

## PUBLICITY OF DEBATE AND THE INCENTIVE TO DISSENT: EVIDENCE FROM THE US FEDERAL RESERVE\*

*Ellen E. Meade and David Stasavage*

Transparency in committee decision making may have clear benefits by making members more accountable to outside observers. We consider one potential cost: the possibility that publishing records of deliberations will make members more reluctant to offer dissenting opinions. We construct a model that compares incentives for members with 'career concerns' to voice dissent when deliberations occur in public or in private. We test the model using an original dataset based on deliberations of the Federal Reserve's Federal Open Market Committee, asking whether the FOMC's 1993 decision to begin releasing transcripts of its meetings has altered incentives for dissent. We find evidence that this is indeed the case.

There has been much recent discussion of the advantages of transparency in agency relationships both in and outside of government. While research has attempted to model this issue theoretically, there has been less progress with empirical tests, a problem due no doubt in large part to the fact that it is difficult to make 'before and after' comparisons of a shift in transparency. Often, no data are available on an agent's actions prior to the establishment of transparency. In this article we focus on one specific type of transparency, publishing verbatim transcripts of committee meetings, and one specific reason why this type of transparency might not be desirable, the possibility that the quality of deliberation on a committee will suffer if the deliberations take place in public. We develop a theoretical model that helps to identify the potential costs of this type of transparency and we then test the model empirically using an original dataset on deliberations of the Federal Reserve's Federal Open Market Committee (FOMC); our dataset is unique in that it records views expressed by policymakers at FOMC meetings and not just their official votes. Our empirical tests focus in particular on the observed effect of the institutional change that occurred in 1993, when the FOMC decided to begin releasing transcripts of its meetings after a delay of five years. Transparency is a particularly relevant issue in monetary policy, because it is commonly argued that when central banks take actions such as publishing macroeconomic forecasts, revealing individual votes on monetary policy committees, or releasing minutes of meetings, this will lead to improved economic outcomes while simultaneously facilitating democratic accountability.<sup>1</sup>

\* We thank Ben Bernanke, Bill English, Charles Goodhart, Petra Gerlach-Kristen, Marco Ottaviani, Nathan Sheets, Hyun Shin, Bauke Visser, Andrew Scott, two anonymous referees and seminar participants at the London School of Economics, the Federal Reserve Bank of St. Louis, the Brookings Institution, the Tinbergen Institute, Rotterdam, Louvain la Neuve and Wayne State University for helpful comments and Chris Crowe and Jacob Kirkegaard for research assistance.

<sup>1</sup> See Faust and Svensson (2001) for a model that demonstrates how credibility depends upon transparency. Gerlach-Kristen (2004) presents empirical evidence on releasing voting records of monetary policy committees, and Gersbach and Hahn (2004) present an interesting theoretical model analysing the effects of publishing voting records. See Geraats (2002) for a survey of the literature on transparency in monetary policy. See also Kohn and Sack (2003), Thornton (2003), Goodfriend (1986) for an early discussion of the issue, and empirical evidence in Chortareas *et al.* (2003).

To investigate the above issue, we first develop a model of deliberation in a committee, where members care both about reaching the correct decision and about convincing an outside audience that they have a high level of expertise. We consider a three-member committee that must decide on a binary action, with the 'correct' action depending on the realisation of an unobserved state variable. One illustration from the context of monetary policy is to have the binary action be the choice between raising interest rates or holding them constant, while the state variable could be whether output is at or above its potential level. Individual committee members receive informative private signals about the state variable and, as a result, the committee is more likely to make the correct policy choice when members accurately reveal this information. In addition, we assume that committee members are uncertain about the accuracy of their private signal, that they speak in sequence, and that a committee member who is known to have a high level of expertise speaks first. As discussed below, these assumptions closely fit practice on the FOMC over the period we consider. We ask how the incentive for committee members to reveal their private signals truthfully varies depending on whether the statements they make during committee deliberations remain private or are subsequently revealed to the public.

In a paper that considers a similar model but only in the context of public deliberation, Ottaviani and Sorensen (2001) show that when a committee member who is known to have high expertise speaks first, subsequent speakers can face an incentive to mimic the behaviour of the known expert rather than to reveal their private information accurately. Their result parallels a number of other papers in the literature on expert advisors with 'career concerns', which have shown how advisors can face incentives to withhold private information if accurate revelation would lead principals to infer that they have a low level of expertise.<sup>2</sup> Prat (2005) is an exception in this literature in considering both a case where an expert's action is observed and a case where it is not observed. Our result extends the conclusions of these previous studies by showing that when deliberation between expert advisors occurs in private there will be a greater incentive to reveal private information. Our idea that deliberation may be hindered by publicity is not a new one. Speaking about the secrecy rule that prevailed during the US Constitutional Convention of 1787, James Madison emphasised that full publicity would have made members more reluctant to express their true opinions freely and he saw secrecy as having been critical to the Convention's ultimate success.<sup>3</sup> As we will discuss below, similar opinions have been expressed regarding the deliberations of the FOMC.

In Section 1 we show that when a known expert on a committee speaks first, other members of the committee will have a greater incentive to reveal their private information truthfully if their individual statements in committee meetings *are not* subsequently made public. When deliberation occurs in private, incentives of individual committee members are more closely aligned with those of the committee as a whole, because outside observers will establish inferences about the expertise of individual committee members based on the quality of the committee's policy decision, rather than on the

<sup>2</sup> See Ottaviani and Sorensen (2006), Levy (2004), Prendergast (1993) and Scharfstein and Stein (1990). Seidmann (2003) looks at voting in public and private committees when there is complete information about the state of the world and all actors know *ex ante* which action will maximise their utility.

<sup>3</sup> Max Farrand (ed.) *Records of the Federal Convention of 1787*, New Haven (1911) III, p. 478.

accuracy of individual statements. Based on this result, we develop the testable proposition that any such committee that switches from private to public deliberation (provided members care sufficiently about their reputations and a known expert speaks first) should be associated with fewer instances in which committee members express opinions that dissent from those expressed by the expert. It should be emphasised that because our model focuses on the specific issue of incentives for officials to reveal information, it cannot be used to make a general assessment of when private deliberation is preferable. Such a calculation would depend upon weighing the costs of transparency in terms of reduced quality of deliberation against the observed benefits in terms of increased accountability and, in the case of monetary policy, increased effectiveness.<sup>4</sup>

In Sections 2 and 3, we test our proposition about public vs. private deliberation by considering a natural experiment involving the US central bank's policymaking body, the FOMC. Before 1993, the FOMC published individual votes of committee members as well as summary minutes of meetings but it did not publish full transcripts that would allow outside observers to determine exactly what individual committee members said during proceedings. Under pressure from Congress, in the fall of 1993 the FOMC agreed to release lightly-edited transcripts of each meeting after a five-year delay. As discussed in Section 2, while the five-year delay was implemented to ensure that committee members would continue to express their opinions freely, some observers at the time thought that even a five-year delay might not be sufficient for this purpose. Our empirical evidence supports this concern. Fortunately for our purposes, the FOMC decision involved the publication of lightly-edited transcripts going back to 1976, based on literal transcriptions made from tape recordings. While many officials before 1993 knew that FOMC meetings were tape-recorded, most thought the recordings were used to prepare meeting minutes and then the tapes were recorded over. Because transcripts exist from a time when meeting participants did not know that their deliberations would be made public, we are able to compare the behaviour of committee members before 1993, when committee members believed that their remarks were private, and after 1993, when they knew that all statements would eventually be made public. To do this we make use of an original dataset that records whether individual FOMC members expressed verbal agreement or disagreement with the Fed chairman's policy proposal. It is important to consider these cases of verbal dissent, because Meade (2005) shows that in the majority of instances where members of the FOMC verbally dissent from the chair's position, they do not subsequently dissent from the chair's position in the official vote. As a result, analysing only actual votes, and not the statements made during the committee discussion, can provide a misleading interpretation of FOMC debates.

<sup>4</sup> While the applicability of this problem may be less relevant for a monetary policy committee than for other committee settings, one could also consider whether a shift from private to public deliberation prompts individual committee members to exert more effort to make useful contributions to the discussion. One could do so following the recent work of Dewatripont and Tirole (2005) where the act of communication is subject to moral hazard in teams. Sibert (2006) suggests that this type of moral hazard problem is relevant to monetary policy committees while Blinder (2006) suggests it is less relevant given the importance of monetary policy decisions.

