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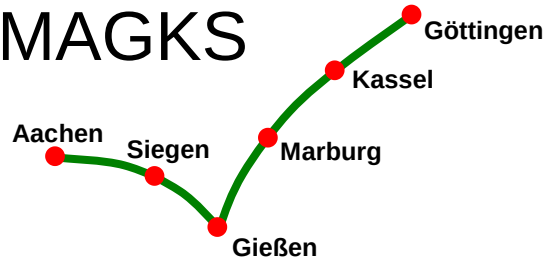

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Reputation and Forecast Revisions: Evidence from the FOMC

Reputation and Forecast Revisions: Evidence from the FOMC

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Abstract: This paper investigates how FOMC members revise their forecasts for key macroeconomic variables. Based on a new data set of forecasts from individual FOMC members between 1992 and 2000 it is shown that FOMC members intentionally overrevise their forecasts at the first revision and underrevise at the final revision date. This pattern of rationally biased forecasts is similar to that of private sector forecasters and is consistent with theories of reputation building among forecasters. The FOMC's shift towards more transparency in 1994 had an impact on how members revised their forecasts and intensified the tendency to underrevise at the later stage of the forecasting process. The tendency to underrevise, i.e. to smooth forecast revisions, is particularly strong for nonvoting members of the committee.

Keywords: biased forecasts, reputation, forecast errors, monetary policy, transparency, Federal Reserve

JEL classification: E43, E52

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1 Introduction

Forecasts of macroeconomic variables are often biased, i.e. the forecast errors are correlated with information available at the time the forecasts were made. This, however, does not necessarily imply deviations from rationality. If forecasters are evaluated before the realizations of the forecast variables are known, they have incentives to submit biased forecasts. They could underadjust to new information to mimic the behavior of established forecasters or overadjust to new information to signal their superior information set. These predictions are formally derived by Ehrbeck and Waldmann (1996) as equilibrium outcomes of a game between a forecaster and a client.[2] A large literature tests these predictions using various data sets.

This paper tests the reputational incentives for forecasters using data of individual forecasts submitted by members of the Federal Open Market Committee (FOMC) of the U.S. Federal Reserve. This data set was made available recently. Previous studies only were able to use the published, i.e. the aggregate, forecast of the FOMC. We provide the first evidence on biased forecasts due to reputational incentives of individual FOMC members.[3] The results suggest a pattern similar to private sector forecasters: forecasters underreact to new information at the latest forecast revision. At the earlier revision date, however, they intentionally overreact to new information. Hence, biased forecasts of monetary policymakers are affected by reputational concerns. In many specifications, in particular for inflation forecasts, the tendency to overrevise at the first opportunity and to underrevise at the final stage, i.e. to smooth forecast revisions, is particularly strong for nonvoting members of the committee. Nonvoting members appear to make greater use of their forecast in order to establish reputation. This is important because the FOMC's own projections are an important input for monetary policy decisions. Orphanides and Wieland (2008) recently show that FOMC forecasts have more explanatory power for actual interest rate decisions than observed outcomes.

Our findings might also explain why the FOMC's forecasts are systematically less informative than the Greenbook forecasts formulated by the Federal Reserve staff. Romer and Romer (2008) find that FOMC inflation forecasts do not contain useful information beyond those included in staff forecasts. A bias due to reputational concerns could be responsible for the poor performance of FOMC forecasts.

[2] Capistran (2008) offers an alternative explanation of biased forecasts in terms of an asymmetric loss function of forecasters. He finds that in the post-Volcker era the Fed's cost of under-predicting inflation was four times the cost of over-predicting.

[3] In a companion paper, Tillmann (2011) shows that hawkish FOMC members submit higher inflation forecasts and, hence, use their forecast strategically. Herding behavior of forecasters is found by Rülke and Tillmann (2011).

The Federal Reserve, like many other central banks, has gradually moved towards a higher degree of transparency. Since 1994 the FOMC has published transcripts of meetings with a five year lag and has been releasing a brief rationale for policy actions. Both measures were intentionally designed to improve the anticipation of future monetary policy decisions by financial market participants and the wider public.[4] As a byproduct, however, these measures not only affected the communication with the public, but also affected the behavior within the FOMC itself. Meade and Stasavage (2008) show that under the new regime Federal Reserve governors and presidents are significantly less likely to express verbal dissent. Among the repercussions on the interaction within the committee could also be a change in the way FOMC members revise their economic forecasts. Although individual forecasts were still not published under the new regime, they were affected indirectly. Since the rationale for policy actions released after interest rate decisions contains hints to the prospects for the economy over the near future, economic forecasts should have become more important in shaping the committee's views. This, in turn, should have strengthened tendencies for reputation building by means of biased forecasting behavior. Since the FOMC's emphasis in the statement is on economic developments in the near future, we expect a stronger effect of the regime shift on the second and last round of forecast revisions in contrast to the first revision opportunity. We find that the shift in 1994 indeed had a strong impact on the final revision, i.e. the update of the outlook for the near future, and no impact on the first revision opportunity.

This paper is organized as follows. Section two outlines the theoretical framework and derives testable implications. The data set is presented in section three. Section four discusses the empirical results. The impact of increased Fed transparency on forecasting behavior is assessed in section five. Section six concludes.

