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ABSTRACT

We provide direct evidence on the sticky information model of Mankiw and Reis (2002) by examining how frequently individual professional forecasters revise their forecasts. We draw interest rate and unemployment rate forecasts from the monthly *Wall Street Journal* surveys conducted between 2003 and 2013. Consistent with the sticky information model we find that forecasters frequently leave their forecasts unrevised but find evidence that revision frequency increases following larger changes in the information set. We also find revision frequencies became more sensitive to new information after the 2008 financial crisis but only weak evidence that frequent revisers forecast more accurately.

Keywords: Expectations, Sticky Information, Survey Forecasts.

JEL Codes: E2, E3, E4, E5

I. Introduction

How economic agents process information to form expectations continues to be a central issue in macroeconomics. Recent work proposes alternatives to the full information, rational expectations model that presumes agents form expectations from complete information and revise them when new, relevant information appears. Woodford (2003) relaxes the full information assumption to develop a model in which agents extract signals from noisy information (the noisy information model).[1] Sims (2003) considers limits to information processing which lead rational agents to form expectations from incomplete information (the rational inattention model). Reis (2006) and Mankiw and Reis (2002) posit significant costs of acquiring and processing information which deter agents from updating their information sets and revising their expectations every time new information arrives (the sticky information model).

Mankiw *et al.* (2003) and Coibion and Gorodnichenko (2012) uncover empirical evidence consistent with the sticky information model by examining indirectly the frequency with which professional forecasters revise their forecasts.[2] Specifically, Mankiw *et al.* simulate inflation forecasts of agents who collect new information and revise their forecasts at different points in time using their sticky information model and then compare the dispersion in the simulated forecasts to the dispersion in actual forecasts made by professional forecasters (and by consumers). They find that the simulated series mirrors the actual series most closely when the simulated forecasters revise their inflation expectations about every 10 months (12.5

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[1] Imperfect information was also the source of the short-run effects on output of monetary policy in models such as Lucas (1972).

[2] Leduc and Sill (2013) report that changes in professional economists' expectations are a "quantitatively important driver of economic fluctuations" and Adam and Padula (2011) find that using professional forecasts to proxy inflation expectations allows the New Keynesian Phillips curve to better explain U.S. inflation dynamics.

months).[3] Coibion and Gorodnichenko (2012) assume that professional forecasters make full information, rational expectations forecasts but costs prevent them from revising their forecasts every period. They estimate the frequency of forecast revision by regressing average forecast errors for a specific horizon on the revision of the average forecast. They conclude that forecasters revise their inflation forecasts once every 6 to7 months, on average.[4]

Andrade and LeBihan (2013) also uncover empirical evidence on the sticky information model but instead of measuring forecast revision frequency indirectly, they do so directly by measuring the fraction of forecasters revising their forecasts using the quarterly European Survey of Professional Forecasters. They find that, on average, forecasters update their inflation forecasts about every 4 months, more frequently than found by Mankiw *et al.* (2003) and Coibion and Gorodnichenko (2012).[5]

In this paper we produce evidence on the sticky information model using direct measures of forecast revision, like Andrade and LeBihan (2013), but compared with prior research we subject the sticky information model to more rigorous testing by using forecasts from the survey of professional forecasters conducted by the *Wall Street Journal (WSJ).* The *WSJ s*urveys forecasters monthly, permitting more frequent forecast revisions than possible with the quarterly (US and European) Surveys of Professional Forecasters or the semi-annual Livingston Survey. Additionally, the *WSJ* survey publishes the names of forecasters together with their forecasts,

[3] Mankiw *et al.* (2003) use the Livingston Survey for professional forecasters and the Michigan Survey of Consumer Attitudes and Behavior for consumer expectations. Carroll (2003) also finds that households appear to revise their expectations, at least partly based on professional forecasts, about once a year.

[4] Coibion and Gorodnichenko (2012) use the quarterly Survey of Professional Forecasters (SPF). Mertens and Nason (2015) use forecasts of the GDP deflator from the SPF to estimate a model similar to that of Coibion and Gorodnichenko (2012) in assuming that forecasts are a weighted average of last period's forecast and the rational expectation using an unobserved components model of inflation. They allow the weight on the past forecast to vary over time and find that forecasters reduced their revision frequency from about every 5 months in the 1970s to about every 7-8 months after 2000.

[5] Andrade and LeBihan (2013) use the quarterly European Survey of Professional Forecasters. Armantier *et al.*(2015) conduct an experiment on how households revise their inflation expectations and find that 42-47 percent do not revise their expectations when given the opportunity.

giving forecasters incentives to forecast carefully. Publication of forecasts with forecaster names allows us to identify which forecasters did or did not revise their forecasts for a specific target date each month. We examine forecasts of the 10-year Treasury bond rate, the federal funds rate, and the unemployment rate because survey participants forecast their values for specific days or months rather than forecast averages of their values over rolling horizons, as in many other surveys. Compared with forecasts of averages, single-date forecasts allow a cleaner measure of the frequency with which agents change their forecasts of future events since they exclude revisions due to the correction of earlier forecast errors.[6] Additionally, our data permit us to test whether the frequency of forecast revision is state dependent by testing whether forecasters revise their forecasts more frequently the more the variables they forecast fluctuate, a test not possible in the basic model of Coibion and Gorodnicheko (2012) which assumes that the frequency of forecast revision is constant through time.

To preview our results, we find direct support for the sticky-information model in that substantial numbers of forecasters do not revise their forecasts at each opportunity. The fraction varies with the variable forecasted. The fraction is also state dependent: forecasters are more likely to revise their forecasts the greater the change in the variable being forecasted since the previous survey. While forecasters often do not revise at every opportunity, we find that the duration between revisions is shorter than that reported by most previous studies, casting some doubt on how well the sticky information model can account for persistence of shocks at the quarterly frequency. We find only weak evidence that forecasters who revise their forecasts infrequently forecast less accurately.

[6] For example if we are forecasting the average annual inflation rate for 2014 and we make our new forecast in, say, May 2014 after observing the monthly inflation rate for April 2014, we may change our forecast by replacing our previous expectation of the April 2014 inflation with the actual value. We would be classified as revising our forecast even if we did not change our expectations of monthly inflation for months from May to December.

The rest of the paper is organized as follows. Section II discusses our data. Section III describes how we test for state dependence in the frequency of revisions and reports our results. Section IV presents extensions of our basic model. Section V concludes our paper.

II. The Data

A. The *Wall Street Journal* Survey

We take our data from the *Wall Street Journal* surveys of professional economic forecasters from March 2003 through December 2013. The survey participants include the chief economists from large banks and investment banks, heads of forecasting firms, and prominent business economists from industry. The economists submit forecasts of several economic variables in the first or second week of each month and the *WSJ* publishes the forecasts on-line shortly thereafter.[7] Economists' names and employers appear along with their forecasts, unlike the Livingston Survey or the (US and European) Surveys of Professional Forecasters. This is important because it permits us to document forecast revisions of individual economists even when they move to other industry positions and to ensure that we only record revisions for individuals who participated in consecutive surveys.[8] Over our sample period the number of economists in each panel ranges from 45 to 60, averaging about 54. The 101 economists who provided forecasts during our sample period represent 96 different employers of which 22% are commercial banks, 14% investment banks, 15% investment advisors, 28% forecasting firms, and the rest are other financial firms, nonfinancial firms, professional associations and universities.

Features of the *WSJ* survey make it well-suited for investigating the sticky information model. The *WSJ* asks economists to predict the June 30 and December 31 values for the 10-year

[7] Monthly surveys began in March 2003 although until 2008 no forecasts were collected at the beginning of January or July. The web site is: http://projects.wsj.com/econforecast/#ind=gdp&r=20. Before March 2003 the *WSJ* surveyed economists twice a year. For an analysis of the semi-annual forecasts, see Mitchell and Pearce (2007).
[8] Engelberg *et al.* (2011, footnote 9) mention that id numbers for the Survey of Professional Forecasters do not necessarily identify the same individuals over time.

Treasury bond rate and the federal funds rate and the June and December unemployment rate, inter alia. (Before June 2007 the *WSJ* requested forecasts of the unemployment rate for May and November). Since end dates are fixed economists' forecast horizons decline over time, from 12 months to one. Survey participants can potentially access very recent information before making their forecasts. Specifically, current interest rate data are available almost contemporaneously. The unemployment rate for a given month is announced on the first Friday of the next month, generally in time for participants to incorporate this rate into their information sets before reporting their new unemployment rate forecasts to the *WSJ*.[9]

Figure 1 shows economists' forecasts of the 10-year bond rate by target date made 11 months ahead of the target date (Panel A), 5 months ahead (Panel B), and 2 months ahead (Panel C).[10] Horizontal bars indicate the actual rates on the target dates (June 30 or December 31). The forecasts reflect generally sharp differences of opinion among the economists, as is typical for surveys of forecasts (cf. Mankiw and Reis, 2003[11]). Unsurprisingly, the 11-months-ahead forecasts exhibit the largest spreads, with 200 basis points or more separating the lowest and highest forecast for a given target date in most instances. Five-months-ahead bond-rate forecasts show ranges of slightly less than 200 basis points while 2-months-ahead forecasts show ranges of about 100 basis points. Patton and Timmermann (2010) find a similar decline in the dispersion of forecasts as the horizon decreases. Interestingly none of the economists surveyed foresaw the 2008 plunge in the bond rate from the 3.5% - 4% range in January through October to 2.25% at

[9] The survey results posted contain some apparent errors. In instances where a forecaster's prediction is substantially different from the prediction for the same target date in the preceding and succeeding surveys, we consider the prediction a probable transcription error. For example one forecaster predicted that the December 31, 2008 value of the 10-year bond rate would be 3.88 percent in the September survey, 1.27 percent in the October survey and 3.68 percent in the November survey. Appendix A lists the probable errors. We omit the questionable data points in the reported results but including them has little effect.

[10] These horizons were chosen as representative of long range, middle range and short range forecasts. We do not use 12-month and 1- month ahead forecasts of interest rates because these only started in 2008.

[11] Reasons for the dispersion of forecasts include diversity in prior beliefs and differences in how forecasters interpret new information. See Manzan (2011).

year-end, even as late as the beginning of November (2-month ahead forecast for December 31, 2008).

