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## Appropriate monetary policy and forecast disagreement at the FOMC

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# Non-technical summary

### Research Question

The Federal Open Market Committee (FOMC) of the Federal Reserve System is responsible for the conduct of monetary policy to, put simple, keep prices stable and employment high. Yet, members of the FOMC are not only in charge of setting interest rates but also of making forecasts for key macroeconomic variables, in particular for the future developments in the inflation rate and the unemployment rate. The present study aims to investigate how dissenting views on appropriate monetary policy translate into disagreement on macroeconomic forecasts.

### Contribution

Disagreement in monetary policy committees is a well-studied phenomenon. This study builds on results from the literature, yet makes important additions. Over a sample period of fourteen years, the committee members' individual forecasts for future rates of inflation and unemployment are matched with their individual interest rates. In both forecast and interest rate data, disagreement is measured such that the direction of disagreement receives particular attention. Using panel methods, it is analyzed whether the direction in which minority voters deviate from the majority's view on interest rates translates into the direction of the disagreement about the macroeconomic outlook. In addition it is studied how committee members revise their individual macroeconomic outlook between two consecutive forecasting rounds.

### Results

Estimation results imply that monetary policy makers that want higher interest rates forecast higher inflation and lower unemployment rates. The individual forecast revision behavior displays a similar pattern. The results can be interpreted such that monetary policy makers that opt for a tightening in monetary policy forecast economic developments that would emerge if the tightening would not be undertaken. Different from similar studies in this field, the current results yield evidence that monetary policy makers do rather not exaggerate their forecasts to signal their view on appropriate monetary policy.

# Nichttechnische Zusammenfassung

### Fragestellung

Der Offenmarktausschuss (engl. Federal Open Market Committee, kurz: FOMC) des amerikanischen Notenbanksystems (engl. Federal Reserve System) verfolgt mit seinen geldpolitischen Entscheidungen, vereinfacht dargestellt, zwei Ziele: Preisstabilität und einen höchstmöglichen Beschäftigungsstand. Die Mitglieder des FOMC sind neben der Zinssetzung auch mit Vorhersagen über die zukünftige Entwicklung dieser wirtschaftlichen Zielgrößen betraut. Die vorliegende Studie versucht, das regelmäßige Auseinanderweichen von und mögliche Übertreibungen bei individuellen Vorhersagen durch unterschiedliche Auffassungen über die Angemessenheit der Geldpolitik zu erklären.

### Beitrag

Uneinigkeit in geldpolitischen Kommittees wie etwa dem FOMC ist ein gut erforschtes Phänomen. Die vorliegende Arbeit fußt auf Ergebnissen aus der Literatur, ergänzt aber wesentliche Bausteine. Über einen Zeitraum von vierzehn Jahren werden den individuell vorhergesagten Werten für die Inflationsrate und die Arbeitslosenquote die Zinswünsche eines jeden Kommittee-Mitglieds zugeordnet. Sowohl die Vorhersagen als auch die Zinswünsche werden dazu in Maße für Uneinigkeit überführt, die die Richtung der Uneinigkeit in besonderer Weise berücksichtigen. Mittels einer sogenannten Paneldatenanalyse wird dann untersucht, ob die Richtung der Uneinigkeit bezüglich der zukünftigen wirtschaftlichen Entwicklung durch die Richtung der Uneinigkeit über die Geldpolitik zu erklären ist und wie sich geldpolitische Entscheidungsträger bei der Aktualisierung ihrer Vorhersagen verhalten.

### Ergebnisse

Die Ergebnisse der Untersuchung legen den Schluss nahe, dass geldpolitische Entscheidungsträger eine höhere Inflationsrate und eine niedrigere Arbeitslosenquote vorhersagen, wenn sie zuvor für eine Zinserhöhung votiert haben. Auch die Aktualisierung von Vorhersagen zwischen zwei Prognoserunden folgt einem ähnlichen Muster. Die Ergebnisse lassen sich dahingehend deuten, dass geldpolitische Entscheidungsträger, die eine Verschärfung der Geldpolitik befürworten, eine Erhöhung der wirtschaftlichen Aktivität voraussagen, wie sie durch ein Unterlassen der von ihnen gewünschten Verschärfung zu erwarten wäre. Anders als bisherige Studien nahelegen, deuten die Ergebnisse in der vorliegenden Arbeit jedoch nicht darauf hin, dass geldpolitische Entscheidungsträger dabei ihre Vorhersagen übertreiben, um ihre geldpolitische Haltung zu unterstreichen.

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# Appropriate Monetary Policy and Forecast Disagreement at the FOMC

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**Abstract**

I assess how dissenting views on appropriate monetary policy result in disagreement about the macroeconomic outlook of Federal Open Market Committee members. FOMC members that voted for a higher Fed Funds Rate than the majority of voters also forecast higher inflation rates, while they forecast lower unemployment rates relative to the consensus view on the future economy. Voters that tighten their stance revise inflation forecasts to the upside and unemployment forecasts to the downside. Members that switched their voting status between forecasting rounds, i.e., switched from voting with the majority to being a dissenting minority voter, or switched vice versa, are significantly more hesitant in revising their macroeconomic forecasts.

**Keywords:** Federal Reserve System, Federal Open Market Committee, Federal Funds Rate, Dissent, Forecast Disagreement

**JEL classification:** C12, E52.

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# 1 Introduction

In this empirical study I assess how dissenting views on appropriate monetary policy affect the individual macroeconomic outlook of Federal Open Market Committee (FOMC) members. I construct dispersion and skew measures for inflation and unemployment forecasts as well as the Fed Funds Rate at the individual level and match these cross-sectional time series member-wise. Simple panel regressions serve to investigate the following questions. Does lacking unanimity in the Fed's decision-making body about the monetary policy instrument result in disagreement about the assessment of future developments in its target variables? Do minority voters forecast different rates of future inflation and unemployment than majority voters? Analogously, how do members revise their forecasts given that they change their individual monetary policy stance? Do FOMC members exaggerate their differences in macroeconomic forecasts to emphasize their view on appropriate monetary policy?

Disagreement among individuals is a characteristic feature of group decision-making. Often, a central bank's decision-making body, such as the FOMC of the Federal Reserve System (Fed), is entrusted with both making interest rate decisions and formulating macroeconomic forecasts. To this extent, the Fed's publications document a multitude of views on the future state of the economy, such as the individual forecasts for inflation and unemployment that are input to the Summary of Economic Projections (SEP), as well on how to steer the economy, that is, mainly, by setting the level of the Fed Funds Rate appropriately.

At the same time, decision-making on monetary policy and the economic outlook is known to be an iterative process. Initial values for future rates of inflation or unemployment are typically derived conditional on assuming the short-term interest rate to take a specific path.[1] An appropriate level of the key interest rate, in turn, is usually set accounting for likely future developments in macroeconomic variables, often utilizing forecast-based interest rate rules. Hence, values for future inflation and unemployment or interest rates are subject to change while they are adjusted, manipulated or even negotiated among decision-makers. Thus, a further observation from the Fed's publications is that the individual members' macro forecasts and their votes on the Fed Funds Rate are of sequential nature. The FOMC's central projections for macroeconomic variables summarize the final individual forecasts that are submitted after the voting on interest rates, as explained by Romer (2010).

Previous work by Banternghansa and McCracken (2009) describes differences in forecast disagreement between dissenters and majority voters at the FOMC, and McCracken (2010b, p.12) discusses forecast disagreement as a *"much finer measurement about the degree to which a specific member of the FOMC [...] potentially [...] disagrees with a proposed policy action"*. Yet, the FOMC data on voting on the Fed Funds Rate and the individual forecasts for inflation and unemployment published afterwards are snapshots from the Fed's iterative decision-making process described above. Picking up on the many insightful findings of Banternghansa and McCracken (2009), McCracken (2010a) and McCracken (2010b), I add the following ingredients to analyze forecast disagreement at the FOMC.

[1] The reader is kindly referred to Knüppel and Schultefrankenfeld (2017) on this subject.

First, I take advantage of the individual-level information in both forecast and voting data. Individual FOMC members' forecasts are made conditional on *"appropriate monetary policy"*, as the Fed Monetary Policy Reports indicate. In this study, the past voting behavior serves as a track record of how FOMC individuals have interpreted this *"admittedly vague concept"*, as McCracken (2010a, p.1) puts it. Moreover, Romer (2010, p.952) describes that *"[...] members were not given any specific assumptions about the conduct of monetary policy but instead conditioned their forecasts on their judgments of appropriate policy."* Individual interest rates series, calculated from the pre-meeting Fed Funds Rate level and the increments members voted for should thus approximate the conditioning assumption of an individual member quite well, although these interest rate series are not forward-looking.

Second, following up on this point, I consider voting data not only from the February and July meetings when forecasts are discussed but also take into account voting data from all the meetings between two consecutive forecasting rounds. Third, based on the set of cross-sectional time series generated from individual information, I exploit the specific timing feature of the data to investigate whether the disagreement among individual FOMC members about future rates of inflation and unemployment can actually *be predicted by* the dissenting views on the appropriate level of the Fed Funds Rate.

Fourth, I utilize skew-related measures for both forecasts and interest rates to account for the direction of dissent and disagreement. This is accomplished by considering deviations of individual interest rates and forecasts from the respective consensus view on these variables. For the Fed Funds Rate, the consensus view is the decision obtained from majority voting, which corresponds to a modal value. The FOMC does not publish point forecasts that represent the consensus view on the economy. The latter can, however, easily be approximated using the cross-sectional modal value of the individual forecasts, assuming it to represent the central forecast consistent with majority voting. I use other point forecast proxies such as mean, median and midrange as well in this study.

Lastly, by controlling for the voting status of monetary policy committee members, where the voting status is either voting with the majority or casting a dissenting view by minority voting, I assess how FOMC members revise their forecasts in response to a change in their monetary policy stance.

Empirical results obtained for the target variables covered by the Fed's Dual Mandate yield insightful answers to the questions posed in the beginning. The cross-sectional dispersion of the individual inflation and unemployment forecasts increases after dissenting views on monetary policy were cast in votes in FOMC meetings. Moreover, dissent measured as interest rate skew translates into forecast skew. That is, a hawkish minority voter's inflation forecast deviates to the upside, a corresponding unemployment forecast to the downside of the respective consensus forecast. Put short, members that vote for higher interest rates forecast higher inflation rates and lower unemployment rates. Similarly, FOMC members that tightened their monetary policy stance revise their inflation forecast to the upside and the unemployment forecast to the downside. In further investigation of the updating behavior, I control for members switching their voting status to dissenting or to majority voting and for members keeping their status of dissenting or majority voting, respectively. Members that switch voting status refrain from updating their inflation forecasts in response to individual monetary policy tightening. They also lower their unemployment forecast to a lesser extent than non-switching members do. These

findings imply that members that change their voting behavior do rather not exaggerate their macroeconomic forecasts to underline their view on appropriate monetary policy.