2 Reputation and rational forecast bias

Biased forecasts do not necessarily reflect deviations from forecast rationality. Incentives such as reputation and remuneration affect the behavior of forecasters and, as a consequence, the properties of forecasts. In their seminal contribution, Ehrbeck and Waldmann (1996) model these incentives in a simple game between a forecaster and a client.

Their model delivers predictions for the slope coefficient in a regression of the forecast error on forecast revisions. In a setting with repeated forecasts, forecasters balance their aim of minimizing forecast errors and building reputation before the outcome is finally observed. The authors show that in equilibrium forecasters have an incentive to make only small

[4] A survey of these steps is presented in Kohn and Sack (2003). Swanson (2006), among others, evaluates the effect of increased Fed transparency on private sector interest rate forecasts.

revisions in their forecasts in order to mimic more experienced and accurate forecasters. They are "rationally stubborn" (Peterson 2001) and smooth their forecast revisions over time. As a consequence, rational forecasters underadjust to new information and the forecast error will be negatively correlated with forecast revisions.[5]

In a second specification of their model, Ehrbeck and Waldmann (1996) let forecasters receive two successive signals. The quality of the first signal is identical for all forecasters. The quality of the second signal, however, differs across forecasters, which can be interpreted as different abilities to interpret previous information in later periods. In equilibrium, forecasters will change their forecast too much because a bold revision is seen as a signal of high quality second-period information. This mechanism implies that forecast errors will be positively correlated with forecast revisions because forecasters overadjust to new information.

A wide literature tests the implications of the Ehrbeck-Waldmann model using various data sets.[6] Amir and Ganzach (1998) assess earnings forecasts of financial market participants. Peterson (2001) finds forecast smoothing for professional yield curve forecasters. Interestingly, he shows important differences in forecast revisions between the first and the second revision opportunity. This will become relevant for our purpose as well. Ashyia (2003, 2006) studies the behavior of Japanese GDP forecasts and GDP forecasts of supranational institutions, respectively. Clements, Joutz and Stekler (2007) use an alternative approach that allows the authors to pool forecasts over different horizons. They provide evidence for forecast smoothing of Greenbook forecasts for inflation, but not for real variables. Kirchgässner and Müller (2006) estimate a similar regression equation and find that German macroeconomic forecasters smooth their forecasts. They interpret this finding as evidence for the reluctance of forecasters to admit mistakes.

We consider forecasts for a variable x_t which is either the inflation rate, the growth rate of real GDP or the unemployment rate, i.e. $x_t \in \{\pi_t, y_t, u_t\}$. At time t a forecaster i chooses a forecast $\mathcal{F}_t^i x_{t+h}$, where h is the forecast horizon. The forecast revision between $t-1$ and t is $\Delta\mathcal{F}_t^i x_{t+h} = \mathcal{F}_t^i x_{t+h} - \mathcal{F}_{t-1}^i x_{t+h}$. This notation follows Coibion and Gorodnichenko

[5] An alternative explanation of biased forecasts, resulting in an identical regression equation, is provided by Coibion and Gorodnichenko (2011). These authors use the concept of rational inattention to map the estimated slope coefficient into a measure of the frequency by which forecasters update their information set. However, given the vast amount of resources invested in the preparation of each FOMC meeting and, in particular, into the forecasting process, this explanation seems implausible for Fed forecasts. Andrade and Le Bihan (2010) estimate of the frequency of information updating in the ECB's survey of professional forecasters. Cross-country evidence based on GDP forecasts is presented by Loungani, Stekler and Tamirisa (2011).

[6] In an early contribution, Scotese (1994) finds forecast smoothing, referred to as a "reputation effect", in Fed staff forecasts for GNP between 1976 and 1985.

(2011). The first release of the actual variable at time $t+h$ is x_{t+h}. To test the model of Ehrbeck and Waldmann (1996), we follow the literature and estimate the following regression equation

$$\mathcal{F}_t^i x_{t+h} - x_{t+h} = c + \alpha \Delta \mathcal{F}_t^i x_{t+h} + \varepsilon_t \tag{1}$$

where c is a constant, α the slope coefficient and ε_t is the error term. Equation (1) relates the forecast error of forecaster i to his forecast revision. The null hypothesis of rational expectations requires $\tilde{c} = \tilde{\alpha} = 0$. The hypothesis of rational underadjustment or forecast smoothing, respectively, is consistent with $\tilde{\alpha} < 0$. Alternatively, the hypothesis of rational overadjustment implies $\tilde{\alpha} > 0$. We test these hypotheses using individual forecasts from FOMC members.

We will also test whether successive forecast revisions change sign. In the spirit of Nordhaus (1987), we estimate the regression

$$\Delta \mathcal{F}_t^i x_{t+h} = c + \alpha \Delta \mathcal{F}_{t-1}^i x_{t+h} + \varepsilon_t \tag{2}$$

The slope coefficient is smaller than one if forecast revisions are smaller in absolute terms at the second revision.[7] The sign of the slope coefficient is negative if a forecaster makes a bold revision in one direction at the first revision opportunity and a second revision in the opposite direction thereafter.

3 The data set

The FOMC, the decision making body of the Federal Reserve, consists of the governors of the Federal Reserve board, the Chairman of the board of governors and the Presidents of the regional Federal Reserve Banks. While only a subgroup of members votes on interest rate policy, all FOMC members regularly submit forecasts for important macroeconomic variables including the rate of inflation.