We find evidence of a change in the character of FOMC deliberations following the 1993 decision to release full transcripts. Distinguishing between FOMC members who are Board Governors, those who are voting Presidents of regional Federal Reserve Banks, and those who are non-voting Presidents, we find that the two former groups have been significantly less likely to express verbal dissents on policy decisions since 1993. The results remain robust when controlling for other potential determinants of individual committee member positions and when controlling for unobserved individual-specific effects. Finally, these results are supported by a number of parallel observations about the changing character of FOMC debate since 1993. While before 1993 FOMC discussions were characterised by frequent ‘off the cuff’ remarks and interruptions, since 1993 there has been an increased tendency for committee members to present the sort of pre-prepared statements that may result in less real deliberation. These empirical results have significant implications for the design of monetary policy institutions, as well as for the operation of committee-based government decisionmaking more generally. They suggest that while transparency in policymaking may have many important benefits, attention should also be given to the possibility that publicity might stifle debate.

In addition to having potential implications for the design of monetary policy institutions, our theoretical and empirical results also have implications for the broader literature on career concerns in agency relationships, as first formulated by Hölmstrom (1999), where agents are concerned about establishing a reputation for having a high level of expertise. We should also add that while our results regarding public deliberation apply most directly to a case of uncertainty about an agent’s expertise, transparency could also have perverse effects when outside observers are uncertain about an agent preferences, as in Morris (2001) and Maskin and Tirole (2004).

In what follows we first present our model of monetary policy deliberation in public and private settings in Section 1. Section 2 discusses the Fed’s 1993 debate regarding the advantages and disadvantages of publishing transcripts. Section 3 presents our data on FOMC deliberations and reviews our empirical estimates of the likelihood of verbal dissent. Section 4 concludes.

## 1. Monetary Policy Deliberation

In this Section we present a simple model of a three player monetary policy committee, composed of players *A*, *B* and *C* that must decide on a binary action  $a \in \{0,1\}$ . This binary action describes reasonably well the choice faced by modern-day central banks, which make interest rate changes in discrete steps and virtually always weigh a tightening or easing move against the alternative of holding interest rates unchanged. Each committee member receives a binary signal  $s_i$  about a state of the world  $\omega \in \{0,1\}$ , with each state equally probable. The signals are independent conditional on the state. Player *A* has a known level of expertise, and her signal is accurate with probability  $p$  where  $p > 0.5$ . Players *B* and *C* also receive a separate signal  $s_i$ . With probability  $\lambda$  each of these officials has the same high level of expertise as *A* (they are of type *h*), and with probability  $(1 - \lambda)$  their signal is uninformative, and they have a low level of expertise (they are of type *l*). Players *B* and *C* know these priors but they do not know their own type and they do not subsequently learn their own type. The expected accuracy of the

signals of Player *B* and *C* is represented by  $q = p\lambda + (1 - \lambda)0.5$ . In what follows we make the following assumption about the expected accuracy of *B* and *C*'s signals. This excludes trivial cases where *B* and *C* have an unambiguous incentive not to truthfully reveal their signals because even jointly, they are less informed than is Player *A*.

ASSUMPTION 1.  $\left(\frac{q}{1 - q}\right)^2 > \frac{p}{1 - p}$

In our model utility for each player depends on both choosing the best policy and on an *outside* observer's *ex post* assessment of the player's level of expertise. This outside observer could be someone who is considering whether to reappoint the committee member, or it could be a prospective employer for the member subsequent to her period of committee service (a firm, university, or other). More generally, even if members of a monetary policy committee are not motivated by explicit future career concerns, they may be motivated by the more simple desire to appear for posterity as someone who has a high level of expertise. In this case all of the assumptions, and thus the predictions, of our model remain fully applicable.<sup>5</sup> The best policy action *a* matches the realisation of the state variable  $\omega$ . The outside observer's *ex post* assessment that a player is of type *h* is conditional on observing the action chosen by the committee, the realisation of the state  $\omega$ , and (when these can be observed) the message  $m_i$  that an individual sends during committee deliberations, and her vote  $v_i$ . We assume that each player receives a reputational payoff proportional to the outside observer's posterior probability that the player has a high level of expertise.<sup>6</sup> In the case where both votes and messages eventually become public this would be  $\Pr(h|a, m_i, v_i, \omega)$ . In addition, we assume that this reputational payoff is scaled by the parameter  $\beta$  with  $\beta > 0$ . There are a number of factors that might affect the value of  $\beta$  but one in particular is that officials who have a longer term to serve on the committee before receiving their reputational payoff would logically discount the present value of this payoff more heavily.<sup>7</sup> Utility for each player follows the following state-dependent function.

$$\begin{cases} a + \beta \Pr(h|a, m_i, v_i, \omega) & \text{if } \omega = 1 \\ (1 - a) + \beta \Pr(h|a, m_i, v_i, \omega) & \text{if } \omega = 0. \end{cases} \tag{1}$$

To the extent that they would like to choose the right policy, players have an incentive to reveal their signals fully. However, their reputational concerns can conflict with this incentive for accurate revelation. We will demonstrate how incentives to reveal information accurately depend on the outside observer's ability to monitor an individual's message and on the parameter  $\beta$ . The timing of the game is as follows:

<sup>5</sup> It is also possible that members of a monetary policy committee want to present a 'united front' and appear to the public to reach decisions by consensus and without internal tensions. In this case, making deliberation public may result in less disagreement among committee members but not due to reputational concerns. We do not model this desire for consensus but mention it because it appears to be important for some monetary policy committees, such as the ECB Governing Council. However, desires to present a united front (presumably with respect to political authorities), would probably apply most directly to immediate release of meeting transcripts and not to the delayed release of transcripts we consider. As we argue below, delayed release may still have a big impact on a policymaker's long-run reputation.

<sup>6</sup> See Holmstrom (1999) and Dewatripont *et al.* (1999).

<sup>7</sup> One interpretation would be to have  $\beta = \delta^n$ , where  $c$  is a parameter,  $\delta$  is a discount factor reflecting the rate of time preference and  $n$  is the number of periods before receiving the reputational payoff. However, this would also raise the issue of incentives to reveal signals truthfully in a multi-period game.

- 1 The state of the world  $\omega$  is realised (but not observed) and private signals  $s_i$  are realised.
- 2 Each player sends a message  $m_i$  with  $A$  speaking first, followed by  $B$ , then  $C$ .
- 3 Players vote on an action  $a \in \{0,1\}$  in the same sequence as during the message round.
- 4 The state of the world  $\omega$  becomes public and each player receives a payoff determined by the action  $a$  and the posterior probability that she has high expertise.

Given the above assumptions, there will always exist equilibria where at the message stage  $A$  reports her signal truthfully and where  $B$  and  $C$  mimic  $A$ 's message, regardless of their private signals. These 'uninformative' equilibria can be sustained, both under public deliberation and private deliberation, as long as  $B$  and  $C$  each anticipate that the other will mimic  $A$ .<sup>8</sup> After an uninformative message stage there are several different equilibrium voting possibilities, as  $B$  and  $C$  might follow  $A$ 's lead when voting, or they might vote according to their private signal. In either case the outcome will be inefficient, as no player will be able to make their voting decision conditional on the information about the state held by both of the other players. In what follows, we concentrate on identifying the conditions for existence of an 'informative' equilibrium where at the message stage  $A$  reports her message truthfully,  $B$  always reports her message truthfully and  $C$  reports her message truthfully if it is 'pivotal'. A message is 'pivotal' here if truthful reporting would result in other players changing their beliefs about which state of the world is more likely. At the voting stage in the informative equilibrium all players vote  $v_i = 1$  if two or more players previously sent a message  $m_i = 1$  and they will vote  $v_i = 0$  otherwise.

We argue that this combination of message and voting strategies constitutes the only plausible equilibrium in which more than one player sends an informative message. It should be noted that while we focus on the case where a committee member with known expertise speaks first in order to fit FOMC practice during the period we consider, the costs of transparency we discuss below could also occur in a context where committee members with lesser expertise speak first, followed by committee members with a higher expected (but not certain) level of expertise. As demonstrated by Ottaviani and Sorensen (2001), anti-seniority rules, by which less expert members of a committee speak first, can induce those with a lower level of expertise (in expected terms) to speak truthfully but if several junior committee members speak first this can create incentives for a subsequent speaker with a high level of expertise to not reveal her private signal.

