Professional Forecasts of Interest Rates and Exchange Rates: Evidence from the Wall Street Journal's Panel of Economists

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Abstract

We use individual economists' 6-month-ahead forecasts of interest rates and exchange rates from the *Wall Street Journal*'s survey to test for forecast unbiasedness, accuracy, and heterogeneity. We find that a majority of economists produced unbiased forecasts but that none predicted directions of changes more accurately than chance. We find the forecast accuracy of most economists to be statistically indistinguishable from that of the random walk model when forecasting the Treasury bill rate but significantly worse for many when predicting the Treasury bond rate and the exchange rate. We find evidence that some economists make predictions that are generally above the survey mean while others are generally below. We also find some support for strategic models that predict that a forecast's absolute deviation from the consensus depends on the industry employing the forecasting economist. Contrary to previous research, we find that economists deviate less from the consensus as they age.

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Even though economists are warned in graduate school to avoid making forecasts that can readily be evaluated, professional economists' forecasts are a staple of the financial press. Several surveys of such forecasts are available and are thought to be valued by households, business firms, and even academic economists.[1] Accurate forecasts that vary little across economists presumably increase users' confidence that economists know what is likely to occur. Recent research such as Laster *et al.* (1996) and Lamont (2002) suggests, however, that economists may have strong incentives to differentiate their forecasts by making predictions that are more extreme than their true expectations.

We contribute to the forecast assessment literature by analyzing the quality of individual economists' interest rate and exchange rate forecasts from a highly visible but relatively little studied survey, the *Wall Street Journal's* panel of economists. This survey is particularly well-suited to assessing forecast quality because the participants' names and employers are published along side their forecasts, publicity which should give participants strong incentives to forecast carefully. We focus on interest rate and exchange rate forecasts – rather than a wider set of variables from the survey – for two reasons: first, interest rates and exchange rates are never reported and then subsequently revised, so the actual values economists were predicting is never

[1] Surveys include the Livingston Survey and the Survey of Professional Forecasters maintained by the Federal Reserve Bank of Philadelphia, the Money Market Services survey and the Blue Chip Forecasts. Carroll (2003) reports evidence that households use the reported forecasts of professional economists in forming their own expectations. Fildes and Stekler (2002) report on surveys that indicate corporations value economic forecasts. Economic researchers increasingly use professional economists' predictions as proxies of otherwise unobservable expectations in studying asset price determination. For example, Anderson *et al*. (2003) and the references cited by them, discuss researchers' use of professional economists' forecasts of macroeconomic variables to distinguish expected from unexpected macroeconomic announcements in studies of financial market reactions to economic news. Frankel and Froot (1987) and MacDonald (2000) observe that forecasts of interest rates and exchange rates potentially enable researchers to separate the confounding effects of expectations and time-varying risk premiums.

an issue, unlike GDP or inflation[2]; and second, the interest rate and exchange rate forecasts have appeared in a consistent form in the *Wall Street Journal* surveys longer than other macroeconomic variables. We proceed by testing whether economists' interest rate and exchange rate forecasts are unbiased (allowing for nonstationarity), more accurate than naïve prediction rules, and affected by economists' strategic behavior.

To preview our results, we find that most of the surveyed economists produce forecasts that are unbiased but less accurate than forecasts generated by a random walk model. Moreover several economists produce long-term interest rate and exchange rate forecasts that are statistically inferior to the random walk model. The economists in the *Wall Street Journal* survey display systematically heterogeneous predictions, similar to the economists that Ito (1990) and MacDonald and Marsh (1996) studied but, unlike the economists Lamont (2002) studied, they tend to make less extreme forecasts as they age. We also find evidence that economists' forecast strategies differ depending on where the economists are employed.

The rest of the paper is organized as follows. Section 1 briefly reviews some of the past work on evaluating survey measures of expectations. Section 2 describes our data. Section 3 reports our empirical results and section 4 offers some conclusions.

1. Review of Past Work

Published assessments of professional economists' forecast quality have focused mainly on three issues.[3] One is whether "consensus forecasts" (mean or median responses to surveys)

[2] Keane and Runkle (1990) present evidence that use of preliminary versus revised data can change the conclusions from unbiasedness tests.

[3] Much of the work on evaluating survey measures of expectations focuses on inflation forecasts. See Croushore (1998) and Thomas (1999) for reviews of this work. MacDonald (2000) examines previous work on financial market expectations.

produce misleading evidence about individual economists' unbiasedness and rationality.[4] Another is whether nonstationarity in the variables economists forecast invalidate the standard tests of forecast unbiasedness.[5] A third issue concerns heterogeneity of individuals' forecasts and strategic behavior by individuals as a potential source of the heterogeneity. Inquiry into this last issue has been deterred by a paucity of forecast series identifiable at the individual level, although a few studies have employed such data. Ito (1990) and MacDonald and Marsh (1996) find evidence of heterogeneous exchange rate expectations from individuals' forecast series, while Laster *et al.* (1999) and Lamont (2002) propose and test models of strategic behavior in which economists are rewarded for being right when others are wrong.[6] Using individual forecast data these last two studies report evidence consistent with strategic behavior, with Laster *et al.* finding that economists from some industries are more likely to deviate from the consensus and Lamont finding that economists make more extreme predictions as they age and when they own their own forecasting firms. [7]

This study investigates the three issues from the forecast assessment literature using individual economists' interest rate and exchange rate forecasts as reported by the *Wall Street Journal's* bi-annual survey of economists. Several researchers have previously used these data to examine forecast errors – among other matters -- though sometimes without the relevant

[4] Most such studies analyze inflation forecasts. While some studies conclude that individual forecasts are generally unbiased and may therefore be pooled (Keane and Runkle (1990), Batchelor and Dua (1991)), others find evidence of bias and conclude that pooling is inappropriate (Figlewski and Wachtel (1981) and Bonham and Cohen (2001)).
[5] The standard test is to regress actual values being forecasted on the forecasts and to test whether the intercept is zero and the slope is one. The results from this literature are mixed, with some researchers finding economists' forecasts to be unbiased despite nonstationary in the actual data (Liu and Maddala (1992), Osterberg (2000)), and other researchers finding evidence of bias (Aggarwal *et al.* (1995) and Schirm (2003)). It is noteworthy that these studies use consensus forecasts rather than individuals' forecasts; none examine interest rate forecasts.
[6] Some researchers (Scharfstein and Stein (1990) and Erbeck and Waldmann (1996)) note that other incentive structures may produce more homogeneous forecasts.
[7] Laster *et al.* (1999) find evidence of strategic forecasting of real GDP in forecasts from the Blue Chip Economic Indicators; and Lamont (2002) finds evidence of strategic behavior in annual forecasts of real GDP growth, inflation, and unemployment reported by *Business Week*.

statistical tests.[8] To our knowledge, however, researchers have not previously used the *Wall Street Journal* data to test either unbiasedness of individual forecasts or strategic forecasting by individual forecasters.