The Fed is the natural research object since it is, to the best of my knowledge, the only central bank whose publicly available information allow the construction of an attributed panel data set of individual macroeconomic forecasts of monetary policy committee members matched with individual interest rate series constructed from their voting behavior. Section 2 provides data details. Section 3 features the results from predicting forecast disagreement by interest rate disagreement. Section 4 presents statistical evidence on forecast updating and potential exaggeration. Section 5 concludes.

# 2 Forecast Disagreement And Monetary Policy Dissent

## 2.1 A Stylized Mechanism

Figure 1 shows plots of the cross-sectional times series of the individual inflation and unemployment rate forecasts and barplots of interest rate disagreement. As the top and middle panels suggest, disagreement about the outlook for both inflation and unemployment is an empirical regularity at the FOMC. Visualized by the deviation of the black solid line, representing the cross-sectional mean of the individual forecasts, and the rosy solid line, representing the cross-sectional mode of the individual forecasts, the cross-sectional distributions at each point in time are usually skewed. Although forecast dispersion and skew are lower for the unemployment rate compared to the inflation rate, it is apparent that inflation and unemployment skew often run contrary to each other. Moreover, as plotted by the bars in bottom panel, there is disagreement about the Fed Funds Rate on a regular basis as well, although to a lesser degree in the second half of the sample than in the first. It thus might be instructive to see how forecast and interest rate disagreement are related in statistical terms.

The many facets of FOMC decision making have been the subjects of numerous insightful studies. Often, the Fed Funds Rate and the forecasts the Summary of Economic Projections (SEP) is based upon are related by means of a Taylor-type rule. At aggregate or individual level, the historical Fed Funds Rate series are regressed on the FOMC's forecasts for inflation, output growth and unemployment, where either aggregate forecasts such as the midrange of the FOMC's central projection, or the members' individual forecasts as described by Romer (2010) are used. Recent exercises of FOMC policy rule estimations using individual-level data are provided, for instance, by Fendel and Rülke (2012), Eichler and Lähner (2014) and Ellis and Liu (2016). Yet, studying how forecast disagreement is related to dissenting views on monetary policy goes well beyond interchanging the $Y$ and the $X$ from the Taylor rule approach. The forecasts submitted by FOMC members are made conditional on the individuals' interpretations of "appropriate monetary policy". Regardless whether this term refers to past, current, or future monetary policy, it describes information on monetary policy that is embodied in the forecast, and fairly naturally resolves the timing issue whether the interest rates or the forecasts were first.

To this extent, I consider the following, highly stylized mechanism. Suppose that, for an upcoming voting round, an FOMC member has prepared his or her preferred level of the Fed Funds Rate that is consistent, in individual terms, with the Dual Mandate. That is, the member has the corresponding future values for inflation and unemployment in mind that are consistent with the individually preferred Fed Funds Rate level. This rate should be the best representation of the individuals' current take on "appropriate monetary policy". It could also be thought of as an initial value of a likely future path for monetary policy.[2]

Based on his or her initial preference for the Fed Funds Rate, each member individually casts a vote on the proposed policy action. A majority voter's individual interest rate coincides with the Fed Funds Rate obtained from voting, so the interest rate after voting is still consistent with the member's initial forecasts for inflation and unemployment. These initial forecasts become the individual's final forecasts and are submitted subsequently. A minority voter's individual interest rate, however, exceeds [or falls short of] the majority's decision on the Fed Funds Rate. Conditional on the new rate, the member is likely to expect future economic activity and prices to move differently than his or her initial forecasts suggested. To restore consistency between the Fed Funds Rate observed after voting and the member's individual take on the Dual Mandate, the individual forecasts for inflation and unemployment are likely to be updated. A minority voter who wanted higher [lower] rates is likely to submit inflation forecasts that are revised upwards [downwards] and unemployment forecasts that are revised downwards [upwards].

A natural way to investigate this mechanism would be to regress revisions of forecasts made before voting on the updates in the individual interest rates as revealed by voting. Calculating the difference between the original interest rate an individual member opted for and the aggregate Fed Funds Rate decision, however, is not exactly possible. Initial individual interest rates that are presumed to underlie the initial forecasts for rates of inflation and unemployment as conditioning assumption are not observed. Yet, using the observed dissent in voting, individual interest rates can be calculated taking the level of the Fed Funds Rate before voting and adding the increments the members individually opted for. The individual interest rate series then differ by the the basis points the individual dissent amounted to. Calculating revisions for forecasts made before voting, however, is infeasible, since only the forecasts submitted after voting are published. Nonetheless, assuming that the members' interpretations of the Dual Mandate and of the transmission mechanism are similar, the Fed Funds Rate decision achieved by majority voting ought to be consistent with the macroeconomic forecasts submitted of the majority voters. These forecasts should then be best represented by the modal value of the individual forecasts. A minority voter's forecast, in turn, is likely to be revised conditional on the new level of the Fed Funds Rate now observed and thus moved away from the majority voters' forecast, assuming that before revision it would have been clustering with the majority voters' forecasts.

[2] "Appropriateness" has always been an integral part of the FOMC's language. Yet, more recent FOMC minutes, for instance of December 13 and 14, 2016, provide a fairly clear-cut definition where *"appropriate monetary policy is defined as the future path of policy that each participant deems most likely to foster outcomes for economic activity and inflation that best satisfy his or her individual interpretation of the Federal Reserve's objectives of maximum employment and stable prices."* See https://www.federalreserve.gov/monetarypolicy/fomcminutes20160615ep.htm.

The suggested way to study the mechanism described above is to run cross-sectional time series regressions of deviations of individual forecasts from the central forecast on deviations of individual interest rates from the respective Fed Funds Rate voting outcome of a period. Both of these measures are skew-related and thus account for the direction of disagreement. Therefore, they should be well-suited to study how minority views on monetary policy affect the assessment of future inflation and unemployment rates.

## 2.2 Measuring Interest Rate Disagreement

The first part of the FOMC data set consists of the individual members' voting behavior when deciding on the Federal Funds Rate, as published in the Minutes and Monetary Policy Statements of the Fed. FOMC voting is a well-studied subject, and the voting behavior is found to be affected by many factors, e.g., by chairmanship, member status, professional background, perception of the state of the economy or partisanship (See, inter alia, Belden (1989), Havrilesky and Gildea (1991), Chappell, Jr., Havrilesky, and McGregor (1993), Chappell, Jr. and McGregor (2000), Chappell, Jr., Havrilesky, and McGregor (2004, 2007a, 2007b), Meade (2005), Meade and Sheets (2005), Gerlach-Kristen and Meade (2010), Besley, Meads, and Surico (2008), Gerlach-Kristen (2009), Eichler and Lähner (2014) and Hansen, McMahon, and Velasco Rivera (2014)).

In the present study, I will make use of dispersion-related measures, akin to second moments, and of skew-related measures to gauge interest rate disagreement. Yet, to be able to construct these measures at all, I have to calculate individual interest rate series for the members first. This is accomplished by taking the individually desired Fed Funds Rate change at each decision-making date documented in the FOMC material.[3] The change $\Delta i_{m,k,t}$ is added to the level of the Fed Funds Rate prevailing before the specific interest rate voting round.[4] Hence, with $m = 1, \ldots, M_t$ indexing the members and $k = 1, \ldots, K_{m,t}$ the meetings in a period $t$ during which a member $m$ attended for voting, the individual Fed Funds Rate can be calculated as

$$i_{m,k,t} = i_{k-1,t} + \Delta i_{m,k,t}. \tag{1}$$

At the next meeting, any individual Fed Funds Rate levels are reset, and the desired amount of change is added to the level of the Fed Funds Rate prevailing at that meeting before voting.[5,6]

Since the publication dates of the FOMC's individual members' forecasts and the individual members' interest rate decisions differ over the year, the timing aspect requires

[3]The voting happens in meetings, and *"The FOMC holds eight regularly scheduled meetings during the year, and other meetings as needed."* The sample contains thus includes extra dates from the FOMC calendar if relevant.

[4]If the preferred basis point change of the dissenter is not explicitly stated, I assume it to be 25 basis points. Exemplarily, consider the period March 31 and July 1 of 1998, when Jerry L. Jordan of the Cleveland Fed dissented in three consecutive meetings, where his reasoning suggested an interest rate increase while the desired amount of increase remains unknown.

[5]See the Fed's FOMC background information under `http://www.federalreserve.gov/monetarypolicy/default.htm`.

[6]See also Chappell, Jr. et al. (1993), Chappell, Jr. and McGregor (2000) and Chappell, Jr., Havrilesky, and McGregor (2004, 2007a, 2007b) for alternative approaches of generating individual interest rate series.

particular attention. The voting data used in this study ranges from 1992 to 2005, and hence, over $T = 14$ years.[7] During that period, SEP macroeconomic forecasts were released twice a year, so that I separate the individual Fed Funds Rate series into two sets of half-year time span data. To match the semi-annual February forecasts, I use interest rate data starting directly after the publication of the preceding July forecasts. The meeting just before the respective February forecasting round is the cut-off date. I proceed analogously when matching voting data and the semi-annual July forecasts. This matching determines the cross-sectional dimension, which is equal to $M_t$, the number of members being on the FOMC during a half-year period.