Twice a year at its February and July meetings the FOMC publishes the monetary policy report to congress.[8] Each FOMC member submits her own forecasts, after intensive briefing by the Board staff. Until recently, however, individual forecasts were kept secret. The published report only contains a range of forecasts and the midpoint of this range, also known as the central tendency.

Recently, the Fed made data on individual FOMC forecasts available for selected years. Based on these releases, Romer (2010) constructs a data set containing forecasts for the

[7] Isiklar, Lahiri and Loungani (2006) and Capistrán and López-Moctezuma (2010) exploit the panel structure of multi-dimensional data sets to test the Nordhaus (1987) hypothesis.

[8] Recently, the frequency of forecasts was increased to four forecasts per year.

period 1992-1998. The data set was recently updated to 1992-2000 is available at David Romer's website. Due to the ten-year publication lag, there is no later data available at the time of writing. The data set contains forecasts from board members as well as from the 12 voting and non-voting regional Federal Reserve Bank presidents. It does not, however, contain forecasts from the chairman.

In the July report, the FOMC prepares forecasts for the inflation rate, the annual growth rate of real GDP and the unemployment rate in the fourth quarter of the current and the next calendar year. The February report contains forecasts for the fourth quarter of the current calendar year. We contrast the forecasts with real-time data on actual realizations, which is also available on David Romer's website.[9] For GDP we use estimates which are released three months after the end of the quarter. Although these numbers are slightly revised, they correspond to what the FOMC and the staff were trying to forecast. For the other variables we use the first release.

Since in our sample period FOMC members submitted forecasts twice a year, we consider two successive forecast revisions. The first revision happens at the February meeting and is denoted by $\mathcal{F}^i_{Feb}x_{Dec} - \mathcal{F}^i_{prevJuly}x_{Dec}$. In that meeting, members update their forecasts submitted at the July meeting in the previous calendar year. We consider only those cases in which both forecasts are submitted by the same individual, i.e. we exclude a few cases where a governor or regional bank president revises the forecast submitted by his predecessor. A second revision happens at the July meeting, where the February forecasts could be updated, i.e. $\mathcal{F}^i_{July}x_{Dec} - \mathcal{F}^i_{Feb}x_{Dec}$.

For the February revisions, we estimate

$$\mathcal{F}^i_{Feb}x_{Dec} - x_{Dec} = c + \alpha\left(\mathcal{F}^i_{Feb}x_{Dec} - \mathcal{F}^i_{prevJuly}x_{Dec}\right) + \varepsilon_{Feb} \tag{3}$$

and for the July revision, the regression is

$$\mathcal{F}^i_{July}x_{Dec} - x_{Dec} = c + \alpha\left(\mathcal{F}^i_{July}x_{Dec} - \mathcal{F}^i_{Feb}x_{Dec}\right) + \varepsilon_{July} \tag{4}$$

Hence, we regress the forecast error, given either the February or the July forecast, on the latest forecast revisions. Since monetary policy decisions are taken based on expectations, we relate the forecast error made at a particular forecast meeting to the revision of forecasts at the same meeting.

- Table (1) about here -

The forecast revisions are plotted in figure (1). Revisions at each meeting are substantial and vary over time. Interestingly, at many meetings members differ not only with respect

[9] See `http://elsa.berkeley.edu/~dromer/`.

to the size of their revision but also the sign of the revision. Table (1) presents some descriptive statistics on the forecast revisions for all three variables. The absolute value of the revisions of inflation and unemployment forecasts are smaller at the second revision opportunity. Changes in output growth forecasts, however, are larger at the second revision.

To the extent members base there forecasts on a macroeconomic model, the revisions of inflation forecasts should be consistent with revisions for real economic activity. Based a simple Phillips curve relationship, for example, one would expect an upward revision of inflation coinciding with an upward revision of growth forecasts or a downward revision of unemployment projections. Table (1) shows that this is the case for the July revision, but not the February revision. One has to bear in mind, however, that during the 1990s the link between inflationary pressure and economic activity weakened due to favorable productivity shocks.[10] This might explain why the mean revision of inflation expectations is negative, while the mean revision of GDP growth is positive.

4 Over- or underrevision of forecasts?

All regression results are based on pooled OLS. The results for the FOMC's inflation forecasts are presented in table (2). Consider first the second forecast revision, i.e. the revision at the July meeting. If all submitted forecasts are included in the panel, we do not find evidence in favor of an underadjustment of forecasts. For the group of Federal Reserve bank presidents and nonvoting FOMC members, however, the estimated slope coefficient is significantly negative. Members of those two groups are reluctant to make bold forecast revisions and instead smooth their forecast revisions over time.

Interestingly, the sign of the slope coefficient is different for the first revision opportunity at the February meeting. Members show clear signs of overadjustment at this stage of the forecasting process. One reason for that is that at the first revision members could hide their reputational concerns or strategic motives, respectively, behind a large veil of forecast uncertainty. Signalling competence by submitting a bold revision is more attractive if the general degree of uncertainty is large, i.e. at the first revision opportunity. At the second revision, the general level of uncertainty is lower and building reputation through forecasting becomes more difficult.