Figure 2 displays economists' forecasts of the fed funds rate 11, 5, and 2 months ahead of the target dates (Panels A, B and C, respectively). Figure 2 shows that most economists' fed funds rate forecasts are forecasts of monetary policy as characterized by the Federal Reserve's fed funds rate target. This is most apparent prior to mid-December 2008 when the Fed changed the fed funds rate target in multiples of 25 basis points, leading economists to make forecasts spaced at 25-basis-point intervals. Thereafter the Fed reset the fed funds rate target to a range of 0 to 25 basis points and issued forward guidance indicating that the rate would be kept at this lower bound for a considerable time.[12] Nevertheless, the 11-months-ahead funds rate forecasts reveal a wide range of opinion on Fed policy post-2008, with forecast spreads frequently exceeding 200 basis points (Panel A). Apparently the Fed's forward guidance did not convince many of the survey participants. As in the case of the bond rate, the surveyed economists failed to foresee the dramatic fall in the funds rate in late 2008 even two months prior to year end.

Figure 3, Panels A-C show the economists' unemployment rate forecasts 10, 4 and 2 months ahead of the target dates. (The different forecast horizons stem from differences in the *WSJ* survey for the unemployment rate pre-and post-2008, which make 11- and 5-months-ahead forecasts unavailable for our whole sample period.) Like the economists' interest rate forecasts, their unemployment rate forecasts exhibit greater differences between high and low predictions for longer horizons: for the 10-month ahead forecasts the ranges are 1.5 to 2 percentage points while for the 4-month-ahead forecasts the ranges drop to around 1 to 1.5 percentage points. Somewhat surprisingly, the ranges for the unemployment rate forecasts 2-months ahead are still

[12] See Campbell *et al.*(2012) for the specifics of forward guidance post-2008.

about 1 percentage point or more for most surveys. The plots also show that economists did not foresee the deep recession that pushed up the unemployment rate in late 2008 and 2009 10 or even 4 months ahead.

B. Forecast Revisions

To investigate possible information rigidity we construct a direct measure of economists' forecast revision behavior. For each survey date t we first compute the number of economists who supplied forecasts on both survey dates t-1 and t and then compute the fraction of those economists who did not revise their forecasts. We denote this fraction as $Nochange_t$. $Nochange_t$ is similar conceptually to the proportion of forecasters not updating, a measure estimated by Coibion and Gorodnichenko (2012). Unlike their measure, $Nochange_t$ is a direct measure of not updating which requires no assumptions about forecasting method or forecaster rationality.[13]

Figure 4 displays $Nochange_t$ for the 10-year bond rate, fed funds rate, and unemployment rate at each forecast horizon averaged across all surveys in our sample period. For the 10-year bond rate $Nochange_t$ averages about one-third for horizons of two to twelve months and about one-eighth for a horizon of one month. These averages imply that the *WSJ* economists revised their forecasts about twice every three months (twice every three surveys) for horizons of 2 to 12 months and nearly every month for horizons of one month. The greater revision rate at the one-month horizon appears to raise the revision rate at the seven-month horizon from two-thirds to three-quarters: when economists make their one-month-ahead forecasts at the start of June (December) for the June 30 (December 31) actual bond rate they also make their seven-months-ahead forecasts for December 31 (June 30).

[13] Changes in revision frequency could arise due to changes in the composition of the panel of forecasters. While there is turnover in the panel, about two-thirds of all revisions are from participants who responded to about eighty percent of the surveys. See Engelberg *et al.* (2011) for a discussion of how changing compositions could affect the usefulness of using mean or consensus forecasts.

Economists in the *WSJ* survey revise their fed funds rate forecasts less frequently than their 10-year bond rate forecasts. $Nochange_t$ for the fed funds rate averages between 55 and 65 percent for all forecast horizons, with no apparent relationship between average $Nochange_t$ and horizon length. These metrics imply that economists revise their forecasts of monetary policy about twice every 5 months.

The economists' revision behavior for unemployment rate forecasts resembles their revision behavior for the 10-year bond rate. The economists failed to revise their unemployment rate forecasts 30 to 45 percent of the time with no apparent relationship between revision frequency and forecast horizon.[14] This implies that they revise their forecasts about twice every three months on average, similar to their revision frequency for the bond rate.

The behavior of $Nochange_t$ both contrasts with and confirms work by Coibion and Gorodnichenko (2012). The average revision frequencies we compute for bond rate, fed funds rate and unemployment rate forecasts by economists in the *WSJ* survey are greater than the revision frequencies Coibion and Gorodnichenko estimate for forecasts of inflation and other variables by economists in the Survey of Professional Forecasters. These differences may reflect the difference between monthly and quarterly surveys.[15] Our finding that substantial proportions of forecasters do not revise their forecasts at every opportunity supports Coibion and Gorodnichenko's interpretation of their results as originating from costly revision rather than noisy information. The higher frequency of revision that we find does, however, cast doubt on

[14] Coibion and Gorodnichenko (2012) report that their measure of information rigidity did not appear to vary across forecast horizon.

[15] Estimates reported in Figure1, Panel B of Coibion and Gorodnichenko (2012) imply times to forecast revision for a long-term interest rate (the AAA bond rate), a short-term interest rate (the three-month Treasury Bill rate), and the unemployment rate of about 3.6 months, about 4.5 months, and about 5 months respectively. Andrade and LeBihan (2013) report that forecasters in the European Survey of Professional Forecasters revise their forecasts about once every four months. Of course, quarterly data restrict the frequency of revision to a minimum of once every 3 months. Mankiw *et al.* (2003) report substantially less frequent revisions, once every 10-12 months.

whether infrequent revision of expectations can account for the persistent effects of shocks at a quarterly frequency.

Our plots of Nochange_t reflect average revision frequency of individual economists. To reflect heterogeneity of revision frequency we construct histograms showing the distribution of economists by frequency of non-revision. For each economist we compute the percentage of non-revisions to previous forecasts of the 10-year bond rate, fed funds rate, and unemployment rate. We restrict our sample to those economists having at least 25 opportunities to revise their forecasts. Figure 5 presents our histograms. Ten categories of unrevised forecast percentages appear on the horizontal axis; the percentage of forecasters in each category appears on the vertical axis. Forecasters who always revise their forecasts at every opportunity (never revise their forecasts) are included in the unrevised forecasts category 0-10% (91-100%).

Economists in the *WSJ* survey show considerable heterogeneity in revising their 10-year bond rate forecasts (Panel A). The 79 economists with 25 or more chances to revise their bond rate forecasts have percentages of unrevised forecasts falling into 8 decile categories (0-10% through 71-80%). The modal category, 11-20%, includes just over 25% of economists; the next most populous category, 41-50%, slightly less than 20% of economists. The percentages of economists with unrevised forecasts between 0 and 30% and between 31 and 60% are nearly equal (about 45% each).

The economists show more homogeneity in revising their fed funds rate forecasts as well as greater reluctance to revise (Panels B and C). Eighty-three economists have 25 or more chances to revise their forecasts over our entire sample period (Panel B). The modal category, 61-70%, includes over 30% of the economists. The percentages of economists with unrevised forecasts between 41 and 60% and between 61 and 80% are nearly equal (about 45% each). We also create a histogram using sample forecasts prior to the era of quantitative easing, from 2003 through 2008 (Panel C). Sixty-nine economists have 25 or more chances to revise their forecasts in this time frame. The histogram for this period lies slightly to the left of the full-period histogram. The modal category, 51-60% unrevised forecasts, includes nearly 30% of the economists. The categories on either side of the modal category contain only slightly smaller percentages of economists (around 25% each).

The economists' unemployment rate revision frequency and heterogeneity fall between those of their bond rate forecasts and their fed funds rate forecasts (Panel D). The 81 economists with 25 or more chances to revise their unemployment rate forecasts have percentages of unrevised forecasts in 7 categories (0-10% through 61-70%). The modal category, 31-40%, includes nearly 35% of economists; the categories on either side of the modal category each include about 20% of the economists. The percentage of economists with unrevised forecasts between 21% and 60% is slightly less than 90%.[16]

The foregoing evidence on forecast revision frequency is consistent with the notion that the costs of acquiring and processing information prevent forecasters from updating their forecasts each time new information becomes available. This evidence begs the question of whether the forecast revision process varies with changes in the economy which cause information to be more or less sticky. Coibion and Gorodnichenko (2012) assume in their framework that the frequency of revision is not state dependent, although they find evidence that

[16] We also investigated the role of employer type in forecast revision behavior. The sticky-information model would explain systematic differences in revision behavior across employer groups by differences in the costs of updating and processing information and differences in the perceived costs of unrevised forecasts. The employer groups are commercial banks, investment banks, investment-advising firms, forecasting and research firms, insurance companies, other financial institutions such as Fannie Mae, bond-rating firms, academia, professional associations, and nonfinancial institutions. Using the subsample of economists who responded to at least 25 surveys we compute the mean frequency of non-revision for economists in each of ten employer categories. Our tests indicate that only economists employed by "other" financial institutions and bond-rating firms have significantly different mean revision rates: they revise their forecasts more frequently than their counterparts at other employer groups. They represent only about 5 percent of the *WSJ* economists, however.

more volatile periods exhibit less information stickiness.[17] We address this question in the next section.

III. Is the Degree of Information Stickiness State Dependent?

A. The Models

Empirically testing the state dependency of forecasters' forecast revision process requires us to model changes in the information set for the economy. While we cannot measure all the incoming information that forecasters might access, one seemingly important piece of information is the amount of recent change in the variable being forecasted. Specifically, an efficient market for 10-year government bonds should imbed all recent information into the current rate, making rate changes since the last survey a good measure of new information. Likewise, announced changes in the fed funds rate target and subsequent funds rate changes should convey information relevant to forecasters, particularly given the Federal Reserve's reluctance to change directions frequently. Similarly, persistence in unemployment rate changes should lead forecasters to interpret recent unemployment rate changes as informative. A practical advantage of representing changes in the information set by changes in the actual variables forecasted is that these variables are available to all economists contemporaneously at virtually no cost.[18]

Some extreme examples illustrate the effect of information set changes on forecasts. Specifically, after the Fed lowered the fed funds rate target by 125 basis points in January 2008 all economists in the February 2008 survey revised their fed funds rate predictions for June 30,

[17] Coibion and Gorodnicheko (2012) report evidence that forecasters revise less frequently during the Great Moderation, perhaps making the economy more vulnerable to large shocks subsequently. They note that "recessions, as periods of increased volatility, should be times when economic agents update and process information faster than in expansions since the (relative) cost of ignoring macroeconomic shocks in recession rises." (page 26)

[18] Later in the paper we use changes in the fed funds rate target in addition to changes in the fed funds rate itself. The fed funds rate target is also available contemporaneously to all economists at virtually no cost.

