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Monetary Policy and the Stock Market: Time-Series Evidence

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Abstract

We construct a slope factor from changes in federal funds futures of different horizons. Slope predicts stock returns at the weekly frequency: faster monetary policy easing positively predicts excess returns. Investors can achieve increases in weekly Sharpe ratios of 20% conditioning on the slope factor. The tone of speeches by the FOMC chair correlates with the slope factor. Slope predicts changes in future interest rates and forecast revisions of professional forecasters. Our findings show that the path of future interest rates matters for asset prices, and monetary policy affects asset prices throughout the year and not only at FOMC meetings.

JEL-Codes: E310, E430, E440, E520, E580, G120.

Keywords: return predictability, policy speeches, expected returns, macro news.

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I Introduction

The FOMC will, of course, carefully deliberate about when to begin the process of removing policy accommodation. But the significance of this decision should not be overemphasized, because what matters for financial conditions and the broader economy is the entire expected path of short-term interest rates and not the precise timing of the first rate increase.

Janet L. Yellen (2015)

...policy deliberations happen on a rather continuous basis.

Kevin Warsh (2015)

The main objectives of the Federal Reserve (Fed) under its dual mandate are price stability and maximum employment. The Fed funds rate is the Fed's main conventional policy tool to achieve those goals. But whereas real consumption, investment, and GDP only respond with a lag to changes in the target rate, asset prices respond directly and immediately. Yellen's quote, however, highlights that asset prices might react not only to changes in short-term interest rates, but also to changes in expectations about the speed of monetary policy loosening and tightening. Previous governor Warsh, instead, stresses that monetary policy decisions happen continuously rather than only on eight scheduled Federal Open Market Committee (FOMC) meetings that are the focus of a large event study literature.

We use weekly changes in the one-month and three-month federal funds futures-implied rates to test for the effect of changes in the future path of monetary policy on asset prices throughout the year.[1] Specifically, we argue that changes in one-month futures, $ff_{t,1}$, affect all future target rates, and we can interpret it as a level factor. Changes in the three-month futures, $ff_{t,3}$, instead also contain information about the future path of monetary policy. We regress changes in the three-month futures-implied rate on the changes in the one-month futures-implied rate to get a purified measure of changes in expectations of the path of future monetary policy. We refer to the residual

[1] We focus on the one- and three-month futures because longer-term futures either did not exist at the beginning of our sample (1994) or were not heavily traded.

of this regression as the *slope factor*. The regression coefficient is close to 1; at a basic level, therefore, we can think of slope as a difference in differences: $slope = \Delta(ff_{t+1,3} - ff_{t,3}) - \Delta(ff_{t+1,1} - ff_{t,1})$. A positive slope factor reflects market expectations of a faster monetary-policy tightening, or markets assume interest rates three months from now will be higher relative to what the market expected last week and relative to the change in expectations for the federal funds rate in one month.

Specifically, we create the slope factor using end-of-day data from Wednesday of week $t-1$ to Wednesday of week t. Slope robustly predicts excess returns of the Center for Research in Security Prices (CRSP) value-weighted index over the following week starting with Wednesday of week t.[2] The slope factor explains around 2% of the weekly variation in stock returns and is robust to the inclusion of lagged weekly returns.[3] The predictability is contained in the following week and is a robust finding across subsamples from 1988 (the beginning of the federal fund futures market) to 2007.[4] The weekly predictability is of similar magnitude and is orthogonal to the predictive power of other standard return predictors such as the dividend-price ratio, the VIX, the variance risk premium, or the term spread.

The FOMC has changed the conduct of monetary policy substantially over time and shifted to a more transparent and granular, inertial approach (see Figure 1). Since the first meeting in 1994, the FOMC has released a press statement after every meeting and policy decision explaining the decision and discussing the future stance of monetary policy. This increased transparency and guidance has decreased the size of monetary policy shocks around FOMC meetings over time (see, e.g., Gorodnichenko and Weber (2016)). Our findings are similar in magnitude when we exclude weeks with FOMC meetings and decisions, and does not vary with turning points in monetary policy or policy decisions during unscheduled meetings. Small values of the slope factor do not

[2]Equity markets close after the close of futures markets and market participants could trade on the predictions of the slope factor.

[3]Weekly stock returns are autocorrelated; see Lo and MacKinlay (1988).

[4]The zero lower bounds on nominal interest rates determine the end of our sample period. We use longer-dated futures contracts to construct a slope factor during the zero-lower-bound period and find results consistent with our baseline analysis (see discussion in Section III *G*).

drive our findings either.

The FOMC has eight scheduled meetings per year, and a large literature studies the effects of monetary policy shocks on financial markets in narrow event windows bracketing those eight meetings. Policymakers attempt to guide financial markets throughout the year and not only during scheduled meetings. We document speeches of the chair or vice chair systematically predicting the slope factor. We use linguistic analysis and find that a more hawkish tone in speeches by the chair or vice chair predicts a faster monetary policy tightening. Our findings are consistent with the idea that monetary policy became more transparent in the 1990s. In fact, Ben Bernanke states in his blog that "monetary policy is 98 percent talk and only two percent action."[5]

Ozdagli and Weber (2016) find a larger effect of surprise monetary easing on financial markets than of surprise tightening. We also find a larger forecasting power of slope in periods with negative slope values, that is, when market participants expect faster monetary policy easing (see Table 6).

One channel through which our slope factor might affect stock returns is through changing expectations about changes in future short-term interest rates. The slope factor predicts changes in future federal funds rates over the following two months and forecast revisions of professional forecasters over the next quarter. Macro news explains 9% of the variation in the slope factor but does not drive our predictability. Hence, news about the economy is unlikely to drive the predictability of weekly stock returns by the slope factor; rather, news about the stance on monetary policy is likely to drive the predictability.

The predictability we uncover is economically large. Using insights from Campbell and Thompson (2008) and Cochrane (1999), we show an investor conditioning on the slope factor can increase his weekly Sharpe ratio by more than 20% compared to a buy-and-hold investor. We argue below trading based on the predictions of the slope factor is feasible and transaction costs are small.

Our results are consistent with a delayed market reaction to monetary policy news

[5]See: http://www.brookings.edu/blogs/ben-bernanke/posts/2015/03/30-inaugurating-new-blog

and short-run monetary policy momentum. We provide anecdotal evidence supporting this interpretation.

A. Related Literature

A large literature at the intersection of macroeconomics and finance investigates the effect of monetary policy shocks on asset prices in an event-study framework. In a seminal study, Cook and Hahn (1989) examine the effects of changes in the federal funds rate on bond rates using a daily event window. They show changes in the federal funds target rate are associated with changes in interest rates in the same direction, with larger effects at the short end of the yield curve. Bernanke and Kuttner (2005)—also using a daily event window—focus on unexpected changes in the federal funds target rate. They find that an unexpected interest rate cut of 25 basis points leads to an increase in the CRSP value-weighted market index of about 1 percentage point. Gürkaynak, Sack, and Swanson (2005b) focus on intraday event windows and find effects of similar magnitudes for the S&P500. Lucca and Moench (2015) document that stock returns already appreciate in the twenty-four hours before the actual FOMC announcement. Savor and Wilson (2013) show 60%-80% of the realized equity premium is earned around scheduled macroeconomic news announcements such as the FOMC meetings, whereas Cieslak, Morse, and Vissing-Jorgensen (2015) document that the entire equity premium since 1994 is earned in even weeks in FOMC-cycle time. Ozdagli and Weber (2016) decompose the overall response into a direct demand effect and higher-order network effects using spatial autoregressions, and find that more than 50% of the overall market response comes from indirect effects. Drechsler, Savov, and Schnabl (2015) provide a framework to rationalize the effect of monetary policy on risk premia.

Besides the effect on the level of the stock market, researchers have recently also studied cross-sectional differences in the response to monetary policy. Ehrmann and Fratzscher (2004), Ippolito, Ozdagli, and Perez (2015), and Chava and Hsu (2015), among others, show that firms with high bank debt, low cash flows, small firms, firms with

low credit ratings, low financial constraints, high price-earnings multiples, and Tobin's q show a higher sensitivity to monetary policy shocks, which is in line with bank-lending, balance-sheet, and interest-rate channels of monetary policy. Gorodnichenko and Weber (2016) show firms with stickier output prices have more volatile cash flows and high conditional volatility in narrow event windows around FOMC announcements. Weber (2015) studies how firm-level and portfolio returns vary with measured price stickiness, and shows that sticky-price firms have higher systematic risk and are more sensitive to monetary policy shocks.

We also contribute to a long literature on return predictability. Campbell (1991) and Cochrane (1992) start from a first-order Taylor series approximation of the definition of returns, and show that variation in the dividend-price ratio has to predict either future cash flows or expected returns. Empirically, they find that the dividend-price ratio is a strong predictor of stock returns, especially at horizons longer than one year, whereas they do not find any cash flow predictability. Lettau and Ludvigson (2001) provide evidence for return predictability using a proxy for the consumption-wealth ratio. Evidence for return predictability by the dividend-price ratio has declined in recent years (see, e.g., Welch and Goyal (2008)). Lettau and Van Nieuwerburgh (2008), Cochrane (2008), and Van Binsbergen and Koijen (2010) allow for structural breaks in the process for the dividend-price ratio, impose theoretical predictions, or estimate a latent process and find strong evidence in favor of return predictability. Ang and Bekaert (2007) and Fama and French (1988) show that short-term interest rates, term spreads, and default spreads are strong predictors of aggregate market returns, whereas Kelly and Pruitt (2013) use information in the cross section of book-to-market ratios. Golez and Koudijs (2014) find return predictability over 400 years of data across different markets. DellaVigna and Pollet (2007) show that predictable changes in demographics affect future firm profitability, and subsequent industry returns. The predictability they uncover is also consistent with inattention. All these studies find evidence for return predictability at longer horizons typically larger than a few quarters and up to several years.

A recent literature studies the effect of macro announcements on financial markets. Andersen, Bollerslev, Diebold, and Vega (2003) construct surprises from Money Market Services and show the conditional mean of six exchange rate jumps following the announcement surprises. Gürkaynak, Sack, and Swanson (2005a) use the same surprise data and find a strong impact of macro surprises on long-term yields. Gilbert (2011) shows that the reaction of the S&P500 to these surprises is consistent with predictions of rational expectations trading models, whereas Gilbert, Scotti, Strasser, and Vega (2016) show that the intrinsic value of macro surprises drives the financial markets response. Ghosh and Constantinides (2016) show innovations in macroeconomic variables are highly correlated with the dividend-price ratio. We also use data from Money Market Services to study the impact of macro surprises on the slope factor and show that financial forecasters adjust their forecasts for federal funds rates following changes in the slope factor.

We make the following contributions to the literature. First, we document that monetary policy has large effects on asset prices outside of the eight scheduled FOMC meetings. Bernanke and Kuttner (2005), in fact, already conjecture that monetary policy is likely to affect asset prices throughout the year and not only on FOMC meeting days. Second, we find changes in expectations about the future path of short-term interest rates are important for the response of stock returns, providing evidence in favor of the effectiveness of forward guidance outside of liquidity traps. Third, we find that speeches by the chair affect the slope factor, which then predicts future changes in short-term interest rates, which could speak to the puzzle documented by Cieslak et al. (2015). But ultimately, the question remains why financial markets react so strongly to macroeconomic surprises in general and monetary policy news in particular. Does monetary policy news predict future consumption growth, do market participants reach for yield, or does monetary policy directly affect risk premia?

II Data

A. Stock Returns

We sample daily returns for the CRSP value-weighted index directly from CRSP. The index is an average of all common stocks trading on NYSE, Amex, or Nasdaq. We define weekly returns as the percentage change in the index from end of day Wednesday of week $t+1$ to end of day Wednesday of week $t+2$. If the Wednesday in week $t+2$ is missing, we use Thursday's closing price, and if both Wednesday and Thursday (in week $t+2$) are missing, we use Tuesday's closing price. If Tuesday, Wednesday, and Thursday are missing, we report the return as missing for that particular week.[6]

B. Federal Funds Futures Data

Federal funds futures started trading on the Chicago Board of Trade in October 1988. These contracts have a face value of \$5,000,000. Prices are quoted as 100 minus the daily average federal funds rate as reported by the Federal Reserve Bank of New York. Federal funds futures face limited counterparty risk due to daily marking to market and collateral requirements by the exchange. We use end-of-day data of the federal funds futures directly from the Chicago Mercantile Exchange (CME). Futures contracts with maturity of up to three years trade on the CME, but futures with maturities longer than six months are not very liquid.[7]

Our sample period starts in 1994 and ends in 2007 for a total of 725 weeks. We start in 1994 to be comparable to the large event-study literature. With the first meeting in 1994, the FOMC started to communicate its decision by issuing press releases after every meeting and policy decision. The liquidity trap and zero-lower bound on nominal interest rates determine the end of our sample, because there is little variation in federal funds

[6] We lose approximately 0.6% of all observations due to this convention. Most of these observations are around Christmas and New Year.

[7] Gürkaynak et al. (2005b) argue federal fund futures with maturity beyond three months were illiquid before 1998.

futures-implied rates. In robustness checks, we employ data going back to 1988, when federal funds futures were introduced, and we study changes in longer-term futures during the liquidity trap period.

C. Slope Factor

Most previous papers have studied the relationship between monetary policy surprises and stock returns in an event study around FOMC press releases. Kuttner (2001) shows that scaled changes of the current-month futures allow isolating the surprise component of monetary policy.[8] The FOMC has eight scheduled meetings per year and, starting with the first meeting in 1994, most press releases are issued around 2:15 p.m. E.T.

We instead are interested in whether monetary policy also matters for asset prices outside of narrowly defined event windows and whether changes in expectations for the path of future short-term rates are important drivers of future stock returns.

Let $ff_{t,1}$ denote the rate implied by the one-month federal funds futures on date t and assume an FOMC meeting takes place during that month. d_1 is the day of the FOMC meeting and m_1 is the number of days in the month. We can then write $ff_{t,1}$ as a weighted average of the prevailing federal funds target rate, r_0, and the expectation of the target rate after the meeting, r_1:

$$ff_{t,1} = \frac{d_1}{m_1} r_0 + \frac{m_1 - d_1}{m_1} \mathbb{E}_t(r_1) + \mu_{t,1}, \tag{1}$$

where $\mu_{t,1}$ is a risk premium. Gürkaynak et al. (2007) estimate risk premia of one to three basis points, and Piazzesi and Swanson (2008) show that they only vary at business cycle frequencies. We focus on weekly changes and neglect risk premia in the following as is common in the literature.

[8]The scaling is necessary to account for the different days of the months of FOMC meetings; see Kuttner (2001).

Absent an FOMC meeting, the one-month futures-implied rate is:

$$ff_{t,1} = r_0 + \mu_{t,1}. \tag{2}$$

The one-week change in the one-month futures implied rate in months with FOMC meetings is:

$$\Delta ff_{t,t+1,1} = \frac{m_1 - d_1}{m_1} \left[\mathbb{E}_{t+1}(r_1) - \mathbb{E}_t(r_1)\right]. \tag{3}$$

When t and $t+1$ are in different months, we already use the next month's future; that is, we roll the contract forward.

Similarly, we can write the one-week change in the three-month futures implied rate in months with FOMC meetings as:

$$\Delta ff_{t,t+1,3} = \frac{d_3}{m_3} \left[\mathbb{E}_{t+1}(r_{3\_}) - \mathbb{E}_t(r_{3\_})\right] + \frac{m_3 - d_3}{m_3} \left[\mathbb{E}_{t+1}(r_3) - \mathbb{E}_t(r_3)\right], \tag{4}$$

where $r_{3\_}$ denotes the federal funds target rate prevailing before the FOMC meeting, which in most cases will coincide with r_1.

We define the slope factor as the residual of a regression of weekly changes in the three-month federal funds futures-implied rate, $\Delta ff_{t,t+1,3}$, on a constant and changes in the one-month futures-implied rate:

$$\Delta ff_{t,t+1,3} = \alpha + \beta \Delta ff_{t,t+1,1} + slope_{t,t+1}. \tag{5}$$

Changes in the near-term futures contract contain information affecting the level of all future federal funds target rates, whereas changes in the longer-term futures also contain information about the path of future short-term rate changes. The regression of the changes in the three-month futures-implied rate on the changes in the one-month futures-implied rate allows us to purify the change in the longer futures from the level component and to get market expectations on how fast or slow the FOMC will increase or decrease

future federal funds target rates. We choose the three-month futures contract because longer-term futures did not trade until 1996 or did not have high trading volume.

The point estimate of α is -0.00 and is indistinguishable from 0, and the point estimate of β is 1.17 with a standard deviation of 0.03:

$$\Delta ff_{t,t+1,3} = \underset{(0.00)}{-0.00} + \underset{(0.03)}{1.17}\Delta ff_{t,t+1,1} + slope_{t,t+1}.$$

The R^2 of the regression is 67%, which indicates that the slope factor explains around one third of the variation in three-month futures changes.

Figure 2 plots the times series of slope in the top panel, together with the time series for changes in the one-month and three-month futures-implied rates in the middle and bottom panel, respectively. By construction, slope is orthogonal to the change in the one-month futures-implied rate but exhibits a correlation of 57% with changes in the three-month futures-implied rate, indicating the slope factor contains useful information about the path of future monetary policy changes.

Figure 3 plots the regression coefficient of equation (5) for a rolling estimating. The red dashed line uses a constant window of 250 weeks, whereas the blue solid line indicates estimates from an expanding window sample. The regression estimate is stable through time and varies between 1.07 and 1.33.

The autocorrelation of the slope factor is 0.11 and spurious predictability arising from highly persistent regressors is no concern in our setting (see Stambaugh (1999) and Kostakis, Magdalinos, and Stamatogiannis (2015) for a recent discussion).

In our empirical analysis, we use a regression residual to predict excess returns. Full-sample estimates incorporate forward-looking information, and the estimation of slope requires a correction of standard errors. Economically, the point estimate is close to 1. We exploit this feature and construct as robustness a slope factor as a simple difference in differences: $slope = \Delta(ff_{t+1,3} - ff_{t,3}) - \Delta(ff_{t+1,1} - ff_{t,1})$. This slope has the advantage that we do not use forward-looking information and it does not require any estimation.

D. Descriptive Statistics

Table 1 reports descriptive statistics of weekly changes in the futures-implied rate, the slope factor, and weekly stock returns. The slope is a regression residual and has a mean of 0. The federal funds rate implied by the one- and three-month federal funds futures are 4.23% and 4.29%, respectively, with average weekly changes of -0.01 for both. The average federal funds target rate was 4.20% during our sample period, and the CRSP value-weighted index had an average weekly excess return of 0.12%.

