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## **Deliberation and Monetary Policy: Quantifying the Words of American Central Bankers, 1979-1999**

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THE LONDON SCHOOL  
OF ECONOMICS AND  
POLITICAL SCIENCE ■

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### Abstract:

The story of what happened to change the course of monetary policy in the US from one of "anguish" to the successful establishment of persistent low inflation by Paul Volcker and Alan Greenspan since 1979 has been extensively studied, but in our view still has gaps in terms of understanding *why* and *how* policy changed. We examine the twenty year history of US monetary policy between 1979 and 1999 in order better to understand the preferences of policy makers as they deliberate in committee on the monetary policy decision. We employ text analysis software to explore the verbatim transcripts of FOMC meetings for three key periods (nine years) between 1979 and 1999 (1979-1981; 1991-1993 and 1997-1999). Rather than imputing preferences from votes, we use the actual words, arguments and rationales espoused by policy makers as they deliberated on the monetary policy decision. Our primary methodological goal is to obtain a systematic and quantifiable account of the decision making process in the FOMC meetings as the US moved from a period of high inflation to sustained low inflation. Among our key findings is that we observe (1) a clear decline in the role of deliberation in FOMC meetings in the late 1990s and an increasing weight on studying the state of the economy; (2) a change in the emphasis on the strategy of monetary policy that appears to be consistent with the greater credibility of low inflation over time; and (3) changes in the relative roles for reserve bank presidents and board governors from the late 1970s to the late 1990s.

"In the broad sweep of history, it is ideas that matter. Indeed, the world is ruled by little else."

*Remarks by Chairman Alan Greenspan at the Adam Smith Memorial Lecture, Kirkcaldy, Scotland, February 5, 2005*

## I. INTRODUCTION

The last thirty years have seen the emergence of a strong consensus worldwide around establishing and maintaining persistent low inflation as the appropriate goal of monetary policy. The experience of the United States is quite typical in this respect, with the shift to a consistent low inflation policy starting with the so-called Volcker Revolution in 1979, followed by the disinflation of the 1980s and the subsequent entrenchment of low inflation.

There are two important components to the low inflation idea. The first involves the development and emergence of the notion that low inflation maximises the utility of the representative economic agent. The second concerns the role of the institutions of monetary policy, central banks, and in particular the structure of the independence of central banks as a necessary condition for delivering persistent low inflation as the goal of monetary policy.

There is a large literature in this area, but it tends to have the characteristic that it focuses on explaining *what* happened and from that inferring *why* the change happened when it did. And it has little to say about *how* the change happened. Moreover, there are areas of the explanation that require more light to be cast than is provided by the simple statement of the policy objective (i.e. the inflation preference of policymakers). A good example of this is the issue of change in institutional structure. In some countries, the causes of the shift to low inflation include a change to a more independent central bank in respect of monetary policy. In others this cannot be observed just by looking at the legal structure. The United States is a good example of this issue. The Federal Reserve derives much of the authority under which it operates from the Federal Reserve Act 1913 (the founding statute). In 1977, the Act was amended in order to direct the Board of Governors to use monetary policy "to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates." This statement of objectives has come to be known as the dual mandate, since "moderate long-term [nominal] interest rates" are the natural product of low inflation (Blinder and Reis 2005). But views have differed sharply over time on what this statement of objectives has meant in practice for the monetary policy preferences of the Federal Reserve. In 1979, former chairman Arthur Burns described the inability of the Fed to do the right thing on inflation as caused by a combination of pernicious ideas on economic policy and a fear in the Fed that unless it toed the (pernicious) line, Congress and the Administration would clip its wings (Burns 1979 (1987)). Consistent with that, it is possible to interpret the 1977 dual mandate as evidence of such a desire. Recently though, the Vice Chairman of the Board of Governors remarked to Congress that:

“the Congress has – correctly in my view – given the Federal Reserve considerable scope to design and implement the best approaches to achieving those statutory objectives. Moreover, . . . the independence that is granted to the Federal Reserve is subject to a well-calibrated system of checks and balances in the form of transparency and accountability to the public and the Congress.

The insulation from short-term political pressures – within a framework of legislated objectives and accountability and transparency – that Congress has established for the Federal Reserve has come to be widely emulated around the world. Considerable experience shows that this type of approach tends to yield a monetary policy that best promotes economic growth and price stability. Operational independence – that is, independence to pursue legislated goals – reduces the odds on two types of policy errors that result in inflation and economic instability. First, it prevents governments from succumbing to the temptation to use the central bank to fund budget deficits. Second, it enables policymakers to look beyond the short term as they weigh the effects of their monetary policy actions on price stability and employment.” (2009)

Nearly thirty years separates the observations of Arthur Burns and Don Kohn and the environment of monetary policy is vastly changed. But the institutional framework of the Federal Reserve has not changed. So, there is clearly more to the story.

Our reason for undertaking another study of US monetary policy during this much studied period is because understanding *why* and *how* policy changed requires a closer observation of the behaviour of the policymakers themselves. Monetary policy is made through a process of deliberating in meetings of a committee<sup>1</sup> to a point where a decision is taken (through a vote) on the stance of policy until the next meeting (about six weeks later for the FOMC). We are fortunate that verbatim transcripts of everything that was said at FOMC meetings exist for the period since 1979. We can therefore directly observe the deliberation of policymakers. In principle this provides us with the opportunity to assess systematically the preferences of policymakers, and why and how they changed over time. The challenge is how to undertake such a systematic assessment of what is a body of text as opposed to a numerical dataset. We accomplish this using full text analysis software. Our objective is to provide a systematic analysis of the period that saw the decisive move from high to low inflation, and to understand better how the process of committee deliberation yielded this important outcome.

The rest of the paper is arranged as follows. Section II summarizes the literature on the preferences of monetary policy makers, and issues arising from this literature; section III presents the data and provides our rationale for our sample of years; section IV outlines our methodology; section V presents our results; and section VI concludes.

## II. IDENTIFYING THE PREFERENCES OF POLICY MAKERS TOWARDS INFLATION

### a. Explanations for Preferences

A large body of literature is devoted to observing and explaining the preferences of central banks towards setting monetary policy. Traditionally, central banks did not state their goals(s) in explicit terms, and were not noted for the clarity of their communication, and so the literature seeks to determine what preferences can be deduced from their actions. Many central banks now set out a quantitative goal, usually a target for the rate of inflation. In this mode of operation, the literature devoted to revealing the preferences of policy makers tends to focus on assessing their behaviour in returning the target measure to its stated goal (typically closing the inflation gap in an inflation targeting regime) and thereby determining their preference for stabilising inflation versus stabilising output. (Examples of this literature include (Sargent 1999; Taylor 1999; Clarida, Gali et al. 2000; Cogley and Sargent 2001).)

This choice of preference(s) can be summarised as a measure of inflation persistence<sup>2</sup>. Here, we define inflation persistence to be the long-run effect of a shock to inflation – for a shock that raises inflation now by, say, 1%, by how much do we expect it to be higher at some future date and how long will it take to return to its previous level, if ever (Pivetta and Reis 2006). As a measurement tool, it plays a central role in explanations of the movement from an era of high inflation in the 1970s to one of low inflation from the 1990s to the present. However, it is only a summary indicator, and the challenge for this literature has been that, particularly in a regime with no explicit quantitative target (e.g., the United States), there are multiple unstated variables at work, namely the variation over time in the preference of the central bank for stabilising inflation *and* output, changes over time in the target variable(s) at which the stabilisation is aimed, and structural changes in the core parameters of the economy (e.g., the natural rate of unemployment).

The monetary history of the United States has provided fertile ground for explanations of the shift to low inflation for at least two reasons. First, the US record points to a high persistence of inflation in the later 1960s and 1970s which is associated with a relatively strong preference among policy makers to stabilise output and thus accommodate the (upward) shocks to inflation. Preferences (as assessed by the change in the stance of policy) appeared to change very abruptly in 1979 when Paul Volcker assumed the chair of the Federal Reserve and the period since then is characterised by a disinflation and then stabilisation at a low level of inflation persistence. Figure 1 shows the pattern of inflation in the US.

[Figure 1 – about here]

But this apparent change in preferences begs a whole series of very important questions concerning why and how it happened. The fact that the modern consensus confirms the benefits of persistent low inflation does not on its own explain why, how and when a central bank (in this case the Federal Reserve) arrived at that conclusion (or at least it can only do so by assuming that at a particular moment in time “the light

came on"). To answer these questions we need better methods to assess the preferences of policy makers.

In particular, better methods are required to explain why and how the behaviour of monetary policy makers changed over time (sometimes abruptly as in 1979, sometimes more gradually as in the subsequent 15 years). One school of thought seeks to explain such changes in terms of learning by policy makers, namely that learning from the mistakes of the past induces changes in preferences and thus the policy stance (Sargent, Williams et al. 2004; Primiceri 2005). This has been fertile ground for modelling, but it still begs important questions around how it happened and why at a particular time. Was it a product of changes in leadership at the Fed? Was it due to the "technology" of analysis and policy implementation that changed the ability of the Fed to determine and achieve a goal of low inflation persistence? Or, was there a role for deeper changes in social norms towards inflation and output/employment stabilisation? Was there some change in political preferences that enabled a change in monetary policy? Any or all of these potential explanations may hold merit.

Prima facie, there is some support for all of these explanations. Studies have estimated inflation persistence under different chairmen of the Fed. Beechey and Österholm introduce dummy variables for chairmen into their analysis (Beechey and Österholm 2007). They find that during the Martin chairmanship (1955-1970) the Federal Reserve's implied target for headline CPI was slightly lower but not significantly different than under Greenspan. But it rose substantially (by four percentage points and more) during the Burns and Miller periods (1970 to August 1979). The subsequent Volcker era (1979 to 1987) saw a substantial decrease, to a level statistically indistinguishable from the Martin-Greenspan eras. But this alone does not prove that "it was the Chairmen that did it", not least because monetary policy is the product of the deliberation of a committee (in this case the FOMC). The so-called Volcker Revolution of 1979 lends itself to a direct study of the "why and how" preferences changed because it appeared to be an abrupt and discrete change in policy.<sup>3</sup> But it is likely to be harder to identify the contribution of a chairman to a change in preferences that takes place over a decade or more (for instance, insofar as these affect the degree of accommodation of supply shocks in the economy and the preference of policy makers for opportunistic disinflation (Kuttner 2004; Kozicki and Tinsley 2005)).

Evidence is available to support the view that changes in preferences towards monetary policy reflect changes in the technology of modelling, analysis and policy implementation. As well as the obvious advances in computational power and speed, monetary policy is now predominantly founded on workhorse New Keynesian models which allow a richer depiction of price and wage setting behaviour in the economy and of the process by which economic agents form expectations about the future. But if better tools make better policy, exactly how does this process work and by how much does it make a difference? It is possible that policymakers have reduced the level of their uncertainty over the model of the economy that they use to form policy, and that this has enabled better policy setting (not least because one important aspect of lower model uncertainty is a better understanding of the impact of the policy setting itself on the expectations of agents in the economy). A more concrete illustration is that policymakers may have become less uncertain about the natural rate

of unemployment in the economy. But of course if we accept the "better tools make better policy" approach, one is unable to account for the low level of inflation persistence in the 1950s and early 1960s, so this explanation is insufficient.

Did societal changes in attitudes towards inflation and output/employment stabilisation provide the backdrop to the successes and failures of policy? In a lecture delivered after leaving the office of Federal Reserve Chairman, Arthur Burns set out "The Anguish of Central Banking" (Burns 1979 (1987)). Burns acknowledged at the start of the lecture that despite their antipathy to inflation and "the powerful weapons they could wield against it" (7), central bankers had failed utterly in their mission to control it. The analysis put forward by Burns of this failure rested on policymakers having overlooked the fundamental "persistent inflationary bias that has emerged from the philosophic and political currents that have been transforming economic life in the United States and elsewhere since the 1930s" (9). Burns went on to argue that the New Deal and post New Deal commitment to maximum or full employment and the expanding role of government regulation as a means to protect particular interest groups against competition (farm price supports, minimum wages, import quotas) fatally undermined the objective of maintaining stable low inflation. Burns characterised this as inducing "secular inflation" (14). What, then, was the role of the central bankers?<sup>4</sup> The explanation that Burns proffered was that they too, despite having the power and tools to deal with the problem, were "caught up in the philosophic and political currents that were transforming American life and culture" (15). More pointedly, he stated that "some members of the Federal Reserve family had themselves been touched by the allurements of the New Economics" (15) and that to act otherwise would have meant that the Federal Reserve would have been "frustrating the will of Congress to which it was responsible" (16). Burns went on to argue that while the Fed did act to restrain inflation (in 1966, 1969 and 1974), it did not sustain that action for long enough because "it repeatedly evoked violent criticism from both the Executive establishment and the Congress and therefore had to devote much of its energy to warding off legislation that could destroy any hope of ending inflation. This testing process necessarily involved political judgments, and the Federal Reserve may at times have overestimated the risks attaching to additional monetary restraint" (16).

Burns described monetary theory as a controversial area that did "not provide central bankers with decision rules that are at once firm and dependable" (17). Central bankers could make errors at practically every stage of the process of making monetary policy, but "their capacity to err has become larger in our age of inflation" (18) because agents no longer took it for granted that a higher level of inflation would be followed by a correction once a recession got under way. The conclusion for Burns was that the practical capacity for central bankers to curb "an inflation that is continually driven by political forces is very limited" (21). Nonetheless, he saw signs of hope, that in the United States "a great majority of the public now regard inflation as the Number One problem facing the country and this judgment is accepted by both the Congress and the Executive establishment" (23).

The Burns analysis had something for everything in terms of arguments to support the various possible explanations for the behaviour of preferences towards monetary policy. At the heart is an argument that broader societal and hence political pressures combined with the development of economic ideas to influence policy setting in ways



that could override the institutional structure (and thus the statutory independence of the central bank). Combined with this overarching assessment was an argument that the quality of the analytical toolkit of the monetary policymaker was inadequate to offset these pressures (central bankers could not win the day with the quality of their models alone) and that those central bankers were only human and thus capable of taking in current fads of the day when it came to economic policymaking.

## **b. The Low Inflation Consensus**

The irony is that Burns delivered his lecture only a few days before Paul Volcker initiated his revolution in US monetary policy. The subsequent thirty years have seen the emergence of a strong consensus worldwide around the goal of monetary policy as persistent low inflation. Within the framework that supports this goal, low inflation is regarded as a necessary, but not sufficient, condition for faster output growth.

There are two essential components to the low inflation consensus idea. First, a key element of the idea is that low inflation maximises the utility of the representative economic agent, and therefore does not involve conflict between interest groups—all benefit from low inflation. This contradicts the old school of analysis (which Burns depicted) in which monetary policy was interpreted through the prism of social interest groups and how their pressure was transmitted to policy makers either directly or indirectly via politicians.

The second component of the low inflation goal idea concerns the institutions of monetary policy—central banks. The rise of the low inflation consensus has coincided with an emphasis on the importance of having a truly independent central bank<sup>5</sup> (Cukierman 1992; Bernhard 1998; Blinder 1998). The cases for low inflation and the role of independent central banks therefore sit together in this account, as a joint reaction to the mistakes of the past. This shift amounted to a rejection of the "allurement of New Economics" in the words of Burns, in which it was believed possible to raise the level of output and employment permanently by accepting a higher rate of inflation. Thus a long-run trade-off had been presumed to exist between unemployment and inflation, something that was attractive to politicians of all descriptions. Even when the theory and evidence indicated that a long-run trade-off did not exist, and pursuing it led to higher inflation, politicians seeking re-election could still be tempted to seek to exploit a short-run trade-off and thus to prefer more inflationary monetary policy for now (in the belief that it could be reversed later). This ran straight into the problem of time inconsistency (Kydland and Prescott 1977). There are two important implications of time inconsistency for this context. First, an environment in which the goal of monetary policy is not well pinned-down (in other words one where there is discretion to change the goal of policy) can lead to an average upward inflation bias (Svensson 2002). Second, a lot depends on whether the monetary policy institution can make binding, and hence credible, commitments about future policy settings. An independent central bank with a clear goal to pursue low inflation provided the institutional framework to achieve lasting low inflation alongside the contribution from the ideas generated by economic theory which identified the problem of time inconsistency in the go-stop anti-inflationary policies of the 1960s and 1970s and the benefit of lasting low inflation in terms of stable economic growth. As noted in the introduction to this paper, the legal status of the Federal Reserve, and hence its formal independence, did not change over this period

of high and then low inflation. But, as the Arthur Burns account makes clear, much appears to have changed in terms of the Fed's perceived freedom to act within that structure.

