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# Forecaster Characteristics and Forecast Outcomes

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Panel data drawn from *The Wall Street Journal's* survey of economic forecasts were used to assess the impact of a forecaster's institutional setting and professional experience on forecast accuracy and bias. Regression results indicate differences in forecaster characteristics have little effect on accuracy, but significantly affect the direction of bias in forecasting interest rates, the inflation rate, real GDP growth and the yen/dollar exchange rate. © 1998 Elsevier Science Inc.

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## I. Introduction

Are professional economists' forecasts systematically different? Recently, this question has received extensive empirical research. The primary focus of such investigations has been, naturally, on accuracy. Research, so far, indicates that accuracy measured by absolute forecast error is not systematically different among forecasters, except for a few isolated variables and circumstances.<sup>1</sup> Accuracy, however, is only one measure of forecast outcomes. Bias—the direction of error—is also important. Research on bias, though limited, indicates that systematic biases may exist. For example, Batchelor and Dua (1990b) observed that forecasters tend to make consistently either pessimistic or optimistic predictions. In addition, Ito (1990) found that exporters and importers differ on their expectations of exchange rate movements.

A number of studies have investigated possible sources of accuracy or bias. Batchelor and Dua (1990a) attempted to explain differences in accuracy in terms of forecasters' economic theories and techniques. Lamont (1995) attributed forecasters' extreme fore-

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<sup>1</sup> See for example Batchelor (1990), Batchelor and Dua (1990a), and Cho (1996). For exchange rates, MacDonald and Marsh (1994) and Cho (1996) reported a systematic difference in accuracy among forecasters.

casts to the strategy of establishing a reputation. In this paper, we seek to investigate other possible factors that have heretofore been unexplored.

Specifically, we examine whether a forecaster's institutional setting and experience systematically affect forecast accuracy or bias.<sup>2</sup> Institutional factors include the size and type of firm with which a forecaster is affiliated. These factors may possibly affect the information set available to a given forecaster at the time of his forecast.<sup>3</sup> Experience encompasses age, education and prior affiliation with the Federal Reserve system.

Relationships between forecast outcomes (accuracy and bias) and forecaster characteristics were estimated using panel data drawn from *The Wall Street Journal's* semi-annual survey of business economists. Our results suggest that forecaster characteristics, in general, make little difference in accuracy (as expected from the lack of systematic difference documented by previous studies). However, these factors significantly affect the direction of error. A consistent pattern of bias is an important characteristic of a forecaster. To the extent a pattern can be established from a forecaster's characteristics, forecast users can make better assessments of forecaster predictions.

## II. The Data and the Methodology

The forecasters used in this study are current and former participants of the semi-annual survey of economic forecasts conducted by *The Wall Street Journal (WSJ)*, beginning December 1981. The number of survey participants has gradually increased from 12 for the initial survey to 65 for the June 1995 survey, the last included in our sample. Overall, 104 different forecasters have participated in at least one of the 28 surveys. From the survey's outset, participants have been asked to forecast short- and long-term interest rates (3-month Treasury bill and 30-year Treasury bond yields) that are expected to prevail at the end of six months. Beginning with the December 1985 survey, participants were also requested to forecast the real GDP growth rate and the inflation rate, as measured by changes in the CPI. The yen/dollar exchange rate was added to the survey in December 1989.

Personal information on survey participants was collected from the membership directories of the American Economic Association and the National Association of Business Economists. Participants who could not be located in either directory, or who had incomplete entries, were deleted from the sample.<sup>4</sup> Information on a forecaster's firm was obtained from either *Dun and Bradstreet's Million Dollar Directory* or *Ward's Business Directory*.

An unbalanced panel model, incorporating fixed effects designed to control for individual survey periods, was specified to relate forecast outcomes with observable forecaster characteristics. Specifically,

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<sup>2</sup> Subsequent to the final revision of this paper, a working paper by Laster et al. (1996) was made public. Their paper, using a different methodology and data set, also examines the effect of institutional setting on forecast outcomes.

<sup>3</sup> Under rational expectations theory, identical information sets lead to identical forecasts. See Keane and Runkle (1990, p. 717).

