Are all analysts equal?

Consistency in forecasting ability

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Abstract

Investors and the financial media apparently believe that there are well-defined quality differentials between Wall Street research analysts, i.e. that some analysts' research is superior to others'. We examine whether these perceived quality differentials exist, in terms of analysts' ability to forecast earnings accurately, and whether these differentials are identifiable on an *ex ante* basis. The results suggest that there is some persistence in forecast accuracy on the part of analysts. In particular, forecast accuracy is associated with analyst experience, breadth of coverage, and brokerage firm size. Analysts selected for All-Star status by industry publications also tend to have higher forecast accuracy. However, the differences in forecast accuracy do not produce material differences in terms of the dollar magnitudes of forecast errors.

Few groups of capital market participants rival equity research analysts for influence. Investors and portfolio managers select stocks in part by scrutinizing analysts' opinions of companies. Financial managers jockey to obtain positive coverage of their firms by influential analysts, in hopes of obtaining a favorable reception when they come to market to raise capital. Financial news organizations disseminate widely analysts' opinions and discuss them so frequently that some analysts have been elevated to the level of media celebrity status. As a result these individuals' pronouncements can send stock prices rocketing or plummeting.

Not all research analysts appear to be created equal, however. Rather there is a widespread perception that there are stark differentials in the quality of analysts' research, so "there are hundreds of Wall Street analysts clamoring for your attention but only a handful can be counted on to make you money" (Nocera (1997)). Similarly Opdyke (2000) writes in *The Wall Street Journal* that "the sports world has its Michael Jordan, its Cal Ripken, its Wayne Gretzky — players who, surrounded by greatness, still stand above the rest. Wall Street, too, has its luminaries." Large investment managers subscribe to several services that evaluate analysts, with the aim of singling out individuals who provide more accurate forecasts of earnings or investment performance. The opinions of these supposedly more talented analysts can then be given more weight.[1] Similarly the financial press periodically polls investment managers to rate the performance of individual analysts. For example, *Institutional Investor* each year selects analysts for its All-American Research Team based on institutional clients' evaluation of the quality of their investment recommendations and research, among other things. The *Wall Street Journal* provides another annual ranking of analyst performance.

The belief that some analysts are better than others carries over into equity prices. Gleason and Lee (2003), Park and Stice (2000) find systematic differences across analysts with respect to the price impact of changes in their estimates: revisions by more prestigious analysts tend to be associated with larger immediate price changes. Mikhail, Walther and Willis (2004) also report that these differences in price impact persist over time. The latter authors find. however, that a trading strategy that follows the recommendations of analysts who have been successful at stock selection in the past turns out to be unprofitable. As well,

[1] See, for example, http://www.starmine.com and http://www.marketperform.com.

differences across analysts in their perceived ability show up in the form of differences in compensation and prestige. In the late 1990s, for example, compensation for a high-status Internet analyst exceeded $15 million a year (Elkind (2001)). Importantly, analyst salaries are closely tied to their ratings in the *Institutional Investor* survey. Analysts included in the All-American lists are handsomely rewarded, and brokerage firms take out advertisements trumpeting their analysts' achievements.

Implicit in the singling out of analysts for "star" status and the industry's overall reliance on analyst rankings is the assumption that it is possible to detect on an *ex ante* basis individuals who consistently provide better results. This paper evaluates carefully whether this presumption has any basis in fact. Specifically we identify whether consistent differences in analyst performance exist, and the economic materiality of these differences. Analysts serve a variety of clienteles (Chan, Karceski and Lakonishok (2004)), however, and they play a number of roles. As a result not all aspects of their performance are easily quantifiable, at least based on publicly available data. For example, analysts' investment advice, in the form of stock recommendations, forecasts of long-term growth and target stock price levels, are difficult to evaluate because they apply over an unspecified horizon. It is not even clear that unbiased research is an analyst's sole objective, since analysts in the past were expected to facilitate investment banking deals, or stimulate clients' trades and thereby generate brokerage commission fees. It may be the case, for example, that analysts have an incentive to paint a flattering picture of a firm's prospects. One way they can accomplish this is by setting the forecast immediately before the earnings announcement date to be lower than what earnings are likely to be, so investors receive a pleasant surprise when the actual numbers are released.

To circumvent these issues we focus on the central function that analysts have traditionally filled, namely the provision of annual earnings forecasts. The financial media lavish a great deal of attention on analysts' estimates, and revisions in these estimates can induce large movements in the stock price (see Landsman and Maydew (2002), Chan et al. (2004)). For our purposes, the advantage of working with earnings forecasts is that they apply to a specific calendar period (the fiscal year), and the actual realization is observed at the end of the period. This lets us quantify which analysts do a better job in terms of providing more accurate forecasts of earnings.

Previous academic research confirms that the consensus estimate of analysts out-performs statistical

models in forecasting earnings. At the level of individual analysts, however, the evidence on consistency in performance is a little cloudier. Brown and Rozeff (1980), O'Brien (1990) fail to find differences in analyst performance over time. Brown (2001) finds an association between an analyst's current forecast error and the same individual's lagged error. Stickel (1992) reports that analysts voted onto the All-American research team subsequently provide more accurate earnings forecasts. Another source of controversy is whether analyst forecast accuracy reflects skill or more mechanical differences. Analysts may vary in their accuracy because some individuals' forecasts are more stale than others'. They may be affiliated with brokerage firms that have different levels of data-collection and processing resources, thereby confounding our understanding of the sources of forecasting skill. In short while we know that analysts as a group exert a strong influence on stock price behavior, we are less confident about whether some individuals' forecasts are more credible than others'.

We assess consistency in analyst forecasting performance from several standpoints: at the level of each stock covered, at the level of an individual analyst, as well as at the level of a brokerage firm. The comparisons of forecast accuracy control for variables such as forecast age, analyst experience, breadth of coverage, and the size of the brokerage firm. We also zero in on two groups where consistently superior forecasting ability might be concentrated: analysts affiliated with large high-status brokerage firms, and analysts selected for star status by influential media outlets such as *Institutional Investor* or *The Wall Street Journal*.

Our results provide statistical evidence in favor of consistency in analyst accuracy in earnings forecasts. For example, of all the analysts ranked in the top quartile by their past accuracy, 21 percent repeat their superior performance in the next year while 16 percent fall to the bottom quartile subsequently. Similarly, conditional on falling in the bottom quartile by past accuracy, the frequency of repeated poor performance in the future is 30 percent while the frequency of improving to the top quartile is 21 percent. The consistency in accuracy persists after controlling for a variety of characteristics of the forecast, the stock being covered, the analyst and the brokerage firm. Large brokerage firms and All-Star analysts tend to be associated with more accurate forecasts. However, the economic magnitude of the differences in forecast accuracy are generally slight.

The rest of the paper is organized as follows. Section 1 describes our empirical approach. Section 2

applies multiple tests to determine whether there is persistence in forecast accuracy. Section 3 evaluates whether large brokerage firms, and All-Star analysts, have an edge in forecast accuracy over their competitors. A final section concludes.

1 Empirical approach

1.1 Data and methodology

We assess analyst performance in terms of their accuracy in forecasting annual earnings per share. Data on actual earnings and individual analyst forecasts are from the Institutional Broker Estimate (I/B/E/S) Detail History file. We consider analysts' forecasts of current fiscal-year (FY1) earnings for domestic U.S. equity issues. Each estimate in the file is associated with codes that identify the analyst issuing the forecast, as well as the affiliated brokerage firm. Our sample period is 1984 to 2002. Prior to 1984, there is some question as to whether the forecasts made by analysts on I/B/E/S conform to the same basis as firms' reported earnings.

