not reported here) we also included the share of Republican candidates on the FOMC as calculated by Chappell, McGregor, and Vermilyea (2004). We find no appreciably different results.

**Statistical Results**

The statistical results are presented in Table 1. As mentioned above, the dependent variable is the share of certainty to uncertainty words in a given meeting transcription. We examine the effects of opposing bias, absolute difference, the target interest rate, and Economic Policy Uncertainty. We find some evidence that moving from an aligned to an opposing median committee member is associated with an increase in the share of certainty words in the meeting. Interestingly, we find that this is true irrespective of whether we calculate the median from the pool of members on schedule to vote or off schedule to vote, though the effect size is larger for the sample that calculates the median from voting members. Using the alternative measure, absolute distance, here we also find a positive relationship. An increase in the (absolute) distance in preferred interests rates is associated with an increase in the share of certainty words. As with opposing bias, we also find that this relationship is stronger in the sample of voting members compared to the sample with all FOMC members, including those not on the roll call.

In terms of our controls, we find a negative relationship between interest rates and the share of certainty words. Interestingly, we find no relationship between the Economic Policy Index and the share of certainty words in the meeting. It may be the case that the target interest rate is capturing much of the variation changes to the economy. The correlation

between the interest rate and the Economic Policy Index measure is 0.376. The correlation between the share of certainty words and the Economic Policy Index measure is -0.141.

Table 1: Regression Results for proportion of Certainty/Uncertainty words and FOMC Opposing Biases

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Share of certainty to uncertainty words | | | |
| | Median Voters | Median All Members | Median Voters | Median All Members |
| Opposing Bias | 0.501*** | | | |
| | (0.187,0.815) | | | |
| Opposing Bias | | 0.295* | | |
| | | (-0.029,0.620) | | |
| Absolute Distance | | | 1.100** | |
| | | | (0.115,2.086) | |
| Absolute Distance | | | | 0.898* |
| | | | | (-0.107,1.904) |
| Interest Rate | −0.204*** | −0.178*** | −0.192*** | −0.186*** |
| | (-0.339,-0.069) | (-0.307,-0.050) | (-0.327,-0.058) | (-0.320,-0.051) |
| Economic Policy Uncertainty | 0.001 | −0.0001 | 0.001 | 0.0003 |
| | (-0.006,0.008) | (-0.007,0.007) | (-0.006,0.008) | (-0.007,0.007) |
| Constant | −1.167** | −1.107** | −1.138** | −1.135** |
| | (-2.255,-0.078) | (-2.150,-0.064) | (-2.225,-0.051) | (-2.214,-0.055) |
| Observations | 99 | 97 | 99 | 97 |
| Log Likelihood | -185.215 | -186.950 | -187.616 | -187.006 |
| Akaike Inf. Crit. | 380.430 | 383.900 | 385.233 | 384.012 |
| Bayesian Inf. Crit. | 393.406 | 396.774 | 398.208 | 396.886 |

*Note: GLMM binomial model* *p<0.1; **p<0.05; ***p<0.01

One possible concern with the above analysis is that we assume that the interpolated data for the committee members are valid and that Burns' stated preferences are agenda setting. The latter assumption is especially important as it could be the case that Burns' proposed am interest rate based on what other committee members want rather than his own preferences. In order to make sure that this is not confounding our results, we also ran the same models as before but this time, use only those cases where Burns speaks first. This reduces the number of FOMC meetings from 99 to 48. The results are give in Table 2.