III Empirical Results

A. Methodology

We focus on one-week predictability of stock returns by the slope factor to establish an effect from changes in the future path of monetary policy on stock returns. Contemporaneous windows might cause concerns of reverse causality. Stock prices are the present discounted value of future dividends, and the CRSP value-weighted index captures almost 100% of the overall market capitalization in the United States. In the long run, economy-wide dividends and GDP are co-integrated, good news about future dividends is good news about the economy, and market participants might expect a faster tightening of future interest rates following good news. In this case, we would find a positive contemporaneous relationship between our slope factor and stock returns. Rigobon and Sack (2003) use a heteroskedasticity-based identification method and indeed find monetary policy systematically reacting to movements in stock prices.[9]

Another potential concern of studying the contemporaneous relationship between the slope factor and stock returns is the fact that both might react to macroeconomic announcements during the week. Weaker-than-expected unemployment numbers might lead to a drop in stock prices and expectations that the FOMC might lower the speed of

[9]We also find a positive contemporaneous association of the slope factor and stock returns at the weekly frequency (see discussion below in section III *F.*).

interest rate increases. We would find a positive contemporaneous association between slope and stock returns, which would, however, be an endogenous response to news about the economy.

Changes in slope could still reflect changes in economic fundamentals. An upward adjustment in inflation expectations or GDP growth could lead to a positive slope factor.[10] We would expect a positive association between slope and future stock returns if slope captures positive news about the macroeconomy, but we find instead slope predicting negative returns. We would expect no reaction of subsequent stock returns to slope if slope captures news of changes in inflation expectations, because stocks are claims to real assets and should be unaffected by inflation.[11]

In section IV*B.*, we show that speeches by the chair and vice chair, instead, affect the slope factor. Macro news also affects the slope factor but has no independent predictive power for future stock returns conditional on the slope factors (see section IV*E.*). Professional forecasters instead change their forecasts about future federal funds rates as a response to changes in the slope factor (see section IV*D.*). Our results are consistent with a delayed market reaction to monetary policy news and short-run monetary policy time series momentum.

B. Baseline

Table 2 presents our baseline finding regressing weekly excess returns in percent of the CRSP value-weighted index starting in week $t+1$, R_{t+1}, on the slope factor of week t, $slope_t$, calculated according to equation (5) and additional covariates measured at the end of week t, X_t:

$$R_{t+1} = \alpha + \beta slope_t + \gamma X_t + \varepsilon_t. \tag{6}$$

[10] Empirically, a Taylor (1993) rule in which nominal interest rates respond positively to inflation and output growth is a good description of actual nominal rates in the data.

[11] See Katz, Lustig, and Nielsen (2015) for an alternative view.

We use in-sample slope estimates in our baseline specification but show results for rolling out-of sample estimations below. We address the first-stage estimation of the slope factor by reporting bootstrapped standard errors in parentheses. We resample changes in federal funds futures and returns simultaneously. For each sample we draw, we re-estimate the slope factor and then estimate the predictive regression (on the re-sampled data). We repeat this process 1,000 times to obtain standard errors for the regression coefficients in the predictive regression.[12]

The point estimate of β is negative and highly statistically significant. Economically, a one-standard-deviation increase in the slope factor (0.04) leads to a drop in weekly returns of 0.3%, which is 1.5 times the average weekly return and 13.5% of a one-standard-deviation move in returns (2.19%). The slope factor explains around 2% of the weekly variation in stock returns.

Campbell, Lo, and MacKinlay (1997) document that weekly stock returns are negatively autocorrelated in the modern period. We add the lagged excess return of the CRSP value-weighted index in column (2). We also find negative autocorrelation for our sample period. However, adding the lagged excess return has little influence on our point estimate of β and adds little explanatory power. Interestingly, the lagged return only explains around 1% of the weekly variation in excess returns when it is the only explanatory variable.

The remaining columns of Table 2 study the robustness of the predictive power of the slope factor when we add other, standard return predictors, which are available at sufficiently high frequencies.

The dividend-price ratio predicts variation in risk premia at the business-cycle frequency (see Campbell (1991) and Cochrane (1992)). We add the dividend-price ratio of the CRSP value-weighted index (dp_t) as a return predictor in column (3). We also find that high dp_t predicts high weekly returns but barely changes the point estimate of the slope factor.

[12]We do not detect any significant error-term autocorrelation, which is why we do not block bootstrap the data.

Bollerslev et al. (2009) argue that time-varying economic uncertainty affects risk premia, and they provide evidence of predictability of quarterly excess returns by the variance risk premium. We add the level of the VIX index (VIX_t) in column (4), realized variance (RV_t) in column (5), and the variance risk premium (VRP_t) as the difference between VIX_t and RV_t in column (6). We do not find evidence for predictability of weekly stock returns by any of the three variance-related measures, and adding them has little impact on the predictability by the slope factor.

Both stock returns and the slope might vary with the level of the federal funds rate. To ensure our baseline regression does not capture these effects, we add the federal funds target rate as covariate in column (7). We find little evidence supporting this consideration. The point estimate is statistically insignificant, the point estimate of β barely changes, and the explanatory power of the regression remains identical.

The slope of the yield curve might be a useful predictor of recessions and economic activity. Fama and French (1988) and Lettau and Ludvigson (2010) document the forecasting power of the term spread for stock returns. We add the term spread from the Federal Reserve Bank of Cleveland in column (8). The term spread has no predictive power for weekly excess returns, and adding it as an additional covariate has little impact on our point estimate of interest.

In column (9), we add the 30-minute monetary policy shock around FOMC announcements from Gorodnichenko and Weber (2016), (mp_t).[13] Tighter monetary policy negatively predicts the next weeks' stock returns but has little impact on the forecasting power of the slope factor.

Column (10) adds all covariates jointly and supports our baseline finding. All predictors jointly explain 7.5% of the weekly variation in stock returns, with the slope factor remaining highly statistically and economically significant.

[13]We merge the monetary policy shock during the week over which we calculate the slope factor and set it to zero for weeks without a meeting.

C. Subsample Analysis

Empirically, monetary policy has become more predictable over time because of increased transparency and communication by the Fed and a higher degree of monetary-policy smoothing (see Figure 1). We, therefore, study subsample results in Table 3. Column (1) repeats our baseline sample for comparison. Restricting our sample from 1994 to 2002, we find slightly larger effects of the slope factor on stock returns. Both the point estimate of β and the explanatory power of the regression increase. The weaker stock market response in the period until 2007 is consistent with Gorodnichenko and Weber (2016) and Ozdagli and Weber (2016), who find weaker reactions of stock returns to monetary policy after 2002. We extend our sample to starting in 1988 in columns (3) and (4). We find slightly lower predictability for this enlarged sample.

Stock markets react strongly to monetary policy surprises in tight windows around FOMC press releases (Bernanke and Kuttner (2005)), but an upward drift occurs in stock returns in the twenty-four hours before scheduled FOMC meetings (see Lucca and Moench (2015)). We study in Table 4 whether a systematic response of stock returns to monetary policy surprises around FOMC press releases or an upward drift in stock returns before the release might drive our findings. Column (1) repeats our baseline estimation. Column (2) removes all weeks from our sample that contain a scheduled or unscheduled FOMC meeting during the period over which we measure stock returns. This restriction removes 118 weeks from our sample but has little impact on our point estimates, statistical significance, or explanatory power of the slope factor. Column (3), instead, removes weeks with FOMC meetings during the period over which we estimate the slope factor. Again, we find little evidence for FOMC weeks driving our findings. Lastly, column (4) removes weeks with meetings in either week t or week $t+1$, reducing our sample size by 1/3. The point estimate is now slightly reduced to -6.10 from our baseline estimate of -6.96, but statistical significance and explanatory power are unchanged. FOMC meetings do not drive our results, and our evidence complements the predictability uncovered by Velikov (2015) and Ozdagli and Velikov (2016).

The sensitivity of stock returns to monetary policy shocks varies across types of events. Ozdagli and Weber (2016) find larger sensitivities of stock returns to monetary policy shocks on turning points in monetary policy compared to regular meetings, and no sensitivity on intermeeting policy decisions. Turning points are target-rate changes in the direction opposite to the previous target-rate change. Turning points signal changes in the current and future stance on monetary policy (Jensen, Mercer, and Johnson (1996); Piazzesi (2005); Coibion and Gorodnichenko (2012)). Intermeeting policy decisions are changes in target rates on unscheduled meetings of the FOMC. Faust et al. (2004) argue that intermeeting policy decisions are likely to reflect new information about the state of the economy, and hence, the stock market might react to news about the economy rather than changes in monetary policy.

Table 5 adds dummy variables equal to 1 if the week during which we create the slope factor contains any meeting (*meeting*), a regular meeting (*regular*), an unscheduled meeting (*intermeeting*), and if the policy decision was a turning point (*turningpoint*), as well as interactions with the slope factor. Stock returns are negative following any meetings, weeks of regular FOMC meetings, and weeks in which the decision was a turning point (columns (2), (3), and (5)). However, we do not find any variation of the slope factor as a function of meeting types.

Faster monetary policy easing might have different effects than an expected increase in the speed of tightening. Ozdagli and Weber (2016) show for a sample similar to ours that the stock market reacts mainly to surprise cuts in interest rates. Table 6 conditions the slope factor on positive and negative realizations. We see in columns (1) and (2) that most of the predictive power comes from negative realizations of slope: increases in the speed of monetary policy easing are more than three times as important as positive values of slope. Defining upside and downside slope factors as realizations more than one standard deviation above or below 0 similar to Lettau et al. (2014) leads to similar conclusions (see columns (3) and (4)).

Monetary policy has become more predictable over time, and many slope observations

are small in absolute value. To ensure these observations do not drive our results, we follow Ozdagli and Weber (2016) and Gorodnichenko and Weber (2016) and restrict our sample to weeks with values of the slope factor larger than 0.015 in absolute value in column (5), cutting our sample almost in half. Economic and statistical significance remains stable when we exclude small values of the slope factor.

The Fed restricts the extent to which members of the FOMC can give public speeches during FOMC blackout periods. These periods start at midnight ET seven days before the beginning of the FOMC meeting and end at midnight ET on the day after the meeting. Table 7 shows our results are robust to the exclusion of blackout weeks. In column (2), we exclude weeks with FOMC meetings; that is, the week we calculate the slope factor covers the blackout period. Results are economically and statistically similar to our baseline results in column (1). The same holds true when we exclude weeks in which our return calculation overlaps with the blackout period or when we exclude both weeks in columns (3) and (4).

D. Target, Path, and Slope

Gürkaynak et al. (2005b) document two factors are necessary to explain the reaction of yields to monetary-policy news. They use the first two principal components in federal funds futures to explain the reaction of bond yields to FOMC press releases, and show rotations of the principal components resemble a target and a path factor. The target factor is similar to the measure of monetary policy surprise used in the event-study literature, whereas the path factor contains information in FOMC press releases that moves future rates.[14] Unconditionally, we find a correlation of the slope factor with the target factor of 15.09% and with the path factor of 14.37%.

Table 8 adds the path and target factors from Gürkaynak et al. (2005b).[15] Column (1) repeats the baseline results. We see in column (2) a higher target factor increases the

[14]The correlation between the target factor of Gürkaynak et al. (2005b) and the monetary policy shock of Gorodnichenko and Weber (2016) is 95.5% over the common sample.

[15]The data for target and path factors limit our sample to end in December 2004.

predictive power and leads to a drop in the next weeks' excess return. Adding the target factor, however, has no effect on the point estimate of the slope factor. Similar results hold when we add the path factor in column (3) or both in column (4). Adding the path factor, however, adds little explanatory power for stock returns. We also add the 30-minute intraday monetary policy shock around FOMC press releases from Gorodnichenko and Weber (2016) in column (5). The high-frequency shock further increases the predictive power and drives out the target factor but has no impact on the point estimate for the slope factor.

These results are consistent with Gürkaynak et al. (2005b), who find little predictive power of their path factor for stock returns. The slope factor differs from their path factor in that it indicates the speed of future increases or decreases in federal funds target rates rather than just any future policy change.

E. Robustness and Placebo Test

We construct the slope factor as a regression residual of changes in the three-month federal funds futures-implied rate on the one-month futures-implied rate. We study in Table 9 whether the slope factor contains information over and above the raw changes in the futures or principal components. Column (1) repeats our baseline regression for convenience. In column (2), we use the first two principal components of the changes in federal funds futures-implied rates using maturities up to six months as covariates and add them to the slope factor in column (3). The first two principal components explain 96.7% of the overall variation. The principal components add little explanatory power and do not change estimates of our coefficient of interest. The raw change in the one-month futures-implied rate has no explanatory power for next weeks' stock returns (column (4)), and the raw change in the three-month futures-implied rate alone is marginally statistically significant and explains less than about one-third of the variation the slope factor explains. We add both raw changes in column (5). Now, changes in the one-month futures positively predict future stock returns, and changes in the three-month futures

negatively predict returns. Once we add the slope factor in columns (7) and (8), we find the raw changes in the futures lose their predictive power for future returns.

Table 10 repeats our baseline estimation of equation (5) for different horizons ranging from one to four weeks. The predictive power of the slope factors for returns is contained at the one-week horizon. Returns over the next two to four weeks are still negative but smaller in absolute value and no longer statistically significant. In section IV *C.*, we discuss the speed of the reaction of stock returns to changes in slope and the implications for market efficiency.

So far, we have used a first-stage regression to purge the short-run variation in federal funds futures and define the regression residual as slope. One concern might be a generated regressor problem or a small sample bias in point estimates, or in sample overfit. To sidestep these concerns, we now construct a new slope factor as a simple difference-in-differences estimator:

$$slope_{simple\_diff} = \Delta ff_{t,t+1,3} - \Delta ff_{t,t+1,1}. \tag{7}$$

This construction has the advantage that it does not rely on first-stage estimation, does not use full-sample data in the construction, and we do not have to bootstrap standard errors. Table 11 reports the results. We see results are economically and statistically indistinguable from our baseline results in Table 2.

Table 12 reports our baseline predictive regressions when we use futures of different horizons to calculate a slope factor. When we use the six-month and one-month futures-implied rate in column (2), we also find a higher slope factors predicting lower returns. We lose 30 weeks because the six-month futures contract was not always traded and the predictive power is 0.6% lower. The new slope factor loses its predictive power once we condition on our baseline slope factor in column (3). Our sample drops by 50% when we use information from nine-month futures, because the futures contract did not constantly trade on the CME. The residual of a regression of the nine-month futures-implied rates on the one-month futures-implied rate has no predictive power for future excess returns.

We see in column (5) that the baseline slope has economically similar predictive power but is not statistically significant, as standard errors increase due to a smaller sample size. A slope based on a regression of six-month futures-implied rates on three-month futures-implied rates has no predictive power beyond the baseline slope factor (see columns (6) and (7)). The results in Table 12 indicate longer-term information or higher-order moments beyond level and slope might not matter for the predictive power of information in federal funds futures for excess returns.

Empirically, we find an economically large and robust effect of the slope factor on the excess returns in the following week. The effect survives a series of robustness checks aimed at ruling out alternative explanations and known predictors in the literature. Ideally, we would like to identify and exploit a source of exogenous variation in the slope factor to reinforce conclusions from these tests. Due to the lack thereof, we perform a placebo exercise to test whether we find a mechanical relationship between changes in federal funds futures of different horizons and future excess returns.

In Table 13, we create a placebo slope factor based on the difference between the changes in the three-month federal funds futures-implied rate and the one-month futures-implied rate:

$$slope_{placebo} = ff_{t+1,3} - ff_{t+1,1}.$$

The placebo slope factor has no predictive power for weekly stock returns across specifications and explains less than 0.15% of the variation in stock returns.

F. Contemporaneous Association

We argue at the beginning of the section that studying the contemporaneous association between the slope factor and the excess returns of the CRSP value-weighted index is difficult due to endogeneity and reverse-causality concerns. We indeed find a positive, statistically significant coefficient on slope of 8.52 (s.e. 2.99). Once we remove scheduled

FOMC meeting weeks, the point estimate reduces to 5.57 (s.e. 3.77) and is no longer statistically significant. Notwithstanding other concerns, scheduled FOMC meetings and regular monetary policy shocks measured as in Gorodnichenko and Weber (2016) drive the positive contemporaneous association between the slope-factor and excess stock market returns.[16]

G. Zero-Lower-Bound Period

Our definition of the slope factor hinges on changes in the three-month and one-month Fed funds futures-implied rates. During most of the period between 2008 and 2014, both changes are close to 0 and our definition of the slope factor breaks down. We circumvent this issue by studying changes in longer-term futures contracts with a sample starting in 2011 when market participants started speculating about a monetary policy liftoff. Specifically, we regress changes in the six-month futures-implied rate on changes in the three-month future-implied rate, and use the residual of the regression as the slope factor during the zero-lower-bound period. Our estimation and prediction period is from the first week of 2011 until the last week of 2014 for a total of 207 observations. We find slope predicts next-week returns with a point estimate of -29.93 with a p-value of 9.2%.

H. Changes in Treasury Yields

Table 14 studies the predictability of changes in three-month and six-month Treasury yields. We downloaded daily yield data directly from the homepage of the U.S. Treasury. We find some evidence that changes in the slope factor positively predict changes in yields over four and five days after the slope calculation. A positive slope factor predicts lower bond prices and higher treasury yields. The predictability is contained within three- and six-month Treasuries. We do not detect predictability at longer horizons.

[16]The change in the one-month futures is highly correlated with the standard monetary policy shock around FOMC meetings during meetings weeks, and enters the calculation of the slope factor with a negative sign.

IV Economic Mechanism

A. Future Changes

We started out arguing that changes in the whole future path of short-term interest rates matter for changes in asset prices. We create a slope factor using changes of federal fund futures of different horizons and indeed find it can predict stock returns: increases in slope result in lower future stock returns. However, we have not shown that changes in the slope factor are related to future changes in federal funds rates.

Table 15 regresses future changes in target rates on the slope factor. We define the one-month change in the target rate as the difference in the actual federal funds target rate over the 21-trading-day period after the period over which we calculate the slope factor. We define longer-period changes accordingly. We see in column (1) that slope predicts one-month changes in federal funds target rates with a positive sign. In column (2), we predict two-month changes in federal funds rates orthogonal to the one-month change. The slope factor predicts two-month changes with a positive sign and adds predictive power to the one-month change. In the remaining columns, we regress future changes of up to six months orthogonalized to the one-month change. We do not detect any predictability in these changes once we condition on the two-month change.

