HOW DO ANALYSTS FORECAST EARNINGS?

ABSTRACT: This paper examines the question of how analysts forecast earnings. We examine the determinants of analysts' forecasts of both short and long run earnings. The paper is motivated by the importance of analyst forecasts as proxies for expected earnings, which is accompanied by a large literature on the properties of analysts' forecast *errors* but limited evidence on the first order effect—how analysts produce the earnings forecasts. There is an implicit assumption permeating the analyst forecast literature that analysts use the fundamental analysis based forecasting frameworks laid out in the leading business valuation texts. These forecasting frameworks evaluate a firm's future prospects in terms of sets of factors relating to the firm's industry, strategy, and financial information. Prior studies generally assume the analysts use this business analysis framework for forecasting. The contribution of this study is to explicitly test this proposition. For 28,261, 21,051 and 25,053 US firm-year observations for analysts' 1 and 2 year ahead forecasts and long run EPS forecasts, our key findings suggest that analysts anchor on historical EPS to forecast short and long run EPS consistent with the recommendations in the business analysis frameworks. However, inconsistent with the recommended fundamental analysis frameworks, our results suggest that analysts use the forecasting framework only in the long run, to obtain a long-run growth rate to apply to the historical EPS reported by management. Overall, the results suggest that analysts believe their best EPS forecast is the current historical EPS reported by management.

Key Words: Analysts' forecasts; analysts' forecasts accuracy; industry and strategy variables.

Data availability: Data used in this paper are available from commercial data providers.

1. Introduction

This paper examines the question of how analysts forecast short run and long run earnings. Specifically, the objectives of this paper are twofold. The first objective is to provide evidence on whether analysts use the "forecasting framework" laid out in leading business analysis textbooks to forecast earnings (e.g., Lundholm and Sloan 2004; Koller et. al. 2006; Penman 2007; Palepu and Healy 2004). The forecasting frameworks evaluate a firm's future prospects in terms of sets of factors relating to the firm's industry, strategy, and financial information. The second objective is to provide evidence on whether analysts' forecast errors are associated with departures from the forecasting framework.

The paper is motivated by the importance of analyst forecasts as proxies for expected earnings, which is accompanied by a large literature on the properties of analysts' forecast *errors* but limited evidence on the first order effect—how analysts produce their earnings forecasts.[1] The analyst forecast literature focuses on the sets of financial information and types of valuation models employed by analysts, and on the determinants of the analysts forecast errors.[2] There is an implicit assumption permeating the analyst forecast literature that analysts use the fundamental analysis based forecasting frameworks laid out in leading business valuation texts. These forecasting frameworks evaluate a firm's future prospects in terms of sets of factors relating to the firm's industry, strategy, and financial information. Prior studies

[1] See Schipper (1991), Brown (1993) and Ramnath et. al. (2008) for reviews of the forecast literature.

[2] Prior studies examine the association between analyst forecast errors and past stock returns (Lys and Sohn 1990; Abarbanell 1991); past earnings performance (DeBondt and Thaler 1990; Mendenhall 1991; Abarbanell and Bernard 1992); analyst forecast revisions (Elliot et. al. 1995); past sales growth and book to price ratio (Frankel and Lee 1998); past analyst forecast errors (Easterwood and Nutt 1999); total accruals (Bradshaw et al. 2001); corporate governance (Bhat et. al. 2006); audit quality (Behn et. al. 2008); corporate financing (Bradshaw et. al. 2006) and corporate disclosures (Lys and Sohn 1990). Surveys suggests analysts use less sophisticated valuation models than would be expected given the valuation technologies now available (e.g., Bradshaw 2002; Demirakos et. al. 2004; Asquith et. al. 2005; Imam et. al. 2008). The evidence suggests commonly used models include earnings multiples and dividend yield (e.g., Arnold and Moizer 1984; Pike et. al. 1993; Barker 1999a, 1999b; Block 1999; Liu et. al. 2002; Imam et. al. 2008).

generally assume the analysts use these business analysis frameworks for forecasting. The contribution of this study is to explicitly test this proposition.

To address this issue, we first identify the forecasting framework from the major business analysis text books used in business schools, and second, relate this information to the IBES 1 and 2 year ahead EPS forecasts, long run (3-5 year ahead) forecasts, and EPS growth measures. The forecasting framework includes four sets of information: (1) current historical EPS; (2) industry; (3) firm-specific strategy; and (4) financial information. The results are based on samples of 28,261, 21,051 and 25,053 US firm-year observations for 1 year ahead, 2 years ahead and long run analysts' EPS forecasts and EPS growth rates, respectively. The sample covers the period 1985 to 2001 and analyst EPS forecasts up to and including 2006.

We find for all the EPS forecasts, 1 and 2 year ahead and long run EPS, that the primary forecasting information impounded in analysts' EPS forecasts is the current historical EPS reported in the income statement by the firms' managers. Historical EPS explains 39 percent of the 1 year ahead EPS forecast, 51 percent of the 2 year ahead EPS forecast, and 85 percent of the long run forecast (an implied EPS backed out of the long run EPS growth rates provided by IBES). However, the results suggest that the forecasting framework, comprising the industry, strategy, and financial information, has limited explanatory power for the 1 year ahead forecasted EPS (1 percent), 2 year ahead forecasted EPS (11 percent), and long run implied EPS forecast (3 percent). Additional tests are conducted for a range of factors that might be omitted forecasting framework variables but we find that the latter, limited explanatory power result for the forecasting framework is robust.

We next focus our tests on the EPS growth rate forecasts. These tests provide additional insights on the determinants of the analysts' EPS forecasts. The results

suggest that the analysts anchor on historic EPS reported in the income statement and only use the forecasting framework for the purpose of estimating a growth rate to apply to the historical EPS number provided by management. The explanatory power of the forecasting framework, for the analysts' forecasted EPS *growth* rate, increases as the forecast horizon increases. Finally, tests relating to the analysts' forecast *errors* suggest that these EPS forecast errors are significantly associated with the forecasting framework: 9.4 percent explanatory power for 1 year ahead EPS forecast errors, 11 percent explanatory power for 2 year ahead EPS forecast errors, and 28 percent explanatory power for the long run (implied) EPS forecast errors. Hence, this evidence confirms the relevance of the forecasting framework and suggests that departures from this forecasting framework are significantly associated with the absolute size of the analyst EPS forecast errors.

This paper makes a significant contribution to the analyst forecast literature by providing evidence on the determinants of the analyst short and long run EPS forecasts. Specifically, the paper tests the maintained hypothesis that the forecasting framework, provided by the major business analysis textbooks, and used in business schools, is used by analysts to obtain their EPS forecasts. The results are consistent with analysts following the recommendation in these textbooks to anchor on historical earnings. However, the results suggest that the forecasting framework advocated in the textbooks plays a much smaller role in the analysts' forecasts than the maintained hypothesis would suggest; and that departures from the framework are significantly associated with the size of the analysts' EPS forecast errors. Hence, the results from this paper suggest that analysts could potentially improve their accuracy, particularly, the long run EPS forecast accuracy by refinements of their forecasting framework.

Our evidence is consistent with the findings of Graham, Harvey and Rajgopal (2005) who report that management guidance of analyst EPS forecasts is an important US phenomenon. They find that US corporate managers report historical EPS numbers that are "engineered" to facilitate the analysts' ability to forecast accurate EPS forecasts for 1 and 2 year ahead forecast horizons. Guiding analysts is so important that the managers indicate they are willing to take economic actions to achieve this goal even though these actions may not maximize the long term value of their firm. Our results are consistent with management providing strong EPS guidance to analysts. This latter practice explains why analysts can obtain their 1 and 2 year ahead EPS forecasts primarily by anchoring on the current historical EPS reported by managers. In the short run, analysts do not need to use the forecasting framework because they cannot do better than the actual EPS numbers provided by management. Management guidance also suggests why the forecasting framework explains more of the long run EPS forecast errors compared to the analysts short run EPS forecast *errors*: i.e., a failure to apply the forecasting framework only affects the long run EPS forecasts because it is only in the long run that the current actual EPS provided by managers is unable to impound longer run changes in the firm's production function. Our evidence is consistent with analysts forecasting EPS as if EPS follows a random walk, a distributional property which has been documented by several prior studies (e.g., Ball and Watts 1972; Albrecht et. al., 1977; Watts and Leftwich 1977; Brown 1993).

The remainder of this paper is organised as follows. Section 2 develops the theory and hypotheses. Sample and research design are set out in Section 3. Section 4 provides the results and additional tests, and concluding comments are provided in Section 5.

2. Theory and Hypothesis Development

Business analysis and valuation textbooks used in business schools provide the building blocks for forecasting the financial statements and future earnings and cash flows (e.g. Lundholm and Sloan 2004; Penman 2007; Koller et. al., 2006; Palepu and Healy 2007). These authors all take an approach that employs information relating to the firm's economic fundamentals along with an analysis of the firm's financial information. The resulting forecasting frameworks include four sets of information relating to current historical earnings, industry, strategy, and financial information.

The maintained hypothesis is that analysts employ these forecasting frameworks to obtain their earnings forecasts and the other financial statement numbers. Ultimately, the forecasted income statement, cash flows and balance sheet data are inputs to the analysts' valuation models. However, the analysts' earnings forecasts are widely used for other purposes such as a proxy for expected earnings. A large literature examines the accuracy of the analyst forecasts focusing on the difference between the actual reported earnings and the average, consensus number forecasted by the analysts. However, very little research examines the determinants of the forecasted earnings numbers and the nature and effects of these determinants on the forecast accuracy.

This paper addresses this gap in the literature. We begin by developing the forecasting framework by reference to the relevant literature and business analysis and valuation textbooks.

2.1 The Forecasting Framework

Business analysis frameworks adopt a "top-down" approach to analyzing the firm starting with the wider economy (Narayanan and Fahey 2001). Most domestic firms

have direct exposure to the wider economy through their capital markets, product markets, input markets, and foreign operations. Even firms without direct exposure to global markets are sensitive to changes in the global economy due to wider conditions affecting their domestic economy. Analysts are advised to study the current state of the wider economy and the consensus among experts about where the economy is headed. In particular, analysts are aware of expected economic growth rates, political risks and currency risks, within each of the countries the firm operates in. These factors can vary widely across countries (Narayanan and Fahey 2001).

After analysts have studied the wider economy, and the firm's exposure to the particular countries, the analysts move on to consider the implications of the domestic economy for the firm and industry under evaluation (Narayanan and Fahey 2001). In particular, analysts are advised to assess the current state and future prospects of a few key macroeconomic indicators including gross domestic product (GDP), interest rates, inflation, foreign exchange rates, oil prices, and other key commodity prices, hedging and trends within the economy's business cycle. The wider economic environment is systematic to all firms at a given point in time (Carpenter and Fredrickson 2001; Narayanan and Fahey 2001).

2.1.1 Current Historical EPS

Forecasting of financial statement information and future expected earnings and cash flows is anchored on current historical earnings. Earnings have been shown to follow a random walk with drift which suggests that current historical earnings are the best estimate of next year's earnings (e.g., Ball and Watts 1972; Albrecht et. al., 1977; Watts and Leftwich 1977; Brown 1993). This time series behaviour of earnings is reflected in the fact that the components of earnings—sales and the cost of sales and the sales, general and administration expenses—are an endogenous function of the

firm's production function. That is, these items are all jointly determined and related in a predictable way. Hence, the current historical earnings usually serve as a useful starting point for evaluating the firm's future earnings potential (e.g., Palepu and Healy 2008, 6-5).

2.2.2 Industry Information

Before considering the details of a particular firm, it is important for analysts to understand the firm's industry (Grant 2005). First, analysts need to understand the firm's industry sensitivity to key economic factors including the GDP growth rate, interest rates, inflation rates, labour costs and other factors. The GDP growth rate is a key driver of profitability across all industries. However, some industries are more sensitive than others as a result of different levels of operating leverage or sensitivity to consumer spending (Hawawini et al. 2003).

Second, analysts need to understand how the industry operates and what the key industry metrics are (Hofer and Schendel 1977). Key industries metrics help diagnose the health of the industry and firms within it. These metrics vary widely between industries based on the nature of the industry. For example, the price of oil is a key metric for the oil and gas industry but not for the semi-conductor industry.

Last, analysts need to understand the level of industry competition. An industry's average profit potential is influenced by the degree of rivalry among existing competitors, the threat of new entrants, the availability of substitute products and the bargaining power of both suppliers and customers (Porter 2004). Less competitive forces mean abnormal levels of industry profitability are easier to sustain. Further, analysts need to consider the impact of regulatory bodies charged with promoting competition within industries (Klapper et al. 2006).