Now, to measure interest rate disagreement by skew, I construct a variable in resemblance of the time series of cross-sectional mean-mode differences as proposed by Gerlach-Kristen (2004). Here, however, I take advantage of the individual members' dimension of the FOMC data and subtract, at each meeting for each member, the Fed Funds Rate majority decision from the individual Fed Funds Rate. Then, I average over the $K_{m,t}$ meetings member $m$ attended for voting over the course of a half-year period $t$. Averaging conveniently eliminates the number-of-meetings dimension in the panel data. Consequently, with $i_{m,k,t}$, the individual Fed Funds Rate obtained from equation (1), the time series of interest rate skew of member $m$ is calculated as

$$\text{iskew}_{m,t} = \frac{1}{K_{m,t}} \sum_{k=1}^{K_{m,t}} (i_{m,k,t} - i_{k,t}), \tag{2}$$

where $i_{k,t}$ is the Fed Funds Rate the majority sets in meeting $k$. The aggregate decision $i_{k,t}$ made in meeting $k$ is achieved by majority voting, so it can be considered a modal value. The skew terminology borrowed from Gerlach-Kristen (2004) can be justified by the fact that the measure in equation (2) accounts for the direction of dissent in ways similar to a mean-mode difference. It allows for asymmetry statements on interest rate voting. Since I attempt panel regressions in the following, I refrain from averaging the interest rate skew measure $\text{iskew}_{m,t}$ over the $M_t$ members at this stage. Rather I preserve, at time $t$, the individual's positive, negative or zero skew value.

I proceed similarly when calculating interest rate dispersion. For every half-year period $t$, however, the $K_{m,t}$ deviations of member $m$'s interest rate from the aggregate Fed Funds Rate decision achieved in meeting $k$ are squared and averaged before the square root is taken.

$$\text{idisp}_{m,t} = \left( \frac{1}{K_{m,t}} \sum_{k=1}^{K_{m,t}} (i_{m,k,t} - i_{k,t})^2 \right)^{1/2}, \tag{3}$$

Contrary to interest rate skew $\text{iskew}_{m,t}$, the interest rate dispersion measure $\text{idisp}_{m,t}$ neglects information on the direction of dissent.

For basically two reasons I utilize the entire set of interest rate deviations collected over half-year voting periods rather that just the single February and July voting data, respectively. First, in the time period considered, dissenting views on monetary policy at the FOMC that are cast in votes are fairly rare, as described for instance by Blinder (2007) or Thornton and Wheelock (2014). Dissent becomes even more rare if only the

[7] The availability of the individual forecasts of FOMC members is crucial for determining the sample size for this study.

voting rounds right before the forecasting rounds were to be utilized. Taken from an entire voting period instead, both the interest rate dispersion from equation (3) and the interest rate skew as shown in equation (2) capture more of the dynamics in voting variation. At the same time, calculating the average over a half-year period smoothes out a potential aggregation effect in the interest rate disagreement measures. I aggregate member-wise and do not mix voting data from members that rotated in with data from members that rotated out.

Second, due to exactly these variations in voting rights and, hence, the composition of the FOMC over time, not all members have attended all meetings during a half-year span. In February and July, however, all members submit forecasts that are based on their individual assessment of appropriate monetary policy, also those who could not actively influence policy in every meeting of a half-year time span.[8] Therefore, I include all members that submit a forecast and have voted at least once in the half-year period before the respective forecasting round. This is to assume the members' monetary policy preferences to be unchanged over the fraction of the period where they have no voting rights, and may be justified by recognizing monetary policy preferences as changing only very slowly. Tables 1a, 1b, 2a and 2b show exactly which interest rate decision-making and forecasting dates are matched.

## 2.3 Measuring Forecast Disagreement

The second part of the FOMC data set, used to construct the dependent variable, consists of the individual members' point forecasts from the period 1992 to 2005.[9] The FOMC issues forecasts for nominal and real GDP, consumer price inflation and the unemployment rate in two semi-annual forecasting rounds for publication in the Monetary Policy Report to the Congress of February and July, respectively.[10,11] In the reports, the individual-level information is summarized by a 'central tendency' and a 'range', respectively.[12]

I focus on the target variables of the Dual Mandate, where the latter term refers to the Fed's two main goals of achieving price stability and maximum sustainable unemploy-

[8]Due to the changing composition of the FOMC during the half-year collection period before the respective semi-annual forecasting round, there are $M_t$ observations of $\text{idisp}_{m,t}$ and $\text{iskew}_{m,t}$, respectively, per period $t$. Matching forecast disagreement for horizon $h = 3$ and interest rate disagreement from the $M_t \in [9; 15]$ members participating in February forecasting yields an unbalanced panel data set of $N = 191$ observations. July forecasting for horizons $h = 1$ and $h = 5$ with $M_t \in [9; 11]$ yields 139 observations.

[9]A detailed data set of FOMC members' forecasts with member names attributed is compiled and described in Romer (2010). The data set is updated using individual-level FOMC data published with a lag of ten years available at http://www.phil.frb.org/research-and-data/real-time-center/monetary-policy-projections/.

[10]The FOMC used to forecast inflation as measured by the consumer price index CPI. With the Monetary Policy Report of February 17, 2000 the FOMC started to emphasize the use of the index for personal consumption expenditures PCE to measure inflation. See the Board of Governors' Monetary Policy Report of February 2000 on p.4.

[11] *"Beginning with the October 30-31, 2007 FOMC meeting, FOMC meeting participants [...] submit individual economic projections in conjunction with four FOMC meetings a year."*, as stated under http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm.

[12]Both 'central tendency' and 'range' are actually range measures, where *"The central tendency excludes the three highest and three lowest projections for each variable in each year."*, as described for instance in the Fed's February 2013 Monetary Policy Report on p.43. Yet, there are exceptions where the central tendency is indeed represented by a single number.

ment.[13] To this extent, let the variable $\hat{y}$ represent a forecast for either the inflation rate or the unemployment rate, such that $\hat{y} \in \{\widehat{\pi}, \widehat{\mathrm{u}}\}$. Made in February forecasting rounds, $\hat{\pi}_{m,t+3|t}$ denotes a three-quarters-ahead forecast for the change in prices from the fourth quarter of the previous year to the fourth quarter of the current year, submitted by member $m$. Analogously, $\hat{u}_{m,t+3|t}$ is a forecast for the unemployment rate to be observed in the fourth quarter of the current year. In July forecasting rounds, FOMC members forecast the same objects, so that $\hat{y}_{m,t+1|t}$ denotes a one-quarter-ahead forecast of the inflation and the unemployment rate, respectively. In addition to the these updated forecasts, committee members forecast the growth rates of prices from the fourth quarter of the current year to the fourth quarter of next year and the respective unemployment rate prevailing in the fourth quarter of the next year. This implies a forecast horizon of five quarters, so that these forecasts are denoted $\hat{y}_{m,t+5|t}$.[14] Over the $T = 14$ years of the sample period, voting FOMC members made 191 individual three-quarter-ahead forecasts in February sessions ($h = 3$) and 139 one-quarter- and five-quarter-ahead in July sessions ($h = 1$ and $h = 5$).[15]

Forecast disagreement is a well-studied phenomenon, and can also be measured in several ways, for instance by the interquartile range (e.g. Mankiw, Reis, and Wolfers (2003), Capistràn and Ramos-Francia (2010), Dovern, Fritsche, and Slacalek (2012)), the standard deviation of individual point forecasts (e.g. Döpke and Fritsche (2006), Boero, Smith, and Wallis (2008), or Coibion and Gorodnichenko (2012)), deviations of individual point forecasts from a central value (e.g. Engelberg, Manski and Williams (2009)), or even multivariate measures for investigating joint disagreement, as in Banternghansa and McCracken (2009). As motivated above, deviations from the mode forecast would measure forecast disagreement in a way corresponding to the interest rate skew defined in equation (2).[16] Yet, as described above, the Fed resorts to publishing forecast ranges only, so that a mode forecast for each forecasting round $t$ has to be approximated by the cross-sectional modal value of the individual forecasts.[17] For completeness, additional regression results shown below are based on further approximations of the central forecast, such as mean, median, and midrange, respectively.[18] To this extent, forecast skew is defined by

$$\text{fskew}^{y}_{m,h,t} \equiv \hat{y}_{m,t+h|t} - \hat{y}^{c}_{t+h|t}, \quad h = 1, 3, 5, \tag{4}$$

where $\hat{y}^{c}_{t+h|t}$ represents the central forecast. In analogy to the interest rate dispersion given by equation (3), I use the absolute value of forecast skew and dub it forecast dispersion,

[13] The monetary policy objectives are described by the Federal Reserve Act amended in 1977, see for instance https://www.federalreserve.gov/aboutthefed/section2a.htm.

[14] The notation corresponds to the quarterly frequency of the forecast horizon, see Orphanides and Wieland (2008) for a similar notation.

[15] Hence, the panels are unbalanced. The cross-sectional dimension in each panel is determined by matching the forecasts with the interest rate voting data, as explained in the following.

[16] Whether individual inflation and unemployment rate forecasts themselves are modal values can be subject to discussion, see Reifschneider and Tulip (2007, p.12) on the "modal nature of projections".

[17] In the rare case of bi- or multimodality, I select the mode closest to the median.

[18] Table 3 compares the relative root mean squared errors (RMSE) of forecast mode, mean and median to the RMSE of the forecast midrange. For inflation at $h = 1$ and $h = 5$, it turns out that the forecast mode comprises the smallest RMSE across data vintages, while the median is slightly better for $h = 3$. For the unemployment rate, there is no clear choice of a proxy in terms of RMSE.

so that

$$\text{fdisp}^{y}_{m,h,t} \equiv |\text{fskew}^{y}_{m,h,t}|. \tag{5}$$

# 3 Predicting Forecast Disagreement by Interest Rate Disagreement

## 3.1 Regressing Forecast Dispersion on Interest Rate Dispersion

I utilize a most simple regression model to investigate whether the forecast dispersion translates into interest rate dispersion. The dependent variable is the absolute value of the deviations of individual forecasts from the central forecast at time $t$, as shown in equation (5).

$$\text{fdisp}^{y}_{m,h,t} = \alpha + \beta_d \cdot \text{idisp}_{m,t-\tau} + \varepsilon_t. \tag{6}$$

As decribed before, the central forecast $\hat{y}^{c}_{t+h|t}$ in $\text{fdisp}^{y}_{m,h,t}$ is approximated by the cross-sectional mean, mode, median or midrange, respectively, with emphasizing the modal value as naturally corresponding to a majority of forecasters. The index $\tau$ in interest rate dispersion $\text{idisp}_{m,t-\tau}$ is added simply to indicate that the voting data stems from before the submission of the final forecasts, while $\tau$ implies no specific length, as shown in tables 1a, 1b, 2a and 2b.

Results for estimating equation (6) are shown in table 4. Higher disagreement on interest rates results in a higher disagreement about the outlook for inflation at all forecast horizons. For July forecasts, i.e. forecasts for $h = 1$ and $h = 5$, this effect is found strongest when using the mode as central forecast. All estimates of $\beta_{\text{d}}$ are statistically significant at the 10% level or higher, while for $h = 3$, using the midrange as central value yields an insignificant estimate of the slope parameter.