To see which analysts consistently do better than others we require a metric that allows direct comparisons across analysts who cover different stocks, and also across time. Forecast errors, either in dollar amounts or percentage terms, do not facilitate such comparisons, since the distribution of errors varies across stocks and across time. Instead we develop the following forecast accuracy measure. For each stock in each year, we assign to every analyst covering the stock that year a score that reflects how closely the analyst's forecast matches actual earnings. In particular we track each analyst's most recent outstanding forecast as of six months before the end of the stock's fiscal year. Our choice of forecast horizon is based on the idea that six months before the fiscal year-end, there is sufficient uncertainty about future earnings to generate dispersion across analysts. Hence any evidence of analyst talent should come through more clearly. As the end of the fiscal year approaches, forecasts tend to converge and analysts appear more homogeneous. Given the length of time until the release of annual earnings there is also less of a tendency for analysts to manipulate strategically their estimates in order to curry favor with potential investment banking clients. Additionally it is less likely that, six months before the fiscal year-end, managers are leaking information to selected analysts in order to guide their forecasts. To mitigate the influence of inactive forecasters, we

discard any estimate that has been outstanding for longer than 100 days as of six months prior to the fiscal year-end.

The score assigned to an analyst is calculated as follows. For all stocks with at least two outstanding forecasts, we calculate the absolute value of the difference between each analyst's forecast and actual earnings per share. The absolute errors are ordered from highest to lowest, and the percentile ranking is used as a score.[2] The end result is that every analyst is assigned an indicator of forecast accuracy that lies between zero (the least accurate forecaster) and one (the most accurate forecaster). By construction the average score is 0.5.

Note that our scoring procedure is fully predictive in nature. In particular, our ranking of analysts who cover a stock in a given year is irrespective of whether they continue their coverage in the future. In the subsequent year some of these individuals may discontinue their forecasts for the stock, while some others may initiate coverage of the stock. The ranking in the subsequent year applies to the reconstituted set of analysts (survivors plus new entrants). Of course, in evaluating whether there is consistency in forecast accuracy we can compare scores across adjacent years for the survivors only.

Our score measure gives no consideration to the magnitude of the forecasting error. An analyst may be ranked higher than another even though their estimates differ by only one cent. Accordingly, statistically significant evidence of consistency in forecasting performance may not translate into economically meaningful differences in forecast accuracy. In our robustness checks we consider another score measure that takes the magnitudes of forecast errors into account.

1.2 Summary statistics

Table 1 reports, for each year over the sample period, the size of the sample used in our analysis. We tabulate the number of eligible: earnings forecasts, firms covered, analysts, as well as brokerage firms. On average each year there are 28,781 forecasts issued by 2,532 analysts employed by 207 brokerage firms covering

[2]Suppose stock i at date t (six months before the end of the current fiscal year) is followed by N_{it} analysts with outstanding forecasts of earnings per share for the current fiscal year. Given actual earnings per share, each analyst is associated with a forecast error, and the absolute errors are ranked from highest to lowest. If analyst j's rank on absolute forecast error for the stock at that date is $R_{ijt} = 1, ..., N_{it}$, the analyst's score is $\rho_{ijt} = \frac{R_{ijt}-1}{N_{ijt}-1}$.

3,575 stocks. As the equity market boomed during the later part of the 1990s, the brokerage industry flourished. As well, equity research activity thrived in its extent and influence, as reflected in the growth in the number of analysts during the late 1990s.

An analyst's forecast accuracy is likely to be influenced in part by personal traits such as experience and breadth of coverage. To provide a frame of reference for our search for persistence in forecasting ability, we begin by providing summary statistics on several pertinent analyst characteristics.

Table 2 examines the extent of coverage of firms by analysts. This is done from two perspectives. Panel A of the table reports the distribution of firms in terms of how many analysts follow a stock. Panel B of the table takes an analyst's standpoint and considers how many firms a given analyst covers. We report the distributions for a single year (2000).

In panel A, of the firms covered on the I/B/E/S database, 28.79 percent are tracked by two or fewer analysts. The median I/B/E/S firm is covered by about 5 analysts. Research within a brokerage firm is typically organized along industry or economic sector classifications, so most analysts cover multiple stocks within the same sector. The median analyst covers roughly 7 stocks, and more than a third of analysts cover upwards of ten stocks. On the other hand there are analysts who concentrate on a small number of stocks. Close to 15 percent of analysts specialize in a single stock, for instance.

Table 3 looks at the experience levels of analysts. Experience is measured in several ways. An analyst's overall business experience refers to the length of time the analyst appears on the I/B/E/S file. This is measured as the number of years elapsed from the analyst's first earnings estimate recorded on the database to the last year the analyst issued a forecast for any firm. We also examine an analyst's experience covering a given firm, measured as the number of years from the analyst's first forecast for the firm to the most recent forecast for the same firm. Lastly we measure experience as an analyst's tenure at the same brokerage firm. In order to track analyst experience over as long a period as possible, note that in Table 3 the sample period extends from 1981 to 2002 (our examination of forecast accuracy covers data over 1984–2002). It is difficult to estimate experience for analysts who leave in the early years of the sample period (because we do not know when they began forecasting prior to 1981) as well as those who enter in the later years. Accordingly, to avoid underestimating analyst experience we discard any analyst whose forecast history ends before 1986,

as well as any analyst whose forecast record starts after 1999.

Our measures of experience indicate that there are few veteran analysts in the industry. The median business experience of an analyst is about 4 years, which is similar to the median tenure with a brokerage firm. The median length of time an analyst covers a particular firm is two years. Since IBES does not follow a brokerage firm through any merger or acquisition activity that make take place, analyst tenure at the same brokerage firm is likely to be understated. Further, we rely on CUSIP identifiers to determine which stocks an analyst covers. Since the CUSIP identifier of a firm can change due to a number of events such as restructuring, acquisition or a merger, our measure of an analyst's firm-level experience may be biased downward as well. Hong and Kubik (2003) also find that average analyst experience tends to be brief.

Given the abbreviated length of most analysts' forecast histories, reliable inferences about forecast accuracy over longer horizons are generally not possible. At the same time, the summary statistics raise the question whether consistency in short-term forecast accuracy is likely to exist. After all, the typical analyst covers the same stock for a short time only, and therefore does not have much opportunity to buid up experience. However, it is also possible that the high turnover in analysts reflects poor forecasters being weeded out and good repeat forecasters being ultimately promoted to other responsibilities. In any event the puzzle is why investors and the media attach so much importance to analysts' opinions, given the limited experience of the majority of analysts.

2 Persistence in analyst forecast accuracy

We check whether good forecasters repeat using a variety of test designs: rank correlations in forecast accuracy between successive years; contingency table tests and regression models that control for other attributes.

2.1 Rank correlation tests

Table 4 tests whether an analyst's past forecasting performance is informative about future forecast performance. Future performance is measured as the accuracy score in the subsequent year $t + 1$. Past forecasting

performance is measured either as the score in the most recent year t, or the scores from the preceding three years averaged and then re-scaled between zero and one. Averaging over the past three years helps to give a clearer indication of which analyst has a better track record in forecasting. However, since the procedure requires a four-year record, we sacrifice observations.

In either case, we correlate analyst i's past accuracy score for stock j as of year t to the same analyst's score for the same stock in the subsequent year $t + 1$. The rank correlations are then averaged across years for a stock, and finally they are averaged across stocks. The results are reported in panel A, along with the proportion of correlations that are significant at the five percent level.

The results for the past one-year score or past-three year average score are similar. The average correlation is positive but low (about 4 percent for the whole sample period), suggesting that past performance has only slight information about performance over the next year. Nonetheless, given the large number of observations about ten percent of the correlations are statistically significant.

