**THE FEDERAL RESERVE’S DUAL MANDATE AND**

**THE INFLATION-UNEMPLOYMENT TRADEOFF**

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# ABSTRACT

Using Federal Open Market Committee (FOMC) transcripts from 1960-2010, this paper examines the evolution of the Committee’s approach to the inflation-unemployment tradeoff. We find: 1) FOMC discussions have increasingly emphasized inflation relative to unemployment and 2) This shift occurred during the Volcker era and has continued even as inflation itself declined, with the result that the emphasis on inflation has become entrenched and disconnected from actual inflation. Finally, we create an expanded Taylor Rule that includes these FOMC discussions and find that the increased emphasis on inflation is positively correlated with the federal funds rate. (*JEL* E5, E4, E6)

# I. INTRODUCTION

Since the early post-war period, the Federal Reserve (the Fed) has had the dual mandate of “price stability” and “maximum employment,” which was reaffirmed with the 1977 Federal Reform Act and the 1978 Full Employment and Balanced Growth Act (Humphrey-Hawkins Full Employment Act). And yet, beginning with Phillips (1958), macroeconomics has debated the degree to which there is a tradeoff between inflation and unemployment (e.g., Samuelson and Solow 1960; Friedman 1968; Phelps 1967; Lucas 1972; Blanchard and Gali 2007; Blanchard 2016). How has the Fed approached the issue of a tradeoff between inflation and unemployment? Has its approach changed over time? These questions are of significance for policymaking and for understanding the relationship between academic debates and policy. While many previous studies have used the Federal Open Market Committee (FOMC) transcripts, a systematic analysis of the tradeoff in FOMC deliberations still remains lacking.[[2]](#footnote-2)

Through semi-automated content analysis, we examine the frequency with which the FOMC members discuss inflation versus unemployment over both the pre- and post-Volcker eras and explore the statistical relationship between these discussions and the federal funds rate. This long-term focus enables analysis of several distinct periods in monetary policymaking, including the 1960s Keynesian era, the stagflation of the 1970s, the “Volcker Revolution,” the subsequent “Great Moderation,” the 2008 financial crisis, and the ensuing Great Recession.[[3]](#footnote-3) Further, the paper is the first, to our knowledge, to explore the association between FOMC discussions on inflation/unemployment and the federal funds rate.

We find the FOMC’s discussions of inflation relative to unemployment have increased over time, even after controlling for actual levels of inflation. Figure 1 provides a descriptive snapshot, later supported with regression analysis, of this shift. It plots the ratio of mentions of inflation to mentions of inflation plus unemployment per FOMC meeting (labelled as INFL) over time.[[4]](#footnote-4) INFL unsurprisingly rises with the increase in US inflation during the 1970s and reaches a peak at the beginning of the Volcker chairmanship. However, post-Volcker, the relative emphasis on inflation continues at this high level even after inflation itself decreases so that INFL becomes divorced from the underlying inflation rate.

[Figure 1 here]

While it may be argued that FOMC talk is inconsequential, the paper also shows that the FOMC discussions have been significantly related to the federal funds rate, controlling for the inflation/unemployment target or the actual levels of inflation/unemployment, i.e. the variables in the Taylor Rule. Although caution is warranted in interpreting this significant correlation as the FOMC discussions having affected the federal funds rate, the finding is highly suggestive that “talk” matters. At a minimum, INFL is a partial proxy for the factors that are causing the FOMC to deviate from the Taylor Rule.

Section 2 provides an econometric analysis of the frequency of discussions of inflation relative to unemployment (INFL), confirming the increased FOMC focus on inflation shown in Figure 1. Section 3 presents an econometric analysis using a modified Taylor rule of the effect of INFL on the Fed’s interest rate policy. Section 4 concludes on the paper’s broad implications.

# II. QUANTITATIVE ANALYSIS OF FOMC TRANSCRIPTS ON THE TRADEOFF

Approaching the FOMC as a collective body, we follow the well-established method of examining FOMC transcripts in unpacking the Fed’s discussions and policy stances (Meade and Thornton 2012; Schonhardt-Bailey 2013; Golub et al 2014; Meade et al 2015; Ericsson 2016), but expand this literature in important ways. The time period examined, and therefore the number of transcripts, is more than any of the previous analyses—532 FOMC transcripts from April 12, 1960 to December 14, 2010, which amounts to approximately 18 million words to code for discussions on inflation and unemployment.[[5]](#footnote-5) In comparison, for instance, Meade and Thornton’s (2012) extensive analysis on the output gap covers 1979-2003, Schonhardt-Bailey’s (2013) study relies on “ten text files” from the Miller, Volcker, and Greenspan eras (2013, 71), and Meade et al (2015) undertake textual analysis on FOMC transcripts in 2005-2014. Our study covers FOMC meetings from Martin, Burns, Miller, Volcker, Greenspan and Bernanke eras.[[6]](#footnote-6) Such a focus is particularly important because analyses that start with the Volcker era will inevitably be emphasizing the uniqueness of that era, and studies that focus on a shorter span will miss the regime changes.