2008 and nearly all revised their predictions for December 31, 2008. Similarly, after seeing the funds rate target fall by 100 basis points during October 2008 nearly all economists in the November 2008 survey revised their fed funds rate forecasts for December 31, 2008.[19]

We use the timing of the *WSJ* survey to define our change variables. We do not observe the exact date on which a given economist submits a forecast and, hence, do not know the most recent values of the variables the economist observed before submitting a forecast. We do know, however, that the *WSJ* assembles its surveys in the first or second week of each month, leading us to compute the change in the actual bond rate, fed funds rate, and fed funds rate target from the last business day of the month before the last survey to the last business day of the month before the current survey. Analogously, we compute the change in the unemployment rate as the difference between the unemployment rates announced at the start of the previous month and the start of the survey month.[20]

Our forecast revision model relates the fraction of economists not revising their predictions ($Nochange_t$) to the previous month's absolute change in the variable forecasted (bond rate, $|\Delta i_{t-1}|$; fed funds rate, $|\Delta ffr_{t-1}|$; or unemployment rate, $|\Delta U_{t-1}|$) and the forecast horizon ($Horizon_t$). While Figure 4 suggests that forecast horizon may not affect the value of $Nochange_t$ in forecasts of the fed funds rate or the unemployment rate, the figure does not hold recent changes in the variables constant. The simplest model has the following form:

$$Nochange_t = \alpha + \beta\ |\Delta variable_{t-1}| + \gamma\ Horizon_t + e_t \qquad (1)$$

[19] The effects of announced changes in fed funds rate targets on economists' fed funds rate forecasts are similar to the effects Coibion and Gorodnichenko (2012) report for the 9-11 attack on immediate forecasts of economic activity.

[20] The Bureau of Labor Statistics announces the unemployment rate on the first Friday of a month for the previous month. Thus, for example, we presume that economists submitting their March 2010 unemployment rate forecasts for June 2010 have observed the change in the unemployment rate from January 2010 to February 2010. We use the announced unemployment rates in the real-time data set from the Federal Reserve Bank of Philadelphia (see Croushore and Stark, 2001) to insure that survey participants had access to this information since there are slight adjustments subsequent to the initial unemployment rate announcements.

where e_t is a random error term. We expect larger absolute changes in i_{t-1}, ffr_{t-1} and U_{t-1} to cause more economists to revise their forecasts, leading β to be negative. The sign of γ is unclear: Figure 4 shows that the unconditional average of $Nochange_t$ may rise or fall as the target date becomes more distant. Since equation (1) restricts $Horizon_t$ to having a linear effect on $Nochange_t$ we relax this restriction by estimating equation (2):

$$Nochange_t = \alpha + \beta\,|\Delta variable_{t-1}| + \Sigma_{j=s}^{j=S}\,\gamma_j\,D_{jt} + e_t \qquad (2)$$

where D_{jt} is a zero-one indicator for forecast horizon of length j.[21]

The design of the *WSJ* survey leads us to estimate equations (1) and (2) for two different forecast horizons. To illustrate, consider the March survey. This survey reports economists' bond rate, fed funds rate and unemployment rate forecasts at the start of March for the ends of June and December, 4 months ahead and 10 months ahead, respectively.[22] More generally every survey reports two forecasts for every economist for every variable: a shorter-horizon forecast (1- to 6-months ahead) and a longer-horizon forecast (7- to 12-months ahead). We estimate equations (1) and (2) separately on data for short- and long-horizon forecasts. In estimates on short-horizon data, Horizon = {1,2,3,4,5,6} and j = {2,3,4,5,6} with j=1 being the omitted category; in estimates on long-horizon data, Horizon = {7,8,9,10,11,12} and j = {8,9,10,11,12} with j=7 being the omitted category.

B. Estimated Models of 10-year Bond Rate Forecasts

Table 1 reports estimates of our models of $Nochange_t$ for the 10-year bond rate using short-horizon forecasts (columns 1.1-1.3) and long-horizon forecasts (columns 1.4-1.6) from the

[21] Since our dependent variable ranges from zero to one, OLS could give misleading results since it does not impose this restriction. To address this possibility we also estimated the models using the quasi-maximum-likelihood estimation method of Papke and Wooldridge (1996). These results are very similar to the OLS results and are reported in Appendix B.

[22] Before June 2007 the *WSJ* survey reported economists' unemployment rate forecasts for May and November.

2003-2013 sample period.[23] Estimates of equation (1) show that longer forecast horizons result in fewer forecast revisions while larger bond rate changes result in more forecast revisions. Column (1.1) shows that more than 31% of economists do not revise their forecasts with a one-month horizon and no change in the bond rate from the previous month (.292 + .023). This fraction increases by about 2 percentage points with each additional horizon month for horizons of up to 6 months. Column (1.4) shows that nearly 37% of economists do not revise their forecasts with a 7-month horizon and no change in bond rate from the previous month (.243 + .018 x 7). This fraction increases by nearly 2 percentage points with each added horizon month for horizons of up to 12 months. A two-standard-deviation change in the bond rate since the last survey, about 38 basis points, reduces the fraction of non-revising economists by about 13 percentage points for short-horizon forecasts (0.378 x -0.348) and by about 11 percentage points for long-horizon forecasts (.378 x -0.302).

Estimates of equation (2) show that forecast horizon length has a non-linear impact on bond rate forecast revisions, with significantly more economists revising their forecasts 1- and 7-months ahead of a target date than in other months. In column (1.2) the estimated coefficients of the five short-horizon indicators $D_2,..,D_6$ are jointly significant and positive but not significantly different from one another. An analogous statement applies to the estimated coefficients of the long-horizon indicators $D_8,...,D_{12}$ in column (1.5). These outcomes lead us to estimate variants of equation (2) with a single binary indicator for a 1-month horizon in the short-horizon model (column 1.3) and a single binary indicator for a 7-month horizon in the long-horizon model (column 1.6). The model estimates indicate that with no change in the bond rate from the prior month, the fraction of unrevised forecasts in each of the 2 to 6 months (8 to 12 months) before

[23] The results we report use the data set that omits the suspected transcription errors mentioned in footnote 9. Including the questionable forecasts does not significantly affect any of the results we report.

the target date is nearly 38% (over 42%). The fraction of non-revising economists falls to about 23% 1 month before the target date (.378 - .146) and to about 30% 7 months before the target date (.423 - .118). A two-standard-deviation change in the bond rate since the last survey, about 38 basis points, reduces the fraction of non-revising economists by about 11 percentage points for short-horizon forecasts (0.378 x -0.299) and by about 10 percentage points for long-horizon forecasts (.378 x -0.272).

C. Estimated Models of Federal Funds Rate Forecasts

Table 2 reports estimates of our $Nochange_t$ models for the fed funds rate using short-horizon forecasts (columns 2.1-2.4) and long-horizon forecasts (columns 2.5-2.8). In addition to $Horizon_t$, D_{jt} and $|\Delta ffr_{t-1}|$ our models include the explanatory variable $|\Delta ffrtarget_{t-1}|$, the absolute change in the Fed's fed funds rate target since the prior survey. We include $|\Delta ffrtarget_{t-1}|$ on the reasoning that economists may consider target changes as well as actual fed funds rate changes when developing their forecasts.

The estimated models show that changes in the fed funds rate target exert as much influence on the economists' funds rate forecast revisions as changes in the actual rate. Columns (2.1) and (2.2) show that 25-basis-point changes in the actual and target rates reduce the fraction of economists not revising their short-horizon forecasts by 9 and 13 percentage points (.25 x-.342 and .25 x -.507), respectively. Similar changes reduce the fraction of economists not revising their long-horizon forecasts by 7 and 8 percentage points (columns 2.5 and 2.6), respectively. When both rate changes appear in the same model only the funds rate target change has a significant coefficient in the model estimate using short-horizon forecasts (column 2.3) while neither rate change has a significant coefficient in the model estimate using long-horizon forecasts (column 2.7).

The estimated models also show that forecast horizon exerts no measurable influence on the economists' funds rate forecast revision behavior. In estimates of equation (1) using short-horizon forecasts (columns 2.1-2.3) and long-horizon forecasts (columns 2.5-2.7) the estimated coefficients of $Horizon_t$ are statistically insignificant. With no change in either the funds rate or the funds rate target the estimated fraction of non-revising economists ranges from 68% to 70% for short-horizon forecasts and from 55% to 57% for long-horizon forecasts. In estimates of equation (2) the estimated coefficients of the binary horizon indicators are generally statistically insignificant (columns 2.4 and 2.8) and the hypotheses that the coefficient are jointly zero and jointly equal cannot be rejected. With no change in the funds rate target the estimated fraction of non-revising economists is 59% for short-horizon forecasts (column 2.4) and 55% for long-horizon forecasts (column 2.8).

D. Estimated Models of Unemployment Rate Forecasts

Table 3 reports estimates of our models of $Nochange_t$ for the unemployment rate using short-horizon forecasts (columns 3.1-3.2) and long-horizon forecasts (columns 3.3-3.5). Estimates of equation (1) show that forecast horizon length affects $Nochange_t$ differently over short versus long forecast horizons whereas unemployment rate changes affect $Nochange_t$ more similarly. Specifically, for forecast horizons from 1 to 6 months column (3.1) shows that 51% of economists do not revise their unemployment rate forecasts with an unchanged unemployment rate, as $Horizon_t$ has a statistically insignificant coefficient. Similarly seven months before the target date column (3.3) shows that 51% of economists do not revise their unemployment rate forecasts with no change in the unemployment rate (.696 - .026 x 7), however this percentage falls by about 2.6 percentage points per month as the forecast horizon increases from 8 to 12 months. In contrast, a two-standard-deviation change in unemployment rate, about 33 basis points, reduces $Nochange_t$ by 24 percentage points for horizons from 1 to 6 months (-.738 x .33) and by about 18 percentage points for horizons from 7 to 12 months (-.560 x .33).