Looking at estimates on a stock-by-stock basis may introduce noise and obscure judgments about which analysts are better forecasters. We can refine our accuracy measure by evaluating forecast performance across all the stocks covered by an individual analyst. To draw a parallel with the money management business, it is a no less challenging task to identify a portfolio manager's stock selection ability. Rather than examining a manager's skill at picking individual stocks, the conventional procedure is to evaluate the manager's overall portfolio. Accordingly in panel B of Table 4 we use a composite accuracy score for analyst i by averaging scores across all the stocks covered in a given period. This average is then re-scaled so that the least accurate forecaster each year has a score of zero and the most accurate forecaster has a score of one. In each year over the sample period we compute a cross-sectional correlation between an analyst's past composite score (either over the past year or past three years) and the next year's composite score; the result is then averaged over years. The average correlations, as well as the percent of yearly correlations (out of 18 years) that are significant at the five percent level, are provided in panel B of Table 4.

Aggregating across stocks covered by each analyst lowers measurement errors, so as a result there is stronger evidence of consistency in forecast accuracy. Average correlations at the analyst level are higher in panel B. Over the entire sample period, the rank correlation between an analyst's score in the current

year and next year's score averages 7.9 percent (compared to 3.8 percent in panel A), and the correlation is significant in 15 out of 18 years (or 83 percent of the time). Measuring performance over a longer past horizon (three years) helps as well. The correlation between the average past three-year score and next year's score rises to 9 percent with significant correlations in 78 percent of the years.

2.2 Contingency table tests

Brown, Goetzmann, Ibbotson and Ross (1992) argue that nonparametric procedures based on contingency tables are less susceptible to survivorship bias in tests for persistence in mutual fund performance. We follow their lead and use the same general approach to see whether good forecasters repeat. The results are reported in Table 5 at the level of individual stocks (panel A), analysts (panel B) and brokerage firms (panel C).

Table 4 says that averaging over past performance helps single out superior forecasters. Accordingly in Table 5 we measure past performance over a three-year horizon and see whether this predicts performance in the next year. If the analyst's past forecast history does not cover three full years, we use as many observations as are available up to that time. In each case the procedure follows the same steps. Each year we rank analysts by the relevant score on past performance: in panel A the score refers to each analyst's accuracy for a particular stock; in panel B the score is an analyst's rescaled average performance indicator across all stocks covered; in panel C the scores are averaged over all analysts employed by the same brokerage firm and rescaled. The ranked analysts or brokerage firms are then placed into one of four equally-sized categories (from category 1 which comprises cases with the lowest score to category 4 with the highest score). In the subsequent year we follow the same classification procedure based on the relevant one-year scores. To ensure that every category in the ranking is populated, we limit the analysis in panel A to stocks that are covered by at least four analysts. Separate categories are created for non-surviving analysts (who provide forecasts in the first year but not in the second year), and new analysts (with forecasts in the second but not the first year). The intersection of these two sorts gives us a contingency table that reports the proportion of cases in each joint classification. We obtain a contingency table for each year in the sample period, and then the results are averaged across years. Finally, to gauge the economic difference between good and bad

forecasters, we report the average over years of the median absolute forecast error for each classification.

To mitigate problems with survivorship bias, Table 5 keeps track of non-surviving analysts and new analysts as well. Accordingly, the frequencies in the table are expressed each year relative to all the analysts who are considered over the two adjacent periods: survivors, non-survivors, and new analysts. As a result, even though the classifications by accuracy are based on quartile breakpoints from then-existing analysts, the percentage of cases in each accuracy quartile is generally less than 25 percent.

At the level of a firm (panel A), there is some tendency for forecast accuracy to persist but the evidence is not eye-catching. For example, on average 2.37 percent of all forecasters fall in the top accuracy quartile in the past as well as in the next year. The proportion of forecasters who are ranked in the top quartile in the past, but who fall in the bottom quartile in the next year, is somewhat lower (2.09 percent). Alternatively, conditional on falling in the highest quartile over the past, 14 percent of the cases remain in the top quartile in the following year compared to 12 percent who drop to the bottom quartile subsequently. [3] Similarly, forecasters who are lowest-ranked based on their past score and who continue to have the lowest accuracy next year make up 2.20 percent of all cases (or 13 percent of the bottom quartile by past score), compared to a smaller proportion (1.91 percent of all cases, or 11 percent of the bottom quartile) who are lowest-ranked based on past accuracy, but are highest-ranked in the following year.

There is somewhat stronger evidence of persistence when forecasting performance is evaluated across all the stocks an analyst covers (panel B). For example, the highest-ranked analysts in the past who are also highest-ranked in the following year represent 4.17 percent of all eligible analysts, or 21 percent of the prior top quartile. A smaller percentage, 3.22 percent of all cases (16 percent of the prior top quartile) comprise analysts who are highest-ranked in the prior period but are the lowest-ranked in the following year. Similarly he proportion of repeat inferior forecasters (who are lowest-ranked in both years) is 4.10 percent. The proportion of analysts who are ranked lowest based on their past score but ranked highest based on the following year's score is less (2.84 percent). Put another way, of the least accurate forecasters over the prior period, 30 percent repeat their poor performance in the next year while only 21 percent improve and reach the top quartile in the following year. More generally, on average survivor cases (with both past and

[3] These percentages are calculated as $\frac{2.37}{2.09+2.20+2.27+2.37+7.89}$, and $\frac{2.09}{2.09+2.20+2.27+2.37+7.89}$, respectively.

next-year forecasts, as given in the first four rows and columns of numbers in panel B) make up about 62 percent of all eligible forecasters. The diagonal cells account for about 29 percent of the survivors. If past and next-year score ranks for the survivors are independent, on average 25 percent of the survivor cases should lie on the diagonal.

Panel B also highlights the amount of turnover in the analyst community. The proportion of non-survivors out of all eligible analysts averages about 18 percent, while new entrants make up another 20 percent.[4] In particular, forecasters who leave the sample tend to have unimpressive past forecast performance. Of the non-survivors, the largest fraction (6.43 percent of all cases, or about 36 percent of non-survivors) falls in the lowest quartile by past forecast accuracy. Our evidence that poor forecasting performance can adversely affect an analyst's career is consistent with the findings in Hong and Kubik (2003). New entrants, on the other hand, tend to be more evenly represented in both the worst and best categories.

The statistical evidence of repeat performance in forecast accuracy does not translate into economically significant differences. Based on past accuracy, the highest-ranked forecasters on average generate a median absolute forecast error of 12.66 cents, compared to an absolute error of 20.14 cents for the lowest-ranked forecasters. In the subsequent year, however, the two groups are almost equivalent in terms of their median absolute errors (14.51 cents for the top quartile versus 14.87 cents for the bottom quartile).

Aggregating the results up to the level of brokerage firms (panel C) yields even stronger statistical evidence of persistence in forecast accuracy. Of the brokerage houses which are ranked in the top quartile by past accuracy, 28 percent (6.14 percent divided by the total in the corresponding row) maintain their ranking in the following year, while 17 percent fall to the bottom quartile in the future. Looking at brokerage firms in the bottom quartile in the previous period, 28 percent also continue to be ranked lowest, and 18 percent move to the top quartile, subsequently. Together, the diagonal cells constitute 33 percent of the survivor cases. Over the following year, the brokerage firms with the highest past score yield a slight improvement in median absolute error (about 0.62 cents) compared to the firms with the lowest past score.

[4]Note that the percentages reported in the text are expressed relative to the total number of surviving, non-surviving and new analysts. Moreover, given the growth of the securities industry over most of the sample period, the number of new entrants, at least in the aggregate, has generally increased over time. As a result the stated percentages tend to understate the rate of entry relative to currently existing analysts, and the rate of exit relative to previously existing analysts.