For the unemployment rate, the interest rate deviation can only in a few cases predict the forecast deviation. In particular, for $h = 1$, mean and midrange as central values yield estimates of $\beta_{\text{d}}$ of 0.13 and 0.12, respectively, each significant at the 1% level. The remaining slope parameter estimates are insignificant, so that, in statistical terms, there is a weakly positive relationship between the dispersion in voting and the forecast dispersion.

## 3.2 Regressing Forecast Skew on Interest Rate Skew

As the plots discussed in section 2.1 and the depicted deviation of mean and modal values suggested, dissenting votes in interest rate may also affect the shape of the cross-sectional distribution of forecasts. Having observed now that the dispersion of the interest rates feeds into the cross-sectional distribution of inflation in general and into the one for unemployment at some instances, it might be instructive to see whether the direction into which a voting member wants the Fed Funds Rate to be changed is connected to the direction to which individual forecasts are located to relative to the majority's assessment of the economy.

Regressing forecast skew on interest rate skew is supposed to serve this purpose. The dependent variable measures, within an observation period $t$, the deviations from the central value of all forecasts, where the main attention, for reasons described above, again

rests on the forecast mode.[19] As for forecast dispersion, model (7) is estimated using all four approximations mean, mode, median and midrange for the central forecast contained in $\text{fskew}^{y}_{m,h,t}$.

$$\text{fskew}^{y}_{m,h,t} = \alpha + \beta_s \cdot \text{iskew}_{m,t-\tau} + \varepsilon_t. \tag{7}$$

Results for estimating equation (7) as shown in the top panel of table 5 are in support of the basic mechanism outlined in section 2.1. Considering column 2 where the mode is used as central value, the results show that, if a minority of members dissented to the upside of the aggregate Fed Funds Rate decision, these members, on average, deviated to the upside of the mode forecast. Estimates of $\beta_s$ are above unity for $h = 1$ and $h = 3$ and close to but below unity for $h = 5$. At the same forecast horizons, estimates of $\beta_s$ become insignificant when varying the central forecast. For $h = 1$ and $h = 3$, however, all results are robust to approximating the central forecast at time $t$ by the mean or median forecast or the midrange of the individual forecasts.

Estimates of the slope parameter $\beta_s$ when regressing the unemployment forecast skew on interest rate skew, as shown in the bottom panel of table 5, show the opposite signs for all forecast horizons and all approximations of the central forecast used, as expected according to the outline of section 2.1. This implies that, if a minority opted for higher rates, the forecasts of these minority voters, on average, fall short of the unemployment forecasts of the majority of forecasters. Yet, at the same time the size of these effects is smaller compared to the effects for inflation forecast skew. For $h = 3$, all slope parameter estimates are significantly different from zero, robust to variations of the central forecast of the unemployment rate. For $h = 1$ this finding holds except for the modal forecst, while for $h = 5$ all estimate of the slope parameter are found insignificant.

## 3.3 Interim Summary and Additional Aspects

In short, FOMC members that vote for higher interest rates forecast higher inflation rates and lower unemployment rates. In more detail, there is empirical evidence that minority voting on the Fed Funds Rate affects the dispersion of individual FOMC members' inflation rate forecasts. The more dispersed individual interest rates are, the more dispersed the assessment of future inflation. To a lesser degree, though, this observation can be made for forecasts of the future unemployment rate, too. Moreover, the skew of the cross-sectional distribution of the individual inflation forecasts is affected by dissenting views on monetary policy. Minority voters that opted for higher rates also deviate with their individual inflation forecast to the upside of the majority's forecast. To a more moderate extent, these findings analogously apply for forecasts of the unemployment rate. Minority voters that opted for an increase in the Fed Funds Rate on average forecast the unemployment rate to fall short of the majority's forecast. Following up on the point by Thornton and Wheelock (2014, p.215) who observe that mainly *"Reserve Bank presidents accounted for [...] dissents between 1994 and 2013"*, I subdivide the cross-sections into presidents and governors to study the impact of interest rate skew from these two subgroups on forecast skew. Results are shown in tables 6a and 6b. For inflation, only the presidents' dissenting views have a significant impact on the distribution of macroeconomic forecasts.

[19] See McCracken (2010b), for instance, for describing absolute deviations from the median as disagreement measure for FOMC forecasts.

These observations nest recent research by Eichler and Lähner (2017) who basically find that governors of the Board forecast more conservative than presidents of the regional Feds.

The results of section 3 suggest that minority voters tend to submit more extreme inflation forecasts than majority voters. This observation touches upon the issue that FOMC forecasts can be treated as reflecting extreme scenarios, since outvoted minority views on monetary policy that *"pay more attention to worse economic outcomes"*, as stressed by Ellison and Sargent (2009, p.3), can live on by means of extreme macroeconomic forecasts. Yet, the argument that FOMC members that want higher interest rates forecast higher inflation rates, dubbed strategic for instance by McCracken (2010a) and Tillmann (2011), can be sharpened by the statistical results described above such that minority voters, on average, set their inflation forecast above, their unemployment forecast below the aggregate forecast. The lack of further control variables in both the model for relating dispersion measures as well as relating skew measures may be rationalized by recalling the assumption that initial forecasts are consistent with individual interest rates, where individual interest rates are likely determined by means of forecast-based interest rate rules such as in Batini and Haldane (1999) and Clarida, Galí, and Gertler (2000).[20] Hence, individual interest rates can be considered as information-encompassing, as they already embody factors such as strategy, partisanship, preferences, etc. Whether minority voters also exaggerate their forecasts when updating them will be addressed in the next section.

# 4 Forecast Updating and Potential Exaggeration

## 4.1 Matching February and July Forecasts

A complementary approach to study the mechanism outlined in section 2.1 is to study the forecast updating behavior of FOMC members in response to a change in their assessment of appropriate monetary policy. This requires a slight modification of the data set. Only forecasts for the current-year, i.e. the Q4-on-Q4 inflation rate and the corresponding Q4 unemployment rate, are made twice a year. Forecasts for $h = 3$, or, three quarters out, are made in the February rounds, forecasts for $h = 1$, i.e., for one quarter out, in July rounds. The July forecasting rounds thus provide revisions of February forecasts. Matching February and July forecasts member-wise, however, requires to discard observations, since the February data comprises 191 individual forecasts and interest rate voting observations, whereas the July data set consists of 139 observations. Moreover, considering members' interest rates only from those voting rounds whereafter forecasts are published results in a further reduction to 124 individual forecasts and interest rates.

[20] A recent assessment of the determinants of FOMC members' interest rate voting is for instance provided by Eichler and Lähner (2014), who draw on earlier studies such as Chappell, Jr. et al. (1993) for the FOMC or Besley et al. (2008) for the Bank of England's MPC. At the aggregate Fed Funds Rate level, Branch (2014) shows that the recent path of the Fed Funds Rates is consistent with a ''nowcasting Taylor Rule", although FOMC forecasts are only proxied by SPF forecasts in that study.

## 4.2 Relating Forecast Updates to Interest Rate Changes

Now, the interest lies in assessing the effect of a change in the individual interest rate on the update of the individual forecast. Both of these quantities are virtually generated within the same time frame, and information on the updating behavior of individual FOMC members is not available, because of which a certain endogeneity bias cannot be ruled out. Although I once again stress that forecasts are submitted after the interest rate decision is made, the idea now is to measure a simple correlation between the Fed Funds Rate update of an individual and the corresponding forecast update. To accomplish this task, I estimate the following model.

$$\hat{y}_{m,t+1|t} - \hat{y}_{m,t+3|t-2} = \alpha + \beta(i_{m,t-\tau} - i_{m,t-2-\tau}) + \varepsilon_t. \tag{8}$$

The left-hand side comprises the difference between the July forecast made by member $m$ for one quarter out and the February forecast for three quarters out, made by the same member $m$. The right-hand side is the difference between the corresponding July and February levels of the members' individual Fed Funds Rate. As it reflects the change of what is considered appropriate monetary policy by a member between Q1 and Q3 of a year, it could also be considered a change in the individual's monetary policy stance.

Results for estimating equation (8) in a straightforward fashion with OLS after plugging in inflation forecasts are shown in the first two columns of the top panel of table 7. There seems to be no linear correlation between the two quantities of interest here, as the estimated correlation is not only insignificant in both the model with and without constant, but it is also zero in magnitude. A possible explanation might be that opposing effects from member subgroups offset each other, such as the Table 3 in Thornton and Wheelock (2014) documents opposing directions of dissent from governors and regional Fed presidents. For the updates of the unemployment rate forecasts in turn, as shown in the first two columns of the bottom panel of table 7, OLS estimation on the stacked data set yields a correlation of $\hat{\beta} = -0.25$. That is, the coefficient estimate is found to be negative, which is quite against the usual narrative of expecting the unemployment rate to go upwards after are interest rate is raised. Rather, it seems that members that expect a higher unemployment rate favor an interest rate decrease.

## 4.3 Assessing Potential Exaggeration

The regression results for relating forecast skew to interest rate skew obtained from model (7) have highlighted the role of minority views for monetary policy. However, the previous section has shown that the effect of a longer-term interest rate change on the updating of inflation forecasts vanishes once simply OLS is applied on the pooled data set. This may result from opposing effects of minority and majority voters. Hence, it would be instructive to see how policy makers update their forecasts accounting for the dynamics in their voting behavior.

Table 8 gives an overview on how many occasions FOMC members' voting behavior has changed and on how many occasions it stayed the same. The largest fraction, 96 out of 124 members, did not change to vote with the majority, while the smallest fraction, 2 out 124 members did not change to vote against the majority's view in the pooled

sample. However, there is also a considerably amount of occasions, roughly one fifth, were members switched to become dissenters and also to become majority voters.