Shown in Figure 1, our dependent variable is INFL, which, to recall, is discussions of inflation divided by discussions of inflation plus discussions of unemployment. Using this ratio rather than the absolute number of mentions of inflation or unemployment controls for the different lengths in transcripts. We used Atlas.ti software to count the concept frequencies, and the concepts used to construct INFL are detailed in Appendix A. To briefly explain, we count not just direct references to inflation and unemployment, but also concepts that proxy discussions on inflation and unemployment. For example, “inflation” includes not just direct mentions of inflation and the price level, but also mentions of CPI, PCE, inflationary, but it excludes inflation targeting (given it is distinct from what we are aiming to measure). Further, each of the concepts under the heading of inflation include multiple words that aim to capture discussions on that concept—most basically, for instance, CPI includes the abbreviated and non-abbreviated forms of the concept (i.e. CPI plus Consumer Price Index). We examined transcripts from different eras to ensure the codings in Appendix A indeed matched actual FOMC references to the examined issues. For robustness analysis, we used alternative measurements of the inflation and unemployment codings to create a different dependent variable (Appendix A1), but substituting INFL with this alternative did not change the main results presented in this paper (results available upon request). This semi-automated content analysis method is well suited to the research question at hand since the specific focus is on discussions of inflation versus unemployment. Other methods, such as topic modelling that would rely on the computer program to determine all “topics” of Fed discussions, would thus not enable us to focus closely on the Phillips Curve tradeoff.

Figure 1 showed the increase in INFL over time and suggested an enhanced focus on inflation disconnected from the actual level of inflation in the post-Volcker era. We now turn to regression analysis to analyze these points. The general form of our specification in Table 1 is:

INFL *t* = α0 + α1Annualized Growth Rate of CPI *t* + α2Civilian

Unemployment Rate *t* + Other Regressors + ε*t* (1)

Our data for inflation and unemployment come largely from the Greenbooks, which contain the data prepared for each FOMC meeting. From these Greenbooks, we use the annualized growth rate of CPI and the civilian unemployment rate in the immediate quarter before the Greenbook date.[[7]](#footnote-7) Hence we use real-time data—what the FOMC observed at the time based on the Greenbooks, since these are the variables that the Fed would be considering in their decisions. As Ben Bernanke (2015) emphasizes, it is important to use “data that were known to policymakers at the time they made their decisions. Because initial data are often substantially revised, using real-time data is essential for evaluating policy choices” (see also Orphanides 2004). Appendix B includes the summary statistics for all variables used and details the construction of the CPI and unemployment variables.

We estimated (1) with OLS[[8]](#footnote-8) and performed the relevant diagnostic tests on INFL.[[9]](#footnote-9) To handle the high degree of autocorrelation, which is common to time series data, we include lagged values of the dependent variable in the estimations.[[10]](#footnote-10) The main points of interest in Table 1 are the pattern of FOMC discussions on inflation relative to unemployment (INFL) over time and whether there was a regime shift in these discussions at some point.

We determine any regime change in the discussions through a combination of statistical tests and a priori reasoning. Testing for a “known break” in the time series at the beginning of the Volcker chairmanship, we can reject the null hypothesis of no break with a p-value less than .00001. We also ran the Quandt Likelihood Ratio test (QLR), and the results also suggest the Volcker era as the “unknown break” in the series (shown in Appendix C).[[11]](#footnote-11)

As a result of these tests, the estimations include *break*, a dummy variable where pre-Volcker eras are 0 and Volcker and post-Volcker eras are 1.[[12]](#footnote-12) We interact *break* with the inflation and unemployment variables to assess any change in FOMC discussions. We also include *time*, a continuous variable that runs from the first FOMC meeting in the sample to the last one and also interact it with *break*. *Time* allows us to control for the over-time increase in INFL observed in Figure 1 and to assess whether post-Volcker, INFL ceased to be related to time as suggested by Figure 1. Again to assess shifts across different eras, we include chair dummies in estimations with no *break*.

Additionally, in our preferred estimations, we control for committee characteristics: the ideological composition of the Committee, proxied by whether the Fed Board Governors on the FOMC were appointed by a Democratic or Republican President, since Democrats may be more prone to prefer lower interest rates (e.g., McGregor 1996); the disciplinary leanings of the Committee, proxied by the number of members of the FOMC with a PhD in Economics (given the relevance of academic debates); and the number of women on the committee (e.g., Gardner and Woolley 2016). In all these cases, we use proportions—for instance, the number of FOMC members with an Economics PhD out of all the FOMC members.

The baseline specification in Table 1 Column (1) gives the expected signs on the CPI and unemployment variables and shows *time* as significant. The higher the inflation, the more the FOMC talks about inflation relative to unemployment, and the higher the unemployment rate, the more they talk about unemployment. But, as time goes on, the discussions increasingly emphasize inflation relative to unemployment for any given level of these variables.

[Table 1 here]

Table 1 Column (2) shows *break* as significant, again suggesting a shift during Volcker in INFL. While the coefficient on CPI is not significant due to multicollinearity between that variable and *time* pre-break, it is of the right sign.[[13]](#footnote-13) Furthermore, the coefficients on *CPI* and *CPI\*break* suggest that post-break, the level of inflation virtually ceases to affect INFL.[[14]](#footnote-14)

Table 1 Column (3) adds in the control variables on committee characteristics. In addition to what was already noted for Column (2), Column (3) shows the divergent effect of *time* on INFL pre- and post-Volcker. Prior to Volcker, INFL increases with time (coefficient on *time*). For Volcker and beyond, however, *time* has no effect on FOMC discussions (the coefficient on *time*+ the coefficient on *break*\**time*).[[15]](#footnote-15)

Table 1 Column (4) places in the chair dummies. These results affirm the findings from previous columns: Martin, Volcker, Greenspan, and Bernanke eras had significantly increased INFL, as Figure 1 descriptively suggested. The effects of Volcker and of the two ensuing chairs on INFL are each about four times larger than Martin’s influence on it. This, once again, suggests a regime change during the Volcker era in the nature of discussions on inflation relative to unemployment.

