INTERNATIONAL JOURNAL OF BUSINESS, 26(2), 2021 ISSN: 1083-4346

# The Effects of Recessions on Earnings Forecasts and Fundamental Signals

Sherwood Lane Lambert
*PhD, CPA*
*Associate Professor of Accounting*
*University of West Florida*
*llambert@uwf.edu*

**ABSTRACT**

We study the effects of the three recessions during 1990-2009 on analysts' next-year EPS forecasts. We find 10 of the 17 forecast-year/forecasted-year pairs studied have the expected inverse relationship between utilization of fundamental signals and forecast error rates when the forecast and forecasted years are outside the recessions' period ranges. Similarly, we find this inverse relationship exists for 2006-2007 and 2007-2008 that are wholly within The Great Recession timeframe. These results are consistent with an inverse relationship existing during periods of extended economic growth or prolonged recession that span the forecast reference year and the realization of the next-year, forecasted EPS. For 1991-1992 when the Gulf War Recession affected the 1991 fundamental signals, and 2001-2002 when the 9/11 Recession affected the 2001 fundamental signals, we find both forecast error rate and efficient utilization of the fundamental signals decreased. We find comparable results for analysts' long-term earnings growth forecasts.

*JEL Classification: G170*

*Keywords: macroeconomy, recession, fundamental signals, analysts, earnings forecasts, earnings relevance*

## I. INTRODUCTION

Between the Iran/Energy Crisis Recession during 1981-1982 and the most recent recession brought on by the COVID-19 pandemic beginning in 2020, three macroeconomic recessions occurred in the United States. These three are the Gulf War Recession from July 1990 to March 1991, the 9/11 Recession from March 2001 to November 2001, and the Great Recession from December 2007 to June 2009. We study how these three recessions may have affected the relationship between analysts' earnings forecasts accuracy and their efficient use of fundamental signals. We use the fundamental signals studied by Abarbanell and Bushee (1997) (henceforth, AB-97) and Lambert (2020) to study the impact of the recessions noted above. Data on the 2020 recession was not yet available in Compustat and I/B/E/S when we performed this study, and AB-97 began studying fundamental signals in 1983 after the 1981-1982 recession. Hence, our research covers the timeframe 1991 through 2008, when the last three recessions occurred before the 2020 COVID-19 recession. AB-97 showed that analysts did not efficiently use the studied fundamental signals when making their next-year earnings forecasts revisions during 1983-1990 and their long-term earnings growth forecast revisions during 1983-1987.

Beginning in 1991 and for each year through 2008, we use a modified version of AB-97's model to study the relationship between analysts' efficient use of the studied fundamental signals and their forecast accuracy rates. We evaluate how macroeconomic recessions may have affected this relationship. We find that analysts' earnings forecast error rates are inversely related to how efficiently analysts used fundamental signals, so long as no recession occurred during either the reference year before analysts' made their forecasts or the forecasted year when the earnings occurred. We also find evidence supporting this inverse relationship holding during extended recessions that contain the forecast and forecasted years. Hence, efficient use of fundamental signals improves analysts' next year earnings forecast accuracy when the forecasts and the forecasted earnings occur during prolonged economic growth or recession. However, we find evidence that making next-year earnings forecasts during a period of economic growth when an unforeseen recession occurs in the forecasted year alters the normal, inverse relationship between efficient use of fundamental signals and forecast accuracy. Similarly, making forecasts of next-year earnings during a recession when economic growth unexpectedly resumes during the forecasted year affects this normal inverse relationship. When these situations occur, an increase (decrease) in analysts' earnings forecast error rates unexpectedly accompanies an increase (decrease) in analysts' use of fundamental signals.

## II. BACKGROUND

Lev and Thiagarajan (1993) used the fundamental signals that security analysts had reported using in making their earnings forecasts and recommendations to test the value relevance of fundamental signals. Except for a slight variation in the definition of effective tax rate (ETR), AB-97 uses the same metric fundamental signals used by Lev and Thiagarajan (1993):

1. Inventory (INV)
2. Accounts Receivable (AR)
3. Gross Margin (GM)
4. Selling and Administrative Expenses (S&A)
5. Effective Tax Rate (ETR)
6. Labor Force (LF)
7. Capital Expenditures (CAPX)

Using the fundamental signals listed above and one-year-ahead earnings change computed as $EPS_{t+1} - EPS_t$ deflated by stock price at the end of year t – 1 (CHGEPS), AB-97 assessed security analysts' efficient use of these expert-guided fundamental signals in making next-year earnings forecast revisions and long-term growth forecast revisions just after the current year financial statements were released. AB-97 found that analysts used some but not all of the studied signals in making their next-year earnings forecast revisions and long-term growth forecast revisions.

Using managerial and financial accounting concepts, Lambert (2020) developed four additional fundamental signals:

1. Change in Free-Cash Flows (CHG_FCF)
2. Change in Market Share (CHG_MKTSHR)
3. Change in Total-Debt-to-Total Assets ratio (CHG_DEBT_AT)
4. Operating Leverage (OPERATING_LEVERAGE)

Using hierarchical regression, Lambert (2020) found that "current-year change in EPS" (CHGEPS), AB-97's seven metric signals, and Lambert (2020) four signals accounted for 74%, 16%, and 10% respectively in predicting "one-year-ahead earnings change" (CEPS1) for All-except-Services firms during 1991-2008. Lambert (2020) found that macroeconomic recessions that occurred during 2001 and 2007 substantially affect the sign, size, and significance of the beta coefficients when regressing "one-year-ahead earnings change" (CEPS1) on the studied fundamental signals in 2000 and 2006.

