Does Deliberation Matter in FOMC Monetary Policymaking? The Volcker Revolution of 1979

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In monetary policy, decision makers seek to influence the expectations of agents in ways that can avoid making abrupt, dramatic, and unexpected decisions. Yet in October 1979, Chairman Paul Volcker led the Federal Reserve's Federal Open Market Committee (FOMC) unanimously to shift its course in managing U.S. monetary policy, which in turn eventually brought the era of high inflation to an end. Although some analysts argue that ''the presence and influence of one individual''—namely, Volcker—is sufficient to explain the policy shift, this overlooks an important feature of monetary policymaking. FOMC chairmen—however, omnipotent they may appear—do not act alone. They require the agreement of other committee members, and in the 1979 revolution, the decision was unanimous. How, then, did Chairman Volcker manage to bring a previously divided committee to a consensus in October 1979, and moreover, how did he retain the support of the committee throughout the following year in the face of mounting political and economic pressure against the Fed? We use automated content analysis to examine the discourse of the FOMC (with this discourse recorded in the verbatim transcripts of meetings). In applying this methodology, we assess the force of the arguments used by Chairman Volcker and find that deliberation in the FOMC did indeed ''matter'' both in 1979 and 1980. Specifically, Volcker led his colleagues in coming to understand and apply the idea of *credible commitment* in U.S. monetary policymaking.

1 Introduction

Abrupt policy changes are fascinating to study but awkward to explain. Traditional voting models and econometric tools are better suited to explaining more regular patterns in policymakers' behavior, not least because patterned behavior is more frequently observed.

In monetary policy, decision makers seek to influence the expectations of agents in ways that can avoid making dramatic and unexpected decisions. Yet in October 1979, under

Chairman Paul Volcker the Federal Reserve's Federal Open Market Committee (FOMC) unanimously shifted its course in managing U.S. monetary policy, which in turn eventually brought the era of high inflation to an end. His successor, Alan Greenspan, described the so-called Volcker Revolution as a ''turning point'' in the economic history of the U.S., which ''rescued our nation's economy from a dangerous path of ever-escalating inflation and instability'' (Greenspan 2005, 137). A unanimous decision was no small feat, particularly in the wake of the scale of division within the FOMC under Volcker's predecessor, G. William Miller.

The key to the Volcker Revolution rests in understanding how Volcker *persuaded* other committee members to endorse a policy that in the short run would be politically unpopular and economically painful for the nation but in the long run would deliver sustained lower inflation and in the process would lead Americans *to expect* stable prices to persist. To understand the Volcker Revolution is to understand the genesis of the Fed's *credible commitment* to lower inflation.

The paper begins by reviewing the story of monetary policy in 1979 and 1980. Next, we consider to what extent the more standard accounts of the revolution explain the lines of argument used to achieve unanimity in the FOMC. We then describe our methodology of automated content analysis as we apply it to the discourse of the FOMC. In applying this methodology, we are able to produce a number of analytical tools to represent the discourse and how it changed over time.

We find that deliberation in the FOMC did matter. Volcker led his colleagues in coming to understand and apply the idea of *credible commitment* in U.S. monetary policymaking. We are able to discern (1) the arguments upon which Volcker relied to gain the initial consensus for the policy shift and differentiate these from (2) the core rationale that he employed to sustain agreement in the midst of the turbulence during the subsequent year. Our analysis allows us to identify and measure Volcker's strategy in shaping the deliberations of the FOMC both over the short and long run. Our focus on the importance of the ideas of ''monetarism'' and ''credibility'' is not new; however, our approach is novel in allowing us to measure the development of these ideas within the committee setting.

2   The Volcker Disinflation: The Story of the FOMC in 1979

2.1   *The Shift in 1979*

During much of 1979 economic forecasts were pointing toward an oncoming recession in the U.S. economy and a rapid rise in the inflation rate. There was a growing realization that past inaction by the FOMC was contributing to deteriorating inflation expectations among the public and instability in financial markets. In Volcker's view, monetary policy was the only tool to address inflation, but the Fed lacked credibility in managing this tool and thus that monetary restraint would be maintained. Volcker's conundrum was how to provide such a demonstration. For this, he required firm support from his colleagues on the FOMC.

For the 18 months until July 1979, William Miller chaired the FOMC, whereas Paul Volcker was a permanent voting member as President of the Federal Reserve Bank of New York. Miller sought consensus in the FOMC but rarely achieved it. In June 1979, Miller finally achieved his desire of a unanimous vote. At that point he left the Fed to become Treasury Secretary in the Carter Administration. During the first part of 1979, up to Miller's departure, policy was tightened three times, so that the target for the Federal Funds Rate rose to 10½% to 10 5/8% in July.

Volcker succeeded Miller as Chairman at the end of July. At the August FOMC meeting, when the target range was raised by ¼%, there were two dissents, one for a larger move up

and one for a smaller move. At the FOMC meeting on 18th September, Volcker success-fully proposed an increase in the target range to 11¼–11³/₄%. The vote was eight to four. The Fed did not, as was customary, publish immediately the voting on the target, nor the target itself, leaving market participants and others to infer the movement in the target. But adjacent to the FOMC meeting, on 18th September, the Fed Board voted to raise the Discount Rate. The vote was split, with four in favor and three dissents for easier policy. The significance of the vote on the Discount Rate was that, unlike the FOMC vote, it was published immediately, as was the rate. The publication of such a close vote gave an im-pression that the Fed might waver in its path of tightening policy. This created substantial disruption in financial markets, and the experience is often cited as the immediate reason for the subsequent abrupt change in policy.

The problem in Volcker's view was that the Fed's focus on interest rates (i.e., its target-ing of the Federal Funds Rate—the wholesale price for overnight loans among banks) cre-ated both a psychological and political barrier to tightening monetary policy significantly, inasmuch as fears of recession would raise the spectre of political attacks against the Fed (Volcker and Gyohten 1992, 166). Hence, Volcker envisaged a new operating target. Rather than targeting interest rates, an alternative strategy would entail targeting the money supply—in short, the new target would be the quantity of money in the system rather than its price. He became disillusioned with the presumed trade-off between unemployment and inflation (the Phillips Curve), which in his words, "did not seem to be working well" and became willing to explore the monetarists' emphasis on controlling the money supply (Volcker and Gyohten 1992, 167).

The backdrop to Volcker's new plan was a divided FOMC, consisting of (broadly de-fined) "liberals," "conservatives," and "monetarists." Liberals on the committee—Nancy Teeters, Emmett Rice, "Chuck" Partee—focused on the presumed trade-off between in-flation and unemployment. According to Partee, "a little inflation" was "a good thing" in that it "lubricated the economy and it was better to have low unemployment" (Greider 1987, 81). For conservatives like Henry Wallich and Phil Coldwell (and less stridently, Volcker and Fred Schultz), the Fed's priority should be to stabilize prices (Greider 1987, 81). Lawrence Roos (President of the St Louis Fed, and to a lesser degree, other bank presidents—Robert Black, John Balles, Monroe Kimbrel) formed a group of mon-etarists within the FOMC (Greider 1987, 98). Roos, the primary monetarist on the FOMC, criticized the Fed for failing to set and adhere to long-term goals in terms of growth in monetary aggregates and for its lack of transparency.

Prior to the unannounced FOMC meeting on Saturday 6th October, Volcker canvassed other members for their support for his solution, that is, shifting from targeting the Fed Funds rate to targeting nonborrowed reserves by the member banks of the Federal Reserve system (but with no fixed monetary rule). Wallich and Coldwell opposed the idea, fearing the inevitable vol-atility in interest rates that would result, but Volcker viewed the volatility—and the uncertainty it would generate—in a more favorable light. With more uncertainty, banks would curtail their lending for speculative purposes—and even more so as Volcker proposed an added reserve requirement of 8% on bank lending. In Volcker's view, the message of 6th October was very simple: "We meant to slay the inflationary dragon" (Volcker and Gyohten 1992, 170).