2. The *Wall Street Journal* survey data

Since 1981 the *Wall Street Journal* has published forecasts of several economic variables at the beginning and mid-point of each year made by economists identified by name and employer. The January survey presents forecasts for the last business day of June while the July survey presents forecasts for the last business day of December.[9] The surveys appear in the first week of January and July along with commentary and, more recently, discussion of the accuracy of the last set of forecasts.[10] The initial survey presented forecasts of the prime rate alone; forecasts of the Treasury bill and Treasury bond rates start in January 1982. Additional forecasts have been added over the years including the dollar-yen exchange rate, beginning in January 1989. Economists employed by banks and securities firms dominate the survey, but economists from industrial corporations, consulting firms, forecasting companies, universities and professional associations also participate.[11]

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[8] Kolb and Stekler (1996) examine the six-month-ahead interest rate forecasts from 1982 through January 1990 and find little evidence that forecasters, individually or on average, can predict the sign of interest rate changes. Greer reports similar evidence for predicting the direction of one-year changes in various variables for 1984-1997 (Greer (1999)) and in the long-term interest rate for 1984-1998 (Greer (2003)). Cho (1996) evaluates the six-month-ahead predictions of twenty-four forecasters who participated in all the surveys from December 1989 through June 1994. He finds that about 80 percent of the forecasters predicted the short-term interest rate more accurately than a random walk model but that very few predicted the long-term interest rate or the exchange rate better than a random walk model. Eisenbeis *et al.* (2002) uses the *Wall Street Journal* data from 1986 to 1999 to illustrate a new approach to ranking forecasters across variables that differ in volatility and cross-correlation.

[9] Respondents have often been asked for 12-month ahead forecasts but these are not available for the entire period.

[10] The selection of survey respondents does not depend on their past performance. The *Journal* tries to get broad representation but also wants to include the chief economists from major financial institutions. We thank Jon Hilsenrath of the *Wall Street Journal* for this information.

[11] For respondents that appeared in at least six surveys from January 1982 through July 2002, the employer mix is as follows: banks (28 individuals and 391 observations), econometric modelers (5 and 109), independent forecasters (22 and 279), industrial corporations (5 and 41), securities firms (38 and 628), and others (12 and 202). This last group includes economists affiliated with universities, insurance companies, bond-rating firms, and professional associations.

We examine the six-month-ahead forecasts of the Treasury bill and Treasury bond rates that began in 1982 and the six-month-ahead forecasts of the dollar-yen exchange rate that began in 1989, ending with the July 2002 survey.[12] The number of survey participants varies over time: only twelve economists participated in the January 1982 survey compared with fifty-five in the July 2002 survey. Considerable turnover of participants occurs as well. For several tests we restrict the sample to the subset of respondents who appeared in at least twenty surveys; thirty-three economists fit this criterion, each of whom made Treasury bill, Treasury bond and exchange rate forecasts for a total of 99 forecast series.

Figure 1 shows the dispersion of forecast errors made by the surveyed economists in predicting the interest rates and the exchange rate, with forecast errors defined as actual minus predicted values. The wide range of errors on each survey date indicates the diversity of forecasts. For many surveys the errors are also largely of one sign, particularly the Treasury bond rate and exchange rate errors. Errors of one sign hint that while expectations vary across individuals, a common source exists for some of the error.[13]

3. Evaluating the survey data

3.1. Tests of unbiasedness

Unbiasedness is a requirement for rationality when a forecaster's loss function is symmetric about the forecast error. The usual unbiasedness test consists of regressing actual values on forecasts of those values and testing the joint hypothesis that the intercept and slope coefficients are zero and one, respectively:

[12] There was a change in the definition of the three-month Treasury bill rate from the discount yield to the bond-equivalent yield starting with the July 1989 survey. The long-term bond rate refers to the thirty-year bond until the July 2001 survey when it was changed to the ten-year rate. All data are available from the authors on request.

[13] The correlation coefficient for the two interest rate forecast errors is 0.66, indicating that most of the forecast errors are from unpredicted shifts in the yield curve rather than unpredicted changes in its slope. There is little evidence of correlation in the errors for interest rates and the exchange rate. The correlation between the Treasury bill rate and exchange rate forecast errors is 0.02; the correlation between the Treasury bond rate and exchange rate forecast errors is –0.07.

$$A_t = \alpha + \beta\ {}_{t-1}F_{it} + \varepsilon_{it} \qquad t = 1,\ldots T \qquad [1]$$

$$H_O: \alpha=0, \beta=1$$

where A_t is the time-t actual value, ${}_{t-1}F_{it}$ is the forecast of A_t made at time (t-1) by forecaster i, and ε_{it} is a random error term.[14]

When A and F are nonstationary and not cointegrated, estimates of [1] may lead to misleading inferences about unbiasedness (Granger and Newbold (1974)). Indeed, unit root tests on levels and first differences of the actual values of the Treasury bill rate, Treasury bond rate, and the yen-dollar exchange rate sampled at six-month intervals show all three series to be nonstationary.[15] Hence the standard unbiasedness test is not valid.