In summary, when we look at "portfolios" of earnings estimates, either for an individual analyst or for a brokerage firm, there is evidence of repeat performance in forecast accuracy. However it is much harder to pick out discernible differences in the magnitude of the forecast errors across good and bad forecasters.

2.3 Regression results

Our comparison of analysts' forecast accuracy is based on their estimates as of six months before the end of the stock's fiscal year. These forecasts are outstanding for different amounts of time, however, so some forecasts are comparatively stale. While we exclude forecasts that are older than 100 days, differences in the timeliness of the forecasts may nonetheless create the false impression that some analysts are superior forecasters even in the absence of any true forecasting skill. Conversely forecasters with true talent may be penalized if they do not update their estimates as frequently as others. The problem of timeliness may be more severe, for example, if the analyst follows many companies.

Beyond adjusting forecasts for their timeliness, we can use other attributes to help single out forecasts that are more accurate. In this section we collect these variables into a regression model to identify *ex ante* superior forecasters.

The model relates the accuracy score, either at the firm-level, analyst-level, or brokerage-level, over the subsequent year to the following variables. To see if past forecast accuracy carries over into the future, we use the average accuracy score over the previous three years (if the record of forecasts does not extend back this far we average over as many of the past years as are available). As a control for forecast timeliness we include the age (in days) of the forecast relative to six months before the fiscal year-end.

We conjecture that future forecast accuracy is also related to several other, currently observable, attributes. The first set of attributes relates to the brokerage firm that employs the forecasting analyst. They are intended to describe the degree of access to management, or the amount of resources available to collect information about firms' prospects. Arguably large brokerage firms have more resources at their disposal and as a result can obtain better information about firms' future profitability. Firm managers may also be more willing to cultivate a relationship with larger, more well-known brokerage firms in order to improve access to capital markes. As a result, analysts with large brokerage firms may have better access to firm

managers. To capture these effects we use the size of the brokerage firm that employs the analyst, as measured by the number of analysts in the current year that are affiliated with the brokerage firm. Specifically we use two dummy variables. The first dummy variable takes the value of one if the forecast is issued by a large brokerage firm (with at least 50 affiliated analysts in the current year) and zero otherwise; the second dummy variable takes the value of one if the forecast is issued by a small brokerage firm (with at most 5 affiliated analysts in the current year) and zero otherwise.

A second set of attributes is related to the analyst's expertise level and specialization. More experienced, and more specialized, analysts presumably should be able to produce more accurate forecasts. The analyst's expertise is proxied by experience level, measured by overall business experience (the number of years the analyst appears on the I/B/E/S file) and number of years' experience forecasting the particular firm. Specialization is measured as the number of distinct firms covered by the analyst in the current year, as well as the number of distinct 2-digit SIC code industries followed by the analyst in the current year. Being chosen for All-Star status by publications such as *Institutional Investor* or *The Wall Street Journal* may also be an indication that the investment community believes that the individual is an expert forecaster. To see whether this is the case we include a dummy variable that is equal to one if the forecast is issued by an All-Star analyst in the current year and zero otherwise. Finally, recent policy reforms posit that brokerage firms with no investment banking business are more likely to be free from conflicts of interest with potential client firms.[5] As a result analysts affiliated with independent brokerages may be more impartial predictors of stock performance and come up with forecasts that are less biased. Their lack of bias, however, may come at some cost because their forecasts may be less accurate. The independent brokers tend to be smaller firms with fewer resources at their disposal and hence may not be as successful in attracting forecasting talent as the larger and more prestigious investment banks. To provide some evidence on this issue we include a dummy variable for forecasts issued by independent brokerage firms. We generate a list of independent brokers by consulting trade publications and industry sources, and then select a subset whose forecasts appear with relatively high frequency on I/B/E/S. The resulting sample comprises six firms, including independent research services (such as Standard & Poor's), an investment firm, and a retail brokerage firm. Their estimates

[5] See, for example, Simon (2004), Simon and Story (2004).

represent roughly 4.5 percent of the forecasts on the I/B/E/S file over the sample period.

The regression model is estimated each year, and coefficient estimates are averaged over years. While each annual regression is based on all stocks with analyst coverage that year, our concern is whether differences across analysts who cover the same stock are associated with differences in accuracy. Hence, to preserve the comparability across stocks of these differences in analyst characteristics, we standardize the analyst attributes as follows. For each stock in a given year, we calculate the mean values of forecast age, firm and industry coverage, business and firm experience, across all analysts covering the stock. Each individual forecaster's attribute is then measured relative to the corresponding average for the stock. The results from the regression are reported in Table 6. The t-statistics of the mean coefficients are calculated relative to the time-series standard deviations of the coefficients. Also reported is the time-series average of the adjusted R-squared values.

If there is no consistency in forecast accuracy the intercept should not be very different from the unconditional mean score (0.5) and the slope coefficient for past accuracy should be close to zero. In panel A of table 6 the regression of next year's score on average past three-year score (model 1) produces an intercept of 0.4806 and a small positive slope coefficient (0.0388) that is more than two standard errors from zero. Nonetheless the explanatory power of past accuracy by itself for next-year accuracy is low: the average R-squared is well below one percent. Forecast age is an important determinant of accuracy, with staler estimates (outstanding for a greater number of days) lowering forecast accuracy. Introducing just this variable into the regression (model 2) raises the adjusted R-squared to 1.7 percent. After controlling for forecast age, the coefficient of past score is still low.

Of the remaining attributes in panel A the dummy for large brokerage firm has a large coefficient that is significant in all the regressions. Everything else constant, forecasts issued by large brokerage firms are associated with a higher average accuracy score by about 2 percent. On the other hand the evidence does not support the notion that independent brokers are consistently more accurate forecasters. The indicator variable for independent brokers has a large negative, and statistically significant, coefficient. Analyst specialization and experience generally have weak effects on accuracy next year. More specialized analysts (who cover fewer stocks and fewer industries), and more experienced analysts (with a longer record) tend to

produce estimates with slightly enhanced accuracy.

The results when accuracy scores are averaged over the stocks covered by an analyst (panel B), and when they are combined over analysts at the same brokerage firm (panel C) generally parallel the above findings. In all panels large brokerage firms have an advantage in forecast accuracy. Comparing across brokerage firms (panel C), large brokers have an edge of 7.36 percent with respect to average accuracy scores. Conversely small brokers rank lower on accuracy by 4.30 percent. Finally independent brokers have average accuracy scores that are lower than other brokerage firms by 6.62 percent. Hence, while independent brokers' estimates are less biased (see Chan et al. (2004)), Table 6 does not indicate that their forecasts are more accurate. Independent brokers' estimates thus do not offer an unambiguous advantage over the forecasts from their competitors who have ties to investment banking. Possibly independent brokers lack the ample resources and the close contact with firm managers that their competitors in large brokerage firms can command, and as a result their accuracy suffers.

Another robust result is that All-Star analysts seem to bring some special talents to the task, after controlling for other attributes. In model 8 the indicator variable for All-Star status uses the list of analysts chosen by *Institutional Investor*, while model 9 uses the group of analysts chosen by *The Wall Street Journal*. For the sake of comparison in model 10 we select our own group of star analysts, comprising those who rank in the top decile by accuracy score in the current year. *Institutional Investor* star analysts produce an accuracy score in the next year that averages 2.59 percent higher than other analysts, even when other attributes are taken into account. The improvement on the part of *Wall Street Journal* star analysts is also notable (1.89 percent on average). These rankings appear to add information beyond accuracy in the current year: when we consider only analysts with current-year accuracy scores in the top decile, their score next year drops on average by 1.54 percent.[6]

[6]Note our definition of a "star" analyst in model 10 is based on accuracy in the current year only. In contrast the past accuracy score that also appears in the regressions is an average over the preceding three years. The negative coefficient on the star analyst dummy variable in model 10 may thus be picking up the effect of transitory forecast errors unrelated to analyst skill.