If we stop the story there, we are left to conclude that, more or less as night follows day, getting the framework of ideas and institutions in place has led to lasting low inflation, end of story. Put another way, there is a big idea – *persistent low inflation is the right goal for monetary policy*. Redistribution among economic interest groups does not feature in such an environment—thus interests are neutralised. And, there is a fairly simple institutional story—an independent central bank is the best structure to overcome the credibility problem that lies in the analysis of time inconsistency.

But if this was the end of the story, it would be unsatisfying insofar as it leaves unstated how the change happened in terms of the policy making process. In an earlier paper we sought to cast more light on how Volcker engineered his revolution by studying in a more systematic way than before the process of deliberation in the FOMC as revealed by the verbatim transcripts of the meetings (Bailey and Schonhardt-Bailey 2008). But in that work we did not seek to explain how the revolution became embedded and led to the lasting low inflation which is sometimes now described as the Great Moderation. We know from the econometric studies that the preference of the Federal Reserve for inflation stability has moved to allowing lower inflation persistence. But we know much less about the degree to which this change in preference reflects a change in preference for output stability (i.e. accommodating more output and employment fluctuation in contrast to the allurements to stabilise at a high level described by Burns) or learning about the model of the economy (e.g. on the natural rate of unemployment) in ways that have enabled a better equilibrium for policy to emerge (this puzzle is reflected in, for instance, (Clarida, Gali et al. 2000; Primiceri 2005; Beechey and Österholm 2007)).<sup>6</sup>

### **c. Survival and Persistence of the Low Inflation Consensus in the Greenspan Era**

The continuing puzzle over how the shift in policy emerged survives even after allowing for the substantial literature on "How Alan Greenspan did it", in the sense of how he entrenched the shift to disinflationary policy established by Paul Volcker (for instance, (Mankiw 2001; Blinder and Reis 2005)). The 1990s were notable not just for a low average level of inflation but also for low volatility of inflation (substantially lower than the 1950s, the previous period of low inflation). Moreover, the volatility of GDP growth in the US economy was substantially lower in the 1990s than in any other post-War decade. Studies of the period indicate that, compared to the 1970s, the Federal Reserve responded more aggressively in terms of moving interest rates to a given move in inflation, but that this fact is consistent with the much lower volatility of interest rates in the 1990s since it appears that economic agents now adjust their expectations to assume a more aggressive response by the Fed and this has tended to damp future inflation and create a virtuous circle of policy (thus pre-emptive behaviour works).

A number of other theories have been put forward to support the success of the 1990s: that the Clinton Administration made better appointments to the Fed Board (i.e., better economists were appointed); that it adopted a more prudent fiscal policy which finally established monetary policy as the tool of macroeconomic stabilisation; that it

refrained from commenting on monetary policy and more generally intervening in a way that bolstered the independence of the Federal Reserve, and thus its credibility in monetary policy; and that the Fed, and Alan Greenspan in particular, became much more intense and thus better at reading the information and data on developments in the economy (Mankiw 2001).

This is the sort of list that would have made Arthur Burns forego his anguish, but it begs a number of unanswered questions. What contribution and influence did these smarter governors of the Fed bring to the FOMC table? How did better fiscal policy feature in the monetary policy-making process? How did the decline of political comment bolster the credibility of the Fed? Did the Fed shift gears in terms of its reading of the data on the economy and did this make a meaningful contribution to reducing uncertainty on the model of the economy?

A complication in describing the Greenspan era is the tendency to characterise policy making as discretionary in the sense that it reacted meeting by meeting to the news received during the intervening period. Two quotations from Greenspan (both cited in (Blinder and Reis 2005) (7-8) aptly describe this approach:

“The economic world . . . is best described by a structure whose parameters are continuously changing. The channels of monetary policy, consequently, are changing in tandem. An ongoing challenge for the Federal Reserve . . . is to operate in a way that does not depend on a fixed economic structure based on historically average coefficients.” (Greenspan 2004)

“Some critics have argued that [the Fed’s] approach to policy is too undisciplined – judgmental, seemingly discretionary, and difficult to explain. The Federal Reserve should, some conclude, attempt to be more formal in its operations by tying its actions solely to the prescriptions of a formal policy rule. That any approach along these lines would lead to an improvement in economic performance, however, is highly doubtful.” (Greenspan 2003)

This aversion towards tying policy to a pre-defined rule (an aversion that is typical among central bankers) illustrates the limitations of a framework for analysing policy ex-post that uses such a rule(s). This literature asserts that while central banks may not commit to follow a stated monetary policy rule ex ante, after the event it is most helpful to examine whether this is what they in fact did. Put simply, since central bankers like Alan Greenspan state that they do not believe in following rules, there must be more to understanding *how* they engineered their achievements than to determine that whatever they may have said, to the contrary they did follow a rule.

Moreover, Blinder and Reis (Blinder and Reis 2005) pose a number of important challenges to the rules based approach. First, rules estimated ex post that appear to “fit the behaviour” typically have confidence intervals sufficiently wide that they leave much room for discretion.<sup>7</sup> Second, their estimated rules show that while Alan Greenspan had a stronger response to unemployment than Paul Volcker, the latter had a weaker response to inflation. These two results alone suggest that we need to know more about how policy is actually made. The third challenge to describing policy making via a rule is that monetary policy is made under conditions of uncertainty, and that in turn this uncertainty should condition the behaviour of the policymaker. Well

before the change in the behaviour of monetary policy from 1979, Brainard (Brainard 1967) made the point that if a policymaker is uncertain about the marginal impact of his policy instrument on the target variable, he should probably use the instrument in smaller measures. Blinder (Blinder 1998) expanded this characterisation of the policy response by adding that using small doses of policy probably means that more doses will be required to get the job done. The key point here is that under conditions of uncertainty it is probably best for policy adjustments to be applied gradually (allowing some time to judge their early effects). More recently, other aspects of uncertainty in monetary policy making have been identified and described. One of these concerns uncertainty about key structural parameters of the economy, something that can be derived from models (of the New Keynesian sort) that incorporate, for instance, sticky prices (Clarida, Gali et al. 1999). Another concerns uncertainty on the accuracy of contemporary data on the economy (the data that policymakers have to use at the time). These are typically revised over the succeeding years, making data uncertainty an issue for policy making (Orphanides 1998; Orphanides and Norden 1999; Orphanides 2001). Since monetary policy decisions have to reflect a summary judgment on the recent and expected future behaviour of all parts of the economy as well as on the likely impact on those parts of the policy decision to be taken, it is not surprising that uncertainty abounds. One illustration from the transcripts of the FOMC underlines the challenge faced by policymakers:

“It seems to me that it is pretty soft information to be taking a policy action on. But beyond that, it seems to me that almost everything that was expressed this morning by the various participants was based upon uncertainty. And I don't think we should be making policy on uncertainty. So, I hope that we hold steady for a period of time in the future.” Roger Guffey, President of the Federal Reserve Bank of Kansas City, speaking at a meeting of the FOMC in early 1991 (quoted in (Woodward 2000: 75).

Policy is always made in uncertainty, but the point is that the level of uncertainty perceived by policymakers can vary.

In summary, we conclude that there is a lot more to understanding the shifts in monetary policy in the US than can be revealed by statistical analysis and associated modelling (good though that can be) alone. At root, as with any policy making function, we want to know what policymakers were doing, and why and how they were doing it.

#### **d. Understanding more about why and how policy is made**

For monetary policy, empirical analyses of the “why” question (very little has been done on the “how” question) typically focus on evidence covering the setting of policy (e.g. the realised policy interest rate) and/or the record of voting in the policymaking body. While this focus is in many ways obvious, both sources of evidence have been used in ways that can obscure important issues.

### *i. Policy Setting*

Policy settings (e.g. the interest rate target set by the FOMC) are typically used in reduced-form econometric analysis that seeks to explain the policy-makers' reactions to key economic data etc. This has led to an industry estimating reaction functions or policy rules of various types (these can be applied either at the level of the collective policy decision or to the preferences for policy of individual members) (Taylor 1993; Clarida, Gali et al. 2000; Chappell, McGregor et al. 2005). The problem with the rules-based approach is that while it can helpfully summarise fluctuations in interest rates, it cannot explain the policy formulation process, namely how policy makers react to particular shocks—since every shock is different and has a different source.<sup>8</sup> Put simply, policymakers will want to know why and how a particular shock has emerged before deciding on their reaction. In contrast, rules and reaction functions, because they are of necessity reduced form, will be based on an average response to past shocks which have very different characteristics. For this reason, it would be helpful to find a more nuanced measure of policymakers' reactions. An alternative literature analyses optimal monetary policy (Fuhrer and Moore 1995; Levin, Wieland et al. 1999; Rudebusch and Svensson 1999; Taylor 1999). The attraction of optimal rates is that they make explicit the objective function of the policymaker. But they can often perform poorly as a tool to explain what actually happened precisely because they are parameterised without reference to the actual evidence. A focus on what policy makers say to explain their decisions seems like a promising avenue in this respect.

### *ii. Dimensionality and Voting*

Commentators on monetary policy making tend easily to lapse into talking in dichotomous terms of "easy" or "tight" and of policymakers as "hawks" or "doves". In contrast, policymakers do not talk in these terms. The tendency to focus on the loose:tight dimension may be the product of the theoretical framework (spatial voting theory), the data (i.e., the votes), or some combination of the two.<sup>9</sup>

The focus of our interest is on the "why" and "how" of the change in the preferences of FOMC members towards inflation persistence and the emergence of a credible commitment to low inflation. We are not of the view that a single dimension—namely a yes/no vote on a proposition for a monetary policy setting—can provide the most useful framework in which to examine this change.

Voting records oversimplify the decision-making process. The preferences of FOMC members are likely to be captured only in part by the votes, as others have noted (Meade 2004). Moreover, in the FOMC dissenting votes are infrequent. They occurred in only 7.8% of all votes from 1966-1996<sup>10</sup> (Chappell, McGregor et al. 2005). As Chappell and his co-authors note, "even when there are disagreements within the Committee, evidence of these disagreements may not show up in voting records" (2). These and other authors (Meade 2004; Meade and Stasavage 2004) examine FOMC transcripts in a limited fashion,<sup>11</sup> and with unavoidable subjectivity in the coding of transcript data (a problem, which as will be shown later, our methodology avoids).

We argue that a focus on the limited measure of the votes fails to reveal the arguments that lie behind these votes. We are less concerned with describing voting decisions *per se* and more concerned with understanding *why* members reached the conclusions they did. Our goal is to understand the motivations that drove members, and their

considerations before reaching a decision. Systematic textual analysis ought to reveal more of this by focusing on what FOMC members said and the way they described their views, rather than just their votes.

### III. DATA

#### a. Selection of Transcripts: Choice of Years to Study

Our data derive from the verbatim transcripts of the FOMC meetings for nine years, divided into three time frames: (a) 1979 (in two files, to differentiate the Miller and Volcker chairmanships), 1980 and 1981; (b) 1991, 1992 and 1993; and (c) 1997, 1998 and 1999. These comprise in total ten text files.

From 1936 until March 1976, the FOMC published (after a five-year lag) a record of each of its meetings in the *Memoranda of Discussion*. As described in Chappell et al (Chappell, McGregor et al. 2005) the Fed stopped publication of the *Memoranda*, apparently in response to pending legislation and a lawsuit that would if successful have required earlier publication. But the Fed continued to produce transcripts of meetings for use in producing its published record of policy actions. In 1993, Alan Greenspan acknowledged the existence of these transcripts and soon afterwards agreed to publish them (with some editing) after a five year lag. As our data spans periods both before and after 1993, we are able to examine in part the effect that anticipated public disclosure had on the discussions at committee meetings.

We do not analyze accounts of FOMC meetings prior to 1979 (*Memoranda of Discussion*), as they are not the same as verbatim transcripts (notably because they do not record the contributions of each member by name) and thus would be unlikely to yield comparable results (which is not to say that they would not be interesting to analyse in their own right).

Since 1979, each annual set of transcripts (covering the eight regular FOMC meetings and any additional conference calls held between meetings) amounts to around a quarter of a million or so spoken words. We have chosen nine years covering broadly the beginning, middle and end of the twenty years following the Volcker Revolution (1979-1981, 1991-1993, and 1997-1999). This amounts to over 2.3 million spoken words. It covers three chairmen, starting with the brief period at the start of 1979 when William Miller held the chair. We therefore cover the very last months of the "go/stop" period up to 1979 when policy lacked the resolve to stick at tackling inflation, the beginning of the Volcker disinflation (starting with the Volcker revolution itself), and the subsequent entrenchment of low inflation credibility under Greenspan.

A closer look at the chosen years helps to explain the logic of the choice (we hope).<sup>12</sup> The year 1979 almost speaks for itself, as the year of decisive change (very much a year of two halves). It is therefore the only year that we break into two parts, to mark the change of chairman in the summer and the abrupt change of policy in October 1979. The next two years capture the difficult birth of the Volcker disinflation. The Volcker Fed raised the nominal federal funds target rate sharply from around 11% in September 1979 to around 17% in April 1980. But evidence of a weakening economy caused a pause in the tightening of policy in the early months of 1980. At the same time there was a sharp rise in oil and gold prices and an increase in the nominal long bond rate pointed to rising inflation expectations notwithstanding a weakening of the economy. Concerns were therefore mounting that the go/stop policy was at work again, to which the Volcker Fed responded with a 3% rise in the

nominal funds rate in March 1980. This along with the credit controls imposed in March contributed to the short recession in the first half of 1980. In response the Fed cut the funds rate by 8% between April and July and economic growth recovered towards the end of 1980. But the lesson of 1980 was that utilising interest rate policy to stabilise output would not achieve disinflation. The Volcker Revolution had a difficult start.

The story of 1981 is quite different. The Fed maintained the nominal federal funds rate at a level which (using a contemporary measure of headline inflation) suggested very high short-term real interest rates of as much as 9%. There was a sharp recession towards the end of 1981 and into 1982. The Fed did bring the nominal funds rate down in the second half of 1981, but only in line with the fall in headline inflation, thus preserving high short term real rates. But throughout this period, the long bond rate indicated that inflation expectations remained elevated and thus that the Fed needed to maintain high short term real rates in order to begin to acquire credibility. The disinflation of 1981 marked the beginning of a consistent move to greater credibility.

In the late 1980s, the Greenspan Fed raised the nominal federal funds rate in order to reverse the rise in inflation and inflation expectations (action which had been delayed by the 1987 stock market crash). As a result of those actions, and the recession that accompanied the first Gulf War, inflation began to fall in 1991. But the unemployment rate rose throughout 1991 and into 1992 (the beginning of the "jobless recovery" that followed the recession of the early 1990s). Monetary policy in the early 1990s is quite typically described as being more restrictive than would have been the case if the inflationary pressures of 1987 and 1988 had been dealt with earlier. The Fed was therefore cautious in lowering the funds rate through 1992, but by the latter part of that year it was able to establish a near zero short term real funds rate (the nominal funds rate was more or less equal to headline inflation) which it maintained until early 1994. During this period the unemployment rate fell to 6% without setting off a negative reaction from inflation expectations. This provides prima facie evidence of the greater credibility of monetary policy, but also that by the early 1990s that credibility was not "in the bag".

During 1994 and early 1995 the Greenspan Fed took pre-emptive actions against evidence of a rise in inflation expectations as shown by the long bond rate. The action was successful in that the bond rate subsequently fell and unemployment did not rise. It provided evidence the inflation and inflation expectations were more firmly anchored than before. And it provided the backdrop to our final three year period at the end of the 1990s, during which low inflation was maintained even though the US economy grew in the four percent range on an annual basis between 1996 and 1999, and the unemployment rate fell below 4% for a while. The story of this period is associated with the rise in productivity growth which no doubt helped to hold down inflation. But since the story on productivity growth was only imperfectly realised at the time (and arguably more imperfectly by almost everyone other than Alan Greenspan) it is striking that the credibility of the commitment to low inflation meant that this period of strong growth did not give rise to an increase in inflation expectations which questioned the commitment to low inflation in monetary policy.

## **b. Limitations of the Transcripts**

Our basic approach is to employ automated textual software to obtain a quantitative analysis of inherently qualitative data. We recognize, however, that using the policy-making record of the committee as a measurement device has limitations. While the FOMC transcripts provide

a verbatim record of discussions and deliberations, this does not automatically make them either an easy source to interpret or an inevitable gold mine of analytical insight. Indeed, none other than Alan Greenspan commented (in an FOMC meeting, and hence in a transcript) in October 1993: "People think reading the raw transcripts is a way of learning things; I would suggest that if they spend six or eight months reading through some of this stuff, they won't like it" (Greenspan 1993: 3).