Finally, we note two interesting findings on the control variables. The significant and negative impact of the proportion of Economics PhD among all members in Column (3) suggests FOMC members with academic backgrounds were more likely to decrease INFL, controlling for a host of other factors. The significant and positive impact of women on INFL (Columns 3, 4) is also worth noting. The reasons behind both of these results are unclear and a possible subject for future research.

All in all, Table 1 provides good evidence to suggest that the FOMC’s discussions evolved over time to emphasize inflation relative to unemployment, independent of underlying patterns of inflation, and this change came about during the Volcker era and was locked-in in the post-Volcker eras.

We recognize that a limitation of our approach could be the reliance on contemporaneous real-time values for inflation and unemployment and not forecasts, which may also be influencing FOMC discussions. But, because Greenbook forecast data for CPI does not start until the October 6, 1979 meeting, we cannot use CPI forecasts to determine whether there was a regime change pre- and post-1979. We have, however, checked the robustness of our results in two ways. First, in Appendix D1, we replicate Table 1 using the CPI forecast data.[[16]](#footnote-16) The results for the post-1979 period do not change appreciably. This gives us some confidence that CPI forecast data for the entire period would likely not change the main results in Table 1. Second, in Appendix D2, we replicate Table 1 using the forecast data for the GDP deflator, which begins on April 4, 1967. Our main results from Table 1 hold, which further increases our confidence in the presented primary findings.

It is beyond the scope of the paper to explain why the FOMC’s focus on inflation became entrenched, so we limit ourselves here to some tentative observations based on previous literature and our reading of the transcripts. One plausible hypothesis is that the Fed, like the Economics profession, was influenced by the seminal contributions of Monetarism and the New Classical economics, notably Phelps (1967), Friedman (1968), Lucas (1972) and Kydland and Prescott (1977). The FOMC transcripts, however, rarely refer to academic literature, supporting Woodford’s statement (2011, 3) that “the conceptual frameworks proposed by central banks to deal with their perceived need for a more systematic approach to policy were, until quite recently, largely developed without much guidance from the academic literature on monetary economics.” Moreover, as Romer and Romer (2004, 135) point out, the FOMC members were well aware of the role of inflationary expectations and a lower bound on unemployment well before Friedman (1968) and Phelps (1967), even if they did not use the term “natural rate.” Our readings of the transcripts confirm this view. For example, at the October 12, 1965 FOMC meeting, New York Fed President Hayes states: “We still face the pressures on prices and labor costs normally arising in an *economy operating close to capacity*… The exuberant stock market of recent weeks is doubtless one more manifestation of incipient *inflationary psychology*” (FOMC October 12, 1965, 35, emphasis added). Thus, in the words of Mervyn King, “practice [was] ahead of theory”—FOMC discussions demonstrated an understanding of some core related concepts, such as inflationary expectations and the natural rate, *before* these terms became a staple of academic literature (King 2005).

Instead, FOMC members’ concerns about their own credibility appear paramount, and the cautionary tale of excessive monetary easing of the 1970’s is cited quite often, acting as an “anchor” at times.[[17]](#footnote-17) For example, at the May 7, 2002 meeting President Guynn asks “Is there a risk that by not tightening in such circumstances we would unintentionally convert a relative energy price increase into an across-the-board increase in prices more generally? That is what happened in the 1970s” (FOMC May 7, 2002, 41-42). Similarly, despite low levels of inflation, in March 2005, Chicago President Moscow expresses concerns about “a 1970s-type inflationary mentality” (FOMC March 22, 2005, 27). In this way, the trauma of the 1970s inflation may have shaped the Fed’s policies long after inflation was brought down, similarly to the way the legacy of the unemployment of the Great Depression locked in the Fed’s primary focus on maintaining low unemployment for decades, even as inflation rose dangerously in the late 1960s (DeLong 1997).

# III. The Relationship between FOMC Discussions and the Federal Funds Rate

The preceding findings show that in its discussions, the FOMC has significantly increased its emphasis on inflation versus unemployment. We think this finding is important in itself in describing a dramatic shift in FOMC deliberations. We now turn to exploring whether the FOMC discussions significantly relate to the Fed’s main policy output, the federal funds rate.

To do so, in Table 2, we estimate a modified version of the Taylor Rule for the federal funds rate between FOMC meetings (*FFRt*)[[18]](#footnote-18) and assess whether the FOMC’s “talk,” INFL, is significantly related to *FFRt*.

Taylor (1993) first articulated his now well-known rule as:

(2)

where *it* is the target nominal federal funds rate at time *t*, *i\** is the long-term equilibrium nominal federal funds rate[[19]](#footnote-19), 2% is the target inflation rate, *π* is the actual inflation rate at time *t*, *y* is the output (GDP) gap at time *t*. “*a*” represents the degree to which the Fed raises the nominal interest rate when inflation is above its target and corresponds to how much the Fed cares about staying close to its inflation target; “*b*” is the corresponding term for the output gap. Taylor originally assumed both of these coefficients were .5. As Bernanke (2015, emphasis added) notes: “In principle, the relative weights on the output gap and inflation [i.e. *a*, *b*] should depend on, among other things, the extent to which policymakers are willing *to accept greater variability in inflation in exchange for greater stability in output*.”

