ON THE INFORMATION CONTENT OF ASYMMETRIC FOMC POLICY STATEMENTS: EVIDENCE FROM A TAYLOR-RULE PERSPECTIVE

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For over two decades, the FOMC has included in its policy decisions a statement of bias toward subsequent tightening or easing of policy. This article examines the predictive content of these statements in a Taylor-rule setting, finding that they convey useful information for forecasting changes in the federal funds rate target, even after controlling for policy responses to inflation and the output gap. Moreover, the evidence suggests that this asymmetry can be represented in terms of shifts to the parameters of the Taylor-rule equation, indicating a greater or lesser degree of responsiveness to information about inflation and output. (*JEL* E52, E58)

I. INTRODUCTION

Since 1983, the Federal Open Market Committee (FOMC) has included in its policy directives a statement indicating conditional expectations about the future. Although the specific language used to communicate expectations has evolved over the years, the "bias" statement has persistently been interpreted as an indicator of the likely direction of future changes in the committee's Federal funds rate target and has therefore been carefully monitored by Fed watchers and other financial market participants.

As the FOMC has enhanced its efforts to communicate its policy intentions to the public in recent years, the contemporary version of the bias statement has been subject to considerable discussion and scrutiny. From 2000 through 2002, the FOMC's postmeeting press releases included a statement referring to the "balance of risks" in the "foreseeable future." Paralleling the Federal Reserve's dual objectives of price stability and maximum sustainable economic growth, the statements took the form of stating that the concerns of FOMC members about prospective economic developments are tilted toward either "inflation pressures" or "economic weakness." In 2003, the committee expanded this "balance of risks" language further to identify separate risk assessments for both inflation and real economic activity.

When it was adopted, the language of the balance-of-risks statement was intended to be more general than the previous statements of policy bias, to avoid giving the impression that the statements directly signaled impending changes in the funds rate target. Nevertheless, as was the case with the earlier language—the balance of risks statement has tended to be interpreted as indicating likely future policy moves.

In this article, I examine the question of whether such an interpretation might be warranted as an empirical matter. In particular, I examine the information content of asymmetric policy statements for predicting future FOMC policy actions using monthly dummy variables to indicate the prevailing direction of policy asymmetry over a sample period of 1984–2002.

The time-series approach facilitates the use of a monthly data set for conditioning the information content of the bias statement on macroeconomic variables thought to be of importance to policy makers. In particular, I use inflation and output data to estimate a baseline

ABBREVIATIONS

CPI: Consumer Price Index
FOMC: Federal Open Market Committee

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Taylor-rule specification for policy and test whether the bias statement provides any additional information for forecasting changes in the FOMC's Federal funds rate target.

The evidence presented here shows that the statements of policy asymmetry do indeed convey information that is useful for forecasting changes in the funds rate target. The information content in the bias statement has been a statistically significant factor for predicting changes in the funds rate target over the sample period, even after controlling for responses to policy variables in the Taylor-rule equation.

In light of this finding, I estimate an alternative specification in which the variables representing asymmetry are interacted with the parameters of the estimated Taylor-rule equation. From this perspective, statements of policy bias are associated with a greater or lesser degree of responsiveness to inflation and output data. During the sample period considered here, variation in the committee's responses to inflation data has evidently been the predominant factor for explaining the predictive power of asymmetric policy statements. This is particularly true for the first half of the sample period, in which the FOMC was actively pursuing a policy of disinflation.

II. THE ASYMMETRIC POLICY STATEMENT AND ITS INTERPRETATION

A Brief History

From 1983 until 1997 statements of an asymmetric bias were included in the FOMC Policy Directive, as a note that "greater reserve restraint" or "lesser reserve restraint" either "would" or "might" be acceptable during the intermeeting period, depending on emerging economic circumstances. With "would" understood to be stronger than "might," the effect of this statement was to indicate a bias toward more restrictive or more accommodative policy.[1]

The bias statement was originally cast in terms of potential responses to deviations of monetary aggregate growth rates from their targets. As monetary targets became less prominent in the committee's approach to policy, the bias statement soon became a more general statement indicating a tilt toward greater ease or restraint to be exercised during the intermeeting period.

For example, consider the statement included in the Policy Directive adopted on 3 July 1996: "In the context of the Committee's long-run objectives for price stability and sustainable economic growth, and giving careful consideration to economic, financial, and monetary developments, somewhat greater reserve restraint *would* or slightly lesser reserve restraint *might* be acceptable in the intermeeting period" (FOMC 1996, emphasis added). Although the statement explicitly refers to the intermeeting period, the bias was often interpreted as a signal regarding the likely direction of future policy in a more general sense.

The use of the might/would convention persisted, with only subtle modifications, through the mid-1990s. The adoption of the present balance-of-risks language and the announcement of FOMC policy decisions evolved during the late 1990s as part of a trend toward greater policy transparency.[2] One of the first steps toward greater transparency was the initiation of public announcements of policy changes. In February 1994, the FOMC began the practice of issuing press releases at the end of each meeting in which their operating objective had been changed.