B. Policy Speeches

The FOMC has increased the transparency of their decisions and manages expectations of participants in financial markets in speeches and testimonies. One way the FOMC might affect market expectations about the speed of future monetary policy easing and tightening might be through the tone of speeches, which we might capture with our slope factor.

We collect all speeches for members of the FOMC from http://www.federalreserve.gov/newsevents/. To classify the tone of speeches, we use a "search-and-count" approach as in Apel and Grimaldi (2012). Search-and-count

is an automated method to classify text into categories. A pre-specified word list which classifies speeches as "hawkish" or "dovish" is the central input. Using this word list, we can count the hawkish and dovish terms within one speech and aggregate over the document. Following this procedure, we obtain a classification if a speech is on average more hawkish or dovish.[17]

As in Apel and Grimaldi (2012), we also compute a net index, to determine if a speech is on average more hawkish, dovish, or possibly neutral. We calculate the net index by

$$NetIndex = \left[\left(\frac{\#hawk}{\#hawk + \#dove}\right) - \left(\frac{\#dove}{\#hawk + \#dove}\right)\right] + 1.$$

A value above 1 implies the speech contains more hawkish than dovish terms, and we would expect a faster future monetary-policy tightening, that is, a positive coefficient when we regress the slope on the net index.

We test in Table 16 whether the tone of speeches by FOMC officials affects the slope factor. We see in columns (1) and (2) more hawkish speeches by any member of the FOMC result in an increase in the slope factor, independent of whether we use the net index or the number of hawkish and dovish terms. Neither the coefficient on the net index nor on the components is statistically significant, however.

The media and market participants might not focus on all speeches by all FOMC members equally, and not every FOMC member might convey equally important information on the stance of future monetary policy. At the same time, some FOMC members might be more powerful and able to affect the future path of actual federal funds target rates. In columns (3) and (4), we only study speeches by the chair and vice chair. We see that a more hawkish tone as indicated by the net index is positively correlated with the slope factor. When we split the net index, we see that a more frequent mention of hawkish words by the chair signals faster monetary tightening, whereas a more dovish

[17]The online appendix contains more details on the procedure, the actual classification we use in Table A.1, and the speeches in Table A.2.

speech is negatively correlated with the slope factor. We see similar results in columns (5) and (6) when we restrict our sample to speeches by the chair or vice chair that contain at least one of the hawkish or dovish terms of our classification. Speeches now explain more than 12% of the variation in the slope factor, which is a regression residual. In column (7), we interact the hawk and dove classification with a dummy variable which equals 1 when the speech is by the chair or vice chair and results are similar.

In line with the interpretation that speeches are a major driver of the variation in the slope factor, we find only four speeches during the blackout period that have at least one hawkish or dovish classification. The slope factor is economically small in absolute value in all four weeks and well within one standard deviation.

C. Speed of Reaction

Financial markets typically react to economic news within minutes. We instead focus on weekly predictability. The slope factor only predicts returns for the next week and has no predictive power for the following weeks. When we split the next week into the individual five trading days, the predictability is contained within days 3 to 5 (see Table 17). The delayed market response is in line with findings in Gürkaynak et al. (2005b). They find an immediate reaction of bond yields and stock returns to their target factor that resembles the monetary policy surprise typically used in the event-study literature. For the path factor, however, they find the financial market needs some time to process the information.

D. Changes in Expectations

The slope factor has predictive power for future equity returns but also predicts changes in future federal funds rates, whereas speeches by the FOMC chair affects the slope factor. One interpretation of these results is that members of the FOMC communicate news about their monetary policy stance throughout the year outside of scheduled FOMC meetings through speeches and testimonies. If the slope factor reveals news about the

future monetary policy stance to the public, we should see market participants updating their expectations for future federal funds rates.

To test for this channel, we regress changes in expectations for future federal funds rates on the slope factor in Table 18. We obtained monthly forecasts for the federal funds rate one to three quarters ahead from Blue Chip financial forecasts. Blue Chip surveys leading business and financial economists typically in a period between the 22^{nd} and 25^{th} of the previous months, and releases the forecasts on the first of the month. We create one-month changes in these forecasts and regress it on the three-week cumulative slope factor ending on or before the 20^{th} of the previous month.[18]

We see in columns (1)–(3) that the three-weeks slope factor significantly predicts forecast revisions of professional forecasters for future federal funds rate over the next three quarters and explains around 12% of the variation. The coefficient on the slope factor is indistinguishable from 1. Slope loses its forecasting power more than one quarter ahead, once we condition on the forecast revision for the first quarter (see columns (4) and (5)), which we would expect because the slope factor only contains information for future federal funds target rates of up to three months ahead. The one-quarter-ahead forecast revision explains more than 80% of the changes in two- and three-quarters-ahead predictions indicating high persistence in forecast revisions.

Financial market participants update forecasts for future federal funds rates following changes in slope. This finding is consistent with the idea that changes in slope reveal information about the speed of future monetary policy tightening and loosening, and professional forecasters update their forecast to the new information.

E. Monetary Policy News versus News about the Economy

A Taylor (1993) rule with nominal interest rates reacting to the output gap and inflation empirically describes actual monetary policy in the United States well. Positive changes in the slope factor might indicate upward revisions of market participants about future

[18]The timing ensures Blue Chip collected the forecasts after the period over which we calculate the slope factor.

output growth or inflation. The reaction of stock returns to the slope factor might therefore constitute a reaction to news about the macro economy rather than monetary policy shocks.

Stocks are claims on real assets, and returns should not responds to changes in inflation expectations. Stock prices, at the same time, are claims to the future stream of cash flows, and prices and returns might increase following positive news about the state of the economy. Empirically, instead, we find increases in slope lead to a drop in stock returns, which is consistent with a reaction of stock returns to monetary policy news.

Table 19 adds macroeconomic shocks to our baseline analysis using data from Haver Analytics.[19] We define macro shocks as the difference between the actual release as first reported and the median forecast from Haver Analytics. We assign the shock values to the five-day period over which we calculate the changes in federal funds futures when the macro announcement occurs between Thursday of week $t-1$ and Wednesday of week t.

We add surprise GDP growth (*shock_gdp*) as an additional covariate in our baseline specification in column (1) of Table 19. Positive news about GDP positively predicts weekly stock returns, which are marginally statistically significant. GDP news, however, has little impact on economic or statistical significance of the slope factor. In column (2), we add news about core consumer price inflation (*shock_cpi*). Higher-than-expected inflation negatively predicts stock returns, but statistical significance is sparse. Inflation surprises have no impact on the predictive power of the slope factor. Column (3) adds both inflation and GDP news jointly. The point estimate on slope barely changes.

Column (4) also adds news about capacity utilization (*shock_cu*), consumer confidence (*shock_cc*), employment costs (*shock_ec*), initial unemployment claims (*shock_ic*), the manufacturing composite index (*shock_mfg*), new home sales (*shock_nhs*), non-farm payroll (*shock_nfp*), core producer price inflation (*shock_ppi*), retail sales (*shock_rs*), and unemployment (*shock_ur*). In addition to GDP news, retail sales positively predict the next weeks' stock returns, whereas higher-than-expected capacity utilization and

[19]Haver data are commonly used to study the reaction of stock returns to macroeconomic shocks; see, for example, Gilbert (2011).

news about higher unemployment negatively predict next weeks' returns. The additional covariates, however, have no impact on the economic or statistical significance of the slope factor.

In the last column, we regress the slope factor on the macro surprises. Higher-than-expected capacity utilization, consumer confidence, manufacturing index, non-farm payroll, producer price inflation, retail sales, and lower-than-expected unemployment numbers lead to an increase in slope consistent with the idea that stronger macroeconomic fundamentals warrant an increase in the speed of future monetary policy tightening.

Table 19 shows that macro news affects the slope factor, but news about the economy is unlikely to drive the predictability of weekly stock returns by the slope factor. Rather, news about the stance of monetary policy seems to be the driving force behind the stock return predictability by the slope factor.

F. Narrative Evidence: Speeches, Speed, and Momentum

A positive slope factor predicts negative stock returns, with the predictability building up in absolute values over the next five days. Macro news has little impact on the predictability, but market participants instead update their expectations about future federal funds rates. These findings are consistent with delayed market reaction to the monetary policy news, that is, short-run monetary policy momentum, and provide evidence that monetary policy news comes out throughout the year and not only during scheduled FOMC meetings. We now discuss as representative examples the narrative background for two weeks in which the slope factor was large in absolute values (above the 95^{th} percentile).

On December 5, 2000, Chairman Alan Greenspan gave a speech at the America's Community Bankers Conference in New York. After a few introductory remarks, he warned about potential risks for the stock market: "Recently, wariness about risk again has increased as default rates on less than investment-grade bonds have moved higher, debt downgrades have become more commonplace, and many high-flying dot-com ventures have

collapsed. More broadly, equity market analysts have been revising down their near-term profit forecasts–with revisions occurring across a range of industries."

He moved on to warn about the impact on the broader economy: "Still, in an economy that already has lost some momentum, one must remain alert to the possibility that greater caution and weakening asset values in financial markets could signal or precipitate an excessive softening in household and business spending."

The Washington Post article, "Greenspan Talk Lifts Markets; Hopes for Rate Cut Rise on Wall St," mentions,

> Some interest rates have been falling in the wake of slowing growth and the expectation that the Fed will have to cut rates in coming months [...]. Financial markets rallied strongly yesterday after Federal Reserve Chairman Alan Greenspan acknowledged that U.S. economic growth has slowed 'appreciably,' convincing many investors that the central bank will begin to cut short-term interest rates.

Interestingly, market participants interpret the statements as news about future changes beyond the next scheduled FOMC meeting. "I don't think it quite suggests that they are ready" to cut rates, said economist Ed McKelvey of Goldman Sachs Group Inc. in New York. But, he added, "It seems certain that at their Dec. 19 meeting Fed policymakers will shift away from their assessment that the risk of accelerating inflation is greater than the risk of an excessive slowdown."

In "The Greenspan Effect," the New York Times writes,

> In a speech, he noted that the stock market, home-building, car sales and demand for consumer durables were all down. Meanwhile, unemployment claims and lending standards were up. With the economy losing momentum, he said, the Fed must 'remain alert to the possibility that greater caution and weakening asset values in financial markets could signal or precipitate an excessive softening in household and business spending.' Traders took

> this convoluted prose as a clear signal: The asset bubble had been pricked. The economy was slowing. And the Fed might start thinking about lowering interest rates as soon as Jan. 30, 2001, when its Open Market Committee meets.

The slope factor is -0.1063 in the week ending on December 6, 2000, and the following week's excess return is 1.08%.

On September 26, 2005, Chairman Alan Greenspan gave a speech to the American Bankers Association Annual Convention in Palm Dessert. He started off with,

> In my remarks today, I plan, in addition, to focus on one of the key factors driving the U.S. economy in recent years: the sharp rise in housing valuations and the associated buildup in mortgage debt. Over the past decade, the market value of the stock of owner-occupied homes has risen annually by approximately 9 percent on average, from $8 trillion at the end of 1995 to $18 trillion at the end of June of this year. Home mortgage debt linked to these structures has risen at a somewhat faster rate.

The Washington Post article, "Concerns Raised as Home Sales, Prices Rise Again; Greenspan Issues Sternest Warning Yet to Bankers Group," says,

> U.S. home sales and prices surged again last month, an industry group reported yesterday, as Federal Reserve Chairman Alan Greenspan warned that the growing use of riskier new mortgages could result in 'significant losses' for lenders and borrowers if the market cools. And some cooling is likely, Greenspan suggested in remarks delivered via satellite to the American Bankers Association convention in Palm Desert, Calif., repeating his view that 'home prices seem to have risen to unsustainable levels' in certain local markets. [...] The Fed [...] indicated it will keep moving the rate higher in coming months to keep inflation under control.

The slope factor is 0.08 in the week ending on September 28, 2005, and the following week's excess return is -1.50%.

These two examples are suggestive, but by no means conclusive. The results in the previous sections on the effect of speeches on the slope factor, the slope factor predicting future interest-rate changes, and the fact market participants update their forecasts for future federal funds rates, combined, suggest monetary policy predictability and short-run monetary policy momentum.

V Economic Magnitudes

We employ the results in Campbell and Thompson (2008) to assess the economic significance of our findings. Specifically, we assess how much an investor could possibly gain following the predictions the slope factor generates, to create a link between statistical measures of forecast performance (out-of-sample R^2) and more interesting economic quantities, such as gains in excess returns or increases in Sharpe ratios.

To generate out-of-sample forecasts, we first re-estimate equation (5) from 1988 through 1994 and use the parameters estimates ($\hat{\alpha}$ and $\hat{\beta}$) to compute an out-of-sample version of the slope factor for the time period from 1995 through 2007:

$$slope_t^{oos} = \Delta ff_{t,t+1,3} - \left(\hat{\alpha} + \hat{\beta}\Delta ff_{t,t+1,1}\right). \tag{8}$$

For the period from 1988 through 1994, we also estimate the following predictive regression:

$$R_{t+1} = \gamma_0 + \gamma_1 slope_t. \tag{9}$$

We then use the parameters estimates from equation (9) together with the out-of-

sample slope factor to compute an out-of-sample prediction for excess returns, as

$$\widehat{R_{t+1}} = \hat{\gamma}_0 + \hat{\gamma}_1 slope_t^{oos}. \tag{10}$$

Following Campbell and Thompson (2008), we then compute the out-of-sample R^2 as

$$R^2_{OOS} = 1 - \frac{\sum_{t=1}^{T}\left(R_{t+1} - \widehat{R_{t+1}}\right)^2}{\sum_{t=1}^{T}\left(R_{t+1} - \bar{R}_{t+1}\right)^2}, \tag{11}$$

where $\bar{R}_{t+1}$ denotes the average excess return over the period from 1988 through 1994. We obtain an out-of-sample R^2 of 0.27%.

Assuming mean-variance preferences with risk-aversion parameter ρ, Campbell and Thompson (2008) show a buy-and-hold investor will earn an excess return of

$$\frac{S^2}{\rho},$$

where S^2 denotes the unconditional squared Sharpe ratio.

An investor conditioning on the prediction of the slope factor will earn an average excess return of

$$\left(\frac{1}{\rho}\right)\left(\frac{S^2 + R^2_{OOS}}{1 - R^2_{OOS}}\right).$$

The weekly unconditional Sharpe ratio from 1988 through 2007 is approximately 7.31%, so a buy-and-hold investor with unit risk aversion would have received an average weekly excess return of 0.53%. An investor using the slope factor to make conditional portfolio choices would have earned an average weekly excess return of 0.81%.

Cochrane (1999) suggests an alternative methodology to evaluate the economic significance of return predictability. Sharpe ratios of a buy-and-hold investor (S) and an investor conditioning on the slope factor are related by $S^* = \sqrt{\frac{S^2 + R^2_{OOS}}{1 - R^2_{OOS}}}$. For our

example, we get an increase in the weekly Sharpe ratio of almost 20%, that is, $S^* = 9.00\%$ compared to $S = 7.31\%$.

Slope is a regression residual and one concern is that trading based on information about the speed of future monetary policy tightening and loosening might not be profitable due to transaction costs. The average percentage bid-ask spread of the SPDR S&P 500 (SPY) between 2002 and 2015 is 0.01% and the median spread is 0.008%. The average absolute weekly excess return instead is 1.7%, indicating transaction costs are not a major concern.

VI Concluding Remarks

Stock prices are the present discounted value of future cash flows and should be sensitive to changes in market expectations of the whole path of future short-term interest rates. We construct a slope factor from changes in federal funds futures-implied rates of different maturities. Increases in the slope factor predict future increases in federal funds target rates and negative stock returns at the weekly frequency. The stock return predictability is a robust feature of the data, holds out-of-sample and during subsamples, and has predictive power similar or larger than standard return predictors.

The predictive power of the slope factor is large in economic terms. An investor who conditions on the slope factor when making portfolio decisions can increase his weekly Sharpe ratio by 20% compared to a buy-and-hold investor.

Consistent with the idea that "monetary policy is 98 percent talk and only two percent action,"[20] we find that speeches by the chair and vice chair change the slope factor, which predicts future changes in federal funds target rates as well as forecast revisions by professional forecasters. Our findings indicate monetary policy affects stock markets continuously throughout the year rather than only during eight scheduled FOMC meetings that have been the focus of an extensive event-study literature. The predictability results are consistent with a delayed market reaction to monetary-policy news and

[20]See: http://www.brookings.edu/blogs/ben-bernanke/posts/2015/03/30-inaugurating-new-blog

short-run monetary-policy momentum. We provide anecdotal evidence supporting this interpretation.

Speeches affect stock returns via their effect on market participants' expectations about the speed of future monetary-policy loosening or tightening. Our findings provide evidence for the power of forward guidance and committing to future interest-rate policies outside of liquidity-trap periods.