Estimates of equation (2), which allow forecast horizon length to affect forecast revision nonlinearly, are qualitatively similar to estimates of equation (1). Horizon has little measurable effect on forecast revision frequency for short-horizon forecasts: in column (3.2) no individual coefficient is significant at the .05 level and one cannot reject the hypothesis that the coefficients on all the horizon dummies are jointly zero at the .05 level. For the longer-horizon forecasts (column 3.4) the coefficients of $D_{10,}$ D_{11} and D_{12} are negative and generally significant. While F tests reject the hypotheses that the five coefficients are jointly zero or jointly equal, one cannot reject the hypothesis that the coefficients on D_{10}, D_{11}, and D_{12} are equal. This outcome leads us to estimate a variant of equation (2) which allows these longer horizons to have the same effect on $Nochange_t$ by including one dummy, D_{10+}, equal to the sum of D_{10}, D_{11}, and D_{12}. The estimated model, reported in column (3.5), implies that with an unchanged unemployment rate about 50% of economists leave their long-horizon forecasts unrevised 7 to 9 months before the target date while about 40% leave their forecasts unrevised 10 to 12 months before the target date. A two-standard-deviation change in unemployment reduces the fraction of non-revising economists by about 18 percentage points (-.537 x .33). We conclude that the *WSJ* economists are more likely to revise their unemployment rate forecasts than their interest rate forecasts for longer horizons.

IV. Extensions

A. Did Forecaster Behavior Change After the Financial Crisis?

Events surrounding the unanticipated bankruptcy of Lehman Brothers in September 2008 radically changed perceptions about "too big to fail" and the reliability of government interventions into financial markets, potentially changing how economic agents form forecasts. Andrade and LeBihan (2013) find greater dispersion in the forecasts of professional European economists after 2007. To see whether the crisis changed how the *WSJ* economists revise their forecasts we compare estimated models of Nochange_t for the bond rate and the unemployment rate for the periods 2003-2007 and 2008-2013. (We do not investigate possible shifts in forecast behavior for the fed funds rate since the funds rate target remained unchanged after December 2008.[24]) We report our estimates in Table 4.

Estimated models of Nochange_t for the bond rate show that after 2007 fewer economists revised their forecasts when the bond rate remained unchanged and more revised them when it did change (Table 4, Panel A). Estimated models of Nochange_t using short-horizon forecasts from 2003 - 2007 and from 2008 - 2013 differ significantly, as shown by F tests of coefficient stability (columns 4.1a and 4.2a). Before 2008 an unchanged bond rate resulted in a Nochange_t estimate of about 33 percent for forecast horizons of 2 to 6 months and about 7 percent (.328 – .256) for horizons of 1 month; after 2007 the percentages were 40% and 26%. A 100-basis-point change in the bond rate reduced Nochange_t by only 14 percentage points before 2008 but nearly 37 percentage points thereafter. Models estimated from long-horizon forecasts changed nearly as much after 2007 as models estimated from short-horizon forecasts (columns 4.3a and 4.4a). Before 2008 an unchanged bond rate produced Nochange_t estimates of 38% and 26% (.375 –.111) for forecast horizons of 8 to 12 months and 7 months, respectively; after 2007 these percentages were 45% and 35%. Before 2008 a 100-basis-point change in the bond rate reduced Nochange_t by nearly 16 percentage points; thereafter the reduction was over 35 percentage points.

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[24] We did estimate models for the surveys before the December 2008 decision. The results were very similar to those reported in Table 2 for the whole period.

Estimated models of $Nochange_t$ for the unemployment rate show that post-2007 more economists revised their forecasts following an unemployment rate change but that fewer revised their long-horizon forecasts without a change (Table 4, Panel B). Estimated models of $Nochange_t$ show significant differences pre-2008 and post-2007, as indicated by F tests. Before 2008 a change in the unemployment rate had no significant effect on $Nochange_t$ in either short- or long-horizon models; after 2007 a 33-basis point change reduced $Nochange_t$ in short- (long-) horizon models by about 22 (17-18) percentage points. This increased sensitivity to unemployment rate changes is consistent with forecasters revising their forecasts more frequently in volatile times, as the standard deviation of monthly unemployment rate changes more than doubled after 2007, increasing from about 0.067 to 0.144. Models of $Nochange_t$ estimated on short-horizon forecasts show that forecast horizon had a consistently negligible effect on forecast revision frequency pre-2008 and post-2007, as the coefficient estimates of $Horizon_t$ are both insignificant. Models estimated on longer-horizon forecasts show that forecast horizon had a smaller effect on forecast revision frequency post- 2007. Specifically in estimates of equation (1), $Horizon_t$ has significant, negative coefficients in both periods, with a one-month increase in horizon length reducing the fraction of non-revisers by about 4% (2%) before 2008 (after 2007). In estimates of the variant of equation (2) with D_{10+}, a one-month increase in forecast horizon 10 to 12 months before the target date reduced the fraction of non-revisers by about 14 percentage points pre-2008 and by about 7 percentage points post-2007.

B. Are Frequent Revisers More Accurate?

Do forecasters who revise their forecasts more frequently produce more accurate forecasts than those who revise less frequently? To investigate this possibility we first compute the squared forecast error for each economist for every target date and horizon and then regress the squared forecast errors on a binary indicator variable coded one if the economist's forecast is unchanged from the prior survey. The sample size for each regression is about 50, roughly the average number of respondents per survey in our 11-year sample period. Table 5 presents estimated differences in the mean squared forecast errors of non-revisers and revisers, with a positive difference indicating larger mean squared forecast errors for non-revisers.

The estimated differences in mean squared forecast errors show that revisers are more accurate than non-revisers but their superiority is weak and uneven. Estimated differences for the 10-year bond rate appear in Table 5, Panel A. In 24% of the 217 surveys revisers have significantly smaller mean square errors than non-revisers while the reverse occurs in only 3% of the surveys. The estimated differences are statistically insignificant in 73% of the surveys. Revisers are less dominant in forecasts of the fed funds rate (Panel B). In 16% of the 96 surveys between 2003 and 2007 revisers are more accurate than non-revisers but in 11% of surveys non-revisers are more accurate; revisers and non-revisers are statistically indistinguishable in 73% of surveys. Revisers are more accurate than non-revisers in forecasting the unemployment rate but only slightly (Panel C). In 225 surveys from 2003 to 2013 revisers had smaller estimated mean square errors in 12% of the surveys compared with 6% of the surveys in which the reverse is true. Revisers and non-revisers are indistinguishable in 82% of the surveys.[25]

V. Conclusions

The sticky information model predicts that forecasters will not always revise their expectations as new information arrives if the expected benefits are less than the expected costs of revision. We find direct evidence for this model in that professional forecasters in a monthly

[25] Panel C includes a large, positive outlier for the June 2009 target date in the November 2008 survey (8-month horizon). In this survey only one forecaster, James Smith, reported an unrevised forecast despite a 40-basis-point increase in the unemployment rate from the previous month. Omitting Smith's forecast eliminates this statistically significant difference.

survey often do not revise their forecasts. Our use of a monthly survey of professional economists' forecasts allows a higher frequency investigation than other research using quarterly or semi-annual surveys. While we find that forecasters revise their estimates somewhat more frequently than previously found, many forecasters revise their forecasts every other month or even less frequently. Forecasts of monetary policy in terms of forecasts of the fed funds rate are revised less frequently than forecasts of the 10-year U.S. bond rate or the unemployment rate. The forecast horizon does not appear to have a strong influence on the frequency of forecast revision. Forecasters exhibit considerable heterogeneity in their revision frequency, suggesting that the costs and benefits of revising may vary considerably across forecasters. As found in similar research, forecast behavior appears to be state dependent as forecasters revise forecasts more frequently in more volatile times. The evidence that more frequent revising improves forecasting performance is weak, further supporting the rational inattention of forecasters.

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Table 1

10-year Bond Rate Forecast Revisions

Horizon Length:	1-6 months			7-12 months		
Column:	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Explanatory Variable:						
$\lvert\Delta i_{t-1}\rvert$	-.348***	-.302***	-.299***	-.302***	-.273***	-.272***
	(.057)	(.061)	(.061)	(.053)	(.055)	(.053)
Horizon	.023***			.018***		
	(.007)			(.007)		
D_1			-.146***			
			(.032)			
D_2		.128***				
		(.034)				
D_3		.133***				
		(.040)				
D_4		.164***				
		(.042)				
D_5		.158***				
		(.044)				
D_6		.147***				
		(.044)				
D_7						-.118***
						(.024)
D_8					.125***	
					(.031)	
D_9					.102***	
					(.033)	
D_{10}					.140***	
					(.037)	
D_{11}					.110***	
					(.042)	
D_{12}					.105***	
					(.034)	
Constant	.292***	.232***	.378***	.243***	.306***	.423***
	(.030)	(.035)	(.017)	(.068)	(.025)	(.017)
F tests, Coefs.of D_j:						
all $D_j = 0$		4.10***			4.86***	
all $D_j =$		0.44			0.32	
R^2	.291	.345	.335	.212	.285	.276
Sample size	109	109	109	109	109	109

The table reports OLS estimates of forecast revision models for the 10-year bond rate by forecast horizon length for the 2003-2013 sample period. The dependent variable is Nochange, the fraction of forecasters with unchanged 10-year bond rate forecasts from the prior survey date. $\lvert\Delta i_{t-1}\rvert$ is the absolute change in the 10-year bond rate from the prior survey date. Horizon is the number of months until the forecast target date (30 June or 31 December). $D_j = 1$ if j is the number of months until the forecast target date (30 June or 31 December) and 0 otherwise. Robust standard errors appear in parentheses. ***, ** and * indicate statistical significance at the .01, .05 and .10 levels, respectively.