These findings of a change in the sign of the slope coefficients are similar to the results of Peterson (2001) obtained for professional yield curve forecasters. At the first revision opportunity, forecasters submit bold changes to their forecasts, probably to establish a

[10] Tillmann (2010) provides an analysis of the Fed's perceived Phillips curve trade-off embodied in these forecasts and shows how that trade-off shifted in the 1990s.

reputation for forecast ability as suggested by the Ehrbeck-Waldman model. At the second meeting, forecasters underadjust to new information. The effect is stronger for Fed governors than for presidents. Furthermore, there is a significant degree of overadjustment for nonvoting members but not for voting members.

- Tables (2) to (4) about here -

A similar pattern is observed for output growth forecasts, see table (3). For the July revisions the estimated slope coefficient is significantly negative for the entire group of members, while it is significantly positive for the February meeting. The results indicate a significant degree of overadjustment of forecasts at the first revision opportunity and a tendency to underadjust at the second opportunity. At the February meeting, the propensity to overadjust previous forecasts is much stronger for governors than for presidents and stronger for voting members than for nonvoting members. At the subsequent revision in July, however, presidents and nonvoters exhibit a stronger tendency to underadjust than governors and voting members, respectively.
The results for the unemployment forecasts are shown in table (4). While the slope coefficient is not statistically significant for the July meeting, there is strong evidence for an overadjustment of forecasts at the February meeting.
Table (8) presents the results for the Nordhaus-regression of the July revision on the preceding February revision, i.e.

$$\mathcal{F}^i_{July}x_{Dec} - \mathcal{F}^i_{Feb}x_{Dec} = c + \alpha\left(\mathcal{F}^i_{Feb}x_{Dec} - \mathcal{F}^i_{prevJuly}x_{Dec}\right) + \varepsilon_t \tag{5}$$

For inflation and unemployment, the estimated slope coefficient is negative and smaller than one. If members, say, revise their inflation forecast upwards in the February meeting, they tend to revise the forecast downwards at the following July meeting. This tendency is particularly strong for nonvoting members of the committee. For employment, however, the estimated slope coefficient is not statistically different from zero.

5 The impact of increased transparency

To evaluate whether the shift to increased transparency in 1993 had an impact on the forecasting behavior, we let the forecast revision interact with a dummy variable

$$\mathcal{F}^i_t x_{t+h} - x_{t+h} = c + \alpha\Delta\mathcal{F}^i_t x_{t+h} + \beta D_{1994} + \gamma\left(D_{1994} \times \Delta\mathcal{F}^i_t x_{t+h}\right) + \varepsilon_t \tag{6}$$

where D_{1994} is a step dummy that takes the value of one from the February 1994 meeting onwards. A significant estimate of γ would imply that link between forecast errors and forecast revisions changed after 1993.
Table (5) shows the results for the inflation forecasts when a regime shift is included. The increase towards higher transparency strongly affects the second revision of forecasts, but not the first. Since the transparent Fed communication pertains to the outlook for the near future, is appears plausible that the effect is strongest for the final revision opportunity roughly six months before the realization of the variable. The revisions 12 months ahead, in contrast, remain unaffected by the new regime. After February 1994 members shift from overrevision to underrevision following the arrival of new information.

- Tables (5) to (7) about here -

A similar observation holds for output growth forecasts, see table (6). The regime shift affects only the second revision of forecasts. While there is an insignificant effect of revisions on forecast errors in the constant-regime regression, there is strong evidence of underrevision after the regime shift. In contrast to the forecasts for inflation and output growth, the revisions of unemployment forecasts are affected at both revision opportunities. The regime shift leads to a stronger overadjustment at the February meeting. At the July meeting, the significantly positive effect of the interaction term offsets the negative effect of $\Delta\mathcal{F}_t^i x_{t+h}$, such that the effect of revisions on forecast errors disappears. Again the effect of increase transparency is much stronger for Federal Reserve bank presidents and nonvoting FOMC members, respectively.
Another step toward increased transparency was undertaken in May 1999. It was decided to issue a press statement immediately following an FOMC meeting at which there are shifts in the committee's views about prospective economic developments.[11] In January 2000, this was modified to include a statement on the balance of risks between heightened inflationary pressure and economic weakness over the foreseeable future. Unfortunately, our data set is too short to allow an analysis of the effects of these changes on FOMC forecasts.

6 Conclusions

Professional forecasters are known to submit biased forecasts. Models of strategic behavior show that forecasters could have in incentive to smooth revisions of their forecasts over time

[11] The early days of the "bias" associated with a monetary policy directive are studied by Chappell, McGregor and Vermilyea (2007). These authors find that it influenced voting by FOMC members and helped in crafting consensus within the committee between 1987 and 1992.

in order to establish reputation. Likewise, it is possible to signal forecasting competence by making overly bold revisions. This paper showed that a similar pattern can be found for forecasts submitted by members of the FOMC. At the first revision opportunity, members make bold revisions of the initial forecasts. At the second and final revision date, however, they tend to smooth forecast revisions. We also showed that the FOMC's shift towards more transparency in 1994 had an impact on the revision behavior at the final revision meeting.