Clements (2015) reviews some of the literature where the deviations from or the clustering towards a central forecast are described and assesses herding and exaggeration of forecasters gathered in the US Survey of Professional Forecasters SPF. After having studied how FOMC forecasts are updated by members by means of equation (8), however, I would like to assess whether subgroups of members, differentiated by their voting behavior, update their forecasts differently. Ideally, FOMC members would be grouped according to the cases represented by the cells of table 8. Then, a simple $F$ test for potential differences between the member subgroups could be conducted. Yet, the case that a member stayed a dissenter occurs only two times. Therefore, I rather subdivide the FOMC members according to the rows of table 8, where I build an indicator variable for the voters that changed their stance. If a member switched from majority voting in February to minority voting in July or vice versa, we can code this to be

$$\text{switch}_{m,t} = \begin{cases} 1, & \text{if} \quad \text{iskew}_{m,t-2} = 0 \ \wedge \ \text{iskew}_{m,t} \neq 0 \\ 1, & \text{if} \quad \text{iskew}_{m,t-2} \neq 0 \ \wedge \ \text{iskew}_{m,t} = 0 \\ 0, & \text{else} \end{cases} . \tag{9}$$

To assess whether the switchers behave differently than members that kept their voting status, the model given by equation (8) can be rewritten such that

$$\begin{aligned} \hat{y}_{m,t+1|t} - \hat{y}_{m,t+3|t-2} = \alpha + \beta \cdot (i_{m,t-\tau} - i_{m,t-2-\tau}) \ \ldots \\ + \beta^{\text{switch}} \cdot \text{switch}_{m,t} \cdot (i_{m,t-\tau} - i_{m,t-2-\tau}) + \varepsilon_t. \end{aligned} \tag{10}$$

Results from estimating equation (10) are shown in columns three and four of table 7. Applying pooled OLS on the data set yields the interesting insight that members that changed their voting status revise their forecasts differently from those that kept their voting status. Regarding inflation, the estimate $\hat{\beta} = 0.18^{*}$ implies that the revision of the individual view on future rates of inflation results from an update of the individual view on appropriate monetary policy, so that members that expect higher inflation vote for higher interest rates. The additional reaction of FOMC members that change their status, however, points to the opposite direction, as the estimated coefficient is $\hat{\beta}^{switch} = -0.23^{**}$. This suggests that switchers submit less strongly revised forecasts for inflation after revising their views on appropriate monetary policy. In fact, the sum of the coefficients implies that switchers rather refrain from updating their inflation forecasts. Vice versa, members that expect higher unemployment vote for lower interest rates, and the mitigating effect on the updating behavior works precisely into the other direction for the unemployment rate, as indicated by $\hat{\beta} = -0.40^{***}$ the effect of all members plus $\hat{\beta}^{switch} = 0.22^{**}$ as the partial effect of the switchers.

Rülke and Tillmann (2011) differentiate FOMC members into voting and non-voting members and test for herding behavior. By applying the test of Bernhardt, Capello, and Kutsoati (2006) to the members' individual forecasts, they find a tendency towards greater dispersion for inflation forecasts for non-voting members. The findings of Rülke and Tillmann (2011) or Tillmann (2011) suggest that members who cannot decide actively on monetary policy exaggerate their inflation forecasts. Estimation results from section 3

show that monetary policy makers that actively tried to set the Fed Funds Rate but got outvoted on their way, induce forecast dispersion and skew. Rather opposite to Rülke and Tillmann (2011) and Tillmann (2011), this section 4's findings suggest that a change in the individual monetary policy stance results in a reluctance to updating forecasts. The update reaction of switchers is significantly smaller compared to monetary policy makers with a more consistent voting behavior. These results imply that mitigation rather than exaggeration coincides with minority views on monetary policy, as if members who already attracted attention during a voting period by switching their voting behavior submit more moderate inflation and unemployment forecast revisions to keep their forecasting behavior out of the spotlight.

# 5 Conclusion

Disagreement among individuals is a characteristic feature of group decision-making. For the Federal Open Market Committee, the main decision-making body of the Federal Reserve System, entrusted with both making interest rate decisions and formulating macroeconomic forecasts, I find that the dispersion of the committee members' individual interest rates translates into the dispersion of their individual macroeconomic forecasts. The direction of disagreement, however, deserves particular attention. By using skew-related measures, that is, by gauging disagreement in terms deviations of individual forecasts and interest rates from a central value, I can account for the direction of disagreement. Assuming that the consensus view can represented by a modal value and noticing that minority views differing from the consensus view translate into the mean value of the respective variable, skew allows to gauge the impact of minority voting on forecast disagreement easily.

In simple panel estimation exercises, I established an empirical relationship between the skew in the FOMC's individual members' macroeconomic assessments and the skew in their corresponding views on the appropriate level of the Fed Funds Rate. I find individual inflation forecasts to exceed the consensus view the greater individual interest rates differ from the majority's Fed Funds Rate decision. At the same instance, individual unemployment forecasts tend to fall short of the consensus view. These findings imply that hawkish minority voters observe interest rates subjectively set too low and inappropriate to meet the goals of the Fed's Dual Mandate. To communicate updated expectations about an over-expansionary economic activity, the unemployment forecast is being revised downwards below the consensus view, and an inflation forecast being revised to exceed the consensus view.

When assessing the forecast revision behavior at the FOMC, I find that members that updated their assessment of appropriate monetary policy to the upside react by applying an upward revision to their inflation forecasts and a downward revision to their unemployment forecasts. Yet, the latter results do not necessarily imply that forecasters exaggerate their differences. When controlling for the dynamics in the voting behavior, I observe that members who switched their voting status between forecasting rounds, e.g. switched from minority voting to become majority voters or vice versa, refrain from updating their inflation forecasts and update their unemployment forecasts to a significantly lesser extent than members who kept their voting status.

Summing up, the estimation exercises conducted in this study established the empirical relationship that dissenting views on appropriate monetary policy are a significant driver of the dispersion in the macroeconomic assessment of the Federal Open Market Committee. Accounting for the direction of interest rate disagreement using skew yields the observation that minority voters that opted for monetary policy tightening forecast higher inflation and lower unemployment rates. Similarly, members that update their individual monetary policy stance towards tightening revise their assessments of inflation to the upside and of unemployment to the downside. However, there seems to be no empirical evidence of forecast exaggeration to signal dissent on the appropriateness of monetary policy. As forecast disagreement can be well-explained by interest rate disagreement, it may represent the remnants of a smoothing process in which the variety of monetary policy preferences is unified by means of majority voting.

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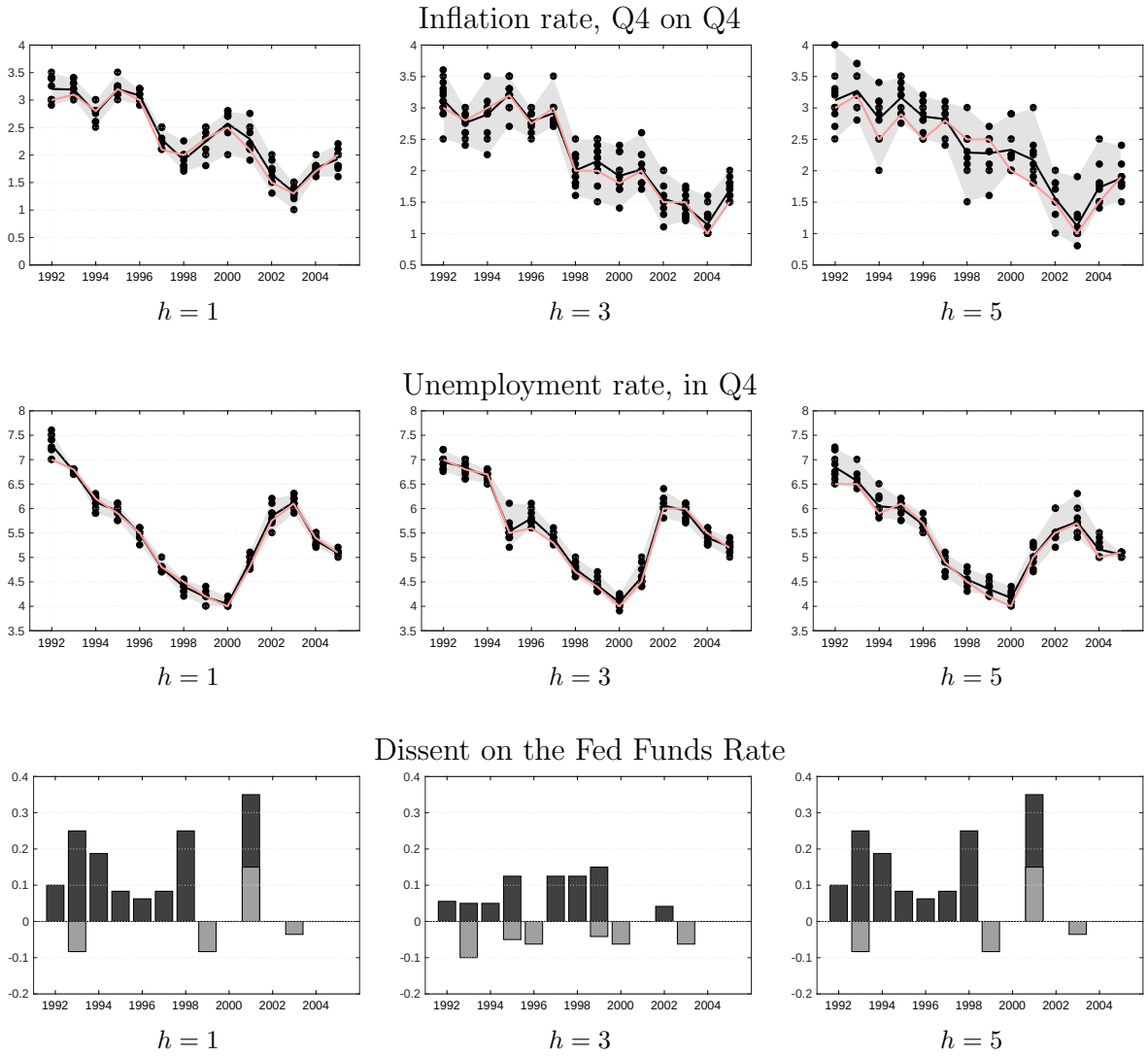
Figure 1: Cross-sectional time series of inflation and unemployment rate forecasts and the Fed Funds Rate dissent




**Notes:** The top panel plots the cross-sectional time series of inflation forecasts for the July forecasting ($h = 1$, $h = 5$) and February forecasting ($h = 3$). The middle panel plots the cross-sectional time series of unemployment forecasts for the July forecasting ($h = 1$, $h = 5$) and February forecasting ($h = 3$). Each vertical array of dots represents the cross-sectional distribution of individual forecasts at time $t$. The solid black line corresponds to the cross-sectional average, the solid rosy line to the cross-sectional modal value of the individual forecasts. The bars of the bottom panel plot the maximum (in black) and minimum (in gray) difference between individual interest rates and the Fed Funds Rate voting outcome.