Liu and Maddala (1992) and Lopes (1998) propose alternatives to the standard unbiasedness test for nonstationary data. Liu and Maddala suggest imposing the restrictions $\alpha=0$ and $\beta=1$ in [1] and using the data to compute forecast errors (A – F); if these errors are stationary, the restrictions are supported and the forecasts are unbiased.[16] Lopes (1998) demonstrates that in finite samples a t-test of the null hypothesis that a forecast series' mean forecast error is zero has greater power than the Liu-Maddala test. To implement either test with our data we must determine, first, whether the Fs are nonstationary and, if so, whether the forecast errors are stationary. We report our findings in Panel A of Table 1.

Using the 5% (10%) significance level, we find 88 (81) of the 99 interest rate and exchange rate forecast series to be nonstationary and 90 (95) of the 99 forecast error series to be stationary; in addition, we find all three survey-mean forecast series to be nonstationary and all

[14] The joint hypothesis that $\alpha=0$ and $\beta=1$ is a sufficient condition for unbiasedness but the necessary condition is that the mean forecast error is zero; see Holden and Peel (1990) and Fildes and Stekler (2002).

[15] The Augmented Dickey Fuller (ADF) statistics using 1 lag for the levels of the Treasury bill rate, Treasury bond rate, and yen-dollar exchange rate are -0.867, -0.970, and -2.396, respectively, indicating that each series has at least one unit root. The ADF statistics for the first differences of the levels data are -4.950, -6.143, and -3.612, indicating that all series are I(1). Rose (1988) and Rapach and Weber (2004) also find that the nominal interest rate has a unit root while Baillie and Bollerslev (1989) report similar findings for nominal exchange rates.

[16] Papers employing this restricted cointegration test include Hakkio and Rush (1989) and Osterberg (2000).

three forecast error series to be stationary. The Liu-Maddala unbiasedness test requires that the forecasts be nonstationary and the errors be stationary. More than three-quarters of the economists pass this test, with 79 (77) of the 99 forecast series passing the test at the 5% (10%) significance level.[17] All three survey-mean forecast series pass the Liu-Maddala test.

Panel B of Table 1 summarizes the results of the tests for zero mean forecast errors. Overall, 80 (75) of the 99 forecast-error series pass the test by producing t-statistics that fail to reject the null of zero mean forecast error at the 5% (10%) level.[18] The errors from the means of the survey forecasts are all insignificantly different from zero. Overall we find that 69 (62) of the 99 individual forecast series and all three survey-mean series show strong evidence of unbiasedness by passing both the Liu-Maddala and Lopes tests at the 5% (10%) level (Panel C, Table 1). We conclude that most of the experienced forecasters produce unbiased forecasts.

3.2 Measures of predictive ability

We measure the predictive accuracy of the surveyed economists two different ways: first, by their success in predicting the direction of interest rate and exchange rate changes;[19] and second, by their mean square forecast error (MSE) relative to the MSE of two benchmarks: the random walk model without drift and, for the exchange rate, the forward rate. We report statistical measures of predictive accuracy in the two panels of Table 2.

Panel A presents statistics on directional accuracy. For the Treasury bill rate and the exchange rate the survey mean, or consensus, forecasts got the direction of change right about

[17] For some individuals there are gaps, usually just one, in the forecast series. While Shin and Sarker (1993) and Ryan and Giles (1998) find that occasional missing values do not change the asymptotic distribution of the standard Dickey-Fuller tests, our samples are small so that the results with a gap remain suspect. Ryan and Giles (1998) report, however, that ignoring gaps rather than filling the gaps with the last observation or interpolating, gave more powerful tests.

[18] In instances where the forecasts errors reject the null, the forecast series err on the high side: this is true of all the Treasury bill rate and exchange rate forecast series and about two-thirds of the Treasury bond rate forecast series.

[19] Leitch and Tanner (1991) argue that the direction of change is more closely related to profits than, say, the mean square error, at least for interest rate predictions.

half the time, and the formal tests of independence of actual and predicted changes confirm that the mean predictions were not statistically different than a naïve model of no change (Schnader and Stekler (1990)).[20] For the long-term bond rate, however, the survey mean forecast got the direction correct only a third of the time, significantly worse than a naïve model as indicated by the rejection of independence by all three test statistics. Evaluating the individual forecasters gives similar results. For the Treasury bill and exchange rate, only about a fifth of the forecasters got the direction of change correct less than 45% of the time. None were significantly better than a naïve model but few were significantly worse. For the long-term bond rate, however, more than half the forecasters got the direction of change correct less than 45% of the time. None were significantly better than a naive model and several were significantly worse. In summary, when the surveyed economists are set the task of predicting the direction of interest rate and exchange rate changes, they acquit themselves modestly, at best.

Our second approach to measuring the surveyed economists' predictive accuracy is to compare their forecast errors to errors made by traditional benchmarks. For the interest rate and exchange rate forecasts we use as a benchmark the random walk model without drift[21]; and for the exchange rate we also use as a second benchmark the forward exchange rate.[22] We compared economists' forecast errors to the benchmarks' errors by computing the mean-square error (MSE) of each economist's and each benchmark's forecast series and then expressing each economist's MSE as a proportion of the benchmark's MSE; thus, outperforming the benchmark amounts to achieving a MSE ratio statistically less than one. We computed similar ratios for the mean or consensus forecasts. To test whether a ratio differs statistically from one we followed

[20] For each forecast series we performed Fisher's exact test, constructed contingency tables to compute the standard χ^2 statistic, and conducted the Pesaran-Timmerman (1992) test. We also performed the test of Cumby and Modest (1987), suggested by Stekler and Petrei (2003), in which the actual change is regressed on a binary variable taking the value of one if the forecaster predicted an increase and zero otherwise. These tests, not reported, also indicated that the respondents were unable to provide useful information on the direction of change.

[21] Specifically, we let the actual values of the interest rates and exchange rate on the last business day in December and June represent forecasts for the last business day in June and December, respectively.

[22] We obtained our forward exchange rate data from the *Wall Street Journal*.

Fildes and Stekler (2002) and used the modified Diebold-Mariano (1995) test statistic proposed by Harvey *et al.* (1997).[23] We report our findings in Panel B of Table 2.