<sup>4</sup> Additionally, several forecasters were deleted from the sample because they did not fit into the categories of firms examined, and they were too few in number to create additional firm types. Another forecaster, A. Gary Schilling, was removed because his extreme forecasts tended to make him an outlier relative to the other survey participants. His inclusion tended to drive a number of regression results. As we are investigating whether observable forecaster characteristics explain forecast variation, his exclusion is a conservative approach. Lamont (1995) also excluded Shilling from his sample.

$$Y_{it} = f(X, T) + e_{it},$$

where  $Y_{it}$  is the forecast outcome (bias or accuracy) of the  $i$ th forecaster for the  $t$ th survey period. The bias is determined by subtracting the realized value from the forecasted value, and the accuracy is measured by the absolute difference between the actual and the forecasted.<sup>5</sup>  $X$  is a vector of observable forecaster characteristics, and  $T$  a vector of survey fixed effects. The latter were included at the suggestion of Keane and Runkle (1990) to prevent error term correlations across forecasters. Specifically, the fixed effects control for both the public information set available to all survey participants at the time of their forecasts and subsequent economic shocks which create common forecast errors.<sup>6</sup> A possibility exists that the error terms for an individual forecaster could still be correlated over time, if, for example, an individual adjusts his forecasts based on how well he did in the past. Unfortunately, due to the limited number of observations on a large number of survey participants, it was not possible to test or correct for possible autocorrelation.<sup>7</sup>

Ideally, fixed effects representing the individual survey participants should also have been included in the model to control for nonobservable personal characteristics, such as ideology or innate skill. This was not feasible, however, because the other explanatory variables are for the most part invariant over time. Including both sets of variables would result in perfect collinearity. In one specification, however, fixed effects were substituted for the explanatory variables to determine if forecasters collectively differ in accuracy and/or bias.

The observable forecaster variables are described below. Three sets of characteristics are discussed: 1) professional experience and education; 2) firm size and ownership, and 3) firm type. Table 1 summarizes the forecaster characteristics for the surveys associated with each of the forecasted variables. Because, on occasion, forecaster characteristics change (e.g., change in employment), the table is based on the characteristics of the participants at the time of their final survey.<sup>8</sup> For GDP growth and inflation rates, 61 participants, collectively, made 582 forecasts between December 1985 and June 1995; for short- and long-term interest rates, 68 participants, collectively, made 687 forecasts between December 1981 and June 1995; and for the yen/dollar exchange rate, 54 participants, collectively, made 437 forecasts between December 1989 and June 1995.

To proxy a forecaster's professional experience, the difference between the year a survey was conducted and the year the forecaster graduated from college was included as an explanatory variable. In terms of forecast accuracy, if experience is a plus, the sign of its coefficient should be negative. It is possible, however, that less vintaged forecasters could be better trained in modern forecasting methods and/or less tied to outmoded

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<sup>5</sup> The Commerce Department routinely revises their reported GDP growth figures. Because some information used in the revisions may not be available to forecasters at the time they make their predictions, Keane and Runkle (1990) used the preliminary figures in testing the rationality of forecasts (i.e., do forecasters make use of available information?). Because we are interested not in rationality, but rather in *relative* forecaster outcomes, we used the revised GDP figures in measuring accuracy and bias.

<sup>6</sup> Error terms for forecasters with 20 or more matched survey periods were subsequently checked for correlation. A general absence of correlation was found.

<sup>7</sup> The survey fixed effects should, however, mitigate the potential problem of autocorrelation over time, to the extent that different forecasters make similar adjustments.

<sup>8</sup> This is for descriptive purposes only. In the regression analysis, characteristics at the time of a given survey were utilized.

