Analysts' Earnings Forecast Accuracy And Activity: A Time-Series Analysis

Mark Myring, Ball State University, USA
William Wrege, Ball State University, USA

ABSTRACT

We examine time-series variations in the accuracy of analysts' earnings forecasts and analyst-specific factors that may explain these variations. Our analysis shows that the accuracy of analysts' annual earnings forecast accuracy has increased over our sample period (1984-2006). In addition, forecasts have become more timely and frequent and analysts tend to issue forecasts for more consecutive years before being replaced. We also find evidence that analysts issue forecasts for fewer companies per year and have a greater degree of industry-specific specialization. Results of our analysis suggest that changes in analyst-specific characteristics have enhanced analysts' ability to make accurate forecasts.

Keywords: Analysts' earnings forecasts, accuracy, time-series changes.

INTRODUCTION

In this paper, we examine time-series variations in the accuracy of analysts' annual earning forecasts and causes for these variations. Analysts are information intermediaries in the capital markets who aggregate both financial and non-financial information to derive estimates of earnings (Schipper 1991). As such, analysts play an important role in financial markets by producing data that help investors make sound financial decisions. Since analysts serve such a critical function, research aimed at better understanding their activities is important to investors and other market participants.

Prior research suggests that forecast accuracy has improved over time (Ramnath, Rock and Shane 2008). In addition, research documents a relationship between the accuracy of analysts' forecasts and characteristics of the analysts and the broker firm for which they work. Jacobs, Lys and Neale (1999) and Clement (1999) demonstrate that the accuracy of analysts' forecasts is affected by factors such as frequency and timeliness of forecasts, experience, industry specialization, number of companies an analyst follows and brokerage house characteristics. While this line of research demonstrates a relation between forecast accuracy and analyst characteristics, it fails to examine whether time-series changes in analyst-specific characteristics explain the observed improvements in forecast accuracy.

We study the time-series changes in forecast accuracy and the characteristics of analysts using I/B/E/S data from 1984-2006. Results of our analysis suggest that the accuracy of analyst's forecasts has improved over time. In addition, we find that analysts provide more timely forecasts and revise forecasts more often than they did in the past. We also find that analysts follow fewer companies and focus their efforts on fewer industries. Finally, analysts tend to issue forecasts for companies for longer periods of time and thus obtain a great deal of firm specific knowledge. Additional analysis suggests that such changes in analyst activity explain improvements in the accuracy of analysts' forecasts.

PREVIOUS RESEARCH

Many studies have examined factors that explain variations in forecast accuracy. Jacob et al. (1999) attempt to explain the relative forecast accuracy using characteristics of analysts. Specifically, forecast accuracy is regressed on the forecast horizon (the number of calendar days between the forecast issue date and the earnings

announcement date), change in analyst (occurs when an analyst leaves a brokerage house), experience (the number of years an analyst has issued forecasts for a company), companies followed (the number of companies followed by an analyst), specialization (the percentage of companies followed by an analyst in the same industry), frequency (the number of forecasts issued by an analyst for a company in the year), broker house size (ranking of the total number of analysts employed by the brokerage house to which an analyst belongs), industry specialization of broker house (percentage of an analyst brokerage house analysts that follow companies in a given industry) and turnover in brokerage house (portion of new analysts that come from outside the brokerage house and the portion of analysts who left the brokerage house). Jacob et al. (1999) find a significant relationship between many of the analyst-specific characteristics and forecast accuracy.

Clement (1999) also examines the impact of analyst specific characteristics on forecast accuracy. In addition analysts' forecasting experience with a specific firm, Clement (1999) incorporates a measure of general experience into the model. The general experience variable represents the number of years in which at least one forecast has been supplied by the analysts. Results of the analysis are fairly consistent with Jacob et al. (1999).

In recent years, the model developed by Jacob et al. (1999) and Clement (1999) has been incorporated in many studies. For example, Baea, Stulzb and Tanc (2008) examine the foreign versus domestic analyst's ability to make accurate earning forecasts after controlling for analyst-specific characteristics. Janakiraman, Radhakrishnon and Szwejkowski (2007) incorporate the Jacob and Clement models in their examination of the impact of Regulation Fair Disclosure (Reg. FD) on analyst forecasting ability. Finally, Jacob, Rock and Weber (2008) use components of the Jacob and Clement models to investigate whether analysts affiliated with investment banks make more accurate forecasts.