2.2 *The Aftermath in 1980*

The record of the FOMC in 1980 is dominated by the rollercoaster pattern of interest rates and the growth of the narrow monetary aggregate (M1), which was the subject of most attention when deciding how to set the objective for nonborrowed reserves. The Federal

Funds Rate began the year at around 18%, fell to 8% in June, and was just under 20% in December. At the start of the year, there were signs of some slowing in the rate of growth of credit extension but with inflation remaining over 15%. In the middle of March, at the instigation of the Carter Administration, the Fed announced a series of emergency credit controls designed to slow further the growth of bank lending. The package was delivered without enthusiasm by the Fed. Although the controls were minimal in their extent, there was a sharp contraction in U.S. economic activity in the second quarter, unemployment rose by 1.5% points to 7.8% in July, and there was a contraction in the M1 money aggregate.

This sharp contraction in activity posed the fundamental challenge to the new monetary framework. In order better to enhance the credibility of monetary policy, the FOMC could either (1) stick to its framework and respond to the contraction in the M1 aggregate, thereby loosening monetary policy and allowing interest rates to fall sharply, or (2) stand against this interpretation of the framework on the view that it would take a stronger lead (and thus tighter policy) to establish persistent low inflation. Initially, Volcker retained the view that credibility came from sticking with the announced framework even though that meant a sharp loosening of policy. Some FOMC members dissented, and in late May Volcker agreed to compromise on the automatic nature of the monetary adjustment. But this move attracted dissent from opposite sides—President Roos who was the leading advocate of rigid monetary targeting and Governor Partee who opposed a narrow approach as a principle but found the easing created by the rigid policy framework attractive to his desire to see more stimulus.

Between May and July the credit controls were removed. The contraction in economic activity turned out to be brief, and by September, the FOMC was faced with the need to tighten policy sharply *and* to do so in the face of the upcoming presidential election. Policy was tightened, but with four dissents within the FOMC in favor of even sharper tightening. The Fed's actions drew criticism from President Carter on the campaign trail. Nonetheless, at each FOMC meeting for the remainder of the year (before and after the election) policy was tightened further.

Volcker later described the easing of policy in the Spring of 1980 as perhaps his largest mistake as Chairman. The volatility of policy during the year also led to extensive scepticism outside the Fed. Volcker's overwhelming concern was that the credibility of monetary policy depended on staying the course with the policy framework. The technique was moderated during the year to allow policy to remain somewhat tighter than the automatic rule would have suggested, but the essence of the framework remained in place.

3   Explanations for the Volcker Revolution

3.1   *The Political Explanation*

Of the many explanations offered for the Volcker Revolution, Greider's is perhaps the simplest. Greider argues that Volcker's solution offered a way to bridge the divide between two camps within the FOMC in that it served "as a veil that cloaked the tough decisions": the FOMC could thus publicly claim "that it was no longer pegging its policy on interest rates, but on the level of M-1," and this in turn "would obscure its hand and might deflect the public attacks when interest rates rose sharply. Fed members could explain, disingenuously, that the rising interest rates were attributable to 'market pressures'" (Greider 1987, 106–07). Or, in the more colorful words of CEA Chairman Schultze:

> In the mind of the Fed, this whole move was, in the broadest sense, a political move, not an economic move. In theory, the Fed could have kept on raising the bejesus out of the interest rates, but that's what it couldn't do politically. The beautiful thing about this new policy was that as interest

rates kept going up, the Fed could say, "Hey, ain't nobody here but us chickens. We're not raising interest rates, we're only targeting the money supply." This way they could raise the rates and nobody could blame them. (Greider 1987, 120)

Both conservatives and liberals on the FOMC saw the solution proposed by Volcker as an effective means of gaining the necessary support among the committee members. During the all-day meeting, Volcker played devil's advocate, prolonging the discussion in an attempt to get members fully to understand that more volatile and, in the short-run, much higher interest rates were the likely consequences. According to Fred Schultz, "Paul was masterful . . . . I knew exactly what he was doing. The others ended up arguing with him, talking him into doing it. By the end of the day, he had them fully committed" (Greider 1987, 123).

But what sorts of arguments did Volcker use to gain the full commitment of his colleagues? Members of the FOMC held firm beliefs about inflation, and yet their actions in October 1979 raise the possibility that these beliefs may have undergone a fundamental shift. If such a shift in beliefs occurred, how do we measure it? Moreover, if their beliefs changed in late 1979, how stable were these new beliefs, particularly in coping with the economic and political pressures of 1980, as the costs of the new policy rose sharply?

3.2 *Economic Explanations*

Previous studies have noted inherent difficulties in accounting for the Volcker Revolution using standard macroeconomic models (Primiceri 2005). Likewise, the behavior of individual monetary policymakers in the Volcker Revolution cannot be explained using standard reaction function approaches (Chappell, McGregor, and Vermilyea 2005) because of the short lifetime of the regime established by the revolution (under 3 years) and the lack of precision in the announced operating target of policy (the dependent variable in a reaction function). Indeed, in their empirical investigation of decision making by the FOMC, Chappell, McGregor, and Vermilyea appear to agree with Greider that the Volcker Revolution was a political decision that insulated the Fed from responsibility for higher interest rates, and for their reaction function equation simply create a dummy variable to capture the shift in 1979 (Chappell, McGregor, and Vermilyea 2005, 15, 36).

Much of the literature on the Volcker Revolution (summarized in Lindsey, Orphanides, and Rasche 2005) has focused on explaining the shifting beliefs of policymakers and how these could fit the observed stance of monetary policy. Yet these approaches are problematic in that they (1) require an understanding of the beliefs of policymakers about variables that neither they (as contemporaries) nor later observers could directly observe—the output gap, the natural rate of unemployment, and the expected persistence of inflationary pressure incorporated by policymakers into their Phillips Curves. This leads to a deeper issue, namely (2) how we can observe the macroeconomic model that each policymaker used to form his judgments on policy (here we use "model" broadly to mean the framework around which each policymaker organized his thinking and views). Subsequent literature tends naturally to impose a single model in order to provide a more tractable analytical framework but at the risk of distancing the focus further away from the actual beliefs of policymakers. And to complicate matters, (3) we need to understand the interaction of shocks (in this case to the U.S. economy) and the beliefs (and hence the model) of policymakers (Sargent, Williams, and Zha 2004).

One response to the limitation of standard macroeconomic models of the Volcker Revolution has been to use a learning approach that allows policymakers to adapt the parameters of their models over time. Some authors have suggested that rather than FOMC

members making persistent mistakes during the so-called Great Inflation of the 1960s and 1970s, they displayed slow learning via adapting their expectations on, for instance, the natural rate of unemployment (Sims 1988; Cho, Williams, and Sargent 2002; Sargent, Williams, and Zha 2004). This learning explanation suggests that policymakers updated their beliefs about the unobserved variables of their model of the economy in every period, and they implemented policy conditional on their current beliefs.[1] Unfortunately, as ex post analytical tools, learning approaches become exercises in retrofitting to the data, that is, parameterizing to fit the change in the beliefs of policymakers as revealed by their decisions.

A second response has been to emphasize the role and impact of a new idea(s) on policy-makers (Romer 2005). Here, too, there is a danger of retrofitting. Ex post, we can observe the development of an idea, and hence, it is attractive to tie that idea in to the observed decisions of policymakers. Yet without observing directly the beliefs of policymakers, we are unable to test whether the idea really influenced their beliefs. According to the ideas explanation for the Volcker Revolution, a new idea—namely, that policymakers will stand a greater chance of achieving their desired outcomes if they are able to make credible commitments (in the sense that the public believes them) about the policies they will follow in the future—triumphed quite suddenly. This idea originated in the famous 1977 article by Kydland and Prescott (1977), one of whose examples was the effect of a credible commitment by monetary policymakers to future low inflation on the inflation expectations and hence wage and price increase demands of the public.[2]

In sum, a common limitation of the academic literature (both of the macroeconomic models and the subsequent corrections to these models) is that it lacks direct observation of why and how policymakers reached their decisions. An obvious, but at first glance perhaps idealistic, alternative approach would be to find a body of evidence that can be analyzed systematically, and, in doing so, provide a direct interpretation of the beliefs of policymakers and how these changed over time (an approach that has been recommended by an appraisal of the monetary policy literature [Freeman 2002, 902]). One source would be records of what policymakers said, provided that such textual material can be processed in a systematic fashion. Fortunately, such a source is available for the Volcker Revolution, namely the transcripts of the meetings of the FOMC. We thus employ a technique that enables full-text analysis of the transcripts in order to assess the deliberations surrounding the Volcker Revolution.