Table 2
Federal Funds Rate Forecast Revisions

Horizon Length:	1-6 months				7-12 months			
Column:	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.6)	(2.7)	(2.8)
Explanatory Variable:								
$\lvert\Delta ffr_{t-1}\rvert$	-.342***		-.004		-.280***		-.151	
	(.070)		(.098)		(.061)		(.094)	
$\lvert\Delta ffrtarget_{t-1}\rvert$		-.507***	-.503***	-.523***		-.329***	-.197	-.353***
		(.050)	(.099)	(.042)		(.077)	(.137)	(.070)
Horizon	-.006	-.005	-.005		.006	.002	.004	
	(.012)	(.011)	(.010)		(.010)	(.010)	(.010)	
D_2				.096				
				(.061)				
D_3				.126**				
				(.064)				
D_4				.074				
				(.066)				
D_5				.069				
				(.057)				
D_6				.007				
				(.068)				
D_8								.066
								(.047)
D_9								.106**
								(.052)
D_{10}								.049
								(.057)
D_{11}								.047
								(.051)
D_{12}								.018
								(.062)
Constant	.697***	.681***	.681***	.594***	.551***	.574***	.567***	.545***
	(.047)	(.042)	(.042)	(.050)	(.092)	(.090)	(.092)	(.037)
F tests, Coefs.of D_j:								
all $D_j = 0$				1.29				.95
all $D_j =$				1.08				.60
R^2	.147	.267	.267	.310	.116	.120	.135	.157
Sample size	114	114	114	114	113	113	113	113

The table reports OLS estimates of forecast revision models for the federal funds rate by forecast horizon length for the 2003-2013 sample period. The dependent variable is Nochange, the fraction of forecasters with unchanged federal funds rate forecasts from the prior survey date. $\lvert\Delta ffr_{t-1}\rvert$ is the absolute change in the federal funds rate from the prior survey date and $\lvert\Delta ffrtarget_{t-1}\rvert$ is the absolute change in the Federal Reserve's federal funds rate target from the prior survey date. Horizon is the number of months until the forecast target date (30 June or 31 December). $D_j = 1$ if j is the number of months until the forecast target date (30 June or 31 December) and 0 otherwise. Robust standard errors appear in parentheses. ***, ** and * indicate statistical significance at the .01, .05 and .10 levels, respectively.

Table 3
Unemployment Rate Forecast Revisions

Horizon Length:	1-6 months		7-12 months		
Column:	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)
Explanatory Variable:					
$\lvert\Delta U_{t-1}\rvert$	-.738***	-.699***	-.560***	-.534***	-.537***
	(.095)	(.104)	(.083)	(.086)	(.082)
Horizon	-.010		-.026***		
	(.007)		(.007)		
D_2		.050			
		(.044)			
D_3		.080*			
		(.047)			
D_4		-.004			
		(.048)			
D_5		-.042			
		(.045)			
D_6		-.002			
		(.045)			
D_8				.027	
				(.041)	
D_9				.010	
				(.042)	
D_{10}				-.075**	
				(.037)	
D_{11}				-.080*	
				(.045)	
D_{12}				-.099**	
				(.045)	
D_{10+}					-.095***
					(.023)
Constant	.512***	.456***	.696***	.485***	.496***
	(.031)	(.038)	(.071)	(.035)	(.021)
F tests, Coefs.of D_j:					
all $D_j = 0$		2.11*		3.50***	
all $D_j =$ if j=10,12				.18	
R^2	.287	.333	.324	.352	.347
Sample size	119	119	107	107	107

The table reports OLS estimates of forecast revision models for the unemployment rate by forecast horizon length for the 2003-2013 sample period. The dependent variable is Nochange, the fraction of forecasters with unchanged unemployment rate forecasts from the prior survey date. $\lvert\Delta U_{t-1}\rvert$ is the absolute change in the unemployment rate from the prior survey date. Horizon is the number of months until the forecast target date (30 June or 31 December). $D_j = 1$ if j is the number of months until the forecast target date (30 June or 31 December) and 0 otherwise. D_{10+} =1 if D_{10}, D_{11} or D_{12} =1 and zero otherwise. Robust standard errors appear in parentheses. ***, ** and * indicate statistical significance at the .01, .05 and .10 levels, respectively.

Table 4

Constancy of Forecaster Revision Behavior, 2003-2007 versus 2008-2013

Panel A: 10-year Bond Rate Forecast Revisions: $Nochange_t = \beta_0 + \beta_1 \; |\Delta i_{t-1}| + \beta_2 D_{jt} + e_t$

Horizon Length:	1-6 months		7-12 months	
Sample Period:	2003-07	2008-13	2003-07	2008-13
Column:	(4.1a)	(4.2a)	(4.3a)	(4.4a)
Explanatory Variable:				
$\|\Delta i_{t-1}\|$	-.140*	-.369***	-.158**	-.353***
	(.077)	(.093)	(.067)	(.089)
D_1	-.256***	-.140***		
	(.030)	(.036)		
D_7			-.111***	-.105***
			(.035)	(.037)
Constant	.328**	.401**	.375***	.455***
	(.023)	(.023)	(.024)	(.024)
F tests across time:				
$\beta_0, \beta_1, \beta_2 = 0$		4.99***		2.28*
R^2	.235	.399	.193	.339
Sample size	37	72	45	64

Panel B: Unemployment Rate Forecasts Revisions: $Nochange_t = \beta_0 + \beta_1 \; |\Delta U_{t-1}| + \beta_2 \, Horizon_t + e_t$

$Nochange_t = \beta_0 + \beta_1 \; |\Delta U_{t-1}| + \beta_2 D_{jt} + e_t$

Horizon Length:	1-6 months		7-12 months			
Sample Period:	2003-07	2008-13	2003-07		2008-13	
Column:	(4.1b)	(4.2b)	(4.3b)	(4.4b)	(4.5b)	(4.6b)
Explanatory Variable:						
$\|\Delta U_{t-1}\|$	-.372	-.676***	-.064	.012	-.537***	-.524***
	(.285)	(.103)	(.280)	(.244)	(.092)	(.093)
Horizon	-.019	.002	-.039**		-.016*	
	(.011)	(.010)	(.018)		(.009)	
D_{10+}				-.135***		-.065**
				(.036)		(.030)
Constant	.553***	.427***	.799***	.492***	.578***	.455***
	(.035)	(.047)	(.144)	(.028)	(.092)	(.032)
F tests across time:						
$\beta_0, \beta_1, \beta_2 =$		4.29***			6.12***	4.41***
R^2	.106	.307	.163	.260	.311	.330
Sample size	49	70	41	41	66	66

This table reports OLS estimates of forecast revision models having Nochange as the dependent variable. In Panel A, Nochange is the fraction of forecasters with 10-year bond rate forecasts unchanged from the prior survey date. $|\Delta i_{t-1}|$ is the absolute change in the ten-year bond rate from the prior survey date. D_1 =1 (D_7 =1) if the number of months until the forecast target date (30 June or 31 December) is 1 (7) and 0 otherwise. In Panel B, Nochange is the fraction of forecasters with unemployment rate forecasts unchanged from the prior survey date. $|\Delta U_{t-1}|$ is the absolute change in the unemployment rate from the prior survey date. Horizon is the number of months until the forecast target date (30 June or 31 December). D_{10+} =1 if the number of months until the forecast target date is 10 or more and 0 otherwise. In both panels robust standard errors appear in parentheses and ***, ** and * indicate statistical significance at the .01, .05 and .10 levels, respectively.

Table 5
Difference between Average Squared Forecast Errors of Non-Revisers and Revisers, by Horizon

Panel A: 10-year Bond Rate Forecasts

Horizon, in months:	1	2	3	4	5	6	7	8	9	10	11	12
Target Date:												
Dec 2003		.025	.052	-.092	.009							
June 2004		.015	-.061*	-.129	-.011		.012	.097	.120	-.010	.231	
Dec 2004		-.015	.116*	.112	.246**		.015	-.079	.251**	.209	.131	
June 2005		.278***	.055	.106	.316**		.377**	.138	.447**	.704***	.373	
Dec 2005		.028	.013	.085*	.131*		.336***	.182**	-.022	.155	.216	
June 2006		.028**	.051**	.001	-.002		.097	.059	.145	.200*	-.114	
Dec 2006		.029**	.015	.018	-.045		.088	-.069	.063	.061	.242***	
June 2007		.025	.041	.084	.010		.084	.115	.041	.116	-.033	
Dec 2007		.148**	-.060	-.208	-.002		-.904**	-.121	-.005	-.183	-.222	
June 2008	.043**	.035	.006	.006	-.144	-.054	.077	-.063	-.070	.082	-.199	
Dec 2008	1.308***	-.340**	.659***	-.227	-.803**	-.242	-.699	-.391	-.367	.382	.390	
June 2009	.022	.463***	.047	.294*	.250	.776***	-.402	.051	-.001	.194	-.388	-.200
Dec 2009	-.023	.043	.106	.097	.045	-.024	.272	.132	.203	.103	.103	---‡
June 2010	.187**	.285	.016	.044	.034	.039	-.002	.213	.054	.058	.517*	.143
Dec 2010	.271***	.233**	.232*	-.080	.018	.111	.361**	-.184	.065	.273	.453	-.088
June 2011	.051	.121***	.031	.042	.087	-.175	.090	-.032	.214**	.265	.215	.125
Dec 2011	-.017	.009	.255***	.892***	.459	.260	.994**	.245	-.026	-.243	.102	-1.606
June 2012	.170***	.291***	.074	.223*	-.065	.196**	.092	-.155	.493	.899	1.339	-.411
Dec 2012	.019**	.076	.169	.200*	.217*	-.048	1.471***	-.454	-.010	.579*	-.154	.103
June 2013	.229**	.024	-.113**	.022	.141**	.085	.001	.270**	.244**	.226**	.064	-.110
Dec 2013	.231*	.055	.122	.036	-.003	.247**	-.006	-.202*	-.208**	-.089	.027	.113
# of comparisons	12	21	21	21	21	12	20	20	20	20	20	9
% + and significant	66.7	38.1	23.8	23.8	23.8	25.0	25.0	10.0	20.0	20.0	10.0	0.0
% – and significant	0.0	4.8	9.5	0.0	4.8	0.0	5.0	5.0	5.0	0.0	0.0	0.0

This panel reports differences in mean squared forecast errors of forecasters who did and did not revise their forecasts of the 10-year government bond rate from the previous survey for the target date shown, by months until the target date. Positive differences indicate larger mean squared errors for non-revisers. The *WSJ* survey did not request 1-, 6- and 12-month-ahead forecasts of the bond rate until June 2008. ***, ** and * indicate differences significantly different from zero at the .01, .05, and .10 levels. ‡ No forecast revision data are available for this date.