More broadly, however, it is important to assess the value of the spoken record as it sheds light on the motivations, intentions and beliefs of members. Why, for instance, did Alan Greenspan dismiss the likely value of the transcripts for understanding the behaviour of the FOMC? Apart from possibly thinking that reading such lengthy records would not be an exciting task, there may be two other reasons: first, that the real debate takes place outside the FOMC, hence limiting the value of the record; and second, that the existence of the transcripts serves to stifle the quality and force of the debate in the FOMC.

There is some evidence to support both of these contentions. Reflecting on meetings *after* 1993—and therefore in the disclosure period—former Fed Governor Larry Meyer commented:

FOMC meetings are more about structured presentations than discussions and exchanges. This surprised me. Each member spoke for about five minutes [in the review of the state of the economy], then gave way to the next speaker. Many read from a prepared text or spoke from a detailed outline, diverging only occasionally to include a comment on what was said earlier in the meeting. To my surprise, what evolved was not a spontaneous discussion, but a series of formal, self-contained presentations. (Meyer 2004: 39)

Meyer also indicates that Board governors met shortly before FOMC meetings at which the chairman (Greenspan) would share his views on the economic outlook and where he was leaning on the policy decision. Meyer describes these sessions as "a much truer give-and-take, a serious exchange of ideas" (Meyer 2004: 51).

There is also some evidence to support the idea that releasing the transcripts itself has the effect of stifling debate. In the June 1998 transcript, President Ed Boehne of the Philadelphia Federal Reserve Bank commented:

Quicker and more complete disclosure already has changed the nature of the Committee's deliberations. I am for the disclosure that we do, but we should not mislead ourselves about how it has changed the nature of these proceedings. I recall participating in routine, vigorous, and freewheeling debates in this room before we decided to release transcripts. Now, most of us read prepared remarks about our Districts and the national economy and even our comments on near-term policy sometimes are crafted in advance. Prepared statements were the rare exception rather than the rule until we started to release transcripts.

What difference did disclosure make to committee deliberations? One of the key findings in this paper is that we provide quantitative evidence to support Boehne's depiction of the "freewheeling debates" (i.e., more deliberative discourse) before 1993 and "prepared statements" after this date. More generally, however, we advance two reasons *a priori* to



anticipate valuable insights from our analysis of the transcripts: (1) advanced textual analysis of policy meetings offers a new way to interrogate and understand vast amounts of textual data (as noted above, we analyze over 2.3 million words of data over a nine year period) ; and (2) the FOMC is after all the policy-making meeting – it would be surprising if it was totally vacuous. Indeed, Larry Meyer concludes in more promising fashion:

So was the FOMC meeting merely a ritual dance? No. I came to see policy decisions as often evolving over at least a couple of meetings. The seeds were sown at one meeting and harvested at the next. So, I always listened to the discussion intently, because it could change my mind, even if it could not change my vote at that meeting. Similarly, while in my remarks to my colleagues it sounded as if I were addressing today's concerns and today's policy decisions, in reality I was often positioning myself, and my peers, for the next meeting. (Meyer 2004: 53)

Meyer's comments implicitly urge researchers to adopt a longer-term approach to understanding the discourse and framework of arguments in FOMC meetings. Our approach in this paper therefore offers a way to examine not just a more static assessment of the meetings in a given period, but more importantly, a way to gauge the longer-term evolution of thinking on monetary policy by FOMC members.

#### **IV. METHODOLOGY**

Automated content analysis of political texts has captured the attention of political scientists, with researchers seeking to measure empirically the policy positions from political party manifestos and legislative speeches (Gabel and Huber 2000; Laver and Garry 2000; Laver and Benoit 2002; Laver, Benoit et al. 2002; Albright 2007; Benoit and Mikhailov 2007; Slapin and Proksch 2007), the dynamics of issue-evolution in Congress (Monroe, Colaresi et al. 2008), political culture (Garson 2002), and to classify or extract meaning from political texts more generally (Hillard, Purpura et al. 2007; Hopkins and King 2007; Klebanov, Diermeier et al. 2008).

A variety of packages are on offer for automated content analysis, each providing its own array of analytical tools and insights into textual data.<sup>13</sup> Some packages appear well-suited to analyze very large corpora encompassing multiple topics, but usually these require a pre-coded or pre-scaled reference document from which "fixed parameters" (Lowe 2008) may be derived and employed on other documents (or the larger population of documents) to scale, code and/or classify these documents (Laver, Benoit et al. 2003; Hopkins and King 2007). Other approaches employ machine-learning in order to mitigate the costs of human labeling, although they recognize that human intervention to monitor and guide the analysis cannot be avoided (Hillard, Purpura et al. 2007). Alceste, the approach used here and elsewhere in the social sciences,<sup>14</sup> does not require any pre-coding but is more limited in that it cannot analyze very large corpora<sup>15</sup> nor corpora containing multiple discrete topics. Its chief advantage for speeches is that it allows the researcher to analyze statistically and spatially the intersection of characteristics of the speakers with the tendency of those speakers to develop and focus on particular themes or arguments. A more detailed description of the Alceste method is given in our appendix.

We use full text analysis software to discern the beliefs and intentions of FOMC members, the deliberative process within the committee setting, and ultimately how they arrived at their policy decision. By employing a longer-time frame we seek to

understand the means by which preferences evolved from the period of high inflation (the Great Inflation) to the subsequent period of sustained low inflation (the Great Moderation). Our primary methodological goal is to obtain a *systematic and quantifiable* account of the decision making process in the FOMC meetings for the three periods under examination.

By full text we mean that the software literally analyses every spoken word and through that maps a framework of argument and associates different elements of that framework with individual policymakers. In contrast with the partial coding of other analyses of these transcripts (Meade 2004; Meade and Stasavage 2004; Chappell, McGregor et al. 2005), we use the full transcripts of meetings of the FOMC. Our approach enables us to weight numerically the relative importance of the main identified themes and the significance (using  $\chi^2$  values) of the association of individual policymakers with the themes.

Our premise is that the beliefs and arguments espoused by individual FOMC members should produce a distinct pattern of association between individuals and themes. We maintain that different themes of discourse that use different vocabulary will result in an observed word distribution that deviates systematically from one where the words are independent of each other. Hence, we infer conditional independence of the structure of words and individuals for a given theme; patterns which deviate significantly and fit with our expectations for a particular theme are thereby evidence of the existence of that theme among FOMC members in a given time period.

As our focus is on the monetary policy decision of the FOMC, we have edited the transcripts to exclude extraneous material<sup>16</sup> and included "tag lines" to identify each speaker's name, member type (chairman, board governor, bank president, or staff). We have also standardized key terms (e.g., the Fed, M1, M2, IMF, and so on) so as to impose control over the lemmatization process and to allow direct comparisons using other software (e.g., our next stage is to re-analyze these data with T-Lab). This procedure around the lemmatization process means that our results for 1979 and 1980 vary slightly from those reported in (Bailey and Schonhardt-Bailey 2008), but the substantive findings remain unchanged.

## **V. ANALYZING FOMC TRANSCRIPTS WITH ALCESTE**

### **a. Basic Statistics**

Tables 1 through 3 provide a summary of the basic statistics for the nine years of FOMC meeting transcripts. As 1979 is divided into two files, thereby separating the Miller and Volcker chairmanships, we present the results for ten text files. In each text file, every speech or interjection by a committee member constitutes a "case" and each is identified (or "tagged") with the characteristics listed above.<sup>17</sup> The analysis produces  $\chi^2$  values for these tags as they relate to each of the classes. Where a policymaker's name tag obtains a high  $\chi^2$  value (i.e., 3.84 or greater, with 1 degree of freedom—or statistical significance at 5%) for a given class, the policymaker's comments are likely to be closely related to the thematic content of that class.

[Tables 1 through 3 – About here]

The "Initial Context Unit", or ICU, is essentially the sampling unit—i.e., a pre-existing division of the text and is specified by the user—and here, ICUs are the speeches or comments of committee members. For instance, under Miller, members made 1062 comments; under Volcker (1979), they made 2349—totalling 3411 for the year. In 1980, members made 3422 comments, and in 1981, 5899 comments.

An "Elementary Contextual Unit", or ECU, is constructed by Alceste based on word and punctuation patterns in the text, and can be thought of as a representative sentence for each class. ECUs are then classified, following the same procedure for word classification (described more fully in our appendix). From Tables 1 - 3, we can see that the classification rates range from 66 % in 1997 to 86 % in 1993, averaging about 77 % across the ten text files.

[Table 4 – about here]

The final two rows in Tables 1 - 3 indicate the number of classes identified in each set of transcripts and the relative size of each class (as measured by the percentage of the total ECUs classified within each), followed by our numeric classification of all the classes across the nine years into broader thematic groups. (We list these broader groups in Table 4.) We have added the labels for each class (e.g., State of the Economy in the Districts, Staff Assessment of the Monetary Policy Stance, and so on) based on an analysis of the most characteristic words for each class (those with high  $\chi^2$  values)<sup>18</sup> and the most representative ECUs for each class. In a future (book-length) version<sup>19</sup> of this paper we will provide examples of the top<sup>20</sup> representative words and ECUs for each thematic group of classes. Our labelling of the classes stems not only from the top representative words and sentences (ECUs), but also from the dozens of other representative words and the list of ECUs for each class that are given in the detailed reports generated by Alceste. As both the words and ECUs are ranked by  $\chi^2$  values, the relative importance (in terms of statistical significance) of key words and phrases is readily apparent.

## b. Key Findings

[Tables 5a, 5b, 6a, and 6 b, about here]

Tables 5a, 5b, 6a and 6b contain our core findings. Table 5a is a summary of the more extensive tables presented in our appendix (A1 through A10), while 5b condenses the findings even further. Tables A1 – A10 list the levels of statistical significance of individual members of the FOMC for each thematic class in all the ten text files. That is, statistical significance for a given member means that that the discourse of that member is highly associated with the thematic content of the class. Table 5a then presents a simple count of the highly significant member types (chairman, board governor, bank president, staff) for each of our broad thematic groups, as listed in Table 4. Table 5b narrows our nine broad categories into two groups. The first contains themes 1 through 6, all of which seek to assess the economy and in particular, examine the relevant data and applicable models and forecasts. The second contains themes 7 through 9, which contain the more deliberative and speculative discourse.

Table 6a employs the same broad categorizations of thematic groups and then summarizes the weighting of classes given in Tables 1 – 3 (last row) Table 6b condenses those weights even further, following the template for Table 5b but with a further division in the deliberative discourse between that focusing on the immediate decision on monetary policy (group 7) and that focusing on the more speculative and longer-term discussions of monetary policy strategy (groups 8 and 9).

Our first cut into understanding the results is a simple plausibility check—i.e., do the results accord with what we might expect FOMC members to discuss in particular notable instances? Some clear examples confirm that the textual analysis has produced results that accord with key markers in US monetary policy history.<sup>21</sup> First, a striking anomaly from Table 6a is the attention given to financial stability and the banking system (group 6) in 1991—anomalous given the absence of similar content for any of the other years. And yet, this finding makes sense in that 1991 saw the height of the Savings and Loan crisis, and thus, one might expect significant discussion of the crisis among FOMC members. A second anomaly from Table 6a is the large weight (18%) given to discussions of the world economy in 1998 (group 5)—again, a singular appearance of this class across all the years. But, as the Asian financial crisis prevailed during 1998, once again our findings appear to fit with the known timeline of events.

Our second cut is a more fundamental examination of the bearing of our results on the evolution of FOMC preferences and the deliberation of members over our three time periods. We obtain three important findings from our analysis.

First, from Table 6b, we observe a clear trend in the role of deliberation in FOMC meetings—in short, its weight in the overall discourse diminishes conspicuously in the later Greenspan period. Viewing groups 7 through 9—i.e., themes that, together, constitute aspects of policy deliberation—across the three periods we find that the average weight for the 1979-1981 period is 58%, for 1991-1993, it is 55%, but by the late 1990s, its weight had declined to just 34%. Conversely, more discourse is devoted to assessing the US and world economy, financial markets, Fed's market operations and so on (groups 1 through 6) in the later period—i.e., these groups obtain an average weight of 42% in the first period, 46% in the second period, and 67% by the late 1990s.

In a related vein, we note from Table 6a that uncertainly around the FOMC decision on the monetary policy stance (group 8) falls away entirely in the late 1990s, achieving a weight of zero. Even if we combine group 8 with the broader discussions on the monetary policy stance and strategy (group 9) in Table 6b, we find that together, the average attention given to these themes falls from 35% in the early period, to 29% in the early 1990s, and 18% in the late 1990s.

There are at least two possible explanations for the apparent decline of deliberation in the FOMC, which we can broadly class as process and substance. The process explanation reflects the Boenhe and Meyer comments from earlier, namely that the FOMC deliberation became more formulaic and less deliberative as the reality of transparency (the expected publication of the transcripts) drove the real deliberation out of the FOMC meetings and into unrecorded "pre-meetings", with the FOMC becoming the place for reading of prepared texts. If so, then we have evidence to support the negative impact of what we might call "extreme transparency" of policy making. One inconvenient result from our analysis for the simple Meyer interpretation is that over our time period the Board Governors appear to make a

larger contribution to FOMC meetings in the later years than they did in the early Volcker period. If the FOMC became more of a ritual, why would they do this? For this reason, we are inclined to think that our results provide more support for the more nuanced Meyer interpretation, namely that the FOMC deliberation may have become more "structured" but the meetings still provided the platform for ideas to be debated and developed into policy. The second explanation for the decline in deliberation over our twenty year period has to do with the substance of monetary policy, namely that as the battle against inflation was won, so the degree of uncertainty around the policy decision declined. Few, if any, central bankers would agree that uncertainty over the interpretation of the economy has declined with time, but it is more plausible to think that uncertainty over the framework of monetary policy has declined, and our results appear to pick this up. So, in sum, both arguments for the decline in the weight given to deliberation over time may well have some merit: the process of deliberation appears to have become more highly structured over time; and uncertainty around the framework of policy declined as the credibility of the Fed rose and acceptance of the benefits of sustained low inflation became entrenched.

A further related finding revealed in Table 5a is that unlike Volcker & Miller, Greenspan attracts highly significant scores in contributing to discussions on the US economy (groups 1 & 2) in the late 1990s. We should not be surprised by this, as it fits Greenspan's well-known reputation for studying the data very hard and his conviction in the late 1990s that there was something important to be seen in the evidence on productivity growth in the US (our results confirm this as the classes for 1999 include one devoted to productivity growth). So, another reason for the observed change in the balance between studying the evidence and deliberating on the decision is that Greenspan showed a statistically significant association with those parts of the meeting devoted to studying the data.

Our second finding examines changes in emphases across the three chairmanships. From Table 6a we see that in 1979-1981, Volcker's FOMC meetings placed a large emphasis on monetary policy and strategy (group 9). This discourse averaged 30% for the three Volcker years (1979, in part, 1980 and 1981). This is not surprising in view of the process of feeling towards a successful disinflationary strategy. Our results are in this sense a reminder that the Volcker Revolution was not a quick move to credible disinflation.

On the face of it, it is perhaps more surprising that the significant identification of discussions of the monetary policy stance and strategy disappears entirely in the early Greenspan period (1991, 1992 and 1993) but by the late 1990s it re-emerges, averaging 18% of the classified discourse. But this needs to be set into the context of the finding of a larger weight given to deliberation on the immediate interest rate decision in 1992 (46%) and the largest scores for uncertainty around the decision in the other two years of this period (32% in 1991 and 56% in 1993). We will need to probe these results more by studying in more detail the identified key phrases (ECUs) to see if they provide a coherent explanation. For now, we conclude that by the early 1990s the strategy towards achieving sustained low inflation and hence credibility for the policy framework was more settled but the final victory was not yet achieved. The strategy was much less "up for grabs" but reaching a decision and the uncertainty around that remained more of an issue as long as the FOMC felt that it had not yet established a fully credible framework of low inflation. By the late 1990s that credibility was much less in doubt, but new issues had emerged surrounding how the monetary policy strategy should deal with the implication of faster productivity growth and the implications for the natural rate of unemployment.

Our third main finding concerns the relative contributions of FOMC members, and has two parts, the apparent change in the role of the reserve bank presidents and the change in the role of the board governors. Table 5b provides a summary of these findings using the broad categorisation of themes (Assessment of the Economy and Deliberation on Policy). Our results suggest that the presidents were much larger contributors to deliberation on policy in the Miller-Volcker period than they were in the Greenspan period, and particularly so in the later Greenspan period. In contrast, the presidents appear to have played a larger role in the assessment of the economy in the Greenspan period, and particularly so in the late 1990s. The governors appear to have played a somewhat larger role in the deliberation in the Greenspan period, but are most noted for their larger contribution to the assessment of the state of the economy (for which they attract no significant scores in the Miller-Volcker period).