In general, the economists' predictions proved no more accurate than the traditional benchmarks and were often worse.[24] The economists were most accurate in predicting the Treasury bill rate: 24% beat the random walk model, as did the survey mean, though none achieved MSE ratios statistically less than one. Consistent with the direction of change results, the economists were least accurate in predicting the Treasury bond rate: none beat the random walk model and 55% (70%) performed significantly worse than a random walk using the 5% (10%) significance level, though the MSE ratio of the survey mean was statistically indistinguishable from one. Though better at predicting the exchange rate, the economists still predicted poorly: none beat a random walk, and 18% (45%) were significantly worse than a random walk at the 5% (10%) level. The economists' exchange rate predictions were also less accurate than those of another poorly-performing predictor of exchange rates, the forward exchange rate: though 9% of economists outperformed the forward rate (none significantly), 15% (24%) predicted the exchange rate significantly worse than the forward rate at the 5% (10%) level.[25] The MSE ratio for the survey mean exceeded one for both benchmarks but was significantly higher only for the random walk model benchmark.

In summary, economists participating in the *Wall Street Journal* surveys exhibit modest directional accuracy and large predictive errors.[26] We now turn to investigating sources for the considerable spread of forecasts at each survey date.

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[23] This statistic tests whether the mean difference between the squared forecast errors of the economist and the random walk model is significantly different from zero. The statistic has a t-distribution under the null hypothesis that the mean is zero.

[24] Tables with the statistics for each of the economists participating in at least twenty surveys are available in upon request.

[25] Chinn and Frankel (1994), find forward exchange rates to be biased predictors of the spot exchange rate.

[26] As a referee pointed out, the 1980s and 1990s may have been particularly difficult decades for economists in predicting inflation, which is likely to affect the predictions of interest rates and exchanges rates. We plan to investigate this issue in future work.

3.3. Tests of systematic forecast heterogeneity and strategic forecasting

The dispersion of forecast errors displayed in Figure 1 show that economists differ substantially in their predictions. While these differences could be random variation about the mean forecasts, previous researchers have found evidence of systematic heterogeneity, with some economists predicting lower values than the consensus, on average, and others predicting higher.[27] In this section we explore sources of heterogeneity in the *Wall Street Journal* forecasts, first looking at systematic behavior by economists individually and in groups, and then looking at strategic behavior by economists.

To test for systematic heterogeneity in the *Wall Street Journal* forecasts we follow Ito (1990). Let the time t forecast of the j^{th} economist, $f_{j,t}$, be a function of common information, I_t, an individual effect represented by an individual-specific dummy variable, g_j, and a random error term, $u_{j,t}$:

$$f_{j,t} = f(I_t) + g_j + u_{j,t} . \qquad j = 1, \ldots J, \quad t = 1,\ldots T. \qquad [2]$$

Assume further that $f(I_t)$ contains a constant, permitting the average of the g_js to be set to zero. Averaging equation [2] across all economists in each time period and then subtracting the average from [2] yields:

$$f_{j,t} - f_{AVE,t} = g_j + (u_{j,t} - u_{AVE,t}) . \qquad j = 1, \ldots J, \quad t = 1,\ldots T. \qquad [3]$$

We examine heterogeneity of forecasts by estimating [3] and testing the restriction that the estimated values of g_j are identical across economists.[28] We do this for two sub-samples: one including all participants who were in at least six surveys, and another including all participants

[27] Ito (1990) tests for heterogeneity in exchange rate forecasts made by Japanese economists. He finds that the data reject the hypothesis of homogeneous forecasts both across individual economists and across the industries of the economists' employment. Ito also finds that economists employed in export industries have a depreciation bias whereas those employed in the import business have an appreciation bias, a pattern he terms the "wishful thinking" effect. MacDonald and Marsh (1996) also find evidence of heterogeneity across exchange rate forecasters from a large survey of European forecasters.

[28] An essentially identical approach is to regress the individual forecasts on a set of time dummies as well as a set of individual dummies and test for individual effects.

in at least twenty surveys, i.e., the economists studied in sections 3.1 and 3.2.[29] We report our results in Panel A of Table 3.

The data clearly reject the null of no systematic differences across individuals. The F-statistics in the first row of Panel A all reject the null at the 1% level. But these statistics include forecasts of A. Gary Shilling, considered to be outliers by Lamont (2002), who dropped them from his sample.[30] Following Lamont we drop Shillings' forecasts and retest for systematic differences across economists. The F-statistics for these tests are in the second row of Panel A and also all reject the null at the 1% level, strong evidence of differences.

To investigate whether heterogeneity of forecasts might originate from economists' industry focus, we estimate a version of [3] in which the g_js represent economists' industries of employment rather than economists themselves.[31] Panel B of Table 3 reports two sets of estimates of [3], one which includes Shillings' forecasts in the category of independently employed economists, and another which puts his forecasts in a separate category using a binary variable named for Shilling and a redefined dummy for independent economists. The importance of accounting for Shilling is apparent in the estimates. Estimates of the Treasury bill model which include Shilling with other independent economists leads to the inference that, on average, independents predict lower bill rates than economists employed elsewhere, forecasts of the latter being otherwise indistinguishable across industries. But when Shilling is removed from the independent economist category, the coefficient estimates of the Shilling variable indicate that, on average, he predicts Treasury bill rates 60 – 66 basis points lower than the consensus forecast and there are no employment effects. Estimates of the Treasury bond model yield analogous results, except that economists employed by security firms and by independent firms, excluding Shilling, predict bond rates 12-15 basis points lower and 10 basis points lower,

[29] These are unbalanced panels since participants change over time.
[30] We thank the referees for suggesting that we examine the impact of Shilling.
[31] We follow Laster *et al.* (1999) in categorizing the firms into industries, see footnote 11.

respectively, than the mean forecasts. Estimates of the exchange rate model indicate that Shilling predicts a dollar worth about 10 yen more than the mean forecast, on average, whereas econometric modelers predict a dollar worth 2-3 yen less. In summary, the Table 3 estimates yield evidence of systematic forecast differences across industries, although the very low R^2s indicate that little of the variation across economists can be explained by employer type.