In August 1997, the FOMC adopted a modification to the wording of the press release, making explicit reference to the Federal funds rate in both the policy directive and the bias statement. The language referring to a greater or lesser degree of reserve restraint was replaced with wording that a higher or lower Federal funds rate would or might be acceptable. In all other respects, the statement remained the same.[3]

1. The directive sometimes modified the two options subtly by referring to "*somewhat* greater (or lesser)" or "*slightly* greater (or lesser)" reserve restraint. However, the somewhat/slightly distinction never directly conflicted with the asymmetry implied by the might/would classification. See Ritter (1993) and Muelendyke (1993, pp. 136–38) for discussion of the subtleties of language in the FOMC directive.

2. Rasche and Thornton (2002) and Poole and Rasche (2003) describe this change in disclosure policy in the broader context of the FOMC's moves to enhance transparency.

3. The minutes of the August 1997 meeting suggest that another subtle modification to the role of the bias statement had taken place: Although the statement continued to refer to the intermeeting period, the minutes report that although the committee members "did not attach a high probability to the prospect that the incoming information would warrant a tightening move during the intermeeting period, they continued to view the next policy move as more likely to be in the direction of some firming than toward easing."

Shortly thereafter, the FOMC began a policy of selectively announcing changes in the direction of the bias itself as part of the press statement. The first such announcement was made in May 1999.[4] In August 1999, the committee formed a Working Group on the Directive and Disclosure Policy. The recommendations of that working group for a change to the "balance of risks" language was adopted at the FOMC meeting of 21 December 1999. The new form for the asymmetric directive was announced in a press release dated 19 January 2000, and the new language was used for the first time at the committee meeting of 1–2 February 2000.

In announcing the adoption of the "balance of risks" language, the committee noted that the new language was intended to clarify the role of the policy bias and its interpretation by the public:

> Previously, the Committee's directive and statement ... may have intensified the public focus on the chance of a subsequent adjustment to the stance of policy, thereby increasing the possibility of misperceptions about the odds and timing of policy action. Also, the sentence in the directive cited a possible adjustment to the intended federal funds rate "during the intermeeting period," but Committee members often intended the time frame to encompass a longer period—another potential source of confusion. (FOMC 19 January 2000)

By stating a bias in the form of a balance of risks between two alternatives related to distinct policy objectives, the FOMC evidently intended to dispel the notion that statements of asymmetry signaled a likelihood of future policy moves directly. Rather, they should be interpreted as conditional assessments about how policy might respond to incoming information about the economy. The committee also disassociated itself with the intermeeting focus of the previous bias language, adopting the preface "for the foreseeable future."

4. Although the first postmeeting announcement of a change in the bias statement was made in May 1999, the committee had endorsed the idea earlier. The FOMC minutes of the December 1998 meeting include the summary of a discussion in which the "the members decided to implement the previously stated policy of releasing, on an infrequent basis, an announcement immediately after certain FOMC meetings when the stance of monetary policy remained unchanged. Specifically, the Committee would do so on those occasions when it wanted to communicate to the public a major shift in its views about the balance of risks or the likely direction of future policy."

Issues and Questions

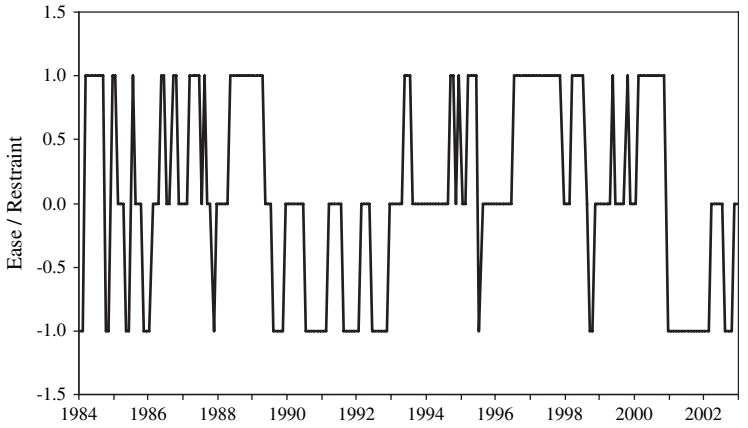
Although the form and timing of public release of asymmetry in the policy directive has changed over time, certain aspects of the practice have been fairly consistent. The statement is explicitly cast in the context of the longer-run goals of monetary policy, indicates a direction of possible future policy moves, and has persistently been interpreted by the financial markets and the press as providing a direct reading on the future direction of monetary policy actions. Rasche and Thornton (2002) document that this interpretation has persisted since the adoption of the balance of risk language, citing numerous examples from the financial press.