### 1.1. *Public Deliberation*

We begin by considering incentives for the three players when both individual votes and individual messages are made public. During the voting stage, the voting rule that produces the 'best' expected policy outcome for the three players would be as follows – vote 1 if it is believed, given the outcome of the message round, that the state is more

<sup>8</sup> As in any model with costless messages, there will also always exist a 'babbling' equilibrium in which all three players send untruthful messages.

likely to be 1, and vote 0 otherwise. Given that this strategy produces the highest expected policy payoff for each player, the only possible incentive to pursue a different voting strategy would be if it resulted in a player receiving a higher reputational payoff than would otherwise have been the case. When we restrict ourselves to considering potential 'informative' equilibria, defined as those where players send truthful messages in equilibrium, then we can argue that all voting strategies other than the efficient one are implausible. The reason for this is that once outside observers have learned the outcome of the message round and, given they know that a player has an incentive to send a truthful message in equilibrium, then there is no further information upon which that player could condition her voting behaviour that would allow an outside observer to update a prior belief about the player's level of expertise. After an informative message round, it might technically be possible to have an equilibrium where players fail to condition their votes on information learned during the message round, but such equilibria could only be supported by implausible out-of-equilibrium beliefs.<sup>9</sup>

Given incentives at the voting stage, the question is whether and when players *B* and *C* will have an incentive to accurately reveal their signals at the message stage. For players *B* and *C* the key condition for existence of an informative equilibrium involves their incentive to reveal their signals truthfully, even if they differ from the signal reported by Player *A*, who has a known high level of expertise. Behaviour of player *C* is a straightforward application of Lemma 1 from Ottaviani and Sorensen (2001), extended to a case of mixed incentives where players are concerned about both reputation and the policy outcome. If *A* and *B* send identical messages, *C* knows that her message will not be pivotal, and she has a clear incentive to mimic the message sent by *A* and *B* regardless of the signal she receives. She knows her message will have no effect on the voting outcome (anticipating the equilibrium voting incentives above) and, given all available information, *C* also believes it more likely that the state is as announced by *A* and *B*. This implies that there cannot be an informative equilibrium where all players report truthfully in all cases. It is possible, however, to have an informative (i.e. separating) equilibrium in which Player *B* always reports her signal truthfully and in which Player *C* reports her signal truthfully if *A* and *B* each send different messages. Player *C* would never deviate from this informative equilibrium (full derivation is presented in the Appendix).

Consider now the incentives for Player *B* to deviate from this informative equilibrium. If Player *B* receives the same signal as reported by *A*, then it is straightforward to show that *B* has an incentive to truthfully report since doing so provides the highest expected payoff both in terms of policy and in terms of reputation. If player *B* receives a different signal from player *A* then she faces a trade-off; if she reports truthfully her expected policy payoff is higher but if she reports falsely and follows *A*'s message, then her expected reputational payoff is higher. The Appendix presents the full derivation of Player *B*'s behaviour, demonstrating that she will report her signal truthfully if reputational concerns are weak ( $\beta$  is sufficiently low) but if reputational concerns are strong (and in particular if  $\beta$  is sufficiently high that the inequality in (9) is satisfied)

<sup>9</sup> So, for example, both *B* and *C* might always vote 1 regardless of their belief about the state, provided that an outside observer believed that any deviation from this strategy indicates a low level of expertise but there is no clear reason why an outside observer would hold this belief given that signals have already been truthfully revealed during the message round.

then the informative equilibrium cannot exist because  $B$  would have an incentive to deviate by mimicking Player  $A$ 's message. If Player  $B$  does not report her signal truthfully in equilibrium, then neither will Player  $C$  and as a consequence, we can make the following proposition.

**PROPOSITION 1.** *When a known expert speaks first, no other committee members will dissent if reputational concerns are sufficiently strong.*

### 1.2. Private Deliberation

The next step is to consider conditions for existence of the informative equilibrium under private deliberation. In order to fit FOMC practice during the period we study, we can define private deliberation as involving a closed-door session for the message round but subsequent publication of individual votes after the voting round.

Under private deliberation, if both Player  $A$  and Player  $B$  truthfully report their signals, then Player  $C$  will continue to have an incentive to reveal her signal truthfully if it is pivotal, as was the case under public deliberation. Player  $B$ 's incentives change significantly when deliberation takes place behind closed doors, as she no longer faces a trade-off between providing a truthful message that maximises her expected policy payoff and providing a false message that maximises her expected reputational payoff. This is because both the policy and reputational payoffs now depend exclusively on the action  $a$ . As before, we focus on the incentive for Player  $B$  to report her signal truthfully, even if it contradicts the message sent by Player  $A$ . If Player  $B$  truthfully reports her signal, her expected payoff is as expressed in (2).

$$q + \beta[q\Pr(h|a = \omega) + (1 - q)\Pr(h|a \neq \omega)]. \quad (2)$$

The first term in (2) is the expected policy payoff, which depends exclusively on the probability that  $C$ 's signal is accurate, since  $C$ 's pivotal message will determine the outcome. The remainder of the expression represents the expected reputational payoff which depends on whether the action  $a$  matches the state  $\omega$ . If Player  $B$  instead falsely reports her signal, then her expected payoff is

$$\frac{p(1 - q)}{p(1 - q) + (1 - p)q} + \beta \left[ \frac{p(1 - q)}{p(1 - q) + (1 - p)q} \Pr(h|a = \omega) + \left(1 - \frac{p(1 - q)}{p(1 - q) + (1 - p)q}\right) \Pr(h|a \neq \omega) \right]. \quad (3)$$

Given expressions (2) and (3) the Appendix shows that Player  $B$  will always have an incentive to report for all values of  $p$  and  $q$  satisfying Assumption 1 truthfully. It is important to note that  $B$ 's incentive to report truthfully in this case does not depend on the relative strength of reputational concerns (the value of  $\beta$ ). The simple reason for this is that the action that maximises  $B$ 's expected reputational payoff now also maximises her expected policy payoff. We can conclude that the informative equilibrium is more likely to exist under private deliberation and will not exist under public deliberation if reputational concerns are strong (i.e.,  $\beta$  is sufficiently positive). This leads to our second and principal proposition for empirical testing.

**PROPOSITION 2.** *When a known expert speaks first and reputational concerns are sufficiently strong, there is a greater likelihood that committee members will dissent if deliberation occurs in private.*

It is worth noting that in presenting our model we have assumed for simplicity that if deliberation shifts from a private to a public venue then committee members do not have the option of exchanging information before the actual meeting takes place, through a pre-meeting that might in real-world terms involve a telephone call, discussions in a hallway, or the like. In practice, Propositions 1 and 2 can still hold even if several committee members have the option of exchanging information in a pre-meeting, provided that not all committee members can participate in the pre-meeting. The broader the degree of participation in a pre-meeting, the smaller is the difference in the equilibrium predictions between public deliberation and private deliberation. In the extreme case, where all committee members could costlessly participate in a pre-meeting, thus shifting debate to another venue, then the distinction between public and private deliberation would disappear.<sup>10</sup> The first-hand account of the Greenspan Fed by former Governor Meyer (2004) suggests that some pre-meeting discussions took place between Greenspan and other Governors on the Fed's Board but that they hardly constituted a complete substitute for the debates that would otherwise take place within formal meetings.

## 2. Deliberation and the Fed's FOMC

From time-to-time, the US Federal Reserve has been subjected to pressures to make its procedures more transparent. One important example of this commenced in the autumn of 1992 when the chairman of the House Banking Committee, Representative Henry Gonzalez, called for the publication of detailed accounts of FOMC meetings shortly after the conclusion of each meeting.<sup>11</sup> Gonzalez reminded the FOMC that it had in the past published accounts of its meetings in heavily-edited Memoranda of Discussion but that it had discontinued the publication of these Memoranda in the spring of 1976.

One topic that received considerable attention during the FOMC's discussion of Gonzalez' request was the effect of transcript publication on the freedom of debate in policy meetings – the question we address in this article. Greenspan's initial written response to Gonzalez indicates that the committee had concerns that transcription would affect 'the deliberative process – the free flow of information and ideas [that are] essential to policymaking.'<sup>12</sup>

In October 1993, the FOMC debated Gonzalez' proposed legislation and its implications in the context of two testimonies by Alan Greenspan, five other Fed Board members and ten Reserve Bank Presidents. Edward Boehne, President of the Federal

<sup>10</sup> The issue of pre-meetings with committees that deliberate in public and in private has been considered by Swank *et al.* (2006).