This paper examines analysts' use of industry information using industry dummy variables based on primary GICS codes. Each industry varies in terms of how it affects a firm's future performance (Hawawini et al. 2003).

2.1.3 Strategy Information

Firm profitability is not solely a function of industry profitability. Firms need to develop strategies to sustain competitive advantage (Bowman and Helfat 2001). Firm strategy varies widely across firms within the same industry including cost leadership, product differentiation and niche strategies (Porter 2004). Analysts need to identity a firm's intended strategy, assess whether the firm possesses the competencies required to execute the strategy and recognise the key risks the firm must guard against (Hitt et al. 2005). The sustainability of the firm strategy must also be considered (Rumelt 1984; Grant 2005).

This paper examines one aspect of firm strategy that relates specifically to firm investment choice. Consistent with Narin (1999) and Matolcsy and Wyatt (2008), this paper uses proxies for information about a firm's primary technology area of investment[3], which we call technology condition variables. These variables proxy for the type of investment firms are undertaking (science linkage); how successful these investments are (technology strength); and how long it takes for these investments to begin generating earnings (technology cycle time). These variables are described in the data and research design.

Matolcsy and Wyatt (2008) argue that greater science linkage will help protect future earnings from appropriation by rival firms, given the greater complexity

[3] Technology areas of investment are based on a simplified version of the Intellectual Property Classification (IPC) produced by the World Intellectual Property Organisation (WIPO). This system is adopted by CHI Research from whose databases who obtained our technology condition variables from. The IPC system is used by CHI because it has an industry orientation.

involved with these investments, compared to those less related to science. Hence, a positive association between science linkage and analysts' forecasts is expected. The paper also argues that greater technology strength increases the likelihood that these investments will generate future earnings, given the performance of similar investments in the past. Hence, a positive association between technology strength and analysts' forecasts is expected. Furthermore, Matolcsy and Wyatt (2008) argue that shorter technology cycle times reduce the uncertainty surrounding an investment's exposure to external shocks and appropriation by rival firms. Hence, a negative association between technology cycle time and analysts' forecasts is expected.

2.1.4 Historical Financial Information

Analysts are expected to apply financial analysis to assess a firm's past performance. Further, financial analysis will assist analysts in determining the plausibility of their future earnings forecasts. It is important to evaluate financial information in the context of changes in the underlying operations and strategies of the firm.

Financial analysis is based on ratio analysis. This involves assessing how various line items in a firm's financial statements relate to one another. Hence, this paper tests variables relating to past earnings performance (DeBondt and Thaler 1990; Mendenhall 1991; Abarbanell and Bernard 1992), book to price ratio (Frankel and Lee 1998) and net capital expenditures. Net capital expenditures are expected to provide analysts with useful information about future economic benefits.[4]

[4] We conduct additional tests on limited sub-samples using two additional financial variables: past 5 years sales growth (Frankel and Lee 1998) and return on net operating assets (being a key profitability ratio that we expect analysts to consider, consistent with Lundholm and Sloan (2004), Koller et al. (2006), Penman (2007) and Palepu et al. (2007)).

A number of studies report that earnings are mean reverting in the short run, with large increases followed by subsequent decreases and vice versa (e.g. Fama and French 2000). Hence, past earnings performance is expected to be negatively related to analysts' short run earnings forecasts. However, all other things being equal, analysts are expected to consider trends in past earnings performance as indications of a firm's long run earnings potential. Hence, past earnings performance is expected to be positively related to analysts' long run earnings forecasts. Book to price ratio is expected to be negatively associated with analysts' forecasts, as a lower book to price ratio represents positive market perceptions of firm value. On the other hand, whilst net capital expenditures represent future economic benefits, it may lead to higher depreciation expenses in the short run, all other things being equal. Therefore, this paper predicts a negative association between net capital expenditures and analysts' forecasts in the short run, but a positive relation in the long run.

2.2 Drivers of Analysts' Forecast Errors

The literature extensively documents the existence of forecast errors and generally examines properties of these errors. However, these studies tend to focus on analysts' use of only part of the forecasting framework, typically specific financial information. For example, studies have examined associations between analysts' forecast errors and past stock returns (Lys and Sohn 1990; Abarbanell 1991); past earnings performance (DeBondt and Thaler 1990; Mendenhall 1991; Abarbanell and Bernard 1992); analyst forecast revisions (Elliot et al. 1995); past sales growth and book to price ratio (Frankel and Lee 1998); past analysts' forecast errors (Easterwood and Nutt 1999); total accruals (Bradshaw et al. 2001); corporate governance (Bhat et al. 2006); audit quality (Behn et al. 2008); corporate financing activities (Bradshaw et

al. 2006) and corporate disclosures (Lys and Sohn 1990)[5]. Whilst these studies often make the assumption that analysts use the full forecasting framework, none explicitly test this proposition. This paper aims to address this issue.

Hence, this paper predicts that the forecasting framework, and each of its specific analyses (e.g. industry, strategy and financial), provide incremental power in explaining analysts' forecast errors. In other words, this paper predicts that forecast errors can be explained by departures from the forecasting framework.

Consistent with our objectives, this paper investigates forecast errors in terms of forecast accuracy, not forecast bias[6]. First, for the tests of strategy information analysis, Easterwood and Nutt (1999) use analysts' reactions to past earnings performance to provide evidence that analysts overreact to positive information. Matolcsy and Wyatt (2008) argue that greater science linkage will help protect future earnings from appropriation by rival firms, given the greater complexity involved with these investments compared to those that are less related to science (representing positive information). Hence, a positive association between science linkage and analysts' forecast errors is expected. Matolcsy and Wyatt (2008) also argue that greater technology strength increases the likelihood that these investments will generate future earnings, given the ability of these investments to have done so in the past (representing positive information). Hence, a positive association between technology strength and analysts' forecast errors is expected. Furthermore, Matolcsy and Wyatt (2008) argue that shorter technology cycle times reduce the uncertainty

[5] We have not tested all financial variables from the prior literature in this paper. This is because some financial variables identified from the past literature were less relevant to the forecast framework, harder to obtain or are believed to proxy for other variables that we have included in our main or additional tests. Hence, not all financial variables are tested for in this paper. However, we acknowledge this as a potential limitation of our paper.

[6] Consistent with the prior literature, forecast accuracy is measured using the absolute value of analysts' forecast errors; whereas, forecast bias is measured using the signed value of analysts' forecast errors (eg. Frankel and Lee 1998; Easterwood and Nutt 1999).

surrounding an investment's exposure to external shocks and appropriation by rival firms. Zhang (2006) provides evidence that analysts become more accurate when information uncertainty is reduced (e.g. leading to smaller absolute forecast errors), using proxies relating to analysts' forecast dispersion. Hence, a positive association between technology cycle time and analysts' forecast errors is expected.

Second, for the tests of financial information, positive past earnings performance is expected to represent positive information, as firms demonstrating levels of past earnings growth, rather than decline. Furthermore, positive net capital expenditures are expected to represent positive information, with firms undertaking investments in future growth opportunities. Hence, this paper predicts positive associations between both of these variables and analysts' forecast errors, consistent with Easterwood and Nutt's (1999) conclusion. Frankel and Lee (1998) provide evidence that book to price ratio is negatively associated with analysts' signed forecast errors. But more pessimistic forecasts still increase the absolute value of forecast errors. Hence, this paper expects a positive relation between book to price ratio and analysts' absolute forecast errors.

3. **Empirical Analysis**

3.1 Sample and Data

This paper comprises US data for the period 1985 – 2001, with analysts forecasting up to 2006. The analyst forecast data is obtained from the I/B/E/S database. The technology conditions data is obtained from the CHI Research technology database[7]. The individual firm-level financial statement data is obtained from the CRSP/Compustat combined database. The financial statement data are fiscal year-end. The technology condition data are annual data[8]. Analysts' forecast data are reported monthly by I/B/E/S for the relevant forecast period (e.g. 1 year ahead, 2 years ahead or long run forecasts accordingly).

Table 1 documents the sample selection process.

[INSERT TABLE 1 AROUND HERE]

From the initial sample of 87,279 firm-year observations, all firms that could not be matched to CHI technology data by hand were removed[9]. This reduced the number of firm-years available to 86,238. The sample was then split according to forecast

[7] CHI Research is a commercial supplier of patent and scientific citation data. The CHI data is complied from patents granted by the United States Patent and Trademark Organisation (USPTO) to United States and non-United States applicants. CHI uses a simplified version of the International Patent Classification (IPC) system because it has an industry orientation.

[8] The technology condition data are not strictly synchronous with the accounting data. We do not believe that this is fatal to our purpose for the following reason. At the technology area level, the technology data is a measure of the accumulation of all prior economic activity in the area (up to the measurement period), which provides a snapshot of prevailing conditions. Given the length of the history that is embodied in the measures (i.e. the life of the technology to date); it is unlikely that the data is so precise that a lag of no more than six months would induce a "look ahead" bias. However, we acknowledge this is a potential limitation.

[9] A range of information items are required to determine the core industry and technology classifications for the CHI technology data, including segment data on sales and management discussion of businesses and products. The small number of firms that were unable to be matched to the I/B/E/S data were small firms or those that were only recently listed with limited public information.

period type: 1 year ahead, 2 years ahead and long run forecasts. This resulted in sub-samples of 56,808, 50,214 and 37,466 firm-year observations, respectively.

Any missing CRSP/Compustat data, and any outliers, were then removed to form the final sub-samples of analyst forecast EPS levels (28, 261, 21,051 and 25,053 firm-year observations, respectively), analyst forecast EPS growth rates (26,811, 21,051 and 12,878 firm-year observations, respectively) and analyst forecast errors (27,003, 19,425 and 19,794 firm-year observations, respectively).

The final samples include firm-years with positive current historical EPS only.

Table 2 summarises the sample composition by the primary GICS codes.

[INSERT TABLE 2 AROUND HERE]

The samples are dispersed across all industries. This diversity in our samples permits us to test the predications, and provides assurance that the results apply across a wide range of firms in the economy.

3.2 Analyst Forecast Variables

This paper uses analysts' median consensus forecasts as they are less affected by outlier forecasts, as opposed to the mean (I/B/E/S 2000).

An analyst may release more than one forecast during the forecast period, up until the period expires (e.g. forecast revisions). Hence, to ensure that analysts' forecasts have the opportunity to include the most recent information prior to an earnings announcement, we ensure the short run forecast variables are the latest ones issued before the end of the forecast period.

This paper uses the long run earnings forecast reported three months after the firm's fiscal year end. This is to ensure the analyst has had the opportunity to incorporate the information contained in the current annual report. Long run forecasts generally refer to a period of between three to five years (I/B/E/S 2000, p.21).

From the theory development, analysts' forecasts encompass both forecast earnings levels and growth rates. I/B/E/S reports forecast EPS levels, but not forecast EPS growth rates for analysts' short run forecasts. Conversely, I/B/E/S reports long run forecast EPS growth rates, but not long run forecast EPS levels. To obtain the respective missing forecast data values, we calculate the *implied* 1 and 2 years ahead forecast EPS growth rates and the *implied* long run forecast EPS levels. Short run *implied* EPS growth rates are calculated by taking a log-linear estimation between current historical EPS (Item #57) and the respective analyst forecast EPS level. Long run *implied* EPS levels are calculated by applying the reported long run forecast EPS growth rates to current historical EPS (Item #57) for a subsequent five-year period. These methods are consistent with the relevant I/B/E/S definitions (see I/B/E/S 2000).

To test the association between analysts' forecast accuracy and the forecasting framework, we need analysts' absolute forecast errors. However, I/B/E/S does not report these values. Hence, the absolute value of analysts' forecast errors is calculated, using the absolute difference between realised EPS levels (for the relevant forecast period) and the analysts' forecast EPS levels.

3.3 Explanatory Variables

The proxies for industry analysis employ dummy variables, based on primary GICS codes.

To test for analysts' use of strategy analysis, measures for the three technology condition variables[10] are required: science linkage (SL), technology strength (TS) and technology cycle time (TCT). Both Narin (1999) and Matolcsy and Wyatt (2008) provide further theoretical justification of these technology condition variables.

The technology data is obtained from a commercial supplier of patent citation and scientific paper citation data, CHI Research. These are measured at the technology area level. A technology area of investment reflects the cumulated history of all investments in technological, organisation and managerial innovations relating to that specific technology (Nelson and Winter 1977).