Table 1a: Monetary policy actions occuring after July forecasting rounds, matched with February forecasts

| Forecast dates | Announcement dates | Type of date | Federal Funds Rate |
|---|---|---|---|
| | 05.08.1991 | conference call‡ | 5.75 |
| | 06.08.1991 | funds rate change‡ | 5.50 |
| | 20.08.1991 | meeting | 5.50 |
| | 13.09.1991 | conference call† | 5.25 |
| | 01.10.1991 | meeting | 5.25 |
| | 30.10.1991 | conference call‡ | 5.25 |
| | 31.10.1991 | funds rate change‡ | 5.00 |
| | 05.11.1991 | meeting | 5.00 |
| | 06.11.1991 | funds rate change | 4.74 |
| | 02.12.1991 | conference call⋆ | 4.75 |
| | 06.12.1991 | funds rate change† | 4.50 |
| | 17.12.1991 | meeting | 4.50 |
| | 20.12.1991 | funds rate change† | 4.00 |
| 11.02.1992 | 04./05.02.1992 | meeting | 4.00 |
| | 18.08.1992 | meeting | 3.25 |
| | 04.09.1992 | funds rate change† | 3.00 |
| | 06.10.1992 | meeting | 3.00 |
| | 17.11.1992 | meeting | 3.00 |
| | 14.12.1992 | conference call⋆ | 3.00 |
| | 22.12.1992 | meeting | 3.00 |
| | 06.01.1993 | conference call⋆ | 3.00 |
| 09.02.1993 | 02./03.02.1993 | meeting | 3.00 |
| | 17.08.1993 | meeting | 3.00 |
| | 21.09.1993 | meeting | 3.00 |
| | 05.10.1993 | conference call⋆ | 3.00 |
| | 15.10.1993 | conference call⋆ | 3.00 |
| | 22.10.1993 | conference call⋆ | 3.00 |
| | 09.11.1993 | conference call⋆ | 3.00 |
| | 10.11.1993 | conference call⋆ | 3.00 |
| | 16.11.1993 | meeting | 3.00 |
| | 21.12.1993 | meeting | 3.00 |
| 15.02.1994 | 03./04.02.1994 | meeting | 3.25 |
| | 20.07.1994 | conference call⋆ | 4.25 |
| | 16.08.1994 | meeting | 4.75 |
| | 27.09.1994 | meeting | 4.75 |
| | 15.11.1994 | meeting | 5.50 |
| | 20.12.1994 | meeting | 5.50 |
| | 30.12.1994 | conference call⋆ | 5.50 |
| 07.02.1995 | 31.01.1995/01.02.1995 | meeting | 6.00 |
| | 22.08.1995 | meeting | 5.75 |
| | 26.09.1995 | meeting | 5.75 |
| | 15.11.1995 | meeting | 5.75 |
| 26.01.1996 | 19.12.1995 | meeting | 5.50 |
| | 20.08.1996 | meeting | 5.25 |
| | 24.09.1996 | meeting | 5.25 |
| | 13.11.1996 | meeting | 5.25 |
| | 17.12.1996 | meeting | 5.25 |
| 11.02.1997 | 04./05.02.1997 | meeting | 5.25 |
| | 19.08.1997 | meeting | 5.50 |
| | 30.09.1997 | meeting | 5.50 |
| | 12.11.1997 | meeting | 5.50 |
| | 16.12.1997 | meeting | 5.50 |
| 10.02.1998 | 03./04.02.1998 | meeting | 5.50 |
| | 18.08.1998 | meeting | 5.50 |
| | 21.09.1998 | conference call⋆ | 5.50 |
| | 29.09.1998 | meeting | 5.25 |
| | 15.10.1998 | conference call† | 5.00 |
| | 17.11.1998 | meeting | 4.75 |
| | 22.12.1998 | meeting | 4.75 |
| Jan/Feb 1999 | 02./03.02.1999 | meeting | 4.75 |

— continued in table 1b —

**Notes:** Entries under 'Type of date' in principle correspond to the historical FOMC meeting dates published under http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm, augmented by relevant dates taken from the Monetary policy Reports. On entries marked with a ‡, decisions were made on the first date, with the change implemented the next day. Individual preferences are inferred from the previous meetings. Entries marked with a † are occasions where there was no official vote, so the individual preferences were inferred from the previous meeting's directive. The transcripts from the meetings, if available, have been taken into account regarding personal preference. Entries marked by a ⋆ are cases where there were no decisions made regarding the funds rate so there is no individual preference data in the data set.

Table 1b: Monetary policy actions occuring after July forecasting rounds, matched with February forecasts

| Forecast dates | Announcement dates | Type of date | Federal Funds Rate |
|---|---|---|---|
| | —continuing table 1a — | | |
| | 24.08.1999 | meeting | 5.25 |
| | 05.10.1999 | meeting | 5.25 |
| | 16.11.1999 | meeting | 5.50 |
| | 21.12.1999 | meeting | 5.50 |
| Jan/Feb 2000 | 01./02.02.2000 | meeting | 5.75 |
| | 22.08.2000 | meeting | 6.50 |
| | 03.10.2000 | meeting | 6.50 |
| | 15.11.2000 | meeting | 6.50 |
| | 19.12.2000 | meeting | 6.50 |
| | 03.01.2001 | conference call | 6.00 |
| January 30-31, 2001 | 30./31.01.2001 | meeting | 5.50 |
| | 21.08.2001 | meeting | 3.50 |
| | 13.09.2001 | conference call | 3.50 |
| | 17.09.2001 | conference call | 3.00 |
| | 02.10.2001 | meeting | 2.50 |
| | 06.11.2001 | meeting | 2.00 |
| | 11.12.2001 | meeting | 1.75 |
| January 29-30, 2002 | 29./30.01.2002 | meeting | 1.75 |
| | 13.08.2002 | meeting | 1.75 |
| | 24.09.2002 | meeting | 1.75 |
| | 06.11.2002 | meeting | 1.25 |
| | 10.12.2002 | meeting | 1.25 |
| January 28-29, 2003 | 28./29.01.2003 | meeting | 1.25 |
| | 12.08.2003 | meeting | 1.00 |
| | 15.09.2003 | meeting | 1.00 |
| | 16.09.2003 | meeting | 1.00 |
| | 28.10.2003 | meeting | 1.00 |
| | 09.12.2003 | meeting | 1.00 |
| January 27-28, 2004 | 28.01.2004 | meeting | 1.00 |
| | 10.08.2004 | meeting | 1.50 |
| | 21.09.2004 | meeting | 1.75 |
| | 10.11.2004 | meeting | 2.00 |
| | 14.12.2004 | meeting | 2.25 |
| February 1-2, 2005 | 02.02.2005 | meeting | 2.50 |

**Notes:** Entries under 'Type of date' in principle correspond to the historical FOMC meeting dates published under http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm, augmented by relevant dates taken from the Monetary policy Reports. On entries marked with a ‡, decisions were made on the first date, with the change implemented the next day. Individual preferences are inferred from the previous meetings. Entries marked with a † are occasions where there was no official vote, so the individual preferences were inferred from the previous meeting's directive. The transcripts from the meetings, if available, have been taken into account regarding personal preference. Entries marked by a ⋆ are cases where there were no decisions made regarding the funds rate so there is no individual preference data in the data set.

Table 2a: Monetary policy actions occuring after February forecasting rounds, matched with July forecasts

| Forecast dates | Announcement dates | Type of date | Federal Funds Rate |
|---|---|---|---|
| | 11.03.1992 | conference call$^{\star}$ | 4.00 |
| | 31.03.1992 | meeting | 4.00 |
| | 09.04.1992 | funds rates change$^{\dagger}$ | 3.75 |
| | 19.05.1992 | meeting | 3.75 |
| | 30.06.1992/01.07.1992 | meeting | 3.75 |
| 09.07.1992 | 02.07.1992 | conference call$^{\dagger}$ | 3.25 |
| | 18.02.1993 | conference call$^{\star}$ | 3.00 |
| | 01.03.1993 | conference call$^{\star}$ | 3.00 |
| | 23.03.1993 | meeting | 3.00 |
| | 18.05.1993 | meeting | 3.00 |
| 12.07.1993 | 06.07.1993/07.07.1993 | meeting | 3.00 |
| | 28.02.1994 | conference call$^{\star}$ | 3.25 |
| | 22.03.1994 | meeting | 3.50 |
| | 24.03.1994 | conference call$^{\star}$ | 3.50 |
| | 18.04.1994 | conference call$^{\dagger}$ | 3.75 |
| | 17.05.1994 | meeting | 4.25 |
| 11.02.1994 | 05.07.1994/06.07.1994 | meeting | 4.25 |
| | 10.03.1995 | conference call$^{\star}$ | 6.00 |
| | 28.03.1995 | meeting | 6.00 |
| | 28.04.1995 | conference call$^{\star}$ | 6.00 |
| | 23.05.1995 | meeting | 6.00 |
| 13.07.1995 | 05.07.1995/06.07.1995 | meeting | 5.75 |
| | 26.03.1996 | meeting | 5.25 |
| | 21.05.1996 | meeting | 5.25 |
| 10.07.1996 | 02.07.1996/03.07.1996 | meeting | 5.25 |
| | 25.03.1997 | meeting | 5.50 |
| | 20.05.1997 | meeting | 5.50 |
| 08.07.1997 | 01.07.1997/02.07.1997 | meeting | 5.50 |
| | 31.03.1998 | meeting | 5.50 |
| | 19.05.1998 | meeting | 5.50 |
| July 1998 | 30.06.1998/01.07.1998 | meeting | 5.50 |
| | 30.03.1999 | meeting | 4.75 |
| | 18.05.1999 | meeting | 4.75 |
| June/July 1999 | 29.06.1999/30.06.1999 | meeting | 5.00 |

— continued in table 2b —

**Notes:** Entries under 'Type of date' in principle correspond to the historical FOMC meeting dates published under http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm, augmented by relevant dates taken from the Monetary policy Reports. On entries marked with a ‡, decisions were made on the first date, with the change implemented the next day. Individual preferences are inferred from the previous meetings. Entries marked with a † are occasions where there was no official vote, so the individual preferences were inferred from the previous meeting's directive. The transcripts from the meetings, if available, have been taken into account regarding personal preference. Entries marked by a $\star$ are cases where there were no decisions made regarding the funds rate so there is no individual preference data in the data set.