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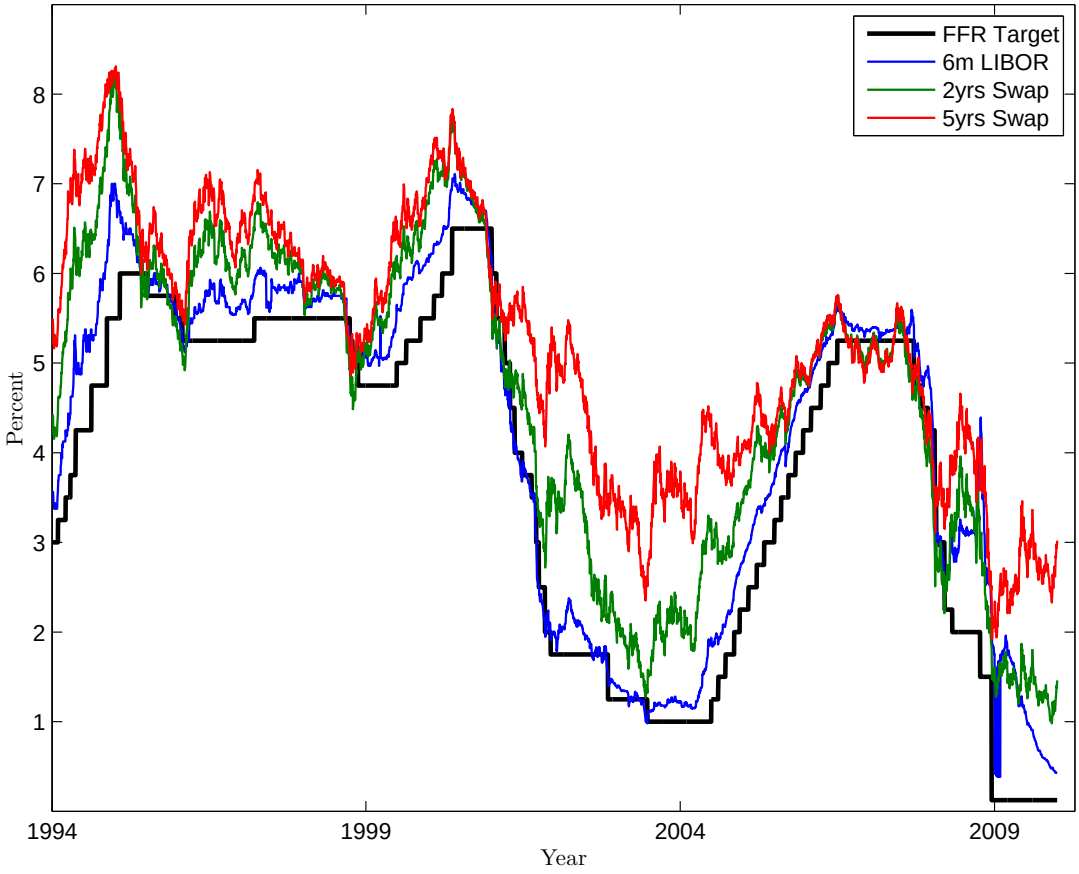
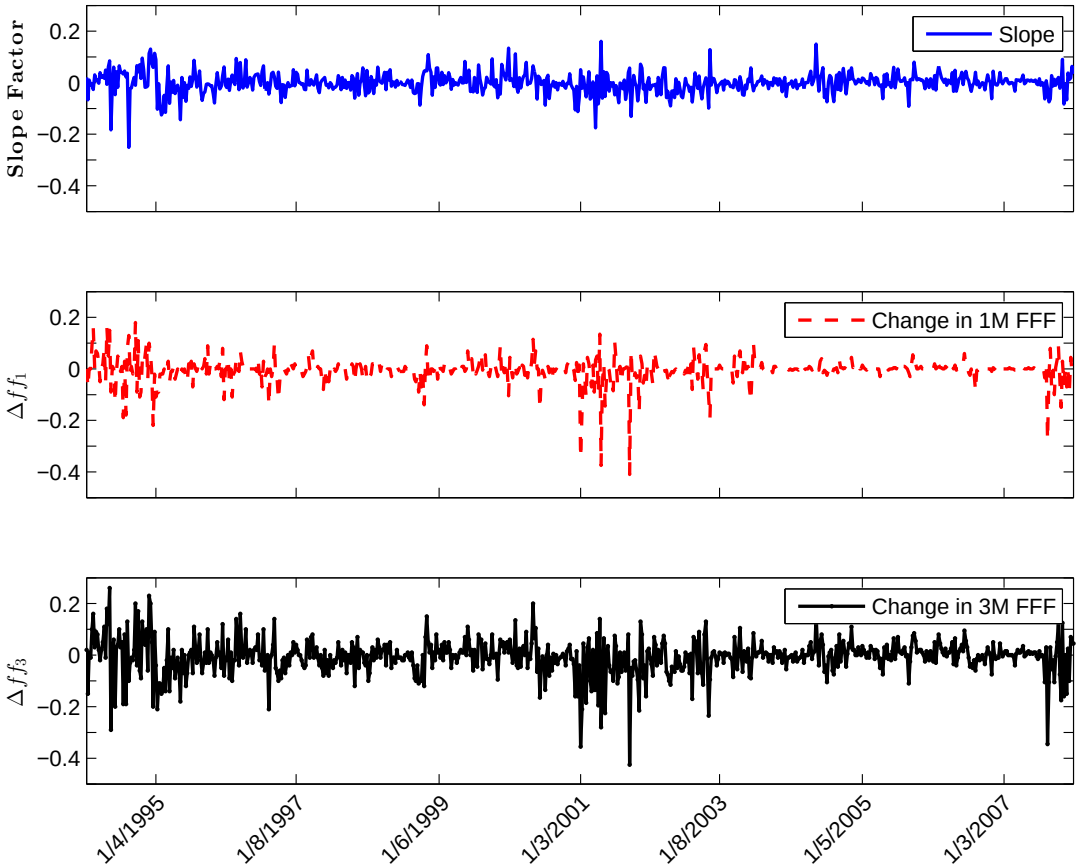
Figure 1: **Time Series of Interest Rates**



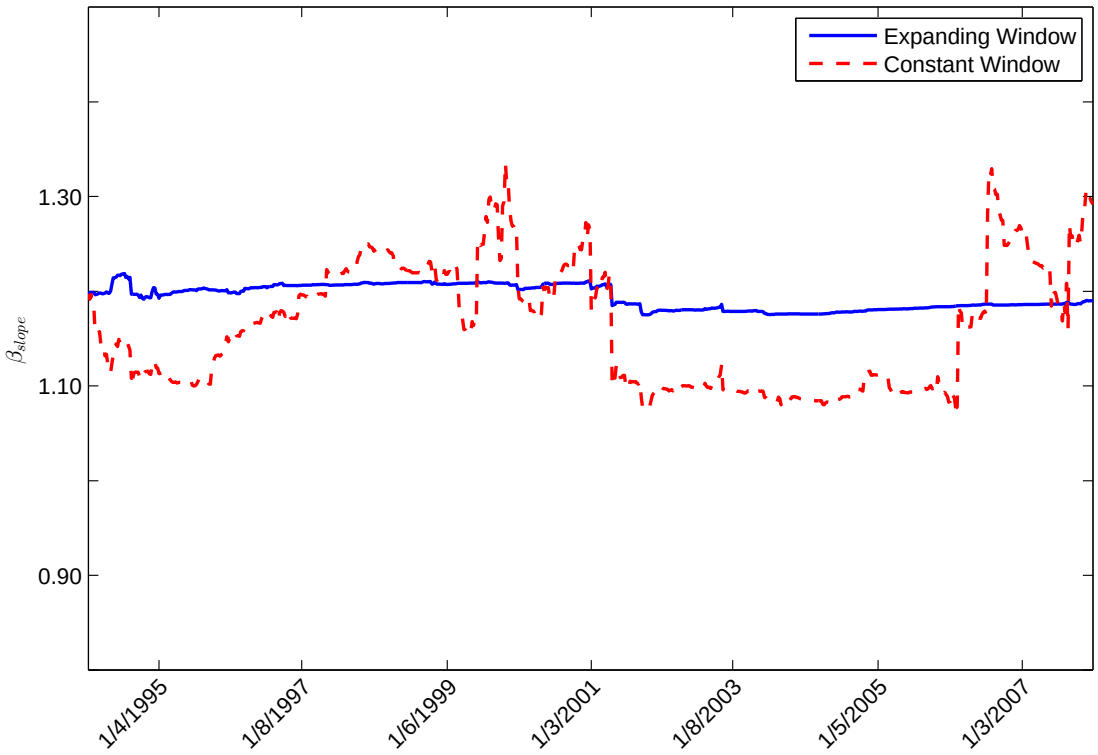
This figure plots the time series of the federal funds target rate, the six-month Libor, and the two- and five-year swap rates from 1994 to 2009.

Figure 2: **Time Series of Slope Factor and Changes in Futures**



This figure plots the time series of the slope factor in the top panel, the weekly changes in the one-month futures-implied federal funds rate in the middle panel, and the weekly changes in the three-month futures-implied federal funds rate in the bottom panel for a sample from 1994 to 2007.

Figure 3: **Regression Coefficient for Slope Estimation**



This figure plots the time series of the regression coefficient, regressing changes in the six-month futures-implied federal funds rate on changes in the one-month futures-implied federal funds rate from 1994 to 2007. The blue solid line reports estimates of an expanding window regression, whereas the red dashed reports coefficients for a constant window estimation of 60 weeks.

Table 1: **Descriptive Statistics**

This table reports descriptive statistics for the slope factor, one- and three-month federal funds futures rates $ff_{t,t+1}$, one-week changes in these rates, the actual federal funds target rate, the absolute value of the slope factor, and weekly returns of the CRSP value-weighted index. The sample period is January 1994 to December 2007 for a total of 725 weeks.

	$Slope_t$	$ff_{t,t+1,1}$	$ff_{t,t+1,3}$	$\Delta ff_{t,t+1,1}$	$\Delta ff_{t,t+1,3}$	Target Rate	abs($Slope_t$)	R_{t+1}
Mean	0.00	4.23	4.29	-0.01	-0.01	4.20	0.03	0.12
Std	(0.04)	(1.73)	(1.74)	(0.05)	(0.07)	(1.75)	(0.03)	(2.21)
Nobs					725			

Table 2: **Predictive Regressions**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$), lagged index returns (R_t), the dividend-price ratio (dp_t), the VIX (VIX_t), realized variance (RV_t), the variance risk premium (VRP_t), the federal funds target rate ($Fedfunds_t$), the term spread ($TermSpread_t$), and the monetary policy shock (mp_t) from Gorodnichenko and Weber (2016). We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	0.20^{**}	0.13^{*}	-0.61^{*}	-0.02	0.03	0.14	0.03	-0.05	0.11^{*}	-2.32^{***}
	(0.08)	(0.09)	(0.41)	(0.29)	(0.20)	(0.15)	(0.22)	(0.20)	(0.09)	(0.80)
$Slope_t$	-7.49^{***}	-6.96^{***}	-7.19^{***}	-6.85^{***}	-6.87^{***}	-6.95^{***}	-6.97^{***}	-6.83^{***}	-6.32^{***}	-6.21^{***}
	(2.16)	(1.98)	(2.00)	(1.97)	(1.97)	(1.99)	(1.99)	(1.99)	(1.96)	(1.95)
R_t		-0.09^{**}	-0.09^{**}	-0.08^{**}	-0.09^{**}	-0.09^{**}	-0.09^{**}	-0.08^{*}	-0.11^{**}	-0.10^{**}
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
dp_t			40.78^{**}							94.24^{***}
			(19.72)							(27.00)
VIX_t				0.01						0.02
				(0.02)						(0.03)
RV_t					0.01					0.02
					(0.02)					(0.03)
VRP_t						0.00				
						(0.03)				
$Fedfunds_t$							0.02			-0.12
							(0.05)			(0.10)
$TermSpread_t$								0.07		0.19^{*}
								(0.07)		(0.14)
mp_t									-11.85^{***}	-11.74^{***}
									(2.74)	(2.73)
R^2	1.92	2.61	3.20	2.66	2.66	2.62	2.65	2.55	5.78	7.49
Nobs	725	724	724	723	724	723	724	718	724	717

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 3: **Predictive Regressions: Subsamples**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) for different subsamples. We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	1994-2007	1994-2002	1988-2007	1988-2002
	(1)	(2)	(3)	(4)
Constant	0.13^{*}	0.11	0.14^{**}	0.12^{*}
	(0.09)	(0.11)	(0.07)	(0.08)
$Slope_t$	-6.96^{***}			
	(1.98)			
R_t	-0.09^{**}	-0.06	-0.09^{**}	-0.07^{*}
	(0.05)	(0.06)	(0.04)	(0.05)
$Slope_{1994-2002}$		-8.05^{***}		
		(2.32)		
$Slope_{1988-2007}$			-4.63^{***}	
			(1.56)	
$Slope_{1988-2002}$				-4.96^{***}
				(1.62)
R^2	2.61	2.85	1.75	1.65
Nobs	724	463	995	734

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 4: **Predictive Regressions: Meeting Weeks**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) and lagged index returns (R_t), excluding weeks with scheduled and unscheduled FOMC meetings. We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	All Weeks	No Meeting Return Week	No Meeting Previous Week	No Meeting in either Week
	(1)	(2)	(3)	(4)
Constant	0.13^{*}	0.23^{***}	0.12^{*}	0.24^{***}
	(0.09)	(0.09)	(0.09)	(0.09)
$Slope_t$	-6.96^{***}	-6.87^{***}	-6.58^{***}	-6.10^{**}
	(1.98)	(2.50)	(2.15)	(2.78)
R_t	-0.09^{**}	-0.08^{*}	-0.08^{*}	-0.09
	(0.05)	(0.06)	(0.06)	(0.07)
R^2	2.61	2.10	2.25	1.74
Nobs	724	606	606	490

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 5: **Predictive Regressions: Meeting Types**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) and lagged index returns (R_t) conditional on meetings types. We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)
Constant	0.13^{*}	0.23^{***}	0.23^{***}	0.13^{*}	0.16^{**}
	(0.09)	(0.09)	(0.09)	(0.08)	(0.09)
$Slope_t$	-6.96^{***}	-6.90^{***}	-6.91^{***}	-7.07^{***}	-7.44^{***}
	(1.98)	(2.49)	(2.40)	(2.10)	(1.95)
R_t	-0.09^{**}	-0.08^{*}	-0.08^{*}	-0.09^{***}	-0.08^{***}
	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)
$Meeting$		-0.59^{***}			
		(0.22)			
$Slope \times Meeting$		-0.55			
		(4.39)			
$Regular$			-0.66^{***}		
			(0.23)		
$Slope \times Regular$			-0.90		
			(4.60)		
$Intermeeting$				1.27	
				(1.01)	
$Slope \times Intermeeting$				0.68	
				(12.45)	
$Turningpoint$					-2.33^{***}
					(0.85)
$Slope \times Turningpoint$					28.42
					(20.16)
R^2	2.61	3.57	3.75	2.84	4.23
Nobs	724	724	724	724	724

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 6: **Predictive Regressions: Asymmetries**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) lagged index returns (R_t) allowing for asymmetric effects of slope: Slope > 0 captures positive values of the slope factor; Slope $<= 0$ captures negative values of the slope factor; $Slope_{upside}$ captures values of the slope factor larger than one standard deviation above 0; $Slope_{downside}$ captures values of the slope factor larger than one standard deviation below 0; $Slope_{normal}$ captures the intermediate values of slope; $Slope_{large}$ captures value of the slope factor larger than 0.015 in absolute value. We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)
Constant	-0.01	0.01	0.05	0.07	0.27^{***}
	(0.11)	(0.11)	(0.09)	(0.09)	(0.11)
$Slope_t > 0$	-2.54	-2.07			
	(3.67)	(3.61)			
$Slope_t <= 0$	-12.21^{***}	-11.25^{***}			
	(3.62)	(3.44)			
R_t		-0.08^{**}		-0.08^{**}	-0.08^{*}
		(0.05)		(0.05)	(0.06)
$Slope_{t,\ normal}$			7.52	7.84	
			(6.27)	(6.20)	
$Slope_{t,\ upside}$			-3.82	-3.41	
			(3.47)	(3.43)	
$Slope_{t,\ downside}$			-12.08^{***}	-11.21^{***}	
			(3.43)	(3.27)	
$Slope_{t,\ large}$					-7.33^{***}
					(1.97)
R^2	2.31	2.96	2.34	3.02	4.22
Nobs	725	724	725	724	413

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 7: **Predictive Regressions: Blackout Periods**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) and lagged index returns (R_t), excluding weeks during blackout period which restrict the extent of public communication. We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	All Weeks	No Meeting Return Week	No Meeting Next Week	No Meeting in either Week
	(1)	(2)	(3)	(4)
Constant	0.13^{*}	0.23^{*}	0.04^{*}	0.13^{*}
	(0.09)	(0.09)	(0.09)	(0.09)
$Slope_t$	-6.96^{***}	-6.87^{***}	-6.63^{***}	-6.36^{***}
	(1.98)	(1.98)	(1.98)	(1.98)
R_t	-0.09^{**}	-0.08^{**}	-0.07^{**}	-0.08^{**}
	(0.05)	(0.05)	(0.05)	(0.05)
R^2	2.61	2.10	2.54	2.17
Nobs	724	606	606	490

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 8: **Predictive Regressions: Target and Path Factor**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$), lagged index returns (R_t), the target ($Targetfactor$) and path ($Pathfactor$) from Gürkaynak et al. (2005b), and the monetary policy shock (mp_t) from Gorodnichenko and Weber (2016). We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)
Constant	0.13^{*}	0.14^{*}	0.13^{*}	0.14^{*}	0.07
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
$Slope_t$	-7.48^{***}	-6.93^{***}	-7.28^{***}	-6.71^{***}	-6.66^{***}
	(2.07)	(2.06)	(2.04)	(2.02)	(2.01)
R_t	-0.06	-0.08^{*}	-0.06	-0.08^{*}	-0.08^{*}
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$Targetfactor$		-0.10^{***}		-0.10^{***}	0.10
		(0.03)		(0.03)	(0.09)
$Pathfactor$			-0.04^{**}	-0.04^{***}	-0.04^{***}
			(0.02)	(0.02)	(0.02)
mp_t					-20.66^{***}
					(8.14)
R^2	2.42	4.57	3.13	5.38	6.76
Nobs	568	568	568	568	568

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 9: **Predictive Regressions: Raw Changes and PCA**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$), the first two principal components of changes in federal funds futures (PC_1, PC_2), and the changes in the one-month and three-month federal funds futures-implied rates ($\Delta ff_{t,t+1,1}$, $\Delta ff_{t,t+1,3}$). We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.14^{*}	0.14^{*}	0.14^{*}	0.14^{*}	0.12^{*}	0.13^{*}	0.13^{*}	0.13^{*}
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
$Slope_t$	-6.76^{***}		-7.61^{**}				-6.75^{***}	-6.32^{***}
	(1.98)		(3.85)				(1.98)	(2.59)
R_t	-0.09^{**}	-0.10^{**}	-0.09^{**}	-0.11^{**}	-0.11^{**}	-0.09^{**}	-0.09^{**}	-0.09^{**}
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
PC_1		0.90^{**}	-0.01					
		(0.49)	(0.64)					
PC_2		-2.74	1.11					
		(2.26)	(3.25)					
$\Delta ff_{t,t+1,1}$				-0.65		7.41^{***}	-0.50	
				(2.01)		(3.01)	(2.01)	
$\Delta ff_{t,t+1,3}$					-2.61^{**}	-6.75^{***}		-0.43
					(1.30)	(1.98)		(1.69)
R^2	2.62	2.15	2.65	1.26	1.86	2.63	2.63	2.63
Nobs	695	695	695	695	695	695	695	695

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 10: **Predictive Regressions: Different Horizons**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) for different forecast horizons running from one week to four weeks. We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	R(t,t+1)	R(t,t+2)	R(t,t+3)	R(t,t+4)
	(1)	(2)	(3)	(4)
Constant	0.12^{*}	0.23^{**}	0.33^{***}	0.43^{***}
	(0.08)	(0.11)	(0.14)	(0.16)
$Slope_t$	-7.70^{***}	-3.31	-2.83	-5.17^{*}
	(2.07)	(3.01)	(3.23)	(3.84)
R^2	1.91	0.19	0.10	0.23
Nobs	725	725	725	725