Table 5 -- *continued*

Panel B: Federal Funds Rate Forecasts

Horizon, in months:	1	2	3	4	5	6	7	8	9	10	11	12
Target Date:												
June 2003		-.039*	-.076*	-.039	-.064							
Dec 2003		.008	.004	.011	.017		.014	.201	.276	.549**	.292	
June 2004		.038**	.026**	-.006	-.009		-.044	-.136	-.058	.006	.110	
Dec 2004		.027**	.032**	.016	-.068		.066*	.214**	.226	.035	.204	
June 2005		.001	-.020**	-.006	-.036		.035	.075	-.199**	-.304**	-.209	
Dec 2005		-.002	.019	-.087*	.093**		-.034	-.021	.181**	.099	-.210**	
June 2006		.024**	.016	.058*	.040		.080	.109	.153	-.376*	.524**	
Dec 2006		-.010	-.001	.012	.015		.040**	-.024	-.025	-.043	.197	
June 2007		-.023**	-.015	-.150**	-.124		.209	.132	.127	.240	.151	
Dec 2007	-.035	.004	.018	.101	.239**		.210	.051	-.319	.019	-.185	
June 2008	-.011*	.003	-.046	.049	---†	.265	.975	.356*	-.322	1.210	.474	
# of comparisons	2	11	11	11	10	1	10	10	10	10	10	
% + and significant	0.0	23.3	18.2	9.1	20.0	0.0	20.0	20.0	10.0	10.0	10.0	
% – and significant	50.0	18.2	18.2	18.2	0.0	0.0	0.0	0.0	10.0	20.0	10.0	

This panel reports differences in the mean squared forecast errors of forecasters who did and did not revise their forecasts of the federal funds rate from the previous survey for the target date shown, by months until the target date. Positive differences indicate larger mean squared errors for non-revisers. The *WSJ* survey did not request 1-, 6- and 12-month-ahead forecasts of the fed funds rate until June 2008. ***, ** and * indicate differences significantly different from zero at the .01, .05, and .10 levels. † All forecasters revised their forecasts.

Table 5 -- *continued*

Panel C: Unemployment Rate Forecasts

Horizon, in months:	1	2	3	4	5	6	7	8	9	10	11	12
Target Date												
May 2003	-.003	.020	.060*	-.031								
Nov 2003	-.007	-.015	-.012	-.185		.288	-.106	-.043	.262	.269		
May 2004	-.007**	.010	.007	.004		.003	-.013	.082	-.129	.031		
Nov 2004	-.001	-.011	-.010	.012		-.017	.024	.045*	.024	.006		
May 2005	-.004	.009	.003	.012		.002	-.011	.011	.007	-.043		
Nov 2005	.001	-.004	-.005	-.003		.016	-.009	.007	.026	.015		
May 2006	.008**	.011	-.022	.047		.019	.023	-.051*	-.060*	.028		
Nov 2006	.024**	.015	.001	-.096		-.030	.005	-.004	-.069	.104*		
May 2007	.004	.033**	-.020	.037		.021	.060	.100	-.070	-.142*		
Nov 2007							.011	-.006	.040	.048		
Dec 2007	.004	-.003	.004	-.014	-.035							
June 2008		-.204	-.042*	.085*	-.050	.072	.038	.029	-.010	.056	.239*	
Dec 2008	.003	---†	.016	.425**	.106	.083	-.199	-.391	.017	.655	-.079	.251
June 2009		.234**	-.179	.417	-.355	-.671	.935	12.987**	.060	.915	-.331	1.178
Dec 2009	.040*	-.158	.014	-.034	-.017	.110	-.202	.483	-.444	3.430**	-.666	.072
June 2010	-.033*	-.038	-.011	-.087**	.038	.085	-.195	.166	.010	.247	-.017	.599*
Dec 2010	-.039	.008	.053*	-.043	-.021	-.026	.018	.067	.124	.025	.062	.042
June 2011	-.010	.048	.044	.030	.123*	.074	.033	-.115*	-.046	.061	-.003	.080
Dec 2011	.160**	-.050	.062	-.165**	-.074	-.075	.097**	.039	.030	.075	.176**	-.037
June 2012	.008*	-.014	.006	.016	.023	.070	.052	-.089	-.052	-.312*	.064	.053
Dec 2012	-.003	.006	.018	-.015	-.010	-.092**	.028	.047	.002	.094**	.081	.141
June 2013	-.003	.007	.021*	.011	.001	.039*	.027	.127**	.071	.075	-.069	-.128**
Dec 2013	.066**	-.022	-.053	-.068**	.101*	-.005	-.147**	-.029	-.110	.119	-.160	.091
# of comparisons	20	21	22	22	13	20	21	21	21	21	12	11
% + and significant	30.0	9.5	13.6	9.1	15.4	5.0	4.8	14.3	0.0	14.3	16.7	9.1
% – and significant	10.0	0.0	4.5	13.6	0.0	5.0	4.8	9.5	4.8	9.5	0.0	9.1

This panel reports difference in the mean squared forecast errors of forecasters who did and did not revise their forecasts of the unemployment rate from the previous survey for the target date shown, by months until the target date. Positive differences indicate larger mean squared errors for non-revisers. The *WSJ* survey switched from requesting unemployment rate forecasts for May and November to June and December starting in June 2007. The *WSJ* survey did not consistently request 1-, 6- and 12-month-ahead forecasts of the unemployment rate until after June 2009. ***, ** and * indicate differences significantly different from zero at the .01, .05, and .10 levels. † All forecasters revised their forecasts.

Figure 1 Forecasts of the 10-year Treasury Bond Rate by Target Date

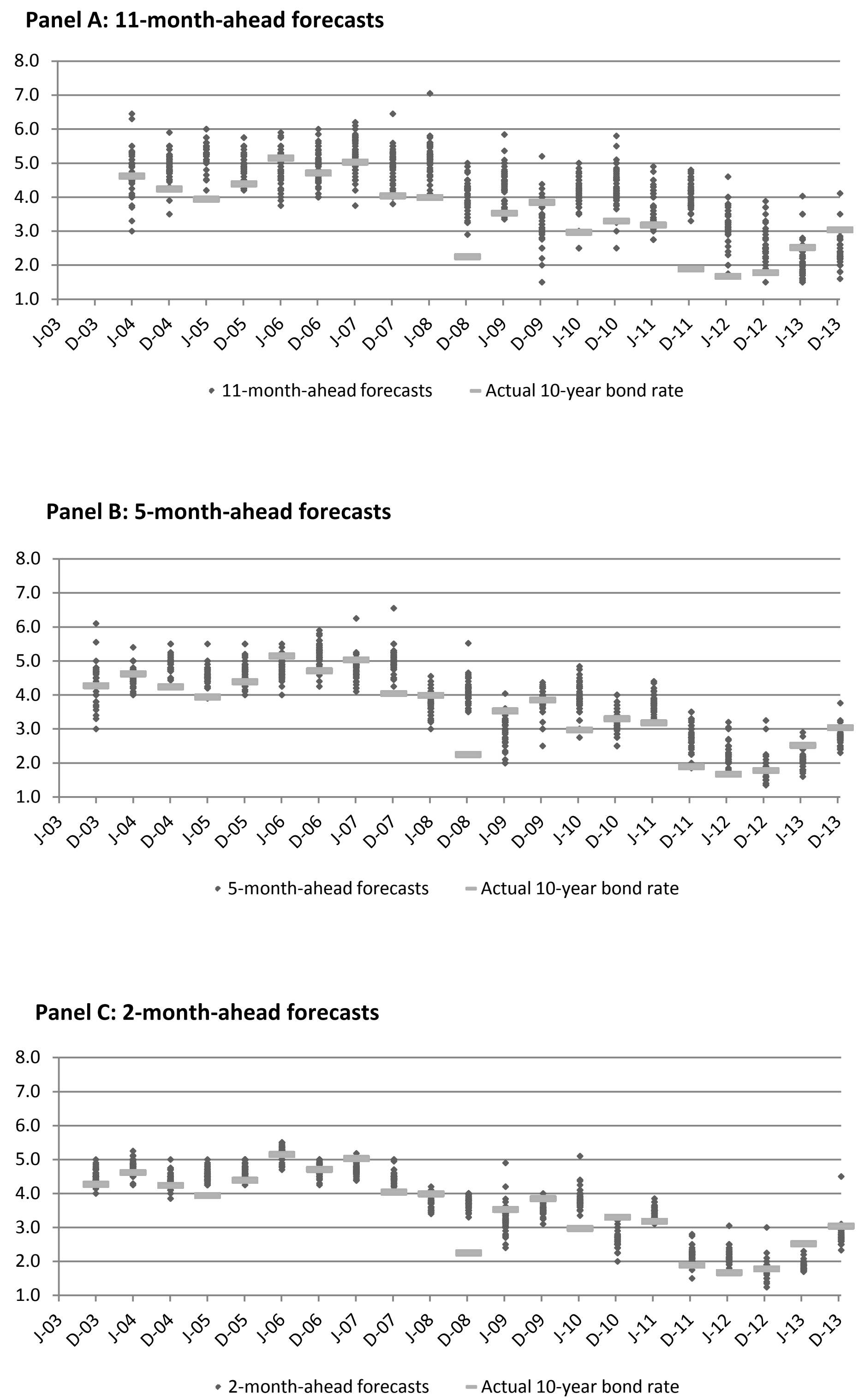
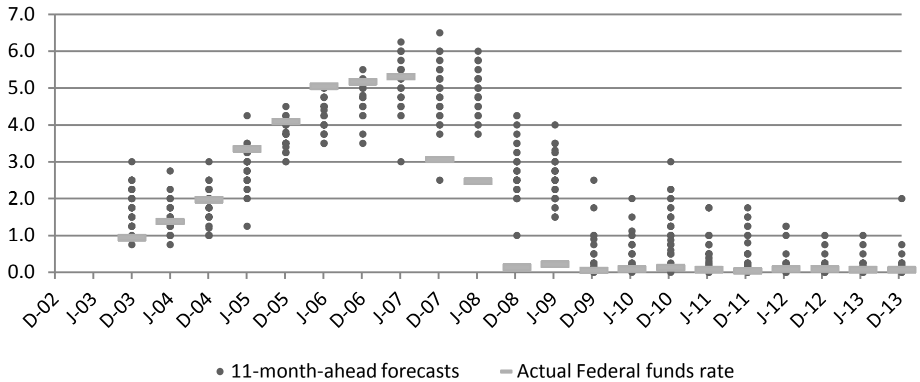
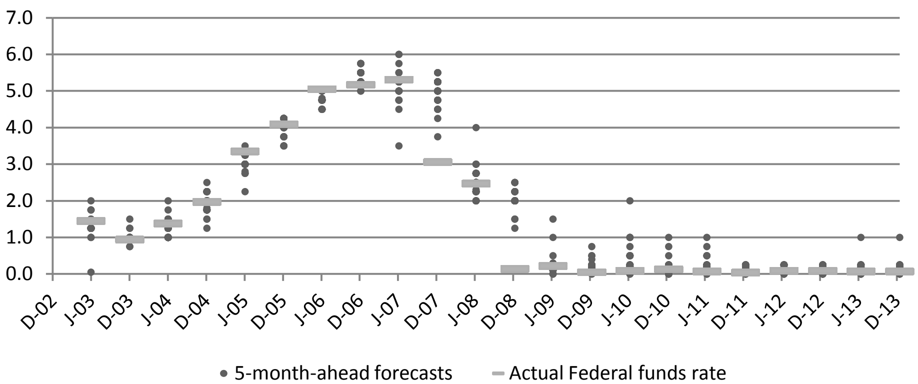