A key goal in our analysis is to understand better the deliberative process that underpins monetary policymaking. Although deliberation is becoming a topical subject among political scientists (Page 1996; Elster 1998; Fishkin and Laslett 2003; Pettit 2003; Quirk 2005; Austen-Smith and Feddersen 2006; Mucciaroni and Quirk 2006), few have sought actually to understand the mechanics of deliberation within a policymaking setting. Indeed, as one author aptly notes ''(u)nwavering faith in deliberation is puzzling because scholars have not clarified how deliberation works'' (Barabas 2004). The deliberative process that underpins monetary policymaking is important not only for the policy outcome but also for the reputations of the committee members, and the Fed as an institution. In short, the process must yield a policy outcome that is rationally defensible but also reflects the judgments of individual members (List and Pettit 2002).

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[1] To fit such models to history, it is necessary to make assumptions about the weight that policymakers place on recent information and to what extent they employ a smoothing component that acts against big shifts in policy (Woodford 2003; Primiceri 2005).

[2] It was not until 1985 that Rogoff filled in the important gap of explaining how a central bank could attain credibility in the first place (Rogoff 1985; Bernanke, Blinder, and McCallum 2005).

4 Arguments for the Policy Shift

We can identify three prominent arguments that Volcker might have employed to convert his FOMC colleagues in October 1979.

4.1 *Commitment*

Volcker might have appealed to the idea of time consistency as developed by Kydland and Prescott (1977) to persuade colleagues that a changed policy would provide a credible commitment to future low inflation and thus influence the expectations of agents (Chari, Christiano, and Eichenbaum 1998; Christiano and Gust 2000; Christiano and Fitzgerald 2003). If "commitment" had a bearing in the discussions, we should expect to see a greater weight on the importance of the credibility of the monetary policy framework, the expected impact of that credibility on inflation expectations, and the inclusion of expectations in the models of FOMC members (the introduction of an expectational Phillips Curve). FOMC members should be concerned about whether agents would believe their commitment to deliver lasting low inflation.

4.2 *Repentance*

Volcker may have persuaded policymakers that the long-run Phillips Curve was vertical, with no scope for assuming a trade-off between inflation and employment and thus over-stating the contribution to stabilization of fine tuning in fiscal policy (Romer and Romer 2002; Meltzer 2005). Support for this explanation would come from evidence that FOMC members both (1) discussed and (2) changed their position on the trade-off between inflation and employment (notably, a changed position should be evident from the more liberal members—Teeters, Rice, Partee). For those who converted, we should find evidence that they had come to accept the idea of a vertical slope on the Phillips Curve. We should expect to see FOMC members devoting considerable (i.e., statistically significant) attention to inflation and output/employment.

4.3 *Money Matters*

Volcker may have persuaded his colleagues that they had underweighted the role of money in their models of inflation (Meltzer 2005). Evidence of FOMC members merely describing their preferred target ranges for money would be necessary but insufficient.

Although other arguments may have swayed the committee members, most research on the Volcker Revolution points to (1) the idea of credible commitment, (2) the shape of the Phillips Curve, and/or (3) the role of money in the inflation process as key rationales for the policy shift. Yet, it is unclear the extent to which Volcker employed any (or all) of these arguments in the critical October 1979 meeting. Even more important than what may or may not have persuaded the FOMC in 1979 is the persistence of their new opinions in the face of the economic and political storms of 1980. It is, of course, conceivable that any deliberation in the October 1979 meeting was a complete charade in that the monetarist solution was simply the lowest common denominator upon which they could all agree to confront the inflationary "dragon." Yet, if this were true, common sense would suggest that turbulent times would quickly strip away the flimsy veil of agreement to expose the underlying dissension and conflict among the liberals, conservatives, and monetarists. One would not expect the FOMC to hold steady to its new operating mechanism throughout the economic and political storms of 1980. Yet, hold firm is exactly what the FOMC did. What, then, was the glue that held the committee together in the face of the turbulence and

uncertainty of 1980? Our findings below suggest that Volcker's solution represented far more than the lowest common denominator. Underpinning his new approach was a powerful idea that would in time break the back of the inflationary spiral.

5   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, and Garry 2003; Albright 2007; Benoit and Mikhailov 2007; Slapin and Proksch 2007), the dynamics of political agenda setting in Congress (Quinn et al. 2006), political culture (Garson 2002), and to classify or extract meaning from political texts more generally (Diermeier et al. 2007; Hillard, Purpura, and Wilkerson 2007; Hopkins and King 2007; Monroe, Quinn, and Colaresi 2007).

A variety of packages are on offer for automated content analysis, each providing its own array of analytical tools and insights into textual data.[3] Some packages appear well suited to analyze very large corpora encompassing multiple topics, but usually these require a precoded or prescaled 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, and Garry 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, and Wilkerson 2007). Alceste, the approach used here and elsewhere in the social sciences,[4] does not require any precoding but is more limited in that it cannot analyze very large corpora[5] or 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 lines of argument. A more detailed description of the Alceste method is given in the online supplementary material.

6   Analyzing FOMC Transcripts with Alceste

We use full-text analysis software to discern which of the rationales appears to have the most support based on what was said by FOMC members over the period immediately before, during, and after the Volcker Revolution. 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 2005; Meade and Stasavage 2004; Chappell, McGregor, and Vermilyea 2005), we use the *full transcripts* of meetings of the FOMC of the U.S. Federal Reserve. Our approach enables us to weight numerically the relative importance of the main identified themes and the significance (using χ^2 values) of the association of individual policymakers with the themes. This should allow us to

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[3]See 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.
[4]Examples of its application in the social sciences include the following: Noel-Jorand et al. 1995; Lahlou 1996; Noel-Jorand et al. 1997; Allum 1998; Brugidou 1998; Brugidou 2003; Noel-Jorand et al. 2004; Schonhardt-Bailey 2006; Bailey and Schonhardt-Bailey 2007; Schonhardt-Bailey 2008.
[5]Although subsequent versions may allow a larger corpus, Alceste 4.7 requires that the corpus not exceed 15 Mb.

measure the positions of policymakers in 1979 under Miller's chairmanship and in 1979 and 1980 under Volcker.

Inasmuch as we seek to assess the rationales for the Volcker Revolution, our premise is that any one (or more) of these rationales 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 that deviate significantly and fit with our expectations for a particular rationale are thereby evidence in favor of that rationale.

Table 1 provides a summary of the basic statistics for the three periods surrounding the Volcker Revolution. We examine three text files—1979 (Miller), 1979 (Volcker), and 1980 (Volcker)—and in these, each speech or interjection by a committee member constitutes a "case" and each is identified (or "tagged") with certain characteristics. Here, we have three tags—the speaking member's name and role on the committee, and for the two 1979 files, the date of the meeting. The analysis produces χ^2 values for these tags as they relate to each of the classes. Where a policymaker's name tag obtains a high χ^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. Further analyses, comparing the results for 1979 and 1980 with equivalent analyses of FOMC transcripts under the chairmanship of Alan Greenspan (1992 and 1998), are described in the web appendix.

The "Initial Context Unit," or ICU, is essentially the sampling unit—that is, a preexisting division of the text and is specified by the user—and here, ICUs are the speeches or comments of committee members. Under Miller, members made 1064 comments; under Volcker (1979), they made 2362—totalling 3426 for the year. In 1980, members made 3430 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 web appendix). From the extended Table 1 in our web appendix, we can see that in the two Greenspan years, a higher percentage (81%–83%)[6] of the retained ECUs were classified than under Miller (68%) in 1979 or Volcker in 1979 (76%). However, FOMC meetings under Volcker in 1980 attain the same higher percentage classification (83%) as the Greenspan years. Our interpretation of the higher classification rates for Volcker (1980) and Greenspan (1992, 1998) is that the content and format of these meetings were more focused than under Miller or the early Volcker meetings.