Tentatively, we draw a number of conclusions. First, we see some support for Meyer's view that in the Greenspan period the deliberation on monetary policy was more a matter for the chairman and board governors. We might also draw some support for the suggestion from Blinder and Reis (Blinder and Reis 2005) that the Clinton Administration appointed better governors than its predecessors. As for the presidents, the finding that they played a larger role in the assessment of the economy in the Greenspan period is consistent with the view that Greenspan placed much more emphasis on drawing out information on the state of the economy that was not revealed in the official statistics. Thus the so-called "go-round" section of the FOMC,<sup>22</sup> in which each member, and particularly the presidents, provide their assessment of developments in the economy since the last meeting (with the presidents providing first hand accounts of what they see on the ground in their districts) appears to have grown in importance under Greenspan. Perhaps more surprising is the finding that the presidents attracted a higher weight of scores on deliberation on policy in the Miller-Volcker period. This is, of course, consistent with the view that the board governors were weaker than their successors. It may, however, also suggest a deeper shift in the relative standing of the reserve banks and board over time, which our methodology has allowed us to quantify. Tentatively, we conclude that in the era of higher inflation there was as we have found, more uncertainty around the strategy of monetary policy and more scope for disagreement (consistent with the assessment by Arthur Burns on the failings of the Fed to address the inflation problem and the restrictions it faced from Congress and Administrations on doing so). There is a well documented history within the Federal Reserve System of some reserve banks to take a quite different view on monetary theory and the right approach to tackling the inflation problem (the Federal Reserve Bank of St Louis was consistently in the monetarist camp), and more so in the period of high inflation. It would therefore be consistent for our results to show that in the period of high inflation when (as Burns described) the Fed appears to have felt constrained by the prospect of retaliation from Congress and/or the Administration, more of the debate came from the "outside Washington" presidents. But this is a tentative conclusion pending a more intensive study of our results.

## VI. CONCLUSION

The story of what happened to change the story of monetary policy in the US from one of "anguish" (to use the term coined by Arthur Burns) to the successful establishment of persistent low inflation by Paul Volcker and Alan Greenspan since 1979 has been extensively studied, but in our view still has gaps in terms of understanding *why* and *how* policy changed. Much of the extensive literature seeks to infer answers to these questions by studying the *what* of policy, but in doing so lacks a direct observation of what policy makers thought they were doing. Yet the "anguish" set out by Burns directly addressed the issue of the failing of

policymakers to tackle the issue. So, we think it is reasonable to conclude that observing policymakers directly can add value when it comes to answering the *why* and *how* questions.

We take a step in this direction by using the transcripts of FOMC meetings and subjecting them to systematic analysis of the comments made by members. We believe that it is important to do this systematically in order to avoid any inadvertent bias that could arise from manual selection of text to study. Moreover, we think that monetary policymaking is fertile ground for this type of study because it involves decision making by deliberation in a committee setting. Generally, we think that too little attention has been given to understanding the process of deliberation in policymaking and how this yields outcomes (decisions) and the quality of those outcomes. Very few decisions on public policy are taken without some form of deliberation. Our work in the field of US monetary policy seeks to examine two key areas of deliberation, on the policy decisions themselves (using the FOMC transcripts) and on the Fed's accountability to Congress for those decisions (using the records of the Congressional Hearings on monetary policy (Bailey and Schonhardt-Bailey 2009)).

Systematic textual analysis produces a vast amount of "output" in terms of results. This paper focuses on summary measures of those results in an attempt to provide some clear high level conclusions on the change in policymaking over the twenty year period that we study. We expect to put more flesh on the bones of our results by studying the detail of the output, particularly the choice of representative statements that emerges from the analysis. But, for now, we think that we have some clear conclusions that point to an enhanced understanding of how the change in monetary policy happened (the summary results provide less clarity on the question of *why* policy changed, but we might hope that the more detailed results will help there).

We can discern five broad themes that might explain more about the change in policy, and the relief of the "anguish" of Arthur Burns:

1. Change in understanding of the facts of the behaviour of the economy (*data*);
2. Change in the quality of modelling and understanding of monetary strategy (*models and strategy*);
3. Change in the process of deliberation in the FOMC (*deliberation*);
4. Change in the contribution of members of the FOMC (*composition*);
5. Change in the broad societal and political pressures identified by Burns (*society and politics*).

Briefly, our findings can be summarised as follows. We find a clear increase in the focus on assessing the state of the economy (*data*) which is associated with Alan Greenspan's time as chairman but may well also reflect a shift of the deliberation process as the framework and strategy of monetary policy becomes less uncertain with the establishment of a credible low inflation record. We see a pattern of development on *models and strategy* whereby the early years of the Miller chairmanship and the initial period of the Volcker disinflation are characterised by substantial uncertainty as we might expect, but this declines in the middle period (the early 1990s) as the framework of the low inflation policy became clear. Interestingly, we observe a re-appearance in the later period notwithstanding the greater clarity on the framework of low inflation, and we put this down to uncertainty on the impact of the productivity shock.

We observe a marked decline in the focus on *deliberation* by the FOMC over time. This is consistent with the increased attention to *data* and the greater clarity on the framework of low

inflation. But it may also reflect changes in the process of deliberation, including the impact of FOMC members knowing (after 1993) that their comments would be on the public record (albeit with a five year delay). So, it is possible that the decline in deliberation reflects the impact of "extreme transparency". In terms of the *composition* of the contributions from FOMC members, we observe a clear shift in the weight of contribution from Reserve Bank Presidents, from deliberation to the assessment of the economy, and an increase in the contribution of the Board Governors. This is consistent with the increased emphasis over time on *data*. It may also be consistent with the view that the quality of appointments as Governors improved over time. And, we may also see a story whereby in the early period the Presidents (who did not owe their appointment to a political process) were a counterweight in the deliberation to the problematic consensus that Burns had identified as infecting the Fed. This counterweight has become much less necessary as the consensus on low inflation has become established.

Finally, we find that the FOMC transcripts have nothing to say about *society and politics* in terms of the external pressures identified by Burns. This is not surprising because the transcripts more or less capture only discussions on the monetary policy decision itself. Moreover, our work on the Congressional hearings is more likely to pick up these issues (Bailey and Schonhardt-Bailey 2009).



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<sup>1</sup> Alan Blinder notes the important and value of committees making monetary policy as part of what he identifies as "the Quiet Revolution" in central banking (Blinder 2004).

<sup>2</sup> This can be thought of in an optimisation framework in which the central bank seeks to minimise a quadratic loss function with the inflation and output gap as arguments for given structural parameters of the macroeconomy (Beechey and Österholm 2007).

<sup>3</sup> We sought to address these questions in (Bailey and Schonhardt-Bailey 2008).

<sup>4</sup> Ironically, the Burns lecture was chaired by his predecessor William McChesney Martin, who famously described the role of the central banker as being to take away the punch bowl just as the party was getting going.

<sup>5</sup> Burns was describing a Federal Reserve that had statutory independence but either did not or could not put this to effect.

<sup>6</sup> One argument to explain the success of monetary policy in the 1990s rests on luck in terms of policy makers' understanding of the natural rate of unemployment in the model of the economy (Mankiw 2001). If wages lag behind productivity, then accelerating productivity growth will lower the natural rate of unemployment until wages catch up. But if the central bank is unaware of the falling natural rate of unemployment it may leave more spare capacity in the economy than it realises or would intend if it had learned the new story, thus putting downward pressure on inflation.

<sup>7</sup> Their estimated rule for the Greenspan era has a 95% confidence interval for the predicted federal funds policy rate on any given date that is 130 basis points wide.

<sup>8</sup> The feedback coefficients in estimated rules do not have a structural interpretation and do not identify key policy parameters, such as the implicit inflation target (Dennis 2004).

<sup>9</sup> The single dimensionality assumption that underlies much of the empirical analysis of FOMC voting behavior either implicitly or explicitly rests upon the spatial voting model (e.g., (Chang 2003)). In this model, the single dimension is usually described in terms of ideology (conservative or liberal), and while other dimensions may be relevant, one dimension enables greater simplicity in terms of modelling and testing. Morris, for example, defends the simplicity associated with a single dimension and in essence, suggests that considering further dimensions is not worth the added complexity:

While monetary politics is certainly complex, it is not clear that the payoff associated with modelling in a multidimensional space would be worth the cost in added complexity. It is a convention for those studying monetary policy to write of monetary 'ease' and monetary 'tightness', of more expansionary monetary policy and more restrictive monetary policy. Ease and tightness are clearly captured in a single dimension, and it is not obvious what other aspects of monetary policy-making would be captured with additional dimensions. (Morris 2000: 38)

The problem revolves around the meaning of a "dimension". In spatial voting theory, dimensionality in an issue space refers to a mechanism that constrains actors' attitudes across a variety of issues. As Poole explains,

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The presence of constraint means that a voter's positions on a variety of specific issues can be captured by her position on one or two fundamental dimensions such as liberalism-conservatism. The presence of constraint implies *two* spaces—one with a few fundamental dimensions, and a second, high-dimensional space representing all the distinct issues. . . . For example, suppose there are  $s$  fundamental dimensions,  $p$  voters, and  $n$  issues, where  $s < n$ . Let  $\mathbf{X}$  be the  $p$  by  $s$  matrix of ideal points of the  $p$  voters on the  $s$  dimension, and let  $\mathbf{Y}$  be the  $p$  by  $n$  matrix of voters' ideal points on the  $n$  issues. The presence of constraint means that the voters' positions on the fundamental dimensions  $\mathbf{X}$  generate all the issue positions  $\mathbf{Y}$ ; that is,  $\mathbf{X}\mathbf{W} = \mathbf{Y}$ , where the  $s$  by  $n$  matrix  $\mathbf{W}$  maps the fundamental dimensions onto the issue dimensions. (Poole 2005: 13-14)

The low-dimension space is generally thought of as the "basic space" which allows the researcher the ability to predict an actor's position in the high-dimensional or "action space". (Poole 2005: 14) It is the latter that contains the multitude of policy issues on which voters have preferences, and the constraint mechanism operates to bundle together many of these issue positions.

Thus, when spatial theorists refer to dimensionality, they are usually thinking of a basic dimension which constrains voters' positions on a number of policy issues—being a conservative, for example, implies a preference for lower levels of taxation and lower levels of public spending. The key dimension is ideology and it is one's position on this dimension that allows us to predict a person's position on government spending, taxation, social services, and so on. In Poole's illustration, low-dimensional maps "show the low-dimensional space underlying individuals' evaluations (the  $\mathbf{X}$  space)—not the multidimensional issue space (the  $\mathbf{Y}$  space)" (Poole 2005: 14) .

The problem with this framework for analysing FOMC voting is that monetary policy making is a single issue, thus  $n = 1$  (hence bundling is not relevant). Some researchers then assume that the basic constraint mechanism is loose:tight, meaning that  $s = 1$ . Not only does this not square well with the standard interpretation of dimensionality in spatial voting theory (from the example above,  $s < n$  fails to apply), but the conception of this basic dimension is itself vacuous: loose:tight contains no broader ideology from which we might predict FOMC members' preferences on other policy dimensions. Divergent partisan preferences do not appear to explain the behavior of FOMC members (Falaschetti 2002), and so we cannot infer party labels from the loose:tight continuum. This continuum is mere description—there is no basic constraint mechanism at work (i.e., no underlying substantive content).

<sup>10</sup> Meade estimates a 30% rate of internal dissent, based upon her reading and manual coding of the transcript data (Meade 2004).

<sup>11</sup> Some authors adopt a more ad hoc approach (e.g., (Abolafia 2004).

<sup>12</sup> Much of the following narrative is drawn from Goodfriend 2003.

<sup>13</sup> See NEMIS (Network of Excellence in text Mining & its applications in Statistics) for a brief survey of 124 text analysis software packages (<http://nemis.cti.gr/>). For a showcase of software used in political science, see <http://www.purpuras.net/apsagroup/>. For free software for coding text, see <http://www.qdap.pitt.edu/cat-updates.htm>.

<sup>14</sup> Examples of its application in the social sciences include: (Noel-Jorand, Reinert et al. 1995; Lahlou 1996; Noel-Jorand, Reinert et al. 1997; Brugidou 1998; Brugidou 2003; Noel-Jorand, Reinert et al. 2004; Schonhardt-Bailey 2006; Bailey and Schonhardt-Bailey 2008; Schonhardt-Bailey 2008).

<sup>15</sup> Although subsequent versions may allow a larger corpus, Alceste 4.7 requires that the corpus not exceed 15 mb.

<sup>16</sup> The discussions exclude from analysis include: the micro detail of Federal Reserve foreign exchange operations (e.g., the so-called warehousing arrangements); staff research studies which, while having a broad impact on policy, were not directly related to the immediate decision; leaks of information; the annual process of re-appointing the chairman and system manager; and so on.

<sup>17</sup> Other relevant tags include whether the member is currently a voting or non-voting member (as bank presidents rotate voting rights and staff members do not vote) and the year of the meeting. The latter tag is intended for use in subsequent analysis of combined years.

<sup>18</sup> The minimum chi-square value for selecting a word is as follows for each file: 7 (Miller 1979), 16 (Volcker 1979), 20 (1980), 16 (1981), 17 (1991), 15 (1992), 16 (1993), 19 (1997), 16 (1998), and 16 (1999). The higher thresholds for the post-Miller transcripts reflect the relatively larger word counts for these text files compared with that of the Miller file. The basic rule of thumb with Alceste is (as with any data)—the more data, the easier it is to attain statistical significance. Hence,

for files with more data, the threshold for statistical significance is set higher (with 20 being the top threshold set within Alceste).

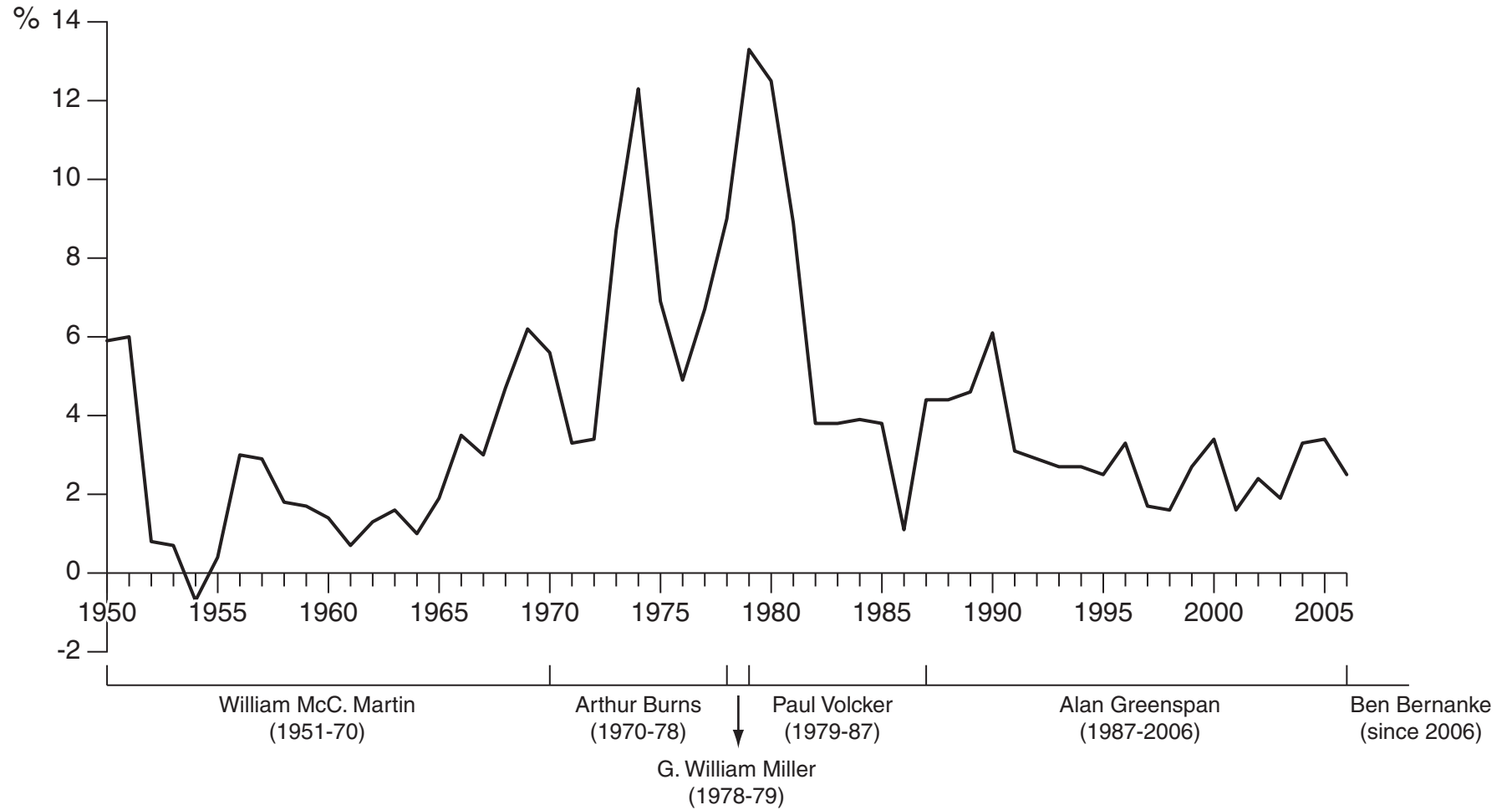
<sup>19</sup> In our book manuscript, we include a full textual analysis of the congressional hearings of the House and Senate banking committees on monetary policy from 1976-2008.