Table 2b: Monetary policy actions occuring after February forecasting rounds, matched with July forecasts

| Forecast dates | Announcement dates | Type of date | Federal Funds Rate |
|---|---|---|---|
| | —continuing table 2a — | | |
| | 21.03.2000 | meeting | 6.00 |
| | 15.05.2000 | meeting | 6.00 |
| | 16.05.2000 | funds rate change | 6.50 |
| June/July 2000 | 27.06.2000/28.06.2000 | meeting | 6.50 |
| | 20.03.2001 | meeting | 5.00 |
| | 11.04.2001 | conference call | 5.00 |
| | 18.04.2001 | conference call | 4.50 |
| | 15.05.2001 | meeting | 4.00 |
| June 26-27, 2001 | 26.06.2001/27.06.2001 | meeting | 3.75 |
| | 19.03.2002 | meeting | 1.75 |
| | 07.05.2002 | meeting | 1.75 |
| June 25-26, 2002 | 25.06.2002/26.06.2002 | meeting | 1.75 |
| | 18.03.2003 | meeting | 1.25 |
| | 25.03.2003 | conference call | 1.25 |
| | 01.04.2003 | conference call | 1.25 |
| | 08.04.2003 | conference call | 1.25 |
| | 16.04.2003 | conference call | 1.25 |
| | 06.05.2003 | meeting | 1.25 |
| June 24-25, 2003 | 24.06.2003/25.06.2003 | meeting | 1.00 |
| | 16.03.2004 | meeting | 1.00 |
| | 04.05.2004 | meeting | 1.00 |
| June 29-30, 2004 | 30.06.2004 | meeting | 1.25 |
| | 22.03.2005 | meeting | 2.75 |
| | 03.05.2005 | meeting | 3.00 |
| June 29-30, 2005 | 30.06.2005 | meeting | 3.25 |

**Notes:** Entries under 'Type of date' in principle correspond to the historical FOMC meeting dates published under http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm, augmented by relevant dates taken from the Monetary policy Reports. On entries marked with a ‡, decisions were made on the first date, with the change implemented the next day. Individual preferences are inferred from the previous meetings. Entries marked with a † are occasions where there was no official vote, so the individual preferences were inferred from the previous meeting's directive. The transcripts from the meetings, if available, have been taken into account regarding personal preference. Entries marked by a ⋆ are cases where there were no decisions made regarding the funds rate so there is no individual preference data in the data set.

Table 3: Relative root mean squared forecast errors of competing central forecast values

| $v$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 12 | 16 | 20 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Central value | **Inflation, Q4 on Q4** | | | | | | | | | | | |
| | **h = 1** | | | | | | | | | | | |
| Mean | 0.964 | 0.970 | 0.971 | 0.972 | 0.971 | 0.971 | 0.972 | 0.971 | 0.970 | 0.969 | 0.970 | 0.972 |
| Mode | 0.896 | 0.905 | 0.909 | 0.910 | 0.911 | 0.911 | 0.921 | 0.931 | 0.939 | 0.936 | 0.935 | 0.937 |
| Median | 0.927 | 0.936 | 0.939 | 0.941 | 0.940 | 0.940 | 0.942 | 0.942 | 0.941 | 0.940 | 0.942 | 0.945 |
| Midrange | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | **h = 3** | | | | | | | | | | | |
| Mean | 0.985 | 0.987 | 0.989 | 0.989 | 0.990 | 0.990 | 0.996 | 1.001 | 1.004 | 1.004 | 1.004 | 1.005 |
| Mode | 1.094 | 1.095 | 1.094 | 1.094 | 1.095 | 1.095 | 1.097 | 1.099 | 1.099 | 1.097 | 1.097 | 1.099 |
| Median | 1.008 | 1.010 | 1.011 | 1.011 | 1.012 | 1.012 | 1.021 | 1.028 | 1.034 | 1.032 | 1.030 | 1.031 |
| Midrange | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | **h = 5** | | | | | | | | | | | |
| Mean | 1.022 | 1.024 | 1.025 | 1.025 | 1.026 | 1.026 | 1.030 | 1.034 | 1.037 | 1.036 | 1.035 | 1.036 |
| Mode | 0.960 | 0.966 | 0.969 | 0.972 | 0.975 | 0.975 | 0.987 | 0.998 | 1.008 | 1.003 | 1.001 | 1.004 |
| Median | 1.040 | 1.041 | 1.042 | 1.043 | 1.045 | 1.045 | 1.051 | 1.057 | 1.062 | 1.061 | 1.060 | 1.061 |
| Midrange | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Central value | **Unemployment, in Q4** | | | | | | | | | | | |
| | **h = 1** | | | | | | | | | | | |
| Mean | 1.033 | 1.033 | 1.033 | 1.033 | 1.033 | 1.033 | 1.033 | 1.033 | 1.033 | 1.032 | 1.032 | 1.032 |
| Mode | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 | 1.144 | 1.144 | 1.144 |
| Median | 1.074 | 1.074 | 1.074 | 1.074 | 1.074 | 1.074 | 1.074 | 1.074 | 1.074 | 1.073 | 1.073 | 1.073 |
| Midrange | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | **h = 3** | | | | | | | | | | | |
| Mean | 1.018 | 1.018 | 1.018 | 1.018 | 1.018 | 1.018 | 1.018 | 1.018 | 1.018 | 1.019 | 1.019 | 1.019 |
| Mode | 1.012 | 1.012 | 1.012 | 1.012 | 1.012 | 1.012 | 1.012 | 1.012 | 1.012 | 1.014 | 1.014 | 1.014 |
| Median | 1.047 | 1.047 | 1.047 | 1.047 | 1.047 | 1.047 | 1.047 | 1.047 | 1.047 | 1.049 | 1.049 | 1.049 |
| Midrange | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | **h = 5** | | | | | | | | | | | |
| Mean | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 | 0.967 |
| Mode | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 |
| Median | 0.960 | 0.960 | 0.960 | 0.960 | 0.960 | 0.960 | 0.960 | 0.960 | 0.960 | 0.961 | 0.961 | 0.961 |
| Midrange | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

**Notes:** The index $v$ refers to the quarterly vintage of the real-time data, so that, for instance, $v = 12$ denotes the data release after twelve quarters. The $T = 14$ forecasting rounds of July ($h = 1$ and $h = 5$) yield $N = T \cdot M_t = 139$ individual forecasts matchable to interest rate voting, the February rounds ($h = 1$) yield $N = 191$ individual forecasts.

Table 4: Effect of interest rate dispersion on forecast dispersion

| Central value | Mean | Mode | Median | Midrange |
|---|---|---|---|---|
| | **Inflation, Q4 on Q4** | | | |
| | **h = 1** | | | |
| $\alpha$ | 0.13*** | 0.13*** | 0.12*** | 0.14*** |
| | (0.012) | (0.013) | (0.012) | (0.010) |
| $\beta_d$ | 0.34*** | 0.49** | 0.32* | 0.31*** |
| | (0.099) | (0.150) | (0.130) | (0.094) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.227 | 0.194 | 0.140 | 0.213 |
| | **h = 3** | | | |
| $\alpha$ | 0.17*** | 0.17*** | 0.16*** | 0.20*** |
| | (0.011) | (0.014) | (0.013) | (0.010) |
| $\beta_d$ | 0.63* | 0.54* | 0.75** | 0.39 |
| | (0.249) | (0.263) | (0.283) | (0.225) |
| $N$ | 191 | 191 | 191 | 191 |
| $R^2$ | 0.125 | 0.052 | 0.105 | 0.130 |
| | **h = 5** | | | |
| $\alpha$ | 0.22*** | 0.24*** | 0.20*** | 0.27*** |
| | (0.020) | (0.029) | (0.022) | (0.021) |
| $\beta_d$ | 0.47* | 0.85* | 0.60* | 0.48* |
| | (0.205) | (0.341) | (0.243) | (0.244) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.113 | 0.070 | 0.076 | 0.067 |
| | **Unemployment, in Q4** | | | |
| | **h = 1** | | | |
| $\alpha$ | 0.10*** | 0.11*** | 0.09*** | 0.10*** |
| | (0.005) | (0.007) | (0.007) | (0.004) |
| $\beta_d$ | 0.13* | -0.14 | 0.12 | 0.12* |
| | (0.055) | (0.173) | (0.065) | (0.056) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.302 | 0.161 | 0.215 | 0.310 |
| | **h = 3** | | | |
| $\alpha$ | 0.10*** | 0.10*** | 0.10*** | 0.11*** |
| | (0.005) | (0.009) | (0.006) | (0.006) |
| $\beta_d$ | 0.15 | 0.04 | 0.15 | 0.12 |
| | (0.113) | (0.163) | (0.139) | (0.130) |
| $N$ | 191 | 191 | 191 | 191 |
| $R^2$ | 0.076 | 0.039 | 0.035 | 0.057 |
| | **h = 5** | | | |
| $\alpha$ | 0.14*** | 0.16*** | 0.13*** | 0.16*** |
| | (0.007) | (0.012) | (0.008) | (0.009) |
| $\beta_d$ | 0.04 | -0.10 | 0.05 | -0.02 |
| | (0.108) | (0.162) | (0.125) | (0.099) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.155 | 0.075 | 0.098 | 0.173 |

**Notes:** Standard errors in parentheses are panel-corrected for cross-correlation and autocorrelation. Asteriks $(***, **, *)$ imply the usual significance level (of 1%, 5%, 10%). The $T = 14$ forecasting rounds of July ($h = 1$ and $h = 5$) yield $N = T \cdot M_t = 139$ individual forecasts matchable to interest rate voting, the February rounds $N = 191$ individual forecasts.