The results shed light on the forecasting behavior of members of monetary policy committees and are important for the design of monetary committees. In many central banks, in particular those that adopted a strategy of inflation targeting, the central bankers' own projections are crucial for policy decisions and are formulated within a committee. We showed that incentives such as reputation building and strategic interaction of forecasters play a non-negligible role in formulating expectations of macroeconomic variables. Future research, which will be based on a larger data sample, is needed in order to evaluate the impact of biased FOMC forecasts on interest rate decisions and policy outcomes.

References

[1] Amir, E. and Y. Ganzach (1998): "Overreaction and underreaction in analysts' forecasts", *Journal of Economic Behavior and Organization* 37, 333-347.

[2] Andrade, P. and H. Le Bihan (2010): "Inattentive professional forecasters", *unpublished*, Banque de France.

[3] Ashiya, M. (2003): "Testing the rationality of Japanese GDP forecasts: the sign of forecast revision matters", *Journal of Economic Behavior and Organization* 50, 263-269.

[4] Ashiya, M. (2006): "Testing the rationality of forecast revisions made by the IMF and the OECD", *Journal of Forecasting* 25, 25-36.

[5] Capistrán, C. (2008): "Bias in Federal Reserve inflation forecasts: is the Federal Reserve irrational or just cautious?", *Journal of Monetary Economics* 55, 1415-1427.

[6] Cápistran, C. and G. López-Moctezuma (2010): "Forecast revisions of Mexican inflation and GDP growth", *Working Paper* No. 2010-11, Banco de México.

[7] Chappell, H. W., R. R. McGregor and T. A. Vermilyea (2007): "The role of the bias in crafting consensus: FOMC decision making in the Greenspan era", *International Journal of Central Banking* 3, 39-60.

[8] Clements, M. P., F. Joutz and H. O. Stekler (2007): "An evaluation of the forecasts of the Federal Reserve: a pooled approach", *Journal of Applied Econometrics* 22, 121-136.

[9] Coibion, O. and Y. Gorodnichenko (2011): "Information rigidity and the expectations formation process: a simple framework and new facts", *unpublished*, University of California Berkeley.

[10] Ehrbeck, T. and R. Waldmann (1996): "Why are professional forecasters biased? Agency versus behavioral explanations", *The Quarterly Journal of Economics* 111, 21-40.

[11] Isiklar, G., K. Lahiri and P. Loungani (2006): "How quickly do forecasters incorporate news? Evidence from cross-country surveys", *Journal of Applied Econometrics* 21, 703-725.

[12] Kirchgässner, G. and U. K. Müller (2006): "Are forecasters reluctant to revise their predictions? Some German evidence", *Journal of Forecasting* 25, 401-413.

[13] Kohn, D. L. and B. P. Sack (2003): "Central bank talk: does it matter and why?", *Discussion Paper* No. 2003-55, Board of Governors of the Federal Reserve System.

[14] Loungani, P., H. Stekler and N. Tamirisa (2011): "Information rigidity in growth forecasts: some cross-country evidence", *IMF Working Paper* No. 11/125, International Monetary Fund.

[15] Meade, E. E. and D. Stasavage (2008): "Publicity of debate and the incentive to dissent: evidence from the US Federal Reserve", *The Economic Journal* 118, 695-717.

[16] Nordhaus, W. D. (1987): "Forecasting efficiency: concepts and applications", *The Review of Economics and Statistics* 69, 667-674.

[17] Orphanides, A. and V. Wieland (2008): "Economic projections and rules of thumb for monetary policy", *Federal Reserve Bank of St. Louis Review* 90, 307-24.

[18] Peterson, S. P. (2001): "Rational bias in yield curve forecasts", *The Review of Economics and Statistics* 83, 457-464.

[19] Poole, W. and R. H. Rasche (2003): "The impact of changes in FOMC disclosure practices on the transparency of monetary policy: are markets and the FOMC better 'synched'?", *Federal Reserve Bank of St. Louis Review*, January/February 2003, 1-10.

[20] Rasche, R. H. and D. L. Thornton (2002): "The FOMC balance-of-risks statement and market expectations of policy actions", *Federal Reserve Bank of St. Louis Review*, September/October 2002, 37-50.

[21] Romer, D. H. (2010): "A new data set on monetary policy: the economic forecasts of individual members of the FOMC", *Journal of Money, Credit, and Banking* 42, 951-957.

[22] Romer, C. D. and D. H. Romer (2008): "The FOMC versus the staff: where can monetary policymakers add value?", *American Economic Review* Papers & Proceedings 98, 230-235.

[23] Rülke, J. C. and P. Tillmann (2011): "Do FOMC members herd?", *unpublished*.

[24] Scotese, C. A. (1994): "Forecast smoothing and the optimal under-utilization of information at the Federal Reserve", *Journal of Macroeconomics* 16, 653-670.

[25] Swanson, E. T. (2006): "Have increases in Federal Reserve transparency improved private sector forecasts?", *Journal of Money, Credit and Banking* 38, 791-819.

[26] Thornton, D. L. and D. C. Wheelock (2000): "A history of the asymmetric policy directive", *Federal Reserve Bank of St. Louis Economic Review*, September/October 2000, 1-16.

[27] Tillmann, P. (2010): "The Fed's perceived Phillips curve: evidence from individual FOMC forecasts", *Journal of Macroeconomics* 32, 1008-1013.

[28] Tillmann, P. (2011): "Strategic forecasting on the FOMC", forthcoming, *European Journal of Political Economy*.