Equation (2) can be reformulated as:

(3)

where is a constant for any given combination of the Fed’s long run nominal interest rate target (*i\**), its inflation target (*π\**), and *un*. Thus, the general form our specification in Table 2 below is as follows: [[20]](#footnote-20)

*FFRt* = α0 + α1Annualized Growth Rate of CPI*t* + α2Civilian Unemployment Rate*t*+ α3INFL*t* + Other Regressors + ε*t* (4)

[Table 2 here]

Column (1) of Table 2 provides a first pass estimation of Equation (4) through OLS. This estimation displays the correct signs for CPI and unemployment variables (higher inflation [unemployment] levels put an upward [downward] pressure on *FFRt*). The magnitude of the CPI coefficient is, however, less than 1, a subject we will return to at the end of this section. Importantly, *INFL* is significantly and positively related to *FFRt*. Of equal importance is that the post-break coefficient on INFL is much greater than the pre-break value. This means that the FOMC’s increased discussion of inflation versus unemployment has a stronger relationship to *FFRt* post-break than pre-break.[[21]](#footnote-21)

Column (1), however, is problematic due to substantial autocorrelation, which has two components (English et al 2003). First, there are variables that affect the federal funds rate that are not in the estimation, and these variables may themselves be autocorrelated. Rudebusch (2002), for example, claims that almost all of the apparent inertia in monetary policy is actually due to autocorrelated errors such as credit crunches and financial crises which have a cascade-like structure. This can be handled by using the Newey-West standard errors (s.e.), a common method for adjusting the error covariance matrix. Second, the estimation in Column (1) is misspecified, making the coefficients biased, because when the FOMC sets the federal funds rate, it tends to smooth the changes it makes. Taking this smoothing into account, the equation that determines *FFRt* is:

*FFRt* = λ (*it* ) +(1-λ) *FFRt-1* (5)

where *it* from Equation (3) is the Taylor Rule interest rate target. We cannot, however, simply include *FFRt-1* in our regressions because the coefficient on a lagged dependent variable in the presence of autocorrelated errors is also biased. We, therefore, estimate (5) using Two Stage Least Squares with the lagged values of the variables in Column (1) as our instruments for *FFRt-1* in the first stage.[[22]](#footnote-22) In the second stage, we include the predicted values of *FFRt-1* from the first stage and use Newey standard errors.

With these methods, Columns (2) and (3) of Table 2 correct both for autocorrelation and misspecification. Column (2) does not include the Chair dummies, whereas Column (3) does. The Chair dummies allow each chairmanship to have its own combination of long run nominal interest rate target (*i\**), inflation target (*π\**), and *un* . We can only estimate the linear combination and not the individual components separately.

Both models display a positive and significant connection of INFL to *FFRt*, much more so post-break than pre-break. Both also show CPI and unemployment with correct signs, with the former being significant in both models. These findings are suggestive that the more FOMC members talk about inflation relative to unemployment (INFL), the higher they set the federal funds rate even after controlling for the real time values of inflation, the unemployment rate, the Chairman, and the makeup of the Committee. According to Column (3), an increase of .1 in INFL post-break (say from 50% to 60%) is associated with a 1.147% increase in the long run federal funds rate, which is definitely not trivial.[[23]](#footnote-23) As noted in Section 1, these results bear the usual caveat that we observe correlation and not causation between INFL and the federal funds rate. In other words, we cannot definitively say that FOMC discussions affected the federal funds rate. Yet, given that we control for a host of variables that plausibly influence the federal funds rate, the results are suggestive. At the very least, INFL captures variables not accounted for by the economic variables in the Taylor Rule, which is a significant finding.

In Column (4), we exclude INFL but otherwise mirror Column (3) to examine how much the inclusion of INFL improves the fit of the regression. While the difference in R-squareds may seem small, the addition of INFL to the equation helps account for about 28% of the remaining unexplained variation (Column 3 compared to Column 4).[[24]](#footnote-24) In short, FOMC deliberations matter not simply in their own right, but also due their relationship to the federal funds rate.[[25]](#footnote-25)

# IV. CONCLUSION

This paper has examined the FOMC’s discussions on the inflation-unemployment tradeoff, and the relationship between these discussions and the federal funds rate, through an analysis of the committee’s transcripts over the fifty years from 1960–2010. To our knowledge, this is the longest time span over which such an analysis has been conducted, permitting an investigation of the changes in the FOMC’s emphasis on inflation versus unemployment.

First, we establish empirically that over time the FOMC discussions have increasingly emphasized inflation relative to unemployment, controlling for the actual levels of inflation and unemployment. Further, this change appears to have begun with Paul Volcker’s chairmanship and has become entrenched post-Volcker. During the run-up of inflation in the 1970’s, the relative discussion of inflation naturally increased. But after Volcker, that discussion became locked in with the emphasis on inflation plateauing at the level it achieved when US inflation was at its highest. The extended subsequent history of low inflation has not lowered the FOMC discussions’ relative emphasis on inflation. In this respect, the discussions at the FOMC with respect to inflation versus unemployment have become detached from the underlying trends in inflation.