Science linkage is calculated as the average number of scientific papers referenced on the front page of the patents in a technology area of investment. Only

[10] Consistent with Matolcsy and Wyatt (2008), our technology conditions are measured for the relevant technology areas of investment within each industry. More specifically, we aggregate the firm-level data from CHI into the "technology area" level of measurement. CHI has structured the raw data by assigning the patenting entities, first, to one of 26 industry classes and, second, to one of 30 technology areas of investment within each of these industries. This structure yields 780 (26 x 30) possible technology areas of investment. These 780 technology areas of investment are the separate technology areas for which we aggregate the firm-level data to compute our measures of technology conditions. Additionally, our technology condition variables are left unscaled. Narin (1999) and Matolcsy and Wyatt (2008) provide further theoretical justification of these technology condition variables.

papers published in highly ranked scientific journals are included in the counts of scientific papers. A higher number of citations to scientific research papers indicate that a technology area is advancing based on scientific research rather than applied research (Narin 1999). Matolcsy and Wyatt (2008) provide evidence that greater science linkage better protects the future earnings streams derived from firm investments in a particular technology area from appropriation by rival firms.

Technology strength is calculated as the "number of patents" in a technology area times "current impact index" for the technology area, consistent with Matolcsy and Wyatt (2008). The current impact index is measured as the number of citations from the current year's patents to patents issued in the most recent five years for the technology area, relative to the entire US patent database[11]. This measures the frequency with which patents previously issued in a technology area are cited on the front page of the patents granted in the current year in the relevant technology area, compared to the average citation frequency in the entire US patent database[12]. Higher values of the technology strength variable indicate a dynamic technology area in which significant new knowledge and valuable investment opportunities are being created for the firms investing in the technology area.

Technology cycle time is calculated as the median age in years of the prior related patents, cited on the front page of the patents in a technology area of investment. This measure reflects the average number of years it takes to for investments in a firm's technology area to generate earnings.

[11] In Narin (1999, 10-11), "When a US patent is issued it has to satisfy three general criteria: it must be useful, it must be novel, and it must be obvious. The novelty requirement is the primary factor leading to the references that appear on the front page of the patent. It is the responsibility of the patent applicant, his attorney, and the patent examiner to identify, through references cited, all the important prior art upon which the issue patent improves."

[12] Benchmarking against the total patent database means a "current impact index" value of 1.0 is an average citation frequency; a value of 2.0 is twice the average citation frequency; and a value of 0.25 is 25 percent of average citation frequency.

To test for analysts' use of financial information, a number of financial statement data items[13] are required. Current historical EPS (EPS_HIST) is the reported diluted EPS excluding extraordinary items (Item #57) for firm j for year t. Past earnings performance (P_PERF) is calculated as the difference between the current (t) and previous year's (t-1) EPS (Item # 57) for firm j. Book to price ratio is calculated as the current year (t) total equity (Item #60) per share (i.e. divided by item #171) divided by the current year (t) closing stock price (Item #24) for firm j. Current net capital expenditure (CAPEX_HIST) is the reported current net capital expenditure (Item #128) per share (i.e. divided by item #171) for year t for firm j.

3.4 Summary Statistics

Descriptive statistics are reported in Table 3 for all variables. All accounting and forecast variables are scaled by average total assets, except the book to price ratio.

[INSERT TABLE 3 AROUND HERE]

The analyst forecast EPS levels (1YR_EPS, 2YR_EPS, LR_EPS) and growth rates (1YR_GR, 2YR_GR, LR_GR) variables indicate a wide range of analysts' forecasts. For example, analysts' 1 year ahead EPS forecast levels (1YR_EPS) range between -0.0905 and 0.1224. This indicates that the sample contains firms that analysts believe to be both highly profitable and not very profitable in the future. The analysts' absolute forecast EPS error variables (1YR_EPS_ERR, 2YR_EPS_ERR, LR_EPS_ERR) also display wide variation. For example, analysts' absolute 1 year

[13] We report the data item number of each financial variable in brackets for the CRSP/Compustat combined database.

ahead EPS errors (1YR_EPS_ERR) vary between 0.000 and 0.071, indicating forecasts where analysts were very accurate to highly inaccurate.

The current historical EPS variable (EPS_HIST) varies from firms making no profit at all (0.000) to firms making significant current profits (0.074), with an average value of 0.006. The proxies for strategy information analysis (SL, TS, TCT) report similar values to Matolcsy and Wyatt (2008). Science linkage (SL) ranges from 0.000 to 28.000 citations to scientific publications, which indicates that firm investments range between no direct influences from science, to a high level of influence in others. Technology strength (TS) varies between 0.000 and 15393, indicating high investment opportunities in some technology areas and very little in others. Similarly, the average technology cycle time (TCT) range from 0.0000 (very fast earnings generation) to 39.24 years (slow earning generation), with an average of 10.29 years. Finally, the financial variables (P_PERF, B_P, CAPEX_HIST) widely dispersed the firms, including those that have performed well and not so well in the past (P_PERF: -0.056 to 0.060), firms that the market values highly and very poorly in relation to book value of equity (B_P: -7.199 to 6.929) and firms that are currently spending substantially on capital expenditures and others that are not spending at all (CAPEX_HIST: 0.000 to 0.333).

Table 4 reports the correlations among the explanatory variables. The Spearman rhos are shown above the diagonal, and the Pearson coefficients are shown below the diagonal.

[INSERT TABLE 4 AROUND HERE]

The correlation matrix indicates that historical EPS is significantly correlated to science linkage (-0.0224), technology cycle time (-0.0481), past earnings performance (0.2455), book to price ratio (-0.0657) and net capital expenditures (0.0404). These correlation coefficients are as expected given the theory and hypothesis development, except science linkage. Further, the technology condition variables are significantly correlated with each other, which is not surprising given that they represent three proxies related to the same technology areas of investment.

3.5 Empirical Models

To test the association between analysts' forecast EPS levels and the forecasting framework, the following equation is estimated using ordinary least squares.

$$\begin{aligned} FC\_EPS_{j,t} = \quad & \alpha_0 + \beta_1 EPS\_HIST_{j,t} + \beta_2 \text{ Industry Codes}_{j,t} + \beta_3 SL_{j,t} \\ & + \beta_4 TS_{j,t} + \beta_5 TCT_{j,t} + \beta_6 P\_PERF_{j,t} + \beta_7 B\_P_{j,t} \\ & + \beta_8 CAPEX\_HIST_{j,t} + \varepsilon_1 \end{aligned} \quad (1)$$

where:

FC_EPS: analysts' median consensus EPS forecast level (or implied EPS level for long run forecasts) for the relevant period for firm j for year t;

EPS_HIST: current historical diluted EPS before extraordinary items for firm j for year t;

Industry Codes: 1 for relevant industry based on GICS codes, 0 otherwise;

SL: science linkage measure for firm j for year t;

TS: technology strength for firm j for year t;

TCT: technology cycle time for firm j for year t;

P_PERF: past earnings performance for firm j for year t;

B_P: book to price ratio for firm j for year t;

CAPEX_HIST: current net capital expenditure per share for firm j for year t;

Historical earnings per share (EPS_HIST) in Equation (1) is implemented as a summary number for the latest historical income statement.

To test the association between analysts' forecast EPS growth rates and the forecasting framework, the following equation is estimated using ordinary least squares.

$$FC\_GR_{j,t} = \alpha_0 + \beta_1 \text{ Industry Codes}_{j,t} + \beta_2 SL_{j,t} + \beta_3 TS_{j,t} + \beta_4 TCT_{j,t} + \beta_5 P\_PERF_{j,t} + \beta_6 B\_P_{j,t} + \beta_7 CAPEX\_HIST_{j,t} + \varepsilon \quad (2)$$

where:

FC_GR: analyst median consensus EPS growth rate forecast (or implied EPS growth rate for short run forecasts) for the relevant period for firm j for year t;

All other variables are defined above.

To test the association between analysts' EPS forecast errors and the forecasting framework, the following equation is estimated using ordinary least squares.

$$FC\_EPS\_ERR_{j,t} = \alpha_0 + \beta_1 \text{ Industry Codes}_{j,t} + \beta_2 SL_{j,t} + \beta_3 TS_{j,t} + \beta_4 TCT_{j,t} + \beta_5 P\_PERF_{j,t} + \beta_6 B\_P_{j,t} + \beta_7 CAPEX\_HIST_{j,t} + \varepsilon_1 \quad (3)$$

where:

FC_EPS_ERR = analysts' median consensus EPS absolute forecast error (or implied EPS absolute forecast error for long run forecasts) for the relevant period for firm j for year t;

All other variables are defined above.

Consistent with Bradshaw et al. (2001), all accounting and analyst forecast variables are scaled by average total assets, except book to price ratio. Additional tests were conducted using beginning of period stock price to scale with similar results.

Kothari et al. (2005) report that survival and data trimming biases can be induced by data truncation and winsorising procedures. This paper deals with the survival bias

by employing an unbalanced panel for our sample (i.e. firms do not need to be listed for the full 17 years to be included). Outliers are identified from the regression residual diagnostics, and they are removed if they are more than three standard deviations from the mean or have undue leverage.

In addition to testing the full empirical models, this paper also reports reduced form regressions. The reduced form regressions introduce each specific type of analysis from the forecasting framework step by step. Further statistical support is provided for the proxies used for each reduced form step using Wald tests. Wald tests are maximum likelihood estimates, where the unrestricted and restricted incremental explanatory powers of a set of proxies are evaluated. For example, a Wald test of the industry proxies tests the joint restrictions that the set of coefficients are equal to zero. A significant Wald test F-statistic indicates that the null hypothesis can be rejected.

4. Results

4.1 Analyst Forecast EPS Levels

Table 5 reports the results based on Equation (1), which tests the association between analyst forecast EPS levels and the forecasting framework for the period 1985 – 2001. The 1 year ahead analyst forecast EPS levels results are reported in Panel A, 2 years ahead in Panel B and long run in Panel C. In each panel, the last regression reports the pooled results of the full model; whereas, the first four regressions use a reduced form procedure where the EPS only regression is first introduced, then EPS with industry, strategy and financial variables step by step.

[INSERT TABLE 5 AROUND HERE]

In Panel 5A, the overall adjusted R^2s vary from 39.04% for EPS only, 39.39% for industry analysis with EPS, 39.07% for strategy analysis with EPS, 39.81% for financial analysis with EPS and 40.14% for the full model. Thus, indicating that analysts' 1 year ahead forecasts anchor on historical EPS. The additional variation explained by each analysis over the EPS only model is: 0.35% for industry analysis, 0.03% for strategy analysis, 0.77% for financial analysis. Each of these analyses are significant, as indicated by significant Wald test F-statistic values of 6.4436, 2.9363 and 7.4012, respectively. The individual regression coefficients indicate that historical current EPS is always positive and significant; 13 out of 23 industry coefficients are significant; none of the strategy coefficients are significant or of the correct sign; 2 out of 3 financial coefficients are significant and as expected (P_PERF, Y0_CAPEX); and B_P is of the expected sign but not significant. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. Overall, the adjusted R^2s indicate that most of the explanation for analysts' 1 year ahead EPS forecast levels comes from historical EPS (39.04%) with only an additional 1.10% explanatory power from the industry, strategy and financial analyses.

In Panel 5B, the overall adjusted R^2s vary from 50.77% for EPS only, 52.00% for industry analysis with EPS, 51.05% for strategy analysis with EPS, 60.70% for financial analysis with EPS and 61.89% for the full model. Thus, indicating that analysts' 2 year ahead forecasts anchor on historical EPS. The additional variation explained by each analysis over the EPS only model is: 1.23% for industry analysis, 0.28% for strategy analysis, 9.93% for financial analysis. Each of these analyses are significant, as indicated by significant Wald test F-statistic values of 21.1639, 13.0059 and 128.1117, respectively. The individual regression coefficients indicate that EPS

is always positive and significant; 20 out of 23 industry coefficients are significant; 1 out of 3 strategy coefficients are significant and of the correct sign (TS) (whilst TCT is of the expected sign, but not significant); 2 out of 3 financial coefficients are significant (P_PERF and B_P), but only P_PERF is of the expected sign. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. Overall, the adjusted R^2s indicate that most of the explanation for analysts' 2 year ahead EPS forecast levels still comes from historical EPS (50.77%) with an additional 11.12% explanatory power from the industry, strategy and financial analyses.

In Panel 5C, the overall adjusted R^2s vary from 84.61% for EPS only, 85.83% for industry analysis with EPS, 85.18% for strategy analysis with EPS, 86.81% for financial analysis with EPS and 87.95% for the full model. Thus, indicating that analysts' long run forecasts anchor on historical EPS. The additional variation explained by each analysis over the EPS only model is: 1.22% for industry analysis, 0.57% for strategy analysis, 2.20% for financial analysis. Each of these analyses are significant, as indicated by significant Wald test F-statistic values of 64.7962, 201.7653 and 168.1811, respectively. The individual regression coefficients indicate that EPS is always positive and significant; 22 out of 23 industry coefficients are highly significant; all strategy coefficients are significant and of the expected signs; and all financial coefficients are significant and of the expected signs. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions, with almost all coefficients highly significant and of the expected signs. Overall, the adjusted R^2s indicate that most of the explanation for analysts' long run EPS forecast levels still comes from historical EPS (84.61%) with

only an additional 3.34% explanatory power from the industry, strategy and financial analyses.