Table 1: Properties of forecast revisions

forecast revision $\Delta\mathcal{F}_t^i x_{t+h}$			variable		
			inflation	output	unemployment
1st revision (February)	$\mathcal{F}^i_{Feb}x_{Dec} - \mathcal{F}^i_{prevJuly}x_{Dec}$	mean	-0.263	0.202	-0.177
		median	-0.225	0.150	-0.200
		std. dev	0.414	0.502	0.286
2nd revision (July)	$\mathcal{F}^i_{July}x_{Dec} - \mathcal{F}^i_{Feb}x_{Dec}$	mean	0.092	0.305	-0.130
		median	0.100	0.500	-0.125
		std. dev.	0.400	0.675	0.366

Table 2: Evidence from inflation forecasts

forecasters	explanatory variables		R^2	# obs.
	const.	$\Delta\mathcal{F}_t^i x_{t+h}$		
1st revision (February) $\mathcal{F}_{Feb}^i x_{Dec} - \mathcal{F}_{prevJuly}^i x_{Dec}$				
all	0.215 (0.110***)	0.291 (0.117***)	0.047	124
presidents	0.235 (0.084***)	0.269 (0.157*)	0.035	91
governors	0.160 (0.076**)	0.391 (0.146***)	0.124	33
voters	0.156 (0.073**)	0.191 (0.136)	0.020	71
nonvoters	0.289 (0.106)	0.391 (0.189**)	0.086	53
2nd revision (July) $\mathcal{F}_{July}^i x_{Dec} - \mathcal{F}_{Feb}^i x_{Dec}$				
all	0.239 (0.026***)	−0.056 (0.057)	0.005	148
presidents	0.266 (0.030***)	−0.130 (0.062**)	0.030	107
governors	0.165 (0.052***)	0.179 (0.111)	0.043	41
voters	0.213 (0.034***)	0.033 (0.072)	0.002	86
nonvoters	0.274 (0.042***)	−0.158 (0.085*)	0.047	62

Notes: The dependent variables are the forecast errors for inflation based on the February and the July forecast, respectively. Results from pooled least-squares estimation. White robust standard errors in parenthesis. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 3: Evidence from output growth forecasts

forecasters	explanatory variables			
	const.	$\Delta\mathcal{F}_t^i x_{t+h}$	R^2	# obs.
1st revision (February) $\mathcal{F}_{Feb}^i x_{Dec} - \mathcal{F}_{prevJuly}^i x_{Dec}$				
all	-0.826 (0.104^{***})	0.534 (0.155^{***})	0.059	124
presidents	-0.794 (0.118^{***})	0.375 (0.198^{*})	0.027	91
governors	-0.905 (0.212^{***})	0.830 (0.256^{***})	0.164	33
voters	-0.877 (0.137^{***})	0.632 (0.189^{***})	0.103	71
nonvoters	-0.737 (0.161^{***})	0.292 (0.274)	0.012	53
2nd revision (July) $\mathcal{F}_{July}^i x_{Dec} - \mathcal{F}_{Feb}^i x_{Dec}$				
all	-0.376 (0.057^{***})	-0.175 (0.081^{**})	0.030	148
presidents	-0.377 (0.070^{*})	-0.175 (0.098^{*})	0.027	107
governors	-0.374 (0.102^{***})	-0.176 (0.147)	0.036	41
voters	-0.389 (0.075^{***})	-0.123 (0.112)	0.015	86
nonvoters	-0.360 (0.091^{***})	-0.262 (0.109^{**})	0.067	62

Notes: The dependent variables are the forecast errors for output based on the February and the July forecast, respectively. Results from pooled least-squares estimation. White robust standard errors in parenthesis. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 4: Evidence from unemployment forecasts

forecasters	explanatory variables			
	const.	$\Delta\mathcal{F}_t^i x_{t+h}$	R^2	# obs.
1st revision (February) $\mathcal{F}^i_{Feb}x_{Dec} - \mathcal{F}^i_{prevJuly}x_{Dec}$				
all	0.519 (0.034***)	0.748 (0.084***)	0.358	124
presidents	0.502 (0.037***)	0.771 (0.091***)	0.400	91
governors	0.543 (0.080***)	0.698 (0.210***)	0.261	33
voters	0.511 (0.043***)	0.714 (0.110***)	0.340	71
nonvoters	0.515 (0.055***)	0.789 (0.130***)	0.378	53
2nd revision (July) $\mathcal{F}^i_{July}x_{Dec} - \mathcal{F}^i_{Feb}x_{Dec}$				
all	0.173 (0.017***)	0.034 (0.059)	0.004	148
presidents	0.164 (0.021***)	0.037 (0.060)	0.004	107
governors	0.197 (0.032***)	0.021 (0.087)	0.002	41
voters	0.181 (0.023***)	0.058 (0.062)	0.011	86
nonvoters	0.163 (0.027***)	−0.003 (0.081)	0.000	62