Evidence is mixed on the subject of whether or not this view has empirical justification: Lapp and Pearce (2000) examined the predictive power of the bias statement for intermeeting funds rate changes from the beginning of the Greenspan chairmanship through December 1998. They found the bias statement to be a statistically significant indicator of the likelihood and direction of changes in the Fed funds rate target during the subsequent intermeeting period. On the other hand, Thornton and Wheelock (2000) found that although the adoption of an asymmetric objective indicates the likely direction of a change in the funds rate target at or before the next FOMC meeting, no change in the target is also a likely outcome. For the sample period 1983–99, they find that the hypothesis that a change in the funds rate target was independent of whether the directive at the previous FOMC meeting was asymmetric could not be rejected.[5]

Previous empirical analyses have focused on the unconditional relationship between bias statements and subsequent changes in the Federal funds rate target. In this article, I introduce monthly indicator variables for the FOMC bias statement into a Taylor-rule representation of the FOMC's implicit policy function, to evaluate the information content of asymmetric policy statements conditional

5. In addition to its potential signaling function, Thornton and Wheelock (2000) describe other roles for the asymmetric objective: namely, that it provided a mechanism for the chairman to carry out intermeeting policy changes and that discussion about the asymmetric statement has been used to help build consensus among the members of the FOMC.

FIGURE 1
Monthly Index of Policy Asymmetry



on information that is widely viewed to be important in the policy-making process.

To the extent that asymmetric policy statements do help predict subsequent policy changes, a remaining question is why? To address this question, I estimate an alternative specification in which the indicator variables for the bias statement are entered interactively with inflation and output-gap measures. This interactive specification shows that the effect of asymmetric policy statements can be represented as generating conditional variation in the parameters of the policy rule. From this perspective, statements of policy asymmetry derive their predictive content from changes in the degree of responsiveness by the FOMC to economic data.

III. DATA AND ANALYSIS

Monthly Indicator Series Representing Policy Asymmetry

Monthly time series for representing direction of the bias in the policy objective are constructed as follows: A dummy variable for "greater reserve restraint," G_t, takes the value of 1 when the bias was toward tightening and 0 otherwise, and a corresponding dummy variable for "lesser reserve restraint," L_t, is equal to 1 when the bias was toward easing and 0 otherwise. A summary measure of the asymmetric bias, B_t, can be constructed as $G_t - L_t$. This summary variable—which takes on values of 1, 0, and -1—is displayed in Figure 1. Of the 228 monthly observations, a tilt toward tightening was in effect on 75 occasions and a tilt toward ease on 55 occasions. For the remaining 98 observations, the policy statement was balanced.

The FOMC has eight regularly scheduled meetings per year—an average of one every six weeks or so. In some months, the meetings were scheduled toward the beginning of the month, whereas in other cases the meetings were toward the middle or end of the month. In constructing dummy variables to represent policy bias, the timing convention adopted was to assign changes to the month in which they were made, regardless of the specific meeting date. This practice amounts to an end-of-month observation on the direction of the bias statement. Hence, a corresponding measure for the Federal funds rate is the end-of-month observation of the FOMC's target rate.[6]

6. The FOMC began targeting the Federal funds rate directly in June 1989. Data for the "intended" Federal funds rate before that date are compiled by Rudebusch (1995), based on Managers' Reports from the Open Market Trading Desk at the Federal Reserve Bank of New York. Alternative measures of the funds rate (the monthly average target and the monthly average effective rate) were found to yield essentially equivalent results to those reported herein.

Over the sample period 1984–2003, the correlation between the bias indicator, B_t, and subsequent changes in the Federal funds rate target, Δi_{t+1}, is significantly positive at 0.41. This is consistent with previous findings: Both Lapp and Pearce (2000) and Thornton and Wheelock (2000) note that policy actions in the opposite direction from a previous bias statement are highly unusual. Moreover, it is clear from Figure 1 that there were fairly long periods during which the bias tended to be in one direction, corresponding to prevailing economic conditions. For example, the periods during and immediately following the recessions of 1990–91 and 2001 are characterized by a tendency toward an easing bias. Given these considerations, it is not surprising that the unconditional correlation should be positive.

However, the FOMC makes decisions about the funds rate target and the statement of asymmetry simultaneously in response to incoming information about the state of the economy. The predictive power of asymmetric statements may simply derive from the fact that particular concerns expressed by the FOMC are subsequently confirmed by economic data, prompting a policy move in the direction of the previously expressed contingency.

To investigate the relationship further, I turn to an examination of the information content of the asymmetric bias in the context of an estimated Taylor-type policy rule.

Taylor-Rule Specification

Taylor (1993) suggested that a simple equation of the form

$$(1) \qquad i_t^* = r + \pi_t + \alpha_\pi(\pi_t - \pi^*) + \alpha_y y_t$$

could serve as a useful representation of monetary policy during the 1980s and 1990s. Equation (1) describes a target Federal funds rate, i_t^*, that is set to equal the current nominal interest rate, $r + \pi_t$, plus responses to the deviation of inflation from target, $\pi_t - \pi^*$, and to the output gap, y_t.