The preceding evidence that individual economists' forecasts deviate systematically and substantially from the consensus but only partly due to employment effects raises the question of whether economists benefit from making extreme forecasts, sometimes much higher than the consensus and sometimes much lower. Laster *et al.* (1999) and Lamont (2002) suggest that economists who are rewarded for both forecast accuracy and "standing out from the crowd" may put forward more extreme predictions than if rewarded for forecast accuracy alone.[32] To investigate this possibility we estimate a model combining elements of Lamont (2002) and Laster *et al.* (1999):

$$| f_j - f_{c(-j)}|_t = \beta_0 + \beta_1 AGE_{j,t} + \beta_2 AVEDEV(-j)_t + \sum \gamma_i D_{i,t} + \varepsilon_{j,t} \quad \text{for } j = 1,...J, \; t = 1...T \quad [4]$$

Our dependent variable, which measures "standing out from the crowd," is the absolute difference between the j^{th} economist's time-t forecast and the average time-t forecast omitting the j^{th} economist. AGE, years of participation in the *Wall Street Journal* survey, controls for changing incentive structures: incentives might encourage young economists to gain publicity with extreme forecasts and older economists to protect their reputations with less extreme forecasts; alternatively, incentives might encourage young economists to hide their inexperience

[32] Lamont (2002) models forecasters' payoff function as follows:

$$w_j = R(|f_j - a|, |f_j - f_{c(-j)}|)$$

where w_j is the payoff to the j^{th} forecaster, $|f_j - a|$ is the absolute value of the j^{th} forecaster's forecast from the actual value, and $|f_j - f_{c(-j)}|$ is the absolute value of the j^{th} forecaster's forecast from the consensus forecast, omitting the j^{th} forecaster's forecast. Lamont assumes the partial derivative of R with respect to the first argument, R_1, is negative: inaccurate forecasts reduce a forecaster's payoff. But he allows that the partial derivative of R with respect to the second argument, R_2, is an empirical question.

with less extreme forecasts and older economists to rely on their seasoning to make bolder forecasts. AVEDEV(-j), which controls for variations in the spread of forecasts over time, is the average absolute deviation of the time-t forecasts from the average time-t forecast, omitting the j^{th} economist. The dummy variables D_{jt} represent the employer types used above in investigating employments effects. Given the sensitivity of employment effects to the treatment of Shilling we estimate two versions of [4], one including Shilling with other independently employed economists and another putting him in a separate category. Table 4 reports estimates of both versions of [4] for both panels of economists.

Our estimated models indicate an age-related incentive structure at odds with the one documented by Lamont (2002). Specifically, we find that economists tend to make predictions closer to the consensus as they age. While the estimated coefficients on AGE are all negative, they are larger in absolute value and generally statistically significant in models with the Shilling variable.[33] This evidence of forecast mean reversion as economists age is contrary to Lamont's evidence for economists forecasting the real economy and inflation.[34] Though pervasive, our age effects are small in absolute terms: compared with a first-time respondent, a 10-year (20-survey) participant is about 6 basis points closer to the mean interest rate forecast and about one yen closer to the mean exchange rate forecast.

In addition to age effects, our estimated models also indicate significant differences in incentive structures across industries. Compared to the left-out group, economists employed by banks and econometric modelers reported forecasts significantly closer to the mean interest rate and exchange rate forecasts; this result holds in both Panels 1 and 2. Forecasts of economists at

[33] Estimates that omit Shilling from the sample, which changes the consensus forecasts and the AVEDEV variable slightly, give essentially identical results to the model that includes a binary variable for Shilling.

[34] As noted above, the *Wall Street Journal* does not systematically drop forecasters with poor records so a negative coefficient should not be due to a survivorship bias. It is possible, however, that people who make extreme and inaccurate forecasts drop out to avoid negative publicity. We also estimated a model with age and AVEDEV(-j) as explanatory variables for each of the individuals listed in Table 2. Age was statistically significant at the .10 level for only about one-third of the panel and was negative in most cases. No individual had significantly positive coefficients on age for all three variables being forecasted.

securities firms were also closer to the means, but only in Panel 2. In Panel 1, forecasts of corporate economists were closer to the mean interest rate forecasts but not the mean exchange rate forecasts. Again, Shilling is a significant outlier, with forecasts deviating substantially from the mean forecasts for all three variables. With Shilling accounted for, there is no evidence that economists at independent forecasting firms produce more radical forecasts than the left out group, although they generally produce more radical forecasts than their counterparts at financial firms or the modelers.[35] The hypothesis that economists' forecasts deviate in absolute value equally from the average time-t forecast regardless of industry is soundly and universally rejected by the data, as indicated by the first row of F-statistics in Table 4. A second set of F statistics tests the hypothesis that there were no differences across economists employed by banks, security firms, corporations, and econometric modelers. This hypothesis is rejected for the interest rate forecasts but not for the exchange rate forecasts. We conclude that incentive structures are one reason economists supply heterogeneous forecasts, with older economists, economists from the financial sector, and econometric modelers less likely to make extreme forecasts.[36]

4. Conclusions

Professional economists cannot take great pride in their forecasting abilities. Our analysis of the forecasts of the panel of economists published bi-annually by the *Wall Street Journal* indicates the forecasts generally appear unbiased, but neither the consensus forecast nor any economist participating in at least twenty surveys have laudable records, particularly with

[35] We also split the independent forecasting firms into those that are named for the forecaster-owner and those that are not. When the effect of Shilling is accounted for, there is no evidence that named firms make more radical forecasts.

[36] We also estimated models to test whether forecast accuracy, measured by the absolute value of the forecast error, varied across industries and found no evidence that there were significant differences.

respect to predicting long-term interest rate or exchange rate movements. We find evidence that some economists make predictions that are systematically above the survey mean while others are systematically below. We also find some support for the strategic models that predict that the absolute deviations of economists' forecasts from the consensus depend on the industry of the economists' employers. Contrary to previous research, we find that economists deviate less from the consensus as they age.