Second, the paper provides evidence that the increased emphasis on inflation in the FOMC’s discussions was connected to their policy priorities. We estimate a Taylor Rule and demonstrate that the increased emphasis on inflation is positively and significantly related to the federal funds rate, even after controlling for the actual levels of inflation and unemployment and their targets. This finding is important in demonstrating how FOMC discussions themselves, or elements captured by the measure of those discussions, affect decisions beyond the factors encapsulated in the traditional Taylor Rule.

While the paper does not aim to provide a full explanation of the reasons for the FOMC’s persistent focus on inflation long after it was brought down, we provide some preliminary analysis. Our reading of the FOMC transcripts suggests that the Fed’s increased emphasis on inflation has more to do with the traumatic effect of the inflation of the 1970’s than with their increased adherence to a particular school of macroeconomics. This hypothesis is analogous to DeLong’s (1997) argument that memories of the devastating unemployment of the 1930s slowed the Fed’s response to the rising inflation of the late 1960s and early 1970s. Additionally, the shifts in the nature of FOMC discussions do not neatly correspond to shifts in the academic study of macroeconomics, and our reading of FOMC transcripts converges with others’ diagnosis (such as Romer and Romer 2004; King 2005): the FOMC discussions do not revolve around academic debates and the emergence of some concepts, such as inflationary expectations, in these discussions predate their academic ascendance.

Finally, whether the FOMC’s increased, and one might say untethered, emphasis on inflation is ultimately a good or a bad thing is difficult to say. On the one hand, inflation has been defeated and kept low for an extended period of time in the US and throughout the industrialized world. Many economists believe that this is the primary cause of the Great Moderation. In this light, to the extent that the FOMC’s relative emphasis on inflation played a role in the sustained low level of inflation, it can be considered favorably.

Also on the plus side, the Fed’s extraordinary expansionary response to the Great Recession under the Bernanke chairmanship indicates that as a decision-making body it has not been paralyzed by its emphasis on inflation. In addition, the flattening of the Phillips Curve and the anchoring of inflationary expectations world-wide (IMF 2013), which may also be attributed to the regime change ushered in by the Volcker chairmanship, has given central banks wide leeway to maneuver their policy responses.

On the negative side, the anchoring of inflationary expectations has made it more difficult to escape a liquidity trap by raising inflationary expectations. Some argue that the Fed’s focus on inflation has reduced labor’s bargaining power and contributed to wage stagnation and inequality.[[26]](#footnote-26) Looking forward, the emphasis on inflation may have made the Fed reluctant to raise its inflation target, so as to give the nominal interest rate more room to fall in the next crisis. Finally, while the flattening of the Phillips Curve and the anchoring of inflationary expectations gives the Fed the leeway to allow the economy to expand more than they would have otherwise, will the Fed’s emphasis on inflation prevent them from using this increased freedom? The Great Recession proved that the Fed was not a prisoner of its inflation rhetoric with respect to responding to an historic downturn, but whether the Fed can easily show the same flexibility in the future remains to be seen.

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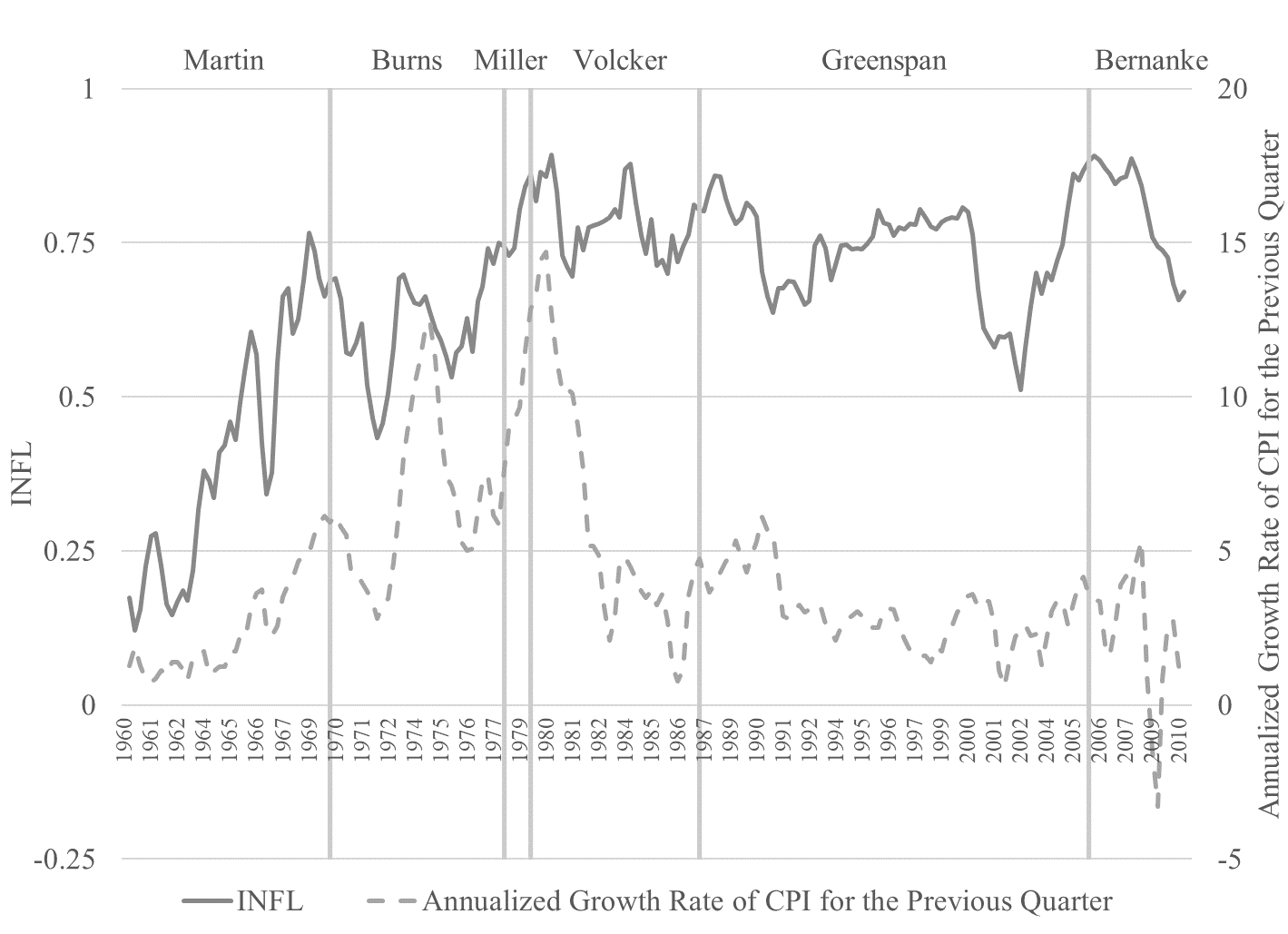
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**FIGURE 1**