In his original specification, Taylor proposed the simple parameterization $\alpha_\pi = \alpha_y = 1/2$ and $\pi^* = r = 2$. Subsequent researchers who have estimated the parameters of the Taylor rule empirically have found it desirable to incorporate interest-rate smoothing as an additional factor describing FOMC policy.[7] One commonly used smoothing specification takes the autoregressive form $i_t = \rho i_t^* + (1 - \rho) i_{t-1}$, in which the observed funds rate target is a linear combination of an underlying latent-variable target rate, i_t^*, and the observed value in the previous period i_{t-1}.

Because the focus of this study is whether asymmetric policy statements predict *changes* in the funds rate target, I adopt an alternative specification proposed by Judd and Rudebusch (1999), which takes the error-correction form

$$(2) \qquad \Delta i_t = \zeta(i_t^* - i_{t-1}) + \varphi \Delta i_{t-1}.$$

Substituting the expression for the funds rate target from (1) into (2), one obtains an estimable form for the smoothed policy rule:

$$(3) \qquad \Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi)\pi_t + \alpha_y y_t] + \varphi \Delta i_{t-1},$$

where α_0 is a constant term that represents a linear combination of estimates for the real interest rate and the inflation target, $\alpha_0 = r - \alpha_\pi \pi^*$.

Previous estimates of the Taylor rule have generally been made at the quarterly frequency. Given the relatively short-term horizon encompassed by asymmetric policy statements, however, analysis of quarterly data is likely to obscure their information content. As a baseline model for this analysis, I estimate a monthly version of equation (3). The dependent variable, Δi_t, is the change in the end-of-month Federal funds rate target. The output gap is represented by the deviation of the log of industrial production from a quadratic time trend. Consistent with the high-frequency version of the model being estimated, the inflation variable is measured as the annualized six-month growth rate of core Consumer Price Index (CPI).[8]

7. Examples include Kozicki (1999), Clarida et al. (2000), Orphanides (2001), and Mehra (2001). The work of Rudebusch (2002), Mehra (2002), and English et al. (2003) has suggested alternative explanations for the lagged adjustment specification. For the purposes of this study, the interest-rate smoothing specification is simply adopted as a parsimonious representation.

8. An appendix to the paper (available on request) shows that the results reported here are not materially affected by the use of a 6-month inflation measure rather than the more typically used 12-month average. The CPI was selected as the inflation measure because it is a monthly series that is not subject to revision, obviating potential problems of vintage versus real-time data. The core measure was selected both to avoid the usual problems with volatile food and energy prices and because the FOMC has explicitly focused on core inflation (at least in recent years).

TABLE 1
Taylor Rule Estimates with Dummy Variables for the Policy Bias;
$\Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi) + \alpha_y y_t + D_{t-1}] + \varphi \Delta i_{t-1}$

	Baseline ($D_{t-1} = 0$)	**$D_{t-1} = \gamma G_{t-1} + \lambda L_{t-1}$**	**$D_{t-1} = \beta B_{t-1}$**
Coefficient estimates (SEs)			
ζ	0.060** (0.016)	0.072** (0.016)	0.073** (0.015)
φ	0.389** (0.061)	0.262** (0.064)	0.269** (0.063)
α_0	0.777 (0.893)	0.397 (0.743)	0.288 (0.715)
α_π	0.399 (0.257)	0.515** (0.206)	0.502** (0.202)
α_y	0.452** (0.080)	0.317** (0.063)	0.314** (0.062)
γ	—	1.342** (0.543)	—
λ	—	−1.921** (0.710)	—
β	—	—	1.579** (0.433)
$\bar{R}^2$	0.2268	0.2920	0.2937
SEE	0.2316	0.2216	0.2213
Q	0.1917	0.0219	0.0378

Notes: Table 1 reports least squares estimates of the parameters of a monthly Taylor rule, estimated using the end-of-month target Federal funds rate, the six-month growth rate of core CPI, the deviation of Industrial Production from a quadratic trend, and the policy bias variables described in the text. $\bar{R}^2$ is the adjusted R-squared, SEE denotes the standard error of the equation, and Q is a Ljung-Box statistic for first-order serial correlation. The sample period is 1984–2002. *Significant at 0.10; **significant at 0.05.