**Table 1.** Forecaster Characteristics<sup>a</sup>

	GDP & Inflation	Interest Rates	Yen/Dollar
<i>Sample</i>			
No. of forecasters	61	68	54
No. of forecasts	582	687	437
Survey periods	Dec. 85–Jun. 95	Dec. 81–Jun. 95	Dec. 89–Jun. 95
<i>Experience</i>			
Average professional experience	28.8 years	28.9 years	29.1 years
Federal Reserve	26%	28%	26%
Average years at Fed	1.6 years	1.7 years	1.5 years
Holding Ph.D.	74%	74%	72%
<i>Firm Characteristics</i>			
Large firm	62%	62%	61%
Owning firm	11%	12%	9%
<i>Firm Types</i>			
Investment house	48%	43%	52%
Bank	30%	32%	26%
Investment consulting	8%	7%	6%
Economic forecasting	5%	7%	6%
Nonprofit	10%	10%	11%

<sup>a</sup> As of the participant's last survey inclusion.

economic theories, resulting in more accurate results. Consequently, we made no prediction as to sign.<sup>9</sup>

Based on our experience measure, survey participants had an average of about 29 years of professional experience. This high level of experience is indicative of *WSJ* survey participants not being drawn from a random sample of forecasters. Indeed, it is plausible that the respondents must already have attained some level of professional recognition in order to have come to the attention of the survey organizers. As such, some caution is warranted in generalizing the reported results to a more representative group of forecasters.

Approximately one quarter of the survey participants had prior professional experience within the Federal Reserve system, either as a research economist or a Board governor. Because of the perceived importance of monetary policy on interest rates and economic activity, forecasters may base their economic predictions on expectations of Fed behavior. Presumably, former researchers and governors have better insights into the Fed's decision-making process. This, in part, explains why former Fed officers are often in high demand by Wall Street firms.<sup>10</sup> Fed experience may sensitize forecasters to the possible consequence of inflation, causing them to overstate inflationary prospects. To test whether prior Fed experience improves accuracy and/or brings in a specific bias, number of years of Fed experience was included as an explanatory variable. The average number of years of Fed

<sup>9</sup> In some specifications, experience squared was also included to account for nonlinear effects of experience, e.g., the best forecasters are those with some experience, and whose human capital has not yet depreciated. The squared term however was insignificant.

<sup>10</sup> For example, upon leaving the Fed in 1994, former Board Governor Wayne Angell became chief economist at the brokerage house Bear Sterns for an annual salary of approximately one million dollars.

experience was approximately one and a half years. The longest association with the Fed within the sample was 12 years.

A third experience variable (PHD) was included to indicate whether a survey participant had earned a doctoral degree. Presumably, doctoral training permits the use of more sophisticated forecasting techniques, as well as providing better training in formal macroeconomic models. Whether or not this translates into better forecasts is testable. Three quarters of the survey participants hold the degree.

The organizations that the survey participants represented at the time of their forecasts were classified into five firm types: investment house (e.g., Merrill Lynch); bank or bank-holding company (e.g., Citicorp); investment advice service (mostly proprietary firms); economic forecasting service (e.g., DRI), and nonprofit sector (e.g., Hudson Institute and academic economists). Firms were classified with the goal of examining the effect of the differences in resources, expertise, and incentives which these firms bring to forecasting.

Investment houses offer the most comprehensive array of services. These include investment banking, brokerage services, portfolio management, etc. Banks may also offer a number of investment services, but their primary concern is managing their own asset and liability portfolios. Investment consulting firms and economic forecasting firms are more difficult to categorize because public information on them is often scarce and some of them probably engage in both traditional economic forecasting and investment advising. In making classifications, well-known forecasting firms such as DRI and WEFA Group were classified as forecasting firms. Economic forecasting firms are more apt to use econometric models, although others may make use of such models, as well. Participants from the nonprofit sector are likely to face different incentives in making forecasts than their for-profit counterparts. Nonprofit economists, particularly academics, are unlikely to have a direct financial stake in the outcomes of their forecasts. Usually, they do not manage portfolios or sell their forecasts to clients. In the for-profit sector, a monetary award is apt to be linked directly to performance.

Investment houses and banks have high representation in the sample. Respectively, for interest rates forecasts, they accounted for 43% and 32% of survey participants. Investment consulting firms, economic forecasting firms, and not-for-profit economists contributed 7%, 7% and 10% of the remaining participants.

Aside from type of organization, size of organization may also have some bearing on the private information available to forecasters. Forecasters working for large firms may have more contacts and greater access to sources. To test this proposition survey participants were classified as belonging to large organizations if they had either 500 employees or \$100 million in revenues.<sup>11</sup> An exception is academic economists who were all classified as having limited resources. Just over 60% of the participants were affiliated with a large firm.