Our finding that the *Wall Street Journal's* panel of economists cannot predict changes in interest rates and exchange rates more accurately than a random walk model is not surprising, given the efficiency of financial markets. What is perhaps surprising is that many of the panel forecast significantly worse than the random walk model, especially when predicting the long-term interest rate. The explanation of this result we favor is that many of the economists face incentives that reward the exceptionally right guess but do not equally penalize the exceptionally wrong guess. An alternative explanation is that even if the economists know the random walk model to be more accurate over time, adopting the random walk forecast leaves them with no story to spin about their forecasts. Always telling customers that you predict no change in interest rates or exchange rates may simply be too truthful to keep one employed.

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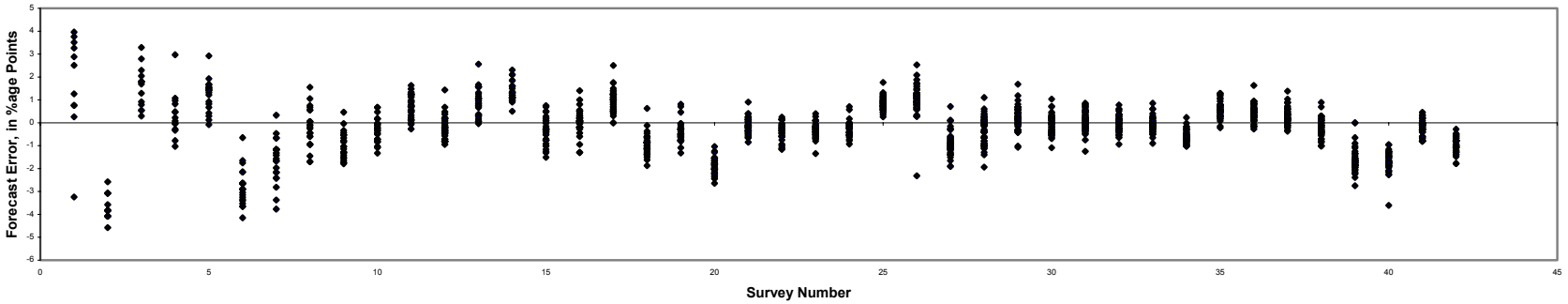
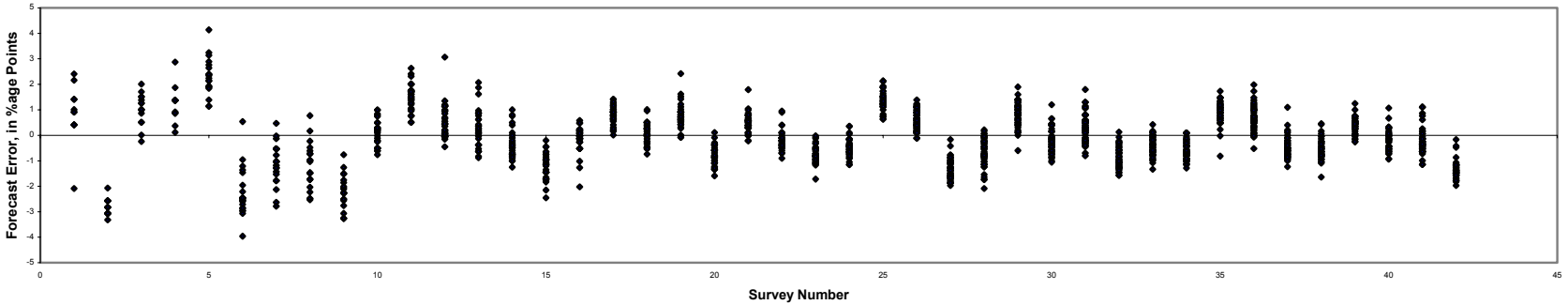
Figure 1 Forecast Errors

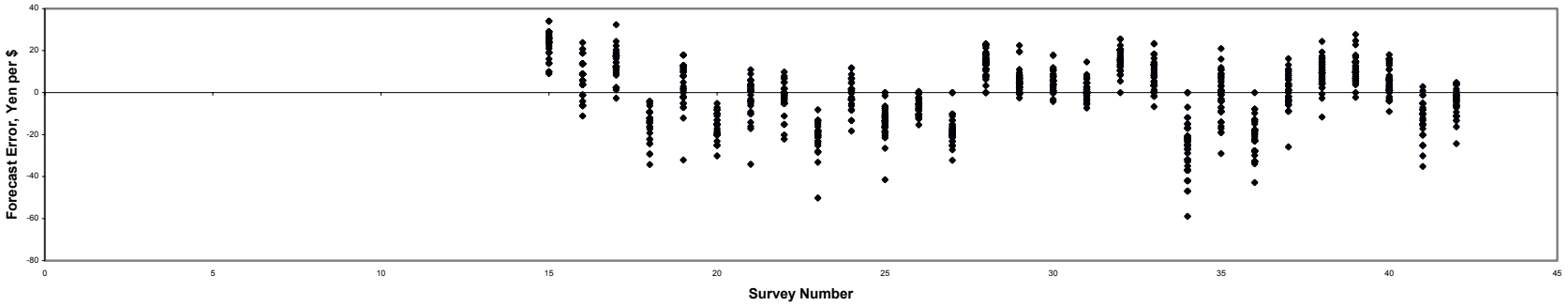
Panel A: Forecast Errors of the Treasury Bill Rate



Panel B: Forecast Errors of the Treasury Bond Rate



Panel C: Forecast Errors of the Yen-Dollar Exchange Rate



Note: Forecast errors are measured as the actual rate minus forecasters' predictions on the survey date, six months earlier. Interest rate forecast errors are shown for the 42 surveys beginning with January 1982 and ending with July 2002. Forecasts of the yen-dollar exchange rate were added to the *Wall Street Journal* survey in January 1989. Forecast errors are shown for the 28 surveys from January 1989 to July 2002.