As indicated by the time subscripts in equation (1), the policy rule is estimated using contemporaneous values for the regressors. Although the data for the CPI and Industrial Production are not available for the current month, the FOMC draws on a much larger information set than simply those two series, so it is reasonable to assume that the committee members have a fairly good sense of the current information contained in those data. Moreover, a policy rule of the form considered in this article might be expected to have a forward-looking component, so the use of contemporaneous regressors is tantamount to an assumption of perfect foresight with respect to that information.[9]

The first line of Table 1 reports the results of least-squares estimation of the baseline model. As found in the previous literature, estimated values for the smoothing parameters, ζ and φ, suggest a very slow adjustment process. The constant term is estimated with a low degree of precision, and is not significant at any conventional confidence level. On the other hand, the coefficients on inflation and the ouptut gap are significant and of the expected sign. In fact, the hypothesis that α_π and α_y are both equal to 1/2, as in the original Taylor specification, cannot be rejected. Although the regression coefficient on inflation, $(1 + \alpha_\pi)$, is not significantly different from one, a (one-tailed) test against the alternative hypothesis $\alpha_\pi < 0$ strongly suggests that the estimated monthly policy rule satisfies the Taylor principle (Taylor 1999), which states that a successful anti-inflation strategy requires changes in the funds rate target that are greater than one-for-one with respect to changes in the inflation rate.

9. The results reported in the appendix also differ from those in the article by using lagged values for the inflation and output gap measures. With regard to this modification as well, no economically significant distinction was found for the article's main results.

The Predictive Value of Policy Bias: Intercept Dummy Variables

The second two lines of Table 1 report the results of adding lagged dummy variables for the status of the FOMC's bias statement to equation (1). The estimates suggest that the prevailing asymmetry statement is a significant predictor of subsequent changes in the funds rate target—even after conditioning on the policy variables in the Taylor-rule equation.

The second line of Table 1 reports estimates with lagged values G_{t-1} and L_{t-1} included as separate explanatory variables in the regression:

$$(5) \quad \Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi)\pi_t + \alpha_y y_t + \gamma G_{t-1} + \lambda L_{t-1}] + \varphi \Delta i_{t-1}.$$

The coefficients on these variables are significant and have the expected sign: G_{t-1} is associated with a higher funds rate target, and L_{t-1} is associated with a lower target. Although the point estimate of the coefficient on L_{t-1} is greater in absolute value than the coefficient on G_{t-1}, the hypothesis $\gamma = -\lambda$ cannot be rejected. The third line of Table 1 reports an esimtate of the equation with that restriction imposed; that is, with the term βB_{t-1} replacing $\gamma G_{t-1} + \lambda L_{t-1}$ in equation (5). The coefficient on the bias is positive and highly significant.[10]

These findings suggest that when the policy bias is tilted toward tightening (easing), there is a significant increase in the likelihood of a subsequent increase (decrease) in the Federal funds rate target. Using the point estimates of $\beta = 1.579$ and $\zeta = 0.073$ from the third row of Table 1, the results suggest that the direction of the bias contributes $\pm$ 12 basis points to a one-month ahead forecast of changes in the Federal funds rate target.

Under either of the specifications that include bias variables, the point estimate for the output-gap coefficient is lower than in the basic Taylor-rule equation, but is still significantly positive and close to 1/2. Note also that after controlling for the effects of the asymmetry in the policy statement, the coefficient on inflation still clearly satisfies the Taylor principle.

Table 2 reports the results of subsample estimates for the regression in Table 1. It has been noted that estimates of Taylor-rule parameters can be quite different over sample periods corresponding to the terms of Fed chairmen (Hakes 1990; Judd and Rudebusch 1998). The first two rows of Table 2 compare the results for the entire sample period with a subsample including only the period of the Greenspan chairmanship (beginning August 1987). The sign and significance of the coefficients are quite similar: A bias toward tightening significantly raises the expected change in the funds rate, whereas a bias toward ease has a coefficient that is significantly negative. The point estimates for both coefficients are larger during the Greenspan years than for the full sample—particularly the coefficient on L_{t-1}—and the hypothesis that the coefficients are equal in absolute value can be rejected for the Greenspan subsample. Incorporating the estimates for the interest-rate smoothing coefficients, the results suggest that a bias toward tightening raises the expected value of the one-month-ahead funds rate by 10 basis points, whereas a bias toward ease lowers the expectation by 21 basis points.

The next two lines in Table 2 compare two subsamples with a break in February 1994, corresponding to the date at which the FOMC began the practice of issuing press releases following meetings at which a change in the funds rate target was announced.[11] This break reveals an interesting difference between the two halves of the sample period: In the earlier period, the coefficient on L_{t-1} is negative, but not significant. In the latter period, the coefficient on G_{t-1} is positive but not significant. One possible interpretation of this finding is that the FOMC was particularly vigilant in its responses to potential inflation shocks during the 1980s and early 1990s—a period in which policy might be characterized as one of deliberate disinflation. In the latter period, on the other hand, a bias toward easier policy was primarily associated with the 2001 recession, in which the FOMC followed a policy of lowering rates as economic data confirmed the view that the economy was weakening sharply.