The final two rows in Table 1 indicate the number of classes identified in each file and the relative size of each class (as measured by the percentage of the total ECUs classified within each). We have added the labels for each class (e.g., *US Economy*, *Uncertainty and Deliberation*, and so on) based on an analysis of the most characteristic words for each class (those with high χ^2 values)[7] and the most representative ECUs for each class. Tables 2–4 in our web appendix provide examples of the top representative words and ECUs

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[6]This compares favorably with the percent of words scored by Laver and Benoit, which ranged from 81% to 94% (Laver and Benoit 2002, 16–17).

[7]The minimum chi-square value for selecting a word is set at 2, 20, and 20, for the Miller, Volcker 1979, and Volcker 1980 transcripts, respectively. The high thresholds for the Volcker transcripts reflect the larger word counts for these text files and the smaller word count for 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).

Table 1   Comparison of basic statistics for FOMC transcripts in Miller, and Volcker eras

	(a) Miller Era (1979)	(b) Volcker Era (1979)	(c) Volcker Era (1980)
Total word count	98,636	181,441	254,645
Unique words analyzed	39,923	74,856	103,809
Passive variables (tagged indicators)	53	54	48
ICUs (no. of speeches/ comments)	1064	2362	3430
Classified ECUs	2156 (=68% of the retained ECU)	4288 (=76% of the retained ECU)	6863 (=83% of the retained ECU)
Lexical classes	6	5	3
Distribution of classes (%)	1. US Economy (stronger inflation, weaker demand, and output) (19.2%) 2. Uncertainty and Deliberation (19.3%) 3. Caution re: Changing Monetary Policy Stance (including International dimension to policy setting) (10.9%) 4. US Economy Demand and Output (12.4%) 5. Federal Reserve Financial Markets Operations (Domestic and International) (10.0%) 6. Target Ranges for Money and Interest Rates (28.2%)	1. Effectiveness of Monetary Policy—Uncertainty over Transmission Mechanism (22.3%) 2. Impact of Volcker Revolution on Interest Rates and Communication of the Policy Change (13.7%) 3. Policy Implementation (level of nonborrowed reserves) (16.7%) 4. Monetary Aggregate Ranges (14%) 5. US Economy (demand and inflation outlook) (33.4%)	1. US Economy (evidence of weakening) (25.86%) 2. Monitoring Targets (reserves target, range for Funds rate) (26.26%) 3. Striving for Credibility (47.88%)

for each class (by χ^2 values), as well as separate files containing *all* the classified ECUs for each text file. Our labeling 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 χ^2 values, the relative importance (in terms of statistical significance) of key words and phrases is readily apparent.

   Notably, although the Miller period contains six thematic classes and Volcker 1979 contains five, Volcker 1980 is conspicuous in having just three thematic classes—also compared with six themes under Greenspan in 1992 and four in 1998 (Bailey and Schonhardt-Bailey 2005). Volcker 1980 is thus conspicuous in two ways—it attains a higher rate of
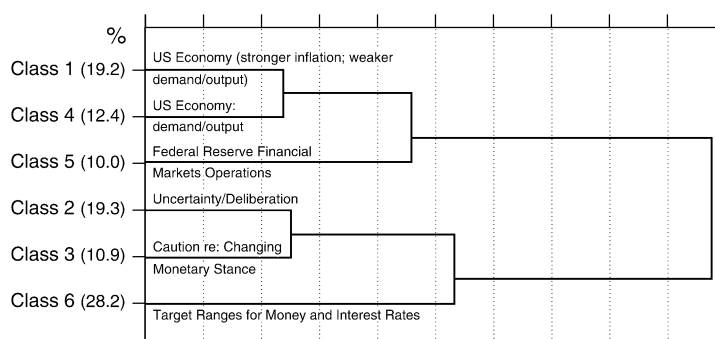
Fig. 1 Tree graph of the classes for the FOMC transcripts, Miller era (1979).

classification (is more focused) than the Miller or Volcker eras in 1979, and the range of themes discussed is fairly narrow relative to those under Miller and Volcker (1979) and Greenspan (1992, 1998).

Figures 1–6 set out the *relative importance* of and the *relationships* between the classes. Figures 1–3 are tree graphs of the classes schematized according to Alceste's descending hierarchical classification procedure (with the percentage distribution indicated in parentheses). The trees group the classes according to similarity in terms of characteristic words and ECUs; the nearer to the left is the link between classes, the more closely they are related (in terms of word and ECU similarity). For illustration, in Fig. 1 (the Miller era) Classes 1 and 4—both of which focus on the U.S. economy—are closely related, as are Classes 2 and 3—both of which relate to the monetary stance and members' uncertainty about changing this stance. Classes 1 and 2 in the 1979 Volcker era (Fig. 2) are closely related, as both are concerned with the monetary policy stance and the impact of changing that stance. The key feature of Figs 1–3 is the relative simplicity of the FOMC discussions under Volcker in 1980, and the distinct nature—in terms of size and content—of the "Striving for Credibility" class in that year, with that one class counting for nearly half the classified ECUs. In other words, the FOMC dedicated the lion's share of its discussions in 1980 to the Fed's ability to demonstrate a credible commitment to lower inflation.

The results from Alceste's classification can also be presented graphically as a spatial representation of the relations between the classes (Figs 4–6).[8] Here, distance reflects the degree of association.[9] Correspondence analysis aims to account for a maximum amount of association[10] along the first (horizontal) axis. The second (vertical) axis seeks to account for a maximum of the remaining association, and so on. Hence, the total association is divided into components along principal axes. The resulting map provides a means for

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[8]Alceste cross-tabulates classes and words in their root form in order to create a matrix, which can then be subjected to factor correspondence analysis (Greenacre 1993). (Greenacre and Underhill 1982; Greenacre 1984; Weller and Romney 1990; Greenacre 1993; Blasius and Thiessen 2001.)

[9]For this, correspondence analysis uses the "chi-squared distance," which resembles the Euclidean distance between points in physical space. However, in correspondence analysis, each squared difference between coordinates is divided by the corresponding element of the average profile (where the profile is a set of frequencies divided by their total). The justification for using the chi-squared concept is that it allows one to transform the frequencies by dividing the square roots of the expected frequencies, thereby equalizing the variances. This can be compared to factor analysis, where data on different scales are standardized. Greenacre provides further geometric reasons for using the chi-squared distance in correspondence analysis (Greenacre 1993, 36).

[10]Correspondence analysis usually refers to the "inertia" of a table, which can also be called "association" (Weller and Romney 1990). A corresponding χ^2 value can be obtained by multiplying the association value by the total n of the table.
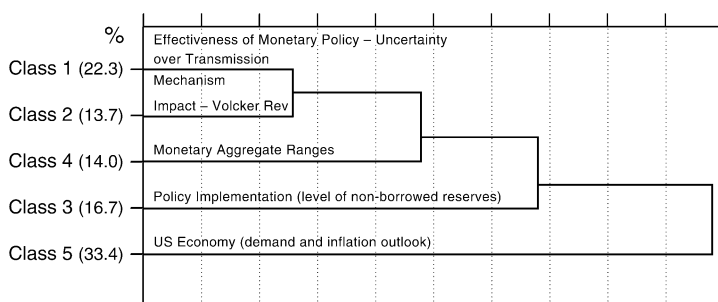
Fig. 2   Tree graph of the classes for the FOMC transcripts, Volcker era (1979).

transforming numerical information into pictorial form. It provides a framework for the user to formulate her own interpretations, rather than providing clear-cut conclusions.[11] The first two factors together account for about 55% and 66% of the variance, which is explained (measured by total inertia) in the original correspondence tables for the Miller and Volcker eras in 1979. Again, the discussions in 1980 are unique: a two-dimensional spatial map captures 100% of the variance, which is explained in the original correspondence tables (total inertia = 40%). The circular appearance of this graph is a product of the space being two-dimensional,[12] and its peculiar appearance may indicate the so-called arch effect, which occurs when one variable has a unimodal distribution with respect to a second. Detrending may remove the arch effect, but this method has been criticized for the resulting loss of information and has been described as "taking a sledge hammer to your data."[13] To explore the distribution of these data more effectively, we provide in our web appendix several three-dimensional moving graphics of the correspondence analysis for both Volcker 1979 and 1980. These moving graphics allow us to compare the simpler, two-dimensional plane exhibited by the correspondence analysis of the word distribution in Volcker 1980 with the higher dimensionality in the previous year. What is clearly evident both from Figs 4–6 in this article and from the graphics on the web appendix is that de-liberation of the FOMC in 1980 was more focused in terms of thematic content than were meetings in the previous two periods (and indeed, more so than under Greenspan [Bailey and Schonhardt-Bailey 2005]).