Using the restricted sample where we know that the chair speaks first, we find consistent results with the full analysis reported above. We find that a committee with an opposing median is associated with a greater share of certainty words in the FOMC meeting. Further-

Table 2: Regression Results for proportion of Certainty/Uncertainty words and FOMC Opposing Biases with Agenda Setting

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Share of certainty to uncertainty words | | | |
| | Median Voters | Median All Members | Median Voters | Median All Members |
| Opposing Bias | 0.717*** | | | |
| | (0.288,1.145) | | | |
| Opposing Bias | | 0.601** | | |
| | | (0.136,1.067) | | |
| Absolute Distance | | | 1.515** | |
| | | | (0.308,2.722) | |
| Absolute Distance | | | | 1.594** |
| | | | | (0.358,2.830) |
| Interest Rate | −0.318*** | −0.298*** | −0.376*** | −0.380*** |
| | (-0.519,-0.117) | (-0.500,-0.095) | (-0.594,-0.157) | (-0.599,-0.161) |
| Economic Policy Uncertainty | −0.008 | −0.009 | −0.010 | −0.009 |
| | (-0.020,0.004) | (-0.021,0.003) | (-0.022,0.002) | (-0.021,0.003) |
| Constant | 0.327 | 0.331 | 0.881 | 0.783 |
| | (-1.506,2.160) | (-1.494,2.156) | (-1.087,2.849) | (-1.172,2.737) |
| Observations | 48 | 48 | 48 | 48 |
| Log Likelihood | -82.605 | -84.734 | -84.985 | -84.779 |
| Akaike Inf. Crit. | 175.209 | 179.469 | 179.970 | 179.559 |
| Bayesian Inf. Crit. | 184.565 | 188.825 | 189.326 | 188.915 |

*Note: GLMM binomial model* *p<0.1; **p<0.05; ***p<0.01

more, we find that as the distance in preferences between the chair and the median member grows, the larger the share of certainty to uncertainty words in the documents. We also find that the interest rate continues to be associated with less certainty words and that the Economic Policy Uncertainty Index continues to show no statistical relationship with our measure of strategic vagueness.

Another concern is that the Economic Policy Uncertainty Index captures future uncertainty but what matters is not uncertainty but economic sentiment. To check for whether economic sentiment matters, we construct and include a measure of economic sentiment for the period using Latent Semantic Scaling (LSS). LSS has been used to measure bias in the news as well as United Nations General Assembly speeches (e.g. Watanabe, 2017; Baturo and Watanabe, 2019). To our knowledge, this is the first application of LSS to FOMC meeting reports. The technique relies on word embeddings and users provide a list of "seed words" to scale documents on a specific dimension. The particular dimension we explore is economic sentiment and we use a generic sentiment dictionary by Turney and Littman (2003). In short, LSS is similar to other kinds of document scaling techniques that estimate documents in a single dimensional space. Rather than estimate documents based on word frequency counts, LSS scores depend on semantic proximity to the chosen seed words. The scaling model is semi-supervised because on the one hand, it automatically estimates semantic proximity between words in a corpus employing word-embedding techniques, yet, on the other hand, users still choose seed words based on their research question, in this case positive and negative words (sentiment). Figure shows the computed sentiment for the period graphically.

Table 3 shows the results one we include sentiment into our analysis. As before, we find a positive and statistically significant relationship between the committee having an opposing median and the share of certainty words in the meeting transcriptions. We also find a similarly positive association between absolute distance and share of certainty words. We find

a negative relationship between the interest rate and the share of certainty language. We also find no meaningful relationship between the Economic Policy Uncertainty Index measure and we also find no evidence that economic sentiment affects the share of certainty/uncertainty words in the meeting documents.

Table 3: Regression Results for proportion of Certainty/Uncertainty words and FOMC Opposing Biases with Sentiment