In summary, the key findings from Table 5 indicate that analyst earnings forecasts anchor on historical EPS for all forecast periods. Further, the longer the forecast period the higher the explanatory power of the forecasting framework, consistent with intuition.

These findings are consistent with Graham et al. (2005). Graham et al. (2005) find that US managers are taking economic actions with the intention of reporting historical EPS numbers that facilitate analysts' short run EPS forecasts. Hence, analysts do not need to use the forecasting framework because their best indicator of future short run earnings performance is the current historical EPS number reported by management, consistent with our short run findings.

Further, this evidence is consistent with annual earnings following a random walk (e.g. Ball and Watts 1972; Albrecht et al. 1977; Watts and Leftwich 1977; Brown 1993). This is indicated by analysts almost exclusive use of historical EPS to forecast short run earnings. In addition, the results indicate that the forecasting framework explains relatively little of their short run forecasts errors, compared to long run errors. Hence, analysts lack of use of the forecasting framework in the short run may be justified, to some extent, by a random walk of earnings.

Table 6 reports a summary of the year-by-year results using Bernard statistics[14] based on Equation (1) for the sample period 1985 – 2001. Further, we provide a summary measure of the number of individual years that were significant and as

[14] Bernard statistics measure the probability of the null hypothesis where each variable's coefficients are equal to zero for the same period. A significant Bernard statistic indicates the null hypothesis is rejected. Bernard provides a possible explanation for downward biased estimates of the errors of the coefficient estimates: cross correlation in the residuals in the regressions (see Bernard 1987). Bernard (1987) recommends basing inferences for these cross-sectional regressions on the mean of coefficient estimates across all years.

expected for the strategy and financial variable's coefficients. The 1 year ahead analyst forecast EPS levels results are reported in Panel A, 2 years ahead in Panel B and long run in Panel C.

[INSERT TABLE 6 AROUND HERE]

Significant Bernard (1987) statistics are found for historical EPS, and all years are significant and as expected for all forecast periods. In Panel A, significant Bernard statistics are reported for none of the strategy coefficients, 1 out of 3 of the financial coefficients (P_PERF) and only 3 out of 23 industry coefficients. Further, no individual year coefficients were significant or as expected, except for 1 individual year for TS. In Panel B, significant Bernard statistics are reported for 1 out of 3 strategy variables (TCT), 2 out of 3 financial variables (P_PERF, B_P) and 18 out of 23 industry variables. Further, 16 individual years for B_P are significant and as expected, with 0 years for all other coefficients. In Panel C, significant Bernard statistics are reported for 2 out of 3 strategy coefficients (SL, TCT), all financial variables and 16 out of 23 industry coefficients. Further, coefficients with significant and as expected individual years are TS with 4 years, P_PERF with 8 years and B_P with 15 years.

These results generally confirm the pooled findings from Table 5 that analysts' forecasts anchor on historical EPS and the longer the forecast period the more significant the forecast framework has in relation to analysts' forecasts.

4.2 Analyst Forecast EPS Growth Rates

Table 7 reports the results based on Equation (2), which tests the association between analyst forecast EPS growth rates and the forecasting framework for the period 1985 – 2001. The 1 year ahead analyst forecast EPS growth rates results are reported in Panel A, 2 years ahead in Panel B and long run in Panel C. In each panel, the last regression reports the pooled results of the full model. On the other hand, the first three regressions use a reduced form procedure where industry, strategy and financial analyses are introduced step by step.

[INSERT TABLE 7 AROUND HERE]

In Panel 7A, the overall adjusted R^2s vary from 0.98% for industry analysis only, 0.81% for strategy analysis only, 2.11% for financial analysis only and 2.22% for the full model. Each of these analyses are significant, except for strategy analysis, as indicated by significant Wald test F-statistic values of 2.4863 for industry analysis and 12.7977 for financial analysis. The individual regression coefficients indicate that none of industry coefficients are significant; none of the strategy coefficients are significant (but SL and TS are insignificant but of the expected signs); and all financial coefficients are significant, but only P_PERF and Y0_CAPEX are of the expected signs. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. Overall, the adjusted R^2s indicate that the forecasting framework offers little explanatory power (2.22% total) in explaining analysts' 1 year ahead EPS growth rates.

In Panel 7B, the overall adjusted R^2s vary from 1.33% for industry analysis only, 0.55% for strategy analysis only, 3.02% for financial analysis only and 5.09% for the

full model. Each of these analyses are significant, as indicated by significant Wald test F-statistic values of 17.7169, 15.1348 and 61.8315, respectively. The individual regression coefficients indicate that again none of the industry coefficients are significant; and only 1 out of 3 strategy coefficients are significant and of the expected sign (TS), whilst TCT is of the of the expected sign but not significant. Further, 2 out of 3 financial coefficients are significant, but only P_PERF is of the expected sign. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. Overall, the adjusted R^2s indicate that the forecasting framework only offers marginally more explanatory power (5.09% total) in explaining analysts' 2 year ahead EPS growth rates, compared to analysts' 1 year ahead EPS growth rates.

In Panel 7C, the overall adjusted R^2s vary from 11.04% for industry analysis only, 4.10% for strategy analysis only, 24.54% for financial analysis only and 40.00% for the full model. Each of these analyses are significant, as indicated by significant Wald test F-statistic values of 74.6730, 115.2741 and 361.1767, respectively. The individual regression coefficients indicate that 21 out of 23 industry coefficients are significant, all strategy coefficients are significant and of the expected signs, and all financial coefficients are highly significant and of the expected signs. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. Overall, the adjusted R^2s indicate that the forecasting framework offers significantly more explanatory power (40.00%) total in explaining analysts long run EPS growth rates, compared to analysts short run EPS growth rates.

In summary, the key findings from Table 7 are that the longer the forecast period, the more explanatory power the forecasting framework has in relation to analysts' forecast EPS growth rates.

Table 8 reports a summary of the year-by-year results using Bernard statistics based on Equation (2) for the sample period 1985 – 2001. Further, this paper provides a summary measure of the number of individual years that were significant and as expected for the strategy and financial variable's coefficients. The 1 year ahead analyst forecast EPS levels results are reported in Panel A, 2 years ahead in Panel B and long run in Panel C.

[INSERT TABLE 8 AROUND HERE]

In Panel A, no significant Bernard statistics are reported for either the strategy or industry analyses coefficients. However, significant values are found for all 3 financial coefficients. Further, only B_P had individual years that were significant and as expected with 2 years. In Panel B, significant Bernard statistics are reported for 1 of the strategy coefficients (TCT), 2 out of 3 financial coefficients (P_PERF, B_P) and 4 out of 23 industry coefficients. Further, coefficients with individual years that were significant and as expected are TCT with 1 year, B_P with 12 years and CAPEX_HIST with 1 year. In Panel C, significant Bernard statistics are reported for 1 of the strategy coefficients (TCT), 2 out of 3 financial coefficients (P_PERF, CAPEX_HIST) and 13 out of 23 industry coefficients. Further, coefficients with individual years that were significant and as expected are TS with 2 years and B_P with 3 years.

These results generally confirm the pooled findings from Table 7 that analysts generally do not use the forecasting framework in the short run, but do use it in the long run.

The key results from the tests of the forecasting framework in Tables 5 and 7 are generally consistent with each other. The findings indicate that the longer the forecast period, the more explanatory power and significance that industry, strategy and financial analyses have in relation to analysts' EPS forecasts.

4.3 Drivers of Analysts' Forecast Errors

Table 9 reports the results based on Equation (3), which tests the association between analysts' EPS absolute forecast errors and the forecasting framework for the period 1985 – 2001. The 1 year ahead analyst forecast EPS errors results are reported in Panel A, 2 years ahead in Panel B and long run in Panel C. In each panel, the last regression reports the pooled results of the full model; whereas, the first three regressions use a reduced form procedure where industry, strategy and financial analyses is introduced step by step.

[INSERT TABLE 9 AROUND HERE]

In Panel 9A, the overall adjusted R^2s vary from 7.51% for industry analysis only, 3.47% for strategy analysis only, 4.85% for financial analysis only and 9.36% for the full model. Each of these analyses are significant, as indicated by significant Wald test F-statistic values of 54.4586, 55.9622 and 43.3504, respectively. The individual regression coefficients indicate that only 2 out of 23 industry coefficients are

significant; all 3 strategy coefficients are significant and of the expected signs (except TCT); and 2 out of 3 financial coefficients are significant and of the expected signs (P_PERF and B_P), with CAPEX_HIST insignificant but of the expected sign. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. However, the strategy coefficients are no longer significant. Overall, the adjusted R^2s indicate that industry and strategy analyses do provide incremental power in explaining forecast errors for analysts' 1 year ahead forecasts as predicted.

In Panel 9B, the overall adjusted R^2s vary from 10.70% for industry analysis only, 3.47% for strategy analysis only, 2.55% for financial analysis only and 10.95% for the full model. Each of these analyses are significant, as indicated by significant Wald test F-statistic values of 76.7503, 51.3615 and 38.4081, respectively. The individual regression coefficients indicate that none of the industry coefficients are significant; all 3 strategy coefficients are significant and of the expected signs (except TCT); and 2 out of 3 financial coefficients are significant and of the expected signs (P_PERF and B_P), with CAPEX_HIST insignificant but of the expected sign. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. However, the strategy coefficients are no longer significant. Overall, the adjusted R^2s indicate that industry and strategy analyses do provide incremental power in explaining forecast errors for analysts' 2 year ahead forecasts, as predicted. Further, this effect is marginally more than that found for analysts' 1 year ahead forecasts in Panel 9A.

In Panel 9C, the overall adjusted R^2s vary from 12.83% for industry analysis only, 4.30% for strategy analysis only, 20.01% for financial analysis only and 27.98% for the full model. Each of these analyses are significant, as indicated by significant

Wald test F-statistic values of 96.9867, 124.3441 and 448.1263, respectively. The individual regression coefficients indicate that 13 out of 23 industry coefficients are significant; all 3 strategy coefficients are significant and of the expected signs (except TCT); and all 3 financial coefficients are significant and of the expected sign, except B_P, which is significant and not of the expected sign. The coefficients in the full regression model are similar to the coefficients in the individual stepwise regressions. Overall, the adjusted R^2s indicate that industry and strategy analyses do provide incremental power in explaining forecast errors for analysts' long run forecasts, as predicted.

In summary, the key findings from Table 9 indicate that industry, strategy and financial analyses provide incremental power in explaining forecast errors. Hence, confirming the importance of the forecasting framework. Further, the explanatory power of the forecasting framework increases as the forecast period is extended in relation to analysts' forecast errors.

Table 10 reports a summary of the year-by-year results using Bernard statistics based on Equation (3) for the sample period 1985 – 2001. Further, this paper provides a summary measure of the number of individual years that were significant and as expected for the strategy and financial variable's coefficients. The 1 year ahead analyst forecast EPS levels results are reported in Panel A, 2 years ahead in Panel B and long run in Panel C.

[INSERT TABLE 10 AROUND HERE]

In Panel A, significant Bernard statistics are reported for none of the strategy coefficients, 2 out of 3 financial coefficients (P_PERF, B_P) and 6 out of 23 industry coefficients. Further, coefficients with individual years that were significant and as expected are P_PERF with 12 years and B_P with 7 years. In Panel B, significant Bernard statistics are reported for 2 strategy coefficients (SL, TCT), 2 financial coefficients (P_PERF, B_P) and 6 industry coefficients. Further, coefficients with individual years that were significant and as expected are TS with 1 year, P_PERF with 7 years, B_P with 11 years and CAPEX_HIST with 1 year. In Panel C, significant Bernard statistics are reported for 2 strategy coefficients (SL, TCT), all financial coefficients and 11 industry coefficients. Further, coefficients with individual years that were significant and as expected are P_PERF with 11 years and CAPEX_HIST with all 17 years.

The year-by-year results generally confirm the pooled findings from Table 9 that the forecasting framework does provide incremental power and significance in explaining analysts' forecast errors. Further, this effect increases as the forecast period is extended.

4.4. Additional Tests

The sensitivity of the findings was tested using alternative specifications of the pooled regressions. The results of the additional tests are not reported.