Interaction between the Bias and Policy-Rule Responses: Slope-Dummy Variables

The Taylor-rule estimates reported in Tables 1 and 2 reveal that asymmetric policy statements have significant predictive power for explaining changes in the funds rate target. However, they reveal little about the mechanism by which statements of policy bias might be manifested in subsequent decisions by the FOMC to adjust the funds rate target. In this subsection I report estimates of Taylor-rule equations in which the dummy variables for policy asymmetry interact with data for inflation and the output gap, revealing the effects

10. Because the bias variables have nonzero means, their inclusion as intercept dummies affects the interpretation of the constant term in these regressions. Given the parameter values reported in Table 2, the inclusion of B has the effect of increasing the value of the constant term by 0.139, while including G and L acts to lower the estimated constant by 0.022.

11. We might expect that the FOMC began a more careful consideration of the public interpretation of policy changes following this innovation. Moreover, this break in the sample period roughly corresponds to a change in emphasis from literal disinflation to a focus on maintaining the low rate of inflation that had been achieved by that time.

TABLE 2
Subsample Analysis of Shift-Dummy Specification;
$\Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi)\pi_t + \alpha_y y_t + \gamma G_{t-1} + \lambda L_{t-1}] + \varphi \Delta i_{t-1}$

	Full Sample	Greenspan	Pre-1994	Post-1994
Coefficient estimates (SEs)				
ζ	0.072** (0.016)	0.067** (0.017)	0.072** (0.020)	0.134** (0.031)
φ	0.262** (0.064)	0.104 (0.071)	0.289** (0.091)	0.061 (0.089)
α_0	0.397 (0.743)	0.845 (0.739)	1.289 (2.381)	0.776 (0.912)
α_π	0.515** (0.206)	0.399* (0.213)	0.179 (0.573)	0.660* (0.366)
α_y	0.317** (0.063)	0.304** (0.060)	0.555** (0.152)	0.222** (0.036)
γ	1.342** (0.543)	1.506** (0.611)	1.915** (0.885)	0.400 (0.302)
λ	−1.921** (0.710)	−3.116** (1.015)	−0.477 (0.840)	−2.565** (0.689)
$\bar{R}^2$	0.2920	0.3305	0.2999	0.4041
SEE	0.2216	0.1887	0.2450	0.1744
Q	0.0219	0.0035	0.2783	1.0326

Notes: See notes to Table 1. The specific subsample periods reported are 1987:08–2002:12 for the Greenspan sample, 1984:01−1994:01 for the pre-1994 period, and 1994:02–2002:12 for post-1994. *Significant at 0.10; **significant at 0.05.

TABLE 3
Taylor Rule Estimates with Interactive Dummy Variables;
$\Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi + \gamma_\pi G_{t-1} + \lambda_\pi L_{t-1})\pi_t + (\alpha_y + \gamma_y G_{t-1} + \lambda_y L_{t-1}) y_t] + \varphi \Delta i_{t-1}$

	Inflation	Output Gap	Both	Asymmetric
Coefficient estimates (SEs)				
ζ	0.075** (0.016)	0.064** (0.016)	0.076** (0.016)	0.079** (0.016)
φ	0.262** (0.065)	0.367** (0.061)	0.263** (0.065)	0.304** (0.062)
α_0	0.476 (0.698)	0.673 (0.874)	0.538 (0.732)	0.963 (0.672)
α_π	0.444** (0.216)	0.418* (0.243)	0.420* (0.223)	0.225 (0.199)
γ_π	0.435** (0.153)	—	0.415** (0.155)	0.519** (0.149)
λ_π	−0.368** (0.170)	—	−0.303* (0.177)	—
α_y	0.343** (0.059)	0.262** (0.102)	0.272** (0.083)	0.293** (0.066)
γ_y	—	0.323* (0.187)	0.113 (0.149)	—
λ_y	—	0.329* (0.174)	0.163 (0.143)	0.226* (0.125)
$\bar{R}^2$	0.2848	0.2400	0.2833	0.2767
SEE	0.2227	0.2296	0.2229	0.2240
Q	0.0082	0.0277	0.0419	0.0203

Notes: See notes to Table 1. *Significant at 0.10; **significant at 0.05.

of a biased outlook on the FOMC's responses to information about the economy.

Table 3 reports estimates in which the bias variables G and L are entered interactively with inflation and output data. In particular, versions of the equation

$$(6)\quad \Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi + \gamma_\pi G_{t-1} + \lambda_\pi L_{t-1})\pi_t + (\alpha_y + \gamma_y G_{t-1} + \lambda_y L_{t-1}) y_t] + \varphi \Delta i_{t-1}$$

are reported. The coefficients represent the marginal influence of asymmetric statements on the reaction-function parameters. For example, the first line of Table 3—which includes only the dummy variables interacting with inflation—shows that both G and L have significant effects. In the absence of a bias in either direction the regression coefficient on inflation is 1.44, but when the existing bias is toward greater restraint the effective coefficient is $1 + \alpha_\pi + \gamma_\pi = 1.88$. That is, the FOMC tended to provide a more forceful response to inflation innovations when there was a bias toward

tigher policy than when there was no bias. The negative coefficient on L_{t-1} implies that a bias toward easier policy is associated with a less forceful response to inflation: the effective coefficient in this case is only $1 + \alpha_\pi + \lambda_\pi = 1.08$. Once again, G_{t-1} and L_{t-1} enter symmetrically: The hypothesis that $\gamma_\pi = -\lambda_\pi$ cannot be rejected.