Fairfield, Sweeney, and Yohn (1996) found that generally accepted accounting principles (GAAP) for disaggregating earnings in the income statement improves the accuracy of forecasts of firms' future profitability. There is incremental predictive content for the average firm from disaggregating earnings into operating income (gross margin, selling, general and administrative expenses, depreciation expense, interest expense, and minority income), non-operating income, and income taxes, special items, and discontinued operations. Further disaggregation does not improve forecasts of one-year-ahead return on equity (ROE).

Lambert et al. (2019) discovered that analysts' average time to make their next-year and next-quarter EPS forecasts following the filing of 10-K and 10-Q reports significantly and permanently shortened post-eXtensible business reporting language (XBRL) as compared to pre-XBRL. This finding is consistent with analysts using financial statements in making their earnings forecasts. However, the results show analysts' forecast accuracy has not significantly increased post-XBRL. Pae and Yoon (2012) showed that forecasting cash flows is not the same as forecasting earnings, and cash flow-specific information improves cash flow forecasting accuracy. Jung, Keeley, and Ronen (2019) demonstrated that the predominant long-term forecast made by analysts is two-year-ahead EPS estimate, and two-year-ahead EPS estimates set market expectations for firms' future earnings. Subsequent revisions to these estimates are highly correlated with contemporaneous changes in stock prices. Bochkay and Levine (2019) combined narrative disclosures in the Management Discussion and Analysis (MD&A) Section of 10-K reports with financial variables to generate explicit firm-level forecasts of 1-year-ahead ROE. They found that models enhanced with MD&A disclosures are more accurate than models using quantitative financial variables alone.

Yao (2015) found that analysts' future earnings forecasts are less accurate for firms reporting losses in the current year as compared to analysts' forecasts for firms showing a profit in the current year. Firms reporting losses have increased over time. Hayn (1995) showed that firms with continuing net losses are not going concerns because investors have a liquidation option. Hence, current losses are less relevant than current profits for forecasting future earnings. Joos and Plesko (2005) determined that investors consider each loss's causes and nature, such as research and development (R&D) expense, when forecasting future firm value. Klein and Marquardt (2006) showed that nonaccounting factors such as small firm size and macroeconomic business cycle recessions are the predominant factors in explaining accounting losses. Darrough and Ye (2007) found that some firms report losses because their revenues are permanently declining while others report losses because they make substantial investments in intangible assets such as human capital and research and development. Analysts are more likely to cover firms that are likely to access the capital markets to fund their growth in the future.

Brown et al. (1987) and O'Brien (1988) documented that analyst earnings forecasts outperform the earnings forecasts generated from statistical time-series models because analysts utilize financial statement information and economic and other information beyond the financial statements more efficiently than the time-series models. Ciftci, Mashruwala, and Weiss (2016) demonstrated that considering the variability and stickiness of costs improves analysts' earnings forecasts, especially when sales decline. Understanding a firms' cost behavior is important in predicting the firm's future expenses and future earnings. Banker and Chen (2006) said understanding cost behavior is one of the most important aspects of profit analysis for managers. Central to the cost-volume-profit analysis discussed in most managerial accounting textbooks is the traditional model of fixed and variable costs. Weiss (2010) revealed that firms with stickier cost behavior have less accurate analysts' earnings forecasts than firms with less sticky cost behavior. Beaver et al. (2008) determine that forecast errors and forecast revisions significantly affect stock prices, indicating each conveys information content. Wahab, Teitel, and Morzuch (2017) studied analysts' use of fundamental signals when a forecasting firm's next-quarter EPS and find that sales and cost of sales are relevant in explaining next-quarter EPS changes. Whereas whisperers evaluate both cash flow fundamentals and accrual-based earnings measures, analysts consider only cash flow fundamentals. Neither analysts nor whisperers fully utilize fundamental signals in making their forecasts, but whisperers' earnings forecasts have higher explanatory power than that of analysts. Wieland (2011) observed that consensus analysts' forecasts incorrectly predict that one-year-ahead annual earnings will increase by 28.9% during 1992–2005. They develop an empirical model that predicts when analysts' forecasts will correctly forecast the direction of the change in next-year earnings by using the information in analysts' characteristics, firms' earnings predictability, and fundamental analysis of firms' earnings growth. Wahlen and Wieland (2011) found that share prices and consensus recommendations alone do not contain the financial statement information that helps predict future earnings changes.

## III. HYPOTHESES

We consider how macroeconomic recessions may affect the expected inverse relationship between security analysts' percent utilization of fundamental signals and the accuracy of their next-year EPS forecasts and long-term growth projections. An unforeseen recession in the future period when the forecasted earnings occur may alter the earnings relevance of the reference-year fundamental signals and adversely affect the analysts' earnings forecast accuracy. Similarly, a recession in the reference year may affect the earnings relevance of fundamental signals in predicting earnings in the future year when unexpected economic growth resumes. In periods of extended economic growth, reference-year fundamental signals' earnings relevance may benefit from a generally consistent macroeconomy during the forecast and forecasted periods. Similarly, in periods of a prolonged recession, the earnings relevance of recession-impacted fundamental signals are consistent with predicting future earnings that are also recession-impacted. Both extended periods of economic growth and prolonged recessions span the forecast and forecasted years and have fundamental signals and forecasted earnings within a similar macroeconomy context. However, a recession in the reference year combined with an unforeseen economic recovery in the forecast period or vice versa can disrupt the earnings relevance of fundamental signals built from reference year financial statements. These considerations lead to the following hypothesizes:

*Hypothesis 1: During periods of prolonged macroeconomic growth or recession that span the reference-year for earnings forecasts and the future year when the forecasted earnings occur, the error rates of analysts' earnings forecasts vary inversely with analysts' percent utilization of fundamental signals.*

*Hypothesis 2: When an unforeseen macroeconomic recession occurs in the future year when forecasted earnings occur but not in the reference-year shortly before analysts make their earnings forecasts, or when a recession happens during the reference year, but there is an unexpected economic recovery in the forecasted year, analysts' forecast error rates increase (decrease) even when analysts' utilization of fundamental signals increases (decreases).*

## IV. METHODOLOGY

This research builds upon AB-97's methodology for testing security analysts' efficient use of the studied fundamental signals in making their one-year EPS forecast revisions during 1991-2008 and making their long-term growth forecast revisions 1991-2004. Following are the modifications that this study made to the AB-97 methodology for assessing security analysts' efficient use of the fundamental signals:

1. I/B/E/S Detail forecasts are used, rather than the I/B/E/S Summary forecasts used by AB-97, in the forecast revision dependent variables, which are "one-year-ahead

forecast revisions" (FY1+1), FY1+5, and LTG+1). We made this revision because there is some question about the exact cutoff dates used in computing the I/B/E/S Summary forecasts. I/B/E/S determines a summary forecast at each "statistical period" (I/B/E/S item "STATPER") date. The concern is that the Summary forecast may consist of more than just those Detail forecasts made during the 30 days studied, such as the "+1" 30-day period that began one month after the reference year earnings announcement. In computing values for the AB-97 dependent variables for "one-year-ahead forecast revisions" (FY1+1) and FY1+5, a 30-day average of the I/B/E/S Detail forecasts is used rather than the I/B/E/S Summary forecasts. Using the I/B/E/S Detail forecasts allows for a more precise determination of the individual analysts' forecasts made for a given company within the 30-day period studied. An average of Detail forecasts was also used instead of Summary forecasts in computing the AB-97's "Long-Term Growth Forecasts during Three Months Beginning One Month after the Current-Year Earnings Announcement" (LTG+1) dependent variable. However, we used 90 days to capture Detail long-term growth forecasts for computing an average of the long-term growth forecasts. The 90-day period increased the likelihood of capturing at least one long-term Detail forecast. This extra time is especially important when capturing Detail long-term forecasts made during the period that began eleven months before the reference-year earnings announcement date because there are typically fewer forecasts made during this earlier period.

2. Using the AB-97 analysts' forecast revision dependent variables such as "one-year-ahead forecast revisions" ($FY1^{+1}$), a method is developed for computing the percent of security analysts' utilization of the studied fundamental signals when making their earnings forecast revisions. In essence, percent of utilization is computed by dividing the adjusted R-square from regressing the analysts' forecast revision dependent variable (for example, "one-year-ahead forecast revisions" $FY1^{+1}$) by the adjusted R-square from regressing the future earnings change dependent variable (for example, "one-year-ahead earnings change" CEPS1) when the *same* firms and fundamental signals are used for both the regressions. The firms used in both regressions are determined not only by requiring that all of the fundamental signals exist (are nonzero) but also that both the forecast revision dependent variable (DV) and the future earning change DV exist. For example, we determine the set of firms for the year studied that have a nonzero "one-year-ahead earnings change" (CEPS1) DV *and that also have* a nonzero "analysts' "one-year-ahead forecast revisions" ($FY1^{+1}$) DV. We then remove extreme values and outliers. The firms that remain are the group of firms that are used in both the "one-year-ahead earnings change" (CEPS1) and "one-year-ahead forecast revisions" ($FY1^{+1}$) regressions, where CEPS1 is first regressed on the fundamental signals using these firms, and then $FY1^{+1}$ is regressed on these same fundamental signals using these same firms. With each DV having been regressed using the same signals and sample of firms, the adjusted R-square from the $FY1^{+1}$ regression can be symmetrically compared to the adjusted R-square from the "one-year-ahead earnings change" (CEPS1) regression. The FY1+1 adjusted R-square ratio to the CEPS1 adjusted R-square measures the analysts' percent utilization of the fundamental signals in making their forecast revisions.

3. In contrast to the methodology discussed in the preceding paragraph 2, AB-97 first regress "one-year-ahead earnings change" (CEPS1) on all of the firms that have at least one analysts EPS forecast made one month following the earnings announcement, regardless of whether or not an eleven-month, prior analysts forecast also exists, as is required for "one-year-ahead forecast revisions" ($FY1^{+1}$) to exist. AB-97 then regress $FY1^{+1}$ on the set of firms for which $FY1^{+1}$ does exist and then compare the size and significance of each of the regression coefficient estimates from the "one-year-ahead earnings change" (CEPS1) regression to the corresponding coefficients from the "one-year-ahead forecast revisions" ($FY1^{+1}$) regression. $FY1^{+1}$ is not computable if no analysts' forecasts exist for the period *before* the earnings announcement date, even if analysts' forecasts exist *after* the earnings announcement date. As such, AB-97 regress "one-year-ahead forecast revisions" ($FY1^{+1}$) on a subset of the firms used in their "one-year-ahead earnings change" (CEPS1) regression. Changing the mix of firms used in these regressions can affect not only the adjusted R-square but also the coefficient estimates. Regressing CEPS1 and $FY1^{+1}$ on the same set of firms allows for a more symmetrical comparison of the two regressions' results. We perform the same analyses for "CEPS1-to-FY1+5" and "CEPSL-to-LTG+1."