First, alternative scaling by beginning of the period stock price (e.g. Lang and Lundholm 1996; Bradshaw 2006) is implemented to test the robustness of the main results. Second, the main regressions are tested using some additional financial variables. Following from Frankel and Lee (1998), additional variables for past sales growth for the tests relating to analysts' use of financial information are used. Further, all leading and academic textbooks (e.g. Lundholm and Sloan 2004; Koller et al.

2006; Palepu et al. 2007; Penman 2007) state that financial analysis should include analysis of a firm's profitability. Whilst past earnings performance (P_PERF) represents such a measure (e.g. DeBondt and Thaler 1990; Mendenhall 1991; Abarbanell and Bernard 1992), additional tests using return on net operating assets (RNOA) were conducted. Third, consistent with much of the prior literature, this paper tests the association between the forecast framework and analysts' forecast bias (i.e. the signed values of analysts' forecast errors).

The tenor of the results remained the same for all additional tests. Hence, providing support for the robustness of the results.

5. Conclusion

This paper addresses the question of how analysts forecast earnings. Specifically, the objectives of this paper are to provide evidence on: (1) whether analysts use the forecasting framework provided by leading textbooks (e.g. Lundholm and Sloan 2004; Koller et al. 2006; Palepu et al. 2007; Penman 2007); and (2) whether analysts' forecast errors are associated with departures from this framework. The forecasting framework requires analysts to consider industry, strategy and financial information. Both short and long run analysts' earnings forecasts are examined.

The findings are based on US samples of 28261, 21051 and 25053 firm-years observations for 1 year ahead, 2 years ahead and long run analysts' earnings forecasts. The key findings suggest that analysts generally do not use the forecasting framework for their short run forecasts, but do use it for their long run forecasts. Further, the tests of forecast errors indicate that industry and strategy analysis provide incremental power in explaining forecast errors, in addition to financial information. Overall, the explanatory power of the forecasting framework in explaining either analysts' forecasts or forecast errors increases as the forecast period is extended.

The sensitivity of these findings is evaluated using alternative specifications of the main pooled regressions. This helps confirm that the results are not driven by experimental design or choice of proxies.

This paper provides a number of opportunities for future researchers. First, future research could attempt to differentiate between ‘star’ analysts and those that are less accurate. Second, future studies could extend this study to examinations of analysts’ use of the forecasting framework within specific industries, consistent with Demirakos et al. (2004). Third, future studies should attempt to forecast future earnings using the forecasting framework to improve forecast accuracy in relation to analysts’ forecasts.

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TABLE 1
Sample Selection for the Pooled Sample for the 1985 - 2001 Period

	1 Year Ahead	2 Year Ahead	Long Run
Initial # of Firms	87,279	87,279	87,279
Less: Firms where CHI classification could not be determined*	(1041)	(1041)	(1041)
# Firms on IBIS with CHI Classification	86,238	86,238	86,238
Less: Firms without relevant analysts' forecasts	(29430)	(36024)	(48772)
# Firms with relevant analysts' forecasts	56,808	50,214	37,466
Less: Missing firm-year observations of required Compustat data	(29547)	(29163)	(12413)
Final analysts' forecast EPS levels sample	**28,261**	**21,051**	**25053**
Less: Missing firm-year observations of required Compustat data	(1380)	(0)	(5231)
Final analysts' forecast EPS growth rates sample	**26881**	**21051**	**12878**
Less: Missing firm-year observations of required Compustat data**	(1258)	(1626)	(5259)
Final analysts' absolute forecast errors sample	**27,003**	**19,425**	**19,794**

*it was harder to determine CHI industry and technology area classfications for some firms as they were small or only listed for a short period of time. Hence, not much public information was available. A range of information items are needed to determine CHI classification including segment data on sales, and management discussion of businesses and products.

**from the final analyst forecast EPS sample, not the final EPS growth rate sample

The final samples comprises of 28261, 21051 and 25159 firm-years for the one-year ahead, two-year ahead and long run forecast level samples for the 1985 - 2001 period, respectively. Our sample only includes firms with positive historical EPS for the current year. Firms do not have to be listed for the entire 17 years to be included in the sample.

TABLE 2
Pooled Sample Composition by Primary GICS Industry Codes
for the Period 1985 - 2001

Industry	GICS Industry Codes	1 years ahead		2 years ahead		Long run	
		# Firm Years	% of Obs.	# Firm Years	% of Obs.	# Firm Years	% of Obs.
Energy	1010	1,325	4.69	1,036	4.92	1,113	4.44
Materials	1510	1,633	5.78	1,356	6.44	1,746	6.97
Capital Goods	2010	2,306	8.16	1,823	8.66	2,403	9.59
Commercial & Professional Services	2020	1,227	4.34	874	4.15	1,278	5.10
Transportation	2030	664	2.35	535	2.54	706	2.82
Automobiles & Components	2510	480	1.70	381	1.81	514	2.05
Consumer Durables & Apparel	2520	1,747	6.18	1,373	6.52	1,926	7.69
Consumer Services	2530	964	3.41	718	3.41	1,010	4.03
Media	2540	811	2.87	560	2.66	743	2.97
Retailing	2550	1,580	5.59	1,151	5.47	1,732	6.91
Food & Staples Retailing	3010	413	1.46	324	1.54	485	1.94
Food, Beverage & Tobacco	3020	780	2.76	623	2.96	882	3.52
Household & Personal Products	3030	252	0.89	196	0.93	274	1.09
Health Care Equipment & Services	3510	1,789	6.33	1,284	6.10	1,597	6.38
Pharmaceuticals, Biotechnology & Life Sciences	3520	1,249	4.42	890	4.23	526	2.10
Banks	4010	2,495	8.83	1,756	8.34	139	0.56
Diversified Financials	4020	608	2.15	429	2.04	519	2.07
Insurance	4030	921	3.26	756	3.59	1,009	4.03
Real Estate	4040	373	1.31	246	1.17	220	0.88
Software & Services	4510	1,990	7.04	1,242	5.90	1,581	6.31
Technology Hardware & Equipment	4520	2,408	8.52	1,699	8.07	2,151	8.59
Semiconductors & Semiconductor Equipment	4530	551	1.95	396	1.88	527	2.10
Telecommunication Services	5010	333	1.18	215	1.02	202	0.81
Utilities	5510	1,362	4.82	1,189	5.65	1,772	7.07
Total		28,261	100.00	21,051	100.00	25,053	100.00

The final samples comprise 28,261, 21,051 and 25,053 firm-years for one-year ahead, two-year ahead and long run forecasts for the 1985 - 2001 period, respectively. The samples only include firms with positive historical EPS for the current year. Firms do not have to be listed for the entire 17 years to be included in the sample. Primary GICS codes are assigned according to the largest percent of sales from the firm's product line breakdown. GICS codes are reviewed and updated each year for each firm appropriately.

TABLE 3
Descriptives Statistics for the Pooled Sample for the 1985 - 2001 Period

	1YR_EPS	2YR_EPS	LR_EPS	1YR_GR	2YR_GR	LR_GR	1YR_EPS_ ERR	2YR_EPS_ ERR	LR_EPS_ ERR	Y0_EPS	SL	TS	TCT
Mean	0.0047	0.0041	0.0139	-0.0905	0.2380	17.0066	0.0036	0.0036	0.0112	0.0062	0.9281	1096.7030	10.2919
Median	0.0021	0.0021	0.0057	-0.0107	0.0010	15.0000	0.0008	0.0012	0.0032	0.0030	0.3600	189.1046	10.5483
Maximum	0.1224	0.0442	0.3128	38.4339	19.8453	130.0000	0.0714	0.0469	0.1984	0.0735	28.0000	15392.760	39.2407
Minimum	-0.0905	-0.0123	0.0000	-38.3349	-12.7251	-14.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Std. Dev.	0.0090	0.0054	0.0218	1.7889	1.4519	8.9826	0.0070	0.0061	0.0205	0.0086	2.5390	2497.9090	3.7279
Skewness	3.2746	2.5190	3.6432	2.5391	6.8793	1.5366	3.7677	3.1162	3.7065	2.8999	7.5018	3.6572	0.9891
Kurtosis	31.5480	11.2553	24.0392	91.8164	67.1809	8.8695	20.7129	14.6939	21.0900	14.2379	66.2806	17.2500	8.1931

All accounting and forecast variables are scaled by average total assets for firm j for year t. The sample only includes firms with positive current historical EPS.
For brevity, only the descriptive statistics for the 1 year ahead forecast EPS level sample's experimental variables are reported. All other sample descriptive statistics are similar.

1YR_EPS = 1 year ahead analyst consensus EPS forecast for firm j for year t;
2YR_EPS = 2 year ahead analyst consensus EPS forecast for firm j for year t;
LR_EPS = Long run analyst consensus implied EPS forecast for firm j for year t;
1YR_GR = 1 year ahead implied analyst median consensus EPS growth rate for firm j for year t;
2YR_GR = 2 year ahead implied analyst median consensus EPS growth rate for firm j for year t;
LR_GR = Long run analyst median consensus EPS growth rate for firm j for year t;
1YR_EPS_ERR = 1 year ahead analyst consensus EPS absolute forecast error for firm j for year t;
2YR_EPS_ERR = 2 year ahead analyst consensus EPS absolute forecast error for firm j for year t;
LR_EPS_ERR = Long run analyst consensus implied EPS absolute forecast error for firm j for year t;
Y0_EPS = Current historical diluted EPS for firm j for year t;
SL = Science linkage measure for firm j for year t;
TS = Technology strength measure for firm j for year t;
TCT = Techology cycle time measure for firm j for year t;
P_PERF = Past EPS performance for firm j for year t;
B_P = Book to price ratio for firm j for year t;
Y0_CAPEX = Current net capital expenditure for firm j for year t.

TABLE 4
Correlation Matrix for the Pooled Sample for the 1985 - 2001 Period

Spearman's rho

	Y0_EPS	SL	TS	TCT	P_PERF	B_P	Y0_CAPEX
Y0_EPS		-0.0682 **	0.0581 **	-0.0386 **	0.2859 **	-0.0482 **	0.0705 **
SL	-0.0224 **		0.3449 **	-0.4441 **	0.0485 **	-0.1981 **	0.0088
TS	0.0047	0.0505 **		-0.4936 **	0.0466 **	-0.2012 **	0.1401 **
TCT	-0.0481 **	-0.1930 **	-0.4123 **		-0.0453 **	0.1361 **	0.0653 **
P_PERF	0.2455 **	0.0461 **	0.0609 **	-0.0549 **		-0.0941 **	-0.0327 **
B_P	-0.0657 **	-0.0920 **	-0.1366 **	0.0920 **	-0.0577 **		-0.1619 **
Y0_CAPEX	0.0404 **	-0.0101 **	-0.0204 **	0.0815 **	-0.0285 **	-0.1258 **	

Pearson Correlations

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.
The Spearman's rho statistics are above the diagonals and the Pearson Correlations are below the diagonal.
For brevity, only the correlations for the 1 year ahead forecast EPS level sample's experimental variables are reported. All other sample descriptive statistics are similar.

Y0_EPS = Current historical diluted EPS for firm j for year t;
SL = Science linkage measure for firm j for year t;
TS = Technology strength measure for firm j for year t;
TCT = Techology cycle time measure for firm j for year t;
P_PERF = Past EPS performance for firm j for year t;
B_P = Book to price ratio for firm j for year t;
CAPEX_HIST = Current net capital expenditure for firm j for year t.