Figure 2 Forecasts of the Federal Funds Rate by Target Date

Panel A: 11-month-ahead forecasts



Panel B: 5-month-ahead forecasts



Panel C: 2-month-ahead forecasts

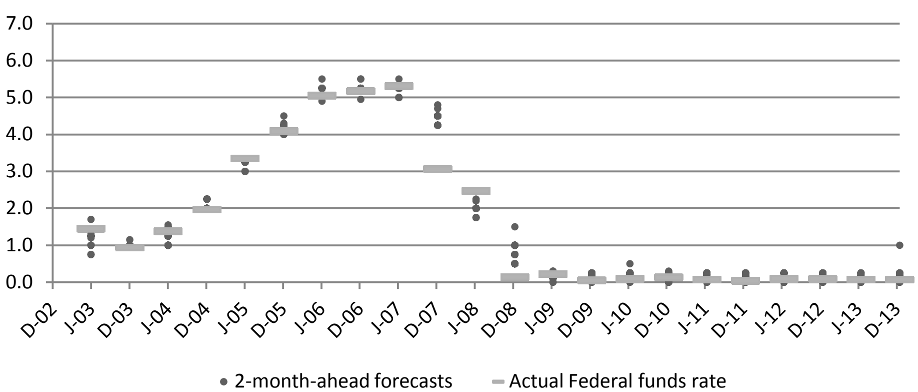


Figure 3 Forecasts of the Unemployment Rate by Target Date

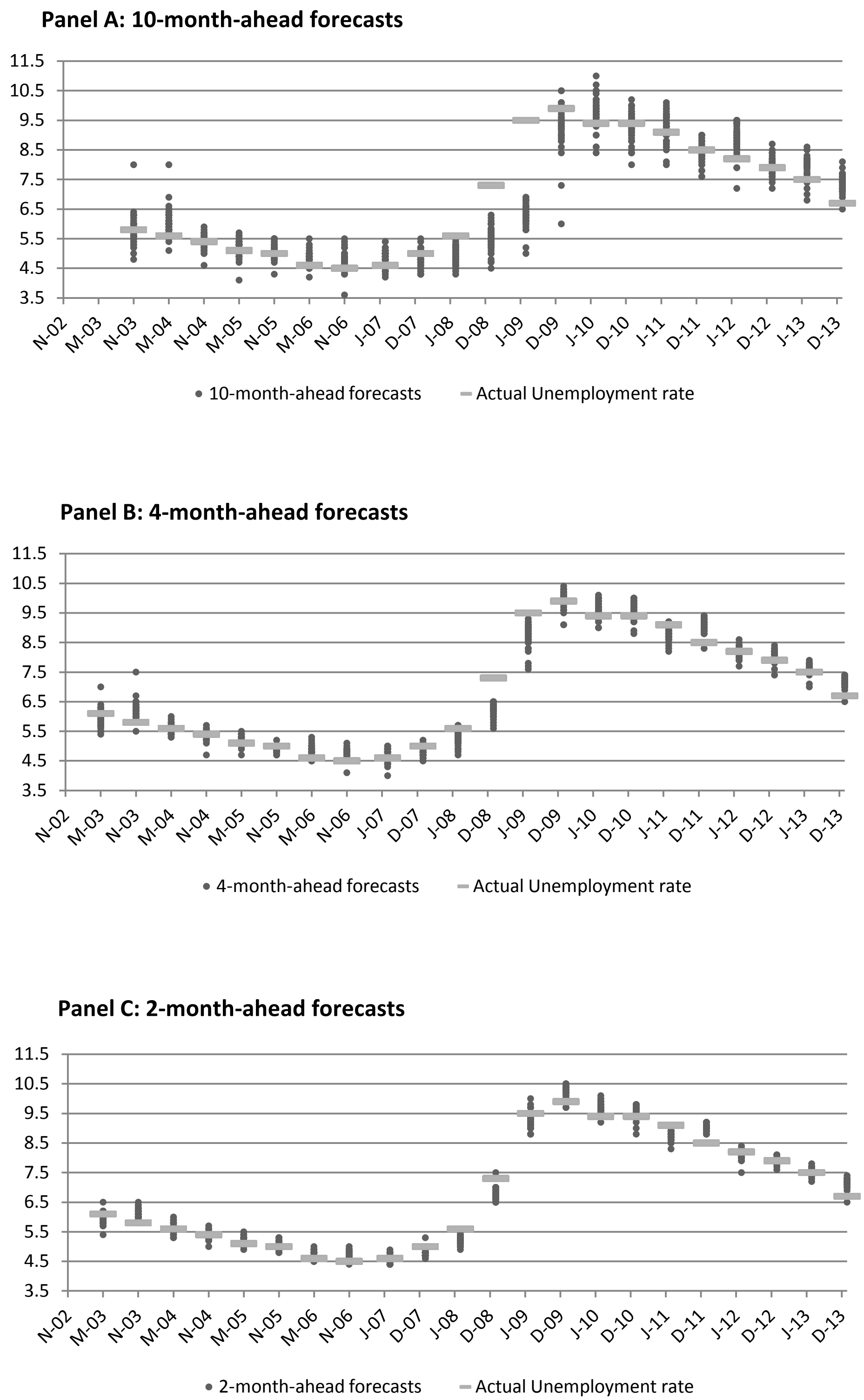


Figure 4 Percentage of Forecasters with Unrevised Forecasts, by Forecast Horizon

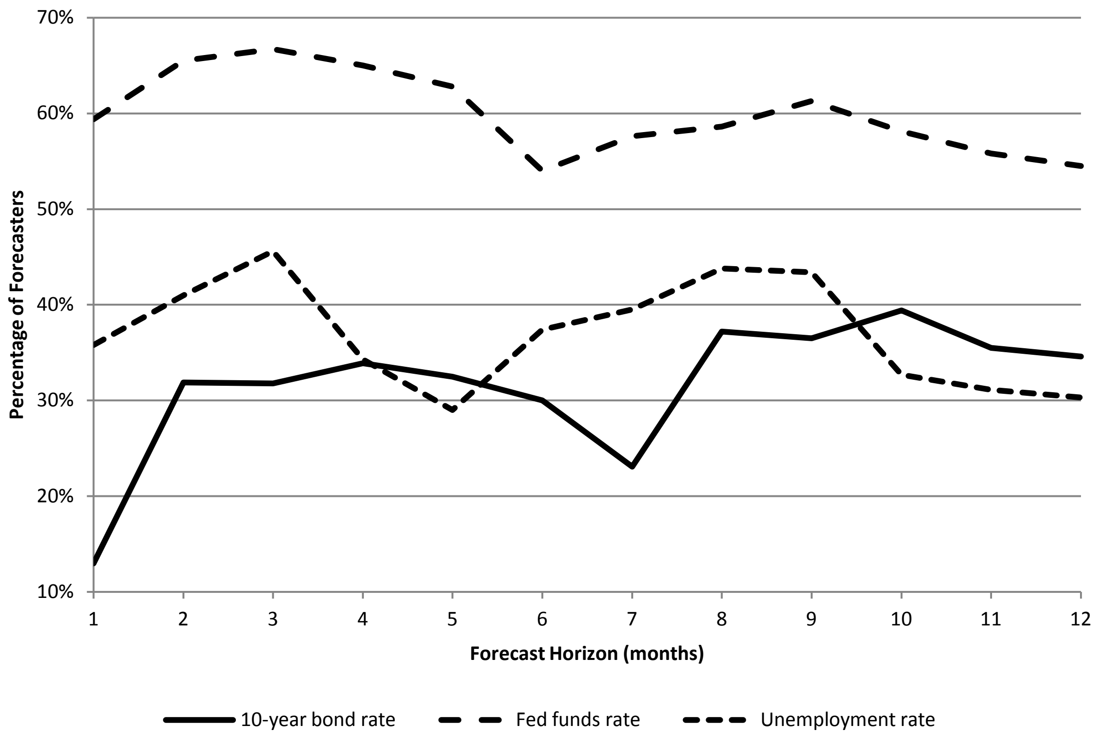
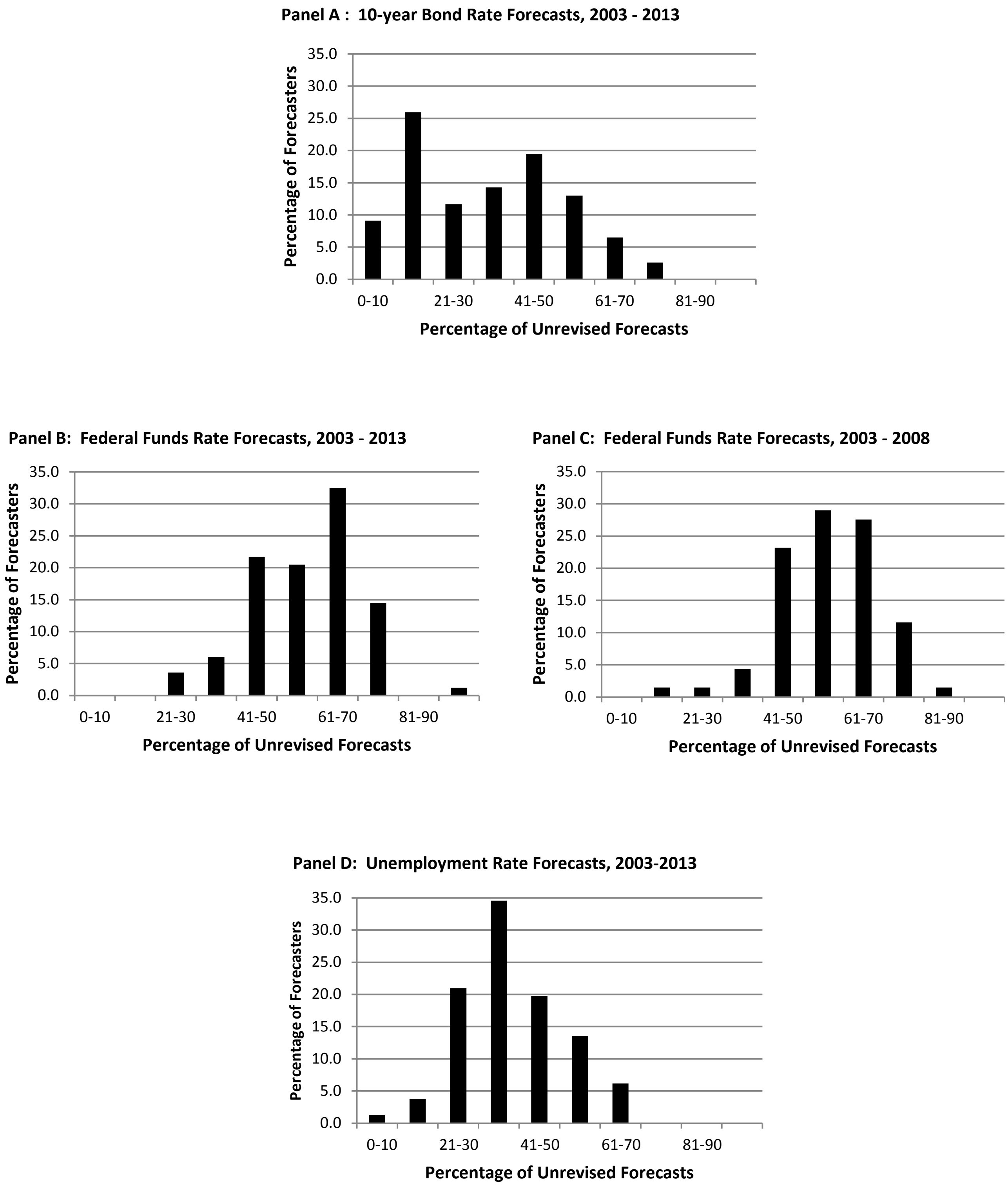