4. This study also identifies the number of years out of the 18 years studied that each signal was significant in the "one-year-ahead earnings change" (CEPS1) regression (alpha = .05) but was not significant in the "one-year-ahead forecast revisions" (FY1+1) regression. The nonzero counts are reported for each signal, indicating specific fundamental signals that the analysts might use more efficiently.

5. We compute Actual error in a security analyst's earnings forecast using the difference between analysts' earnings forecasts and the actual earnings realized. The analysts' forecasts used to measure the percent efficient utilization of the studied signals are also used to calculate the average actual percent forecast error rates. With this approach, we use the same analysts' forecasts in computing both the average actual forecast error rate and the average percent of efficient utilization of the signals. We then compare these two measurements to analyze the expected association of lower signal use to higher actual forecast error rate and vice versa.

### A. Data Sources

We obtained the financial statement data used in this study from the Wharton Research Data Services (WRDS) Compustat "North America Fundamentals Annual - updated monthly. We used the security analysts' forecast data in WRDS I/B/E/S "Detail History - Detail File with Actuals." For evaluating security analysts' efficient use of the fundamental signals and measuring actual forecast error rates, the studied firms had to be North American firms with the required analysts' next-year forecasts or long-term growth forecasts recorded in I/B/E/S in addition to having their annual financial statement information recorded in Compustat. We studied only annual reporting periods and long-term growth; we did not evaluate quarterly financial statements and forecasts. We included firms regardless of their fiscal year; there was no requirement that a firm's fiscal year matched the calendar year.

### B. Dependent Variables

AB-97 defines CEPS1 as "one-year-ahead earnings change" computed as $EPS_{t+1}$ - $EPS_t$ deflated by the stock price at the end of year t-1. AB-97 specifies CEPSL as "long-term earnings growth" calculated as the geometric mean rate of growth between year t and t+5. AB-97 calculates analysts' forecast revisions using I/B/E/S consensus forecasts of one-year-ahead earnings and five-year earnings growth. For compatibility with "one-year-ahead earnings change" (CEPS1), AB-97 identifies "one-year-ahead forecast revisions" ($FY1^{+1}$) as the difference between the forecast of CEPS1 outstanding *one* month after the announcement of year t earnings and the forecast of CEPS1 that was outstanding 12 months earlier. AB-97 defines "one-year-ahead forecast revisions" ($FY1^{+5}$) as the difference between the forecast of "one-year-ahead earnings change" (CEPS1) outstanding *five* months after the announcement of year t earnings and the forecast of CEPS1 that was outstanding 12 months earlier. AB-97 based the revisions on forecasts issued one month after the earnings report ($FY1^{+1}$) and five months after the earnings report ($FY1^{+5}$) to ensure that it was possible for analysts to calculate the fundamental signals at the date of the revisions. $FY1^{+1}$ ($FY1^{+5}$) is the forecast revision of one-year-ahead earnings, deflated by the stock price at the end of year t-1, made during the one-month timeframe (five-month timeframe) following the earnings announcement date. AB-97 specifies $LTG^{+1}$ as the forecast revision of the long-term growth rate in earnings made during the one-month timeframe following the earnings announcement date. In this study, "one-year-ahead forecast revision ($FY1^{+1}$) and ($FY1^{+5}$) are computed as defined in AB-97 Table 1, except we use the one-month average of the *Detail* IBES forecasts instead of *Summary* IBES forecast. Our Long-Term Growth Forecast Revision ($LG1^{+1}$) is as defined in AB-97 Table 1, except we use a three-month average of the *Detail* IBES forecasts instead of the *Summary* IBES forecast taken from one month.

### C. Independent Variables

AB-97 defines CHGEPS as is the change in earnings per share between years t-1 and t (contemporaneous with the fundamental signals) deflated by the stock price at the end of year t-1. The independent variables used in this study are AB-97's "change in current-year EPS" (CHGEPS), AB-97's seven expert-guided fundamental signals (INV, AR, GM, S&A, ETR, LF, and CAPX), and Lambert (2020) four, concept-guided fundamental signals (CHG_FCF, CHG_MKTSHR, CHG_DEBT_AT, and OPERATING_LEVERAGE). AB-97's independent variables are defined in AB-97's Table 1, and Lambert (2020) independent variables are defined in Lambert (2020) Table 2.

## V. RESULTS FROM TESTING ANALYSTS' UTILIZATION OF FUNDAMENTAL SIGNALS

### A. Next-Year Forecasts Made in the First Month after Current-Year Earnings Release

As discussed in Methodology, we compute security analysts' percent efficient use of signals when making their "One-Year-Ahead Forecast Revisions Made One Month after Earnings Announcement" (FY1+1) for a given year as the ratio of adjusted R-square from the "one-year-ahead earnings change" (CEPS1) regression to the adjusted R-square from the FY1+1 regression. We use the same firms in both regressions. Table 1 reports the average results for 1991-2008, where for each year, we regress CEPS1 on the full model of fundamental signals ("current-year change in EPS" CHGEPS, AB-97 seven metric signals, and Lambert (2020) four signals) for the firms that had both a nonzero "one-year-ahead forecast revisions" (FY1+1) value and a nonzero "one-year-ahead earnings change" (CEPS1) value. Then, we regress FY1+1 on the same full model of fundamental signals, using the same firms used in the CEPS1 regression. Table 1 reports the average adjuster R-square values from the yearly CEPS1 regressions was 0.091, and the average adjusted R-square values from the annual "one-year-ahead forecast revisions" (FY1+1) regressions was .050. Hence, security analysts' average percent utilization of "current year change in EPS" (CHGEPS) and the studied Fundamental Signals is 55% (.050 divided by 0.091). On average, the security analysts used 55% of the explanatory/predictive power available to them through the studied full-model of fundamental signals when making their next-year EPS forecast revision during the 30-days beginning one month after the earnings announcement for the reference year.