TABLE 5
Tests of the Association Between Analyst Forecast EPS Levels and the Forecasting Framework for the Pooled Samples for the Period 1985 - 2001

$$FC\_EPS\ (j,t) = \alpha 0 + \beta 1\ EPS\_HIST\ (j,t) + \beta 2\ Industry\ Codes\ (j,t) + \beta 3\ SL\ (j,t) + \beta 4\ TS\ (j,t) + \beta 5\ TCT\ (j,t) + \beta 6\ P\_PERF\ (j,t) + \beta 7\ B\_P\ (j,t) + \beta 8\ CAPEX\_HIST\ (j,t) + \varepsilon I$$

Equation (1)

Panel A: 1 Year Ahead Forecast EPS Levels

	Expected Signs	Pooled Coefficients				
		EPS Only	Industry Analysis	Strategy Analysis	Financial Analysis	Full Model
Intercept		-0.0009	0.0000	-0.0011	-0.0008	-0.0002
		-3.3851 **	-0.0248	-3.4405 **	-2.7827 **	-0.3216
EPS_HIST	+	0.6610	0.6527	0.6624	0.6729	0.6656
		42.9508 **	40.9959 **	42.8640 **	41.0600 **	39.7697 **
SL	+			-5E-05		-1E-05
				-1.8307		-0.4844
TS	+			-3E-08		-5E-08
				-1.1386		-1.5551
TCT	-			2E-05		1E-05
				1.2706		0.7260
P_PERF	-				-0.0709	-0.0686
					-4.3359 **	-4.1638 **
B_P	-				-0.0001	-0.0002
					-1.0005	-1.4020
CAPEX_HIST	-				-0.0021	-0.0021
					-2.0904 *	-1.8136
Automobiles & Components			-0.0008			-0.0007
Banks			-0.0013 **			-0.0011
Capital Goods			-0.0010 *			-0.0010 *
Commercial & Professional Services			0.0005			0.0005
Consumer Durables & Apparel			-0.0002			-0.0002
Consumer Services			-0.0006			-0.0005
Diversified Financials			-0.0009			-0.0010
Energy			-0.0009 *			-0.0008
Food & Staples Retailing			-0.0009 *			-0.0008
Food, Beverage & Tobacco			-0.0009 *			-0.0009 *
Health Care Equipment & Services			0.0000			0.0002
Household & Personal Products			-0.0013 *			-0.0013 *
Insurance			-0.0013 **			-0.0014 **
Materials			-0.0011 **			-0.0010 *
Media			-0.0006 **			-0.0007 **
Pharmaceuticals, Biotechnology & Life Sciences			-0.0024 **			-0.0019 **
Retailing			-0.0003			-0.0003
Semiconductors & Semiconductor Equipment			-0.0021 **			-0.0017 **
Software & Services			-0.0009			-0.0005
Technology Hardware & Equipment			-0.0008			-0.0005
Telecommunication Services			-0.0014			-0.0010
Transportation			-0.0018 **			-0.0015 **
Utilities			-0.0010 *			-0.0009 *
Adjusted R-squared		0.3904	0.3939	0.3907	0.3981	0.4014
F-statistic		1251.29	540.26	1065.19	935.43	412.96
# of Obs.		28,261	33,188	33,188	28,261	28,261
Wald test F-statistic			6.4436 **	2.9363 *	7.4012 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years.

TABLE 5
Tests of the Association Between Analyst Forecast EPS Levels and the Forecasting Framework for the Pooled Samples for the Period 1985 - 2001

$$FC\_EPS\ (j,t) = \alpha 0 + \beta 1\ EPS\_HIST\ (j,t) + \beta 2\ Industry\ Codes\ (j,t) + \beta 3\ SL\ (j,t) + \beta 4\ TS\ (j,t) + \beta 5\ TCT\ (j,t) + \beta 6\ P\_PERF\ (j,t) + \beta 7\ B\_P\ (j,t) + \beta 8\ CAPEX\_HIST\ (j,t) + \varepsilon I$$

Equation (1)

Panel B: 2 Year Ahead Forecast EPS Levels

	Expected Signs	Pooled Coefficients				
		EPS Only	**Industry Analysis**	**Strategy Analysis**	**Financial Analysis**	**Full Model**
Intercept		-0.0004	0.0024	-0.0003	-0.0020	0.0005
		-2.1562 *	2.3833 *	-1.2738	-9.9858 **	0.4819
EPS_HIST	+	0.7592	0.7270	0.7552	0.7765	0.7547
		50.0041 **	46.8758 **	49.7652 **	47.4881 **	45.4232 **
SL	+			-4E-05		8E-06
				-1.8555		0.5309
TS	+			1E-07		8E-08
				5.3674 **		3.4417 **
TCT	-			-1E-05		-2E-05
				-0.8443		-1.6215
P_PERF	-				-0.2124	-0.2087
					-14.7970 **	-14.7615 **
B_P	-				0.0014	0.0017
					13.2500 **	15.4072 **
CAPEX_HIST	-				0.0011	0.0003
					1.3350	0.3257
Automobiles & Components			-0.0022 *			-0.0022 *
Banks			-0.0035 **			-0.0030 **
Capital Goods			-0.0026 **			-0.0023 *
Commercial & Professional Services			-0.0012			-0.0011
Consumer Durables & Apparel			-0.0019			-0.0018
Consumer Services			-0.0021 *			-0.0020
Diversified Financials			-0.0034 **			-0.0032 **
Energy			-0.0028 **			-0.0025 *
Food & Staples Retailing			-0.0030 **			-0.0024 *
Food, Beverage & Tobacco			-0.0027 **			-0.0021 *
Health Care Equipment & Services			-0.0020 *			-0.0016
Household & Personal Products			-0.0025 *			-0.0019
Insurance			-0.0033 **			-0.0033 **
Materials			-0.0029 **			-0.0026 *
Media			-0.0028 **			-0.0024 *
Pharmaceuticals, Biotechnology & Life Sciences			-0.0038 **			-0.0028 *
Retailing			-0.0020 *			-0.0022 *
Semiconductors & Semiconductor Equipment			-0.0024 *			-0.0023 *
Software & Services			-0.0032 **			-0.0028 *
Technology Hardware & Equipment			-0.0018			-0.0021 *
Telecommunication Services			-0.0014			-0.0016
Transportation			-0.0030 **			-0.0030 **
Utilities			-0.0030 **			-0.0029 **
Adjusted R-squared		0.5077	0.5200	0.5105	0.6070	0.6189
F-statistic		1603.850	699.135	1379.049	1626.656	728.196
# of Obs.		26,428	26,428	26,428	21,051	21,051
Wald test F-statistic			21.1639 **	13.0059 **	128.1117 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.
The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a

TABLE 5
Tests of the Association Between Analyst Forecast EPS Levels and the Forecasting Framework for the Pooled Samples for the Period 1985 - 2001

FC_EPS (j,t) = α0 + β1 EPS_HIST (j,t) + β2 Industry Codes (j,t) + β3 SL (j,t) + β4 TS (j,t) + β5 TCT (j,t) + β6 P_PERF (j,t) + β7 B_P (j,t) + β8 CAPEX_HIST (j,t) + ε1
Equation (1)

Panel C: Long run implied EPS forecast

	Expected Signs	Pooled Coefficients				
		EPS Only	**Industry Analysis**	**Strategy Analysis**	**Financial Analysis**	**Full Model**
Intercept		-0.0031	-0.0058	-0.0010	-0.0008	-0.0026
		-8.2034 **	-9.0571 **	-2.3534 *	-2.3206 *	-4.1902 **
EPS_HIST	+	2.6612	2.6105	2.6427	2.5279	2.4921
		92.2776 **	86.3308 **	92.3008 **	114.6784 **	108.3599 **
SL	+			0.0002		0.0001
				6.1976 **		2.4239 *
TS	+			5E-07		1E-07
				16.2300 **		3.1745 **
TCT	-			-0.0002		-0.0001
				-12.2269 **		-5.4412 **
P_PERF	+				0.2825	0.2508
					12.9866 **	12.1759 **
B_P	-				-0.0029	-0.0018
					-18.9744 **	-14.2150 **
CAPEX_HIST	+				0.0497	0.0532
					4.0270 **	4.1434 **
Automobiles & Components			0.0011			0.0005
Banks			0.0031 **			0.0027 **
Capital Goods			0.0013 *			0.0008
Commercial & Professional Services			0.0046 **			0.0034 **
Consumer Durables & Apparel			0.0015 **			0.0014 **
Consumer Services			0.0056 **			0.0034 **
Diversified Financials			0.0033 **			0.0027 **
Energy			0.0027 **			0.0025 **
Food & Staples Retailing			0.0029 **			0.0020 **
Food, Beverage & Tobacco			0.0020 **			0.0011 *
Health Care Equipment & Services			0.0065 **			0.0048 **
Household & Personal Products			0.0017 *			0.0005
Insurance			0.0025 **			0.0022 **
Materials			0.0019 **			0.0011 *
Media			0.0039 **			0.0027 **
Pharmaceuticals, Biotechnology & Life Sciences			0.0069 **			0.0044 **
Retailing			0.0044 **			0.0036 **
Semiconductors & Semiconductor Equipment			0.0083 **			0.0062 **
Software & Services			0.0110 **			0.0086 **
Technology Hardware & Equipment			0.0066 **			0.0048 **
Telecommunication Services			0.0062 **			0.0039 **
Transportation			0.0023 **			0.0020 **
Utilities			0.0016 **			0.0012 *
Adjusted R-squared		0.8461	0.8583	0.8518	0.8681	0.8795
F-statistic		9369.991	4388.364	8325.049	8245.802	3977.343
# of Obs.		28,968	28,968	28,968	25,053	25,053
Wald test F-stat			62.7962 **	201.7653 **	168.1811 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.
The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a

TABLE 6
Tests of the Association Between Analyst Forecast EPS Levels and the Forecasting Framework for the Year-by-Year Samples over the Period 1985 - 2001

$$FC\_EPS\ (j,t) = \alpha 0 + \beta 1\ EPS\_HIST\ (j,t) + \beta 2\ Industry\ Codes\ (j,t) + \beta 3\ SL\ (j,t) + \beta 4\ TS\ (j,t) + \beta 5\ TCT\ (j,t) + \beta 6\ P\_PERF\ (j,t) + \beta 7\ B\_P\ (j,t) + \beta 8\ CAPEX\_HIST\ (j,t) + \varepsilon I \quad \textit{Equation (1)}$$

Year by Year: Analyst forecast EPS levels

	Short Run Expected Signs	Panel A: 1 Year Ahead EPS		Panel A: 2 Year Ahead EPS		Long Run Expected Signs	Panel C: Long Run Implied EPS	
		Bernard statistic	# years as expected & significant	Bernard statistic	# years as expected & significant		Bernard statistic	# years as expected & significant
Intercept		0.074		0.016 *			0.102	
EPS_HIST	+	0.000 **	17/17	0.000 **	17/17	+	0.000 **	17/17
SL	+	0.667	0/17	0.425	0/17	+	0.006 **	0/17
TS	+	0.127	1/17	0.872	0/17	+	1.000	4/17
TCT	-	0.718	0/17	0.000 **	0/17	-	0.003 **	1/17
P_PERF	-	0.000 **	0/17	0.000 **	0/17	+	0.000 **	8/17
B_P	-	0.893	0/17	0.000 **	16/17	-	0.000 **	15/17
Y0_CAPEX	-	0.015 *	0/17	0.980	0/17	+	0.002 **	0/17
Automobiles & Components		0.134		0.031 *			0.333	
Banks		0.214		0.004 **			0.005 **	
Capital Goods		0.117		0.012 *			0.207	
Commercial & Professional Services		0.840		0.470			0.002 **	
Consumer Durables & Apparel		0.457		0.059			0.069	
Consumer Services		0.361		0.047 *			0.001 **	
Diversified Financials		0.133		0.002 **			0.003 **	
Energy		0.119		0.008 **			0.007 **	
Food & Staples Retailing		0.149		0.019 *			0.011 *	
Food, Beverage & Tobacco		0.182		0.038 *			0.158	
Health Care Equipment & Services		0.654		0.057			0.001 **	
Household & Personal Products		0.102		0.071			0.265	
Insurance		0.035		0.003 **			0.010 *	
Materials		0.096		0.016 *			0.114	
Media		0.261		0.017 *			0.008 **	
Pharmaceuticals, Biotechnology & Life Sciences		0.043 *		0.005 **			0.009 **	
Retailing		0.569		0.018 **			0.001 **	
Semiconductors & Semiconductor Equipment		0.017		0.009 **			0.007 **	
Software & Services		0.243		0.016 *			0.000 **	
Technology Hardware & Equipment		0.296		0.068			0.001 **	
Telecommunication Services		0.511		0.001 **			0.008 **	
Transportation		0.023 *		0.006 **			0.038 *	
Utilities		0.112		0.003 **			0.069	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Bernard (1987) statistic measures the probability of the null hypothesis where each variables coefficients are equal to zero for the sample period. A significant Bernard statistic indicates the null hypothesis is rejected.

All accounting and analyst forecast variables are scaled by average total assets for firm j for year t. Industry codes are formed using primary GICS codes for firm j for year t. GICS code descriptions are included in Table 2. FC_EPS is the analyst median consensus EPS forecast (or implied EPS forecast for long run forecasts) for the relevant period for firm j for year t; EPS_HIST is the current historical diluted EPS for firm j for year t; SL is the science linkage measure for firm j for year t; TS is the technology strength measure for firm j for year t; TCT is the technology cycle time measures for firm j for year t; P_PERF is past EPS performance for firm j for year t; B_P is book to price ratio for firm j for year t; and Y0_CAPEX is the current net capital expenditure per share for firm j for year t.