**Inflation Discussions over Time**



Notes: INFL = mentions of inflation divided by total mentions of inflation and unemployment. See Appendix A for the measurement of INFL and Appendix B for the measurement of CPI. The figure contains smoothed quarterly data, which are generated by: 1) taking average of observed values associated with Greenbook dates within the same quarter and assigning this averaged value to each quarter, and 2) taking the average of the quarterly values of the adjacent three quarters and assigning this averaged value to each quarter.

*Sources*: ALFRED; FOMC Greenbooks; Authors’ Dataset.

**TABLE 1**

**INFL Over Time (OLS)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DV: INFL | (1) | (2) | (3) | (4) |
| VARIABLES | Baseline | Baseline + Break | Committee +Break | Committee + Chairs |
|  |  |  |  |  |
| Annualized Growth Rate of CPI | 0.005\*\*\* | 0.002 | 0.003 | 0.006 |
| (0.002) | (0.004) | (0.004) | (0.004) |
| Civilian Unemployment Rate | -0.003 | -0.026\*\*\* | -0.027\*\*\* | -0.019\*\* |
| (0.004) | (0.008) | (0.008) | (0.009) |
| Time | 0.000\*\*\* | 0.001\*\*\* | 0.001\*\*\* | 0.002\*\*\* |
|  | (0.000) | (0.000) | (0.000) | (0.000) |
| Lag 1 of INFL | 0.346\*\*\* | 0.287\*\*\* | 0.269\*\*\* | 0.250\*\*\* |
|  | (0.049) | (0.049) | (0.049) | (0.050) |
| Lag 2 of INFL | 0.191\*\*\* | 0.140\*\*\* | 0.127\*\* | 0.108\*\* |
|  | (0.052) | (0.050) | (0.050) | (0.050) |
| Lag 3 of INFL | 0.189\*\*\* | 0.138\*\*\* | 0.125\*\*\* | 0.103\*\* |
|  | (0.044) | (0.044) | (0.044) | (0.044) |
| Break (Volcker and beyond=1) |  | 0.162\*\* | 0.305\*\*\* |  |
|  |  | (0.066) | (0.087) |  |
| Break \* CPI |  | -0.001 | -0.004 | -0.008 |
|  |  | (0.004) | (0.005) | (0.005) |
| Break \* Unemployment |  | 0.022\*\*\* | 0.017\* | 0.004 |
|  |  | (0.008) | (0.009) | (0.010) |
| Break \* Time |  | -0.001\*\*\* | -0.001\*\*\* | -0.002\*\*\* |
|  |  | (0.000) | (0.000) | (0.000) |
| Proportion of Women among All Members |  |  | 0.339\*\*\* | 0.438\*\*\* |
|  |  | (0.120) | (0.122) |
| Proportion of Economics PhD among All Members |  |  | -0.203\* | -0.131 |
|  |  | (0.117) | (0.144) |
| Proportion of Republicans among Governors |  |  | 0.005 | -0.034 |
|  |  | (0.022) | (0.028) |
| Bernanke |  |  |  | 0.975\*\*\* |
|  |  |  |  | (0.171) |
| Burns |  |  |  | 0.166\* |
|  |  |  |  | (0.091) |
| Greenspan |  |  |  | 0.885\*\*\* |
|  |  |  |  | (0.151) |
| Martin |  |  |  | 0.227\*\*\* |
|  |  |  |  | (0.067) |
| Miller |  |  |  | 0.114 |
|  |  |  |  | (0.101) |
| Volcker |  |  |  | 0.843\*\*\* |
|  |  |  |  | (0.140) |
| Constant | 0.096\*\*\* | 0.215\*\*\* | 0.284\*\*\* |  |
|  | (0.029) | (0.048) | (0.058) |  |
|  |  |  |  |  |
| Observations | 528 | 528 | 528 | 528 |
| R-squared | 0.724 | 0.738 | 0.743 | 0.748 |
|  |  |  |  |  |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*Sources*: ALFRED; FOMC Greenbooks; Authors’ Dataset.