**Table 1**

Analysts' Avg. Percent Use of Fundamental Signals in Making Their Next-Yr EPS Forecast Revisions One Month after the Current-Yr Earnings Announcement ($FY1^{+1}$)

(Avg. Adj. R2 for $FY1^{+1}$) / (Avg. Adj. R2 for CEPS1) = Utilization Percent

Same Firms Used in Regressions on CEPS1 and on $FY1^{+1}$

| "One-year-ahead earnings change" (CEPS1) Regression Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Fundamental Signals (Independent Variables or "Signals") | Avg. Beta | Avg. Sig. | Total # Yrs Sig. at alpha = .05 | Total # Yrs Sig. at alpha = .10 | # NEG | # NEG SIG ** | # POS | # POS SIG** |
| (Constant) | 0.002 | 0.239 | 11 | 1 | 6 | 3 | 12 | 8 |
| CHGEPS | -0.204 | 0.052 | 12 | 2 | 17 | 12 | 1 | 0 |
| INV | -0.008 | 0.354 | 6 | 1 | 13 | 6 | 5 | 0 |
| AR | 0.005 | 0.546 | 2 | 0 | 6 | 0 | 12 | 2 |
| GM | -0.020 | 0.392 | 4 | 3 | 13 | 4 | 5 | 0 |
| S&A | -0.016 | 0.361 | 4 | 2 | 12 | 2 | 6 | 2 |
| ETR | -0.230 | 0.296 | 6 | 1 | 14 | 6 | 4 | 0 |
| LF | -0.015 | 0.384 | 4 | 1 | 12 | 4 | 6 | 0 |
| CAPX | 0.003 | 0.431 | 3 | 1 | 7 | 1 | 11 | 2 |
| CHG_FCF | 0.000 | 0.461 | 2 | 0 | 7 | 1 | 11 | 1 |
| CHG_DEBTAT | 0.026 | 0.308 | 7 | 1 | 2 | 0 | 16 | 7 |
| CHG_MKTSHR | -0.009 | 0.462 | 2 | 1 | 11 | 2 | 7 | 0 |
| OL | 0.000 | 0.521 | 3 | 0 | 8 | 2 | 10 | 1 |
| Avg. Adj. R2 from annual regressions on CEPS1 | | | | | | 0.091 | | |
| Avg. Annual Durbin-Watson | | | | | | 1.960 | | |

Analysts Next-Year EPS Forecast Revisions ($FY1^{+1}$) Regression Results

| Fundamental Signals (Independent Variables or "Signals") | Avg. Beta | Avg. Sig. | Total # Yrs Sig. at alpha = .05 | Total # Yrs Sig. at alpha = .10 | # NEG | # NEG SIG ** | # POS | # NEG SIG ** | # SIG** CEPS1 but not SIG** $FY1^{+1}$ | # Sign <> |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | -0.004 | 0.225 | 11 | 0 | 13 | 10 | 5 | 1 | ------ | ----- |
| CHGEPS | -0.012 | 0.305 | 4 | 0 | 12 | 3 | 6 | 1 | 9 | 4 |
| INV | -0.001 | 0.426 | 2 | 1 | 14 | 2 | 4 | 0 | 5 | 1 |
| AR | 0.004 | 0.353 | 4 | 0 | 1 | 0 | 17 | 4 | 2 | 0 |
| GM | -0.001 | 0.238 | 7 | 2 | 9 | 3 | 9 | 4 | 3 | 0 |
| S&A | -0.002 | 0.407 | 4 | 1 | 11 | 2 | 7 | 2 | 3 | 1 |
| ETR | -0.015 | 0.327 | 5 | 1 | 11 | 4 | 7 | 1 | 6 | 1 |
| LF | -0.001 | 0.513 | 3 | 1 | 11 | 2 | 7 | 1 | 2 | 0 |
| CAPX | 0.001 | 0.401 | 1 | 5 | 5 | 0 | 13 | 1 | 3 | 1 |
| CHG_FCF | 0.000 | 0.398 | 1 | 2 | 9 | 1 | 9 | 0 | 2 | 1 |
| CHG_DEBT AT | 0.005 | 0.446 | 2 | 2 | 4 | 0 | 14 | 2 | 6 | 2 |
| CHG_MKTSHR | 0.000 | 0.349 | 6 | 1 | 8 | 2 | 10 | 4 | 2 | 0 |
| OL | 0.000 | 0.375 | 4 | 1 | 10 | 4 | 8 | 0 | 2 | 0 |
| Total number of occurrences where signal is sig. ** for CEPS1 but is not sig. for $FY1^{+1}$: | | | | | | | | | **45** | |
| Avg. Adj. R2 from annual regressions on $FY1^{+1}$ | | | | | | | | | 0.050 | |
| Avg. Durbin Watson from annual regressions | | | | | | | | | 1.986 | |
| Avg. # of Firms per Year (same firms used in CEPS1 and $FY1^{+1}$ annual regressions) | | | | | | | | | 365 | |
| Analysts' Avg. % Use of Fundamental Signals | | | | | | | | | **55%** | |
| Analysts' Avg. Actual Mean Error Percent | | | | | | | | | **101%** | |
| Std. Dev. Of Analysts' Avg. Actual Error Percent | | | | | | | | | 43% | |