RESEARCH QUESTIONS AND MODELS

It is commonly suggested that analysts' earnings forecasts have become more accurate in recent years (Ramnathet et al. 2008). However, few studies have formally attempted to document this change or explain why this change has occurred. We hypothesize that the improvement in forecast accuracy is due, in part, to changes in analyst-specific characteristics. Analyst-specific characteristics, such as experience and specialization, have been shown to have a significant influence on the accuracy of forecasts (Jacob et al. 1999, Clement 1999). However, no research investigates how these factors change over time. We fill this void by examining the time series relation between analyst-specific characteristics and forecast accuracy.

First we examine the changes in forecast accuracy over time. We then examine the time-series characteristics of analysts' forecasts. Specifically, we examine five attributes of analysts' forecasts: forecast age, forecast frequency, analyst experience, number of companies followed and industry specialization. Forecast age represents the average number of days between the issue of the earnings forecast and the actual earnings announcement by the firm. Forecast frequency is the number of forecasts issued by an analyst for a specific company in a year. The experience variables measure analysts' expertise with a particular firm and is calculated as the number of years experience forecasting earnings for a particular company. The final two variable measure portfolio complexity. The number of companies followed is measured by the number of forecast an analyst issues for unique companies during the year. The specialization variables represent the percentage of companies followed by the analyst in the same industry.

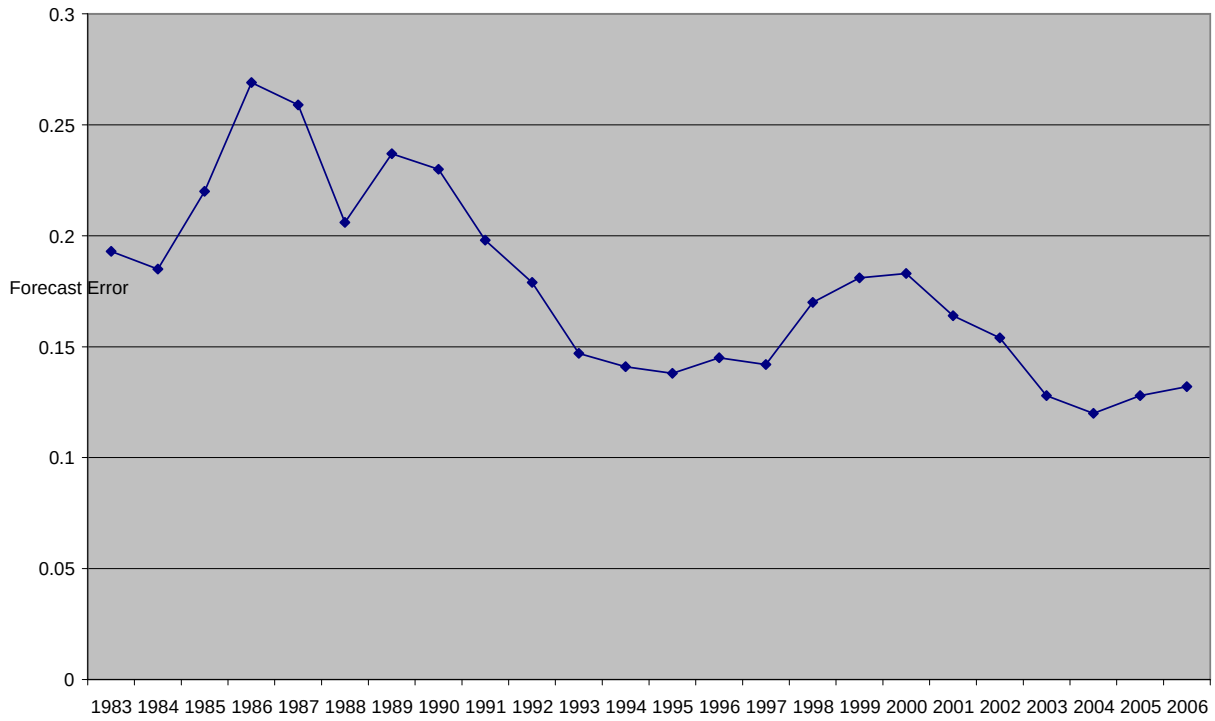
Trends in forecast accuracy and characteristics are first identified using graphical analysis. The association between forecast accuracy and analyst characteristics is first examined using correlation analysis. Finally, univariate and bivariate regressions are used to further examine the relation between forecast accuracy and analyst characteristics.