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 11: **Predictive Regressions: Difference Slope**

This table reports weekly predictive regressions of the excess returns of the CRSP value-weighted index on the slope factor ($Slope_t$), lagged index returns (R_t), the dividend-price ratio (dp_t), the VIX (VIX_t), realized variance (RV_t), the variance risk premium (VRP_t), the federal funds target rate ($Fedfunds_t$), the term spread ($TermSpread_t$) and the monetary policy shock (mp_t) from Gorodnichenko and Weber (2016). We report Newey West standard errors in parentheses. We construct the slope factor as the simple difference of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (7)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.12	−0.64	−0.02	0.03	0.13	0.03	−0.05	0.12	−2.33***
	(0.09)	(0.42)	(0.30)	(0.16)	(0.12)	(0.24)	(0.23)	(0.08)	(0.77)
$Slope_t$	−6.76***	−7.05***	−6.65***	−6.65***	−6.76***	−6.75***	−6.61***	−6.23***	−6.13***
	(2.06)	(2.09)	(1.96)	(2.04)	(2.07)	(2.01)	(2.04)	(1.89)	(1.85)
R_t	−0.09**	−0.09**	−0.08**	−0.09**	−0.09**	−0.09**	−0.08**	−0.11**	−0.10**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
dp_t		41.80**							94.60***
		(20.13)							(26.71)
VIX_t			0.01						0.02
			(0.02)						(0.03)
RV_t				0.01					0.02
				(0.01)					(0.02)
VRP_t					0.00				
					(0.02)				
$Fedfunds_t$						0.02			−0.12
						(0.05)			(0.09)
$TermSpread_t$							0.07		0.19
							(0.08)		(0.13)
mp_t								−11.76***	−11.73***
								(2.56)	(2.49)
R^2	2.59	3.22	2.64	2.64	2.60	2.62	2.53	5.56	7.28
Nobs	724	724	723	724	723	724	718	724	717

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 12: **Predictive Regressions: Termstructure**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) for different subsamples. We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

		$\Delta ff_{t,t+1,6} \perp \Delta ff_{t,t+1,1}$		$\Delta ff_{t,t+1,9} \perp \Delta ff_{t,t+1,1}$		$\Delta ff_{t,t+1,6} \perp \Delta ff_{t,t+1,3}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.14	0.14	0.14	0.05	0.06	0.14	0.14
	(0.09)	(0.09)	(0.09)	(0.12)	(0.13)	(0.09)	(0.09)
$Slope_t$	-6.76^{***}		-9.16^{*}		-6.37		-7.24^{***}
	(2.23)		(4.71)		(5.73)		(2.48)
R_t	-0.09^{**}	-0.10^{**}	-0.10^{**}	-0.15^{**}	-0.15^{*}	-0.11^{***}	-0.10^{**}
	(0.04)	(0.04)	(0.04)	(0.08)	(0.08)	(0.04)	(0.04)
$Slope_{6,1}$		-2.59^{***}	1.42				
		(1.00)	(2.14)				
$Slope_{9,1}$				-0.48	1.09		
				(0.96)	(1.57)		
$Slope_{6,3}$						-0.48	1.51
						(1.87)	(2.09)
R^2	2.62	2.02	2.68	2.18	2.63	1.25	2.69
Nobs	695	695	695	350	350	695	695

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 13: **Predictive Regressions: Placebo Slope**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on a placebo slope factor ($Slope_{Placebo}$) and lagged index returns (R_t). We report bootstrapped standard errors in parentheses. We construct the placebo slope factor as the change of weekly changes of the three-month federal funds futures-implied rate and the one-month federal funds futures-implied rate. Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)
Constant	0.15^{*}	0.17^{**}
	(0.10)	(0.10)
$Slope_{t\ Placebo}$	-0.43	-0.45
	(0.45)	(0.45)
R_t		-0.10^{**}
		(0.05)
R^2	0.15	1.25
Nobs	725	724

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 14: **Predictive Regressions: Changes in Treasury Yields**

This table reports weekly predictive regressions of the changes in three-month and six-month Treasury yields on the slope factor ($Slope_t$). We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	$3Months$					$6Months$				
	$\Delta y_{t,t+1}$	$\Delta y_{t,t+2}$	$\Delta y_{t,t+3}$	$\Delta y_{t,t+4}$	$\Delta y_{t,t+5}$	$\Delta y_{t,t+1}$	$\Delta y_{t,t+2}$	$\Delta y_{t,t+3}$	$\Delta y_{t,t+4}$	$\Delta y_{t,t+5}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	-0.01^{***}	-0.00^{*}	0.02^{***}	0.01^{***}	-0.00	-0.01^{***}	-0.00	0.02^{***}	0.01^{***}	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Slope_t$	0.03	0.06	0.13	0.19^{**}	0.17^{*}	0.03	0.08	0.15^{*}	0.19^{**}	0.24^{***}
	(0.06)	(0.09)	(0.12)	(0.11)	(0.11)	(0.05)	(0.07)	(0.10)	(0.09)	(0.10)
R^2	0.06	0.11	0.26	0.61	0.43	0.08	0.24	0.57	0.77	0.98
Num. obs.	726	726	726	726	726	726	726	726	726	726

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 15: **Predictive Regressions: Future Fed Funds Rate**

This table reports weekly predictive regressions of a residual of a regression of changes in future federal funds target rates on the one-month target rate on the slope factor ($Slope_t$), and one-month and two-month changes in federal funds rates (Δff_{t+1}, Δff_{t+2}) for horizons lasting from one month ($M1$) to six months ($M6$). We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	$\Delta M1$	$\Delta M2 \perp \Delta M1$	$\Delta M3 \perp \Delta M1$	$\Delta M4 \perp \Delta M1$	$\Delta M5 \perp \Delta M1$	$\Delta M6 \perp \Delta M1$
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.00	0.01*	0.03***	0.04***	0.05***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
$Slope_t$	0.78***	0.98***	−0.13	0.02	0.23	0.29
	(0.23)	(0.21)	(0.30)	(0.35)	(0.45)	(0.63)
Δff_{t+1}		0.36***				
		(0.05)				
Δff_{t+2}			0.87***	1.20***	1.49***	1.73***
			(0.03)	(0.05)	(0.06)	(0.07)
R^2	2.42	15.35	63.41	63.34	61.00	56.80
Nobs	726	726	726	726	726	726

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 16: **Linguistic Analysis Speeches**

This table reports weekly predictive regressions of the slope factor the one of speeches by members of the FOMC. We use linguistic analysis to count the number of occurrences of hawkish or dovish words. The online appendix contains our dictionary. $Hawk - DoveIndex$ is a net index that is larger than 1 if the speech contains more hawkish than dovish terms. $Hawk$ and $Dove$ count the occurrences of hawkish and dovish words. $Chair$ is a dummy that equals 1 if a speech is by the chair or vice chair ($Chair$). We report Newey West standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	−0.32	−0.13	−1.56***	−0.68**	−1.99*	−0.94	−0.18
	(0.41)	(0.24)	(0.59)	(0.27)	(1.10)	(0.90)	(0.23)
Hawk-Dove Index	0.33		1.06**		1.73**		
	(0.33)		(0.45)		(0.75)		
Hawk		0.09		0.56***		0.61*	0.02
		(0.05)		(0.21)		(0.31)	(0.07)
Dove		−0.09		−0.30*		−0.28*	0.29
		(0.16)		(0.17)		(0.17)	(0.25)
Hawk × Chair							0.43*
							(0.22)
Dove × Chair							−0.68**
							(0.33)
R^2	0.21	0.61	2.98	4.60	12.38	12.35	1.97
Num. obs.	380	380	173	173	43	43	380
Only Speeches by Chair			X	X	X	X	
At least 1 classification					X	X	

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 17: **Predictive Regressions: Day-by-Day**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$) and lagged returns. Note that in a slight abuse of notation, we refer to the respective lagged returns as R_{t-1}; for $R_{t,t+1}$, R_{t-1} denotes the return $R_{t-1,t}$, for $R_{t,t+2}$ the lagged return is $R_{t-1,t+1}$, that the other lagged returns are constructed in the same manner. We report boostrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	$R_{t,t+1}$	$R_{t,t+2}$	$R_{t,t+3}$	$R_{t,t+4}$	$R_{t,t+5}$	$R_{t,t+6}$	$R_{t,t+7}$	$R_{t,t+8}$	$R_{t,t+9}$	$R_{t,t+10}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	0.02	0.03	0.06	0.07	0.11*	0.15*	0.14	0.14	0.16*	0.18*
	(0.04)	(0.06)	(0.07)	(0.08)	(0.09)	(0.10)	(0.11)	(0.11)	(0.12)	(0.12)
$Slope_t$	−0.15	−0.91	−3.37**	−6.41***	−7.41***	−5.08**	−4.99**	−5.08**	−4.51*	−3.25
	(1.00)	(1.34)	(1.74)	(1.92)	(2.07)	(2.33)	(2.45)	(2.64)	(2.82)	(3.03)
R_{t-1}	0.04	0.02	−0.07	−0.10**	−0.08*	−0.07*	−0.02	−0.04	−0.02	−0.00
	(0.05)	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
R^2	0.12	0.08	0.89	2.50	2.49	1.33	0.63	0.71	0.44	0.18
Nobs	726	726	726	726	726	726	726	726	726	726

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 18: **Predictive Regressions: Future Forecast Changes**

This table reports monthly predictive regressions of changes in expectations of future fed funds rate on the cumulative slope factor over the previous three weeks ($Slope_{t-3:t}$), and the one-month change in expectations for horizons lasting from one quarter ($Q1$) to three quarters ($Q3$). We report Newey-West standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first February 1994 to December of 2007 for a total of 163 months.

	$\Delta Q1$	$\Delta Q2$	$\Delta Q3$	$\Delta Q2$	$\Delta Q3$
	(1)	(2)	(3)	(4)	(5)
Constant	-0.01	-0.01	-0.02	-0.00	-0.01
	(0.02)	(0.03)	(0.03)	(0.01)	(0.01)
$Slope_{t-3:t}$	0.89^{***}	1.02^{***}	1.00^{***}	0.11	0.12
	(0.17)	(0.16)	(0.16)	(0.08)	(0.12)
$\Delta\,\mathbb{E}\,ff_{t+1}$				1.03^{***}	1.00^{***}
				(0.04)	(0.04)
R^2	11.32	12.22	11.55	88.26	82.26
Nobs	163	163	163	163	163

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 19: **Predictive Regressions: Macro News**

This table reports weekly predictive regressions of the returns of the CRSP value-weighted index on the slope factor ($Slope_t$), lagged index returns (R_t) and macro surprises from Haver Analytics: news about GDP growth (shock_gdp), core consumer price inflation (shock_cpi), capacity utilization (shock_cu), consumer confidence (shock_cc), employment costs (shock_ec), initial unemployment claims (shock_ic), the manufacturing composite index (shock_mfg), new home sales (shock_nhs), non-farm payroll (shock_nfp), core producer price inflation (shock_ppi), retail sales (shock_rs), and unemployment (shock_ur). We report bootstrapped standard errors in parentheses. We construct the slope factor as a regression residual of weekly changes of the three-month federal funds futures-implied rate on the one-month federal funds futures-implied rate (see equation (5)). Our sample period is from the first week of 1994 to the last week of 2007 for a total of 725 weeks.

	(1)	(2)	(3)	(4)	(5)
Constant	0.13^{*}	0.13^{*}	0.12^{*}	0.09	-0.00
	(0.09)	(0.09)	(0.09)	(0.09)	(0.00)
$Slope_t$	-6.84^{***}	-6.86^{***}	-6.74^{***}	-6.71^{***}	
	(1.98)	(1.99)	(1.99)	(2.04)	
R_t	-0.09^{**}	-0.09^{**}	-0.09^{**}	-0.08^{*}	
	(0.05)	(0.05)	(0.05)	(0.05)	
shock_gdp	0.59^{*}		0.58^{*}	0.55^{*}	-0.00
	(0.37)		(0.37)	(0.37)	(0.01)
shock_cpi		-1.99	-1.98	-1.43	0.02
		(1.58)	(1.58)	(1.57)	(0.04)
shock_cu				-0.77^{*}	0.02^{**}
				(0.52)	(0.01)
shock_cc				-0.03	0.00^{**}
				(0.04)	(0.00)
shock_ec				0.04	0.04
				(1.56)	(0.04)
shock_ic				-0.00	-0.00^{*}
				(0.00)	(0.00)
shock_mfg				-0.05	0.00^{***}
				(0.07)	(0.00)
shock_nhs				-0.00	0.00
				(0.00)	(0.00)
shock_nfp				-0.00^{**}	0.00^{***}
				(0.00)	(0.00)
shock_ppi				0.58	0.02^{**}
				(0.68)	(0.01)
shock_rs				0.54^{*}	0.02^{***}
				(0.35)	(0.01)
shock_ur				-2.40^{**}	-0.05^{**}
				(1.20)	(0.02)
R^2	2.97	2.76	3.12	5.17	9.23
Nobs	724	724	724	724	726

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Online Appendix: Monetary Policy and the Stock Market: Time-Series Evidence

Andreas Neuhierl and Michael Weber

Not for Publication

I Lingustic Speech Classification

In applying the search-and-count approach, we first follow procedure often employed in natural language processing, i.e., we first remove stop words (e.g., "and" or "the") and then create stem words.

We collect all speeches for members of the FOMC from http://www.federalreserve.gov/newsevents/. To classify the tone of speeches, we use a "search-and-count" approach as in Apel and Grimaldi (2012). Search-and-classify is an automated method to classify text into categories. The key input into "search-and-count" classification is a pre-specified word list which the research classifies as "hawkish" or "dovish." Using this pre-specified word list, we can count the hawkish and dovish terms within one speech and aggregate over the document. Following this procedure, we obtain a classification if a speech is on average more hawkish or dovish.

A subtlety arises in applying the approach of Apel and Grimaldi (2012) to our data as they work with Swedish texts. In Swedish, compound words such as "output gap" appear with a blank between the two words. In English many interesting words in our application are compound words, e.g., "labor force participation." We therefore first use a list of such compound words to create a list of relevant nouns to be paired with an adjective or verb. We then look at all two-grams (contiguous combinations of two words within a document). We require that one word within a two-gram contains either one of our nouns or verbs or adjectives. After this filtering step, we obtain a list of two-grams which we classify into hawkish and dovish. To obtain this classification, we read a large number of speeches to determine in which context these two-grams are typically used. We report the classified two-grams and our initial word list available in Table A.1.

Table A.1: **Hawk–Dove Classification**

This table reports the classification of the twograms we use to classify speeches by FOMC members as dovish or hawkish. Our sample period is from the January 1996 to December 2007.

Dovish	Hawkish
anchor inflationexpectations	aggregatedemand higher
anchored inflationexpectations	assetprices increase
boost aggregatedemand	assetprices rise
boost economicactivity	businessinvestment increased
cut federalfundsrate	declines unemploymentrate
cut interestrates	declining unemploymentrate
cuts federalfundsrate	drop unemploymentrate
cutting federalfundsrate	economicactivity increased
declines assetprices	economicoutlook increased
declines crudeoil	employment increased
declines economicactivity	energyprices rise
declines employment	exchangerates lower
declines energyprices	gradualincreases federalfundsrate
declines houseprices	grossdomesticproduct rising
declines laborforceparticipation	growing currentaccountdeficit
declining houseprices	higher assetprices
declining interestrates	higher employment
downwardpressure assetprices	higher energyprices
downwardpressure houseprices	higher federalfundsrate
downwardpressure interestrates	higher houseprices
drop crudeoil	higher inflationexpectations
drop houseprices	higher interestrates
easedstance monetarypolicy	higher productivitygrowth
easing monetarypolicy	higher unitlaborcosts
employment declined	houseprices increase
employment fallen	houseprices increased
employment fell	houseprices rise
employment stable	houseprices rising
federalfundsrate lower	increase assetprices
firmlyanchored inflationexpectations	increase coreinflation
houseprices declined	increase currentaccountsurpluses
houseprices fallen	increase economicactivity
houseprices fell	increase employment
increase aggregatedemand	increase energyprices
increase currentaccountdeficit	increase federalfundsrate
increase laborproductivity	increase houseprices
increase unemploymentrate	increase inflationexpectations
increased productivitygrowth	increase interestrates
increases laborproductivity	increase productivitygrowth
increases productivitygrowth	increase resourceutilization

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Table A.1: **Hawk–Dove Classification (continued)**

Continued from previous page.

Dovish	Hawkish
inflationexpectations anchored	increase targetfederalfunds
inflationexpectations declined	increase unitlaborcosts
inflationexpectations firmlyanchored	increased economicactivity
inflationexpectations remainedstable	increased employment
inflationexpectations stable	increased laborforceparticipation
inflationexpectations wellanchored	increases aggregatedemand
interestrates declined	increases assetprices
interestrates drop	increases businessinvestment
interestrates easing	increases crudeoil
interestrates lower	increases employment
interestrates lowering	increases energyprices
interestrates remain	increases federalfundsrate
keeping interestrates	increases houseprices
keeping monetarypolicy	increases inflationexpectations
laborproductivity increased	increases interestrates
lower energyprices	increases outputgap
lower federalfundsrate	increases unitlaborcosts
lower houseprices	inflationexpectations increased
lower inflationexpectations	interestrates higher
lower interestrates	interestrates increase
lower levelrealoilprices	interestrates increased
lower potentialoutput	interestrates mightrise
lowered federalfundsrate	interestrates mustrise
lowering federalfundsrate	interestrates raise
lowering interestrates	interestrates raised
monetarypolicy easing	interestrates rise
nonaccelerating inflationrate	interestrates rising
productivitygrowth increased	lower currentaccountdeficit
productivitygrowth increases	lower productivitygrowth
raise aggregatedemand	lower unemploymentrate
rapid productivitygains	monetarypolicy tightening
reduce federalfundsrate	personalsavingrate fallen
reduce interestrates	raise federalfundsrate
reduce unemploymentrate	raise interestrates
reduced economicactivity	raised interestrates
reduced federalfundsrate	raising assetprices
reduced interestrates	raising federalfundsrate
reducing federalfundsrate	raising interestrates
reducing interestrates	rapid productivitygrowth

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Table A.1: **Hawk–Dove Classification (continued)**

Continued from previous page.