<sup>11</sup> Specifically, the Federal Reserve Accountability Act of 1993 introduced by the US House of Representatives' Committee on Banking, Finance and Urban Affairs in January 1993 called for minutes, a transcript and a videotape to be made available to the public within 60 days of an FOMC meeting. Gonzalez' challenge to Fed practices arose amid changing attitudes about the rights of government agencies to secrecy. See Goodfriend (1986).

<sup>12</sup> December 1992 letter from Alan Greenspan to Henry B. Gonzalez. See Transcripts (1993), January 6 conference call, p. 19.

Reserve Bank of Philadelphia and the only Fed policymaker to have been part of FOMC deliberations in the 1970s, indicated that at the time that the Memoranda of Discussion were published, 'meetings were much more formal [with] less give-and-take and there was a tendency for people to come in with prepared statements, which made it difficult for the subsequent give-and-take that I think has become a real strength of the Committee.'<sup>13</sup> Boehne's comment provides evidence that the Memoranda had affected FOMC debate, despite a lag of five years before publication.

In testimony before the House Banking Committee, Greenspan stated that '... central banks should be disclosing everything they can up to the point where the disclosure affects their effectiveness.'<sup>14</sup> Subsequently, Greenspan elaborated on his concerns that certain disclosure practices could impede the deliberation process, saying:<sup>15</sup>

A considerable amount of free discussion and probing questioning by the participants of each other and of key FOMC staff members takes place. In the wide-ranging debate, new ideas are often tested, many of which are rejected ... The prevailing views of many participants change as evidence and insights emerge. This process has proven to be a very effective procedure for gaining a consensus ... It could not function effectively if participants had to be concerned that their half-thought-through, but nonetheless potentially valuable, notions would soon be made public. I fear in such a situation the public record would be a sterile set of bland pronouncements scarcely capturing the necessary debates which are required of monetary policymaking. A tendency would arise for one-on-one pre-meeting discussions, with public meetings merely announcing already agreed-upon positions or for each participant to enter the meeting with a final position not subject to the views of others.

During these October discussions, FOMC members were informed that the Fed staff kept raw, unedited transcripts of all FOMC meetings since 1976. Although policymakers knew that their discussions were tape-recorded, most thought that these tapes were used to construct minutes and then recorded over at the next meeting. What few, if any, FOMC members knew was that the staff prepared literal transcriptions of the tapes in the process of writing the minutes, and that these literal transcriptions were on file. After Greenspan revealed this information publicly during testimony, the FOMC had little choice but to agree to transcript publication and, in November 1993, the committee voted to publish lightly-edited transcripts with a five-year delay. What is notable when reading the transcript of this meeting is a decidedly scripted element to the discussion – official statements appear to have been prepared and read into the record and, in contrast with earlier meetings, there is much less give-and-take.

In January 1995, an FOMC sub-committee reviewed the transcript decision and proposed that the FOMC agree to continue with the publication of lightly-edited transcripts after a delay of five years. The view of the sub-committee was that the FOMC would have been better served if the tape had never been running. Reserve Bank President Hoenig stated that 'the tape has had some chilling effect on our discussions. I see a lot more

<sup>13</sup> FOMC Transcripts (1993), October 5 conference call, p. 4.

<sup>14</sup> Hearing (1993*a*), p. 27.

<sup>15</sup> Hearing (1993*b*), p. 10.

people reading their statements.<sup>16</sup> Greenspan was more moderate, however, noting that ‘there is very little evidence that the quality of our discussions has been reduced.’<sup>17</sup> This variation in views suggests that the deliberative process may have been affected by the publication of the transcripts – the hypothesis we test in Section 3.

### 3. Empirical Tests

#### 3.1. *The FOMC Transcript Data*

The FOMC meets eight times per year at pre-determined dates that vary little from year to year.<sup>18</sup> In our empirical analysis, we examine the 72 meetings from 1989 to 1997, all of which were chaired by Alan Greenspan. At all of these meetings, the discussion was divided into two ‘rounds’.<sup>19</sup> In the first round officials presented their general views on the economy, while in the second round officials discussed policy options. The second round culminated in a formal vote. The first policymaker to speak in the second round was Alan Greenspan, who generally offered lengthy remarks on his views and made a policy recommendation. Other policymakers followed. At the end of the discussion, a formal vote was taken (with the chairman casting his vote first). Thus, the model used in this article follows the actual structure of FOMC discussions in which a known expert, Greenspan, speaks first. Although there are only twelve voting members at any given FOMC meeting, it has been typical for all nineteen policy officials to participate in both rounds of the discussion.

Official votes of FOMC members are published. Blinder *et al.* (2001) noted strong internal pressure for official FOMC voters to agree with Greenspan’s policy proposal which suggests that official votes over-state the extent of consensus within the committee. The official votes do indeed suggest a strong element of consensus, with dissents during the Greenspan period averaging just over 6%. Interestingly, dissents have declined markedly since the end of 1993: between August 1987 (Greenspan’s first FOMC meeting) and the end of 1993, official dissents were nearly 9% of all votes; since 1994, the dissent rate has been less than 4%. Krause (1994) found evidence that dissent rates have declined as the tenure of various Fed chairmen rose and attributed this to the rise in the number of Fed officials appointed during a chairman’s term.

The FOMC transcripts themselves provide another interesting source from which to assess agreement and disagreement among policymakers. In our empirical analysis, we use an original dataset that codes voiced preferences for the short-term interest rate expressed by each meeting participant (whether voting or non-voting), gathered from the transcripts for FOMC meetings between 1989 and 1997.<sup>20,21</sup> We focus on the short-term interest rate despite the fact that the Fed formally targeted borrowed reserves over

<sup>16</sup> FOMC Transcripts (1995), January meeting, p. 20.

<sup>17</sup> FOMC Transcripts (1995), January meeting, p. 22.

<sup>18</sup> This schedule was set in 1981, when the FOMC reduced its annual number of meetings from twelve to eight.

<sup>19</sup> The only exception to this pattern during Greenspan’s tenure was his first FOMC meeting in August 1987 which pre-dates our sample period.

<sup>20</sup> For additional detail on the dataset, see Meade (2005).

<sup>21</sup> Our dataset does not include the conference calls that can be convened between meetings at the chairman’s discretion. Between 1989 and 1997, there were 41 such conference calls, most of which were concerned with issues other than the setting of short-term interest rates. For the calls that were concerned with the stance of policy, none discussed a specific policy proposal or resulted in an official vote.

much of the sample period.<sup>22</sup> Voiced preferences differ from official votes because voting FOMC members are more likely to voice disagreement with Greenspan's proposal than to cast an official dissent; moreover, official votes do not include contributions by non-voting participants.<sup>23</sup>

In much of our empirical work, we exclude observations for all of the 1993 meetings because it was difficult to determine with any certainty when meeting participants knew that the literal transcriptions existed and that their comments would eventually become public. In fact, the dating of this must range widely, because Greenspan knew about the existence of the literal transcriptions from late 1992, while other officials apparently did not know until the Congressional hearings in October 1993.<sup>24</sup> Thus, we examine the pre-tape period of 1989 to 1992 and the post-tape period of 1994 to 1997, a total of 64 FOMC meetings. Forty-nine of those meetings resulted in no change in interest rates, while seven resulted in a tightening and eight in an easing of monetary policy. Our transcript dataset contains 1,068 voiced preferences for the direction of the Fed funds rate (the views expressed by voting and non-voting meeting participants other than Greenspan) and 645 official votes (excluding the votes cast by Greenspan).

Table 1 shows the frequency distribution for policymakers' agreement or disagreement with Greenspan's proposed interest rate over the pre- and post-tape periods. We have broken down the identity of policymakers into Board members (the Governors, excluding Greenspan, who vote at every FOMC meeting), voting Federal Reserve Bank Presidents (the New York Bank President and four others), and non-voting Presidents (seven participate but do not vote). The degree of consensus in voiced preferences has risen in the post-1993 period for Board members and voting Bank Presidents; this parallels the rise in consensus in the official vote. Only the behaviour of the non-voting Presidents reflects greater dissensus after 1993 than before.