3 Who are the better forecasters?

The regressions from the previous section suggest that two groups may merit singling out as potentially more accurate forecasters: large brokerage firms, and All-star analysts. In this section we flesh out this finding, and explore further the gains in accuracy from following forecasts by each of these two groups.

3.1 Do large brokerage firms issue better forecasts?

Within the securities industry a number of firms tend to be regarded as highly prestigious and receive the bulk of attention from businesses and the media. In Krigman, Shaw and Womack's (2001) survey of financial managers, for example, the main reasons cited for switching underwriters are underwriter prestige and expanding analyst coverage of the stock. Perhaps not coincidentally, the high-prestige brokerage firms also employ large numbers of analysts, many of whom have high profiles and high salaries.

Table 7 investigates whether the prestige of some brokerage firms can be accounted for, at least in part, by their skill in forecasting earnings. The table provides descriptive characteristics and average accuracy scores for brokerage firms broken out by size (number of affiliated analysts), and for independent brokerage firms (who do not engage in investment banking business). The results by brokerage firm size are reported for four groups of brokerage firms: the three largest brokerage firms in each year (denoted Top 3 in the table); all large brokers (with more than 50 affiliated analysts), small broker firms (with fewer than five analysts), and the intermediate category (mid-sized broker firms). Each year we calculate accuracy scores for a brokerage firm in a given category by averaging the accuracy scores across all analysts who are affiliated with the broker. Broker firm scores are then rescaled to fall between zero (the brokerage firm whose analysts provide the least accurate forecasts for the stocks they cover) and one (the broker whose analysts provide the most accurate forecasts).

Since large brokerage firms are engaged in multiple lines of business, they also become involved in investment banking relationships with the firms they cover. As a result, they have been accused of conflict of interest, charging them with biased forecasts that flatter their client firms.[7] The existence of a bias in brokerage firms' estimates, however, does not necessariy render them useless to an investor. Large brokers'

[7] See, for instance, the discussion and evidence in Chan et al. (2004).

close ties to management and their extensive resources may instead give them an edge in accuracy, so they may be nearer to realized earnings even if they err systematically in one direction. In contrast, independent brokers are thought to provide forecasts that are more unbiased because they are less susceptible to conflicts of interest.

Six months before the fiscal year-end, all categories of brokerage firms issue estimates that tend on average to be optimistic. The median forecast errors (earnings estimates minus actual earnings per share) are all positive, ranging from 3.8 cents for large brokers to 6.5 cents for small brokers. Despite their overall optimism bias, however, some brokerage firms are more accurate forecasters. In particular, large brokers turn in higher accuracy scores. Notably, the 3 largest brokerage firms each year are highly visible financial giants. In 2002, for example, this group comprises Merrill Lynch, Salomon Smith Barney, and Goldman Sachs. They devote impressive amounts of resources to equity analysis. On average over 1985–2002, they each employ 100 analysts, who cover 583 firms. Their estimates as of six months before the fiscal year-end yield an average accuracy score of 0.6851, so they turn out to be relatively more accurate, with a median absolute error of 14.46 cents. More generally for all large brokers the average accuracy score is 0.6176, and their median absolute error is 13.97 cents. Small brokerage firms, on the other hand, have a mean accuracy score of 0.4406 and median absolute error of 15.74 cents per share.

Independent brokers as a group are associated with low accuracy: the average accuracy score is 0.3954, and their median absolute error is 15.10 cents per share. However, the sample of independent brokers is not large, so it is difficult to measure their performance precisely.

3.2 All-Star analysts

Each year analysts are chosen for the *Institutional Investor (II)* All-American Research Team by polling buy-side portfolio managers. Winning analysts are chosen on the basis of research insight, client service, the performance of their stock recommendations, and the accuracy of their earnings estimates.[8] Similarly *The Wall Street Journal (WSJ)*, in its yearly "Best on the Street" survey, singles out analysts who excel in

[8]The rankings are published in the October issue of *Institutional Investor*, and further details are provided in *Institutional Investor* U.S. Equities Market Report (2003).

terms of the performance of their recommendations as well as the accuracy of their earnings forecasts. The list is published in June each year.

The *II* survey has some features of a popularity poll tilted toward larger, high-status brokerage firms. Nonetheless an individual's appearance on the list is a sign that at least some influential investors perceive the analyst to be an accurate forecaster (among other things). At the same time, the *WSJ* list often contains analysts from smaller and less well-known firms. Both sets of rankings, therefore, may be helpful in spotlighting superior forecasters.

Table 8 looks at whether analysts who have been chosen for star status either by *Institutional Investor* or *The Wall Street Journal* live up to their billing. Every year we cull the lists of star analysts from either publication and we track their accuracy scores over a three-year window that starts from the year preceding their selection, and ends in the year following their selection. The sample period starts from 1993 for the *Institutional Investor* list, or from 1994 for *The Wall Street Journal*, and ends in 2001 for both cases. The individuals in each list are matched up with all other analysts who issue estimates for the stocks covered by the star analysts, and their forecasting performance is then compared.

There is some ambiguity as to the timing of the forecasts that are the basis for analysts' selection by either *Institutional Investor* or *The Wall Street Journal*. We assume that both sources consider forecasts for the fiscal year immediately prior to the year in which the lists are published. To take as an example, consider the analysts selected for the lists published in 2000 (in the October issue of *II* or in June for the *WSJ*). We report the accuracy of their forecasts for fiscal year 1999 (denoted the selection year) as well as their accuracy in the preceding year (fiscal year 1998 forecasts) and in the following year (fiscal year 2000 forecasts). To the extent that *II* or *WSJ* use more up-to-date forecasts than we do, we may be missing some signals of consistent accuracy.

Analysts on the *II* list (panel A) have superior accuracy scores in the year prior to their selection. Their mean score in the previous year is 0.5448, compared to 0.5075 for their counterparts covering the same stocks. These select individuals continue to have a slight edge in the selection year and the subsequent year as well. The *II* analysts' scores one year after their selection averages 0.5307 compared to 0.5031 for other analysts. In terms of their prospective forecast errors, however, the *II* analysts look less stellar. In the post-

selection year, the median absolute percentage forecast error is 10.12 percent and the median absolute error is 16.77 cents for the star analysts, compared to 10.88 percent and 16.55 cents for their comparison group.

The results for the *WSJ* list (panel B) are similar. They have superior forecast accuracy in the past year and the following year relative to their selection, but there is only a slight advantage to following their forecasts in terms of the resulting forecast errors. In the year after their selection, for example, the median absolute error for both the *WSJ* stars and their counterparts is about 18 cents.

Panel C checks whether the selection criteria used by external sources such as the *II* and *WSJ* add new information. We do this by comparing the previous results to those obtained from performing the same analysis on analysts who are ranked in the top decile each year based on our one-year forecast accuracy score. In the selection year their mean score is 0.95 (by construction), with an accompanying average absolute forecast error of 14 cents. The score reverts to 0.5188 in the following year, suggesting that there is a large measurement error component in year-to-year forecast accuracy. As before, statistical accuracy does not translate into measurable improvement with respect to dollar forecast errors.

4 Conclusion

Investors and the financial media seem to believe that there are well-defined quality differentials between Wall Street research analysts. During the late 1990s, for example, a select few analysts received the bulk of attention from the media and were elevated to near-celebrity status. Investment firms tout products that weed out superior analysts from the crowd with the hope of obtaining more informative forecasts of future earnings or profitable stock recommendations. The financial press conduct polls and trumpet lists of individuals anointed to be star analysts. These lists are widely disseminated as marketing vehicles to clients and raise the prestige of the securities firms; in turn individuals on these lists are richly compensated.