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | Share of certainty to uncertainty words | | | |
| | Median Voters | Median All Members | Median Voters | Median All Members |
| Opposing Bias | 0.473*** | | | |
| | (0.159,0.786) | | | |
| Opposing Bias | | 0.282* | | |
| | | (-0.045,0.608) | | |
| Absolute Distance | | | 1.053** | |
| | | | (0.035,2.071) | |
| Absolute Distance | | | | 0.823 |
| | | | | (-0.206,1.852) |
| Interest Rate | −0.196*** | −0.167** | −0.190*** | −0.181*** |
| | (-0.332,-0.060) | (-0.295,-0.038) | (-0.328,-0.052) | (-0.318,-0.043) |
| Economic Policy Uncertainty | 0.001 | −0.0005 | 0.0004 | 0.0001 |
| | (-0.006,0.008) | (-0.007,0.006) | (-0.007,0.007) | (-0.007,0.007) |
| Latent Sentiment | 0.014 | 0.039 | −0.006 | 0.003 |
| | (-0.125,0.152) | (-0.101,0.178) | (-0.148,0.135) | (-0.137,0.143) |
| Constant | −1.149** | −1.118** | −1.106** | −1.112** |
| | (-2.223,-0.075) | (-2.140,-0.096) | (-2.184,-0.027) | (-2.178,-0.046) |
| Observations | 96 | 94 | 96 | 94 |
| Log Likelihood | -178.585 | -179.909 | -180.785 | -180.100 |
| Akaike Inf. Crit. | 369.170 | 371.819 | 373.569 | 372.201 |
| Bayesian Inf. Crit. | 384.556 | 387.078 | 388.955 | 387.461 |

*Note: GLMM binomial model* *p<0.1; **p<0.05; ***p<0.01

# 3 Conclusion

In this paper, we proposed strategic vagueness as an important feature of political delegation and committee deliberations. We characterized the ways committee structure (institutional design) and committee composition impacts the content of language in monetary policy-making committees. We find that while ex-post, the public prefers either a committee chair