Figure 5 Distribution of Forecasters by Percentage of Unrevised Forecasts



Appendix A Questionable Data Points in the *Wall Street Journal* Surveys

10-year Bond rate Forecasts

Survey	Target Date	Question
June 2008	June 2008	Prakken & Varvares forecast is 1.65 with previous forecast of 3.55
June 2008	Dec 2008	Prakken & Varvares forecast is 2.13 with previous forecast of 4.1 and subsequent forecast of 4.2
Oct 2008	Dec 2008	Prakken & Varvares forecast is 1.27 with previous forecast of 3.88 and subsequent forecast of 3.68
Nov 2008	Dec 2008	Sterne forecast is .9 with previous forecast of 3.70 and subsequent forecast of 3.00
Oct 2008	June 2009	Prakken & Varvares forecast is 1.13 with previous forecast of 4.35 and subsequent forecast of 3.36
Nov 2008	June 2009	Sterne forecast is 1.3 with previous forecast of 3.70 and subsequent forecast of 3.50
Dec 2008	June 2009	Wilson forecast is 1.65 with previous forecast of 2.89 and subsequent forecast of 2.80

Fed funds rate forecasts

Feb 2003	June 2003	Shilling forecast is .05 with previous forecast of 2.89 and subsequent forecast of 2.80
Sept 2009	Dec 2009	Johnson forecasts are recorded as -.125 instead of .125
June 2011	Dec 2011	Maki forecast is .0125 with previous forecast of .125 and subsequent forecast of .125
June 2011	June 2012	Maki forecast is .0125 with previous forecast of .125 and subsequent forecast of .125
July 2012	June 2013	Several cases of forecasts recorded as .0125 with previous and subsequent forecasts of .125

Unemployment rate forecasts

Feb 2006	May 2006	Swonk forecast of 3.4 with previous forecast of 5.0 and subsequent forecast of 4.8
Feb 2006	Nov 2006	Swonk forecast of 3.6 with previous forecast of 5.0 and subsequent forecast of 4.7

August 2006	Nov 2006	Duncan forecast of 2.8 with previous forecast of 4.8 and subsequent forecast of 4.8
May 2008	June 2008	Sterne forecast is 2.9 with previous forecast of 5.2
May 2008	Dec 2008	Sterne forecast is 2.4 with previous forecast of 5.0 and subsequent forecast of 5.1
Dec 2008	Dec 2008	Brinkman forecast of 8.3 with previous forecast of 6.9
Feb 2009	June 2009	Meil forecast is 5.8 with previous forecast of 8.3 and subsequent forecast of 9.0
Nov 2013	Dec 2013	Handler forecast is 1.7 and probably should be 7.1

Appendix B Model Estimates Using Quasi-Maximum-Likelihood Estimation

Table B1
10-year Bond Rate Forecast Revisions (Estimates using Papke and Wooldridge, 1996)

Horizon Length:	1-6 months			7-12 months		
Column:	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Explanatory Variable:						
$\lvert\Delta i_{t-1}\rvert$	-2.365***	-1.794***	-1.773***	-1.513***	-1.403***	-1.390***
	(.390)	(.378)	(.385)	(.281)	(.287)	(.285)
	[-.416]	[-.364]	[-.360]	[-.339]	[-.314]	[-.311]
Horizon	.116***			.081**		
	(.037)			(.032)		
	[024]			[.018]		
D_1 or D_7			-.934***			-.580***
			(.262)			(.127)
			[-.159]			[-.121]
D_2 or D_8		.851***			.615***	
		(.264)			(.145)	
		[.189]			[.144]	
D_3 or D_9		.862***			.504***	
		(.286)			(.159)	
		[.192]			[.118]	
D_4 or D_{10}		1.016***			.676***	
		(.285)			(.168)	
		[.228]			[.159]	
D_5 or D_{11}		.984***			.543***	
		(.296)			(.194)	
		[.220]			[.127]	
D_6 or D_{12}		.952***			.530	
		(.293)			(.159)	
		[.217]			[.125]	
Constant	-.869***	-1.354***	-.427***	-1.092***	-.845***	-.268***
	(.160)	(.275)	(.082)	(.310)	(.128)	(.075)
χ^2 tests, Coefs.of D_j:						
all $D_j = 0$		13.89***			23.01***	
all $D_j =$		1.93			1.43	
Sample size	109	109	109	109	109	109

See notes for Table 1. The marginal effects, comparable to the OLS estimates in Table 1, appear in brackets. The standard errors for the Papke-Wooldridge estimated coefficients appear in parentheses.

Table B2
Federal Funds Rate Forecast Revisions (Estimates using Papke and Wooldridge, 1996)

Horizon Length:	1-6 months				7-12 months			
Column:	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.6)	(2.7)	(2.8)
Explanatory Variable:								
$\lvert \Delta ffr_{t-1} \rvert$	-1.569***		.022		-1.262***		-.717	
	(.417)		(.544)		(.349)		(.461)	
	[-.365]		[.005]		[-.309]		[-.175]	
$\lvert \Delta ffrtarget_{t-1} \rvert$		-2.375***	-2.393***	-2.545***		-1.405***	-.807	-1.529***
		(.397)	(.656)	(.370)		(.402)	(.620)	(.379)
		[-.553]	[-.558]	[-.593]		[-.343]	[-.197]	[-.374]
Horizon	-.024	-.023	-.023		.028	.008	.019	
	(.052)	(.046)	(.047)		(.041)	(.040)	(.041)	
	[-.005]	[-.005]	[-.005]		[.007]	[.002]	[.005]	
				.433				.267
D_2 or D_8				(.258)				(.188)
				[.087]				[.064]
D_3 or D_9				.597**				.443**
				(.282)				(.214)
				[.131]				[.105]
D_4 or D_{10}				.330				.198
				(.278)				(.229)
				[.074]				[.048]
D_5 or D_{11}				.289				.181
				(.234)				(.204)
				[.066]				[.044]
D_6 or D_{12}				.037				.065
				(.276)				(.247)
				[.008]				[.016]
Constant	.822***	.771***	.770***	.381*	.192	.309	.264	.186
	(.206)	(.189)	(.187)	(.202)	(.378)	(.373)	(.381)	(.145)
χ^2 tests, Coefs.of D_j:								
all $D_j = 0$				7.09				4.97
all $D_j =$				4.89				2.55
Sample size	114	114	114	114	113	113	113	113

See notes for Table 2 and Table B1

Table B3

Unemployment Rate Forecast Revisions (Estimates using Papke and Wooldridge, 1996)

Horizon Length:	1-6 months		7-12 months		
Column:	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)
Explanatory Variable:					
$\|\Delta U_{t-1}\|$	-3.440***	-3.259***	-2.564***	-2.455***	-2.462***
	(.511)	(.535)	(.415)	(.420)	(.411)
	[-.804]	[-.762]	[-.600]	[-.575]	[-.576]
Horizon	-.045		-.114***		
	(.032)		(.013)		
	[-.010]		[-.027]		
D_2 or D_8		.205		.112	
		(.190)		(.165)	
		[.049]		[.026]	
D_3 or D_9		.328*		.038	
		(.199)		(.170)	
		[.078]		[.009]	
D_4 or D_{10}		-.035		-.331**	
		(.211)		(.161)	
		[-.008]		[-.075]	
D_5 or D_{11}		-.211		-.354*	
		(.204)		(.200)	
		[-.048]		[-.080]	
D_6 or D_{12}		-.026		-.454**	
		(.194)		(.203)	
		[-.006]		[-.100]	
D_{10+}					-.418***
					(.102)
					[-.097]
Constant	.102	-.141	.905**	-.029	.022
	(.134)	(.165)	(.311)	(.144)	(.088)
χ^2 tests, Coefs.of D_j:					
all D_j = 0		10.75*		18.05***	
all D_j =		10.58**		16.66***	
Sample size	119	119	107	107	107

See notes for Table 3 and Table 1B