This paper examines whether these perceived quality differentials have any basis in terms of analysts' ability to forecast earnings accurately. We focus on earnings forecasts because they are a central function of research analysts. Further, since actual earnings are reported at the end of the year, it is possible to evaluate objectively the accuracy of an individual's forecast, as opposed to the accuracy of a forecast of growth or target price over an unspecified future horizon.

Our results suggest that there is some persistence in forecast accuracy on the part of analysts. Of the analysts who are ranked in the top quartile by past accuracy, 21 percent remain in the top quartile in the following year; 16 percent fall to the bottom quartile subsequently. In the case of the least accurate forecasters (in the bottom quartile) by past accuracy, 30 percent are still ranked lowest in the next year; 21 percent rise to the top quartile a year later.

Forecast accuracy tends to be positively associated with analyst experience and negatively associated with the breadth of coverage. In particular, two *ex ante* observable attributes help to identify accurate forecasters. Analysts affiliated with large brokerage firms, and analysts selected for All-Star status by either *Institutional Investor* or *The Wall Street Journal* provide, on average, more accurate estimates of earnings. On the other hand, analysts affiliated with independent brokerage firms that have no investment banking business suffer from low accuracy. Independent brokers are more unbiased because they are less susceptible to conflicts of interest from investment banking ties. At the same time they may lack the access to firm managers, and the level of resources that come with the lucrative investment banking ties to those firms.

Our sample of earnings estimates over many stocks, analysts and years provides evidence of persistence in forecast accuracy. The statistical evidence of persistence is not accompanied by material economic differences, however. The improvement in accuracy when measured in terms of the dollar difference between actual and forecasted earnings is negligible.

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Table I
Sample size

The sample comprises all analysts with current fiscal-year (FY1) earnings estimates for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. For each stock an analyst's most recent forecast as of six months before the fiscal year-end is recorded, subject to the requirement that the estimate be outstanding for no more than 100 days. The number of eligible forecasts, the number of firms covered, the number of analysts issuing estimates, and the number of brokerage firms affiliated with the analysts, are reported for each calendar year over the sample period.

	Number of eligible:			
Year	Forecasts	Firms	Analysts	Brokerage firms
1984	19,280	2,337	1,858	119
1985	20,893	2,488	1.937	138
1986	21,708	2,601	1.952	143
1987	22,497	2,807	1,961	156
1988	22,507	2,867	1,958	174
1989	22,949	2,853	2,031	185
1990	25,654	2,903	2,149	185
1991	23,938	2,891	1,985	185
1992	25,810	3,128	1,904	183
1993	28,330	3,487	2,097	206
1994	28,272	3,878	2,333	206
1995	30,512	4,172	2,532	214
1996	32,646	4,674	2,847	246
1997	35,098	5,056	3,211	280
1998	38,465	4,935	3,427	310
1999	37,495	4,708	3,612	289
2000	35,710	4,531	3,623	266
2001	40,209	3,878	3,296	229
2002	34,864	3,728	3,395	213

Table II
Distribution of firms by analyst coverage and
distribution of analysts by firms covered, 2000

The sample comprises all analysts with current fiscal-year (FY1) earnings estimates for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. Statistics are reported for calendar year 2000 on the distribution of firms with respect to the number of analysts with outstanding forecasts (panel A), and the distribution of analysts with respect to the number of firms covered (panel B).

Panel A			Panel B		
Analyst coverage	Percent of firms	Cumulative percent	Firm coverage	Percent of analysts	Cumulative percent
1	16.92	16.92	1	14.77	14.77
2	11.87	28.79	2	8.58	23.35
3	10.66	39.45	3	6.14	29.49
4	8.72	48.17	4	4.52	34.01
5	7.12	55.29	5	5.01	39.02
6	6.40	61.69	6	4.99	44.02
7	4.72	66.41	7	4.99	49.01
8	4.05	70.47	8	5.06	54.07
9	3.44	73.91	9	4.72	58.79
10	2.81	76.72	10	5.06	63.84
11 – 15	9.84	86.55	11 – 15	19.17	83.02
16 – 20	5.64	92.19	16 – 20	9.89	92.91
21 – 25	3.46	95,65	21 – 25	3.59	96.50
26 – 30	1.92	97.56	26 – 30	1.56	98.06
31 – 35	1.36	98.92	31 – 35	0.90	98.96
> 35	1.08	100.0	> 35	1.04	100.0

Table III
Distribution of analysts by experience (in years)

The sample comprises all analysts with current fiscal-year (FY1) earnings estimates for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. For each analyst three measures of experience are calculated. Business experience is the number of years elapsed from the analyst's first estimate recorded on the file to the same analyst's last recorded estimate. Firm experience is the number of years between the analyst's first estimate for a given firm and the same analyst's last estimate for the same firm. Tenure with brokerage firm is the number of years from analyst's first estimate on behalf of a given brokerage firm to the same analyst's last estimate on behalf of the same brokerage firm. To mitigate problems in measuring experience because the sample period is left- and right-censored, analysts whose last forecast is made before 1986 are excluded, and analysts whose first forecast is made after 1999 are also excluded.

Business experience	Percent of analysts	Cumulative percent	Firm experience	Percent of analysts	Cumulative percent	Tenure with brokerage	Percent of analysts	Cumulative percent
1	12.99	12.99	1	27.42	27.42	1	16.89	16.89
2	15.72	28.71	2	23.65	51.07	2	21.35	38.24
3	11.76	40.48	3	14.95	66.02	3	16.57	54.82
4	11.43	51.91	4	10.67	76.69	4	13.46	68.28
5	9.50	61.41	5	6.78	83.47	5	9.69	77.97
6	7.60	69.01	6	4.52	88.00	6	6.25	84.23
7	5.70	74.70	7	3.13	91.12	7	4.42	88.64
8	4.12	78.83	8	2.18	93.30	8	3.02	91.66
9	3.67	82.49	9	1.49	94.79	9	2.03	93.69
10	2.36	84.85	10	1.12	95.91	10	1.38	95.07
11	1.95	86.80	11	0.88	96.80	11	1.04	96.11
12	1.64	88.44	12	0.76	97.55	12	0.78	96.89
13	1.98	90.42	13	0.65	98.21	13	0.73	97.62
14	2.05	92.47	14	0.47	98.68	14	0.34	98.41
$\geq$15	7.53	100.00	$\geq$15	1.32	100.00	$\geq$15	1.59	100.00

Table IV
Correlation in forecast performance

The sample comprises all analysts with current fiscal-year (FY1) earnings estimates for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. For each firm covered by at least three analysts in the current year, analysts with valid outstanding estimates as of six months before the fiscal year-end are ranked on the basis of absolute forecast error and assigned a score between zero (the least accurate forecaster for the firm in that year) to one (the most accurate forecaster for the firm in that year). Rank correlations between scores in the current year, or scores averaged over the preceding three years and re-scaled, and scores in the next year are computed for each stock in panel A. Correlation coefficients are then averaged over stocks and over years. The average correlation, as well as the percent of firm-year correlations that are significant at the five percent level, are reported. In panel B, accuracy scores are averaged over all stocks covered by an individual analyst and rescaled between zero and one each year. Rank correlations between analysts' current yearly scores, or prior three-year average score, and next-year scores are computed each year. The results are averaged over years and reported, along with the percentage of years with correlations that are significant at the five percent level.