Finally, following Lamont (1995), we also included a dummy variable (OWN), taking on the value 1 when a forecaster was identified as having a proprietary interest in his/her firm. Lamont hypothesized that proprietors tend to make extreme forecasts to enhance name recognition. Ten to thirteen percent of each of the samples consist of survey

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<sup>11</sup> Data limitations prevented the construction of a continuous variable.

**Table 2.** Determinants of Forecast Accuracy

	GDP Growth	Inflation Rate	Short-Term Interest	Long-Term Interest	Yen/Dollar
Constant	0.358 <sup>c</sup> (1.89)	0.641 <sup>a</sup> (5.80)	0.460 <sup>a</sup> (2.73)	0.858 <sup>a</sup> (6.87)	13.5 <sup>a</sup> (9.18)
Experience	-.00168 (0.39)	.00556 <sup>b</sup> (2.01)	-.00094 (0.34)	-.00267 (1.01)	.0357 (0.96)
Fed experience	-.0114 (1.23)	-.0138 <sup>b</sup> (2.06)	.00340 (0.50)	-.00016 (0.03)	.0579 (0.62)
Ph.D	.0369 (0.50)	-.0950 <sup>c</sup> (1.76)	-.00793 (0.18)	-.0616 (1.32)	.0352 (0.05)
Own	.0696 (0.62)	-.0912 (0.90)	-.0191 (0.22)	-.0869 (1.20)	-.0299 (0.26)
Large	0.130 (1.44)	-.0871 (1.08)	-.0308 (0.52)	-.0214 (0.35)	-.0282 (0.40)
Bank	-.0850 (1.19)	.0282 (0.63)	.0310 (0.27)	-.0688 <sup>c</sup> (1.70)	-.0144 (0.24)
Investment consulting	.0292 (0.20)	-.0871 (0.88)	.0830 (0.81)	-.0336 (0.37)	-1.53 (1.48)
Economic consulting	-.0263 (0.25)	-.0430 (0.39)	-.00229 (0.02)	-.0609 (0.85)	0.616 (0.52)
Non-profit	0.200 (1.57)	-.0239 (0.24)	0.158 (1.58)	.0293 (0.37)	-.0491 (0.05)
R <sup>2</sup>	.477	.703	.647	.618	.579
N	582	582	687	687	437
d.f.	553	553	650	650	414

*t* statistics in parentheses (standard errors are corrected for heteroscedasticity).

<sup>a</sup> Denotes significant at the 1% level of confidence.

<sup>b</sup> Denotes significant at the 5% level of confidence.

<sup>c</sup> Denotes significant at the 10% level of confidence.

Fixed effects for forecast periods not shown.

participants representing their own firms. Lamont's hypothesis was re-examined with our alternative data set.<sup>12</sup>

### III. Regression Results

Tables 2 and 3 present, respectively, the regression results for accuracy and bias for each of the dependent variables. Due to the presence of possible heteroscedasticity, the regressions were estimated using White's GLS estimator.<sup>13</sup> Of the five firm groups, investment house was omitted from the equations. Thus, the accuracy and bias of survey participants employed by other firms were interpreted as relative to investment house forecasters.

With a few exceptions, the explanatory variables were all insignificant in explaining accuracy. This result is not surprising, given prior studies indicating a lack of systematic difference in accuracy among forecasters. A few interesting results were found in the prediction of inflation, however. Both Fed experience and holding a Ph.D were associated

<sup>12</sup> Lamont's data were drawn from surveys conducted by *Business Week*.

<sup>13</sup> Heteroscedasticity was tested for using the Breusch-Pagan test [see Greene (1997) for a discussion]. Significance levels using OLS were comparable to those reported using the White estimator.