### 3.2. *The Simple 'Tape' Equation*

We looked first at a very simple specification. Using a binomial indicator of voiced agreement (0) or disagreement (1) with Greenspan's proposal as the dependent variable,<sup>25</sup> we examined whether monetary policymakers were less likely to voice disagreement with Greenspan's interest rate proposal after 1993 than before (consistent with the prediction of our theoretical model). In our simple 'tape' equation, we included only indicator variables and interaction terms as independent variables: a dummy to pick up the effects of known transcription after 1993 (*TAPE*), a dummy for voting Bank Presidents

<sup>22</sup> Other researchers have done this as well. See Thornton and Wheelock (2000) and Thornton (2006).

<sup>23</sup> The policy under consideration at each meeting over the period we examine in this study had two dimensions: a level for the Fed funds rate and the 'bias' or 'tilt' in the policy directive. We ignore the bias in our analysis, largely because the precise role of the bias has been subject to some debate. Thornton and Wheelock (2000) and Meade (2005) have shown that its main role was to help in achieving a consensus on short-term interest rates.

<sup>24</sup> In a conference call on 15 October 1993, Greenspan and some others discussed when they first became aware of the literal transcriptions. Greenspan says he found out in the fall of 1992 and had presumed, until very recently, that the existence of transcripts was 'common knowledge'. A senior member of the Fed staff asserted that most officials did not know 'until recently that these transcripts existed and that they were kept'. Several policymakers concur with this remark. (See FOMC Transcripts (1993), October 15 conference call).

<sup>25</sup> Over the period studied, Greenspan's interest rate proposal at the start of the discussion was identical to the policy proposal that the FOMC voted on.

Table 1  
*Number of Policymakers Disagreeing With Interest Rate Proposal*

	Pre-1993	
	Voiced preference	Official vote
Voting Board members	17	16
Voting Bank Presidents	31	19
Non-voting Bank Presidents	36	–
Total	84	35

  

	Post-1993	
	Voiced preference	Official vote
Voting Board members	5	2
Voting Bank Presidents	22	11
Non-voting Bank Presidents	50	–
Total	77	13

Table 2  
*Simple ‘Tape’ Equation\**

Dependent variable: *VOICED PREF*  
 Voiced agreement with Greenspan interest rate proposal (0), Voiced disagreement (1)

	Logit estimation	
	Coefficient	t-value
<i>TAPE</i>	–1.26	–2.41
<i>BPVOTER</i>	0.76	2.34
<i>TAPE</i> × <i>BPVOTER</i>	0.84	1.39
<i>NonVOTER</i>	0.60	1.89
<i>TAPE</i> × <i>NonVOTER</i>	1.63	2.83
Sample start year	1989	
No. obs	1,068	
Prob > Chi <sup>2</sup>	<0.01	

\*Constants included but not reported. Logit estimation performed using White standard errors.

(*BPVOTER*), a dummy for non-voting Bank Presidents (*NonVOTER*), an interaction of the tape and voting Bank President dummies (*TAPE* × *BPVOTER*), and an interaction of the tape and non-voting Bank President dummies (*TAPE* × *NonVOTER*). Table 2 reports coefficient estimates and standard errors from the estimation of this simple ‘tape’ equation using standard logit techniques. The coefficient on the *TAPE* dummy is significant and negative, indicating that once Fed policymakers knew that their discussions were being taped, they tended to voice greater agreement with Greenspan’s proposals. Table 3 shows that the estimated probability of disagreement with Greenspan’s rate proposal drops sharply after 1993 for official FOMC voters.<sup>26</sup> After

<sup>26</sup> The estimated probability for each group before and after 1993 was calculated by setting the relevant dummy variables equal to 1 or 0. So, for example, to calculate the estimated probability of dissent for voting Bank presidents after 1993 we set *TAPE* = 1, *BPVOTER* = 1, *NonVOTER* = 0, *TAPE* × *BPVOTER* = 1 and *TAPE* × *NonVOTER* = 0.

Table 3  
*Estimated Probability of Disagreement With Greenspan Rate Proposal*

	Pre-1993		Post-1993	
	Prob	SE	Prob	SE
Voting Board members	0.10	(0.02)	0.03	(0.01)
Voting Bank Presidents	0.20	(0.03)	0.14	(0.03)
Non-voting Bank Presidents	0.17	(0.03)	0.23	(0.03)

(based on marginal effects from logit estimation of simple 'tape' equation, standard errors in parentheses)

1993, the probability of dissent from the proposed interest rate is only 3% for Board members and 14% for voting Bank Presidents, down from 10% and 20%, respectively, before 1993. In addition, the probability of dissent for non-voting Bank Presidents rises after 1993, a result we discuss further below. While the estimates from this simple specification are suggestive, we have omitted many potentially important determinants from the equation that could bias the results. Thus, we turn next to a broader specification.

### 3.3. *The General 'Tape' Equation*

Our general 'tape' specification uses the same binomial voiced preference indicator for the dependent variable but adds to the set of explanatory variables in order to better control for the environment facing policymakers at each FOMC meeting. First, over the period studied, Greenspan's reputation and influence increased substantially, which may, over time, have made other policymakers increasingly reluctant to disagree with him. As some policymakers were already on the FOMC when Greenspan was appointed while others joined during the sample period, we used a reputational proxy (*EXPdiff*) for each individual that tracks experience on the FOMC (in months) relative to Greenspan.

Second, to control for the macroeconomic environment facing policymakers, we used real-time forecasts that were prepared by the Fed staff for each FOMC meeting and included in the 'Greenbook' distributed to all policymakers several days in advance of the meeting. The Greenbook forecasts are the basis for FOMC discussion of the US economic situation, and two of the most important variables considered are the forecast for consumer price inflation and the estimated gap of real GDP from its potential level. Because our dependent variable classifies all disagreement into a single category and ignores the direction of the disagreement (as between lower or higher interest rates) we included the absolute value of the real-time forecast for current inflation (*CPI*) and the output gap (*GAP*) as explanatory variables.<sup>27</sup> It is important to note that while agreement or disagreement with a specific policy proposal may be systematically related to these variables, the sign of the relationship is not clear *a priori*. It may be the

<sup>27</sup> Greenbook forecasts for consumer price inflation were obtained from the web site of the Federal Reserve Bank of Philadelphia, while Greenbook forecasts for the output gap were provided by David Small. In general, the current period is the quarter of the FOMC meeting; when the FOMC meeting falls in the first few days of a quarter, current inflation and output gap refer to the quarter in which the Greenbook forecast was made.

Table 4  
*General 'Tape' Equation\**

	Logit estimation		Random effects logit estimation	
	Coefficient	t-value	Coefficient	t-value
<i>TAPE</i>	-1.52	-2.39	-1.79	-2.37
<i>BPVOTER</i>	0.65	1.70	0.37	0.68
<i>TAPE</i> × <i>BPVOTER</i>	1.02	1.59	1.58	2.13
<i>NonVOTER</i>	0.44	1.19	0.18	0.33
<i>TAPE</i> × <i>NonVOTER</i>	1.91	3.14	2.34	3.32
<i>EXPdiff</i>	0.00	1.19	0.00	0.39
<i>CPI</i>	0.07	0.59	0.08	0.59
<i>GAP</i>	0.02	0.21	0.07	0.57
<i>PROD</i>	-0.63	-2.58	-0.66	-2.55
<i>FVCPI</i>	-1.55	-0.99	-1.48	-1.23
<i>FVGDP</i>	-1.35	-1.21	-1.79	-1.05
Sample start year	1990		1990	
No. obs	931		931	
Prob > Chi <sup>2</sup>	<0.01		<0.01	

\*Constants included but not reported. Logit estimation performed using White standard errors.

case that extreme values of inflation and the output gap are associated with greater dissensus, or alternatively that these are precisely the periods when there will be the most agreement on the committee about actions to be taken.