		Correlation between next-year score and			
		Current 1-year score		Past average 3-year score	
Sample period	No. of cases	Correlation	% significant	Correlation	% significant
Panel A: Firm-level forecast accuracy					
1984–1992	7873	0.046	9.9	0.043	10.2
1993–2002	10268	0.031	10.3	0.034	10.2
1984–2002	18141	0.038	10.1	0.038	10.2
Panel B: Analyst-level forecast accuracy					
1984–1992	13535	0.098	88.9	0.107	88.9
1993–2002	19317	0.059	77.8	0.073	66.7
1984–2002	32852	0.079	83.3	0.090	77.8

Table V
Contingency table tests for consistency in forecast performance

The sample comprises all analysts with current fiscal-year (FY1) earnings estimates for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. In each year over the sample period and for each firm covered by at least four analysts in the current year, analysts with valid outstanding estimates as of six months before the fiscal year-end are ranked on the basis of absolute forecast error for the current year and assigned a score from zero (the least accurate forecaster for the firm in that year) to one (the most accurate forecaster for the firm in that year). In panel A, analysts are ranked by their average scores over the prior three years and and placed in one of four groups from worst (lowest score) to best (highest score). Analysts are also ranked by their score over the following year and placed in one of four groups. Analysts with no forecast for the stock in the following year are placed in a separate category (non-survivors); analysts with a forecast for the stock in the following year but no forecasts over the prior three years are also placed in a separate category (new). The proportion of analysts falling in each of the categories from the intersection of the two classifications, along with the median absolute forecast error (forecast minus actual earnings per share) in each category, is calculated for each stock. The averages over years are reported in the table. In panel B, each analyst's score is averaged across all stocks covered by the individual and the above classification procedure is applied to analysts' overall scores. In panel C, the scores of all analysts affiliated with a given brokerage firm are averaged and the above classification procedure is applied to brokerage firms' overall scores.

Panel A: Firm-level forecast accuracy

Past score	Next year score rank					Absolute forecast error	
rank	1 (Worst)	2	3	4 (Best)	Non-survivors	Past	Next year
1 (Worst)	2.20	1.95	1.89	1.91	8.87	0.2241	0.1652
2	2.36	2.35	2.37	2.36	7.39	0.1797	0.1642
3	2.19	2.44	2.47	2.49	7.24	0.1428	0.1603
4 (Best)	2.09	2.20	2.27	2.37	7.89	0.0947	0.1582
New	8.30	8.21	8.14	8.02			0.1379
Past error	0.1618	0.1606	0.1600	0.1588	0.1391		
Next year error	0.2637	0.1827	0.1317	0.0699			

Panel B: Analyst-level forecast accuracy

Past score	Next year score rank					Absolute forecast error	
rank	1 (Worst)	2	3	4 (Best)	Non-survivors	Past	Next year
1 (Worst)	4.10	3.54	3.01	2.84	6.43	0.2014	0.1487
2	3.66	4.64	4.60	3.31	3.73	0.1612	0.1477
3	3.09	4.72	5.20	3.89	3.04	0.1422	0.1422
4 (Best)	3.22	3.64	4.13	4.17	4.79	0.1266	0.1451
New	6.41	3.98	3.57	6.29			0.1485
Past error	0.1682	0.1507	0.1520	0.1605	0.1785		
Next year error	0.2030	0.1473	0.1269	0.1065			

Panel C: Brokerage house-level forecast accuracy

Past score rank	Next year score rank					Absolute forecast error	
	1 (Worst)	2	3	4 (Best)	Non-survivors	Past	Next year
1 (Worst)	6.03	4.68	2.67	3.84	4.40	0.2021	0.1641
2	4.77	6.13	5.13	4.29	1.68	0.1648	0.1553
3	2.48	5.39	7.42	4.96	1.65	0.1442	0.1550
4 (Best)	3.73	4.16	5.59	6.14	2.09	0.1421	0.1579
New	5.33	2.35	1.84	3.24			0.1807
Past error	0.1773	0.1495	0.1556	0.1708	0.2039		
Next year error	0.1987	0.1564	0.1414	0.1358			

Table VI
Consistency in forecast performance: regression results

The sample comprises all analysts with current fiscal-year (FY1) earnings estimates for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. In each year over the sample period and for each firm covered by at least four analysts in the current year, analysts with valid outstanding estimates as of six months before the fiscal year-end are ranked on the basis of absolute forecast error for the current year and assigned a score from zero (the least accurate forecaster for the firm in that year) to one (the most accurate forecaster for the firm in that year). In panel A, analyst i's score for stock j in year t is regressed on: analyst i's average score for stock j over the prior three years; the number of days analyst i's forecast has been outstanding as of six months before the stock's fiscal year-end, measured relative to the average number of days all forecasts for stock j have been outstanding in year t; dummy variables representing whether analyst i is affiliated with a large brokerage firm (which has at least 50 analysts) or with a small brokerage firm (which has at most 5 analysts); the number of stocks covered by analyst i relative to the average number of firms covered by all analysts with outstanding forecasts for stock j; the number of two-digit SIC code industries covered by analyst i relative to the average number of industries covered by all analysts with outstanding forecasts for stock j; the number of prior years in which analyst i has outstanding I/B/E/S forecasts for any stock; the number of prior years in which analyst i has outstanding forecasts for stock j; a dummy variable representing whether analyst i is affiliated with an independent brokerage firm with no investment banking business; and a dummy variable representing whether analyst i has been awarded All-Star status either on the *Institutional Investor* list (model 8) or *Wall Street Journal* ranking (model 9), or has been ranked in the top decile based on average score over all stocks covered (model 10). Values for forecast age are Winsorized at the 95th percentile; values for firm coverage and industry coverage are Winsorized at the 1st and 99th percentiles. In panel B the regression is fit to analysts' current-year scores averaged across all stocks covered by the individual, with prior three-year score, forecast age averaged across all stocks covered. In panel C the regression is fit to current-year scores averaged across all analysts affiliated with a given brokerage firm, using prior three-year score and forecast age averaged across all the brokerage firm's analysts. In each case the regression is estimated each year over the sample period, and the time-series average coefficient, t-statistic based on the time-series standard deviation of the coefficients, and average adjusted R-squared, are reported.

Model	Intercept	Past 3-year score	Forecast age	Large brokerage	Small brokerage	No. of firms covered	No.of industries covered	Business experience	Firm experience	Independent brokerage	All-Star status	Adjusted R^2
Panel A: Firm-level forecast accuracy												
1	0.4806	0.0388										0.0019
	(201.5)	(8.21)										
2	0.4800	0.0383	-0.0018									0.0170
	(203.3)	(8.14)	(-11.24)									
3	0.4725	0.0373		0.0221	-0.0192							0.0039
	(206.4)	(7.96)		(8.61)	(-2.04)							
4	0.4746	0.0347	-0.0019	0.0207	-0.0097	-0.0002	-0.0031	0.0013	0.0017	-0.0373		0.0226
	(202.7)	(7.61)	(-11.42)	(9.07)	(-1.05)	(-1.20)	(-5.72)	(1.32)	(2.25)	(-4.59)		
5	0.4762	0.0321	-0.0022	0.0153	-0.0195	-0.0003	-0.0032	0.0008	0.0006	-0.0559	0.0104	0.0277
	(142.4)	(5.02)	(-9.13)	(5.40)	(-2.42)	(-1.45)	(-6.23)	(1.92)	(0.64)	(-6.75)	(2.52)	
6	0.4762	0.0294	-0.0022	0.0170	-0.0197	-0.0003	-0.0031	0.0007	0.0006	-0.0485	0.0115	0.0274
	(129.8)	(4.40)	(-8.45)	(6.02)	(-2.19)	(-1.55)	(-5.54)	(1.53)	(0.56)	(-8.02)	(1.69)	
7	0.4745	0.0345	-0.0019	0.0208	-0.0099	-0.0002	-0.0030	0.0013	0.0017	-0.0372	0.0014	0.0228
	(201.8)	(7.65)	(-11.42)	(9.18)	(-1.09)	(-1.14)	(-5.72)	(1.31)	(2.25)	(-4.60)	(0.27)	