**Table 3.** Determinants of Relative Forecast Bias

	GDP Growth	Inflation Rate	Short-Term Interest	Long-Term Interest	Yen/Dollar
Constant	0.265 (1.24)	0.619 <sup>a</sup> (5.02)	0.410 <sup>a</sup> (2.82)	0.584 <sup>a</sup> (4.35)	-8.14 <sup>a</sup> (5.09)
Experience	-.00650 (1.35)	.00388 (1.30)	.00468 (1.56)	.00853 <sup>a</sup> (3.14)	-0.149 <sup>a</sup> (3.77)
Fed experience	-.0119 (1.12)	.0264 <sup>a</sup> (3.83)	.0147 <sup>b</sup> (2.09)	.0172 <sup>a</sup> (2.93)	-0.174 <sup>c</sup> (1.85)
Ph.D	.00198 (0.02)	-.0286 (0.50)	-0.111 <sup>b</sup> (2.22)	-.0981 <sup>b</sup> (2.00)	-0.732 (1.00)
Own	-0.457 <sup>a</sup> (3.51)	-0.236 <sup>b</sup> (2.25)	-0.482 <sup>a</sup> (5.07)	-0.474 <sup>a</sup> (5.08)	0.398 (0.32)
Large	-0.122 (1.21)	-.0643 (0.78)	-.0631 (0.92)	-.0478 (0.73)	-1.35 (1.61)
Bank	-.0818 (1.00)	-.0253 (0.50)	-.0151 (0.31)	.0337 (0.78)	-0.679 (1.02)
Investment consulting	.0908 (0.58)	-.0411 (0.39)	-.00218 (0.02)	.0936 (0.97)	-1.18 (0.93)
Economic consulting	-.0676 (0.54)	-0.444 <sup>a</sup> (4.27)	-0.207 <sup>b</sup> (2.49)	-0.284 <sup>a</sup> (3.73)	-2.29 <sup>b</sup> (2.03)
Non-profit	0.380 <sup>a</sup> (2.57)	-.0722 (0.67)	-0.205 <sup>b</sup> (2.41)	-0.160 <sup>c</sup> (1.89)	-0.152 (0.13)
R <sup>2</sup>	.784	.850	.815	.828	.850
N	582	582	687	687	437
d.f.	553	553	650	650	414

*t* statistics in parentheses (standard errors are corrected for heteroscedasticity).

<sup>a</sup> Denotes significant at the 1% level of confidence.

<sup>b</sup> Denotes significant at the 5% level of confidence.

<sup>c</sup> Denotes significant at the 10% level of confidence.

Fixed effects for forecast periods not shown.

with improved forecast accuracy. Each year of Fed experience decreased absolute forecast error by 1.4 basis points. Forecasters with a Ph.D degree were almost 10 basis points more accurate than forecasters without one.<sup>14</sup> General experience, however, tended to increase forecast error—ten years of experience raised a forecaster's relative error by 5.6 basis points. Despite being significant, the relative differences in accuracy are small. For example, given a mean inflation rate over the sample period of 3.46%, holding a Ph.D yielded less than a 3% improvement in forecast accuracy.

For the other dependent variables, the only significant results (at the 10% level) pertained to firm type.<sup>15</sup> Based on the mean values of the forecasted variables, nonprofit forecasters were estimated to be nearly 12% less accurate than bank economists in predicting GDP growth, and 2.5% less accurate than those affiliated with economic forecasting firms with respect to short-term interest rates.<sup>16</sup> Bank economists were also

<sup>14</sup> Fed experience or the Ph.D may not be the fundamental cause of the greater accuracy. The Fed both seeks and attracts those possessing greater ability. Similarly, forecasters holding a Ph.D may have superior innate skills which are independent of their formal training.

<sup>15</sup> *t* tests were performed to ascertain significant differences among the firm-type coefficients.

<sup>16</sup> Laster et al. (1996), examining GDP growth forecasts, found bank economists to have smaller absolute deviations from the consensus forecast than did other forecast groups.



estimated to be slightly less accurate (0.8%) than investment house forecasters in predicting long-term interest rates.

Despite the few significant coefficients, collectively, the observable forecaster characteristics were statistically insignificant in all the accuracy equations (null hypothesis: all coefficients are zero). The explanatory power of the equations is derived from the survey fixed effects. If forecaster fixed effects are substituted for the forecaster explanatory variables, analogous results are obtained.