   In the correspondence graphs for the Miller and Volcker eras (Figs 4–6), the thematic classes are indicated in bold, whereas tags for the names of speakers (FOMC members and staff) are given by symbols. All three graphs indicate a basic "dimensionality" along the horizontal axis, which divides themes relating to the U.S. economy from the remaining themes—a feature that essentially replicates the separation of the classes in the tree dia-grams. The second dimension is, however, less easy to interpret in these graphs.

   More important is the spatial positions of the classes and tags. These reveal that FOMC members (Governors and Presidents) and staff (i.e., economists from the Fed who attend meetings and speak in an advisory capacity) tend to cluster around different themes, which

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[11]The association and χ^2 statistic may be interpreted geometrically as the degree of dispersion of the set of rows and columns (or, profile points) around their average, where the points are weighted.
[12]That is, because the coordinates of points reflect correlation—and the more distant the points are from one another, the less likely they are to be co-occurrent—the coordinates of points and number of columns analyzed in a two-dimensional space will result in a circular appearance.
[13]The solution to the arch effect is a disputed topic—(see Wartenberg, Ferson, and Rohlf 1987; Schuur and Kiers 1994; Holland 2006) and Ordination Methods (http://ordination.okstate.edu/).
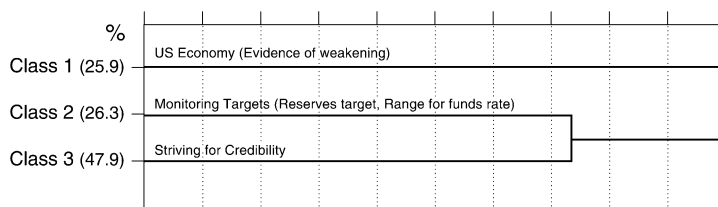
Fig. 3 Tree graph of the classes for the FOMC transcripts, Volcker era (1980).

in turn suggests that the themes covered by staff members were often distinct from those of the actual FOMC members. In the Miller period (Fig. 4), Fed staff focused on the state of the U.S. economy (Classes 1 and 4) and on the Fed's financial markets operations (Class 5), whereas FOMC members discussed policy-focused topics such as the monetary policy stance (including the uncertainty surrounding changing it—Classes 2 and 3) and target ranges (Class 6). In the 1979 Volcker period (Fig. 5), Fed staff again focused on the U.S. economy (Class 5), with some attention also given to the implementation of the new policy stance (Class 3). Meanwhile, FOMC members were again more concerned with issues surrounding the monetary policy framework, such as the transmission mechanism and the impact of changing that policy framework (Classes 1 and 2), and with monetary aggregate ranges (Class 4). In 1980, staff are situated nearer to discussions relating to the U.S. economy (Class 1), whereas FOMC members focus particularly on the issue of credibility (Class 3), and they overlap in discussing the monitoring of targets (Class 2).

Although the spatial graphs provide a visual representation of the data, we can obtain greater precision in measuring the relationships between tags and thematic classes from the levels of statistical significance assigned to each tag. From Tables 5–7 in our web appendix, we obtain the numbers of name tags associated with each thematic class, where the level of χ^2 association is given in terms of statistical significance (using a standard χ^2 table with 1 degree of freedom). In Fig. 7, we group all the classes into four categories: (1) U.S. economy and the Fed's Financial Operations (including policy implementation); (2) Monetary Policy Stance, Uncertainty, and Monitoring Target Ranges; (3) Impact of the Volcker Revolution; and (4) Striving for Credibility. We present these as simple bar charts to illustrate three features. First, Fed staff are highly associated with discussions on the U.S. economy and Fed operations, whereas FOMC members are more associated with the monetary policy stance (and uncertainty surrounding it) and target ranges. Second, not surprisingly, the one and only member tag for the Impact of the Volcker Revolution in Fig. 7b belongs to Volcker himself. Third, in 1980, discussion focusing on the Fed's attempts to gain credibility—which dominates the discussions (at 48% of the classified ECUs)—virtually replaces the previous focus of FOMC members on the Monetary Policy Stance category. Fed Staff remain predominantly focused on the U.S economy and Fed operations.

In sum, 1980 appears to be an anomalous year for the FOMC in that discussions covered fewer themes, and of those covered, the Fed's credibility was paramount. In terms of the observed thematic classes in 1980, FOMC members did not expend much effort in re-evaluating the shape of the Phillips Curve or in highlighting the role of money in the inflation process. We thus have an emerging view about what held the committee together in the face of the storms of 1980, namely *the goal of demonstrating a credible commitment to lower inflation*. Yet, to see how this idea took hold in 1980, we require a clearer understanding of the interpretation and importance that Volcker and his colleagues placed on credible commitment in monetary policy. In particular, we investigate the extent to which Volcker
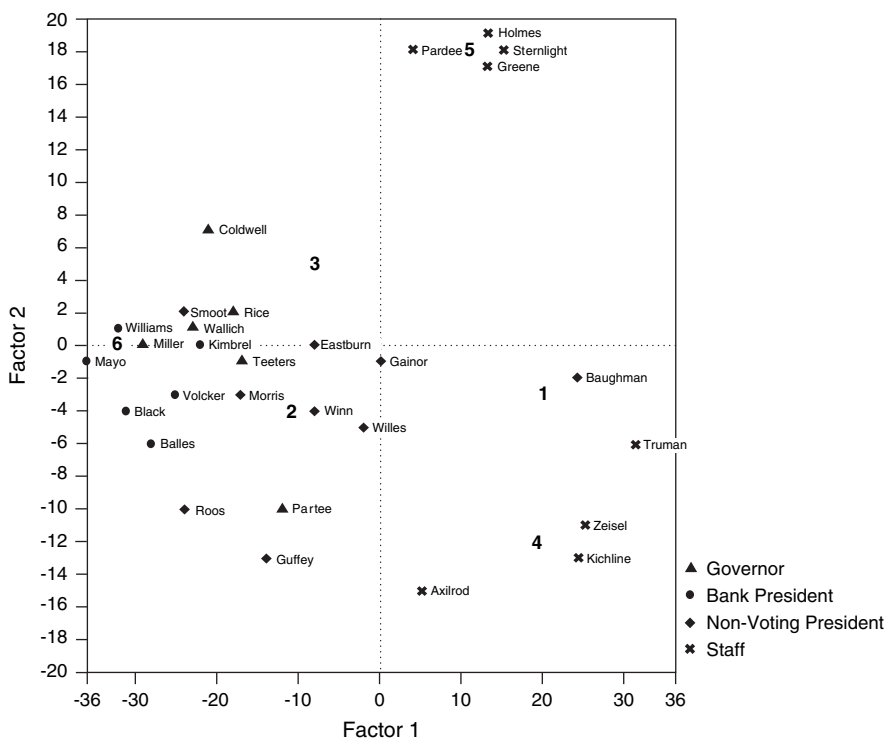
	% Association	% Cumulative
Factor 1	31.0	31.0
Factor 2	24.0	55.0

1 US Economy (stronger inflation; weaker demand and output)
2 Uncertainty and Deliberation
3 Caution re: Changing Monetary Policy Stance
4 US Economy Demand and Output
5 Federal Reserve Financial Markets Operations
6 Target Ranges for Money and Interest Rates

Fig. 4 Correspondence analysis of classes for FOMC transcripts, Miller era (1979).

introduced and elevated the idea of credibility within FOMC deliberations, as well as the prominence (or lack thereof) in the policy shift of the role of money in the inflation process.