TABLE 7
Tests of the Association Between Analyst Forecast EPS Growth Rates and the Forecasting Framework for the Pooled Samples for the Period 1985 - 2001

$$FC\_GR(j,t) = \alpha 0 + \beta 1\ Industry\ Codes(j,t) + \beta 2\ SL(j,t) + \beta 3\ TS(j,t) + \beta 4\ TCT(j,t) + \beta 5\ P\_PERF(j,t) + \beta 6\ B\_P(j,t) + \beta 7\ CAPEX\_HIST(j,t) + \varepsilon I$$

Equation (2)

Panel A: 1 Year Ahead Implied EPS Growth Rates

	Expected Signs	Pooled Coefficients			
		Industry Analysis	Strategy Analysis	Financial Analysis	Full Model
Intercept		-0.4379	-0.5441	-0.5055	-0.5443
		-0.5793	-5.7671 **	-5.7692 **	-0.7633
SL	+		2E-03		6E-03
			0.3876		0.8022
TS	+		3E-06		1E-05
			0.4755		1.1843
TCT	-		7E-03		5E-03
			1.5387		1.0204
P_PERF	-			-27.3730	-27.2718
				-4.7538 **	-4.6876 **
B_P	-			0.1295	0.1434
				3.2392 **	3.3572 **
CAPEX_HIST	-			-0.6576	-0.7530
				-2.6097 **	-2.4195
Automobiles & Components		-0.0710			-0.0819
Banks		-0.0278			-0.0599
Capital Goods		-0.0949			-0.0880
Commercial & Professional Services		0.1708			0.1230
Consumer Durables & Apparel		-0.0756			-0.0925
Consumer Services		-0.1167			-0.0193
Diversified Financials		0.0022			-0.0423
Energy		0.0601			0.1321
Food & Staples Retailing		-0.0059			0.0171
Food, Beverage & Tobacco		0.0609			0.0555
Health Care Equipment & Services		-0.0791			0.0204
Household & Personal Products		-0.0462			-0.0120
Insurance		-0.0089			-0.0858
Materials		0.0174			0.0402
Media		0.0972			0.0875
Pharmaceuticals, Biotechnology & Life Sciences		-0.1432			-0.0960
Real Estate		0.0665			-0.0072
Retailing		-0.0687			-0.0637
Semiconductors & Semiconductor Equipment		-0.2863			-0.2439
Software & Services		-0.1394			-0.1118
Technology Hardware & Equipment		-0.0815			-0.0598
Telecommunication Services		-0.0606			-0.0290
Transportation		-0.2858			-0.2022
Utilities		0.0496			0.0304
Adjusted R-squared		0.0098	0.0081	0.0211	0.0222
F-statistic		8.8246	14.6616	31.4287	14.2712
# of Obs.		31,681	31,681	21,051	21,051
Wald test F-stat		2.4863 **	0.8363	12.7977 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a maximum likelihood estimate of how close the unrestricted estimates are to satisfying the specified restrictions under the null hypothesis. A significant F-statistic indicates teh null hypothesis is rejected. Wald tests have been done on the specific forecasting framework analysis variables in each model only.

TABLE 7
Tests of the Association Between Analyst Forecast EPS Growth Rates and the Forecasting Framework for the Pooled Samples for the Period 1985 - 2001

$$FC\_GR(j,t) = \alpha 0 + \beta 1\ Industry\ Codes(j,t) + \beta 2\ SL(j,t) + \beta 3\ TS(j,t) + \beta 4\ TCT(j,t) + \beta 5\ P\_PERF(j,t) + \beta 6\ B\_P(j,t) + \beta 7\ CAPEX\_HIST(j,t) + \varepsilon I$$

Equation (2)

Panel B: 2 Year Ahead Implied EPS Growth Rates

	Expected Signs	Pooled Coefficients			
		Industry Analysis	Strategy Analysis	Financial Analysis	Full Model
Intercept		0.4590	0.2403	-0.1984	-0.0541
		1.8669	3.1965 **	-2.8403 **	-0.1953
SL	+		-4E-03		3E-04
			-0.7553		0.0693
TS	+		5E-05		3E-05
			5.7307 **		3.7039 **
TCT	-		-5E-03		-4E-03
			-1.3890		-1.1850
P_PERF	-			-57.3102	-60.1503
				-8.5834 **	-9.0801 **
B_P	-			0.4810	0.6410
				10.5499 **	12.8897 **
CAPEX_HIST	-			0.0664	-0.2003
				0.2421	-0.6076
Automobiles & Components		-0.2917			-0.3233
Banks		-0.4957			-0.4346
Capital Goods		-0.2446			-0.1986
Commercial & Professional Services		0.0773			0.1373
Consumer Durables & Apparel		-0.1754			-0.1709
Consumer Services		-0.1413			-0.0408
Diversified Financials		-0.3903			-0.3506
Energy		-0.2352			-0.1893
Food & Staples Retailing		-0.4292			-0.2702
Food, Beverage & Tobacco		-0.2324			-0.0421
Health Care Equipment & Services		-0.0494			0.0994
Household & Personal Products		-0.3290			-0.1290
Insurance		-0.4186			-0.4650
Materials		-0.3280			-0.2885
Media		-0.2538			-0.1458
Pharmaceuticals, Biotechnology & Life Sciences		-0.4220			-0.1159
Real Estate		-0.1496			-0.3085
Retailing		-0.1811			-0.1517
Semiconductors & Semiconductor Equipment		-0.3461			-0.2470
Software & Services		0.1051			0.1310
Technology Hardware & Equipment		0.0402			0.0307
Telecommunication Services		-0.1630			-0.0978
Transportation		-0.4560			-0.3766
Utilities		-0.4769			-0.4667
Adjusted R-squared		0.0133	0.0055	0.0302	0.0509
F-statistic		9.9666	8.7513	35.8002	25.6957
# of Obs.		26,650	26,650	21,199	21,199
Wald test F-stat		17.7169 **	15.1348 **	61.8315 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a maximum likelihood estimate of how close the unrestricted estimates are to satisfying the specified restrictions under the null hypothesis. A significant F-statistic indicates teh null hypothesis is rejected. Wald tests have been done on the specific forecasting framework analysis variables in each model only.

TABLE 7
Tests of the Association Between Analyst Forecast EPS Growth Rates and the Forecasting Framework for the Pooled Samples for the Period 1985 - 2001

$$FC\_GR(j,t) = \alpha 0 + \beta 1\ Industry\ Codes(j,t) + \beta 2\ SL(j,t) + \beta 3\ TS(j,t) + \beta 4\ TCT(j,t) + \beta 5\ P\_PERF(j,t) + \beta 6\ B\_P(j,t) + \beta 7\ CAPEX\_HIST(j,t) + \varepsilon I$$

Equation (2)

Panel C: Long Run Forecast EPS Growth Rates

	Expected Signs	Pooled Coefficients: Industry Analysis	Strategy Analysis	Financial Analysis	Full Model
Intercept		0.0675	0.1511	0.0508	0.0438
		8.0781 **	15.1148 **	8.5300 **	5.1284 **
SL	+		0.0045		0.0015
			5.8545 **		2.7387 **
TS	+		0.0000		0.0000
			15.2214 **		3.0890 **
TCT	-		-0.0043		-0.0012
			-8.6678 **		-4.2098 **
P_PERF	+			8.3950	6.8275
				16.3750 **	15.6045 **
B_P	-			-0.0469	-0.0170
				-16.5461 **	-7.8949 **
CAPEX_HIST	+			10.1690	10.2981
				38.8040 **	41.9653 **
Automobiles & Components		0.0096			-0.0560 **
Banks		-0.0135 **			-0.0445 **
Capital Goods		0.0283 **			-0.0072
Commercial & Professional Services		0.1363 **			0.0601 **
Consumer Durables & Apparel		0.0310 **			-0.0695 **
Consumer Services		0.0342 *			-0.0286 **
Diversified Financials		0.0548 **			0.0238 **
Energy		0.1455 **			-0.0207 **
Food & Staples Retailing		0.0318 **			-0.0055
Food, Beverage & Tobacco		0.0756 **			0.0182 **
Health Care Equipment & Services		-0.0132 *			-0.0438 **
Household & Personal Products		0.0199 *			-0.0239 **
Insurance		0.0358 **			0.0077
Materials		0.1812 **			0.0919 **
Media		0.1093 **			0.0439 **
Pharmaceuticals, Biotechnology & Life Sciences		-0.0442 **			0.0003
Retailing		-0.0003			0.0110
Semiconductors & Semiconductor Equipment		-0.0292 **			-0.0134 *
Software & Services		0.3108 **			0.2022 **
Technology Hardware & Equipment		0.1906 **			0.0945 **
Telecommunication Services		0.1389 **			0.0631 **
Transportation		0.0548 **			-0.0102
Utilities		-0.0534 **			-0.0652 **
Adjusted R-squared		0.1104	0.0410	0.2454	0.4000
F-statistic		90.7952	64.4860	416.8294	360.8760
# of Obs.		22,596	22,596	12,878	12,878
Wald test F-stat		74.6730 **	115.2741 **	361.1767 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.
The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a maximum likelihood estimate of how close the unrestricted estimates are to satisfying the specified restrictions under the null hypothesis. A significant F-statistic indicates teh null hypothesis is rejected. Wald tests have been done on the specific forecasting framework analysis variables in each model only.

TABLE 8
Tests of the Association Between Analyst Forecast EPS Growth Rates and the Forecasting Framework for the Year by Year Samples over the Period 1985 - 2001

$$FC\_GR(j,t) = \alpha 0 + \beta 1\ Industry\ Codes(j,t) + \beta 2\ SL(j,t) + \beta 3\ TS(j,t) + \beta 4\ TCT(j,t) + \beta 5\ P\_PERF(j,t) + \beta 6\ B\_P(j,t) + \beta 7\ CAPEX\_HIST(j,t) + \varepsilon I$$
Equation (2)

Year by Year: Analyst forecast EPS growth rates

	Short Run Expected Signs	Panel A: 1 Year Ahead Implied EPS Growth Rate		Panel B: 2 Year Ahead Implied EPS Growth Rate		Long Run Expected Signs	Panel C: Long Run EPS Growth Rate	
		Bernard statistic	# years as expected & significant	Bernard statistic	# years as expected & significant		Bernard statistic	# years as expected & significant
Intercept		0.424		0.921			0.000 **	
SL	+	0.570	0/17	0.390	0/17	+	0.053	0/17
TS	+	0.036	0/17	0.649	0/17	+	0.962	2/17
TCT	-	0.207	0/17	0.023 *	1/17	-	0.003 **	0/17
P_PERF	-	0.000 **	0/17	0.000 **	0/17	+	0.000 **	0/17
B_P	-	0.000 **	2/17	0.000 **	12/17	-	0.075	3/17
CAPEX_HIST	-	0.007 **	0/17	0.749	1/17	+	0.020 *	0/17
Automobiles & Components		0.547		0.194			0.397	
Banks		0.953		0.015 *			0.029 *	
Capital Goods		0.672		0.658			0.254	
Commercial & Professional Services		0.751		0.125			0.006 **	
Consumer Durables & Apparel		0.682		0.704			0.104	
Consumer Services		0.871		0.553			0.019 *	
Diversified Financials		0.883		0.089			0.053	
Energy		0.661		0.572			0.053	
Food & Staples Retailing		0.983		0.273			0.012 *	
Food, Beverage & Tobacco		0.852		0.500			0.044 *	
Health Care Equipment & Services		0.853		0.053			0.059	
Household & Personal Products		0.781		0.915			0.751	
Insurance		0.835		0.006 **			0.168	
Materials		0.991		0.288			0.034 *	
Media		0.651		0.892			0.020 *	
Pharmaceuticals, Biotechnology & Life Sciences		0.701		0.878			0.035 *	
Retailing		0.780		0.995			0.002 **	
Semiconductors & Semiconductor Equipment		0.574		0.587			0.047 *	
Software & Services		0.537		0.088			0.000 **	
Technology Hardware & Equipment		0.745		0.222			0.000 **	
Telecommunication Services		0.649		0.000 **			0.000 **	
Transportation		0.338		0.074			0.076	
Utilities		0.995		0.015 *			0.092	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Bernard (1987) statistic measures the probability of the null hypothesis where each variables coefficients are equal to zero for the sample period. A significant Bernard statistic indicates the null hypothesis is rejected.

All accounting and analyst forecast variables are scaled by average total assets for firm j for year t. Industry codes are formed using primary GICS codes for firm j for year t. GICS code descriptions are included in Table 2. FC_GR is the analyst median consensus EPS growth rate forecast (or implied EPS growth rate for short run forecasts) for the relevant period for firm j for year t; EPS_HIST is the current historical diluted EPS for firm j for year t; SL is the science linkage measure for firm j for year t; TS is the technology strength measure for firm j for year t; TCT is the technology cycle time measures for firm j for year t; P_PERF is past EPS performance for firm j for year t; B_P is book to price ratio for firm j for year t; and CAPEX_HIST is the current net capital expenditure per share for firm j for year t.