DATA AND RESULTS

Data for this study is collected from the I/B/E/S detail files. Forecast errors are defined as the absolute value of analysts' annual EPS forecast less actual annual EPS deflated price. Multiple measures are used to represent analyst specific characteristics. Analyst-specific attributes include analyst activity (age of forecast and

frequency of forecast), experience, portfolio complexity (number of companies followed), and specialization in an industry. Time-series charts of analyst forecast accuracy is Figure 1.

Figure 1:
Average Forecast Errors



Based on the chart, it appears that forecast errors have decreased over the years. In 1983, the mean forecast error was 0.20. This figure dropped to less then 0.15 of earning post 2002. Note also that average forecast errors increase in the late 1990s and early 2000s. There are two likely causes for the pattern. First, this time period represented the burst of the technology 'bubble' and the beginning of a recessionary period. In addition, it was in this time period that Reg. FD was implemented. Reg. FD limited the amount of non-public information company management could provide to analysts and thus likely reduced the accuracy of earnings forecasts.

The following figures represent the time-series representation of the five analyst characteristic variables.

Figure 2:
Forecast Age in Days

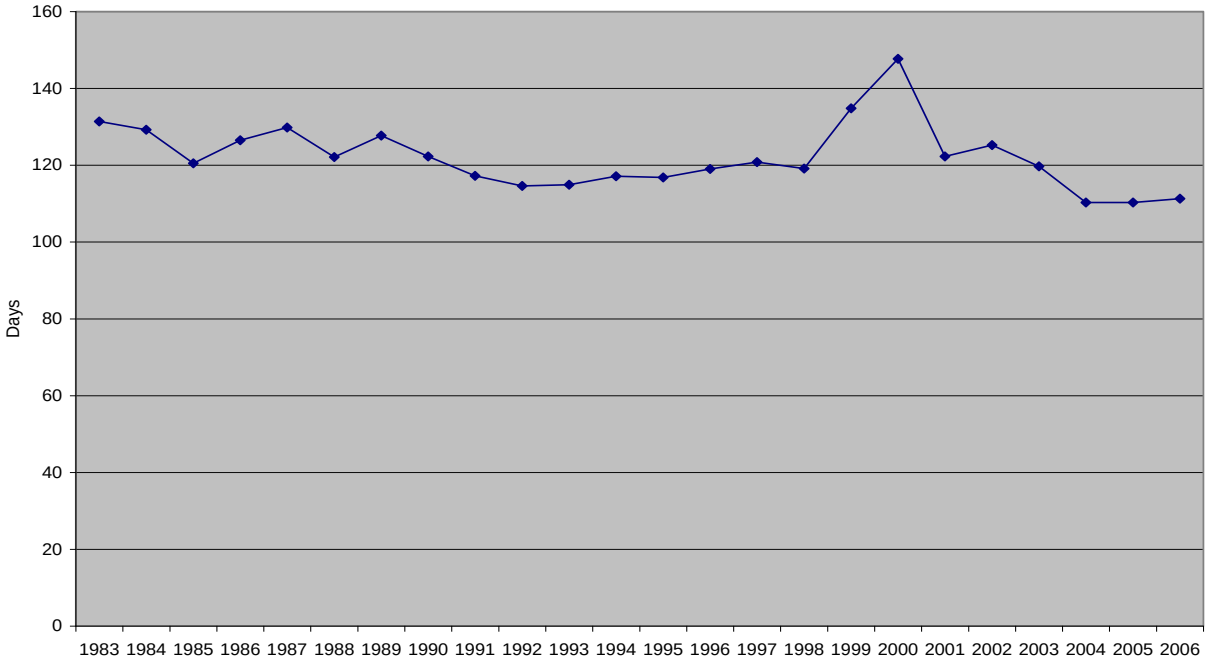


Figure 3:
Forecast Frequency

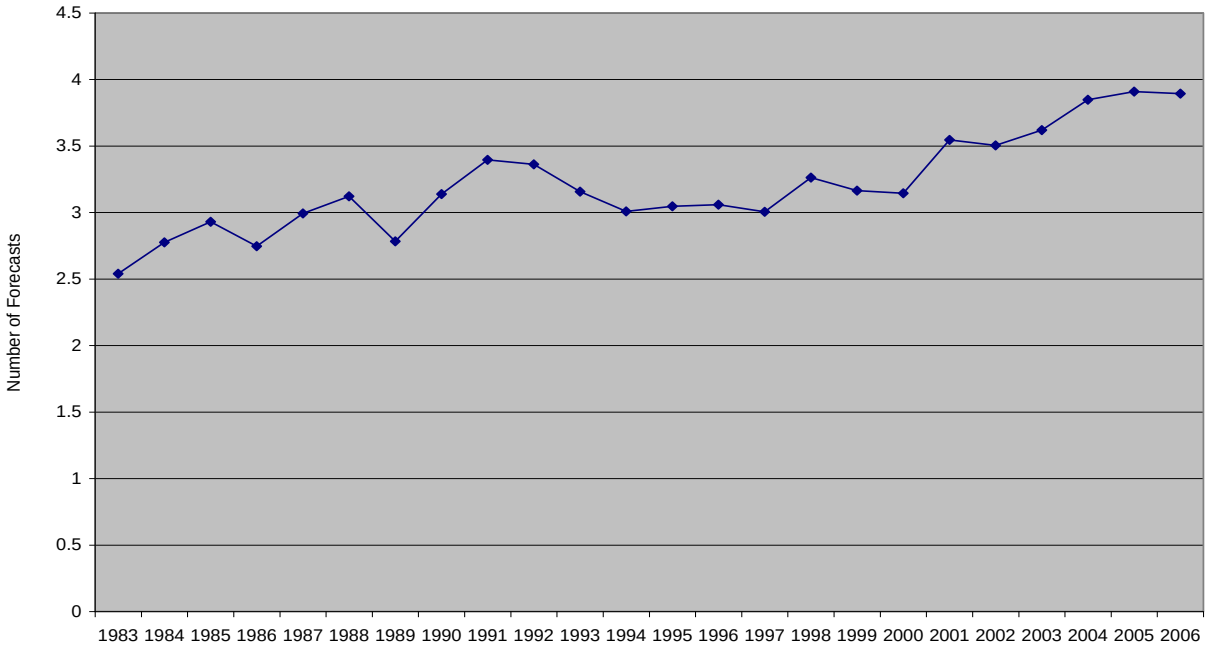


Figure 4:
Experience in Years

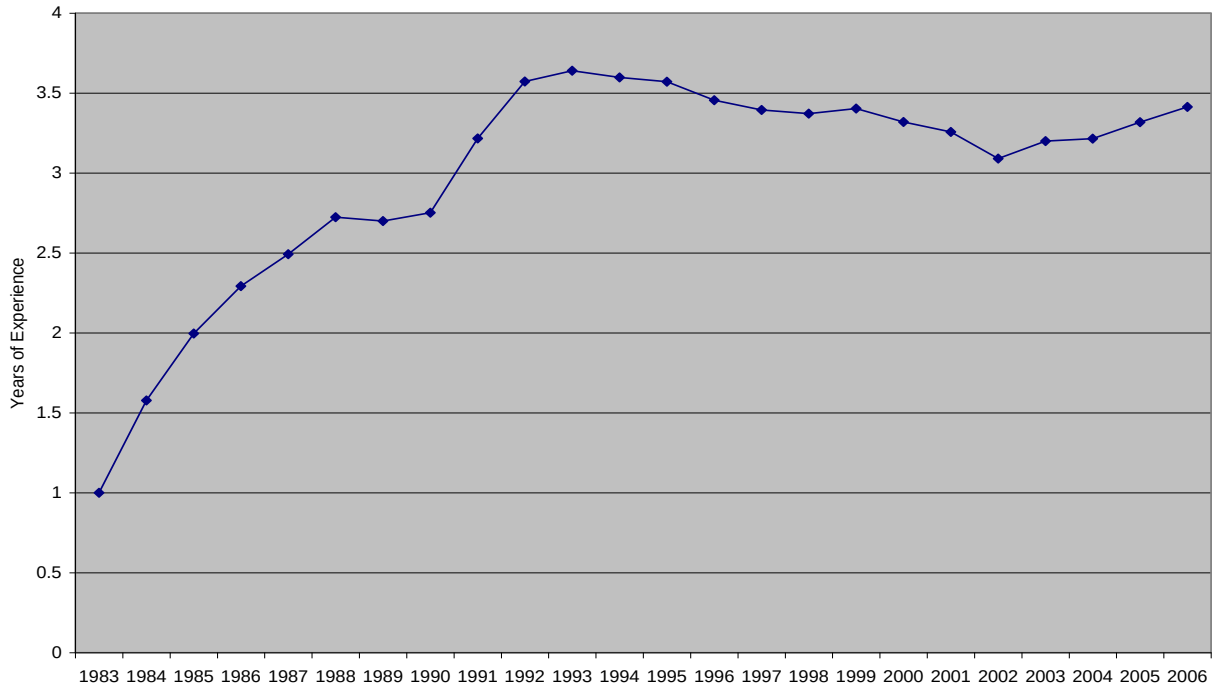


Figure 5:
Number of Companies Followed

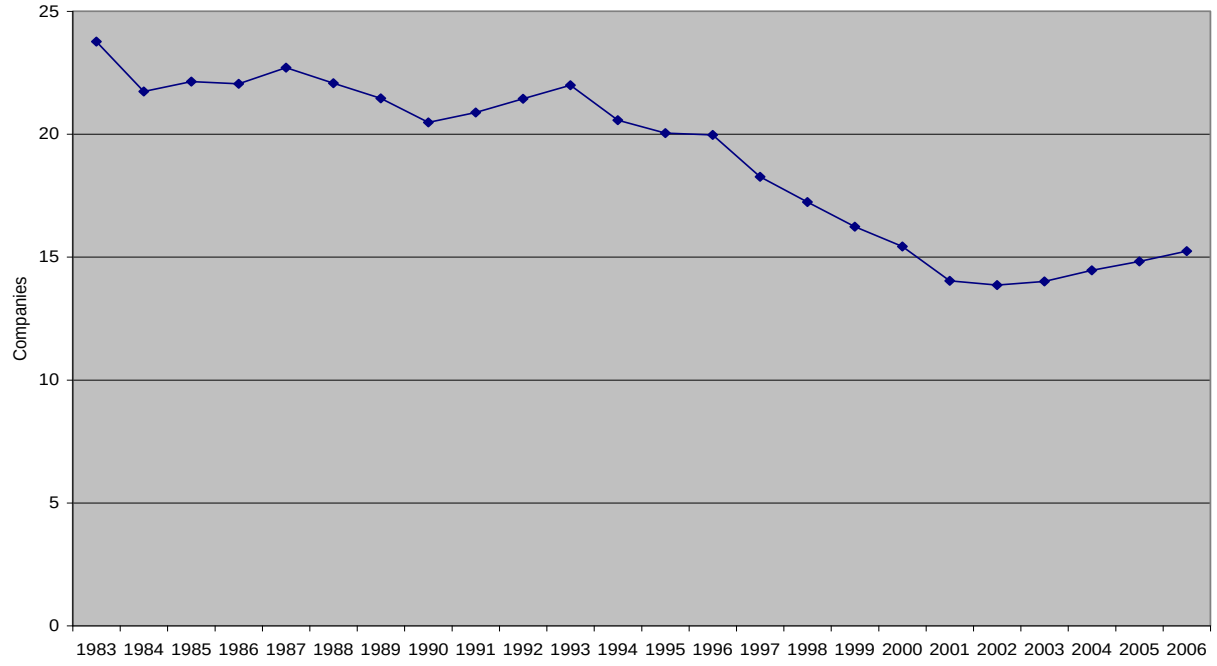
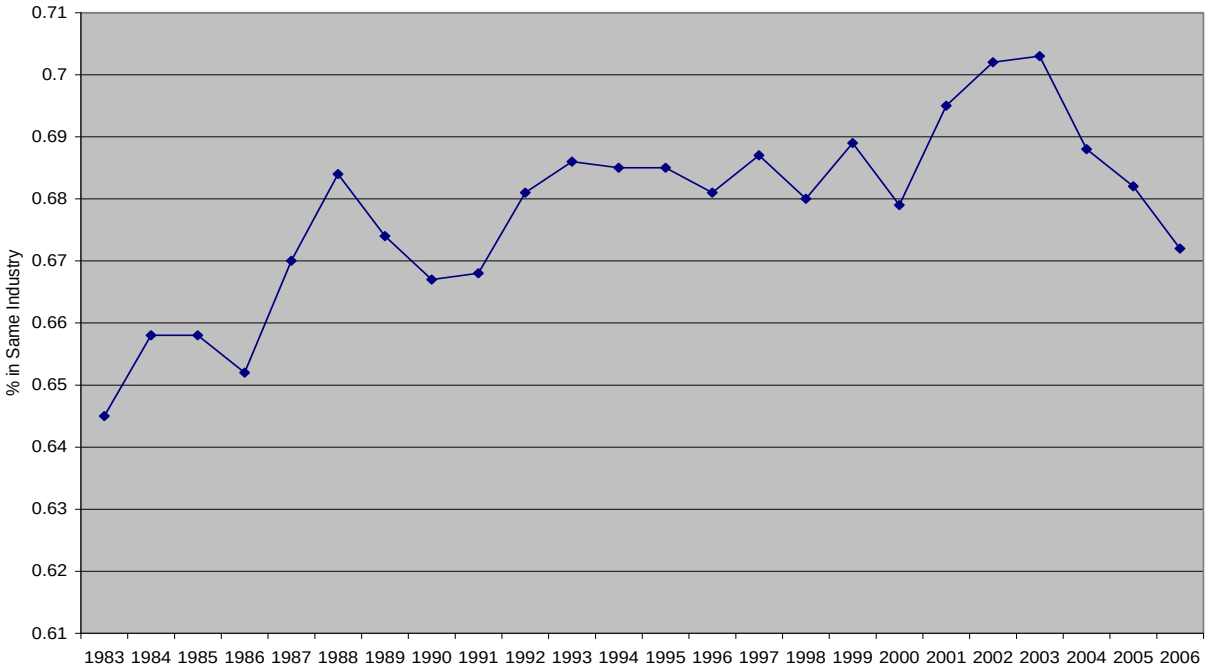