<sup>20</sup> "Top" defined by highest ranking  $\chi^2$  values.

<sup>21</sup> Our analysis of the text files is focused on the monetary policy making process of the FOMC. We have therefore not included those parts of the meetings that form outside the discussion of monetary policy (for instance discussions that happened after the committee reached its decision on monetary policy, and were thus distinct). In fact there were few such elements to the meetings, but a prime example is the discussion of the failure of the Long Term Capital Management hedge fund in 1998.

<sup>22</sup> Our appendix A details the structure of the FOMC meeting under Greenspan.

Figure 1: US Consumer Price Inflation (% Change YOY Dec/Dec)



Source: US Department of Labor, Bureau of Labor Statistics

**Table 1: Basic Statistics for FOMC transcripts, 1979 (Miller), 1979 (Volcker), 1980 and 1981 [new Alceste]**

	<b>FOMC Transcripts, 1979 (Miller)</b>	<b>FOMC Transcripts, 1979 (Volcker)</b>	<b>FOMC Transcripts, 1980</b>	<b>FOMC Transcripts, 1981</b>
Total Word Count	99,592	183,361	257,941	344,401
Unique Words Analyzed	38,177	71,664	99,906	132,087
Passive Variables (Tagged Indicators)	55	48	48	65
I.C.U.s (= number of speeches / comments)	1062	2349	3422	5899
Classified E.C.U.s	2132 (= 69% of the retained E.C.U.)	4802 (= 79% of the retained E.C.U.)	6799 (= 82% of the retained E.C.U.)	7125 (= 78% of the retained E.C.U.)
Lexical Classes	6	5	4	4
Distribution of Classes (%) and Thematic Content <b>[thematic group, in bold]</b>	<p>1 (15) <i>Uncertainty on Setting the Target Range for Monetary Aggregates</i> <b>[8b]</b></p> <p>2 (15) <i>Uncertainty on the Interest Rate Decision</i> <b>[8a]</b></p> <p>3 (11) <i>US Economy Performance (Credit Conditions &amp; Inflation)</i> <b>[1a]</b></p> <p>4 (12) <i>US Economy Performance and Staff Forecast (Demand and Output)</i> <b>[2a &amp; 2b]</b></p> <p>5 (10) <i>Fed's Market Operations</i> <b>[4]</b></p> <p>6 (37) <i>Deliberation on Target Ranges for Monetary Aggregates &amp; Interest Rates</i> <b>[7b &amp; 7c]</b></p>	<p>1 (32) <i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation)</i> <b>[1b &amp; 2b]</b></p> <p>2 (20) <i>Deliberation on Target Ranges for Monetary Aggregates</i> <b>[7c]</b></p> <p>3 (20) <i>Effectiveness of Monetary Policy—Uncertainty over the Transmission Mechanism</i> <b>[8c]</b></p> <p>4 (16) <i>Reserves Levels and the Fed's Market Operations</i> <b>[4]</b></p> <p>5 (12) <i>Impact of the Volcker Revolution including Communication of the Policy Change</i> <b>[9b]</b></p>	<p>1 (47) <i>Striving for Credibility</i> <b>[9b]</b></p> <p>2 (15) <i>Deliberation on the Target Ranges for Monetary Aggregates &amp; Interest Rates</i> <b>[7b &amp; 7c]</b></p> <p>3 (26) <i>US Economy Performance &amp; Staff Forecast for Demand and Output (Evidence of Weakening)</i> <b>[2a &amp; 2b]</b></p> <p>4 (11) <i>Performance of Non-Borrowed Reserves Relative to Target</i> <b>[3]</b></p>	<p>1 (32) <i>Choice of Monetary Policy Target/Framework</i> <b>[9a]</b></p> <p>2 (20) <i>Deliberation on Target Ranges for Monetary Aggregates &amp; Non-Borrowed Reserves</i> <b>[7c &amp; 7d]</b></p> <p>3 (21) <i>Reserves Levels &amp; the Fed's Market Operations</i> <b>[4]</b></p> <p>4 (27) <i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation)</i> <b>[1b &amp; 2b]</b></p>



**Table 2: Basic Statistics for FOMC transcripts, 1991, 1992, and 1993 [new Alceste]**

	<b>FOMC Transcripts, 1991</b>	<b>FOMC Transcripts, 1992</b>	<b>FOMC Transcripts, 1993</b>
Total Word Count	224,962	225,627	206,064
Unique Words Analyzed	92,035	93,477	84,822
Passive Variables (Tagged Indicators)	51	57	42
I.C.U.s (= number of speeches / comments)	1341	1161	1046
Classified E.C.U.s	5172 (= 83% of the retained E.C.U.)	4385 (= 72% of the retained E.C.U.)	4809 (= 86% of the retained E.C.U.)
Lexical Classes	6	5	5
Distribution of Classes (%) and Thematic Content <b>[thematic group, in bold]</b>	<ul style="list-style-type: none"> <li>1 (25) <i>State of the Economy in the Districts</i> <b>[1c &amp; 2c]</b></li> <li>2 (12) <i>Financial Market Developments and Fed's Market Operations</i> <b>[4]</b></li> <li>3 (12) <i>Staff Assessment of the Monetary Policy Stance</i> <b>[7a]</b></li> <li>4 (10) <i>Credit Conditions, Banking System Stability</i> <b>[6]</b></li> <li>5 (9) <i>Deliberation on the Interest Rate Policy Decision</i> <b>[7b]</b></li> <li>6 (32) <i>Uncertainty Around the Interest Rate Decision</i> <b>[8a]</b></li> </ul>	<ul style="list-style-type: none"> <li>1 (18) <i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation)</i> <b>[1b &amp; 2b]</b></li> <li>2 (14) <i>Staff Assessment of the Monetary Policy Stance</i> <b>[7a]</b></li> <li>3 (22) <i>State of the Economy in the Districts</i> <b>[1c &amp; 2c]</b></li> <li>4 (32) <i>Deliberation on the Interest Rate Policy Decision</i> <b>[7b]</b></li> <li>5 (14) <i>Financial Market Developments &amp; Fed's Market Operations</i> <b>[4]</b></li> </ul>	<ul style="list-style-type: none"> <li>1 (56) <i>Uncertainty on the Model of the Economy and Appropriate Monetary Policy Strategy</i> <b>[8c]</b></li> <li>2 (15) <i>State of the Economy in the Districts</i> <b>[1c &amp; 2c]</b></li> <li>3 (12) <i>US Economy Demand and Output Performance, and Staff Forecast</i> <b>[2a &amp; 2b]</b></li> <li>4 (9) <i>Deliberation on the Interest Rate Decision</i> <b>[7b]</b></li> <li>5 (8) <i>Fed's Market Operations</i> <b>[4]</b></li> </ul>

**Table 3: Basic Statistics for FOMC transcripts, 1997, 1998, and 1999 [new Alceste]**

	<b>FOMC Transcripts, 1997</b>	<b>FOMC Transcripts, 1998</b>	<b>FOMC Transcripts, 1999</b>
Total Word Count	258,552	268,772	262,514
Unique Words Analyzed	112,422	117,365	113,272
Passive Variables (Tagged Indicators)	40	63	36
I.C.U.s (= number of speeches / comments)	1097	1223	999
Classified E.C.U.s	4607 (= 66% of the retained E.C.U.)	6250 (= 82% of the retained E.C.U.)	4910 (= 71% of the retained E.C.U.)
Lexical Classes	5	7	8
Distribution of Classes (%) and Thematic Content <b>[thematic group, in bold]</b>	<p>1 (25) <i>Choice of Target to Achieve Monetary Stability; Role of Money Ranges</i> <b>[9a]</b></p> <p>2 (15) <i>Staff Assessment of the Monetary Policy Stance, and Deliberation on the Interest Rate Decision</i> <b>[7a &amp; 7b]</b></p> <p>3 (24) <i>State of the Economy in the Districts</i> <b>[1c &amp; 2c]</b></p> <p>4 (8) <i>Financial Market Developments</i> <b>[4]</b></p> <p>5 (27) <i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation)</i> <b>[1b &amp; 2b]</b></p>	<p>1 (17) <i>State of the Economy in the Districts</i> <b>[1c &amp; 2c]</b></p> <p>2 (24) <i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation)</i> <b>[1b &amp; 2b]</b></p> <p>3 (12) <i>Financial Market Developments</i> <b>[4]</b></p> <p>4 (10) <i>Outlook for the World Economy / Asia Crisis</i> <b>[5]</b></p> <p>5 (11) <i>Deliberation on the Interest Rate Decision</i> <b>[7b]</b></p> <p>6 (8) <i>Staff Forecast for the Rest of the World</i> <b>[5]</b></p> <p>7 (18) <i>Deliberation on Broader Issues on the Monetary Policy Stance and Strategy</i> <b>[9c]</b></p>	<p>1 (23) <i>Deliberation on the Interest Rate Decision</i> <b>[7b]</b></p> <p>2 (11) <i>Productivity Growth in the US</i> <b>[2d]</b></p> <p>3 (12) <i>US Economy—Demand &amp; Output (Strength of Domestic Demand)</i> <b>[2a]</b></p> <p>4 (12) <i>Financial Market Developments</i> <b>[4]</b></p> <p>5 (11) <i>Stance of Policy &amp; How to Publish It / Transparency</i> <b>[9b]</b></p> <p>6 (11) <i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation)</i> <b>[1b &amp; 2b]</b></p> <p>7 (12) <i>State of the Economy in the Districts (Output)</i> <b>[2c]</b></p> <p>8 (9) <i>State of the Economy in the Districts (Inflation)</i> <b>[1c]</b></p>

#### 4: Full List of Major Themes for FOMC Transcripts, 1979-99 [Compiled from Tables 1-3]

<b>1. US Economy: Inflation</b>	
	1a. US Inflation Performance
	1b. Fed Staff Forecast for US Inflation
	1c. State of the Economy in the Districts (Evidence of Inflation)
<b>2. US Economy: Demand and Output</b>	
	2a. US Demand and Output Performance
	2b. Fed Staff Forecast for US Demand and Output
	2c. State of the Economy in the Districts (Evidence on Demand and Output)
	2d. Productivity Growth in the US
<b>3. Performance of the Monetary Aggregates and Non-Borrowed Reserves</b>	
<b>4. Financial Market Developments and the Fed's Market Operations</b>	
<b>5. The World Economy (Rest of the World)</b>	
<b>6. Credit Conditions, Banking System Stability / Financial Stability</b>	
<b>7. Deliberation of the Decision</b>	
	7a. Staff Assessment of the Stance of Monetary Policy
	7b. FOMC Deliberation on the Interest Rate Decision
	7c. FOMC Deliberation on the Target Ranges for Monetary Aggregates
	7d. FOMC Deliberation on the Target for Non-Borrowed Reserves
<b>8. Uncertainty Around the Decision</b>	
	8a. Uncertainty Around the Interest Rate Decision
	8b. Uncertainty Around the Setting of Target Ranges for the Monetary Aggregates
	8c. Uncertainty Around the Model of the Economy and the Monetary Transmission Mechanism
<b>9. Monetary Policy Stance, Strategy and Communication</b>	
	9a. Choice of Monetary Policy Target Framework
	9b. Impact and Credibility of Monetary Policy, Including Communication
	9c. Deliberation of Monetary Policy Strategy

**Table 5a: Summary of Major Themes and Significant\* Tags for FOMC Member Types [from Appendix, Tables A1-A10]**

Major Themes in Transcripts, Grouped	1979 (Miller)	1979 (Volcker)	1980 (Volcker)	1981 (Volcker)	1991 (Greenspan)	1992 (Greenspan)	1993 (Greenspan)	1997 (Greenspan)	1998 (Greenspan)	1999 (Greenspan)
<b>1 &amp; 2:</b> US Economy – Performance & Forecast (Demand and Output, and Inflation)	S (5) P (1)	S (5)	S (7) P (1)	S (5)	P (7) S (4)	P (10) S (5)	P (10) S (3)	P (10) G (3) S (3)	P (11) S (3) C (1) G (1)	P (11) S (5) G (3) C (1)
<b>3 &amp; 4:</b> Financial Market Developments, Fed’s Market Operations, & Growth of the Monetary Aggregates / Non-Borrowed Reserves	S (4)	S (2)	S (2) C (1)	S (7) P (3)	S (7)	S (5)	S (7)	S (2)	S (1)	S (5)
<b>5:</b> World Economy									G (4) S (4) P (3)	
<b>6:</b> Financial Stability / Banking System					G (2) S (3)					
<b>7:</b> Deliberation on the Decision on the Monetary Policy Stance	C (1) G (1) P (1)	P (3) G (2) C (1) S (1)	G (2) P (2) S (1)	P (2) C (1) G (1)	G (2) S (2) C (1)	G (5) P (4) S (2) C (1)	P (2) S (2) C (1) G (1)	S (3) G (2)	G (2) P (2) S (2)	P (4) G (3) C (1)
<b>8:</b> Uncertainty around the Decision on the Monetary Policy Stance	P (7) G (1)	P (8) G (2)			P (6) G (3) C (1)		G (4) C (1) S (1)			
<b>9:</b> Monetary Policy Stance & Strategy		C (1) P (1)	P (8) G (2) C (1)	P (6) G (3) C (1)				P (4) C (1) G (1)	G (3) P (2) C (1) S (1)	S (3) G (2)

- Tags for which  $\chi^2$  value is at least at the 1% significance level (see Appendix). C=Chairman (in blue and in larger font); G=Board Governor (in red); P=Bank President (in green); and S=Fed Staff (in black). The number of members in each group which obtain statistically significant values for their tags is given in brackets, and member type is listed in each cell according to the number of statistically significant members.

**Table 5b: Broad Categorizations of Major Themes from Table 5a: Total Number of Significant Members\* Across Groupings of Themes**

Major Themes in Transcripts, Grouped	1979 (Miller)	1979 (Volcker)	1980 (Volcker)	1981 (Volcker)	1991 (Greenspan)	1992 (Greenspan)	1993 (Greenspan)	1997 (Greenspan)	1998 (Greenspan)	1999 (Greenspan)
<b>1 through 6:</b> Assessment of Economy	<b>G (0)</b> <b>P (1)</b>	<b>G (0)</b> <b>P (0)</b>	<b>G (0)</b> <b>P (1)</b>	<b>G (0)</b> <b>P (3)</b>	<b>G (2)</b> <b>P (7)</b>	<b>G (0)</b> <b>P (10)</b>	<b>G (0)</b> <b>P (10)</b>	<b>G (3)</b> <b>P (10)</b>	<b>G (5)</b> <b>P (14)</b>	<b>G (3)</b> <b>P (11)</b>
<b>7 through 9:</b> Deliberation on Policy	<b>G (2)</b> <b>P (8)</b>	<b>G (4)</b> <b>P (12)</b>	<b>G (4)</b> <b>P (10)</b>	<b>G (4)</b> <b>P (8)</b>	<b>G (5)</b> <b>P (6)</b>	<b>G (5)</b> <b>P (4)</b>	<b>G (5)</b> <b>P (2)</b>	<b>G (3)</b> <b>P (4)</b>	<b>G (5)</b> <b>P (4)</b>	<b>G (5)</b> <b>P (4)</b>

\*G=Board Governors (in red); P=Bank Presidents (in green).