The story is quite different for the relative bias equations, where, collectively, the observable characteristics were statistically different from zero at better than the 1% level of significance in all equations. In terms of statistical significance and size of coefficient, proprietary ownership, represented by OWN, contributed substantially to forecast bias. Compared with the majority of forecasters, the minority of forecasters who represent their own firm understated real GDP growth by over 18% of mean GDP growth; the inflation rate by nearly 7%, and short- and long-term interest rates by 7.5% and 5.4%, respectively. The direction of their bias indicates that they made too optimistic forecasts on inflation and interest rates, relative to others. Even their pessimistic forecast on real GDP can be interpreted as an expression of optimism: Wall Street tends to regard low economic growth as a positive factor for financial markets, as slower growth signals low inflation and low interest rates which increase the value of bonds and stocks. Either they are optimists by nature or they attempt to influence clients' expectations. In the latter case, their forecasts are subject to a principal-agent conflict of interest. The conflict of interest interpretation is consistent with the results obtained by Lamont (1995), which showed that forecasters who own their own firms make extreme forecasts to gain attention. While his [Lamont (1995)] results indicate that extreme forecasts resulted in lesser accuracy, our results do not indicate a loss of accuracy relative to other forecasters.

Interestingly, Federal Reserve experience led to higher expectations of inflation and interest rates, and lower expectations for the dollar. Relative to no association with the Fed, ten years of Fed experience led to a higher prediction of the inflation rate by 7.6%, and interest rates by a relatively small 2%. The bias in the dollar was also relatively small—a 1.4% lower exchange rate prediction. The primary responsibility of the Federal Reserve is to preserve the purchasing power of currency. This policy emphasis may lead former Fed researchers and decision makers to overweight inflationary consequences in forecasting.

Increased professional experience was associated with higher long-term interest rate projections and lower dollar expectations, whereas holders of a doctoral degree tended to understate interest rates. Although statistically significant, the relative magnitudes for all three findings are perhaps too small to be of any consequence.

Based on *t* tests, forecasters affiliated with economic forecasting firms tended to make lower inflation rate projections than all their counterparts; lower interest rate projections than all, except those associated with nonprofit institutions, and a weaker dollar than investment house economists. Relative to others, they tended to understate inflation by 11% and interest rates by slightly over 3%. The biases of these forecasters appear to be consistent with a focus on the Fisher effect, in which a lower inflation projection leads to lower expected interest rates. Alternatively, forecasters affiliated with nonprofit organizations roughly overstated the GDP growth rate by a large 16% relative to all others, and understated interest rates by approximately 3% relative to all, except economic consulting firm forecasters. As these forecasters did not understate inflation, they appear to have



regarded lower interest rates as real (as opposed to nominal) phenomena, leading to an expectation of stronger economic growth.

In their interest rate predictions, forecasters affiliated with firms managing investment portfolios (e.g., investment house, banks) tended to have a positive bias. A possible consequence of understating interest rates could be large capital losses to their firms' portfolios; thus, overstating expected rates may be the conservative approach. Conceivably, financial considerations could be affecting the outlook and judgment of these forecasters.

#### IV. Conclusions

This paper has examined the relationships between the characteristics of forecasters and their accuracy and bias, using unbalanced panel data compiled from *The Wall Street Journal's* survey of economic forecasts. Forecaster characteristics were not a strong predictor of forecast accuracy. Still, it is interesting to note that forecasters with a Ph.D degree or Fed experience tended to make slightly more accurate inflation forecasts than forecasters without these attributes.

Some forecaster characteristics significantly affected forecast bias. The most noticeable bias was found among forecasters who own their own firm. They tended to make upbeat forecasts, perhaps to appeal to their clients. Forecasters with Federal Reserve experience tended to overstate inflation and interest rates. These biases can be construed as reflecting the policy concerns of the central bank. Additionally, forecasters affiliated with firms managing large investment portfolios tended to overstate expected interest rates.

Because the *WSJ* sample may not be representative of the forecaster population, caution is warranted in generalizing the results. However, to the extent that they do generalize, the results can be potentially helpful to those who rely on private and public forecasts. Users frequently face conflicting forecasts. This study suggests that it helps to know the background of the forecasters. The information may not be useful in predicting who will be more accurate in absolute size of forecast error, but may be useful in predicting who will under or overstate important economic variables.

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