Finally, we included three independent variables designed to capture the economic uncertainty facing FOMC policymakers. Using the Greenbook estimates of output per hour in the non-farm business sector, we computed a forecast error for productivity growth.<sup>28</sup> This variable, *PROD*, is intended to quantify the Fed's perception of economic uncertainty. In addition, we used the standard deviation of one-year-ahead private sector forecasts for inflation and real GDP (*FVCPI* and *FVGDP*, respectively) from Consensus Economics as proxies for forecast uncertainty. As with the real-time macroeconomic forecasts, the expected sign of the uncertainty variables is not clear *a priori*. More uncertainty about economic conditions may be associated with more dispersed signals received by committee members and thus greater disagreement. Alternatively, greater uncertainty may make policymakers more likely to follow the initial position provided by the chair.

Table 4 provides estimated coefficients and t-values for the general tape equation based on standard logit techniques. As in the simple tape specification, the *TAPE* dummy is negative and highly statistically significant. Neither the relative experience variable (*EXPdiff*) nor the real-time macro forecasts (*CPI* and *GAP*) are statistically significant. The variables that reflect uncertainty (*PROD*, *FVCPI*, and *FVGDP*) all point to greater voiced agreement as uncertainty rises but only *PROD* is significant.

<sup>28</sup> Specifically, we computed a Greenbook forecast error for productivity growth by subtracting from the estimate for productivity growth in the quarter prior to an FOMC meeting the productivity forecast that was made in the previous Greenbook. We then computed a root mean square error based on the forecast errors in two successive Greenbooks.

Table 5  
*Estimated Probability of Disagreement With Greenspan Rate Proposal*

	Pre-1993		Post-1993	
	Prob	SE	Prob	SE
Voting Board members	0.11	(0.04)	0.03	(0.01)
Voting Bank Presidents	0.19	(0.05)	0.12	(0.03)
Non-voting Bank Presidents	0.16	(0.04)	0.22	(0.04)

(based on marginal effects from logit estimation of general 'tape' equation, standard errors in parentheses)

Table 5 reports the estimated probability of disagreement with Greenspan's proposal for each category of FOMC meeting participant based upon the marginal effects from the logit estimation.<sup>29</sup> These estimated probabilities are very similar to those shown in Table 3, and point to a drop in voiced disagreement after 1993 for Board members and voting Bank Presidents. These results appear to align with the magnitude of the reputational payoff parameter in our model. Over the period studied, the *de facto* term of a Board member averaged 5.8 years, less than the 12-year average that Bank Presidents remained in their position. Thus, reputational concerns could play more of a role for Board members than for Bank Presidents, accounting for greater herding behaviour and less dissent among the former than the latter after 1993.<sup>30</sup> Furthermore, as before, the likelihood of disagreement rises after 1993 for non-voting participants. Although we do not examine separately the terms in office for voting and non-voting Bank Presidents, it would not be surprising if the reputational concerns of non-voters were weaker than for participants whose official votes are recorded.

Over the period we examine, 35 officials (other than Greenspan) participated in FOMC deliberations. In order to account for the possibility that the decline in disagreement after 1993 reflects the departure of specific individuals from the committee, we re-estimated our general tape equation controlling for individual-specific effects using random effects logit. Unlike conventional random effects estimators, the consistency of the random effects logit estimator does not depend on the assumption that the random effect is uncorrelated with the independent variables.<sup>31</sup> The random effects estimates, shown in Table 4, are nearly identical to the results from standard logit estimation and point to a significant, negative effect of transcription.<sup>32</sup> A likelihood ratio test of the random effects estimates with the standard logit estimates rejects the null hypothesis that there is no difference between them.<sup>33</sup>

<sup>29</sup> The estimated probability for each group before and after 1993 was calculated by setting the relevant dummy variables equal to 1 or 0, while setting the other variables equal to their mean values.

<sup>30</sup> It is important to note that Board members often stay for less than the full length of their official term. Furthermore, Board members may care about their internal reputations. Since the Fed chairman assigns the responsibilities within the institution, Board members who want an interesting assignment have an incentive to keep the chairman happy.

<sup>31</sup> See Wooldridge (2002, p. 490).

<sup>32</sup> Estimation using fixed effects logit produced broadly similar results. However, fixed effects estimation has the disadvantage that it drops from the sample individuals who have no variation in voiced preference or voting behaviour, and so reduced our sample by 44 observations.

<sup>33</sup> The proportion of total variance explained by the panel-level variance component is 18%. The likelihood ratio test results in a chi-squared statistic of 27.01; the null hypothesis is rejected at the 1% level of significance.

### 3.3.1. *Sensitivity tests*

We tested the sensitivity of our estimation results in two ways. First, we examined the exclusion of 1993 observations by re-estimating our general tape equation using the entire data sample. Because we do not know precisely how to date the *TAPE* indicator variable, we generated eight sets of parameter estimates using eight different *TAPE* indicators reflecting each FOMC meeting in 1993. In doing this, we allowed the data to tell us the appropriate dating of the *TAPE* dummy. Both the standard logit and random effects logit estimates point to a dating of the *TAPE* dummy from the July or August meeting; that is, the estimation results including the 1993 observations and a *TAPE* dummy dated from the July or August meetings (the fourth and fifth meeting of the year) are nearly identical to the estimation results reported on Table 4.

Second, the binomial indicator of voiced preference used as the dependent variable in our tape equations does not distinguish between disagreements that favour easier policy than Greenspan's proposal from disagreements that favour tighter policy. In order to examine the possibility that the *TAPE* coefficient is sensitive to the direction of disagreement, we re-estimated the general tape equation using multinomial logit and a multinomial indicator of agreement and disagreement as the dependent variable.<sup>34</sup> Using a Wald test, we were unable to reject the null hypothesis that the *TAPE* parameter is equal for disagreements in favour of tightening and easing.

### 3.4. *Additional Hypotheses*

We examined three additional hypotheses. Our first additional hypothesis is that known transcription should have no effect on voting behaviour, because votes were published both before and after 1993. To investigate this hypothesis, we use a binomial indicator of voted assent (0) or dissent (1) as the dependent variable. Because policy-makers voiced their preferences before casting their vote, we included the voiced preference as an additional independent variable. Table 6 provides results using standard and random effects logit estimation. The voiced preference is positive and highly significant in all equations, indicating that an official vote is most likely to be assenting (dissenting) when verbal agreement (disagreement) was voiced. No other independent variable is statistically significant in the specifications. From these results we conclude that official votes, which were made available to the public both before and after 1993, were not affected by the release of the transcripts.<sup>35</sup>

Our second additional hypothesis is that a policymaker should be less likely to switch his view between voicing a preference and casting a vote after 1993 than before. This hypothesis is derived directly from our theoretical model, since in the 'informative' equilibrium, which is more likely to exist under private deliberation, there will be a greater probability of committee members switching their publicly expressed position

<sup>34</sup> The dependent variable was coded as follows: voiced agreement (0), disagreement in favour of tighter policy (1), and disagreement in favour of easier policy (-1) relative to Greenspan's proposal. Because of this change, we used actual values for the real-time Greenbook inflation and output gap forecasts, rather than their absolute values.

<sup>35</sup> The proportion of total variance explained by the panel-level variance component is 49%. The likelihood ratio test which compares the null hypothesis of standard logit to the alternative hypothesis of random-effects logit results in a chi-squared statistic of 19.87; the null hypothesis is rejected at the 1% level of significance.

Table 6  
*First Additional Hypothesis: Official Vote\**

Dependent variable: <i>VOTE</i> <sup>†</sup> Voted assent (0), Voted dissent (1)				
	Logit estimation		Random effects logit estimation	
	Coefficient	t-value	Coefficient	t-value
<i>VOICED PREF</i>	3.20	7.10	3.83	6.67
<i>TAPE</i>	-1.31	-1.53	-0.78	-0.56
<i>BPVOTER</i>	-0.24	-0.43	-0.20	-0.20
<i>TAPE</i> × <i>BPVOTER</i>	1.27	1.41	0.83	0.64
<i>EXPdiff</i>	-0.00	-0.89	-0.01	-0.86
<i>CPI</i>	0.08	0.42	0.04	0.17
<i>GAP</i>	0.04	0.21	0.31	1.06
<i>PROD</i>	-0.16	-0.33	-0.39	-0.69
<i>FVCPi</i>	1.65	0.64	1.31	0.34
<i>FVGDP</i>	-1.97	-1.08	-1.70	-0.69
Sample start year	1990		1990	
No. obs	559		559	
Prob > Chi <sup>2</sup>	<0.01		<0.01	

\*Constants included but not reported. Logit equations estimated using White standard errors.