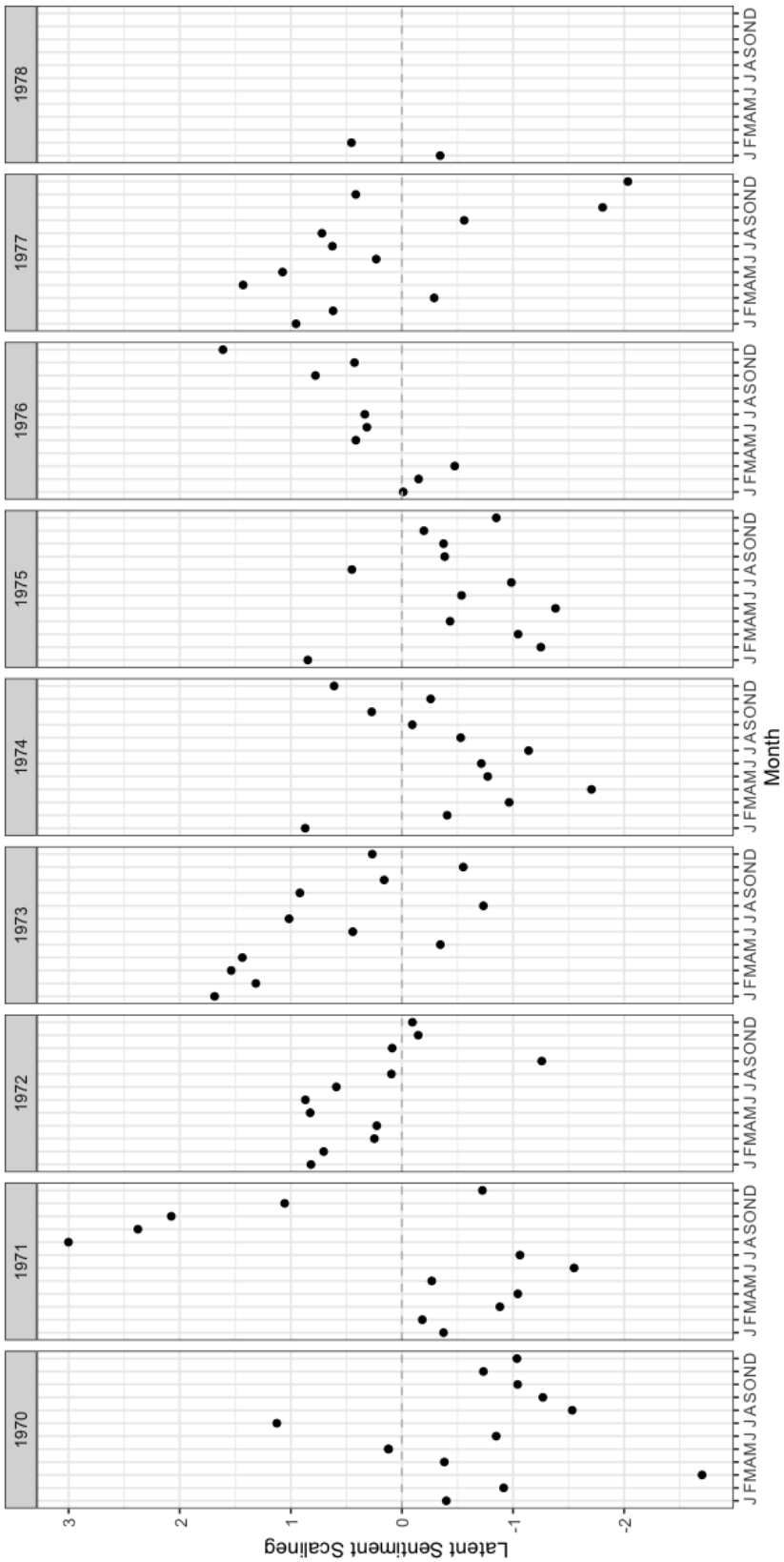



Figure 6: Economic Sentiment

acting alone as a single agent or a committee without an agenda setting chair (whichever is less biased), ex-ante, the institutional structure of a committee with an agenda setting chair and an opposing median reduces strategic vagueness in communications. In other words, factious rather than homogeneous monetary policy committees use greater certainty language in committee meetings as they deliberate policy.

Our findings are, interestingly, the opposite to previous findings in the literature on courts. This literature finds that greater vagueness is used to lubricate inter-committee disagreement. Instead, we find that on the FOMC, divided committees use more certainty language and are thus more transparent than committees with more homogeneous preferences. Our findings are important for the politics of central bank appointments, suggesting that those appointing central bankers can improve central bank transparency by appointing oppositely biased committee members.

Our model isolates the effect of strategic vagueness from other forms of vagueness as well as isolates bargaining over vagueness from other possible objects of bargaining. This allows for a relatively simple and clean result about vagueness. In our model, vagueness is assumed to be an instrument used to affect the actions or beliefs of the public. Since the public is non-strategic and the committee members have symmetric information, the model does not uncover any mechanism through which vagueness affects the actions of the public, other than through a mechanical relation between the two. This means that our paper speaks to agent selection and optimal central bank appointments from the perspective of within-committee rather than external accountability. While it is likely that both external and internal accountability mechanisms operate together, there is much less research on the within-committee politics of central banking and so we put our focus there.

Finally, there is a large literature on deliberation and transparency in monetary policymaking committees. Much of that literature investigates the relationship between the transparency of monetary policy committee's deliberations, and the incentives of their mem-

bers to signal private information. Future research might want to look at whether or not our channel, e.g. diversity in preferences, is complementary with existing channels such as career concerns and private information (Eichler and Lähner, 2014), and/or or contradicts them. For the moment, this paper adds to that literature policy preferences composition as another important factor that matters.

The empirical section tests our theoretical model on strategic vagueness in the FOMC. We find evidence that opposing preferences are associated with a higher share of certainty words in the meeting transcriptions, at least during the tenure of Chairman Burns. This application is perhaps an easy test of our theory as the FOMC exhibits most of those features that our model highlights as being effective: a strong chair, an opposing (or not) counterpoint in the median, the ability to take an outside offer by way of publicly dissenting to the policy, and a non-strategic public that the committee is not explicitly addressing. Future work might try to test our model to other types of committees. According to our argument and findings, we show that committee diversity has transparency benefits that has henceforth been overshadowed by an interest in policy.