Model	Intercept	Past 3-year score	Forecast age	Large brokerage	Small brokerage	No. of firms covered	No.of industries covered	Business experience	Firm experience	Independent brokerage	All-Star status	Adjusted R^2
Panel B: Analyst-level forecast accuracy												
8	0.4559	0.0620	-0.0039	0.0319	-0.0486	-0.0006	-0.0046	0.0014		-0.0949	0.0259	0.0538
	(74.6)	(5.35)	(-12.27)	(8.94)	(-4.09)	(-1.43)	(-3.64)	(1.73)		(-12.68)	(3.53)	
9	0.4577	0.0553	-0.0038	0.0342	-0.0441	-0.0006	-0.0050	0.0015		-0.0914	0.0189	0.0503
	(71.4)	(5.26)	(-11.29)	(9.80)	(-3.62)	(-1.37)	(-3.76)	(1.52)		(-11.78)	(3.68)	
10	0.4493	0.0817	-0.0035	0.0351	-0.0375	-0.0002	-0.0038	0.0031		-0.0774	-0.0154	0.0494
	(83.8)	(7.45)	(-15.29)	(13.26)	(-2.78)	(-0.85)	(-4.09)	(1.69)		(-9.90)	(-2.17)	
Panel C: Brokerage firm-level forecast accuracy												
11	0.4550	0.1136	-0.0052	0.0736	-0.0430	-0.0005	-0.0081	0.0144		-0.0662		0.1201
	(35.0)	(4.72)	(-9.26)	(7.83)	(-2.67)	(-0.35)	(-2.15)	(4.65)		(-2.51)		

Table VII
Forecast accuracy results for brokerage firms

The sample comprises all analysts with current fiscal-year (FY1) earnings for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. In each year over the sample period and for each firm covered by at least four analysts in the current year, analysts with valid outstanding estimates as of six months before the fiscal year-end are ranked on the basis of absolute forecast error for the current year and assigned a score from zero (the least accurate forecaster for the firm in that year) to one (the most accurate forecaster for the firm in that year). Scores are averaged over all stocks covered by the same analyst and then aggregated over all analysts affiliated with the same brokerage firm. Results are provided for brokerage firms classified by size (number of affiliated analysts): the top three brokerage firms in each year; large brokerage firms with more than 50 analysts; mid-sized brokerage firms with more than 5 but fewer than 50 analysts; small brokerage firms with fewer than 5 analysts. Results are also given for a sample of independent brokerage firms with no investment banking business. Averages across years are given for: the number of brokerage firms in each category; the number of affiliated analysts; the number of stocks covered by affiliated analysts; the accuracy score; absolute value of percentage forecast error (absolute value of the difference between forecast and actual earnings per share, divided by the absolute value of actual earnings per share); percentage forecast error (difference between forecast and actual earnings per share, divided by actual earnings per share); absolute value of forecast error in dollars (forecast less actual); forecast error in dollars; and forecast age (the number of days an analyst's forecast for a stock is outstanding, as of six months before the end of the fiscal year, minus the average age of all outstanding forecasts for the stock) averaged over all stocks covered by the brokerage firm's analysts.

Sample classification	Number of brokerages	Number of analysts	Number of firms	Accuracy Score	Absolute percent error	Percent error	Absolute error ($)	Error ($)	Forecast age (days)
Top 3 brokerage firms, 1985–1990	3	82	444	0.6559	17.28	8.03	0.1682	0.0702	0.11
Top 3 brokerage firms, 1991–1996	3	92	583	0.7291	11.05	2.14	0.1157	0.0224	1.99
Top 3 brokerage firms, 1997–2002	3	124	722	0.6703	11.18	2.95	0.1500	0.0356	0.50
Top 3 brokerage firms, 1985–2002	3	100	583	0.6851	13.17	4.37	0.1446	0.0427	0.87
Large brokerage firms	13	51	357	0.5990	12.90	3.92	0.1392	0.0377	1.55
Mid-sized brokerage firms	111	11	71	0.5140	15.11	5.53	0.1394	0.0460	-0.03
Small brokerage firms	61	2	14	0.4406	17.49	7.78	0.1574	0.0650	0.54
Independent brokerage firms	6	20	174	0.3954	12.14	4.47	0.1510	0.0452	0.70

Table VIII
Forecast accuracy results for All-Star analysts

The sample comprises all analysts with current fiscal-year (FY1) earnings for domestic U.S. common stocks from January 1984 to October 2002 on the I/B/E/S Daily Detail Earnings Estimate History file. Each year all analysts on the *Institutional Investor* All-American Research Team poll (panel A), or *The Wall Street Journal* Best on the Street list (panel B), are selected. Alternatively in each year over the sample period and for each firm, analysts with valid outstanding estimates as of six months before the fiscal year-end are ranked on the basis of absolute forecast error for the current year and assigned a score from zero (the least accurate forecaster for the firm in that year) to one (the most accurate forecaster for the firm in that year). Each year analysts whose accuracy scores averaged across all stocks they cover fall in the top decile are selected in panel C. Statistics are calculated for each group in the selection year, the previous year and the following year, and the results averaged over all years in the sample period are reported. Corresponding statistics are calculated for all other analysts covering the same stocks. Results are given in each category for: the number of eligible analysts; the average number of years these analysts have outstanding forecasts recorded on the I/B/E/S file; the average number of firms covered; the average accuracy score (scaled between zero and one); the median absolute percentage forecast error (the absolute value of the difference between forecast and actual earnings per share, divided by the absolute value of actual earnings per share); the median percentage forecast error (the difference between forecast and actual earnings per share, divided by the absolute value of actual earnings per share); the median absolute value of the forecast error (in dollars per share); and the median forecast error (in dollars per share).

Classification	Year relative to selection	Number of analysts	Experience (years)	Number of firms	Accuracy Score	Absolute percent error	Percent error	Absolute error ($)	Error ($)
Panel A: Institutional Investor All-Stars, 1993–2001									
All-Stars	One year before	64	8.7	12	0.5448	9.43	1.01	0.1702	0.0210
	Selection year	64	9.6	12	0.5330	9.88	1.78	0.1686	0.0259
	One year after	63	10.6	12	0.5307	10.12	1.33	0.1677	0.0194
Others	One year before	1466	6.4	9	0.5075	10.16	1.46	0.1705	0.0234
	Selection year	1767	6.5	8	0.5005	10.69	2.12	0.1718	0.0288
	One year after	1486	7.6	8	0.5031	10.88	2.09	0.1655	0.0256
Panel B: Wall Street Journal All-Stars, 1994–2001									
All-Stars	One year before	38	7.4	9	0.5380	9.62	1.14	0.1710	0.0267
	Selection year	42	7.7	9	0.5766	10.02	0.69	0.1694	0.0164
	One year after	42	8.6	9	0.5188	11.18	2.46	0.1808	0.0371
Others	One year before	1096	6.6	9	0.5066	10.37	1.74	0.1769	0.0297
	Selection year	1294	6.8	9	0.4975	10.17	1.24	0.1732	0.0191
	One year after	1124	7.9	9	0.5004	10.91	2.40	0.1767	0.0299
Panel C: Top decile analysts based on past 1-year score, 1985–2001									
All-Stars	One year before	153	5.3	5	0.5411	13.51	5.59	0.2349	0.0898
	Selection year	267	4.5	3	0.9503	9.51	3.25	0.1423	0.0467
	One year after	172	5.5	5	0.5188	14.17	4.84	0.2086	0.0677
Others	One year before	1480	6.4	9	0.5097	12.82	4.36	0.2391	0.0835
	Selection year	1797	6.4	8	0.4591	14.14	5.44	0.2478	0.0968
	One year after	1487	7.6	8	0.4989	13.37	4.50	0.2231	0.0744