Table 1 also provides for each fundamental signal a count of the years where the signal was a significant predictor of "one-year-ahead earnings change" (CEPS1) but was not a significant predictor of "one-year-ahead forecast revisions" (FY1+1). These counts offer insight into the specific signals the analysts may have underutilized. Table 1 shows a total of 45 instances where a signal was significant in predicting "one-year-ahead earnings change" (CEPS1) during a year but was not significant in predicting "one-year-ahead forecast revisions" (FY1+1). The most underutilized signals were "Effective Tax Rate" (ETR) and "Change in Total-Debt-to-Total Assets ratio" (CHG_DEBT_AT). These two signals each have six-of-eighteen years studied where the signal significantly predicted "one-year-ahead earnings change" (CEPS1) but was not a significant predictor of "one-year-ahead forecast revisions" (FY1+1). Table 1 also shows that "Inventory" (INV) was not used efficiently in five-of-eighteen years studied.

In addition to computing analysts' annual efficient signal utilization percent, we compute the mean of the actual analysts' forecast error percent for each year, also called the "actual forecast error rate." Table 1 reports the 18-year average of the analysts' yearly actual forecast error rate in predicting next-year ESP was 101%, with a standard deviation of 43%. The annual actual forecast error rate is the mean of the absolute value of analysts' forecast error percent for each of the firms studied (the firms in the average 365 reported in Table 1) in forecasting the EPS for the next year during the month beginning one month after the reference (current) year earnings announcement. For a given firm i and reference year t, we compute the analysts' forecast error percent in making their forecasts for EPS(t+1) during one month after firm i announced its year t earnings as:

*Actual Forecast Error Percent (i, t) =*
*| [Actual EPS(i, t+1) – Analyst's Detail EPS (t+1) forecast made during the month beginning one month after the earnings announcement for year t] / Actual EPS (i, t+1) |*

In the formula above, Actual EPS(i, t+1) is the "ACTUAL" data item in I/B/ES. In I/B/E/S, most of the analysts' Detail EPS forecasts for the next year are accompanied by the ACTUAL data item, which is EPS that the firm realized and reported in its financial statements. The mean of Actual Forecast Error Percent (i, t) for all i firms provides the mean actual forecast error percent for reference year t. The 18-year average of these yearly means is 101%, as reported in Table 1.

More efficient utilization of financial statement information should help analysts to make more accurate earnings forecasts. During periods of macroeconomic stability, analysts' forecast errors should decrease with increased use of fundamental signals and vice versa. This relationship should hold during times of stable economic growth. In a prolonged recession, analysts can adjust their earnings forecast based on the changed macroeconomy using fundamental signals based on financial statement data filed during the recession when forecasting earnings for the next year that is still in the recession. However, in times of recession occurring in the year when the forecasts were made but not in the forecasted next year, or vice versa, fundamental signals based on historical financial statement data may be less effective in predicting future earnings. For example, the best random walk formula for predicting sales in a future period may lose accuracy in predicting future sales when a recession occurs in the future period.

Figure 1 provides the annualized results from Table 1 and tabulates and graphically depicts security analysts' actual average forecast error rates when forecasting next-year EPS and the analysts' percent efficient utilization of the studied fundamental signals for each year during 1991 through 2008. Table 1 summarizes next-year EPS forecasts made during the month that began one month after the reference-year earnings announcement (dependent variable "one-year-ahead forecast revisions" FY1+1). Between the Iran/Energy Crisis Recession in 1981-1982 and the 2020 COVID-19 Recession in 2020, three macroeconomic recessions occurred in the United States, as shown in Figure 2 (Barufaldi and Chappelow, 2020). We hypothesize that the three macroeconomic recessions shown in Figure 2 had a confounding effect on the relationship between signal utilization and forecast accuracy.

**Figure 1**
Analysts' Annual Utilization of Fundamental Signals and Forecast Accuracy for Forecasting Next-Year EPS within One Month after the Current Year Earnings Release
1991 – 2008

| Year | Forecast Error Rate | Utilization of Signals | Change in Error Rate from Prior year | Change in Utilization Rate From Prior Year |
|---|---|---|---|---|
| 1991 | 83% | 7% | | |
| 1992 | 81% | 0% | -2% | -7% |
| 1993 | 74% | 97% | -7% | 97% |
| 1994 | 89% | 53% | 15% | -44% |
| 1995 | 165% | 51% | 76% | -2% |
| 1996 | 64% | 59% | -101% | 8% |
| 1997 | 209% | 7% | 145% | -52% |
| 1998 | 71% | 79% | -138% | 72% |
| 1999 | 65% | 92% | -6% | 13% |
| 2000 | 163% | 49% | 98% | -43% |
| 2001 | 89% | 66% | -74% | 17% |
| 2002 | 51% | 63% | -38% | -3% |
| 2003 | 64% | 50% | 13% | -13% |
| 2004 | 79% | 98% | 15% | 48% |
| 2005 | 87% | 97% | 8% | -1% |
| 2006 | 61% | 75% | -26% | -22% |
| 2007 | 112% | 51% | 51% | -24% |
| 2008 | 115% | 4% | 3% | -47% |
| Average: | 101% | 55% | 2% | 0% |