The observation that λ_π is negative has interesting implications. In an environment where inflation strays symmetrically both above and below the FOMC's implicit objective, one might expect the coefficient on L_{t-1} to be positive: A negative innovation to inflation would require a forceful easing response to bring inflation back toward the target. The estimated coefficients suggest, however, that although the committee responded vigorously to "inflation scares" (Goodfriend 1993), the response to falling inflation was simply to allow nominal interest rates to fall in approximately direct proportion. This pattern is consistent with the notion that the Fed was pursuing a policy of "opportunistic disinflation" (Orphanides and Wilcox 2002) over the sample period. Indeed, the data in Figure 1 show that the committee indicated a tilt toward easing during much of the period from 1990 through 1993, a period in which inflation was trending sharply downward.

The evident focus on disinflation over the sample period is also suggested by the lack of robustness in estimates of the interaction between the bias variables and the output gap, reported in the second line of Table 3. In contrast to the interaction with inflation, dummy variables interacting with the output gap have coefficients that are positive for both directions, but are significant at only a 10% level. Taking the coefficient estimates at face value, the implication is that the FOMC responds to output gap innovations more than twice as forcefully in the presence of a tilt in either direction than with no bias expressed. Nevertheless, this characterization provides little overall explanatory power: The adjusted *R*-squared and standard error of the equation show that little improvement in fit is provided by the inclusion of dummy variables interacting with the output gap.

The regression results reported in the third row of Table 3, which include all four of the interactive terms, confirm that the explanatory power of the bias variable is associated with interaction with inflation, but not the output gap. The coefficient estimates show the same pattern as in the previous two specifications.

Finally, the fourth set of estimates in Table 3 shows the results of assuming that the effects of asymmetric policy statements take a form consistent with the balance of risks language, in which a bias toward tightening is associated with concerns about inflation and a tilt toward easing is associated with prospects for weakness in economic growth. The estimates are generally supportive of this asymmetric interpretation of the policy bias: The coefficient measuring the response to inflation under a tightening bias is positive and highly significant, and the coefficient representing the response to output under an easing bias is positive and significant at the 10% level (the associated *p*-value is 0.072). Nevertheless, in terms of goodness of fit, this equation is virtually indistinguishable from the full specification reported in the third line of Table 3.

Tables 4 and 5 present subsample analysis of selected specifications from Table 3. In both tables, it is clear that the sample period including only the Greenspan years differs little from the full-sample estimates. The coefficients interacting with inflation (Table 4) are of the same sign and are significant. The point estimates for the coefficients interacting with the output gap (Table 5) are nearly identical to the full-sample estimates, although smaller standard errors of the estimates make them significant at the 5% level. Nevertheless, in a regression including interactive terms with both inflation and the output gap for the Greenspan years (not shown in the tables), the coefficients interacting with inflation are significant at the 5% level, whereas the coefficients interacting with the output gap are not.

Dividing the sample into pre-1994 and post-1994 subperiods again yields some interesting contrasts. In the equations estimating interaction with the inflation terms, the coefficient estimating the effect of a bias toward tighter policy is significant in the pre-1994 sample, whereas the coefficient associated with a bias toward ease is not. In the post-1994 sample, the reverse is true. On the other hand, the subsample analysis of output-gap interaction terms shows that the coefficients for both directions of bias in both subsamples have positive point estimates, but they are generally not statistically significant.

Overall, these results are consistent with the conjecture that the pre-1994 period was

TABLE 4
Subsample Analysis of Dummy Variables Interacting with Inflation;
$\Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi + \gamma_\pi G_{t-1} + \lambda_\pi L_{t-1})\pi_t + \alpha_y y_t] + \varphi \Delta i_{t-1}$

	Full Sample	Greenspan	Pre-1994	Post-1994
Coefficient estimates (SEs)				
ζ	0.075** (0.016)	0.067** (0.017)	0.074** (0.020)	0.133** (0.031)
φ	0.262** (0.065)	0.098 (0.072)	0.279** (0.092)	0.035 (0.091)
α_0	0.476 (0.698)	0.476 (0.729)	1.558 (2.372)	0.508 (0.928)
α_π	0.444** (0.216)	0.453** (0.229)	0.092 (0.584)	0.790** (0.385)
α_y	0.343** (0.059)	0.327** (0.058)	0.544** (0.148)	0.234** (0.035)
γ_π	0.435** (0.153)	0.582** (0.207)	0.482** (0.206)	0.110 (0.121)
λ_π	−0.368** (0.170)	−0.755** (0.259)	−0.070 (0.191)	−1.062** (0.286)
$\bar{R}^2$	0.2848	0.3272	0.3034	0.4042
SEE	0.2227	0.1891	0.2444	0.1744
Q	0.0082	0.0019	0.3028	0.9656

Notes: See notes to Table 2. *Significant at 0.10; **significant at 0.05.