TABLE 9
Tests of the Association Between Analyst Forecast EPS Errors and the Forecasting Framework for the Pooled Samples for the Period 1985 - 2001

$$FC\_EPS\_ERR\ (j,t) = \alpha 0 + \beta 1\ Industry\ Codes\ (j,t) + \beta 2\ SL\ (j,t) + \beta 3\ TS\ (j,t) + \beta 4\ TCT\ (j,t) + \beta 5\ P\_PERF\ (j,t) + \beta 6\ B\_P\ (j,t) + \beta 7\ CAPEX\_HIST\ (j,t) + \varepsilon I$$

Equation (3)

Panel A: 1 Year Ahead Forecast EPS Errors

	Expected Signs	Pooled Coefficients			
		Industry Analysis	Strategy Analysis	Financial Analysis	Full Model
Intercept		0.0097	0.0061	0.0054	0.0086
		3.8960 **	16.2528 **	14.8111 **	3.6476 **
SL	+		0.0001		0.0000
			3.7047 **		1.3787
TS	+		0.0000		0.0000
			9.5446 **		-1.3621
TCT	+		-0.0001		0.0000
			-3.7104 **		-1.4854
P_PERF	+			0.1747	0.1568
				10.9361 **	9.9886 **
B_P	+			0.0006	0.0011
				3.8354 **	7.2437 **
CAPEX_HIST	+			0.0010	0.0023
				0.9582	2.0006
Automobiles & Components		-0.0046			-0.0039
Banks		-0.0066 **			-0.0048
Capital Goods		-0.0038			-0.0030
Commercial & Professional Services		-0.0033			-0.0026
Consumer Durables & Apparel		-0.0031			-0.0023
Consumer Services		-0.0035			-0.0032
Diversified Financials		-0.0050			-0.0039
Energy		-0.0047			-0.0050
Food & Staples Retailing		-0.0061			-0.0051
Food, Beverage & Tobacco		-0.0050			-0.0040
Health Care Equipment & Services		-0.0021			-0.0015
Household & Personal Products		-0.0041			-0.0029
Insurance		-0.0059			-0.0050
Materials		-0.0054			-0.0047
Media		-0.0044			-0.0035
Pharmaceuticals, Biotechnology & Life Sciences		-0.0034			-0.0031
Real Estate		-0.0048			-0.0043
Retailing		-0.0037			-0.0028
Semiconductors & Semiconductor Equipment		-0.0023			-0.0014
Software & Services		-0.0006			0.0003
Technology Hardware & Equipment		-0.0015			-0.0009
Telecommunication Services		-0.0040			-0.0030
Transportation		-0.0045			-0.0040
Utilities		-0.0070 **			-0.0061 **
Adjusted R-squared		0.0751	0.0347	0.0485	0.0936
F-statistic		65.1520	60.8116	73.4057	61.5847
# of Obs.		31,617	31,617	27,003	27,003
Wald test F-stat		54.4586 **	55.9622 **	45.3504 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a maximum likelihood estimate of how close the unrestricted estimates are to satisfying the specified restrictions under the null hypothesis. A significant F-statistic indicates the null hypothesis is rejected. Wald tests have been done on the specific forecasting framework analysis variables in each model only.

TABLE 9
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Equation (3)

Panel B: 2 Year Ahead Forecast EPS Errors

	Expected Signs	Pooled Coefficients			
		Industry Analysis	Strategy Analysis	Financial Analysis	Full Model
Intercept		0.0076	0.0053	0.0040	0.0043
		3.0603 **	15.5862 **	11.9891 **	2.1017
SL	+		0.0001		0.0001
			3.2472 **		1.6946
TS	+		0.0000		0.0000
			10.1147 **		1.3766
TCT	+		-0.0001		0.0000
			-2.7474 **		-1.0488
P_PERF	+			0.2139	0.1884
				8.3469 **	7.7361 **
B_P	+			0.0012	0.0023
				6.1760 **	11.2514 **
CAPEX_HIST	+			0.0013	0.0015
				0.8721	0.8558
Automobiles & Components		-0.0020			-0.0005
Banks		-0.0056			-0.0024
Capital Goods		-0.0020			-0.0001
Commercial & Professional Services		-0.0012			0.0010
Consumer Durables & Apparel		-0.0010			0.0007
Consumer Services		-0.0025			-0.0008
Diversified Financials		-0.0042			-0.0018
Energy		-0.0031			-0.0021
Food & Staples Retailing		-0.0048			-0.0024
Food, Beverage & Tobacco		-0.0037			-0.0013
Health Care Equipment & Services		-0.0008			0.0010
Household & Personal Products		-0.0025			0.0000
Insurance		-0.0042			-0.0023
Materials		-0.0036			-0.0016
Media		-0.0036			-0.0013
Pharmaceuticals, Biotechnology & Life Sciences		-0.0020			-0.0002
Real Estate		-0.0036			-0.0019
Retailing		-0.0021			-0.0003
Semiconductors & Semiconductor Equipment		0.0009			0.0031
Software & Services		0.0010			0.0025
Technology Hardware & Equipment		0.0011			0.0026
Telecommunication Services		-0.0030			-0.0015
Transportation		-0.0026			-0.0009
Utilities		-0.0057			-0.0037
Adjusted R-squared		0.1070	0.0347	0.0255	0.1095
F-statistic		73.3604	46.7373	27.7350	52.9452
# of Obs.		24,157	24,157	19,425	19,425
Wald test F-stat		76.7503 **	51.3615 **	38.4081 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a maximum likelihood estimate of how close the unrestricted estimates are to satisfying the specified restrictions under the null hypothesis. A significant F-statistic indicates teh null hypothesis is rejected. Wald tests have been done on the specific forecasting framework analysis variables in each model only.

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Equation (3)

Panel C: Long Run Implied EPS Errors

	Expected Signs	Pooled Coefficients			
		Industry Analysis	Strategy Analysis	Financial Analysis	Full Model
Intercept		0.0109	0.0157	0.0074	0.0102
		7.9003 **	17.0556 **	10.0920 **	6.4689 **
SL	+		0.0002		0.0002
			3.4891 **		2.2745
TS	+		0.0000		0.0000
			14.5686 **		-1.6425
TCT	+		-0.0004		-0.0001
			-8.3761 **		-3.3790 **
P_PERF	+			0.8818	0.7888
				10.8179 **	10.5223 **
B_P	+			-0.0048	-0.0028
				-11.2345 **	-7.1403 **
CAPEX_HIST	+			1.0002	1.0092
				32.9620 **	34.4729 **
Automobiles & Components		0.0016			-0.0031
Banks		-0.0068 **			-0.0015
Capital Goods		0.0007			-0.0027
Commercial & Professional Services		0.0072 **			0.0010
Consumer Durables & Apparel		0.0057 **			0.0027
Consumer Services		0.0043 **			-0.0066 **
Diversified Financials		-0.0031			-0.0022
Energy		-0.0019			-0.0086 **
Food & Staples Retailing		-0.0042 **			-0.0082 **
Food, Beverage & Tobacco		-0.0019			-0.0062 **
Health Care Equipment & Services		0.0101 **			0.0034
Household & Personal Products		-0.0005			-0.0036
Insurance		-0.0044 **			-0.0031
Materials		-0.0023			-0.0054 **
Media		0.0007			-0.0029
Pharmaceuticals, Biotechnology & Life Sciences		0.0022			-0.0024
Retailing		0.0036 **			-0.0010
Semiconductors & Semiconductor Equipment		0.0141 **			0.0075 **
Software & Services		0.0179 **			0.0123 **
Technology Hardware & Equipment		0.0142 **			0.0071 **
Telecommunication Services		0.0090 **			0.0022
Transportation		0.0020			-0.0093 **
Utilities		-0.0075 **			-0.0091 **
Adjusted R-squared		0.1283	0.0430	0.2001	0.2798
F-statistic		86.3023	54.4114	261.6389	171.9031
# of Obs.		22,596	22,596	19,794	19,794
Wald test F-stat		96.9867 **	124.3441 **	448.1263 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.
The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. T-statistics are reported under each estimated coefficient, except for industry codes for brevity. The pooled estimations include fixed effects for years. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Wald test statistic is a maximum likelihood estimate of how close the unrestricted estimates are to satisfying the specified restrictions under the null hypothesis. A significant F-statistic indicates teh null hypothesis is rejected. Wald tests have been done on the specific forecasting framework analysis variables in each model only.

TABLE 10
Tests of the Association Between Analyst Forecast EPS Errors and the Forecasting Framework for the Year-by-Year Samples over the Period 1985 - 2001

FC_EPS_ERR (j,t) = α0 + β1 Industry Codes (j,t) + β2 SL (j,t) + β3 TS (j,t) + β4 TCT (j,t) + β5 P_PERF (j,t) + β6 B_P (j,t) + β7 CAPEX_HIST (j,t) + εI
Equation (3)

Year by Year: Analyst Forecast EPS Errors

	Short Run Expected Signs	Panel A: 1 Year Ahead EPS Absolute Forecast Error		Panel A: 2 Year Ahead EPS Absolute Forecast Error		Long Run Expected Signs	Panel C: Long Run Implied EPS Absolute Forecast Error	
		Bernard statistic	# years as expected & significant	Bernard statistic	# years as expected & significant		Bernard statistic	# years as expected & significant
Intercept		0.005 **		0.04 *			0.00 **	
SL	+	0.069	1/17	0.02 *	0/17	+	0.01 **	0/17
TS	+	0.098	0/17	0.12	1/17	+	0.27	0/17
TCT	+	0.085	0/17	0.01 *	0/17	+	0.00 **	0/17
P_PERF	+	0.000 **	12/12	0.00 **	7/17	+	0.00 **	11/17
B_P	+	0.023 *	7/12	0.00 **	11/17	+	0.00 **	0/17
CAPEX_HIST	+	0.748	0/17	0.91	1/17	+	0.00 **	17/17
Automobiles & Components		0.126		0.16			0.13	
Banks		0.012 *		0.12			0.40	
Capital Goods		0.235		0.18			0.26	
Commercial & Professional Services		0.276		0.03 *			0.32	
Consumer Durables & Apparel		0.378		0.02 *			0.05 *	
Consumer Services		0.236		0.74			0.00 **	
Diversified Financials		0.110		0.42			0.29	
Energy		0.027 *		0.23			0.00 **	
Food & Staples Retailing		0.033 *		0.14			0.00 **	
Food, Beverage & Tobacco		0.092		0.80			0.00 **	
Health Care Equipment & Services		0.617		0.03 *			0.22	
Household & Personal Products		0.270		0.23			0.06	
Insurance		0.038 *		0.12			0.21	
Materials		0.063		0.63			0.01 *	
Media		0.097		0.77			0.19	
Pharmaceuticals, Biotechnology & Life Sciences		0.106		0.73			0.06	
Retailing		0.248		0.42			0.95	
Semiconductors & Semiconductor Equipment		0.591		0.09			0.04 *	
Software & Services		0.712		0.00 **			0.00 **	
Technology Hardware & Equipment		0.721		0.00 **			0.00 **	
Telecommunication Services		0.017 *		0.21			0.32	
Transportation		0.138		0.56			0.00 **	
Utilities		0.015 *		0.01 *			0.00 **	

*,** Indicate significance at the 0.05 and 0.01 levels, respectively.

The standard errors are Newey-West adjusted to control for heteroscedasticity, in relation to autocorrelated disturbances with unspecified structures. Significance tests for the coefficients are two-tailed tests. All accounting and forecast variables are scaled by average total assets. The Bernard (1987) statistic measures the probability of the null hypothesis where each variables coefficients are equal to zero for the sample period. A significant Bernard statistic indicates the null hypothesis is rejected.

All accounting and analyst forecast variables are scaled by average total assets for firm j for year t. Industry codes are formed using primary GICS codes for firm j for year t. GICS code descriptions are included in Table 2. FC_EPS_ERR is the analyst median consensus EPS absolute forecast error (or implied EPS absolute forecast error for long run forecasts) for the relevant period for firm j for year t; EPS_HIST is the current historical diluted EPS for firm j for year t; SL is the science linkage measure for firm j for year t; TS is the technology strength measure for firm j for year t; TCT is the technology cycle time measures for firm j for year t; P_PERF is past EPS performance for firm j for year t; B_P is book to price ratio for firm j for year t; and CAPEX_HIST is the current net capital expenditure per share for firm j for year t.