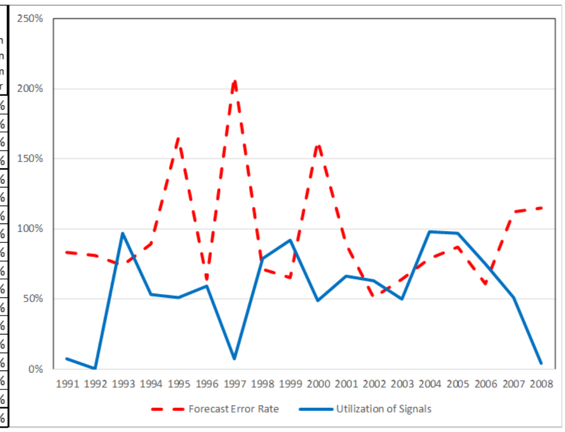



**Figure 2**
Recessions that Occurred in the United States Between 1983 and 1999

| Name | Period Range | Duration (months) | Peak unemployment | GDP decline |
|---|---|---|---|---|
| The Gulf War Recession | July 1990–Mar 1991 | 8 months | 6.80% | −1.5% |
| The 9/11 Recession | Mar 2001–Nov 2001 | 8 months | 5.50% | −0.3% |
| The Great Recession | Dec 2007–June 2009 | 18 months | 10.0% | −4.3% |

Figure 1 shows that 10 of the 17 from-year/to-year pairs studied have a decrease (increase) in the analysts' efficient utilization of the studied fundamental signals accompanied by an increase (decrease) in analysts' forecast error rates *and* are outside the "Period Ranges" of the three recessions shown in Figure 2. These 10 pairs of years are: 1992-1993, 1993-1994, 1994-1995, 1995-1996, 1996-1997, 1997-1998, 1998-1999, 1999-2000, 2002-2003, and 2004-2005. These ten gray-shaded pairs of years occur *outside* the timeframes of the three recessions listed in Figure 2. This evidence supports Hypothesis 1 that analysts forecast error rates decrease (increase) with more (less) efficient use of the fundamental signals and vice versa during periods of macroeconomic growth when not affected by macroeconomic recessions. We next consider the remaining seven from-year/to-year pairs shown in Figure 1, which are: 1991-1992, 2000-2001, 2001-2002, 2003-2004, 2005-2006, 2006-2007, and 2007-2008.

The first pair, 1991-1992, includes 1991 that intersects with the Gulf War Recession that happened during July 1990 - March 1991. This pair shows a -2% decrease in forecast error rate and a -7% decrease in utilization of the signals when analysts forecasted 1992 earnings in 1991. This evidence is consistent with the eight-month Gulf War Recession having affected the expected inverse relationship between analysts' use of the 1991 fundamental signals (based on the recession-impacted 1991 financial statements) in 1991 when forecasting 1992 EPS, thereby reducing the accuracy of their 1992 EPS forecasts.

For 2001-2002, Figure 1 indicates a -38% decrease in error rate for analysts' forecasting 2002 from 2001 accompanied by a -3% decrease in analysts' efficient utilization of the fundamental signals. The 9/11 Recession from March 2001 to November 2001, shown in Figure 2, occurred when analysts used fundamental signals based on 2001 financial statements to forecast 2002 earnings. The evidence is consistent with the 9/11 Recession having impacted the expected inverse relationship between utilization of signals and forecast accuracy when analysts made their 2002 earnings forecasts in 2001.

During 2005-2006, Figure 1 indicates a -26% percent decrease in forecast error rate and a -22% decrease in analysts' utilization of the fundamental signals. This 2005-2006 period is before The Great recession that Figure 2 shows began in December 2007 and lasted 18 months until June 2009. Our evidence is consistent with Hypothesis 2, with analysts not expecting the coming recession in 2005 when forecasting 2006 earnings, and the worsening of economic conditions that preceded The Great Recession affecting 2006 earnings. Evidence that the economic downturn began in 2006 before the Great Depression's official start in December 2007 is that real GDP growth rate decreased from 3.5% in 2005 to 2.9% in 2006 as the US Federal Reserve raised interest rates in 2006.

For 2000-2001, the 9/11 Recession occurred for eight months in 2001, but Figure 1 shows forecast error rates decreased by -74% while signal utilization increased by 17% from 2000 to 2001. As discussed above, the impact of the 9/11 Recession is seen in the next year, 2002. This result might be explained by the timing of the impact of a relatively brief recession that begins and end in less than one year. Our findings show that the 9/11 Recession's impact on the relationship we study occurred in the year following the recession year rather than before it.

Figure 1 shows the analysts' forecast error rate from 2006-2007 increased by 51%, while analysts' efficient employment of the fundamental signals decreased by -24%. Figure 1 also indicates that analysts' forecast error rate from 2007-to-2008 increased by 3%, while the analysts' efficient use of the fundamental signals decreased by -47%. The 2006-2007 and 2007-2008 periods intersected with the period range of The Great Recession from December 2007 to June 2009, as shown in Table 2. These results are consistent with Hypothesis 1 that states that analysts' earnings forecast accuracy is the expected inverse relationship between analysts' efficient utilization of fundamental signals and forecast accuracy rates during periods of a prolonged recession. Analysts were aware of the recession when making their 2007 and 2008 earnings forecasts, they used fundamental signals based on recession-impacted 2006 and 2007 financial statements, and the recession would continue past the realization of the earnings for 2007 and 2008.