TABLE 5
Subsample Analysis of Dummy Variables Interacting with the Output Gap;
$\Delta i_t = \zeta[\alpha_0 - i_{t-1} + (1 + \alpha_\pi)\pi_t + \alpha_y + \gamma_y G_{t-1} + \lambda_y L_{t-1})y_t] + \varphi \Delta i_{t-1}$

	Full Sample	Greenspan	Pre-1994	Post-1994
Coefficient estimates (SEs)				
ζ	0.064** (0.016)	0.066** (0.019)	0.062** (0.020)	0.114** (0.036)
φ	0.367** (0.061)	0.265** (0.070)	0.354** (0.085)	0.328** (0.091)
α_0	0.673 (0.874)	1.188 (0.784)	2.562 (2.833)	0.147 (1.334)
α_π	0.418* (0.243)	0.195 (0.230)	−0.036 (0.681)	0.754 (0.519)
α_y	0.262** (0.102)	0.264** (0.087)	0.475** (0.219)	0.220** (0.064)
γ_y	0.323* (0.187)	0.351** (0.173)	0.489 (0.380)	0.159 (0.112)
λ_y	0.329* (0.174)	0.348** (0.163)	0.369 (0.314)	0.206* (0.112)
$\bar{R}^2$	0.2400	0.2121	0.2769	0.1780
SEE	0.2296	0.2047	0.2490	0.2048
Q	0.0277	0.1259	0.1172	0.6726

Notes: See notes to Table 2. *Significant at 0.10; **significant at 0.05.

characterized by a particular aversion to upward movements of inflation, with the bias statement indicating a tendency for more forceful response to such movements. In the years after 1994, on the other hand, the bias statement evidently contained little information about subesquent policy moves, in either direction. Rather, a relatively large coefficient on the unconditional response to inflation, α_π, suggests a more balanced response to inflation surprises in either direction.

IV. DISCUSSION AND CONCLUSIONS

Over the course of two decades, the FOMC has issued asymmetric statements regarding the economic outlook and likely policy responses. The findings reported in this article show that those statements have contained significant predictive power for subsequent changes in the Federal funds rate target.

In particular, when dummy variables representing the direction of the bias are included as intercept shifters in a Taylor-rule equation, they provide significant explanatory power in addition to the estimated average responses of the committee to inflation and output innovations. When the dummy variables are entered as interacting with inflation and output-gap series, the estimated coefficients show that the expression of an asymmetric outlook can be interpreted as altering the magnitude

of the committee's responses to incoming information about the economy.

Although the results suggest that the FOMC has responded more forcefully to movements in the output gap following the expression of an asymmetric outlook, this effect tends to be overwhelmed by a heightened responsiveness to news about inflation. This finding is clearly consistent with the predominant disinflationary focus of U.S. monetary policy over the sample period—especially the first half of the period. However, a different pattern might well prevail in an ongoing low-inflation environment.

The effectiveness of the balance of risks statement and its interpretation by the public has been the subject of some controversy. At its meeting on 18 March 2003, the FOMC declined to specify a balance of risks, citing unusual geopolitical uncertainties. Subsequently, the committee introduced a two-part bias statement, evaluating the balance of risks with respect to inflation and economic growth trends independently. Additional language has also been introduced in an apparent effort to further clarify the FOMC's outlook and intentions.

In the context of these changes, comments by members of the committee and analyses in the financial press have raised some longstanding criticisms of asymmetric policy statements (see, for example, Berry 2003). One fundamental criticism is that such statements continue to be widely viewed by the markets as a direct signal about the direction of future policy changes, when in fact the press release announcing the adoption of the balance of risks language in January 2000 clearly indicated the committee's desire to avoid that interpretation.

The evidence presented in this article provides some insight into this issue. In the regressions with the bias variables entered as intercept shift factors, the significance of the bias dummies implies the rather implausible interpretation that the committee sets the funds rate target by considering the current state of the economy, then adding or subtracting a few basis points depending on the direction of their previously expressed bias. This is precisely the nature of the interpretation problem that has been widely discussed.

On the other hand, the regression results in which the bias dummies are entered as interactive terms provide a more reasonable explanation for the predictive power of asymmetric policy statements: Expressions of perceived risks in the outlook indicate an enhanced degree of diligence and generate more forceful responses to subsequent information about output and inflation trends.

Nevertheless, in terms of predictive power, the interactive-dummy specification provides no improvement in the overall fit of the model relative to the intercept shift specification. Although the results reported herein provide a reasonable explanation for why asymmetric policy statements have predictive power for subsequent changes in the funds rate, many market participants and analysts might find it sufficient simply to know that the statements do, in fact, include significant information content.

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