Table 1
Tests of Unbiasedness of *Wall Street Journal* Forecasts[a]

	Treasury Bill Rate Forecasts	Treasury Bond Rate Forecasts	¥ - $ Exchange Rate Forecasts
A. Liu-Maddala Restricted Cointegration Test of Unbiasedness			
1. Survey Mean Forecast Series:			
ADF statistic for the forecast series:	–2.647	–2.459	–1.941
ADF statistic for the forecast errors:	–4.309***	–5.570***	–2.838**
Passes tests for unbiasedness:	yes	yes	yes
2. Individual Forecast Series:			
% of economists having nonstationary forecast series at the 5% (10%) level:	82% (70%)	88% (82%)	97% (94%)
% of economists having stationary forecast errors at the 5% (10%) level:	94% (100%)	97% (100%)	82% (88%)
% of economists passes unbiasedness test at 5% (10%) level:	76% (70%)	85% (82%)	79% (82%)
B. Tests of zero average forecast error (Lopes (1998))			
1. Survey Mean Forecast Series:	–0.233	–0.135	–1.529
t-statistic for the null of zero mean forecast error:			
Passes test for unbiasedness:	yes	yes	yes
2. Individual Forecast Series:			
% of economists having zero mean forecast errors at the 5% (10%) level:	79% (73%)	73% (67%)	91% (88%)
:			
C. Joint Unbiasedness			
1. Survey Mean Forecast Series:			
Forecast series unbiased by both the Liu-Maddala and Lopes tests at the 5% (10%) level?	yes	yes	yes
2. Individual Forecast Series:			
% of economists having unbiased forecast series by the Liu-Maddala and Lopes tests at the 5% (10%) level:	73% (58%)	61% (55%)	76% (76%)

Notes: [a] Survey mean forecasts include all economists in each survey. Individual forecasts are for the thirty-three economists who appeared in at least 20 surveys. *** and ** signify statistical significance at the .01 and .05 levels

Table 2
Accuracy of Forecast Series [a]

Variable	Treasury Bill Rate	Treasury Bond Rate	¥ - $ Exchange Rate	
A. Directional Accuracy				
1. Survey Mean Forecast Series:				
% of correctly predicted directional changes:	52%	33%	46%	
Tests of independence of actual and predicted changes				
p- value for Fisher's exact test:	1.000	0.024**	0.687	
χ^2 :	0.096	6.133**	0.491	
Pesarean – Timmerman statistic:	0.098	6.283**	0.509	
2. Individual Forecast Series				
% of economists who correctly predicted the direction of changes in:				
more than 55% of their surveys:	33%	15%	42%	
45% to 55% of their surveys:	48%	30%	39%	
less than 45% of their surveys:	18%	55%	18%	
% of economists whose predicted and actual changes reject statistical independence at the 5% (10%) significance level as determined by:				
Fisher's exact test:	3% (6%)	9% (12%)	0%	
χ^2 test:	6% (12%)	15% (21%)	0%	
Pesarean – Timmerman test:	6% (12%)	18% (21%)	0%	
Variable	Treasury Bill Rate	Treasury Bond Rate	¥ - $ Exchange Rate	¥ - $ Exchange
Benchmark	Random Walk			Forward Exchange Rate
B. Predictive Accuracy				
1. Survey Mean Forecast Series				
Ratio of MSE of survey mean forecast to MSE of benchmark	0.9	1.1	1.2**	1.1
2. Individual Forecast Series				
% of economists whose MSE relative to the MSE error of the banchmark model is:				
1.4 or more:	39%	67%	39%	33%
1.2 – 1.4:	6%	24%	39%	33%
1.0 – 1.2:	30%	9%	22%	24%
less than 1.0:	24%	0%	0%	9%
% of economists whose MSEs differ statistically from the MSE of the benchmark model at the 5% (10%) level using the Diebold-Mariano test statistic:	6% (15%)	55% (70%)	18% (42%)	15% (24%)

[a] See note a, Table 1.
** signifies statistical significance at the 0.05 level.

Table 3

Estimates of Heterogeneity Model

Dependent Variable: Deviation of individual's time-t forecast from the mean time-t forecast

A. Tests of Differences across Individuals

Data set	Panel 1 – Forecasters with at least 6 forecasts			Panel 2 – Forecasters with at least 20 forecasts		
Number of forecasters	93	93	86	33	33	33
Number of forecasts	1648	1650	1295	924	924	722
Forecast variable	T-Bill rate	T-Bond rate	Yen/$ rate	T-Bill rate	T-Bond rate	Yen/$ rate
F test for differences	4.09***	8.63***	6.76***	5.96***	15.38***	12.23***
F test for differences excluding Shilling	3.69***	7.62***	5.92***	5.24***	13.25***	9.99***