7 A Closer Look at What FOMC Members Said

In this section, we set out the evidence from our full-text analysis of the transcripts for 1979 and 1980 that supports or rejects each of the three plausible rationales that Volcker might have used to gain the support of his colleagues and to keep that support throughout 1980.

7.1 *Commitment*

For the Miller period, Classes 2 and 3 ("Uncertainty and Deliberation" and "Caution re: Changing the Monetary Policy Stance") relate to the framework for monetary policy.
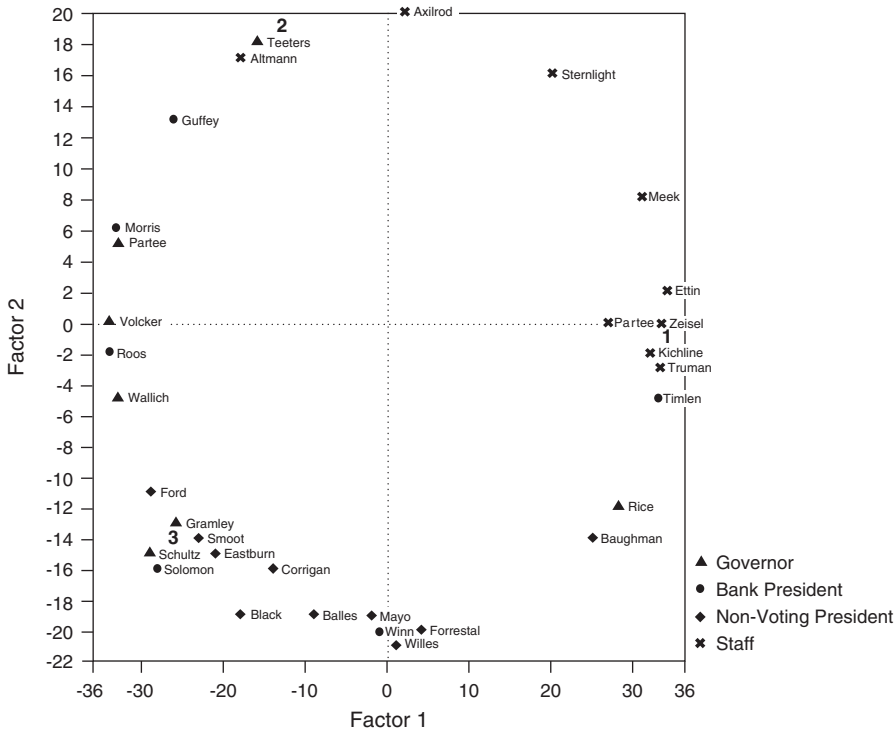
	% Association	% Cumulative
Factor 1	39.0	39.0
Factor 2	27.0	66.0
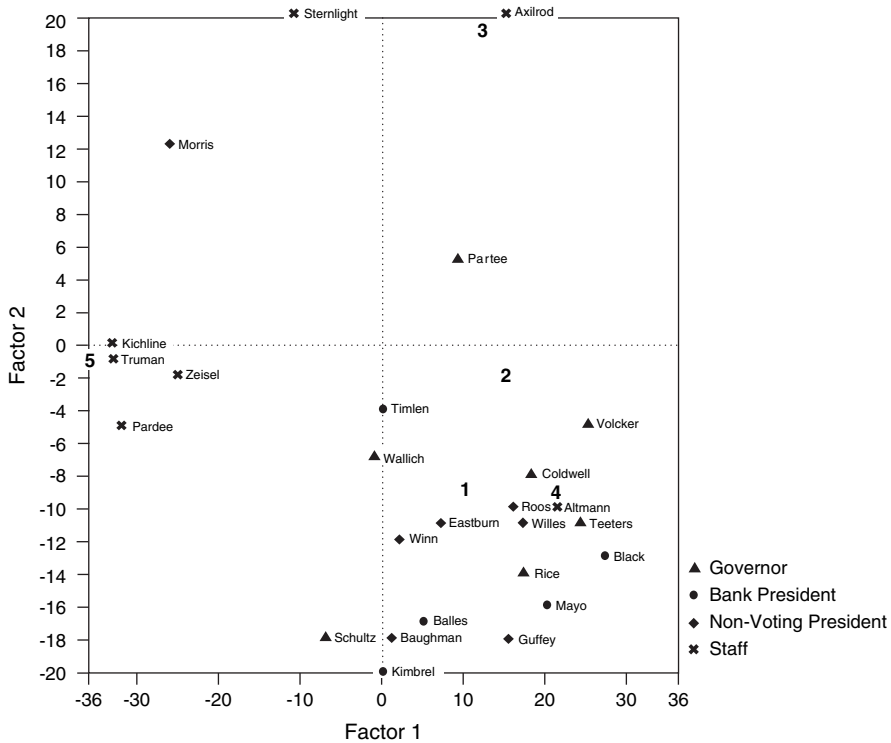
1 Effectiveness of Monetary Policy – Uncertainty Over Transmission Mechanism
2 Impact of Volcker Revolution on Interest Rates and Communication of the Policy Change
3 Policy Implementation (level of non-borrowed reserves)
4 Monetary Aggregate Ranges
5 US Economy (demand and inflation outlook)

Fig. 5 Correspondence analysis of classes for FOMC transcripts, Volcker era (1979).

Together, they account for 30% of the overall distribution of classes and they are closely linked in the tree diagram (meaning that the language used by members often overlapped). All the 18 significant tags for these two classes belong to members of the FOMC. Of the 20 most representative ECUs for these classes, three provide the clearest message on the thinking of FOMC members toward the role of commitment in the monetary policy framework (name of member, χ^2, and *class number*, all in parenthesis):

> Our credibility would be hurt more if we put out some very specific numbers [for the FOMC's target range for monetary aggregates] and can't come near them than if we put out some generalized statement of policy intent, which we know is about the best we can do at this point really. (Chairman Miller, **18**, 2)

> I think we should do all we can to resist a high inflation rate but, as has been observed by some others, there seems to be a limit to the effectiveness of monetary policy as an anti-inflationary instrument given the kind of inflation we are facing at the present time. (Governor Rice, **26**, 3)

	% Association	% Cumulative
Factor 1	59.0	59.0
Factor 2	41.0	100

1 US Economy (evidence of weakening)

2 Monitoring Targets (Reserves target, Range for funds rate)

3 Striving for Credibility

Fig. 6 Correspondence analysis of classes for FOMC transcripts, Volcker era (1980).

> I feel that we have to recognize the limitations of monetary policy here and save our ammunition, for the moment anyway, but I certainly would watch carefully. (President Mayo, **24**, 3)

From these, we can observe three characteristics of the Miller period. First, although some members at least recognized the importance of policy credibility, they were more concerned that they might lose it, rather than gain it. In retrospect, this is odd, given the widespread view that the Fed had severely damaged its credibility during the Great Inflation period of the 1960s and 1970s. Second, where a concern to fight inflation was expressed, it was dominated by a greater concern that monetary policy was impotent in the face of theparticular shocks. Third, in the face of uncertainty over the effectiveness of monetary policy, FOMC members would tend toward inaction (the risk-adjusted costs of doing something in the face of uncertainty outweighed the costs of doing nothing).