Notes: The dependent variables are the forecast errors for unemployment based on the February and the July forecast, respectively. Results from pooled least-squares estimation. White robust standard errors in parenthesis. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 5: Evidence from inflation forecasts

forecasters	explanatory variables				R^2	# obs.
	const.	$\Delta\mathcal{F}_t^i x_{t+h}$	D_{1994}	$D_{1994} \times \Delta\mathcal{F}_t^i x_{t+h}$		
	1st revision (February) $\mathcal{F}_{Feb}^i x_{Dec} - \mathcal{F}_{prevJuly}^i x_{Dec}$					
all	0.077 (0.053)	0.085 (0.126)	0.152 (0.087*)	0.217 (0.178)	0.051	124
presidents	0.020 (0.057)	−0.053 (0.104)	0.228 (0.107**)	0.332 (0.198*)	0.040	91
governors	0.114 (0.081)	0.449 (0.265*)	0.057 (0.125)	−0.058 (0.308)	0.127	33
voters	0.112 (0.051**)	0.306 (0.171*)	0.049 (0.100)	-0.117 (0.224)	0.023	71
nonvoters	−0.074 (0.148)	−0.177 (0.158)	0.371 (0.186**)	0.587 (0.262**)	0.093	53
	2nd revision (July) $\mathcal{F}_{July}^i x_{Dec} - \mathcal{F}_{Feb}^i x_{Dec}$					
all	0.208 (0.034***)	0.489 (0.072***)	0.006 (0.046)	−0.701 (0.093***)	0.151	148
presidents	0.238 (0.039***)	0.440 (0.089***)	0.006 (0.052)	−0.671 (0.111***)	0.140	107
governors	0.144 (0.054***)	0.567 (0.105***)	−0.016 (0.083)	−0.723 (0.170***)	0.229	41
voters	0.211 (0.051***)	0.511 (0.113***)	−0.035 (0.065)	−0.676 (0.138***)	0.163	86
nonvoters	0.202 (0.042***)	0.445 (0.075***)	0.062 (0.064)	−0.711 (0.116***)	0.168	62

Notes: The dependent variables are the forecast errors for inflation based on the February and the July forecast, respectively. Results from pooled least-squares estimation. White robust standard errors in parenthesis. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 6: Evidence from output growth forecasts

forecasters	explanatory variables				R^2	# obs.
	const.	$\Delta\mathcal{F}_t^i x_{t+h}$	D_{1994}	$D_{1994} \times \Delta\mathcal{F}_t^i x_{t+h}$		
	1st revision (February) $\mathcal{F}_{Feb}^i x_{Dec} - \mathcal{F}_{prevJuly}^i x_{Dec}$					
all	−0.059 (0.062)	0.699 (0.076***)	−0.893 (0.131***)	−0.175 (0.182)	0.145	124
presidents	−0.052 (0.088)	0.931 (0.197***)	−0.859 (0.159***)	−0.518 (0.286*)	0.105	91
governors	−0.113 (0.053**)	0.705 (0.041***)	−0.943 (0.251***)	0.056 (0.286)	0.255	33
voters	−0.118 (0.087)	0.757 (0.104***)	−0.894 (0.176***)	−0.184 (0.234)	0.201	71
nonvoters	0.010 (0.078)	1.172 (0.343***)	−0.868 (0.197***)	−0.777 (0.441*)	0.076	53
	2nd revision (July) $\mathcal{F}_{July}^i x_{Dec} - \mathcal{F}_{Feb}^i x_{Dec}$					
all	−0.549 (0.049***)	0.055 (0.073)	0.305 (0.091***)	−0.379 (0.121***)	0.082	148
presidents	−0.548 (0.052***)	0.135 (0.077*)	0.314 (0.107***)	−0.498 (0.141***)	0.093	107
governors	−0.548 (0.103***)	−0.132 (0.180)	0.289 (0.173)	−0.129 (0.245)	0.070	41
voters	−0.529 (0.077***)	0.029 (0.106)	0.249 (0.129*)	−0.263 (0.173)	0.044	86
nonvoters	−0.580 (0.037***)	0.089 (0.081)	0.383 (0.123***)	−0.564 (0.141***)	0.171	62

Notes: The dependent variables are the forecast errors for output based on the February and the July forecast, respectively. Results from pooled least-squares estimation. White robust standard errors in parenthesis. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 7: Evidence from unemployment forecasts

forecasters	explanatory variables				R^2	# obs.
	const.	$\Delta\mathcal{F}_t^i x_{t+h}$	D_{1994}	$D_{1994} \times \Delta\mathcal{F}_t^i x_{t+h}$		
1st revision (February) $\mathcal{F}_{Feb}^i x_{Dec} - \mathcal{F}_{prevJuly}^i x_{Dec}$						
all	0.333 (0.029***)	0.115 (0.147)	0.234 (0.047***)	0.765 (0.170***)	0.428	124
presidents	0.359 (0.034***)	−0.223 (0.174)	0.179 (0.053***)	1.082 (0.196***)	0.455	91
governors	0.291 (0.036***)	0.300 (0.090***)	0.403 (0.098***)	0.777 (0.245***)	0.433	33
voters	0.319 (0.035***)	0.303 (0.101***)	0.248 (0.060***)	0.526 (0.156***)	0.409	71
nonvoters	0.385 (0.031***)	−0.293 (0.135**)	0.185 (0.065***)	1.233 (0.178***)	0.464	53
2nd revision (July) $\mathcal{F}_{July}^i x_{Dec} - \mathcal{F}_{Feb}^i x_{Dec}$						
all	0.163 (0.029***)	−0.257 (0.108**)	0.042 (0.035)	0.373 (0.120***)	0.066	148
presidents	0.151 (0.035***)	−0.352 (0.080***)	0.042 (0.042)	0.464 (0.101***)	0.072	107
governors	0.189 (0.050***)	−0.193 (0.179)	0.051 (0.061)	0.320 (0.201)	0.084	41
voters	0.154 (0.041***)	−0.173 (0.141)	0.069 (0.047)	0.325 (0.154**)	0.081	86
nonvoters	0.173 (0.040***)	−0.419 (0.094***)	0.011 (0.052)	0.486 (0.130***)	0.072	62