Figure 6:
Specialization



The figures demonstrate that the characteristics of analysts' forecasts have changed over time. Figure 2 shows that the age of analysts' forecasts has trended down slightly across the years. Specifically, in the early to mid 1980s, the average age of analysts' earnings forecast was approximately 130 days. This number fell to approximately 110 day in recent years. Also note that there is again an increase in the age of the forecasts in the late 1990s and early 2000s. This increase may be a result of the recession or Reg. FD. More timely forecasts have been shown to be more accurate.

Figures 3 and 4 demonstrate an increase both in the frequency of analysts' forecasts and the experience of analysts. Specifically, near the beginning of the research period, the average number of forecasts an analyst issued for a company in a year was 2.5. This number increased to nearly four forecasts per year by the end of the sample period. Increases in the frequency of forecasts are typically associated with increases in forecast accuracy. Figure 4 demonstrates that the number of years experience issuing forecasts for a firm has also increased across the sample period. Increases in the experience have typically been associated with increases in forecast accuracy.

The final two figures examine the time-series trend in number of companies followed and industry specialization. Figure 5 demonstrates that the number of companies followed has decreased substantially during the sample period. In the early 1980s, the average analyst issued forecasts for more than 20 companies. Today, analysts follow approximately 15 companies. Analysts who followed a greater number of companies tend to produce less accurate earnings forecasts. Figure 6 shows that industry specialization has also increased. In the early 1980s, approximately 60% of analysts' forecasts were made for firms in the same industry. This number increased to over 70% in the early 2000s. Interestingly industry specialization has decreased in recent years. Prior research shows that greater industry specialization is associated with greater forecast accuracy.

Next, we examine the association between the patterns in the analyst-specific characteristics and forecast accuracy. We first use correlation analysis to examine the relationship between forecast accuracy and characteristics of analysts. Yearly averages of each analyst's characteristics variable as well as the yearly averages for forecast

accuracy are used in this analysis. This results in a total of 24 yearly observations. In addition, a variable called 'year' is included to demonstrate the trend in the variable over time. Results of this analysis are provided in Table 1.

Table 1:
Correlation among Yearly Averages of Variables

	Error	Age	Frequency	Experience	Companies	Specialization	Year
Error	•	0.494 (0.001)	-0.610 (0.001)	-0.567 (0.001)	0.616 (0.001)	-0.626 (0.001)	**-0.751** **(0.001)**
Age		•	0.548 (0.001)	-0.391 (0.059)	0.102 (0.632)	-0.227 (0.285)	**-0.304** **(0.15)**
Frequency			•	0.589 (0.002)	-0.787 (0.001)	0.590 (0.002)	**0.851** **(0.001)**
Experience				•	0.589 (0.002)	0.768 (0.001)	**0.716** **(0.001)**
Companies					•	-0.688 (0.001)	**-0.934** **(0.001)**
Specialization						•	**0.741** **(0.001)**
Year							•

p-values in parenthesis.