For the 1979 Volcker period, Classes 1 and 2 ("Effectiveness of Monetary Policy—Uncertainty over the Transmission Mechanism" and "Impact of the Volcker revolution and Communication of the Policy Change") relate to the framework for monetary policy.
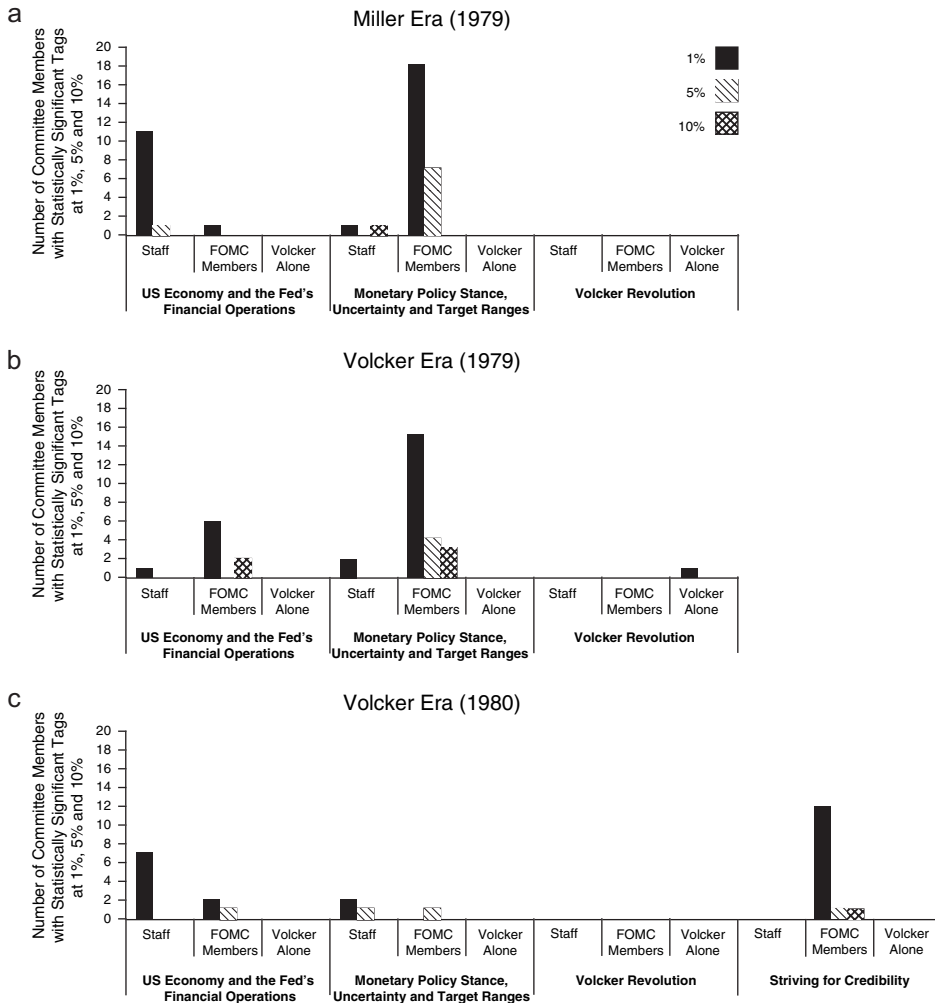
Fig. 7 Grouped classes by type of committee member. (a) Miller era (1979). (b) Volcker era (1979). (c) Volcker era (1980).

Together, they account for 36% of the overall distribution of classes and are closely linked in the tree diagram. There are 13 significant tags for Class 1, the effectiveness of monetary policy—all belonging to FOMC members but *none* of these were Volcker. Rather, Volcker's tag is highly significant ($\chi^2 = 226$) for Class 2, the impact of the Volcker Revolution and communication of the policy change—and no other FOMC member's tag is significant for this class. Indeed, this is the only class in 1979 for which Volcker's tag is overwhelmingly dominant.

A closer look at the statements of committee members shows that to the extent that commitment was discussed, it was done so within the context of the effectiveness of monetary policy (Class 1) rather than as part of discussions on the impact of the Volcker Revolution (Class 2). FOMC members' discussions of commitment within Class 1 suggest that they viewed the credibility of the Fed as something to be gained, not lost (in direct contrast to the Miller era):

> But I don't think that approach will be a very happy one unless people are pretty confident about our long term intentions. That's the credibility problem and the confidence we have to establish as I see it, and we haven't got a helluva lot of time as the recession comes along but particularly if it gets worse. (Chairman Volcker, **39**, 1)

> If they see our interest rates drop before they see some progress in the fight against inflation, then they are going to believe that we have lost our resolve and, therefore, act accordingly. (President Guffey, **24**, 1)

> There's also a possibility of getting some positive mileage from taking a fairly specific posture as to our plans regarding the orientation of monetary policy beyond 1980 because if we're going to be able to make progress on the inflation front," (President Baughman, **22**, 1)

> But it seems to me if our major problem is inflation, and we visualize ourselves as being in a box and we're trying to find a way out, then we're pretty much forced to orient monetary policy to a rather long term horizon. (President Baughman, **19**, 1)

These suggest that FOMC members envisaged the idea of a credible commitment in terms of the need for the Fed to establish credibility. To the extent that beliefs shifted, this was toward recognizing that the benefits of adopting a consistent anti-inflation policy outweighed the costs of doing nothing. Hence, members became more concerned with gaining than losing credibility, and a bias toward action replaced a bias toward inaction.

In 1980, FOMC members spoke clearly in terms of credibility, but in terms of minimizing risk and with a fair amount of uncertainty as to the means to achieving credibility. The single largest thematic class—"striving for credibility"—shows that as the committee grappled with targeting nonborrowed reserves, it was concerned with its ability to communicate the Fed's intentions to the public. For Mayo, the determination to show commitment was clear: "we have to keep our eye on the ball and dig in" ($\chi^2 = 21$), and "I think you can indicate qualitatively how we are leaning in our thinking without getting into quantities and without disturbing credibility" ($\chi^2 = 17$). For Volcker, credibility was closely linked with the public's confidence in the Fed to "bail them out" of serious difficulties: "on the other hand, the opposite danger is sitting there. The danger is that if people's confidence that they're going to get bailed out of any serious situation were ever seriously challenged, the sense of panic in this economy could be enormous" ($\chi^2 = 16$). Taken together, the ECUs and representative words for the "striving for credibility" class illustrate a determination to stay the course and to renew public confidence in the Fed's commitment to managing inflation. Of the 17 significant FOMC member tags for this class, Volcker's tag leads the rest by a fair margin, with Volcker's χ^2 value of 163, and the next nearest (belonging to Corrigan) of 42.

7.2 *Repentance*

A simple test of this explanation is whether FOMC members obtain statistically significant tags for classes devoted to inflation and output/employment. For the Miller period, there are two classes relating to inflation and activity in the U.S., Classes 1 and 4. Taken together, they account for 32% of the distribution of classes. But, in terms of statistically significant tags, those for Fed staff outnumber FOMC members by eight to one. The same is true for the 1979 Volcker era, where one class appears to cover inflation and activity in the U.S. (Class 5, accounting for 33% of the distribution of classes), but among the significant tags the staff outnumber FOMC members by five to one; in 1980, Class 1 which focuses on the weakening of the U.S. economy, shows a similar dominance of staff to FOMC members of seven to three. The tree maps of the Miller and two Volcker periods also indicate that the classes devoted to inflation and activity in the U.S. economy are separated from the classes

devoted to the framework and stance of policy, most obviously in the two Volcker periods. So, we appear to have a story that in both the Miller and Volcker periods there was a clear distinction between discussion of economic activity and inflation, and discussion of the policy stance and framework. But, it is telling that the staff, and not FOMC members, dominated the discussion of the U.S. economy. Thus, we find no clear evidence that Volcker or his colleagues latched onto the *Repentance* rationale for their policy shift.

7.3 *Money Matters*

If Volcker persuaded his colleagues of the importance of the role of money in the inflation process (i.e., that *Money Matters*), we should see evidence of a class(es) that emphasized not just the description of members' preferred target ranges for the monetary aggregates but also that members were placing more emphasis on inflation as a monetary phenomenon. The precise change made by the Volcker Revolution in the operating procedures of the Fed was to shift from an interest rate target to targeting the nonborrowed reserve holdings of banks (a component of the narrow money aggregate). But an absence of evidence of members focusing on the role of money in the inflation process would tend to confirm the criticism of monetarists that the Volcker Revolution was not a triumph of monetarism.