**Table 6a: Distribution of Major Themes within each Set of Transcripts\* [from Tables 1 - 3]**

<b>Major Themes in Transcripts, Grouped</b>	<b>1979 (Miller)</b>	<b>1979 (Volcker)</b>	<b>1980 (Volcker)</b>	<b>1981 (Volcker)</b>	<b>1991 (Greenspan)</b>	<b>1992 (Greenspan)</b>	<b>1993 (Greenspan)</b>	<b>1997 (Greenspan)</b>	<b>1998 (Greenspan)</b>	<b>1999 (Greenspan)</b>
<b>1 &amp; 2:</b> US Economy – Performance & Forecast (Demand and Output, and Inflation)	23	32	26	28	25	40	28	52	42	56
<b>3 &amp; 4:</b> Financial Market Developments, Fed’s Market Operations, & Growth of the Monetary Aggregates / Non-Borrowed Reserves	10	16	11	21	12	14	8	8	12	12
<b>5:</b> World Economy									18	
<b>6:</b> Financial Stability / Banking System					10					
<b>7:</b> Deliberation on the Decision on the Monetary Policy Stance	37	20	15	20	21	46	9	15	11	23
<b>8:</b> Uncertainty around the Decision on the Monetary Policy Stance	30	20			32		56			
<b>9:</b> Monetary Policy Stance & Strategy		12	47	32				25	18	11
<i>TOTAL (=100 but for rounding)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>

\* Defined as the share of retained ECUs that are classified into each theme (links with the percentage distribution classes in the last row of Tables 1, 2 & 3).

**Table 6b: Broad Categorizations of Major Themes from Table 6a**

Major Themes in Transcripts, Grouped	1979 (Miller)	1979 (Volcker)	1980 (Volcker)	1981 (Volcker)	1991 (Greenspan)	1992 (Greenspan)	1993 (Greenspan)	1997 (Greenspan)	1998 (Greenspan)	1999 (Greenspan)
<b>1 through 6:</b> Assessment of Economy	33	48	37	49	47	54	36	60	72	68
<b>7 through 9:</b> Deliberation on Policy	67	52	62	52	53	46	65	40	29	34
<i>TOTAL (=100 but for rounding)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>
<b>1 through 6:</b> Assessment of Economy	33	48	37	49	47	54	36	60	72	68
<b>7:</b> Deliberation on the Immediate Decision on Monetary Policy	37	20	15	20	21	46	9	15	11	23
<b>8 and 9:</b> Uncertainty and Deliberation on Monetary Policy Strategy	30	32	47	32	32	0	56	25	18	11
<i>TOTAL (=100 but for rounding)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>	<i>(100)</i>

\* Defined as the share of retained ECUs that are classified into each theme (links with the percentage distribution classes in the last row of Tables 1, 2 & 3).

## TABLES FOR PART III OF APPENDIX

**For Tables A1 through A10, the following levels of statistical significance apply**

Statistical Significance (df = 1)	$\chi^2$ value
N.S.	< 2.71
10 %	< 3.84
5 % (*)	< 6.63
1 % (**)	< 10.80
< 1 % (***)	$\geq$ 10.80



**Table A1: Thematic Classes for 1979 (Miller) FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

<b>Classes for 1979 Miller (thematic classification group in brackets)</b>	<b>Miller / Volcker Tag (with <math>\chi^2</math>)</b>	<b>Board Governors (with <math>\chi^2</math>)</b>	<b>Bank Presidents (with <math>\chi^2</math>)</b>	<b>Staff Members (with <math>\chi^2</math>)</b>
<i>Uncertainty on Setting the Target Range for Monetary Aggregates</i> [8b]		* (5.1) Partee	*** (49.5) Balles *** (14.5) Volcker ** (8.4) Eastburn * (4.7) Smoot * (3.3) Winn	
<i>Uncertainty on the Interest Rate Decision</i> [8a]		*** (14.8) Wallich (2.8) Rice	*** (47.6) Morris *** (41.3) Roos *** (13.2) Willes *** (11.8) McIntosh * (6.6) Rankin * (5.4) Volcker * (5.1) Guffey (3.7) Eastburn	
<i>US Economy Performance (Credit Conditions &amp; Inflation)</i> [1a]			*** (67.0) Baughman	*** (37.6) Kichline *** (25.6) Axilrod ** (10.6) Pardee
<i>US Economy Performance and Staff Forecast (Demand and Output)</i> [2a & 2b]				*** (357.1) Kichline *** (130.9) Zeisel *** (67.9) Truman (2.8) Axilrod
<i>Fed's Market Operations</i> [4]				*** (256.9) Sternlight *** (251.6) Greene *** (231.3) Pardee *** (132.6) Holmes
<i>Deliberation on Target Ranges for Monetary Aggregates &amp; Interest Rates</i> [7b & 7c]	*** (184.6)	** (10.0) Coldwell * (6.0) Rice	** (9.7) Mayo * (5.7) Black	* (5.2) Altmann

**Table A2: Thematic Classes for 1979 (Volcker) FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

<b>Classes for 1979 Volcker (thematic classification group in brackets)</b>	<b>Volcker Tag (with <math>\chi^2</math>)</b>	<b>Board Governors (with <math>\chi^2</math>)</b>	<b>Bank Presidents (with <math>\chi^2</math>)</b>	<b>Staff Members (with <math>\chi^2</math>)</b>
<i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation) [1b &amp; 2b]</i>				*** (462.4) Kichline *** (140.4) Pardee *** (132.2) Zeisel *** (126.9) Truman *** (11.3) Sternlight * (5.5) Prell
<i>Deliberation on Target Ranges for Monetary Aggregates [7c]</i>	*** (34.0)	*** (22.9) Teeters ** (10.4) Partee * (6.0) Rice * (4.5) Coldwell	*** (46.9) Black *** (18.0) Guffey ** (7.1) Balles (2.72) Mayo	*** (25.8) Altmann * (4.0) Holmes
<i>Effectiveness of Monetary Policy—Uncertainty over the Transmission Mechanism [8c]</i>		*** (20.8) Wallich *** (15.0) Rice (3.6) Teeters (2.8) Schultz	*** (43.5) Roos *** (38.4) Eastburn *** (37.0) Winn ** (10.4) Baughman ** (9.1) Balles ** (8.2) Kimbrel ** (7.7) Willes ** (6.7) Mayo * (5.1) Black	
<i>Reserves Levels and the Fed's Market Operations [4]</i>		* (3.9) Partee		*** (621.1) Axilrod *** (149.2) Sternlight
<i>Impact of the Volcker Revolution including Communication of the Policy Change [9b]</i>	*** (230.1)		*** (42.6) Willes * (6.1) Timlen (3.2) Mayo	

**Table A3: Thematic Classes for 1980 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

Classes for 1980 (thematic classification group in brackets)	Volcker Tag (with $\chi^2$ )	Board Governors (with $\chi^2$ )	Bank Presidents (with $\chi^2$ )	Staff Members (with $\chi^2$ )
<i>Striving for Credibility</i> [9b]	*** (195.4)	*** (31.1) Schultz *** (12.1) Gramley * (5.1) Wallich	*** (42.9) Corrigan *** (32.8) Roos *** (30.7) Mayo *** (22.1) Balles *** (20.6) Eastburn *** (17.8) Black *** (17.0) Solomon ** (10.0) Winn * (5.8) Ford * (5.8) Smoot	
<i>Deliberation on the Target Ranges for Monetary Aggregates &amp; Interest Rates</i> [7b & 7c]		*** (31.3) Partee *** (20.8) Teeters * (6.0) Rice	*** (32.8) Guffey ** (8.1) Morris * (5.8) Czerwinski	*** (60.5) Axilrod ** (9.5) Altmann
<i>US Economy Performance &amp; Staff Forecast for Demand and Output (Evidence of Weakening)</i> [2a & 2b]			*** (16.8) Timlen * (5.7) Baughman	*** (669.6) Kichline *** (502.3) Pardee *** (229.3) Zeisel *** (89.4) Sternlight *** (73.4) Truman *** (29.9) Meek *** (12.7) Ettin
<i>Performance of Non-Borrowed Reserves Relative to Target</i> [3]	** (8.0)		(3.5) Roos	*** (155.2) Sternlight *** (125.2) Axilrod * (3.9) Meek

**Table A4: Thematic Classes for 1981 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

<b>Classes for 1981 (thematic classification group in brackets)</b>	<b>Volcker Tag (with <math>\chi^2</math>)</b>	<b>Board Governors (with <math>\chi^2</math>)</b>	<b>Bank Presidents (with <math>\chi^2</math>)</b>	<b>Staff Members (with <math>\chi^2</math>)</b>
<i>Choice of Monetary Policy Target/Framework [9a]</i>	*** (15.0)	*** (33.1) Schultz *** (19.8) Gramley ** (9.1) Wallich * (4.1) Rice	*** (79.0) Roos *** (15.1) Ford *** (15.0) Winn *** (13.4) Morris *** (11.4) Mayo ** (9.2) Corrigan * (5.9) Black * (5.6) Balles (3.6) Forrestal	
<i>Deliberation on Target Ranges for Monetary Aggregates &amp; Non-Borrowed Reserves [7c &amp; 7d]</i>	*** (168.7)	*** (11.3) Teeters	*** (21.9) Guffey ** (8.6) Solomon	(3.5) Altmann
<i>Reserves Levels &amp; the Fed's Market Operations [4]</i>			*** (38.2) Keehn *** (34.8) Doyle *** (21.4) Boykin * (5.1) Boehne * (4.5) Winn	*** (475.2) Kichline *** (254.2) Zeisel *** (198.5) Cross *** (139.9) Truman *** (133.0) Pardee *** (86.7) Sternlight *** (52.9) Greene ** (7.8) Meek
<i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation) [1b &amp; 2b]</i>				*** (564.2) Axilrod *** (51.4) Lindsey *** (41.6) Sternlight *** (25.4) Ettin ** (9.9) Meek

**Table A5: Thematic Classes for 1991 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

Classes for 1991 (thematic classification group in brackets)	Greenspan Tag (with $\chi^2$ )	Board Governors (with $\chi^2$ )	Bank Presidents (with $\chi^2$ )	Staff Members (with $\chi^2$ )
<i>State of the Economy in the Districts [1c &amp; 2c]</i>			*** (277.9) Keehn *** (86.7) Forrestal *** (70.8) Guffey *** (60.3) Parry *** (22.8) Hoenig *** (19.3) McTeer *** (12.6) Hendricks * (4.0) Stern	*** (87.7) Prell *** (41.5) Slifman *** (13.6) Promisel ** (8.2) Truman
<i>Financial Market Developments and Fed's Market Operations [4]</i>				*** (666.6) Sternlight *** (497.8) Greene *** (453.8) Cross *** (167.9) Lovett *** (135.1) Truman *** (121.1) Siegman *** (67.7) Promisel
<i>Staff Assessment of the Monetary Policy Stance [7a]</i>		*** (14.1) Angell	*** (44.3) Hoskins ** (9.5) Black	*** (352.3) Kohn (3.1) Prell
<i>Credit Conditions, Banking System Stability [6]</i>		*** (36.5) Mullins *** (30.4) LaWare		*** (78.6) Kohn *** (59.7) Prell *** (11.9) Stifman
<i>Deliberation on the Interest Rate Policy Decision [7b]</i>	*** (43.2)	*** (11.0) LaWare * (5.7) Lindsey	(3.0) McTeer	*** (16.3) Sternlight
<i>Uncertainty Around the Interest Rate Decision [8a]</i>	*** (97.4)	*** (101.2) Kelley *** (22.5) Angell *** (15.7) Phillips (3.7) Seger	*** (151.9) Corrigan *** (62.1) Melzer *** (27.8) Syron *** (15.3) Boehne *** (14.8) Black ** (8.6) Oltman * (5.0) Stern * (4.5) Hoskins	

**Table A6: Thematic Classes for 1992 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

<b>Classes for 1992 (thematic classification group in brackets)</b>	<b>Greenspan Tag (with <math>\chi^2</math>)</b>	<b>Board Governors (with <math>\chi^2</math>)</b>	<b>Bank Presidents (with <math>\chi^2</math>)</b>	<b>Staff Members (with <math>\chi^2</math>)</b>
<i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation [1b &amp; 2b]</i>		* (4.4) Mullins	* (5.2) Parry * (4.9) Hendricks	*** (181.4) Prell *** (180.8) Truman *** (151.8) Stockton *** (25.9) Kohn ** (7.2) Simpson (2.8) Siegman
<i>Staff Assessment of the Monetary Policy Stance [7a]</i>		** (7.5) Mullins	*** (42.6) Jordan * (4.5) Oltman	*** (307.1) Kohn *** (40.6) Prell
<i>State of the Economy in the Districts [1c &amp; 2c]</i>			*** (323.5) Keehn *** (109.0) Forrestal *** (77.6) Hoenig *** (75.1) Stern *** (48.3) McTeer *** (40.2) Parry *** (28.7) Syron *** (28.3) Boehne ** (10.1) Melzer ** (8.4) Black * (5.5) Hendricks * (4.7) Broaddus	
<i>Deliberation on the Interest Rate Policy Decision [7b]</i>	*** (148.5)	*** (91.9) Lindsey *** (90.4) Kelley *** (35.4) Angell *** (28.2) Phillips *** (15.4) Mullins	*** (39.6) Corrigan *** (25.6) Syron ** (8.4) Melzer * (6.2) Black * (5.4) Boehne	
<i>Financial Market Developments &amp; Fed's Market Operations [4]</i>				*** (1,287.0) McDonough *** (338.0) Sternlight *** (185.5) Lovett *** (106.9) Greene *** (22.4) Truman

**Table A7: Thematic Classes for 1993 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

<b>Classes for 1993 (thematic classification group in brackets)</b>	<b>Greenspan Tag (with <math>\chi^2</math>)</b>	<b>Board Governors (with <math>\chi^2</math>)</b>	<b>Bank Presidents (with <math>\chi^2</math>)</b>	<b>Staff Members (with <math>\chi^2</math>)</b>
<i>Uncertainty on the Model of the Economy and Appropriate Monetary Policy Strategy [8c]</i>	*** (31.8)	*** (78.0) Angell *** (69.3) Mullins *** (24.9) Lindsey *** (19.2) Kelley	* (3.9) Jordan (2.9) Corrigan	*** (67.1) Prell
<i>State of the Economy in the Districts [1c &amp; 2c]</i>		** (10.5) Phillips	*** (169.2) Hoenig *** (151.2) Forrestal *** (83.8) Parry *** (44.9) Syron *** (44.3) Boehne *** (26.9) Keehn *** (17.0) McTeer *** (16.2) Broaddus *** (16.0) Melzer *** (12.9) Jordan * (4.7) Oltman	
<i>US Economy Demand and Output Performance, and Staff Forecast [2a &amp; 2b]</i>			*** (107.1) Keehn	*** (549.9) Truman *** (48.4) Slifman *** (44.6) Prell * (5.5) Siegman * (4.7) Kohn
<i>Deliberation on the Interest Rate Decision [7b]</i>	*** (37.3)	*** (16.7) LaWare	*** (35.3) Corrigan *** (10.8) McTeer * (6.1) Stern	*** (44.5) Kohn *** (11.8) Bernard
<i>Fed's Market Operations [4]</i>				*** (678.5) Greene *** (419.6) Lovett *** (330.7) Fisher *** (234.9) McDonough *** (75.1) White *** (44.3) Siegman *** (18.9) Truman

**Table A8: Thematic Classes for 1997 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

Classes for 1997 (thematic classification group in brackets)	Greenspan Tag (with $\chi^2$ )	Board Governors (with $\chi^2$ )	Bank Presidents (with $\chi^2$ )	Staff Members (with $\chi^2$ )
<i>Choice of Target to Achieve Monetary Stability; Role of Money Ranges [9a]</i>	*** (286.4)	*** (19.9) Rivlin	*** (30.3) Melzer *** (22.3) Boehne ** (8.8) Broaddus ** (8.5) McDonough (3.1) Jordan	
<i>Staff Assessment of the Monetary Policy Stance, and Deliberation on the Interest Rate Decision [7a &amp; 7b]</i>		*** (31.2) Meyer *** (28.9) Gramlich * (6.4) Kelley		*** (221.0) Kohn *** (16.3) Truman ** (7.8) Bernard
<i>State of the Economy in the Districts [1c &amp; 2c]</i>			*** (156.2) McTeer *** (140.9) Moskow *** (88.2) Guynn *** (79.4) Jordan *** (69.6) Hoenig *** (60.7) Minehan *** (15.7) Boehne *** (11.1) Broaddus ** (10.7) Stern (2.9) Parry	
<i>Financial Market Developments [4]</i>				*** (1,903.6) Fisher *** (260.2) Truman * (5.6) Stockton
<i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation) [1b &amp; 2b]</i>		*** (99.5) Meyer *** (39.0) Phillips ** (8.7) Kelley	*** (13.9) Parry	*** (208.9) Prell *** (37.6) Slifman *** (22.9) Stockton * (6.6) Kohn