The above analysis shows that there is significant correlation between forecast error and all five analyst characteristics. Specifically, the correlation coefficient on forecast age is 0.494 (significant at 0.01), indicating reductions in the age of forecasts over time have been associated with increases in forecast accuracy. The correlations between error and frequency and experience are negative and significant. This suggests that the increase in both the frequency in forecasts and the experience of analysts over time are associated with more accurate earnings forecasts. The positive and significant correlation between the yearly average of the number of companies followed and error indicates that analysts now focus on limited number of companies and make more accurate forecasts. Finally, analyst-specialization increases have resulted in smaller forecast errors, as demonstrated by the negative correlation between specialization and accuracy.

The correlation analysis also provides an examination statistical significance of the observed trends in the figures. Specifically, the 'year' variable is significantly correlated with error and all analyst characteristics other than forecast age. This indicates that forecast error and the number of companies have decreased over time while the frequency of forecasts, experience of analysts, and specialization have increased over time. Finally, note that significant correlation exists among many analyst-specific characteristics, making multiple regressions difficult due the potential for multicolinearity problems.

Next, we performed univariate regressions of yearly average forecast errors on yearly averages of each of the five analyst-specific variables. Because these regressions only contain one independent variable, the correlation analysis from Table 1 is exactly the same as the regression coefficients. Thus, the only incremental information obtained from this analysis is the relative strength of the relationship between forecast accuracy and analyst characteristics represented by adjusted R^2. A chart of the adjusted R^2 from the univariate regressions is provided in Figure 7.

Figure 7:
Adjusted R^2 From Univariate Regressions

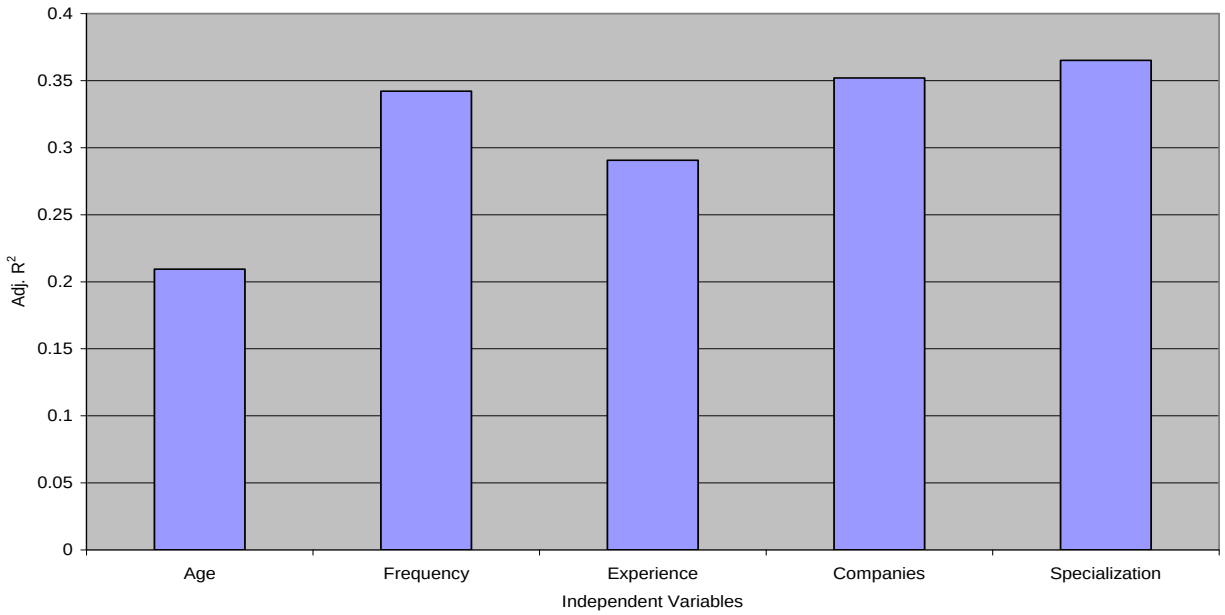


Figure 7 shows that the univariate regressions possess relatively high explanatory power, ranging from 0.21 for the forecast age regression to 0.365 for the industry specialization regression. This analysis shows that changes frequency of forecasts, the number of companies followed and the industry specialization provide the strongest association with the trend to more accurate earnings forecasts. Increases in experience play a less important role in the improvements of forecast accuracy. Finally, decreases in forecast horizon provide the smallest ability to explain reductions in forecast errors.