For the Miller period, Class 6 can be categorized as "Target Ranges for Money and Interest Rates." This accounts for 28% of the overall distribution of classes. There are 11 significant tags for this class, nine of which belong to members of the FOMC and two belong to staff. In the tree diagram, this class is more closely linked to the classes on the stance of monetary policy and the uncertainty faced by the FOMC. But the representative ECUs for this class are entirely taken up by descriptions of the preferences of FOMC members for the target ranges for money and *not* by analysis of the role of money in the inflationary process. We do find references to money in the representative ECUs for Classes 2 and 3, suggesting that there was some discussion of the role and contribution of money to inflationary pressures. But these ECUs suggest that FOMC members were confused about the signals from the monetary aggregates:

> We see relationships that go way out of the range of historical experience. We haven't any idea of the validity of the forecast for the monetary aggregates, I'm afraid, and the combination of those two events does not make me want to linger over the aggregates. (President Volcker, **25**, 2)

> So I'd come out and say that we do know what is happening to the aggregates within the usual guidelines of our interpretation here. I might even go so far as to stick my neck out and say that I think monetary policy has done a good job in the last six or nine months in terms of achieving some slowing in the aggregates. (President Mayo, **19**, 2)

> Inflation is the number one concern that we continue to hear about and it's taking its toll. We would be reluctant to put much emphasis at the moment on movements in the aggregates because they are confusing, both to us and to the market as a matter of fact. (President Kimbrel, **23**, 3)

Two messages emerge from these statements: first, when the monetary aggregates gave conflicting or confusing signals, the tendency was to ignore them, and second, as the third ECU shows, there was a tendency to think of inflation as a problem divorced from the behavior of the aggregates.

Turning to the 1979 Volcker period, Class 3 relates to the implementation of policy after the Volcker Revolution through the targeting of nonborrowed reserves, whereas Class 4 covers the description of the monetary aggregate target ranges. Together, they account for 31% of the overall distribution of classes. There are 15 significant tags for these classes, 11 of which belong to members of the FOMC and four belong to staff. The representative

ECUs for these classes are entirely taken up by descriptions of the preferences of FOMC members for the target for nonborrowed reserves and the target ranges for money and again not by analysis of the role of money in the inflationary process. Nor do we find references to money in the representative ECUs for the other classes.

We can apply one further test by using the correspondence analysis maps (Figs 4–6) to investigate whether we can see any common pattern of association for those FOMC members known to be more in favor of a stricter monetarist approach. As noted earlier, Presidents Roos, Black, Balles, and Kimbrel were most drawn toward the monetarist camp (with Roos the strongest identifier) (Greider 1987, 97–8). Figure 4 (Miller period) indicates a correspondence between the positions of Roos, Black, and Balles, but less so Kimbrel (consistent with the ECU reported above). In the 1979 Volcker period (Fig. 5), the proximity of their positions lessens, and in 1980 (Fig. 6), Roos is positioned much further from Black and Balles (with Kimbrel having left the committee). Tentatively, we conclude that the monetarist case may have been more actively deployed as a critique of policy under Miller than it was to support the Volcker Revolution. It may well have served as a veil to cloak the Fed's new stance and distance it from the inevitably high interest rates to follow—but the rationale was superficial and fleeting in its relevance.

We conclude that the *Money Matters* explanation at best fits as an explanation of the Volcker revolution insofar as the targeting of nonborrowed reserves provided a vehicle to achieve greater restraint in policy setting and for achieving consensus among the FOMC. But the evidence does not indicate that FOMC members set out to instigate a policy whose rationale lay in implementing monetarist principles.

8   Conclusion

Our intention has been to use the Volcker revolution to illuminate two much wider issues of interest to economists and political scientists: first, it can be important to understand not just why policy changed but also how it happened, and second, there is a danger inherent in many studies that impose an ex post framework of analysis to understand previous events.[14]

From a methodological perspective, we have sought to confront the difficulty of finding a systematic framework of analysis in which to capture and measure both the process of deliberation and the beliefs of policymakers. A systematic and unbiased textual analysis tool appears to be a promising avenue for meeting this objective.

We have noted that abrupt policy changes such as the Volcker Revolution are by their nature difficult to explain using conventional analytical techniques. A good share of the literature on the Volcker Revolution seeks to explain the change in terms of shifts in the largely unobserved beliefs of policymakers. But the danger of this type of approach is that of retrofitting—that is, using the information ex post to fit a model that creates a story of shifts in unobserved beliefs. Such an approach is plausible insofar as it fits the story as observed ex post, but that is of course ultimately a circular process. Moreover, reliance on a ''shift in beliefs'' explanation almost by definition rules out the importance of the deliberative process within the FOMC, which gave rise to policy change.

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[14]A parallel is found in work by Orphanides and others that points to the danger of seeking to explain past decision making in monetary policy using the view of past data that we have now rather than the data that contemporaries actually had at their disposal. In other words, most studies of the past tend to rely on regressions using the (often substantially revised) data available now, rather than the so-called real time data that contemporaries actually had (Orphanides 2002).

Most research on the Volcker Revolution points to (1) the idea of credible commitment, (2) the shape of the Phillips Curve, and/or (3) the role of money in the inflation process as key rationales for the policy shift. Yet this research has left unspecified the extent to which Volcker employed any (or all) of these arguments in the critical October 1979 meeting. Even more important than what may or may not have persuaded the FOMC in 1979 is the persistence of members' new opinions in the face of the economic and political storms of 1980.

A key finding from our analysis is the change in the form and substance of the discourse in the FOMC during this period. The more structured discourse of 1980 is conspicuous. Under Volcker in 1980 FOMC discussions appear to be simpler and more focused, notably with the distinctive focus on the ''Striving for Credibility'' class in that year. Thus, the FOMC dedicated the lion's share of its discussions in 1980 to the Fed's ability to demonstrate a credible commitment to lower inflation. Volcker's tag is the dominant one in the ''Striving for Credibility'' class in 1980. By contrast, in the second half of 1979, after he became Chairman the credibility theme is mixed with a theme of ''money matters.'' Volcker then relegated the theme of ''money matters'' in 1980 in favor of his core theme—credible commitment. Hence, ''money matters'' seems to have been important in winning the initial argument, but what sustained agreement through 1980 was the core theme of credible commitment.

There are two reasons why we think deliberation matters in monetary policymaking. First, although there is an extensive literature on so-called policy rules (Taylor 1999), no central bank has chosen to set policy by means of using a rule as a form of autopilot (i.e., simply taking the reading from a rule formula and setting policy accordingly). Instead, the output (i.e., a suggested interest rate), usually of looking at several different possible rules, is often used as an input to the deliberative decision-making process. Second, around the world, monetary policy is typically decided as a result of a committee process involving multiple decision makers engaging in a process of deliberation that leads to a vote. The FOMC is an important example of this arrangement. So, there are strong a priori reasons to think that the process of deliberation matters in shaping decisions on monetary policy and therefore to analyze the contemporary record of policymaking. The FOMC provides an excellent opportunity to do this because of the availability of full transcripts of its meetings.

Our analysis of the textual evidence suggests that FOMC members came to accept the importance of committing to an anti-inflationary policy. But, although members noted the role of agents' inflation expectations, their commitment to an anti-inflationary policy was not set within a formal model of credibility and commitment. The tool for delivering the policy change was to adopt a monetary target (nonborrowed reserves), but again this was not done within a well-articulated framework of the role of money. Finally, we have been able to provide more measured evidence that, as Chairman, Volcker first persuaded FOMC members that ''money matters'' and subsequent to that, he cemented the idea of maintaining a credible commitment to low inflation. We have therefore been able to use a full-text analysis tool to build a more measured account of how the Chairman achieved a consensus through use of the deliberative process. Overall, a systematic analysis of dialogue and debate helps to establish an appropriate role for ideas and deliberation in shaping policy decisions by isolating the relative importance of different arguments in shaping lines of discussion.

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