Dovish	Hawkish
reduction aggregatedemand	reduce currentaccountdeficit
reduction federalfundsrate	reductions unemploymentrate
reduction inflationexpectations	resourceutilization increased
reduction interestrates	rise assetprices
reductions federalfundsrate	rise coreinflation
reductions interestrates	rise employment
resourceutilization subdued	rise energyprices
rise productivitygrowth	rise federalfundsrate
rise unemploymentrate	rise headlineinflation
rising currentaccountdeficit	rise houseprices
rising productivitygrowth	rise inflationexpectations
risks economicactivity	rise interestrates
risks economicoutlook	rise personalsavingrate
risks outlookeconomicactivity	rise unitlaborcosts
stabilizing economicactivity	rising assetprices
stabilizing employment	rising employment
stabilizing monetarypolicy	rising energyprices
stable economicconditions	rising houseprices
stable inflationexpectations	rising inflationexpectations
stable inflationrate	rising interestrates
stable interestrates	risks longterminflationoutlook
stable monetarypolicy	sharpincreases energyprices
stableprices moderate	sharpincreases interestrates
subdued unitlaborcosts	sharprise interestrates
sustainable employment	tightening monetarypolicy
unemploymentrate declined	unemploymentrate declining
unemploymentrate rising	unemploymentrate fallen
upwardpressure exchangerates	unemploymentrate fell
wellanchored inflationexpectations	unemploymentrate lower
	upwardpressure coreinflation
	upwardpressure interestrates

Table A.2: **Speeches by FOMC members**

This table reports the speeches we use for the linguistic analysis, the title with link to the speech, the role of the speaker, the number of hawkish and dovish words, and the net index. The sample period is June 1996 to December 2007 for a total of 794 speeches.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
6/13/1996	Alan Greenspan	Chairman	yes	0	0	1
6/18/1996	Edward W. Kelley, Jr.	Governor		0	0	1
9/8/1996	Laurence H. Meyer	Governor		1	1	1
9/19/1996	Alan Greenspan	Chairman	yes	0	0	1
10/2/1996	Lawrence B. Lindsey	Governor		0	0	1
10/5/1996	Alan Greenspan	Chairman	yes	0	0	1
10/7/1996	Alan Greenspan	Chairman	yes	0	0	1
10/9/1996	Lawrence B. Lindsey	Governor		1	1	1
10/11/1996	Lawrence B. Lindsey	Governor		0	0	1
10/16/1996	Alan Greenspan	Chairman	yes	0	0	1
10/24/1996	Susan M. Phillips	Governor		0	0	1
10/31/1996	Edward W. Kelley, Jr.	Governor		0	0	1
11/18/1996	Alan Greenspan	Chairman	yes	0	0	1
11/21/1996	Laurence H. Meyer	Governor		0	0	1
11/25/1996	Susan M. Phillips	Governor		0	0	1
12/3/1996	Edward W. Kelley, Jr.	Governor		0	0	1
12/5/1996	Alan Greenspan	Chairman	yes	0	1	0
12/6/1996	Alan Greenspan	Chairman	yes	2	0	2
12/19/1996	Alice M. Rivlin	Vice Chair	yes	0	0	1
1/5/1997	Laurence H. Meyer	Governor		0	1	0
1/14/1997	Alan Greenspan	Chairman	yes	1	0	2
1/16/1997	Laurence H. Meyer	Governor		3	2	1.2
1/24/1997	Laurence H. Meyer	Governor		0	0	1
1/28/1997	Susan M. Phillips	Governor		0	0	1
1/29/1997	Edward W. Kelley, Jr.	Governor		0	0	1
2/14/1997	Susan M. Phillips	Governor		0	0	1
2/21/1997	Alan Greenspan	Chairman	yes	0	0	1
3/3/1997	Susan M. Phillips	Governor		0	0	1
3/7/1997	Alan Greenspan	Chairman	yes	0	0	1
3/13/1997	Alice M. Rivlin	Vice Chair	yes	0	0	1
3/22/1997	Alan Greenspan	Chairman	yes	0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
4/4/1997	Alice M. Rivlin	Vice Chair	yes	0	1	0
4/10/1997	Laurence H. Meyer	Governor		0	0	1
4/12/1997	Alan Greenspan	Chairman	yes	0	0	1
4/24/1997	Laurence H. Meyer	Governor		11	2	1.692308
4/29/1997	Alan Greenspan	Chairman	yes	0	0	1
5/1/1997	Alan Greenspan	Chairman	yes	0	0	1
5/3/1997	Alan Greenspan	Chairman	yes	0	0	1
5/8/1997	Alan Greenspan	Chairman	yes	3	0	2
5/23/1997	Laurence H. Meyer	Governor		0	1	0
6/10/1997	Alan Greenspan	Chairman	yes	0	0	1
6/18/1997	Susan M. Phillips	Governor		0	0	1
6/18/1997	Laurence H. Meyer	Governor		0	0	1
9/4/1997	Laurence H. Meyer	Governor		2	3	0.8
9/5/1997	Alan Greenspan	Chairman	yes	0	0	1
9/12/1997	Alan Greenspan	Chairman	yes	0	0	1
9/12/1997	Laurence H. Meyer	Governor		0	0	1
9/17/1997	Laurence H. Meyer	Governor		2	2	1
9/19/1997	Susan M. Phillips	Governor		0	0	1
9/23/1997	Edward W. Kelley, Jr.	Governor		0	0	1
10/5/1997	Alan Greenspan	Chairman	yes	0	0	1
10/11/1997	Alan Greenspan	Chairman	yes	0	0	1
10/14/1997	Alan Greenspan	Chairman	yes	0	0	1
10/14/1997	Alan Greenspan	Chairman	yes	0	0	1
10/14/1997	Laurence H. Meyer	Governor		5	2	1.428571
10/15/1997	Susan M. Phillips	Governor		0	0	1
10/30/1997	Susan M. Phillips	Governor		0	0	1
10/31/1997	Laurence H. Meyer	Governor		0	0	1
11/4/1997	Susan M. Phillips	Governor		0	0	1
11/7/1997	Alan Greenspan	Chairman	yes	0	0	1
12/1/1997	Laurence H. Meyer	Governor		0	0	1
12/2/1997	Alan Greenspan	Chairman	yes	3	0	2
12/3/1997	Alan Greenspan	Chairman	yes	0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
12/15/1997	Edward W. Kelley, Jr.	Governor		0	0	1
1/3/1998	Alan Greenspan	Chairman	yes	3	0	2
1/8/1998	Laurence H. Meyer	Governor		2	3	0.8
1/12/1998	Alan Greenspan	Chairman	yes	0	0	1
1/16/1998	Alan Greenspan	Chairman	yes	0	0	1
2/11/1998	Edward W. Kelley, Jr.	Governor		0	0	1
2/17/1998	Alice M. Rivlin	Vice Chair	yes	0	0	1
2/26/1998	Alan Greenspan	Chairman	yes	0	0	1
2/27/1998	Alan Greenspan	Chairman	yes	0	0	1
2/27/1998	Edward M. Gramlich	Governor		1	1	1
3/2/1998	Laurence H. Meyer	Governor		0	0	1
3/3/1998	Alan Greenspan	Chairman	yes	0	0	1
3/4/1998	Roger W. Ferguson, Jr.	Governor		1	0	2
3/6/1998	Edward M. Gramlich	Governor		0	0	1
3/9/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
3/16/1998	Laurence H. Meyer	Governor		7	3	1.4
3/17/1998	Susan M. Phillips	Governor		0	0	1
3/19/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
3/19/1998	Alice M. Rivlin	Vice Chair	yes	0	0	1
3/26/1998	Susan M. Phillips	Governor		0	0	1
4/2/1998	Alan Greenspan	Chairman	yes	0	0	1
4/2/1998	Laurence H. Meyer	Governor		3	4	0.857143
4/4/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
4/9/1998	Laurence H. Meyer	Governor		1	2	0.666667
4/16/1998	Laurence H. Meyer	Governor		0	0	1
4/16/1998	Roger W. Ferguson, Jr.	Governor		1	1	1
4/23/1998	Alice M. Rivlin	Vice Chair	yes	0	0	1
4/30/1998	Laurence H. Meyer	Governor		2	1	1.333333
5/2/1998	Alan Greenspan	Chairman	yes	0	0	1
5/7/1998	Alan Greenspan	Chairman	yes	0	0	1
5/7/1998	Alice M. Rivlin	Vice Chair	yes	0	0	1
5/12/1998	Laurence H. Meyer	Governor		0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
5/12/1998	Alice M. Rivlin	Vice Chair	yes	0	0	1
5/20/1998	Alan Greenspan	Chairman	yes	0	0	1
6/3/1998	Laurence H. Meyer	Governor		0	1	0
6/9/1998	Laurence H. Meyer	Governor		0	0	1
6/18/1998	Alice M. Rivlin	Vice Chair	yes	2	0	2
7/9/1998	Roger W. Ferguson, Jr.	Governor		2	3	0.8
7/10/1998	Alan Greenspan	Chairman	yes	0	0	1
7/20/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
8/28/1998	Alan Greenspan	Chairman	yes	1	0	2
9/4/1998	Alan Greenspan	Chairman	yes	0	0	1
9/15/1998	Edward M. Gramlich	Governor		0	0	1
9/17/1998	Roger W. Ferguson, Jr.	Governor		2	2	1
9/18/1998	Laurence H. Meyer	Governor		0	0	1
9/28/1998	Alice M. Rivlin	Vice Chair	yes	0	0	1
9/29/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
10/5/1998	Laurence H. Meyer	Governor		0	7	0
10/14/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
10/16/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
10/22/1998	Roger W. Ferguson, Jr.	Governor		0	1	0
10/22/1998	Laurence H. Meyer	Governor		0	0	1
10/22/1998	Alice M. Rivlin	Vice Chair	yes	2	0	2
10/27/1998	Roger W. Ferguson, Jr.	Governor		0	0	1
10/29/1998	Edward W. Kelley, Jr.	Governor		0	1	0
11/5/1998	Alan Greenspan	Chairman	yes	1	0	2
11/6/1998	Edward M. Gramlich	Governor		0	0	1
11/12/1998	Laurence H. Meyer	Governor		0	0	1
1/3/1999	Roger W. Ferguson, Jr.	Governor		1	3	0.5
1/4/1999	Laurence H. Meyer	Governor		0	0	1
1/11/1999	Laurence H. Meyer	Governor		0	0	1
1/15/1999	Roger W. Ferguson, Jr.	Governor		0	1	0
1/21/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
2/11/1999	Roger W. Ferguson, Jr.	Governor		1	0	2

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
2/16/1999	Alan Greenspan	Chairman	yes	0	0	1
2/24/1999	Alice M. Rivlin	Vice Chair	yes	0	0	1
2/25/1999	Laurence H. Meyer	Governor		7	6	1.076923
2/25/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
3/1/1999	Alice M. Rivlin	Vice Chair	yes	0	0	1
3/3/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
3/8/1999	Edward M. Gramlich	Governor		0	0	1
3/8/1999	Alan Greenspan	Chairman	yes	2	0	2
3/9/1999	Alan Greenspan	Chairman	yes	0	0	1
3/10/1999	Edward W. Kelley, Jr.	Governor		0	0	1
3/12/1999	Laurence H. Meyer	Governor		0	0	1
3/16/1999	Alan Greenspan	Chairman	yes	0	1	0
3/16/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
3/19/1999	Alan Greenspan	Chairman	yes	0	0	1
3/25/1999	Edward W. Kelley, Jr.	Governor		0	1	0
4/6/1999	Alice M. Rivlin	Vice Chair	yes	0	0	1
4/13/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
4/14/1999	Laurence H. Meyer	Governor		5	4	1.111111
4/16/1999	Alan Greenspan	Chairman	yes	0	0	1
4/22/1999	Laurence H. Meyer	Governor		8	3	1.454545
4/22/1999	Edward M. Gramlich	Governor		3	3	1
4/26/1999	Laurence H. Meyer	Governor		0	1	0
4/29/1999	Alan Greenspan	Chairman	yes	1	0	2
5/6/1999	Alan Greenspan	Chairman	yes	0	2	0
5/13/1999	Alice M. Rivlin	Vice Chair	yes	0	0	1
5/13/1999	Alice M. Rivlin	Vice Chair	yes	0	0	1
6/1/1999	Alice M. Rivlin	Vice Chair	yes	0	0	1
6/2/1999	Alan Greenspan	Chairman	yes	0	0	1
6/3/1999	Laurence H. Meyer	Governor		0	0	1
6/10/1999	Roger W. Ferguson, Jr.	Governor		0	1	0
6/10/1999	Alan Greenspan	Chairman	yes	0	0	1
6/14/1999	Laurence H. Meyer	Governor		0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
6/16/1999	Edward M. Gramlich	Governor		1	0	2
6/22/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
7/29/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
8/27/1999	Alan Greenspan	Chairman	yes	0	0	1
9/8/1999	Alan Greenspan	Chairman	yes	0	0	1
9/8/1999	Laurence H. Meyer	Governor		7	3	1.4
9/9/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
9/15/1999	Edward M. Gramlich	Governor		0	0	1
9/16/1999	Edward W. Kelley, Jr.	Governor		0	0	1
9/17/1999	Alan Greenspan	Chairman	yes	0	0	1
9/17/1999	Edward M. Gramlich	Governor		0	0	1
9/21/1999	Roger W. Ferguson, Jr.	Governor		2	1	1.333333
9/27/1999	Laurence H. Meyer	Governor		0	0	1
9/27/1999	Alan Greenspan	Chairman	yes	0	0	1
9/28/1999	Roger W. Ferguson, Jr.	Governor		0	0	1
9/30/1999	Alan Greenspan	Chairman	yes	0	0	1
10/1/1999	Laurence H. Meyer	Governor		0	0	1
10/6/1999	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/11/1999	Alan Greenspan	Chairman	yes	0	0	1
10/12/1999	Laurence H. Meyer	Governor		4	6	0.8
10/14/1999	Alan Greenspan	Chairman	yes	0	0	1
10/15/1999	Alan Greenspan	Chairman	yes	0	0	1
10/19/1999	Alan Greenspan	Chairman	yes	0	0	1
10/28/1999	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/28/1999	Alan Greenspan	Chairman	yes	2	0	2
11/2/1999	Alan Greenspan	Chairman	yes	1	0	2
11/4/1999	Edward M. Gramlich	Governor		1	1	1
11/15/1999	Alan Greenspan	Chairman	yes	0	0	1
11/30/1999	Laurence H. Meyer	Governor		4	3	1.142857
12/15/1999	Laurence H. Meyer	Governor		0	0	1
1/7/2000	Roger W. Ferguson, Jr.	Vice Chair		4	0	2
1/13/2000	Edward M. Gramlich	Governor		1	1	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
1/13/2000	Alan Greenspan	Chairman	yes	4	2	1.333333
1/14/2000	Laurence H. Meyer	Governor		0	0	1
1/20/2000	Laurence H. Meyer	Governor		1	0	2
2/3/2000	Laurence H. Meyer	Governor		0	0	1
2/17/2000	Roger W. Ferguson, Jr.	Vice Chair		1	1	1
2/23/2000	Laurence H. Meyer	Governor		0	1	0
2/25/2000	Laurence H. Meyer	Governor		0	0	1
3/3/2000	Laurence H. Meyer	Governor		6	1	1.714286
3/6/2000	Alan Greenspan	Chairman	yes	1	0	2
3/6/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
3/7/2000	Edward M. Gramlich	Governor		0	0	1
3/8/2000	Alan Greenspan	Chairman	yes	1	0	2
3/13/2000	Edward M. Gramlich	Governor		0	0	1
3/22/2000	Alan Greenspan	Chairman	yes	0	0	1
3/30/2000	Edward W. Kelley, Jr.	Governor		0	0	1
4/5/2000	Alan Greenspan	Chairman	yes	3	0	2
4/6/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
4/7/2000	Alan Greenspan	Chairman	yes	1	0	2
4/10/2000	Alan Greenspan	Chairman	yes	0	0	1
4/11/2000	Alan Greenspan	Chairman	yes	0	0	1
4/12/2000	Laurence H. Meyer	Governor		25	2	1.851852
4/14/2000	Alan Greenspan	Chairman	yes	0	0	1
4/14/2000	Edward M. Gramlich	Governor		0	0	1
4/17/2000	Edward M. Gramlich	Governor		0	0	1
4/20/2000	Edward M. Gramlich	Governor		1	1	1
4/27/2000	Alan Greenspan	Chairman	yes	1	0	2
5/4/2000	Alan Greenspan	Chairman	yes	0	0	1
5/4/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/9/2000	Roger W. Ferguson, Jr.	Vice Chair		5	1	1.666667
5/11/2000	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
5/12/2000	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
5/18/2000	Alan Greenspan	Chairman	yes	0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
5/22/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/25/2000	Alan Greenspan	Chairman	yes	0	0	1
5/26/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/31/2000	Laurence H. Meyer	Governor		0	0	1
6/1/2000	Laurence H. Meyer	Governor		0	0	1
6/6/2000	Laurence H. Meyer	Governor		11	5	1.375
6/13/2000	Alan Greenspan	Chairman	yes	1	1	1
7/11/2000	Alan Greenspan	Chairman	yes	0	0	1
7/12/2000	Alan Greenspan	Chairman	yes	0	0	1
8/25/2000	Alan Greenspan	Chairman	yes	0	1	0
8/31/2000	Laurence H. Meyer	Governor		0	0	1
9/15/2000	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
9/18/2000	Alan Greenspan	Chairman	yes	0	0	1
10/11/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/16/2000	Alan Greenspan	Chairman	yes	0	0	1
10/19/2000	Laurence H. Meyer	Governor		15	3	1.666667
10/19/2000	Alan Greenspan	Chairman	yes	0	1	0
10/19/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/20/2000	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/24/2000	Laurence H. Meyer	Governor		2	3	0.8
10/31/2000	Roger W. Ferguson, Jr.	Vice Chair		3	0	2
11/14/2000	Alan Greenspan	Chairman	yes	0	0	1
11/20/2000	Alan Greenspan	Chairman	yes	0	0	1
11/21/2000	Edward M. Gramlich	Governor		0	0	1
12/5/2000	Alan Greenspan	Chairman	yes	2	0	2
12/6/2000	Edward M. Gramlich	Governor		0	0	1
12/6/2000	Roger W. Ferguson, Jr.	Vice Chair		6	1	1.714286
12/8/2000	Alan Greenspan	Chairman	yes	0	0	1
1/12/2001	Roger W. Ferguson, Jr.	Vice Chair		4	4	1
1/25/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
2/14/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
2/15/2001	Laurence H. Meyer	Governor		0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
2/20/2001	Edward M. Gramlich	Governor		2	5	0.571429
2/27/2001	Roger W. Ferguson, Jr.	Vice Chair		1	1	1
3/5/2001	Laurence H. Meyer	Governor		0	0	1
3/7/2001	Alan Greenspan	Chairman	yes	0	0	1
3/9/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
3/15/2001	Laurence H. Meyer	Governor		0	0	1
3/23/2001	Edward M. Gramlich	Governor		0	0	1
3/27/2001	Alan Greenspan	Chairman	yes	0	0	1
3/28/2001	Laurence H. Meyer	Governor		1	1	1
4/5/2001	Edward M. Gramlich	Governor		0	0	1
4/5/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
4/6/2001	Alan Greenspan	Chairman	yes	0	0	1
4/19/2001	Roger W. Ferguson, Jr.	Vice Chair		0	3	0
4/19/2001	Edward M. Gramlich	Governor		0	0	1
4/26/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
4/27/2001	Alan Greenspan	Chairman	yes	1	1	1
5/10/2001	Alan Greenspan	Chairman	yes	1	1	1
5/10/2001	Laurence H. Meyer	Governor		0	0	1
5/17/2001	Laurence H. Meyer	Governor		0	0	1
5/18/2001	Alan Greenspan	Chairman	yes	0	0	1
5/21/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/21/2001	Laurence H. Meyer	Governor		1	2	0.666667
5/24/2001	Laurence H. Meyer	Governor		6	0	2
5/24/2001	Alan Greenspan	Chairman	yes	5	2	1.428571
6/6/2001	Laurence H. Meyer	Governor		9	3	1.5
6/11/2001	Edward M. Gramlich	Governor		0	0	1
6/14/2001	Roger W. Ferguson, Jr.	Vice Chair		4	0	2
6/20/2001	Alan Greenspan	Chairman	yes	0	0	1
6/20/2001	Edward M. Gramlich	Governor		1	0	2
6/28/2001	Alan Greenspan	Chairman	yes	0	0	1
6/28/2001	Alan Greenspan	Chairman	yes	1	1	1
7/17/2001	Laurence H. Meyer	Governor		0	10	0