We also conducted bivariate regressions as part of our analysis. Recall that a strong correlation exists among analyst characteristics (which serve as our independent variables). Because of the potential for multicolinearity, along with the small sample size in our analysis, a regression including all five analyst-specific characteristics is not possible. Thus, we regress average forecast error on horizon and each of the other four variables. This combination is used because the correlation between age and the other analyst characteristics is lowest and thus the probability of multicolinearity is reduced. The results are shown in the Table 2.

Table 2:
Bivariate Regression of Forecast Error on Analyst Characteristics

	Int.	Age	Frequency	Experience	Companies	Spec.	**Adj. R^2**
Model 1	0.218 (1.25)	0.001 (1.14)	-0.056 (-2.41)**				**0.408**
Model 2	0.064 (0.50)	0.002 (1.76)*		-0.027 (2.42)**			**0.352**
Model 3	-0.226 (2.47)**	0.002 (3.01)***			0.007 (3.96)***		**0.526**
Model 4	**1.02** **(3.01)*** **	**0.002** **(2.39)** **				**-1.575** **(2.39)** **	**0.477**

Results of the bivariate regression analysis in Table 2 are consistent with prior findings. All models have a relatively high adjusted R^2, ranging from 0.352 to 0.526. In all models, the coefficient on age is positive and the variable is significant in three of four cases. The frequency variable remains negative and is significant, indicating that frequency increases are associated with smaller forecast errors. The experience variable is also negative and significant, suggesting that the increase in experience increases the accuracy of analysts' forecasts. The coefficient on the companies followed variable is negative, demonstrating the decrease in the number of companies followed over the years has enhanced analysts' ability to make accurate forecasts. Finally, the specialization variable is positive and significant, indicating that the increase in analysts' ability to specialize over the years has resulted in greater forecast accuracy.

CONCLUSION

In this paper, we examined changes in analysts' forecast accuracy and factors that may help explain these changes. Using data between 1984-2006, we found a substantial increase in the accuracy of analysts' annual earning forecasts. In addition, we find that analysts provide more timely forecasts and revise forecasts more often than they did in the past. We also found that analysts follow fewer companies and specialize more in certain industries. Finally, analysts tend to issue forecasts for companies for longer periods of time (i.e., are more experienced in the companies for which they issue forecasts).

Next, we attempted to determine if changes in analysts' forecasts explain the improvement in forecast accuracy observed over time. This was accomplished using correlation analysis, univariate and bivariate regressions. Results of these analyses consistently show that the improvement in forecast accuracy is, in part, due to changes in analysts' forecast attributes (e.g., more timely forecasts, greater number of forecast revisions, etc.). Future research in this area should attempt to develop a comprehensive model which more completely explains the observed improvements in forecast accuracy. Such a model should include the analyst-specific characteristics examined here, as well as economic, regulatory and firm-specific factors.

REFERENCES

1. Baea, K., R. Stulzb and H. Tanc. 2008. Do local analysts know more? A cross-country study of the performance of local and foreign analysts. *Journal of Financial Economics* 88(3): 581-606.
2. Clement, M. 1999. Analyst forecast accuracy: Do ability, resources, and portfolio complexity matter? *Journal of Accounting and Economics* 27: 285-303.
3. Jacob, J., T. Lys and M. Neale. 1999. Expertise in forecasting performance of security analysts. *Journal of Accounting and Economics* 28: 51-82.
4. Jacob, J., S. Rock and D. Weber. 2008. Do non-investment bank analysts make better earnings forecasts? *Journal of Accounting, Auditing & Finance* 23(1): 23-61
5. Janakiraman, S., S. Radhakrishnon, R. Szwejkowski. 2007. Regulation Fair Disclosure and analysts' first-forecast horizon. *Journal of Accounting, Auditing and Finance* 22(2): 339-378.
6. Ramnath, S., S. Rock and P. Shane. The financial analyst forecasting literature: A taxonomy with suggestions for further research. *International Journal of Forecasting* 24(1):34-75.
7. Schipper, K. 1991. Analysts' forecasts. *Accounting Horizons* 5: 105-132.

NOTES