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# Online Appendix

## Proof of Proposition 1

*Proof.* Since $\theta^e$ can be freely distorted within the range of feasibility, when $C$ or $M$ are the sole committee members, they can achieve their optimal distortion if feasible, so that $y_C = b_C$ and $y_M = b_M$ respectively.

The proof proceeds in four steps. The first step establishes when a player $i$ will vote for $C$'s proposal. The second shows that if $M$ votes for a proposal, then it will pass. The third step establishes that equilibrium vagueness $v^*$ is increasing in equilibrium distortions $y^*$. Finally, the fourth step demonstrates the comparative static results presented in Proposition 1. This requires four cases (1-4).

The **first step** is to establish that $i$ will only vote for a proposal $y$ if $|b_i - y| \leq |b_i - x|$. Plugging into $i$'s utility function, $y$ and $x$ gives utility $u_i(y) = -(y - b_i)^2$ and $u_i(x) = -(x - b_i)^2$ which implies that $i$'s utility is weakly higher under $y$ exactly when $|b_i - y| \leq |b_i - x|$ holds.

The **second step** is to note that if $M$ votes for a proposal, which only occurs if $|b_M - y| \leq |b_M - x|$, then the proposal passes otherwise it is voted down and the status quo is enacted. This is because if $b_M$ is the median level of bias, then one of two cases must hold. Let $M$ be the $m^{th}$ committee member. (a) $y \geq x$ in which case $|b_i - y| \leq |b_i - x|$ for all $i > m$ or (b) $y < x$ in which case $|b_i - y| \leq |b_i - x|$ for all $i < m$. In either case, the proposal passes. On the other hand, if $|b_M - y| > |b_M - x|$, then $M$ will not vote for the proposal, and either (a) $|b_i - y| > |b_i - x|$ for all $i > m$ or (b) $|b_i - y| > |b_i - x|$ for all $i < m$. Since at least a majority votes against the proposal, it fails and the status quo is enacted. Finally, note that $C$ is indifferent between proposing $x$ and a failing proposal. In this case of indifference, we assume that $C$ proposes $x$ which then passes.

The **third step** is to note the relationship between a distortion, $y$, and the implied level of vagueness, $v_y$. Vague transmissions imply a range of possible values $\left[\underline{\theta}, \overline{\theta}\right]$. In order to be truthful, $\theta$ must be in the range $\left[\underline{\theta}, \overline{\theta}\right]$. For any distribution, it must also be that $\theta^e \in \left[\underline{\theta}, \overline{\theta}\right]$. This range is minimized (vagueness is minimized) when when the range is set so that $\theta = \underline{\theta}$ to achieve a distortion $y > 0$ and $\theta = \overline{\theta}$ to achieve a distortion $y < 0$. Take the case where $y > 0$. Since $\theta = \underline{\theta}$ and $\theta^e = \theta + y$, it follows that $\theta^e = \underline{\theta} + y$. Taking expectations over the uniform distribution, it is also the case that $\theta^e = \underline{\theta} + \frac{\overline{\theta} - \underline{\theta}}{2}$. Taken together, this implies that $y = \frac{\overline{\theta} - \underline{\theta}}{2}$.

Hence, vagueness is increasing in the size of distortions, $d = |y|$ when $y > 0$. A symmetric argument holds for $y < 0$.

The **fourth step** is to characterize the four cases presented in Proposition 1. Recall that we are assuming that $x$ is restricted to be feasible throughout.

**Case 1 (Median chair):**

In this case $b_M = b_C$. Since $C$ and $M$ label the same agent, then $y_C = y_M$. Since $x$ is always an option for a proposal, then setting $y = y_C$ implies that $|b_M - y| = |b_M - y_M| \leq |b_M - x|$. Hence, $y_C$ is proposed and it passes. Equilibrium vagueness is then $v^* = v_C$.