Table 5: Effect of interest rate skew on forecast skew

| Central value | Mean | Mode | Median | Midrange |
|---|---|---|---|---|
| | **Inflation, Q4 on Q4** | | | |
| | **h = 1** | | | |
| $\alpha$ | -0.01 | 0.03 | -0.03 | -0.01 |
| | (0.016) | (0.020) | (0.016) | (0.017) |
| $\beta_s$ | $0.75^{**}$ | $1.09^{***}$ | $0.99^{***}$ | $0.53^{*}$ |
| | (0.253) | (0.240) | (0.218) | (0.269) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.081 | 0.144 | 0.134 | 0.038 |
| | **h = 3** | | | |
| $\alpha$ | -0.00 | $0.06^{*}$ | 0.01 | 0.00 |
| | (0.024) | (0.030) | (0.026) | (0.028) |
| $\beta_s$ | $1.31^{*}$ | $1.37^{*}$ | $1.27^{*}$ | $1.57^{**}$ |
| | (0.557) | (0.544) | (0.573) | (0.562) |
| $N$ | 191 | 191 | 191 | 191 |
| $R^2$ | 0.024 | 0.044 | 0.021 | 0.033 |
| | **h = 5** | | | |
| $\alpha$ | -0.00 | $0.11^{**}$ | 0.02 | -0.03 |
| | (0.030) | (0.038) | (0.030) | (0.032) |
| $\beta_s$ | 0.40 | $0.99^{*}$ | 0.45 | 0.03 |
| | (0.408) | (0.427) | (0.410) | (0.452) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.006 | 0.039 | 0.010 | – |
| | **Unemployment, in Q4** | | | |
| | **h = 1** | | | |
| $\alpha$ | 0.00 | 0.02 | 0.00 | 0.01 |
| | (0.011) | (0.013) | (0.012) | (0.012) |
| $\beta_s$ | $-0.30^{*}$ | -0.39 | $-0.33^{*}$ | $-0.30^{*}$ |
| | (0.147) | (0.205) | (0.146) | (0.151) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.020 | 0.021 | 0.023 | 0.019 |
| | **h = 3** | | | |
| $\alpha$ | 0.00 | $0.03^{***}$ | $0.01^{*}$ | $-0.03^{***}$ |
| | (0.005) | (0.006) | (0.005) | (0.005) |
| $\beta_s$ | $-0.81^{**}$ | $-0.85^{*}$ | $-0.81^{**}$ | $-0.90^{*}$ |
| | (0.302) | (0.331) | (0.296) | (0.408) |
| $N$ | 191 | 191 | 191 | 191 |
| $R^2$ | 0.026 | 0.034 | 0.027 | 0.035 |
| | **h = 5** | | | |
| $\alpha$ | 0.00 | $0.08^{***}$ | 0.02 | $-0.04^{*}$ |
| | (0.014) | (0.020) | (0.016) | (0.016) |
| $\beta_s$ | -0.28 | -0.34 | -0.12 | -0.13 |
| | (0.250) | (0.274) | (0.272) | (0.283) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.008 | 0.018 | 0.003 | 0.003 |

**Notes:** Standard errors in parentheses are panel-corrected for cross-correlation and autocorrelation. Asteriks $(***, **, *)$ imply the usual significance level (of 1%, 5%, 10%). The $T = 14$ forecasting rounds of July ($h = 1$ and $h = 5$) yield $N = T \cdot M_t = 139$ individual forecasts matchable to interest rate voting, the February rounds $N = 191$ individual forecasts.

Table 6a: Effect of FOMC governors' and regional Fed presidents' interest rate skew on inflation forecast skew

| Central value | Mean | Mode | Median | Midrange |
|---|---|---|---|---|
| | **Inflation, Q4 on Q4** | | | |
| | **h = 1** | | | |
| $\alpha$ | -0.01 | 0.04 | -0.03 | -0.01 |
| | (0.016) | (0.021) | (0.016) | (0.017) |
| $\beta_s^{gov}$ | -0.14 | 0.36 | 0.11 | -0.32 |
| | (0.298) | (0.250) | (0.241) | (0.309) |
| $\beta_s^{pres}$ | 0.92*** | 1.30*** | 1.23*** | 0.69** |
| | (0.237) | (0.226) | (0.174) | (0.263) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.111 | 0.189 | 0.197 | 0.065 |
| | **h = 3** | | | |
| $\alpha$ | -0.00 | 0.06* | 0.01 | 0.01 |
| | (0.024) | (0.029) | (0.026) | (0.029) |
| $\beta_s^{gov}$ | -1.28 | -1.32 | -1.34 | -1.23 |
| | (1.406) | (1.366) | (1.377) | (1.491) |
| $\beta_s^{pres}$ | 1.87** | 1.94*** | 1.83** | 2.13*** |
| | (0.591) | (0.570) | (0.606) | (0.582) |
| $N$ | 191 | 191 | 191 | 191 |
| $R^2$ | 0.045 | 0.064 | 0.041 | 0.054 |
| | **h = 5** | | | |
| $\alpha$ | -0.00 | 0.12** | 0.02 | -0.03 |
| | (0.030) | (0.037) | (0.030) | (0.032) |
| $\beta_s^{gov}$ | -0.58 | 0.21 | -0.32 | -1.07 |
| | (0.504) | (0.515) | (0.531) | (0.609) |
| $\beta_s^{pres}$ | 0.79* | 1.52** | 0.80 | 0.32 |
| | (0.401) | (0.480) | (0.431) | (0.467) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.030 | 0.069 | 0.024 | 0.019 |

**Notes:** Standard errors in parentheses are panel-corrected for cross-correlation and autocorrelation. Asteriks $(***, **, *)$ imply the usual significance level (of 1%, 5%, 10%). The $T = 14$ forecasting rounds of July ($h = 1$ and $h = 5$) yield $N = T \cdot M_t = 139$ individual forecasts matchable to interest rate voting, the February rounds $N = 191$ individual forecasts.

Table 6b: Effect of FOMC governors' and regional Fed presidents' interest rate skew on unemployment forecast skew

| Central value | Mean | Mode | Median | Midrange |
|---|---|---|---|---|
| | **Unemployment, in Q4** | | | |
| | **h = 1** | | | |
| $\alpha$ | 0.00 | 0.02 | 0.00 | 0.01 |
| | (0.011) | (0.013) | (0.012) | (0.012) |
| $\beta_s^{gov}$ | -0.10 | -0.33 | -0.18 | -0.13 |
| | (0.206) | (0.257) | (0.198) | (0.196) |
| $\beta_s^{pres}$ | -0.36 | -0.34 | -0.39 | -0.36 |
| | (0.201) | (0.301) | (0.212) | (0.210) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.021 | 0.014 | 0.023 | 0.021 |
| | **h = 3** | | | |
| $\alpha$ | 0.00 | $.03^{***}$ | $0.01^{*}$ | $-0.03^{***}$ |
| | (0.005) | (0.005) | (0.004) | (0.005) |
| $\beta_s^{gov}$ | $-2.01^{*}$ | $-2.99^{**}$ | $-2.54^{**}$ | -1.64 |
| | (0.833) | (0.914) | (0.835) | (1.022) |
| $\beta_s^{pres}$ | -0.55 | -0.36 | -0.44 | -0.75 |
| | (0.313) | (0.323) | (0.302) | (0.446) |
| $N$ | 191 | 191 | 191 | 191 |
| $R^2$ | 0.038 | 0.061 | 0.047 | 0.038 |
| | **h = 5** | | | |
| $\alpha$ | 0.00 | $0.08^{***}$ | 0.02 | $-0.04^{*}$ |
| | (0.014) | (0.020) | (0.015) | (0.016) |
| $\beta_s^{gov}$ | 0.12 | 0.11 | 0.34 | 0.17 |
| | (0.448) | (0.482) | (0.461) | (0.459) |
| $\beta_s^{pres}$ | -0.50 | $-0.58^{*}$ | -0.38 | -0.30 |
| | (0.257) | (0.281) | (0.296) | (0.310) |
| $N$ | 139 | 139 | 139 | 139 |
| $R^2$ | 0.020 | 0.028 | 0.017 | 0.008 |

**Notes:** Standard errors in parentheses are panel-corrected for cross-correlation and autocorrelation. Asteriks $(**, **, *)$ imply the usual significance level (of 1%, 5%, 10%). The $T = 14$ forecasting rounds of July ($h = 1$ and $h = 5$) yield $N = T \cdot M_t = 139$ individual forecasts matchable to interest rate voting, the February rounds $N = 191$ individual forecasts.

Table 7: Effect of changing stance on forecast updating

| | Pooled OLS | Pooled OLS w/o constant | Pooled OLS | Pooled OLS w/o constant |
|---|---|---|---|---|
| | **Inflation, Q4 on Q4** | | | |
| $\alpha$ | $0.13^{***}$ | | $0.10^{**}$ | |
| | (0.034) | | (0.034) | |
| $\beta$ | 0.02 | 0.01 | $0.18^{*}$ | $0.25^{***}$ |
| | (0.037) | (0.043) | (0.071) | (0.076) |
| $\beta^{\text{switch}}$ | | | $-0.23^{**}$ | $-0.34^{***}$ |
| | | | (0.081) | (0.085) |
| $N$ | 124 | 124 | 124 | 124 |
| $R^2$ | 0.001 | 0.001 | 0.042 | 0.089 |
| | **Unemployment, in Q4** | | | |
| $\alpha$ | $-0.09^{***}$ | | $-0.07^{*}$ | |
| | (0.027) | | (0.031) | |
| $\beta$ | $-0.25^{***}$ | $-0.25^{***}$ | $-0.35^{***}$ | $-0.40^{***}$ |
| | (0.028) | (0.033) | (0.060) | (0.047) |
| $\beta^{\text{switch}}$ | | | 0.14 | $0.22^{***}$ |
| | | | (0.073) | (0.057) |
| $N$ | 124 | 124 | 124 | 124 |
| $R^2$ | 0.291 | 0.267 | 0.307 | 0.311 |

**Notes:** Robust standard errors in parentheses. Asteriks $(***, **, *)$ imply the usual significance level (of 1%, 5%, 10%). Matching the $T = 14$ forecasting rounds of February and July accounting only for members who voted and forecast at the meeting where forecasts are submitted results in a dataset of $N = 124$ individual observations.

Table 8: Dynamics of FOMC members' voting status between February and July forecasting rounds

| | majority voter | dissenter |
|---|---|---|
| stayed | 97 | 2 |
| switched to | 6 | 19 |

**Notes:** The table numbers the occasions where members have kept or changed their voting behavior between the February and July forecasting rounds. Matching the T = 14 forecasting rounds of February and July accounting only for members who voted and forecast at the meeting where forecasts are submitted results in a dataset of $N = 124$ individual observations. 97 members kept voting with the majority, and 2 members kept dissenting from the majority. 9 dissenters switched to voting with the majority, and 19 departed from the majority and dissented.