B. Tests of Differences across Industry of Forecaster

Number of forecasters	93	93	93	93	79	79	33	33	33	33	33	33
Number of forecasts	1648	1648	1650	1650	1295	1295	924	924	924	924	722	722
Forecast variable	T-Bill	T-Bill	T-Bond	T-Bond	Yen/$	Yen/$	T-Bill	T-Bill	T-Bond	T-Bond	Yen/$	Yen/$
Banks	-.0169 (.0423)	-.0169 (.0417)	-.0068 (.0411)	-.0068 (.0401)	.2853 (.6368)	.2853 (.6201)	.0076 (.0623)	.0076 (.0610)	.0110 (.0595)	.0110 (.0575)	-.4515 (.8656)	-.4515 (.8256)
Corporate Forecasters	-.0399 (.0846)	-.0399 (.0833)	-.0829 (.0813)	.0829 (.0794)	1.4928 (1.2359)	1.4928 (1.2035)	NA	NA	NA	NA	NA	NA
Securities firms	-.0583 (.0395)	-.0583 (.0389)	-.1546*** (.0384)	-.1546*** (.0375)	.2994 (.5882)	.2994 (.5728)	-.0550 (.0556)	-.0550 (.0545)	-.1249** (.0531)	-.1249** (.0513)	-.5773 (.7350)	-.5773 (.7010)
Econometric Models	-.0383 (.0581)	-.0383 (.0572)	-.0558 (.0564)	-.0558 (.0551)	-1.9478** (.8854)	-1.9478** (.8621)	.0376 (.0723)	.0376 (.0708)	.0203 (.0691)	.0203 (.0667)	-2.9860*** (1.0074)	-2.9860*** (.9608)
Independent Forecast firms	-.1352 (.0451)***	-.0523 (.0459)	-.2065*** (.0439)	-.1071** (.0442)	.6321 (.6646)	-.6181 (.6638)	-.1488** (.0638)	-.0058 (.0665)	-.2090*** (.0610)	-.0340 (.0627)	.7253 (.8293)	-1.3858* (.8290)
Shilling		-.6610*** (.0851)		-.8367*** (.0819)		10.6338*** (1.3487)		-.6081*** (.0961)		-.7706*** (.0905)		10.2248*** (1.3690)
Constant	.0586 (.0344)	.0539 (.0339)	.1009*** (.0334)	.1009*** (.0326)	-.2011 (.5071)	-.2011 (.4937)	.0010 (.0484)	.0010 (.0474)	.0348 (.0462)	.0348 (.0447)	.2079 (.6186)	.2079 (.5900)
F1[#]	2.52***	10.92***	9.48***	21.85***	2.28**	13.91***	2.85**	10.30***	6.55***	18.96***	3.83***	17.82***
F2	2.48**	.47	9.24***	6.38***	2.80**	3.26**	1.63	1.17	6.07***	4.48**	4.05**	3.15**
F3	.58	.60	8.06***	8.45***	3.38**	3.57**						
F4		.67		6.61***		2.61**						
Adjusted R^2	.005	.035	.025	.071	.005	.057	.008	.048	.024	.089	.016	.105

Notes:

***, **, * denote statistical significance at the .01, .05, and .10 levels.

[#] F1 is the F-statistic for the test that all industry dummies are jointly zero; F2 is the F-statistic for the test that the dummies for banks, security firms, corporations, independents and modelers are jointly equal; F3 tests that all but independents are equal; F4 tests all dummies but Shilling jointly equal zero.

Table 4
Estimates of Incentives Model
Dependent Variable: Absolute deviation of an individual's time-t forecast from the mean time-t forecast, excluding that individual

Data set	Panel 1						Panel 2					
Number of forecasters	93	93	93	93	79	79	33	33	33	33	33	33
Number of forecasts	1648	1648	1650	1650	1295	1295	924	924	924	924	722	722
Forecast variable	T-Bill	T-Bill	T-Bond	T-Bond	Yen/$	Yen/$	T-Bill	T-Bill	T-Bond	T-Bond	Yen/$	Yen/$
AGE	-.0012 (.0011)	-.0028*** (.0010)	-.0021** (.0010)	-.0035*** (.0010)	-.0348** (.0146)	-.0558*** (.0145)	-.0010 (.0015)	-.0024 (.0014)	-.0021 (.0014)	-.0032** (.0013)	-.0269 (.0200)	-.0496** (.0197)
AVEDEV	.8574*** (.0511)	.8035*** (.0498)	.7037*** (.0763)	.6333*** (.0743)	.8366*** (.0794)	.8459*** (.0777)	1.0665*** (.0833)	.9714*** (.0809)	.9574*** (.1154)	.8481*** (.1119)	.6496*** (.1107)	.6579*** (.1072)
Banks	-.0691** (.0288)	-.0719** (.0279)	-.1131*** (.0274)	-.1152*** (.0266)	-1.1486*** (.4202)	-1.1977*** (.4116)	-.1587*** (.0443)	-.1507*** (.0427)	-.2087*** (.0404)	-.2025*** (.0389)	-2.6618*** (.5845)	-2.616*** (.5664)
Corporate Forecasters	-.1067* (.0581)	-.1212** (.0564)	-.1136** (.0546)	-.1249** (.0529)	-.8043 (.8270)	-.9904 (.8102)						
Securities firms	-.0184 (.0267)	-.0196 (.0259)	-.0009 (.0254)	-.0014 (.0246)	-.4961 (.3855)	-.5050 (.3775)	-.1000*** (.0390)	-.0949** (.0375)	-.0890** (.0356)	-.0841** (.0343)	-2.4447*** (.4933)	-2.3989*** (.4780)
Econometric Models	-.1178*** (.0345)	-.1143*** (.0378)	-.1497*** (.0371)	-.1460*** (.0359)	-1.3626** (.5760)	-1.2967** (.5641)	-.1965*** (.0502)	-.1900*** (.0483)	-.2349*** (.0457)	-.2295*** (.0440)	-2.5459*** (.6693)	-2.4734*** (.6485)
Independent Forecast firms	.0853*** (.0306)	.0056 (.0307)	.0565* (.0291)	-.0197 (.0292)	.2819 (.4375)	-.4469 (.4393)	.0639 (.0449)	-.0684 (.0458)	.0547 (.0408)	-.0649 (.0417)	-.6380 (.5618)	-1.7593*** (.5680)
Shilling		.5896*** (.0574)		.5406*** (.0545)		6.3000*** (.9105)		.5073*** (.0672)		.4543*** (.0610)		4.8104*** (.9587)
Constant	.0844** (.0345)	.1232*** (.0337)	.1640*** (.0404)	.2079*** (.0394)	1.7817*** (.5448)	2.0284*** (.5346)	.0832 (.0526)	.1321** (.0510)	.1548*** (.0588)	.2071*** (.0569)	3.9494*** (.7593)	4.2635*** (.7371)
F tests of differences across industries[#]	9.85*** [4.22***]	4.47*** [4.57***]	14.60*** [14.24***]	10.76*** [15.31***]	3.96*** [1.88]	2.41** [2.01]	11.90*** [3.30**]	5.00*** [.3.9**]	19.09*** [11.74***]	11.34*** [12.47***]	10.28*** [.10]	7.69*** [.10]
Adjusted R^2	.179	.228	.090	.146	.088	.125	.198	.257	.135	.198	.089	.145

Notes:
***, **, * denote statistical significance at the .01, .05, and .10 levels.
[#] top F-statistic tests that all industry dummies are jointly zero; bottom F-statistic tests that dummies for banks, security firms, corporations, and modelers are jointly equal.