For cases 2-4, we proof the case where $b_M > 0$. The case where $b_M < 0$ is symmetric with the appropriate inequality and sign reversals.

**Case 2 (Constrained Committee):**

In this case $b_M > b_C$ . Since $b_M > b_C$, the argument in the third step implies that $v_M > v_C$.

(a) Let $x \in (b_C, b_M)$, $C$ can propose $x$, which $M$ weakly prefers to accept. Again, by the argument in step 3, the vagueness associated with $x$ here is such that $v_M > v_x > v_C$. $C$ prefers $y = x$ to $y > x$ since it is closer to $C$'s ideal point. $M$ will reject any $y < x$ since the status quo would then be strictly preferred. Hence, in this case, equilibrium vagueness is such that $v^* = v_x$ and $v_M > v^* > v_C$.

(b) Let $x = b_M$. In this case, $M$ rejects any proposal that is not $y = x$ since $M$ can attain $y_M$ through reverting to the status quo. In this case, equilibrium vagueness is such that $v^* = v_x = v_M$.

(c) Let $x \in [b_M, 2b_M - b_C]$. Consider the strategy where $C$ proposes $y = 2b_M - x$. Since, $x \leq 2b_M - b_C$, then $y_C \leq 2b_M - x$. Since $x \geq b_M$, then $y_M \geq 2b_M - x$. Hence, for proposed distortion $y$, $v_M \geq v_y \geq v_C$. $M$ accepts proposal $y$ since $|b_M - y| = |b_M - (2b_M - x)\,| = |-(b_M - x)\,| = |b_M - x|$ and rejects all proposals $y' < y$. $C$ prefers $y$ to all proposals $y' > y$, therefore $C$ proposes $y = 2b_M - x$ and it is accepted. Therefore, equilibrium vagueness is $v^* = v_y$ so that $v_M \geq v^* \geq v_C$.

(d) Let $x \notin (b_C, 2b_M - b_C)$. First, let $x < b_C$. Since $y_C = b_C$ and $x < b_C < b_M$, then $|b_M - y_C| \leq |b_M - x|$, therefore the committee will accepts $y_C$ which is $C$'s most preferred option. Equilibrium vagueness is then $v^* = v_C$. Now assume that $x > 2b_M - b_C$. This implies that $x > 2b_M - b_C > b_M > b_C$. Therefore, $|b_M - y_C| \leq |b_M - x|$ since $|b_M - x| \geq |b_M - (2b_M - b_C)\,| = |b_C - b_M| = |b_M - b_C| = |b_M - y_C|$. Therefore the committee will accepts $y_C$ which is $C$'s most preferred option. Equilibrium vagueness is then $v^* = v_C$.

**Case 3 (Dominant chair):**

In this case it is assumed that $b_C > b_M$ .

(a) In this subcase it is assumed that $x \geq b_C$. Since $y_C = b_C$ and $b_M < b_C \leq x$, then $|b_M - y_C| \leq |b_M - x|$, therefore the committee will accepts $y_C$ which is $C$'s most preferred option. Equilibrium vagueness is then $v^* = v_C$.

(b) In this subcase it is assumed that $x \leq 2b_M - b_C$. This implies that $b_C > b_M \geq x$. Therefore, $|b_M - y_C| \leq |b_M - x|$ since $|b_M - x| \geq |b_M - (2b_M - b_C)\,| = |b_C - b_M| = |b_M - b_C| = |b_M - y_C|$. Therefore the committee will accepts $y_C$ which is $C$'s most preferred option. Equilibrium vagueness is then $v^* = v_C$.

**Case 4 (Constrained chair):**

In this case $b_C > b_M$ . Since $b_C > b_M$, the argument in the third step implies that $v_C > v_M$. (Note that the $x \notin (2b_M - b_C, b_c)$ case is covered by the "Dominant chair" case.)