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Table A.2: **Speeches by FOMC members (continued)**

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Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
7/18/2001	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
8/3/2001	Edward M. Gramlich	Governor		0	0	1
8/31/2001	Alan Greenspan	Chairman	yes	1	0	2
8/31/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
9/4/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/11/2001	Alan Greenspan	Chairman	yes	0	0	1
10/12/2001	Laurence H. Meyer	Governor		0	1	0
10/15/2001	Laurence H. Meyer	Governor		0	0	1
10/16/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/23/2001	Alan Greenspan	Chairman	yes	0	0	1
10/23/2001	Edward M. Gramlich	Governor		0	0	1
10/24/2001	Alan Greenspan	Chairman	yes	0	0	1
10/26/2001	Alan Greenspan	Chairman	yes	0	0	1
11/8/2001	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
11/8/2001	Edward M. Gramlich	Governor		0	0	1
11/13/2001	Alan Greenspan	Chairman	yes	0	1	0
11/27/2001	Laurence H. Meyer	Governor		4	4	1
11/30/2001	Edward M. Gramlich	Governor		2	3	0.8
11/30/2001	Alan Greenspan	Chairman	yes	0	0	1
12/3/2001	Alan Greenspan	Chairman	yes	0	0	1
12/5/2001	Laurence H. Meyer	Governor		0	0	1
12/18/2001	Laurence H. Meyer	Governor		0	0	1
1/8/2002	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
1/10/2002	Alan Greenspan	Chairman	yes	0	0	1
1/11/2002	Alan Greenspan	Chairman	yes	0	1	0
1/16/2002	Roger W. Ferguson, Jr.	Vice Chair		1	6	0.285714
1/16/2002	Laurence H. Meyer	Governor		2	5	0.571429
1/16/2002	Alan Greenspan	Chairman	yes	0	0	1
1/18/2002	Edward M. Gramlich	Governor		0	0	1
2/7/2002	Mark W. Olson	Governor		0	0	1
2/8/2002	Mark W. Olson	Governor		0	0	1
2/20/2002	Edward M. Gramlich	Governor		5	0	2

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
2/27/2002	Roger W. Ferguson, Jr.	Vice Chair		2	6	0.5
2/28/2002	Alan Greenspan	Chairman	yes	0	1	0
2/28/2002	Susan Schmidt Bies	Governor		3	0	2
3/1/2002	Edward M. Gramlich	Governor		0	0	1
3/4/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
3/4/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
3/7/2002	Edward M. Gramlich	Governor		0	0	1
3/12/2002	Mark W. Olson	Governor		0	0	1
3/13/2002	Alan Greenspan	Chairman	yes	0	0	1
3/21/2002	Susan S. Bies	Governor		1	3	0.5
3/26/2002	Mark W. Olson	Governor		0	0	1
3/26/2002	Alan Greenspan	Chairman	yes	0	0	1
4/8/2002	Edward M. Gramlich	Governor		0	0	1
4/22/2002	Alan Greenspan	Chairman	yes	0	0	1
4/30/2002	Mark W. Olson	Governor		0	0	1
5/2/2002	Edward M. Gramlich	Governor		0	0	1
5/3/2002	Alan Greenspan	Chairman	yes	0	0	1
5/9/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/10/2002	Alan Greenspan	Chairman	yes	0	0	1
5/11/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/13/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/17/2002	Mark W. Olson	Governor		0	0	1
5/21/2002	Mark W. Olson	Governor		0	0	1
5/21/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/31/2002	Mark W. Olson	Governor		0	0	1
6/10/2002	Susan S. Bies	Governor		0	0	1
6/11/2002	Susan S. Bies	Governor		1	3	0.5
6/20/2002	Susan S. Bies	Governor		0	0	1
7/5/2002	Edward M. Gramlich	Governor		0	0	1
7/8/2002	Mark W. Olson	Governor		0	0	1
7/26/2002	Mark W. Olson	Governor		0	0	1
8/30/2002	Alan Greenspan	Chairman	yes	2	1	1.333333

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
9/25/2002	Alan Greenspan	Chairman	yes	0	0	1
9/25/2002	Alan Greenspan	Chairman	yes	0	0	1
9/25/2002	Alan Greenspan	Chairman	yes	0	0	1
9/28/2002	Susan S. Bies	Governor		1	2	0.666667
10/1/2002	Susan S. Bies	Governor		1	0	2
10/3/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/7/2002	Alan Greenspan	Chairman	yes	0	0	1
10/8/2002	Susan S. Bies	Governor		1	0	2
10/9/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/15/2002	Ben S. Bernanke	Governor		12	2	1.714286
10/16/2002	Roger W. Ferguson, Jr	Vice Chair		2	3	0.8
10/16/2002	Roger W. Ferguson, Jr	Vice Chair		0	0	1
10/16/2002	Edward M. Gramlich	Governor		0	0	1
10/22/2002	Mark W. Olson	Governor		0	0	1
10/23/2002	Alan Greenspan	Chairman	yes	0	0	1
10/24/2002	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/29/2002	Alan Greenspan	Chairman	yes	0	0	1
11/7/2002	Susan S. Bies	Governor		0	0	1
11/7/2002	Edward M. Gramlich	Governor		0	0	1
11/8/2002	Ben S. Bernanke	Governor		2	0	2
11/12/2002	Alan Greenspan	Chairman	yes	0	1	0
11/12/2002	Roger W. Ferguson, Jr.	Vice Chair		0	7	0
11/12/2002	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
11/12/2002	Mark W. Olson	Governor		0	0	1
11/12/2002	Susan S. Bies	Governor		0	1	0
11/18/2002	Mark W. Olson	Governor		0	0	1
11/18/2002	Alan Greenspan	Chairman	yes	0	0	1
11/19/2002	Alan Greenspan	Chairman	yes	0	0	1
11/20/2002	Roger W. Ferguson, Jr.	Vice Chair		1	0	2
11/21/2002	Ben S. Bernanke	Governor		1	1	1
11/22/2002	Donald L. Kohn	Governor		1	1	1
12/13/2002	Susan S. Bies	Governor		0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
12/13/2002	Mark W. Olson	Governor		1	0	2
12/19/2002	Alan Greenspan	Chairman	yes	1	1	1
1/4/2003	Edward M. Gramlich	Governor		1	4	0.4
2/3/2003	Ben S. Bernanke	Governor		2	5	0.571429
2/5/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
2/6/2003	Mark W. Olson	Governor		0	0	1
2/11/2003	Susan Schmidt Bies	Governor		3	0	2
2/12/2003	Roger W. Ferguson, Jr	Vice Chair		1	2	0.666667
2/21/2003	Ben S. Bernanke	Governor		1	3	0.5
2/27/2003	Susan Schmidt Bies	Governor		0	0	1
2/28/2003	Donald L. Kohn	Governor		10	8	1.111111
3/4/2003	Alan Greenspan	Chairman	yes	0	0	1
3/7/2003	Alan Greenspan	Chairman	yes	0	0	1
3/13/2003	Mark W. Olson	Governor		0	0	1
3/24/2003	Donald L. Kohn	Governor		2	1	1.333333
3/25/2003	Ben S. Bernanke	Governor		2	5	0.571429
3/28/2003	Alan Greenspan	Chairman	yes	0	0	1
4/3/2003	Alan Greenspan	Chairman	yes	0	0	1
4/4/2003	Alan Greenspan	Chairman	yes	0	0	1
4/7/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
4/9/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
4/9/2003	Alan Greenspan	Chairman	yes	0	0	1
4/10/2003	Mark W. Olson	Governor		0	0	1
4/24/2003	Edward M. Gramlich	Governor		0	0	1
4/24/2003	Ben S. Bernanke	Governor		1	0	2
4/28/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/7/2003	Susan Schmidt Bies	Governor		0	0	1
5/8/2003	Alan Greenspan	Chairman	yes	0	0	1
5/13/2003	Alan Greenspan	Chairman	yes	0	0	1
5/16/2003	Roger W. Ferguson, Jr.	Vice Chair		0	2	0
5/22/2003	Mark W. Olson	Governor		2	1	1.333333
5/30/2003	Susan Schmidt Bies	Governor		0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
5/31/2003	Ben S. Bernanke	Governor		0	3	0
6/10/2003	Donald L. Kohn	Governor		0	0	1
6/10/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
6/11/2003	Susan Schmidt Bies	Governor		0	0	1
6/11/2003	Roger W. Ferguson, Jr.	Vice Chair		1	2	0.666667
6/11/2003	Ben S. Bernanke	Governor		0	0	1
6/13/2003	Edward M. Gramlich	Governor		2	0	2
6/16/2003	Susan Schmidt Bies	Governor		0	0	1
6/17/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
6/20/2003	Donald L. Kohn	Governor		0	0	1
6/26/2003	Mark W. Olson	Governor		0	0	1
7/23/2003	Ben S. Bernanke	Governor		1	3	0.5
8/7/2003	Susan Schmidt Bies	Governor		0	0	1
8/10/2003	Susan Schmidt Bies	Governor		0	0	1
8/18/2003	Edward M. Gramlich	Governor		0	0	1
8/29/2003	Alan Greenspan	Chairman	yes	0	0	1
9/4/2003	Edward M. Gramlich	Governor		0	0	1
9/4/2003	Ben S. Bernanke	Governor		0	2	0
9/22/2003	Mark W. Olson	Governor		0	0	1
9/24/2003	Donald L. Kohn	Governor		14	0	2
9/26/2003	Alan Greenspan	Chairman	yes	0	0	1
10/1/2003	Edward M. Gramlich	Governor		0	1	0
10/2/2003	Ben S. Bernanke	Governor		6	5	1.090909
10/8/2003	Susan Schmidt Bies	Governor		4	2	1.333333
10/8/2003	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
10/8/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
10/9/2003	Edward M. Gramlich	Governor		0	0	1
10/17/2003	Ben S. Bernanke	Governor		0	0	1
10/17/2003	Donald L. Kohn	Governor		0	1	0
10/24/2003	Ben S. Bernanke	Governor		1	0	2
10/29/2003	Alan Greenspan	Chairman	yes	0	0	1
10/31/2003	Susan Schmidt Bies	Governor		1	0	2

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
11/6/2003	Alan Greenspan	Chairman	yes	0	2	0
11/6/2003	Ben S. Bernanke	Governor		1	3	0.5
11/13/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
11/14/2003	Edward M. Gramlich	Governor		0	0	1
11/20/2003	Alan Greenspan	Chairman	yes	0	1	0
11/21/2003	Roger W. Ferguson, Jr.	Vice Chair		0	2	0
11/22/2003	Mark W. Olson	Governor		0	0	1
12/2/2003	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
12/11/2003	Alan Greenspan	Chairman	yes	0	0	1
1/3/2004	Alan Greenspan	Chairman	yes	3	2	1.2
1/3/2004	Ben S. Bernanke	Governor		3	1	1.5
1/3/2004	Ben S. Bernanke	Governor		0	0	1
1/4/2004	Ben S. Bernanke	Governor		3	2	1.2
1/4/2004	Roger W. Ferguson, Jr.	Vice Chair		1	0	2
1/7/2004	Donald L. Kohn	Governor		3	1	1.5
1/13/2004	Alan Greenspan	Chairman	yes	0	0	1
1/14/2004	Ben S. Bernanke	Governor		0	0	1
1/26/2004	Alan Greenspan	Chairman	yes	0	0	1
11/19/2004	Alan Greenspan	Chairman	yes	1	0	2
12/2/2004	Ben S. Bernanke	Governor		0	0	1
12/7/2004	Susan Schmidt Bies	Governor		0	0	1
2/4/2004	Susan Schmidt Bies	Governor		0	0	1
2/19/2004	Susan Schmidt Bies	Governor		1	0	2
2/20/2004	Ben S. Bernanke	Governor		1	2	0.666667
2/20/2004	Alan Greenspan	Chairman	yes	0	1	0
2/23/2004	Alan Greenspan	Chairman	yes	2	1	1.333333
2/25/2004	Edward M. Gramlich	Governor		2	1	1.333333
2/25/2004	Susan Schmidt Bies	Governor		0	0	1
2/26/2004	Susan Schmidt Bies	Governor		5	4	1.111111
2/26/2004	Ben S. Bernanke	Governor		0	1	0
2/27/2004	Mark W. Olson	Governor		0	0	1
2/27/2004	Alan Greenspan	Chairman	yes	0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
3/1/2004	Mark W. Olson	Governor		0	0	1
3/2/2004	Alan Greenspan	Chairman	yes	0	0	1
3/2/2004	Ben S. Bernanke	Governor		13	2	1.733333
3/12/2004	Alan Greenspan	Chairman	yes	0	1	0
3/17/2004	Alan Greenspan	Chairman	yes	0	1	0
3/25/2004	Alan Greenspan	Chairman	yes	0	0	1
3/25/2004	Donald L. Kohn	Governor		6	0	2
3/26/2004	Edward M. Gramlich	Governor		0	0	1
3/26/2004	Donald L. Kohn	Governor		0	0	1
3/27/2004	Ben S. Bernanke	Governor		0	0	1
3/30/2004	Ben S. Bernanke	Governor		2	3	0.8
3/31/2004	Edward M. Gramlich	Governor		2	1	1.333333
4/1/2004	Ben S. Bernanke	Governor		0	0	1
4/1/2004	Donald L. Kohn	Governor		8	1	1.777778
4/8/2004	Roger W. Ferguson, Jr.	Vice Chair		3	0	2
4/15/2004	Ben S. Bernanke	Governor		1	2	0.666667
4/16/2004	Alan Greenspan	Chairman	yes	0	0	1
4/16/2004	Ben S. Bernanke	Governor		0	0	1
4/22/2004	Susan Schmidt Bies	Governor		5	4	1.111111
4/22/2004	Ben S. Bernanke	Governor		4	4	1
4/23/2004	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
4/23/2004	Ben S. Bernanke	Governor		4	4	1
4/26/2004	Mark W. Olson	Governor		0	0	1
4/26/2004	Susan Schmidt Bies	Governor		0	0	1
4/27/2004	Alan Greenspan	Chairman	yes	0	0	1
4/27/2004	Susan Schmidt Bies	Governor		0	0	1
5/5/2004	Mark W. Olson	Governor		0	2	0
5/6/2004	Susan Schmidt Bies	Governor		0	0	1
5/6/2004	Alan Greenspan	Chairman	yes	2	0	2
5/6/2004	Mark W. Olson	Governor		0	0	1
5/13/2004	Alan Greenspan	Chairman	yes	0	0	1
5/14/2004	Edward M. Gramlich	Governor		2	1	1.333333

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
5/17/2004	Roger W. Ferguson, Jr.	Vice Chair		0	1	0
5/17/2004	Susan Schmidt Bies	Governor		0	0	1
5/19/2004	Susan Schmidt Bies	Governor		0	0	1
5/20/2004	Edward M. Gramlich	Governor		0	0	1
5/20/2004	Ben S. Bernanke	Governor		1	0	2
5/20/2004	Alan Greenspan	Chairman	yes	0	0	1
5/21/2004	Edward M. Gramlich	Governor		1	1	1
5/22/2004	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
6/3/2004	Susan Schmidt Bies	Governor		0	0	1
6/4/2004	Donald L. Kohn	Governor		5	2	1.428571
6/8/2004	Alan Greenspan	Chairman	yes	1	0	2
6/10/2004	Mark W. Olson	Governor		0	0	1
6/15/2004	Mark W. Olson	Governor		0	2	0
6/21/2004	Ben S. Bernanke	Governor		0	1	0
6/22/2004	Susan Schmidt Bies	Governor		0	0	1
6/24/2004	Edward M. Gramlich	Governor		0	0	1
7/7/2004	Roger W. Ferguson, Jr.	Vice Chair		1	1	1
7/15/2004	Susan Schmidt Bies	Governor		4	1	1.6
7/16/2004	Susan Schmidt Bies	Governor		0	0	1
7/21/2004	Roger W. Ferguson, Jr.	Vice Chair		1	0	2
8/12/2004	Edward M. Gramlich	Governor		0	0	1
8/12/2004	Susan Schmidt Bies	Governor		0	0	1
8/27/2004	Alan Greenspan	Chairman	yes	0	1	0
9/10/2004	Edward M. Gramlich	Governor		0	0	1
9/16/2004	Edward M. Gramlich	Governor		1	2	0.666667
9/28/2004	Susan Schmidt Bies	Governor		0	0	1
9/30/2004	Susan Schmidt Bies	Governor		5	1	1.666667
10/4/2004	Ben S. Bernanke	Governor		0	0	1
10/5/2004	Alan Greenspan	Chairman	yes	0	0	1
10/6/2004	Roger W. Ferguson, Jr.	Vice Chair		5	1	1.666667
10/7/2004	Roger W. Ferguson, Jr.	Vice Chair		2	0	2
10/7/2004	Ben S. Bernanke	Governor		1	2	0.666667