<sup>†</sup>Dependent variable excludes votes cast by Greenspan.

about the state  $\omega$  between the message round and the voting round. Table 7 provides information on the consistency between preferences voiced and votes cast for FOMC policymakers. While the majority of voters did not switch position either before or after 1993, the number of voters who did switch positions dropped from 41 before 1993 to 18 after that date. Voters who switch are most likely to voice disagreement but cast an assenting vote. To investigate this hypothesis, we used a binomial indicator that tracks officials who did not switch views (0) and those who did (1),<sup>36</sup> and once again we included the voiced preference as an independent variable. Table 8 reports the results of standard and random effects logit estimation of the likelihood of switching position between the voicing of a preference and the casting of a vote. The voiced preference is positive and highly significant; in addition, the tape effect is negative but significant

Table 7  
*Switched View Between Voiced Preference and Vote in Monetary Policy Decisions* (number)

	Pre-1993	Post-1993
Voters who did not switch	283	300
Voters who did switch	41	18
<i>Of which:</i>		
Voiced disagreement but voted assent	27	16
Voiced agreement but voted dissent	14	2

<sup>36</sup> This variable *SWITCH* is related to the dependent variables *VOICED PREF* and *VOTE* but is not a simple linear transformation of them. In the second additional hypothesis, we look explicitly at the decision to switch positions, given that a view has already been voiced.

Table 8  
*Second Additional Hypothesis: Switched View\**

Dependent variable: SWITCH <sup>†</sup> No switch between voiced preference and vote (0), Switch (1)				
	Logit estimation		Random effects logit estimation	
	Coefficient	t-value	Coefficient	t-value
<i>VOICED PREF</i>	4.19	9.02	5.19	7.64
<i>TAPE</i>	-1.58	-1.63	-2.07	-1.31
<i>BPVOTER</i>	-0.23	-0.36	-0.57	-0.61
<i>TAPE</i> × <i>BPVOTER</i>	1.22	1.36	2.17	1.56
<i>EXPdiff</i>	0.00	0.09	0.00	0.48
<i>CPI</i>	-0.40	-1.67	-0.39	-1.21
<i>GAP</i>	0.32	1.51	0.52	1.58
<i>PROD</i>	-0.58	-1.11	-0.62	-1.08
<i>FVCPI</i>	-0.08	-0.02	2.51	0.56
<i>FVGDP</i>	-0.93	-0.32	-3.45	-1.10
Sample start year	1990		1990	
No. obs	559		559	
Prob > Chi <sup>2</sup>	<0.01		<0.01	

\*Constants included but not reported. Logit equations estimated using White standard errors.

<sup>†</sup>Dependent variable excludes votes cast by Greenspan.

only at the 10% level using standard logit techniques.<sup>37</sup> Table 9 provides estimates of the likelihood of a switch in position, based on the marginal effects from standard logit estimation. The estimated probability that a Board member switches drops from 5% to 1% after 1993. Although the likelihood that a voting Bank President switches a view also drops, the decline from 4% to 3% is much smaller.

Finally, we examined a hypothesis that follows directly from our theoretical model which predicts that the greater information revealed during private deliberation will produce a policy choice that tracks optimal policy more closely than under public deliberation. To evaluate this prediction, we must first have a measure of the optimal policy based on the 'true' state of the economy. A classic Taylor rule can provide one

Table 9  
*Estimated Probability of a Switch Between Voiced Preference and Official Vote in Monetary Policy Decisions*

	Pre-1993		Post-1993	
	Prob	SE	Prob	SE
Voting Board members	0.05	(0.025)	0.01	(0.007)
Voting Bank Presidents	0.04	(0.022)	0.03	(0.014)

Based on marginal effects from logit estimation in Table 8, standard errors in parentheses.

Based on marginal effects from logit estimation in Table 8, standard errors in parentheses.

<sup>37</sup> The tape effect is not statistically significant when the equation is estimated using random effects logit. The proportion of total variance explained by the panel-level variance component is 37%. The likelihood ratio test which compares the null hypothesis of standard logit to the alternative hypothesis of random-effects logit results in a chi-squared statistic of 13.06; the null hypothesis is rejected at the 1% level of significance.

(albeit imperfect) proxy for the true state. Orphanides (2003) uses data on inflation and output gaps and the parameterisation in Taylor's original 1993 article to produce an optimal interest rate setting. He demonstrates that the actual short-term interest rate tracks optimal policy quite closely in the several years prior to 1993, but that the optimal and actual policies diverge quite sharply after 1993 (2003, Figure 2). This is potential evidence in support of our hypothesis.

#### 4. Conclusion

In this article, we consider the effects of one specific type of transparency – the publication of detailed transcripts from committee meetings – on the quality of a committee's discussion and debate. We first developed a theoretical model of deliberation on a three-member committee in which a known expert speaks first and all members of the committee are concerned both about making the correct policy decision and about having a good reputation in public. We showed that in this model the likelihood of having an informative equilibrium in which members accurately reveal private information is greater when deliberation takes place behind closed doors than when deliberation occurs in public. We then subjected this model to empirical testing using an original dataset on deliberations of the Federal Reserve's FOMC from 1989–97. The Fed provides a useful experiment for testing our model because of an institutional change in 1993 after which the FOMC decided to begin releasing transcripts of its meetings after a delay of five years. Using binomial logit regressions, we find that the evidence provides support for our empirical hypotheses. Fed policymakers appear to have responded to the decision to publish meeting transcripts by voicing less dissent with Greenspan's policy proposals for the short-term interest rate. While voiced preferences show an effect of known transcription, the official votes, which were made public throughout the entire period, do not. Consistent with these findings, our work also shows that voters were somewhat less likely to switch positions between voicing a preference and the official vote after 1993 than before. Our theoretical and empirical evidence has implications for the conduct of monetary policy, as well as for more general debates about the effect of transparency in agency relationships involving professionals who wish to establish reputations for expertise.

#### Appendix

##### *Proposition 1*

*Behaviour of Player C under private deliberation:* Consider the incentives during the message round for Player *C* if *A* and *B* do not send the same message. If *A* and *B* send different messages about the state, and the signal received by *C* corresponds to the message reported by *B*, then *C*'s belief about the state will be as follows (we denote this posterior probability by  $\theta$ ),

$$\Pr(\omega = m_a | m_a, m_b, s_c) = \frac{p(1-q)^2}{p(1-q)^2 + (1-p)q^2} = \theta. \quad (4)$$

Under these conditions, if  $C$  truthfully reports her signal, then her expected payoff is the following.

$$(1 - \theta) + \beta \left[ (1 - \theta) \frac{p\lambda}{p\lambda + 0.5(1 - \lambda)} + \theta \frac{(1 - p)\lambda}{(1 - p)\lambda + 0.5(1 - \lambda)} \right]. \tag{5}$$

In expression (5) and the subsequent expressions, the reputational payoff in the case that  $C$ 's message corresponds to the true state is  $\Pr(h|m_c = \omega) = p\lambda/p\lambda + 0.5(1 - \lambda)$ . Her payoff in the case where her message turns out to be incorrect is  $\Pr(h|m_c \neq \omega) = (1 - p)\lambda/(1 - p)\lambda + 0.5(1 - \lambda)$ . If Player  $C$  falsely reports her signal, then her expected payoff is shown in (6).

$$\theta + \beta \left[ \theta \frac{p\lambda}{p\lambda + 0.5(1 - \lambda)} + (1 - \theta) \frac{(1 - p)\lambda}{(1 - p)\lambda + 0.5(1 - \lambda)} \right]. \tag{6}$$

Based on (5) and (6), and given Assumption 1 which implies that  $\theta < 0.5$ , it is straightforward to observe that the expected utility from truthful reporting will be higher than the expected utility from false reporting. As a result, Player  $C$  has an incentive to report her signal accurately if her message is pivotal.