(a) Let $x \in (2b_M - b_C, b_M)$. Consider the strategy where $C$ proposes $y = 2b_M - x$. Since, $x > 2b_M - b_C$, then $y_C > 2b_M - x$. Since $x < b_M$, then $y_M < 2b_M - x$. Hence, for proposed distortion $y$, $v_C > v_y > v_M$. $M$ accepts proposal $y$ since $|b_M - y| = |b_M - (2b_M - x)\,| = |-(b_M - x)\,| = |b_M - x|$ and rejects all proposals $y' > y$. $C$ prefers $y$ to all proposals $y' < y$, therefore $C$ proposes $y = 2b_M - x$ and it is accepted. Therefore, equilibrium vagueness is $v^* = v_y$ so that $v_C > v^* > v_M$.

(b) Let $x = b_M$, $M$ rejects any proposal that is not $y = x$ since $M$ an attain $y_M$ through reverting to the status quo. In this case, equilibrium vagueness is such that $v^* = v_M$.

(c) Let $x \in (b_M, b_C)$. $C$ can propose $x$, which $M$ weakly prefers to accept. Again, by the argument in step 3, the vagueness associated with $x$ here is such that $v_C > v_x > v_M$. $C$ prefers $y = x$ to $y < x$ since it is closer to $C$'s ideal point. $M$ will reject any $y > x$ since the status quo would then be strictly preferred. Hence, in this case, equilibrium vagueness is such that $v^* = v_x$ and $v_C > v^* > v_M$. □

## Proof of Proposition 2

*Proof.* First, recall that $b_C \geq 0$ without loss of generality and by assumption in Proposition 2, it must be that this inequality holds strictly. Second, note that $|x| < \min[|b_C|, |b_M|]$ can correspond to several cases in Proposition 1. We proceed through these cases systematically. Recall that Proposition 2 is divided into two statements (categories of committee biases), in (1) $C$ and $M$ have opposite biases and in (2) they have like biases.

**Case 1 (Median chair):**

This case inherently falls into category (2) of Proposition 2. From the results of this case in Step 4 of Proposition 1, this case implies that $y^* = b_C = b_M > x$. By Step 3 in Proposition 1, this implies that $v^* > v_x$ and not convergent to 0 as $x \to 0$.

**Case 2 (Constrained Committee):**

(1) $b_M < 0$: As $x \to 0$, we must be in subcase (a) since $0 \in (-b_M, b_C)$. Therefore $v^* = v_x$ and $v^*$ converges to 0 as $x \to 0$.

(2) $b_M > 0$: As $x \to 0$, we must be in subcase (d) since $0 < b_C$. Therefore $v^* > v_C$ as $x \to 0$ and does not converge to 0 as $x \to 0$.

**Case 3 (Dominant chair):**

(1) $b_M < -b_C$: This case never occurs as $x \to 0$ since either $x \geq b_C > 0$ or $x \leq 2b_M - b_C < 0$, which means that $x$ cannot be arbitrarily close to 0.

(2) $b_M > b_C$: From the results of this case in Step 4 of Proposition 1, this case implies that $y^* = b_C > x$. By Step 3 in Proposition 1, this implies that $v^* > v_x$ and not convergent to 0 as $x \to 0$.

**Case 4 (Constrained chair)**

(1) $b_M \leq 0 \leq b_C$: This only falls into constrained chair case (Case 4) the subcase (c). This is because $0 \in (b_M, b_C)$ implies $x \in (b_M, b_C)$ under the assumptions of Proposition 2. Therefore $v^* = v_x$ and $v^*$ converges to 0 as $x \to 0$.

(2) $0 < b_M < b_C$: This only falls into Case 4 under subcase (a) since $0 < b_M$ implies $x \in (2b_M - b_C, b_M)$ under the assumptions of Proposition 2. When $0 < 2b_M - b_C$, we cannot be in the constrained chair case. Therefore $v^* = v_y > v_M$ and $v^*$ does not converge to 0 as $x \to 0$. □