**Table A9: Thematic Classes for 1998 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

<b>Classes for 1998 (thematic classification group in brackets)</b>	<b>Greenspan Tag (with <math>\chi^2</math>)</b>	<b>Board Governors (with <math>\chi^2</math>)</b>	<b>Bank Presidents (with <math>\chi^2</math>)</b>	<b>Staff Members (with <math>\chi^2</math>)</b>
<i>State of the Economy in the Districts [1c &amp; 2c]</i>			*** (192.1) Guynn *** (179.7) Moskow *** (120.6) Jordan *** (71.9) Minehan *** (56.4) McTeer *** (55.8) Hoenig *** (34.5) Boehne *** (20.7) Rieves *** (18.7) Stern *** (14.5) Broaddus * (5.9) Parry	
<i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation) [1b &amp; 2b]</i>	*** (14.1)	*** (56.1) Meyer * (4.6) Phillips	** (8.6) Parry	*** (453.3) Prell *** (95.6) Stockton *** (28.7) Kohn
<i>Financial Market Developments [4]</i>			* (4.9) McDonough	*** (2,379.4) Fisher
<i>Outlook for the World Economy / Asia Crisis [5]</i>		*** (34.3) Kelley *** (32.9) Ferguson *** (28.9) Rivlin ** (6.7) Meyer	*** (64.4) McDonough	*** (29.3) Truman *** (18.7) Johnson * (4.9) Kohn * (4.6) Promisel
<i>Deliberation on the Interest Rate Decision [7b]</i>		*** (76.0) Gramlich *** (23.7) Kelley * (5.6) Ferguson * (5.2) Rivlin	*** (17.4) Boehne ** (8.7) Broaddus	*** (73.2) Bernard ** (10.0) Gillum
<i>Staff Forecast for the Rest of the World [5]</i>		*** (11.0) Meyer	*** (16.8) McTeer ** (8.5) Parry	*** (340.8) Johnson *** (268.7) Hooper *** (56.7) Truman *** (33.3) Promisel (3.0) Kohn
<i>Deliberation on Broader Issues on the Monetary Policy Stance and Strategy [9c]</i>	*** (46.1)	*** (34.6) Gramlich *** (14.1) Kelley ** (7.2) Rivlin	** (8.9) Poole ** (8.3) Jordan	** (8.1) Truman

**Table A10: Thematic Classes for 1999 FOMC Transcripts, With Statistically Significant Tags for Committee Member Types**

Classes for 1999 (thematic classification group in brackets)	Greenspan Tag (with $\chi^2$ )	Board Governors (with $\chi^2$ )	Bank Presidents (with $\chi^2$ )	Staff Members (with $\chi^2$ )
<i>Deliberation on the Interest Rate Decision</i> [7b]	*** (12.0)	*** (109.0) Gramlich *** (104.7) Ferguson *** (14.1) Kelley	*** (45.8) Poole *** (35.7) Broaddus *** (31.5) McDonough *** (20.3) Boehne	
<i>Productivity Growth in the US</i> [2d]	*** (764.3)	(3.5) Rivlin		*** (134.9) Prell *** (20.9) Stockton
<i>US Economy—Demand &amp; Output (Strength of Domestic Demand)</i> [2a]		*** (14.1) Kelley	(3.7) Minehan (3.1) McDonough	*** (57.5) Kohn *** (55.6) Johnson *** (24.3) Prell (3.1) Simpson
<i>Financial Market Developments</i> [4]				*** (2,145.8) Fisher *** (362.1) Alexander *** (72.0) Johnson *** (17.8) Simpson ** (6.9) Madigan
<i>Stance of Policy &amp; How to Publish It / Transparency</i> [9b]		*** (58.4) Meyer *** (14.2) Kelley		*** (538.2) Kohn *** (24.6) Fox *** (12.5) Bernard
<i>Staff Forecast for US Economy (Demand and Output, &amp; Inflation)</i> [1b & 2b]		*** (287.4) Meyer *** (21.5) Gramlich * (5.9) Rivlin	*** (64.5) Parry	*** (39.6) Stockton *** (15.2) Madigan ** (6.8) Prell
<i>State of the Economy in the Districts (Output)</i> [2c]			*** (115.3) Moskow *** (85.5) Hoenig *** (82.3) McTeer *** (59.6) Parry *** (51.1) Guynn *** (15.0) Stern *** (13.3) Broaddus *** (12.1) Minehan ** (8.9) McDonough	
<i>State of the Economy in the Districts (Inflation)</i> [1c]			*** (277.3) Jordan *** (71.3) Minehan *** (57.7) Poole *** (31.6) Moskow *** (11.1) Guynn *** (3.0) Broaddus	



## APPENDIX

### **APPENDIX A: FOMC MEETING STRUCTURE**

The best source of a description of how the FOMC operates is almost certainly members themselves; we thus draw upon accounts by Larry Meyer (Meyer 2004) and Bill Poole (Poole 1998).

The Federal Reserve System consists of the Board of Governors in Washington and the 12 Federal Reserve Banks (whose districts cover the whole of the United States). Board members (governors) are appointed by the President and confirmed by the Senate. Governors may serve only one full-term (14 years) but they may serve the latter part of a partial term (as a replacement for an earlier appointee) and then a full term. The President designates one of the seven governors to be chairman (of the Federal Reserve Board of Governors and the FOMC) for a four year term (renewable within the limits of their term as a governor) and another to be vice chairman of the Federal Reserve Board of Governors. Both designations are confirmed by the Senate. Reserve Bank presidents are appointed by their boards of directors subject to confirmation by the Board of Governors.

The FOMC is the main monetary policy body of the Federal Reserve System. It has 12 voting members, the seven governors and five of the Reserve Bank Presidents. The President of the Federal Reserve Bank of New York is a permanent voting member, and vice chairman of the FOMC. The other 11 Presidents take up the remaining four voting positions on a rotating basis (the order of rotation is designed to ensure a fairly even geographical spread of voting Presidents). But all the Presidents attend every FOMC meeting, participate fully in the debate and signal their intention on the policy action (the voting members vote after this). It is therefore possible to identify the preferences of all members, though care is needed in interpreting these since a dissenting preference by a voting member is more transparent to the outside world than one by a non-voter. In 1992 and 1998 this was because the record of voting was published with a delay of only a few weeks,<sup>1</sup> while the preference of a non-voter only becomes evident five years later when the transcripts are published.

The FOMC meets eight times a year (roughly every six weeks). Meetings are for the most part devoted to the immediate decision on monetary policy – in our analysis of the transcripts we have included only this element of meetings. The *monetary policy* discussion in the 1992 and 1998 transcripts always took the same order in terms of the sections of the discussion. It started with (1) a report on domestic and international market operations by the manager of the Open Market “Desk” at the Federal Reserve Bank of New York. The desk is the operational arm of the FOMC, implementing decisions by buying and selling US government securities in open markets operations (OMOs). This report was followed by questions for the manager from FOMC members. Next came the *outlook section* (2), where two or (no more than) three of the senior staff economists from the Board of Governors reviewed the news in data releases for both the US economy and key data for the rest of the world since the last meeting of the FOMC (the “inter-meeting” period). They followed this with a description of how, reflecting

this news, they had adjusted the Board staff's best "guess" economic forecast (the Greenbook) from the one presented at the previous meeting.<sup>ii</sup> The staff presentation was followed by questions and comments from members of the FOMC.

The next section of the meeting (3) involved each member of the FOMC providing an assessment of the news on the state of the economy during the inter-meeting period. Bank presidents almost always began by describing the state of the economy in their district (typically illustrating this with information they have picked up from contacts in their district) and then commenting on the state of the national economy. As governors do not have districts, their remarks were confined to the state of the national economy. Section 3 thus has two components: (a) the state of the regional economies, and (b) the state of the national economy. The Chairman did not contribute to this section of the meeting (other than to act as chair).<sup>iii</sup>

Next came (4) the so-called *policy go-around* where all members conclude by expressing their preferences on the policy stance. This section began with a senior staff economist pulling together the conclusions of the earlier discussions and indicating the most likely options for the policy setting (typically presenting two options) and how these could be interpreted to be consistent with the news in the inter-meeting period (typically one of these options would be for rates to stay the same while the other one would be for them to move up/down).<sup>iv</sup> The Chairman then gave his interpretation of what the news on the state of the economy meant for the economic outlook. He concluded by indicating his preference for the policy setting.

An important element of the FOMC meeting structure is that the chairman declared his preference first. Meyer (Meyer 2004) comments that by not participating in the state of the economy session, but going first in the policy go-around, the chairman has the final word on the outlook and the first word on the policy decision, thus making it easier for him to build a consensus around his own position. After the chairman, all the other members outlined the major policy considerations that they saw and their preferred policy stance. In the 1992 and 1998 transcripts there was no subsequent iteration in which members can change their preference (there is evidence of this in a few earlier years).

Finally the secretary of the FOMC called the roll of voting members who vote on the text of a policy directive that instructs the desk in the New York Fed.

## APPENDIX B: DETAILS OF ALCESTE METHODOLOGY

Alceste is textual analysis software that identifies a speaker's association of ideas and main arguments—ideas and arguments which can then be correlated with characteristics of the speaker's (e.g., party affiliation, constituency characteristics and so on). The package relies upon co-occurrence analysis, which is the statistical analysis of frequent word pairs in a text corpus. Alceste was developed by Max Reinert (Reinert 1983; Reinert 1998; Reinert 2003) and has been applied in sociology, psychology, and political science (Noel-Jorand, Reinert et al. 1995; Lahlou 1996; Noel-Jorand, Reinert et al. 1997; Brugidou 1998; Guerin-Pace 1998; Bauer 2000; Brugidou 2003; Noel-Jorand, Reinert et al. 2004; Schonhardt-Bailey 2005; Schonhardt-Bailey 2006). It has been described as a “methodology” insofar as it “integrates a multitude of highly sophisticated statistical methods,” (Kronberger and Wagner 2000: 306) and, “(t)aken together, the program realizes a complex *descending hierarchical classification* combining elements of different statistical methods like segmentation (Bertier and Bouroche 1975), hierarchical classification and dichotomization based on reciprocal averaging or correspondence analysis (Hayashi 1950; Benzecri 1981; Greenacre 1993) and the theory of dynamic clouds (Diday, Lemaire et al. 1982)” (Kronberger and Wagner 2000: 306).

There are two preconditions for good results with Alceste: (1) the textual data must be consistent within the whole (e.g., themes and conditions of production are both consistent); and (2) the text must be large enough for the statistical output to be relevant (with a minimum of 10,000 words).

Alceste determines word distribution patterns within a text, with the objective being to obtain a primary statistical classification of simple statements (the Elementary Contextual Units described in the text) in order to reveal the most characteristic words, which in turn can be distinguished as word classes that represent different forms of discourse concerning the topic of the text. Through its dictionary, Alceste prepares the text by reducing different forms of the same word (in the form of plurals, suffixes, etc.) to the root form and transforms irregular verbs to the indicative, thereby producing a matrix of reduced forms. It also subdivides the corpus into “function words” (articles, prepositions, conjunctions, pronouns, and auxiliary verbs) and “content words” (nouns, verbs, adjectives, and adverbs). The content words are understood to carry the meaning of the discourse and the final analysis is based on these. The program creates a data matrix (an “indicator matrix”) which allows an analysis of statistical similarities and dissimilarities of words in order to identify repetitive language patterns. This matrix relates relevant words in columns and contextual units in rows, so that if a given word is present, a 1 is entered in the cell; otherwise, the entry is 0. Then, using descending hierarchical classification analysis, the program identifies word classes. The first class comprises the total set of contextual units in the initial indicator matrix. The program then attempts to partition that class into two further classes that contain different vocabulary and ideally do not contain any overlapping words. The methods used for this are optimal scaling and the adoption of a maximum chi-squared criterion for cutting the ordered set of words. Alceste compares the distribution of words in each of the two new classes with the average distribution of words. Different forms of discourse that use different vocabulary

will result in an observed word distribution that deviates systematically from one where the words are independent of each other. The procedure searches for maximally separate patterns of co-occurrence between the word classes. The chi-squared criterion is thus used as a measure of the relationship that exists between words, rather than as a test.

Following an iterative process, the descending hierarchical classification method decomposes the classes until a predetermined number of iterations fails to result in further divisions. (The default  $\chi^2$  threshold for selection of characteristic statements (ECUs) is 0, and for tags it is 2. ECUs with  $\chi^2$  values below 0 are unclassified; hence, the percent of classified ECUs (Table 1) constitutes a goodness of fit measure.) With each step, the descending hierarchical classification uses the first factor of the factorial analysis of correspondences; its top-down design thus allows it to eliminate class “artefacts” (Reinert 2006). The result is a hierarchy of classes, which may be schematized as a tree diagram.

For a detailed exposition of the algorithm, see (Reinert 1983), and for a step-by-step explanation of each stage of the analysis, see (Reinert 1990). More simply, the classification follows a specified procedure using chi-squared, and may be illustrated using Kronberger and Wagner’s example of the decomposition of an original matrix into two classes (Kronberger and Wagner 2000: 309).

	Specific vocabulary of class 2		Overlapping vocabulary		Specific vocabulary of class 3		
	<i>food</i>	<i>fruit</i>	<i>say</i>	<i>word j</i>	<i>Cure</i>	<i>cancer</i>	
Class 2	45	12	20	$k_{2j}$	0	0	$k_2$
Class 3	0	0	21	$k_{3j}$	33	20	$k_3$
	45	12	41	$k_j$	33	20	$k$

Classes 2 and 3 are optimally separate in that they have as little overlap in words as possible. “The numbers in the table ( $k_{2j}$ ,  $k_{3j}$ ) indicate the frequency of contextual units for each class containing a specific word  $j$ . In our example, class 2 consists of statements containing words like ‘food’ and ‘fruit’, while words like ‘cancer’ and ‘cure’ are typical for class 3. Of course, it will rarely be possible to separate statements such that words occurring in one class do not appear in the other. There will always be some overlapping vocabulary, like the word ‘say’ in the example” (Kronberger and Wagner 2000: 309).

The chi-squared procedure then establishes “out of all possible procedures” two classes that maximize the following criterion:

$$\chi^2 = k_2 k_3 \sum_{j \in J} \left[ \left( \frac{k_{2j}}{k_2} - \frac{k_{3j}}{k_3} \right)^2 \div k_j \right], \text{ where}$$

$$k_{2j} = \sum_{i \in I_2} k_{ij}; k_2 = \sum_{i \in I_1} k_{2j}; k_j = k_{2j} + k_{3j}$$

In sum, while the above offers a summary of the software, we acknowledge that Alceste—like many other software of this type—is something of a “blackbox”. To confront this issue in part we have accepted all the default parameters for our textual analysis, thereby facilitating future attempts at replication. Our larger project, of which this paper is a part, will address the “blackbox” issue more extensively by comparing our results from Alceste with those from an equivalent textual analysis software.