*Behaviour of player B under public deliberation:* If  $s_b \neq m_a$  then  $B$ 's belief that the state is as reported by  $A$  is  $\Pr(\omega = m_a | m_a, s_b) = p(1 - q)/p(1 - q) + (1 - p)q$ . If  $B$  sends a false message  $m_b = m_a$ , then she knows that Player  $C$  will also send the same message, and all players will vote  $v_i = m_a$ . As a result, her expected utility from false reporting is as follows.

$$\frac{p(1 - q)}{p(1 - q) + (1 - p)q} + \beta \left\{ \left[ \frac{p(1 - q)}{p(1 - q) + (1 - p)q} \right] \frac{p\lambda}{p\lambda + 0.5(1 - \lambda)} + \left[ 1 - \frac{p(1 - q)}{p(1 - q) + (1 - p)q} \right] \frac{(1 - p)\lambda}{(1 - p)\lambda + 0.5(1 - \lambda)} \right\}. \tag{7}$$

If  $B$  instead reports her signal accurately, then she receives the following expected utility:

$$q + \beta \left\{ \left[ 1 - \frac{p(1 - q)}{p(1 - q) + (1 - p)q} \right] \frac{p\lambda}{p\lambda + 0.5(1 - \lambda)} + \left[ \frac{p(1 - q)}{p(1 - q) + (1 - p)q} \right] \frac{(1 - p)\lambda}{(1 - p)\lambda + 0.5(1 - \lambda)} \right\}. \tag{8}$$

Based on (5) and (6), as long as the following inequality is satisfied,  $B$  will report her signal truthfully

$$q - \frac{p(1 - q)}{p(1 - q) + (1 - p)q} > \beta \left[ 2 \frac{p(1 - q)}{p(1 - q) + (1 - p)q} - 1 \right] \left[ \frac{\frac{p\lambda}{p\lambda + 0.5(1 - \lambda)}}{\frac{(1 - p)\lambda}{(1 - p)\lambda + 0.5(1 - \lambda)}} \right]. \tag{9}$$

When the inequality in (9) is satisfied, Player  $B$  will accurately report her signal, regardless of whether it corresponds to the message sent by  $A$ . This inequality can be satisfied for a plausible range of parameters but it is less likely to be satisfied as  $\beta \rightarrow \infty$ . As mentioned above, one factor that may lead to a higher value of  $\beta$  is if a player has a relatively short term to serve on the committee.

*Behaviour of player B under private deliberation:* Given (2) and (3) in the text, Player  $B$  will not have an incentive to deviate by falsely reporting her signal as long as the following inequality is satisfied. This inequality is derived by comparing the difference in expected utility between truthfully reporting (2) and falsely reporting (3) and then simplifying.

$$q - \frac{p(1 - q)}{p(1 - q) + (1 - p)q} > 0 \tag{10}$$

It can be demonstrated that this inequality will in fact be satisfied for all values of  $p$  and  $q$  for which Assumption 1 holds.

*Uniqueness of the informative equilibrium:* The remaining possibility for an informative equilibrium in pure strategies under private deliberation can be ruled out. It could never be an equilibrium for *B* to mimic *A*'s signal and for *C* to subsequently report truthfully, because *C* would know that in the case where her message contradicted a truthful message sent by *A*, her belief about the state would be  $\Pr(m_a = \omega | m_a, s_c) = (1 - q)p / (1 - q)p + (1 - p)q$ , which will always be greater than 0.5, given our assumption that  $q < p$ . Consequently, Player *C* would have an incentive to send the same message as *A*.

*American University*  
*New York University*

*Submitted: 29 June 2005*

*Accepted: 3 January 2007*

## References

- Blinder, A. (2006). 'Monetary policy by committee: why and how', De Nederlandsche Bank Working Paper, no. 092/2006.
- Blinder, A., Goodhart, C., Hildebrand, P., Lipton, D. and Wyplosz, C. (2001). 'How do central banks talk?', Geneva Reports on the World Economy Number 3, London: Centre for Economic Policy Research.
- Chortareas, G., Stasavage, D. and Sterne, G. (2003). 'Does monetary policy transparency reduce disinflation costs?', *The Manchester School*, vol. 71(5) (September), pp. 521–40.
- Dewatripont, M. and Tirole, J. (2005). 'Modes of communication', *Journal of Political Economy*, vol. 113(6) (December), pp. 1217–38.
- Dewatripont, M., Tirole, J. and Jewitt, I. (1999). 'The economics of career concerns, Part I: Comparing information structures', *Review of Economic Studies*, vol. 66(1) (January), pp. 183–98.
- Faust, J. and Svensson, L. (2001). 'Transparency and credibility: monetary policy with unobservable goals', *International Economic Review*, vol. 42(2) (May), pp. 369–97.
- Federal Open Market Committee Transcripts, Board of Governors of the Federal Reserve System, selected years.
- Geraats, P. (2002). 'Central bank transparency', *Economic Journal*, vol. 112 (6) (July), pp. 532–65.
- Gerlach-Kristen, P. (2004). 'Is the MPC's voting record informative about future UK monetary policy?', *Scandinavian Journal of Economics*, vol. 106(3) (September), pp. 299–313.
- Gersbach, H. and Hahn, V. (2004). 'Voting transparency, conflicting interests, and the appointment of central bankers', *Economics and Politics*, vol. 16 (3) (November), pp. 321–45.
- Goodfriend, M. (1986). 'Monetary mystique: secrecy and central banking', *Journal of Monetary Economics*, vol. 17 (1) (January), pp. 63–92.
- Hearing before the Committee on Banking, Finance and Urban Affairs (1993a). US House of Representatives, 103rd Congress, October 13.
- Hearing before the Committee on Banking, Finance and Urban Affairs (1993b). US House of Representatives, 103rd Congress, October 19.
- Holmström, B. (1999). 'Managerial incentive problems: a dynamic perspective', *Review of Economic Studies*, vol. 66(1) (January), pp. 169–82.
- Kohn, D. and Sack, B. (2003). 'Central bank talk: does it matter and why', Board of Governors of the Federal Reserve System Economic Discussion Series No. 55, May.
- Krause, G. (1994). 'Federal Reserve policy decision making: political and bureaucratic influences', *American Journal of Political Science*, vol. 38(2) (May), pp. 124–44.
- Levy, G. (2004). 'Anti-herding and strategic consultation', *European Economic Review*, vol. 48(3) (June), pp. 503–25.
- Maskin, E. and Tirole, J. (2004). 'The politician and the judge: accountability in government', *American Economic Review*, vol. 94(4) (September), pp. 1034–54.
- Meade, E.E. (2005). 'The FOMC: preferences, voting, and consensus', *Federal Reserve Bank of St. Louis Review*, vol. 87(2) (March/April), pp. 93–101.
- Meyer, L. (2004). *A Term at the Fed: An Insider's View*, New York: Harper Collins.
- Morris, S. (2001). 'Political correctness', *Journal of Political Economy*, vol. 109(2) (April), pp. 231–65.
- Orphanides, A. (2003). 'Historical monetary policy analysis and the Taylor Rule', *Journal of Monetary Economics*, vol. 50(5) (July), pp. 983–1022.
- Ottaviani, M. and Sorensen, P. (2001). 'Information aggregation in debate: who should speak first?', *Journal of Public Economics*, vol. 81(3) (September), pp. 393–421.

- Ottaviani, M. and Sorensen, P. (2006). 'Professional advice', *Journal of Economic Theory*, vol. 126(1) (January), pp. 120–42.
- Prat, A. (2005). 'The wrong kind of transparency', *American Economic Review*, vol. 95(3) (June), pp. 862–77.
- Prendergast, C. (1993). 'A theory of "yes men"', *American Economic Review*, vol. 83(4) (September), pp. 757–70.
- Scharfstein, D. and Stein, J. (1990). 'Herd behavior and investment', *American Economic Review*, vol. 80(3), pp. 465–79.
- Seidmann, D. (2003). 'A theory of voting patterns and performance in private and public committees', working paper, Nottingham University.
- Sibert, A. (2006). 'Central banking by committee', De Nederlandsche Bank working paper no. 091/2006.
- Swank, J., Swank, O. and Visser, B. (2006). 'Transparency and pre-meetings', mimeo, Erasmus University Rotterdam.
- Thornton, D. (2003). 'Monetary policy transparency: transparent about what?', *The Manchester School*, vol. 71(5) (September), pp. 478–97.
- Thornton, D. (2006). 'When did the FOMC begin targeting the federal funds rate? What the verbatim transcripts tell us', *Journal of Money, Credit, and Banking*, vol. 38(8) (December), pp. 2039–71.
- Thornton, D. and Wheelock, D. (2000). 'A history of the asymmetric policy directive', *Federal Reserve Bank of St. Louis Review*, September/October, pp. 1–16.
- Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*, Cambridge: MIT Press.