**TABLE 2**

**Relationship between FOMC Discussions and Federal Funds Rate (FFRt)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DV: FFRTt | (1) | (2) | (3) | (4) |
|  |  |  |  |  |
| VARIABLES | Baseline | Previous Column with Predicted Values of FFRTt-1 and Newey | Chair Dummies with Predicted Values of FFRTt-1 and Newey | Chair Dummies with Predicted Values of FFRTt-1 and Newey  No INFL |
|  |  |  |  |  |
| INFL | 1.957\*\*\* | 1.203\*\* | 1.155\*\*\* |  |
|  | (0.561) | (0.520) | (0.441) |  |
| Annualized Growth Rate of CPI | 0.743\*\*\* | 0.312\*\*\* | 0.223\*\*\* | 0.334\*\*\* |
|  | (0.058) | (0.060) | (0.066) | (0.074) |
| Civilian Unemployment Rate | -0.054 | -0.035 | -0.317\*\* | -0.493\*\*\* |
|  | (0.093) | (0.120) | (0.138) | (0.185) |
| Break \* INFL | 5.364\*\*\* | 4.569\*\*\* | 3.972\*\*\* |  |
|  | (1.698) | (0.872) | (0.790) |  |
| Break \* CPI | -0.357\*\*\* | -0.157 | -0.103 | -0.156 |
|  | (0.106) | (0.101) | (0.103) | (0.123) |
| Break \* Unemployment | 0.516\*\*\* | 0.200 | 0.095 | 0.150 |
|  | (0.150) | (0.197) | (0.156) | (0.198) |
| Proportion of Women among All Members | -14.578\*\*\* | -7.420\*\* | -5.699\* | -5.398 |
|  | (2.405) | (2.922) | (3.123) | (3.747) |
| Proportion of Economics PhD among All Members | -5.399\*\*\* | -2.204 | -2.070 | -3.654 |
|  | (1.740) | (2.144) | (2.128) | (2.982) |
| Proportion of Republicans among Governors | -2.616\*\*\* | -1.098\* | 0.130 | 0.207 |
|  | (0.445) | (0.587) | (0.766) | (0.950) |
| Bernanke |  |  | 0.092 | 6.333\*\* |
|  |  |  | (2.388) | (2.769) |
| Burns |  |  | 3.629\*\*\* | 6.229\*\*\* |
|  |  |  | (1.205) | (1.648) |
| Greenspan |  |  | 1.107 | 6.934\*\* |
|  |  |  | (2.158) | (2.693) |
| Martin |  |  | 3.083\*\*\* | 5.156\*\*\* |
|  |  |  | (0.852) | (1.246) |
| Miller |  |  | 4.224\*\*\* | 6.845\*\*\* |
|  |  |  | (1.138) | (1.607) |
| Volcker |  |  | 3.205 | 9.882\*\*\* |
|  |  |  | (2.476) | (3.100) |
| Predicted Values of FFR t-1 |  | 0.587\*\*\* | 0.553\*\*\* | 0.432\*\*\* |
|  |  | (0.049) | (0.059) | (0.079) |
| Break (Volcker and beyond=1) | -1.835 | -2.431 |  |  |
|  | (1.934) | (2.078) |  |  |
| Constant | 4.910\*\*\* | 1.901\*\*\* |  |  |
|  | (0.503) | (0.560) |  |  |
|  |  |  |  |  |
| Observations | 515 | 514 | 514 | 514 |
| R-squared | 0.680 | 0.913 | 0.921 | 0.889 |

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*Sources*: ALFRED; FOMC Greenbooks; Authors’ Dataset.