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
10/7/2004	Alan Greenspan	Chairman	yes	0	0	1
10/8/2004	Ben S. Bernanke	Governor		0	1	0
10/8/2004	Roger W. Ferguson, Jr.	Vice Chair		0	2	0
10/14/2004	Ben S. Bernanke	Governor		1	0	2
10/15/2004	Donald L. Kohn	Governor		1	0	2
10/15/2004	Alan Greenspan	Chairman	yes	0	0	1
10/19/2004	Alan Greenspan	Chairman	yes	0	0	1
10/21/2004	Ben S. Bernanke	Governor		6	2	1.5
10/21/2004	Susan Schmidt Bies	Governor		0	0	1
10/23/2004	Susan Schmidt Bies	Governor		4	0	2
10/26/2004	Roger W. Ferguson, Jr.	Vice Chair		1	0	2
10/29/2004	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
11/5/2004	Susan Schmidt Bies	Governor		0	0	1
11/15/2004	Mark W. Olson	Governor		4	1	1.6
11/18/2004	Susan Schmidt Bies	Governor		0	0	1
1/6/2005	Donald L. Kohn	Governor		0	0	1
1/7/2005	Ben S. Bernanke	Governor		0	0	1
1/7/2005	Roger W. Ferguson, Jr.	Vice Chair		1	5	0.333333
1/9/2005	Donald L. Kohn	Governor		2	0	2
1/12/2005	Roger W. Ferguson, Jr.	Vice Chair		3	2	1.2
1/18/2005	Susan Schmidt Bies	Governor		5	1	1.666667
1/19/2005	Ben S. Bernanke	Governor		7	4	1.272727
1/27/2005	Roger W. Ferguson, Jr.	Vice Chair		3	2	1.2
2/4/2005	Alan Greenspan	Chairman	yes	0	0	1
2/6/2005	Alan Greenspan	Chairman	yes	0	0	1
2/7/2005	Susan Schmidt Bies	Governor		0	0	1
2/11/2005	Ben S. Bernanke	Governor		0	3	0
2/24/2005	Ben S. Bernanke	Governor		7	4	1.272727
2/28/2005	Mark W. Olson	Governor		0	0	1
3/2/2005	Edward M. Gramlich	Governor		0	1	0
3/8/2005	Ben S. Bernanke	Governor		7	5	1.166667
3/10/2005	Alan Greenspan	Chairman	yes	2	0	2

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Table A.2: **Speeches by FOMC members (continued)**

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Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
3/10/2005	Ben S. Bernanke	Governor		5	3	1.25
3/11/2005	Alan Greenspan	Chairman	yes	1	0	2
3/14/2005	Susan Schmidt Bies	Governor		0	0	1
3/18/2005	Alan Greenspan	Chairman	yes	0	0	1
3/30/2005	Ben S. Bernanke	Governor		0	0	1
3/31/2005	Susan Schmidt Bies	Governor		0	0	1
4/5/2005	Alan Greenspan	Chairman	yes	0	0	1
4/8/2005	Alan Greenspan	Chairman	yes	0	0	1
4/14/2005	Donald L. Kohn	Governor		11	0	2
4/14/2005	Ben S. Bernanke	Governor		5	3	1.25
4/18/2005	Susan Schmidt Bies	Governor		7	1	1.75
4/20/2005	Roger W. Ferguson, Jr.	Vice Chair		5	2	1.428571
4/21/2005	Edward M. Gramlich	Governor		0	0	1
4/22/2005	Donald L. Kohn	Governor		11	3	1.571429
4/27/2005	Roger W. Ferguson, Jr.	Vice Chair		0	2	0
5/5/2005	Alan Greenspan	Chairman	yes	0	0	1
5/12/2005	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
5/15/2005	Alan Greenspan	Chairman	yes	0	0	1
5/16/2005	Mark W. Olson	Governor		0	0	1
5/17/2005	Susan Schmidt Bies	Governor		0	0	1
5/19/2005	Alan Greenspan	Chairman	yes	3	0	2
5/19/2005	Susan Schmidt Bies	Governor		0	0	1
5/19/2005	Mark W. Olson	Governor		0	0	1
5/20/2005	Donald L. Kohn	Governor		1	2	0.666667
5/20/2005	Alan Greenspan	Chairman	yes	1	1	1
5/26/2005	Edward M. Gramlich	Governor		0	1	0
5/26/2005	Susan Schmidt Bies	Governor		0	0	1
5/27/2005	Roger W. Ferguson, Jr.	Vice Chair		4	0	2
6/3/2005	Edward M. Gramlich	Governor		0	0	1
6/3/2005	Mark W. Olson	Governor		1	0	2
6/6/2005	Alan Greenspan	Chairman	yes	1	0	2
6/7/2005	Susan Schmidt Bies	Governor		1	0	2

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
6/8/2005	Susan Schmidt Bies	Governor		0	0	1
6/14/2005	Susan Schmidt Bies	Governor		1	0	2
6/15/2005	Donald L. Kohn	Governor		0	0	1
6/23/2005	Mark W. Olson	Governor		0	0	1
7/21/2005	Donald L. Kohn	Governor		0	0	1
8/26/2005	Alan Greenspan	Chairman	yes	2	1	1.333333
8/27/2005	Donald L. Kohn	Governor		1	3	0.5
8/27/2005	Alan Greenspan	Chairman	yes	1	0	2
9/16/2005	Mark W. Olson	Governor		1	0	2
9/24/2005	Roger W. Ferguson	Vice Chair		0	0	1
9/26/2005	Susan Schmidt Bies	Governor		0	0	1
9/26/2005	Alan Greenspan	Chairman	yes	2	1	1.333333
9/27/2005	Alan Greenspan	Chairman	yes	0	0	1
9/28/2005	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
9/29/2005	Donald L. Kohn	Governor		1	2	0.666667
10/11/2005	Donald L. Kohn	Governor		1	2	0.666667
10/12/2005	Alan Greenspan	Chairman	yes	0	0	1
10/12/2005	Susan Schmidt Bies	Governor		1	0	2
10/12/2005	Mark W. Olson	Governor		2	2	1
10/13/2005	Mark W. Olson	Governor		2	2	1
10/17/2005	Alan Greenspan	Chairman	yes	2	1	1.333333
10/18/2005	Roger W. Ferguson, Jr.	Vice Chair		15	0	2
10/19/2005	Donald L. Kohn	Governor		14	3	1.647059
10/26/2005	Alan Greenspan	Chairman	yes	0	0	1
10/27/2005	Alan Greenspan	Chairman	yes	0	0	1
11/3/2005	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
11/7/2005	Mark W. Olson	Governor		0	0	1
11/14/2005	Alan Greenspan	Chairman	yes	1	0	2
11/15/2005	Mark W. Olson	Governor		0	0	1
11/15/2005	Roger W. Ferguson, Jr.	Vice Chair		5	1	1.666667
11/28/2005	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
11/29/2005	Roger W. Ferguson, Jr	Vice Chair		1	0	2

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
11/30/2005	Susan Schmidt Bies	Governor		1	0	2
12/2/2005	Alan Greenspan	Chairman	yes	0	0	1
12/2/2005	Alan Greenspan	Chairman	yes	0	0	1
12/5/2005	Mark W. Olson	Governor		0	0	1
12/6/2005	Susan Schmidt Bies	Governor		0	0	1
12/14/2005	Alan Greenspan	Chairman	yes	0	0	1
1/18/2006	Susan Schmidt Bies	Governor		2	1	1.333333
2/2/2006	Susan Schmidt Bies	Governor		1	0	2
2/6/2006	Ben S. Bernanke	Chairman	yes	0	0	1
2/23/2006	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
2/24/2006	Ben S. Bernanke	Chairman	yes	4	2	1.333333
2/24/2006	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
3/3/2006	Roger W. Ferguson, Jr.	Vice Chair		21	1	1.909091
3/8/2006	Ben S. Bernanke	Chairman	yes	0	0	1
3/10/2006	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
3/13/2006	Mark W. Olson	Governor		0	0	1
3/16/2006	Donald L. Kohn	Governor		4	0	2
3/20/2006	Ben S. Bernanke	Chairman	yes	1	5	0.333333
3/29/2006	Susan Schmidt Bies	Governor		0	0	1
3/31/2006	Susan Schmidt Bies	Governor		0	0	1
3/31/2006	Roger W. Ferguson, Jr.	Vice Chair		0	0	1
4/3/2006	Randall S. Kroszner	Governor		0	0	1
4/5/2006	Ben S. Bernanke	Chairman	yes	0	0	1
4/6/2006	Randall S. Kroszner	Governor		0	1	0
4/10/2006	Mark W. Olson	Governor		0	0	1
4/10/2006	Susan Schmidt Bies	Governor		0	0	1
4/13/2006	Donald L. Kohn	Governor		14	1	1.866667
4/13/2006	Mark W. Olson	Governor		3	1	1.5
4/17/2006	Roger W. Ferguson, Jr.	Vice Chair		0	2	0
4/20/2006	Ben S. Bernanke	Chairman	yes	0	0	1
4/27/2006	Donald L. Kohn	Governor		0	1	0
4/28/2006	Susan Schmidt Bies	Governor		0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

Continued from previous page.

Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
5/3/2006	Ben S. Bernanke	Chairman	yes	0	0	1
5/4/2006	Susan Schmidt Bies	Governor		2	0	2
5/11/2006	Donald L. Kohn	Governor		0	0	1
5/16/2006	Ben S. Bernanke	Chairman	yes	0	0	1
5/16/2006	Susan Schmidt Bies	Governor		0	0	1
5/16/2006	Mark W. Olson	Governor		0	0	1
5/18/2006	Ben S. Bernanke	Chairman	yes	0	0	1
5/18/2006	Donald L. Kohn	Governor		0	1	0
5/24/2006	Randall S. Kroszner	Governor		0	0	1
5/25/2006	Mark W. Olson	Governor		1	0	2
6/5/2006	Ben S. Bernanke	Chairman	yes	3	0	2
6/6/2006	Susan Schmidt Bies	Governor		0	0	1
6/9/2006	Ben S. Bernanke	Chairman	yes	0	0	1
6/12/2006	Ben S. Bernanke	Chairman	yes	0	0	1
6/12/2006	Mark W. Olson	Governor		0	0	1
6/12/2006	Susan Schmidt Bies	Governor		0	0	1
6/13/2006	Ben S. Bernanke	Chairman	yes	0	0	1
6/14/2006	Susan Schmidt Bies	Governor		2	0	2
6/15/2006	Ben S. Bernanke	Chairman	yes	10	0	2
6/15/2006	Randall S. Kroszner	Governor		2	1	1.333333
6/16/2006	Donald L. Kohn	Governor		1	3	0.5
6/16/2006	Randall S. Kroszner	Governor		2	1	1.333333
7/4/2006	Susan Schmidt Bies	Governor		0	0	1
7/6/2006	Donald L. Kohn	Vice Chair		1	1	1
7/18/2006	Kevin Warsh	Governor		2	0	2
8/25/2006	Ben S. Bernanke	Chairman	yes	0	0	1
8/31/2006	Ben S. Bernanke	Chairman	yes	1	4	0.4
9/1/2006	Ben S. Bernanke	Chairman	yes	0	0	1
9/11/2006	Donald L. Kohn	Vice Chair		0	0	1
9/27/2006	Randall S. Kroszner	Governor		6	3	1.333333
10/4/2006	Ben S. Bernanke	Chairman	yes	1	0	2
10/4/2006	Donald L. Kohn	Vice Chair		5	3	1.25

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Table A.2: **Speeches by FOMC members (continued)**

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Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
10/11/2006	Susan Schmidt Bies	Governor		0	0	1
10/12/2006	Frederic S. Mishkin	Governor		1	0	2
10/16/2006	Ben S. Bernanke	Chairman	yes	0	0	1
10/17/2006	Susan Schmidt Bies	Governor		2	0	2
11/1/2006	Ben S. Bernanke	Chairman	yes	1	0	2
11/2/2006	Susan S. Bies	Governor		2	1	1.333333
11/3/2006	Donald L. Kohn	Vice Chair		0	0	1
11/10/2006	Ben S. Bernanke	Chairman	yes	0	1	0
11/16/2006	Randall S. Kroszner	Governor		0	2	0
11/21/2006	Kevin Warsh	Governor		0	0	1
11/28/2006	Ben S. Bernanke	Chairman	yes	3	5	0.75
11/30/2006	Susan Schmidt Bies	Governor		0	0	1
12/1/2006	Ben S. Bernanke	Chairman	yes	0	0	1
12/1/2006	Donald L. Kohn	Vice Chair		1	1	1
12/15/2006	Ben S. Bernanke	Chairman	yes	0	1	0
1/5/2007	Ben S. Bernanke	Chairman	yes	0	0	1
1/8/2007	Donald L. Kohn	Vice Chair		3	3	1
1/11/2007	Susan Schmidt Bies	Governor		2	0	2
1/17/2007	Frederic S. Mishkin	Governor		10	0	2
1/18/2007	Susan Schmidt Bies	Governor		3	1	1.5
2/6/2007	Ben S. Bernanke	Chairman	yes	0	0	1
2/21/2007	Donald L. Kohn	Vice Chair		0	0	1
2/26/2007	Susan Schmidt Bies	Governor		0	0	1
3/2/2007	Ben S. Bernanke	Chairman	yes	1	3	0.5
3/5/2007	Randall S. Kroszner	Governor		0	0	1
3/5/2007	Kevin Warsh	Governor		1	0	2
3/6/2007	Ben S. Bernanke	Chairman		0	0	1
3/9/2007	Randall S. Kroszner	Governor		0	2	0
3/9/2007	Donald L. Kohn	Vice Chair		1	0	2
3/12/2007	Randall S. Kroszner	Governor		5	2	1.428571
3/22/2007	Randall S. Kroszner	Governor		0	0	1
3/22/2007	Donald L. Kohn	Vice Chair		0	0	1

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Table A.2: **Speeches by FOMC members (continued)**

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Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
3/23/2007	Frederic S. Mishkin	Governor		0	7	0
3/30/2007	Ben S. Bernanke	Chairman	yes	0	1	0
4/10/2007	Frederic S. Mishkin	Governor		3	11	0.428571
4/11/2007	Ben S. Bernanke	Chairman	yes	0	0	1
4/20/2007	Frederic S. Mishkin	Governor		2	2	1
4/25/2007	Ben S. Bernanke	Chairman	yes	0	0	1
4/26/2007	Frederic S. Mishkin	Governor		0	0	1
5/1/2007	Ben S. Bernanke	Chairman	yes	1	0	2
5/10/2007	Randall S. Kroszner	Governor		0	0	1
5/15/2007	Ben S. Bernanke	Chairman	yes	0	0	1
5/15/2007	Randall S. Kroszner	Governor		0	0	1
5/16/2007	Donald L. Kohn	Vice Chair		0	0	1
5/16/2007	Randall S. Kroszner	Governor		1	1	1
5/17/2007	Ben S. Bernanke	Chairman	yes	1	0	2
5/22/2007	Ben S. Bernanke	Chairman	yes	0	0	1
5/23/2007	Randall S. Kroszner	Governor		0	0	1
5/24/2007	Frederic S. Mishkin	Governor		1	3	0.5
6/1/2007	Randall S. Kroszner	Governor		5	1	1.666667
6/5/2007	Ben S. Bernanke	Chairman	yes	1	0	2
6/5/2007	Kevin Warsh	Governor		0	0	1
6/14/2007	Randall S. Kroszner	Governor		0	0	1
6/15/2007	Ben S. Bernanke	Chairman	yes	2	0	2
6/23/2007	Frederic S. Mishkin	Governor		0	0	1
7/10/2007	Ben S. Bernanke	Chairman	yes	4	8	0.666667
7/12/2007	Randall S. Kroszner	Governor		0	0	1
8/1/2007	Randall S. Kroszner	Governor		0	0	1
8/31/2007	Ben S. Bernanke	Chairman	yes	2	1	1.333333
9/1/2007	Frederic S. Mishkin	Governor		0	1	0
9/6/2007	Randall S. Kroszner	Governor		0	0	1
9/10/2007	Frederic S. Mishkin	Governor		0	1	0
9/11/2007	Ben S. Bernanke	Chairman	yes	2	0	2
9/21/2007	Donald L. Kohn	Vice Chair		1	4	0.4

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Table A.2: **Speeches by FOMC members (continued)**

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Date	Speaker with link	Role	Chair	# Hawks	# Doves	Net Index
9/21/2007	Kevin Warsh	Governor		0	1	0
9/21/2007	Frederic S. Mishkin	Governor		0	0	1
9/24/2007	Ben S. Bernanke	Chairman	yes	0	0	1
9/27/2007	Frederic S. Mishkin	Governor		2	4	0.666667
9/28/2007	Frederic S. Mishkin	Governor		1	1	1
10/5/2007	Donald L. Kohn	Vice Chair		1	0	2
10/5/2007	Kevin Warsh	Governor		0	1	0
10/11/2007	Randall S. Kroszner	Governor		0	2	0
10/12/2007	Ben S. Bernanke	Chairman	yes	0	0	1
10/12/2007	Donald L. Kohn	Vice Chair		0	2	0
10/15/2007	Ben S. Bernanke	Chairman	yes	1	1	1
10/19/2007	Ben S. Bernanke	Chairman	yes	0	1	0
10/20/2007	Frederic S. Mishkin	Governor		7	2	1.555556
10/22/2007	Randall S. Kroszner	Governor		0	0	1
10/26/2007	Frederic S. Mishkin	Governor		10	4	1.428571
11/5/2007	Frederic S. Mishkin	Governor		4	4	1
11/5/2007	Randall S. Kroszner	Governor		0	0	1
11/6/2007	Ben S. Bernanke	Chairman	yes	0	0	1
11/7/2007	Kevin Warsh	Governor		0	3	0
11/13/2007	Randall S. Kroszner	Governor		0	0	1
11/14/2007	Ben S. Bernanke	Chairman	yes	0	1	0
11/16/2007	Randall S. Kroszner	Governor		2	3	0.8
11/28/2007	Donald L. Kohn	Vice Chair		1	2	0.666667
11/29/2007	Ben S. Bernanke	Chairman	yes	0	0	1
11/29/2007	Frederic S. Mishkin	Governor		2	6	0.5
11/30/2007	Randall S. Kroszner	Governor		0	0	1