Notes: The dependent variables are the forecast errors for unemployment based on the February and the July forecast, respectively. Results from pooled least-squares estimation. White robust standard errors in parenthesis. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Table 8: The correlation of subsequent forecast revisions

forecasters	explanatory variables		R^2	# obs.
	const.	$\Delta\mathcal{F}^i_{Feb}x_{t+h}$		
		Inflation		
all	0.049 (0.043)	−0.214 (0.085**)	0.046	122
presidents	0.038 (0.056)	−0.230 (0.112**)	0.048	91
governors	0.074 (0.067)	−0.182 (0.112)	0.042	31
voters	0.087 (0.055)	−0.095 (0.091)	0.008	69
nonvoters	0.006 (0.070)	−0.032 (0.140**)	0.114	53
		Output		
all	0.331 (0.068***)	−0.088 (0.106)	0.004	122
presidents	0.314 (0.074***)	0.003 (0.117)	0.000	91
governors	0.377 (0.163**)	−0.263 (0.206)	0.035	31
voters	0.374 (0.091***)	−0.143 (0.132)	0.012	69
nonvoters	0.265 (0.108**)	0.043 (0.171)	0.000	53
		Unemployment		
all	−0.319 (0.027***)	−0.694 (0.083***)	0.344	122
presidents	−0.325 (0.029***)	−0.746 (0.088***)	0.421	91
governors	−0.289 (0.065***)	−0.516 (0.181***)	0.157	31
voters	−0.316 (0.036***)	−0.652 (0.110***)	0.299	69
nonvoters	−0.323 (0.043***)	−0.744 (0.130***)	0.402	53

Notes: The dependent variable is the July forecast revision. Results from pooled least-squares estimation. White robust standard errors in parenthesis. A significance level of 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

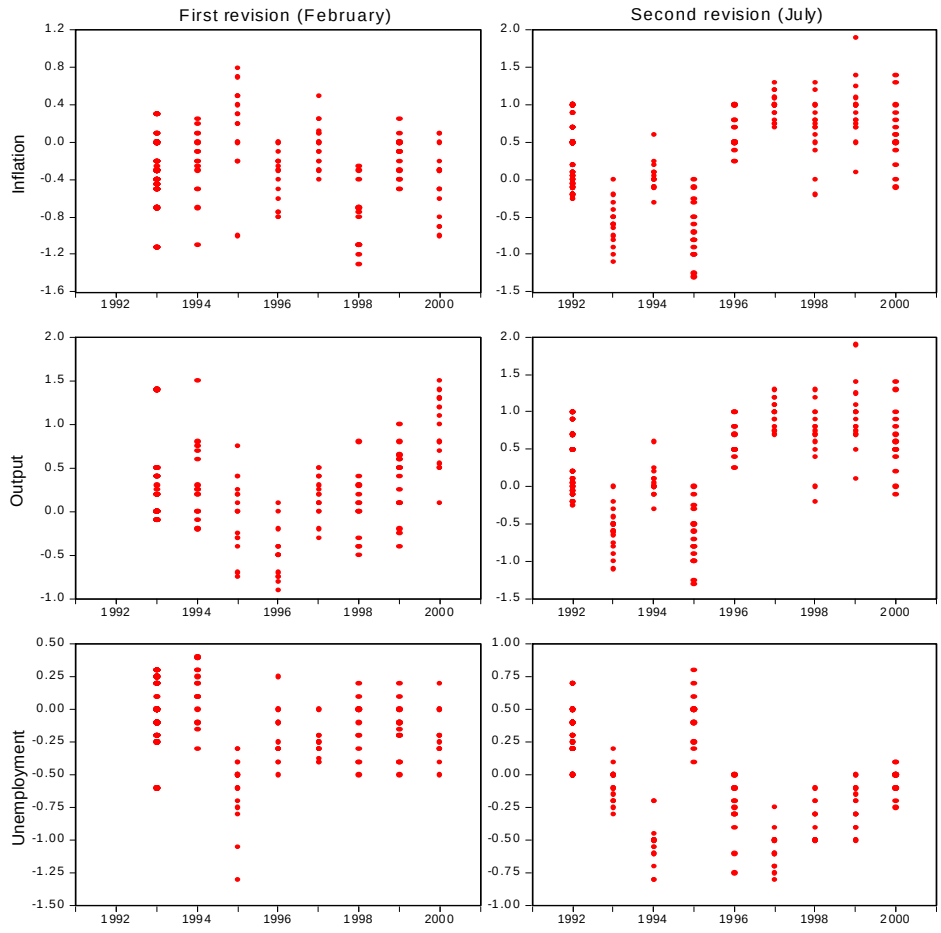

Figure 1: Forecast revisions of individual FOMC members (in percentage points)