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2. Narrative analyses, for example, provide insights into the thinking of the Fed over the 20th century, but do not systematically illuminate the shift in FOMC discussions on inflation versus unemployment (Friedman and Schwartz 1963; DeLong 1997; Romer and Romer 2004; Meltzer 2009). Clarida et al (1999) and Orphanides (2004) examine the changes in the Fed’s reaction functions in the pre- and post-Volcker eras. Chappell et al (2005) analyze the Burns and Greenspan eras with a focus on the voting behavior of individual FOMC members. Meade and Thornton (2012) undertake a word count analysis of the 1979-2003 FOMC transcripts to examine whether the FOMC members based their inflation discussions and forecasts on the output gap. Schonhardt-Bailey (2013) studies FOMC deliberations through select documents from the Miller, Volcker, and Greenspan eras. [↑](#footnote-ref-2)
3. Since FOMC transcripts are released with a five-year delay, we analyzed transcripts that were available at the time we began the study. [↑](#footnote-ref-3)
4. We discuss later the choice for this dependent variable; our results are robust to measuring discussions of inflation and discussions of unemployment in slightly different ways. [↑](#footnote-ref-4)
5. From 1960-1967, we use Historical Minutes and, from June 1967 to March 1976, the Memorandum of Discussion, which “served as the most detailed account of the discussion at each FOMC meeting” and hence constitute “extensive minutes” (https://www.federalreserve.gov). In 1993, in addition to the decision to release the contemporary FOMC transcripts, the Fed made the decision to construct and release edited transcripts dating back to 1976. Thus, while perhaps not as extensive as current-day transcripts, we have access to detailed historical discussions of the FOMC. Regardless, the length of minutes is not an issue, given our dependent variable adjusts for length. Furthermore, the regime change in FOMC discussions does not coincide with any of the changes in transcript type and release. [↑](#footnote-ref-5)
6. The analysis starts with the first meeting for which there is real-time data (see below). [↑](#footnote-ref-6)
7. We use CPI because, of all measures of inflation, it goes farthest back in time (year 1960), and the FOMC focused on CPI during the majority of the time under examination (until year 2000). [↑](#footnote-ref-7)
8. OLS can be problematic when the dependent variable ranges from 0 to 1 because the regression’s predicted values can be less than 0 or greater than 1 (which is impossible). In this case, however, all our predicted values were between 0 and 1. We also ran the regressions with a generalized linear model using the logit transformation and the results did not change appreciably. [↑](#footnote-ref-8)
9. Both the Augmented Dickey-Fuller and the Phillips-Perron tests reject that INFL has a unit root. [↑](#footnote-ref-9)
10. A number of different diagnostic tests, including Akaike’s and Schwarz’s Bayesian information criteria, suggested the use of two or three lags. With the three added lags, the regressions pass Durbin’s “alternative test” for serial correlation and the Portmanteau (Q) test for white noise. [↑](#footnote-ref-10)
11. The QLR test was run on Model (4) in Table 1. [↑](#footnote-ref-11)
12. We take Volcker’s first meeting as Chairman, August 14, 1979, as the beginning of the Volcker era. [↑](#footnote-ref-12)
13. If we just eliminate *break*, CPI remains insignificant, but if we eliminate *time* and *break\*time*, then CPI becomes significant, suggesting pre-*break* *time* is washing out the significance of CPI. [↑](#footnote-ref-13)
14. We cannot reject the null hypothesis that the CPI coefficients (pre-break + post-break) sum to zero in Cols (2), (3) and (4) with a high degree of certainty: F test p-values of .7012, .8371, and .5215 respectively. We can reject the hypothesis that the sum of the unemployment coefficients equal zero in Cols (3) and (4) but not (2). [↑](#footnote-ref-14)
15. We cannot reject the null hypothesis that the sum of the coefficients equals zero (F test p-value = .1599). [↑](#footnote-ref-15)
16. The forecast data for CPI and GDP deflator are for the immediate quarter after the Greenbook date. [↑](#footnote-ref-16)
17. Anchoring occurs when an easily-accessible example becomes the focal point for decision-making (Kahneman and Tversky 1979). For a recent study on the importance of heuristic availability in Fed decisions, see Eichengreen (2012). [↑](#footnote-ref-17)
18. The effective federal funds rate between meetings is calculated by taking the average of the daily effective federal funds rates for days between one meeting and the next. [↑](#footnote-ref-18)
19. Which equals the long run real interest rate plus the Fed’s inflation target. [↑](#footnote-ref-19)
20. Table 2 estimations exclude observations after January 28, 2009, because thereafter the federal funds rate was at its lower zero bound, while the Taylor Rule would have predicted that it should go below zero. [↑](#footnote-ref-20)
21. We would like to thank an anonymous referee for suggesting that we include an INFL\*break variable in these regressions. [↑](#footnote-ref-21)
22. In standard 2SLS, the fitted values of *FFRt-1* from the first stage are by construction independent of the errors in the 2nd stage, but here because of the lags, the fitted values are only close to independent. Thinking in terms of instrumental variables, the fitted values from the 1st stage, as in standard 2SLS, represent the optimal linear combination of instruments to replace *FFRt-1* in the 2nd stage. [↑](#footnote-ref-22)
23. The long run effect is calculated as follows: the immediate effect of a one unit increase in INFL post-break on *FFRt* in Column (3) equals 5.126 (i.e., 1.155 + 3.971), which according to equation (5) equals λ\* INFL’s effect on the Taylor Rule Target. λ equals (1 - the coefficient on Predicted *FFRt-1*), which is 0.447. Therefore, the influence of INFL post-break on the Taylor Rule Target Interest Rate itself (which also equals INFL’s long run effect on the federal funds rate when FFRt = FFRt-1) equals 5.126/.447 = 11.47. INFL, of course, cannot increase by a unit since it is less than 1. A 10% increase will therefore result in 1.147% increase in FFR. [↑](#footnote-ref-23)
24. Following a referee’s suggestion, we also ran a simple regression with the error term in Columns (1), (2) and (3) as the dependent variable and INFL as the independent variable. In all cases, the coefficient on INFL was statistically significant and positive. This means that larger values of INFL correspond to times when the standard Taylor Rule under-predicts the federal funds rate. [↑](#footnote-ref-24)
25. It should be noted that in all of our regressions that use the CPI, the long run coefficient on the CPI is less than 1. This implies that when the inflation rate increases, the FOMC does not raise the federal funds rate as much, so the real interest rate falls. When we use the forecast GDP deflator, however, the long run coefficient is greater than 1 (See Appendix D2). We have, nevertheless, chosen to present the CPI results because they span a time period that is 35% longer. [↑](#footnote-ref-25)
26. For example, “Why is the Fed So Scared of Inflation?” *New York Times* Editorial <https://www.nytimes.com/2017/08/22/opinion/fed-inflation-interest-rates-workers.html>, and Matthew Klein, <https://www.barrons.com/articles/is-the-fed-partly-to-blame-for-wage-stagnation-1532128102>, July 20, 2018. [↑](#footnote-ref-26)