## APPENDIX C: FOMC MEMBERSHIP: 1979-81; 1991-93; AND 1997-99

1979-81

February 1979

*Voters*

Miller, Chairman  
Volcker, Vice-Chairman  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
President Willes  
President Baughman  
President Eastburn  
President Mayo (Alternate)

*Non-voters*

Balles, Alternate member  
Black, Alternate member  
Guffey, President of FR Bank of Kansas City  
Morris, President of FR Bank of Boston  
Roos, President of FR Bank of St. Louis

March 1979

*Voters*

Miller, Chairman  
Volcker, Vice-Chairman  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
President Balles  
President Black  
President Kimbrel  
President Mayo

*Non-voters*

Guffey, Morris, Roos and Winn, Alternate members of FOMC

Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia

April 1979

*Voters*

Miller, Chairman  
Volcker, Vice-Chairman  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
President Balles  
President Black  
President Kimbrel  
President Mayo

*Non-voters*

Guffey, Morris, Roos and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Willes, President of FR Bank of Minneapolis

May 1979

*Voters*

Miller, Chairman  
Volcker, Vice-Chairman  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
President Balles  
President Black  
President Kimbrel  
President Mayo

*Non-voters*

Guffey, Morris, Roos and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia  
Willes, President of FR Bank of Minneapolis

July 1979

*Voters*

Miller, Chairman  
Volcker, Vice-Chairman  
Governor Rice  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
President Balles  
President Black  
President Kimbrel  
President Mayo

*Non-voters*

Guffey, Morris, Roos and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia  
Willes, President of FR Bank of Minneapolis

August 1979

*Voters*

Volcker, Chairman  
Governor Rice  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Balles  
President Black  
President Kimbrel  
President Mayo  
First Vice-President Timlen (Alternate)

*Non-voters*

Guffey, Morris, Roos, Timlen and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia

Willes, President of FR Bank of Minneapolis

September 1979

*Voters*

Volcker, Chairman  
Governor Rice  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Balles  
President Black  
President Kimbrel  
President Mayo  
First Vice-President Timlen (Alternate)

*Non-voters*

Guffey, Morris, Roos, Timlen and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia

October 1979

*Voters*

Volcker, Chairman  
Governor Rice  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Balles  
President Black  
President Kimbrel  
President Mayo  
First Vice-President Timlen (Alternate)

*Non-voters*

Guffey, Morris, Roos, Timlen and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia

November 1979

*Voters*

Volcker, Chairman  
Governor Rice  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Balles  
President Black  
President Kimbrel  
President Mayo  
First Vice-President Timlen (Alternate)

*Non-voters*

Guffey, Morris, Roos, Timlen and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia

January 1980

*Voters*

Volcker, Chairman  
Governor Rice  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Balles  
President Black  
President Kimbrel  
President Mayo  
First Vice-President Timlen (Alternate)

*Non-voters*

Guffey, Morris, Roos, Timlen and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia

February 1980

*Voters*

Volcker, Chairman  
Governor Rice  
Governor Coldwell  
Governor Partee  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Balles  
President Black  
President Kimbrel  
President Mayo  
First Vice-President Timlen (Alternate)

*Non-voters*

Guffey, Morris, Roos, Timlen and Winn, Alternate members of FOMC  
Baughman, President of FR Bank of Dallas  
Eastburn, President of FR Bank of Philadelphia

March 1980

*Voters*

Volcker, Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Roos  
President Guffey  
President Morris  
President Winn  
First Vice-President Timlen (Alternate)

*Non-voters*

Baughman, Eastburn, Mayo, Timlen, and Willes, Alternate members of FOMC  
Balles, President of FR Bank of San Francisco  
Black, President of FR Bank of Richmond

April 1980

*Voters*

Volcker, Chairman  
\*Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Roos  
President Guffey  
President Morris  
President Winn

\*Elected as Vice-Chairman at the meeting of 18 March 1980, to take effect after 1 April.

*Non-voters*

Baughman, Eastburn, Mayo, Timlen, and Willes, Alternate members of FOMC  
Balles, President of FR Bank of San Francisco  
Black, President of FR Bank of Richmond

May 1980

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Roos  
President Guffey  
President Morris  
President Winn

*Non-voters*

Baughman, Eastburn, Mayo, Timlen, and Willes, Alternate members of FOMC  
Balles, President of FR Bank of San Francisco  
Black, President of FR Bank of Richmond

July 1980

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Gramley  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Roos  
President Morris  
President Winn

President Guffey [not present]

*Non-voters*

Balles, Baughman, Eastburn, and Mayo, Alternate members of FOMC  
Black, President of FR Bank of Richmond

August 1980

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Gramley  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Roos  
President Morris  
President Winn

President Guffey [not present]



*Non-voters*

Balles, Baughman, Eastburn, and Mayo, Alternate members of FOMC  
Black, President of FR Bank of Richmond  
Corrigan, President of FR Bank of Minneapolis  
Ford, President of FR Bank of Atlanta

September 1980

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Gramley  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Roos  
President Morris  
President Winn  
President Guffey

*Non-voters*

Balles, Baughman, Eastburn, and Mayo, Alternate members of FOMC  
Black, President of FR Bank of Richmond  
Corrigan, President of FR Bank of Minneapolis  
Ford, President of FR Bank of Atlanta

October 1980

November 1980

December 1980

As for September 1980

February 1981

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman

Governor Gramley  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Roos  
President Morris  
President Winn  
President Guffey

*Non-voters*

Balles, Boehne, Boykin, Mayo, and Timlen, Alternate members of FOMC  
Black, President of FR Bank of Richmond  
Corrigan, President of FR Bank of Minneapolis  
Ford, President of FR Bank of Atlanta

March 1981

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
President Boehne  
President Boykin  
President Corrigan  
President Winn (Alternate)

*Non-voters*

Balles, Black, Ford, and Winn, Alternate members of FOMC  
Guffey, President of FR Bank of Kansas City  
Morris, President of FR Bank of Boston  
Roos, President of FR Bank of St. Louis

April 1981

*Voters*

Volcker, Chairman

Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
Governor Gramley  
President Boykin  
President Corrigan  
President Winn (Alternate)

*Non-voters*

Balles, Black, Ford, and Winn, Alternate members of FOMC  
Guffey, President of FR Bank of Kansas City  
Morris, President of FR Bank of Boston  
Roos, President of FR Bank of St. Louis  
Doyle, First Vice-President of FR Bank, Chicago  
Smoot, First Vice-President of Philadelphia

May 1981

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
Governor Gramley  
President Boykin  
President Boehne  
President Corrigan  
President Winn (Alternate)

*Non-voters*

Balles, Black, Ford, and Winn, Alternate members of FOMC  
Guffey, President of FR Bank of Kansas City  
Morris, President of FR Bank of Boston  
Roos, President of FR Bank of St. Louis  
Doyle, First Vice-President of FR Bank, Chicago  
Smoot, First Vice-President of Philadelphia

June 1981

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
Governor Gramley  
President Boykin  
President Boehne  
President Corrigan  
President Winn (Alternate)

*Non-voters*

Balles, Black, Ford, and Winn, Alternate members of FOMC  
Guffey, President of FR Bank of Kansas City  
Morris, President of FR Bank of Boston  
Roos, President of FR Bank of St. Louis  
Doyle, First Vice-President of FR Bank, Chicago  
Smoot, First Vice-President of Philadelphia

July 1981

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
Governor Gramley  
President Boykin  
President Boehne  
President Corrigan  
President Keehn

*Non-voters*

Balles, Black, Ford, and Winn, Alternate members of FOMC

Guffey, President of FR Bank of Kansas City  
Morris, President of FR Bank of Boston  
Roos, President of FR Bank of St. Louis  
Doyle, First Vice-President of FR Bank, Chicago  
Smoot, First Vice-President of Philadelphia

August 1981

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
Governor Gramley  
President Boykin  
President Black (Alternate)  
President Corrigan  
President Keehn

*Non-voters*

Balles, Black, and Winn, Alternate members of FOMC  
Morris, President of FR Bank of Boston  
Roos, President of FR Bank of St. Louis

October 1981

*Voters*

Volcker, Chairman  
Solomon, Vice-Chairman  
Governor Partee  
Governor Rice  
Governor Teeters  
Governor Wallich  
Governor Schultz  
Governor Gramley  
President Boykin  
President Boehne  
President Corrigan  
President Keehn

*Non-voters*

Balles, Black, and Winn, Alternate members of FOMC

Guffey, President of FR Bank of Kansas City

Morris, President of FR Bank of Boston

Roos, President of FR Bank of St. Louis

Doyle, First Vice-President of FR Bank, Chicago

Smoot, First Vice-President of Philadelphia

November 1981

&

December 1981 (as for October 1981)

## **1991-1993**

### *January*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Seger  
President Black  
President Forrestal  
President Keehn  
President Parry (The preceding names are the voters)

Guffey, Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne & Stern, Presidents of the Federal Reserve Banks of Philadelphia and  
Minneapolis

### *February*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Seger  
Governor Kelley  
President Black  
President Forrestal  
President Keehn  
President Parry

Guffey, Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer, & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

### *March*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
President Black  
President Forrestal  
President Keehn

President Parry

Guffey, Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

*April*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
President Black  
President Forrestal  
President Keehn  
President Parry

Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

*May*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
President Black  
President Forrestal  
President Keehn  
President Parry

Guffey, Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

*July*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare



Governor Mullins  
Governor Kelley  
President Black  
President Forrestal  
President Keehn  
President Parry

Guffey, Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

*August*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
President Black  
President Forrestal  
President Keehn  
President Parry

Guffey, Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

*October*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
President Black  
President Forrestal  
President Keehn  
President Parry

Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

*November*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
President Black  
President Forrestal  
President Keehn  
President Parry

Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

*December*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
Governor Lindsey  
Governor Phillips  
President Black  
President Forrestal  
President Keehn

Hoskins, Melzer, and Syron, Alternate Members of the FOMC  
Boehne, McTeer & Stern, Presidents of the Federal Reserve Banks of Philadelphia,  
Dallas, and Minneapolis

**1992**

*January*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley

Governor Lindsey  
Governor Phillips  
President Hoenig  
President Melzer  
President Syron

Boehne, McTeer, Keehn, and Stern, Alternate Members of the FOMC  
Black & Forrester, Presidents of the Federal Reserve Banks of Richmond and Atlanta

*February*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
Governor Lindsey  
Governor Phillips  
President Hoenig  
President Melzer  
President Syron  
President Hendricks (First Vice-President)

Boehne, Keehn, McTeer, and Stern, Alternate Members of the FOMC  
Black, Forrester, and Parry, Presidents of the Federal Reserve Banks of Richmond,  
Atlanta, and San Francisco

*March*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
Governor Lindsey  
Governor Phillips  
President Hoenig  
President Melzer  
President Syron  
President Jordan

Boehne, Keehn, McTeer, and Stern, Alternate Members of the FOMC  
Black, Forrester, and Parry, Presidents of the Federal Reserve Banks of Richmond,  
Atlanta, and San Francisco

*May, July, August, October, and November (as for above, March 1992)*

*December*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
Governor Lindsey  
Governor Phillips  
President Hoenig  
President Melzer  
President Syron  
President Jordan

Boehne, Keehn, McTeer, and Stern, Alternate Members of the FOMC  
Broaddus (President-elect of FRB Richmond)  
Forrestal, and Parry, Presidents of the Federal Reserve Banks of Atlanta, and San Francisco

**1993**

*January*

Alan Greenspan (Chairman)  
Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
Governor Lindsey  
Governor Phillips  
Governor Keehn  
President Boehne  
President McTeer  
President Stern

Broaddus, Jordan, and Forrestal, Alternate Members of the FOMC  
Hoening, Melzer, and Syron, Presidents of the Federal Reserve Banks of Kansas City, St. Louis, and Boston

*February*

Alan Greenspan (Chairman)

Corrigan (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
Governor Lindsey  
Governor Phillips  
Governor Keehn  
President Boehne  
President McTeer  
President Stern

Broaddus, Jordan, Parry, and Forrestal, Alternate Members of the FOMC  
Hoening, Melzer, and Syron, Presidents of the Federal Reserve Banks of Kansas City, St. Louis, and Boston

*March and May as above, February 1993*

*July*

Alan Greenspan (Chairman)  
Oltman (First Vice-President, FRB of New York, attending as Alternate Member for Corrigan)  
Governor Angell  
Governor LaWare  
Governor Mullins  
Governor Kelley  
Governor Lindsey  
Governor Phillips  
Governor Keehn  
President Boehne  
President McTeer  
President Stern

Broaddus, Jordan, Parry, and Forrestal, Alternate Members of the FOMC  
Hoening, Melzer, and Syron, Presidents of the Federal Reserve Banks of Kansas City, St. Louis, and Boston

*August*

Alan Greenspan (Chairman)  
McDonough (Vice-Chairman)  
Governor Angell  
Governor LaWare  
Governor Mullins

Governor Kelley  
Governor Lindsey  
Governor Phillips  
Governor Keehn  
President Boehne  
President McTeer  
President Stern

Broaddus, Jordan, Parry, and Forrestal, Alternate Members of the FOMC  
Hoening, Melzer, and Syron, Presidents of the Federal Reserve Banks of Kansas City, St.  
Louis, and Boston

*September, October, November, December as above, for August 1993.*

## 1997-99

### 1997

#### *February*

Alan Greenspan (Chairman)  
President McDonough (Vice-Chairman)  
President Broadus  
President Guynn  
Governor Kelley  
Governor Meyer  
President Moskow  
President Parry  
Governor Phillips  
Governor Rivlin

Hoening, Jordan, Melzer, and Minehan, Alternate Members of the FOMC

Boehne, McTeer, and Stern, Presidents of the FRB of Philadelphia, Dallas, and Minneapolis

*March, May, July, August, and September (as above)*

#### *November*

Alan Greenspan (Chairman)  
President McDonough (Vice-Chairman)  
President Broadus  
Governor Ferguson  
Governor Gramlich  
President Guynn  
Governor Kelley  
Governor Meyer  
President Moskow  
President Parry  
Governor Phillips  
Governor Rivlin

Hoening, Jordan, Melzer, and Minehan, Alternate Members of the FOMC

Boehne, McTeer, and Stern, Presidents of the FRB of Philadelphia, Dallas, and Minneapolis

#### *December*

As above, except Melzer not included as Alternate Member of FOMC

1998

*February*

Alan Greenspan (Chairman)  
President McDonough (Vice-Chairman)  
Governor Ferguson  
Governor Gramlich  
President Hoenig  
President Jordan  
Governor Kelley  
Governor Meyer  
President Minehan  
Governor Phillips  
Governor Rivlin

Boehne, McTeer, Moskow, and Stern, Alternate Members of the FOMC

Broadus, Guynn, and Parry, Presidents of the FRB of Richmond, Atlanta, and San Francisco

*March*

Alan Greenspan (Chairman)  
President McDonough (Vice-Chairman)  
Governor Ferguson  
Governor Gramlich  
President Hoenig  
President Jordan  
Governor Kelley  
Governor Meyer  
President Minehan  
Governor Phillips  
Governor Rivlin  
President Poole

Boehne, McTeer, Moskow, and Stern, Alternate Members of the FOMC

Broadus, Guynn, and Parry, Presidents of the FRB of Richmond, Atlanta, and San Francisco

*May*

As above

*June*

Alan Greenspan (Chairman)  
President McDonough (Vice-Chairman)  
Governor Ferguson



Governor Gramlich  
President Hoenig  
President Jordan  
Governor Kelley  
Governor Meyer  
President Minehan  
Governor Rivlin  
President Poole

Boehne, McTeer, Moskow, and Stern, Alternate Members of the FOMC

Broadus, Guynn, and Parry, Presidents of the FRB of Richmond, Atlanta, and San Francisco

*August, September, October, November, and December*  
As above

1999

*February*  
Alan Greenspan (Chairman)  
President McDonough (Vice-Chairman)  
President Boehne  
Governor Ferguson  
Governor Gramlich  
Governor Kelley  
Governor Meyer  
President McTeer  
President Moskow  
Governor Rivlin  
President Stern

Broadus, Guynn, Jordan, and Parry, Alternate Members of the FOMC

Minehan, Poole, and Hoenig, Presidents of the FRB of Boston, St. Louis, and Kansas City

*March and May*  
As above

*June*  
Alan Greenspan (Chairman)  
President McDonough (Vice-Chairman)  
President Boehne  
Governor Ferguson

Governor Gramlich  
Governor Kelley  
Governor Meyer  
President McTeer  
President Moskow  
President Stern

Broadus, Guynn, Jordan, and Parry, Alternate Members of the FOMC

Minehan, Poole, and Hoenig, Presidents of the FRB of Boston, St. Louis, and Kansas City

*August, October, November, and December*  
As above

**APPENDIX D: THEMATIC CLASSES FOR ALL FOMC  
TRANSCRIPTS (1979, 1980, 1981, 1991, 1992, 1993, 1997, 1998, AND  
1999)**

[INSERT TABLES A1 THROUGH A10, ABOUT HERE]

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<sup>i</sup> This has changed since 1998 so that the votes are now disclosed with the immediate policy statement.

<sup>ii</sup> "Inter-meeting period" is one of the important terms in the language of the FOMC, reflecting the way in which monetary policy is set in an incremental fashion – i.e. taking the incremental news and assessing the impact of that against the baseline of the FOMC's previous view.

The Greenbook is delivered to FOMC members towards the end of the week before the FOMC meeting. Bank Presidents typically have their own forecast prepared for their participation in the FOMC by their staff.

<sup>iii</sup> Bank presidents begin this section of the meeting but within the section the order is not fixed (Meyer 2004: 39) describes the order as following the "wink" system – as each member indicated their desire to speak.

<sup>iv</sup> These two options do not come as a surprise to members – they have been circulated before the meeting in the Bluebook.

<sup>v</sup> For Alceste, "statements" are defined as "contextual units." The program automatically determines contextual units with reference to punctuation and the length of the statement up to a maximum of 250 characters.