In summary, our results in Figure 1 support Hypothesis 2, with "forecast error rate *decreasing* with the utilization of signals *decreasing*" when the forecast-year/forecasted-year pair overlaps with or is close to the Period Range of the associated recession shown in Figure 2. We observe this result for 1991-1992 associated with the Gulf War Recession of 1991-1992, 2001-2002 associated with the 9/11 recession of 2001, and 2005-2006 associated with The Great Recession of 2007-2009 (percent changes shown in bold in Figure 1). Except for 2003-2004, the results in Figure 1 for the other forecast-year/forecasted-year pairs support Hypothesis 1, showing the expected inverse relationship between forecast error rate and utilization of fundamental signals during years of macroeconomic (GDP) growth and during the prolonged Great Recession that spanned multiple years. The 2003-2004 pair is peculiar in that it is the *only one* of the 17 pairs studied that has "forecast error rate *increasing* with the utilization of signals *increasing*." Real GDP increased from $13.879 trillion in 2003 to $14.913 trillion in 2004 with no associated recession, so we expect Hypothesis 1 to hold. We find no macroeconomic information to explain the 2003-2004 anomaly.

### B. Next-Year Forecasts Made in the Fifth Month after Current-Year Earnings Release

AB-97's "One-Year-Ahead Forecast Revisions Made Five Months after Earnings Announcement" ($FY1^{+5}$) is essentially the same as "One-Year-Ahead Forecast Revisions Made One Month after Earnings Announcement" ($FY1^{+1}$), except $FY1^{+5}$ measures analysts' next-year EPS forecast revisions made in the 30-day period that began *five* months (rather than *one* month used with $FY1^{+1}$) after the reference year earnings announcement date. Like $FY1^{+1}$, $FY1^{+5}$ is computed in this study using an average of I/B/E/S Detail Forecasts for a month, rather than using the I/B/E/S Summary forecasts used in AB-97, but otherwise, $FY1^{+5}$ used in this study is as defined by AB-97. With $FY1^{+5}$, the analysts have had five months to digest the reference-year signals, as compared to one month with $FY1^{+1}$.

The same methodology used to produce the results reported in Table 1 for $FY1^{+1}$ is also used in producing the results reported in Table 2 for $FY1^{+5}$ that shows Averages for Annual Regressions for 1991-2008. As with the CEPS1-to-$FY1^{+1}$ analysis, the same treatment for extreme values and outliers was performed, the same set of firms used in a year's "one-year-ahead earnings change" (CEPS1) regression were also used in the year's $FY1^{+5}$ regression, and the same full model of independent variables was used in both regressions.

On average, Table 2 indicates that analysts were 45% efficient in using the studied fundamental signals when they made their next-year EPS forecast revisions during the thirty-day period that started five months after the current-year earnings announcement date. During this same thirty-day period, their average actual error was 54%, with a standard deviation of 276%. The evidence is consistent with analysts' actual forecast error rate declining from 101% during the first month after reference year earnings announcement (the "+1" month) to 54% during the fifth month after reference year earnings announcement (the "+5" month). This improvement occurred even with signal utilization slightly declining from 55% in the "+1" month to 45% in the "+5" month. Analysts likely have other sources of information besides the year t financial statements available during the "+5" month that was not available during the "+1" month. For example, analysts may have information on first-quarter results for year t +1 during the fifth month when forecasting EPS for year t+1. This result is consistent with earnings-relevant information from other sources besides the year t financial statements being available by the +5 month. We find that analysts' forecast accuracy substantially increased as their signal utilization slightly declined in forecasting year t+1 earnings during the +5 month vis-à-vis the +1 month.

**Table 2**
Analysts' Avg. Percent Use of Fundamental Signals in Making Their Next-Yr EPS Forecast Revisions Five Months after the Current-Yr Earnings Announcement ($FY1^{+5}$)
(Avg. Adj. R2 for $FY1^{+5}$) / (Avg. Adj. R2 for CEPS1) = Utilization Percent
Same Firms Used in Regressions on CEPS1 and on $FY1^{+5}$
Table Shows Averages for Annual Regressions for 1991-2008

**"One-year-ahead earnings change" (CEPS1) Regression Results**

| Fundamental Signals (Independent Variables or "Signals") | Avg. Beta | Avg. Sig. | Total # Yrs Sig. at alpha = .05 | Total # Yrs Sig. at alpha = .10 | # NEG | # NEG SIG ** | # POS | # POS SIG** |
|---|---|---|---|---|---|---|---|---|
| (Constant) | 0.005 | 0.202 | 9 | 0 | 4 | 1 | 14 | 8 |
| CHGEPS | -0.204 | 0.158 | 12 | 1 | 16 | 12 | 2 | 0 |
| INV | -0.008 | 0.395 | 1 | 1 | 16 | 1 | 2 | 0 |
| AR | 0.003 | 0.498 | 2 | 1 | 8 | 0 | 10 | 2 |
| GM | -0.025 | 0.218 | 8 | 1 | 13 | 6 | 5 | 2 |
| S&A | -0.014 | 0.321 | 6 | 2 | 12 | 4 | 6 | 2 |
| ETR | -0.222 | 0.223 | 4 | 5 | 14 | 4 | 4 | 0 |
| LF | -0.014 | 0.494 | 1 | 2 | 13 | 1 | 5 | 0 |
| CAPX | 0.004 | 0.507 | 2 | 1 | 4 | 0 | 14 | 2 |
| CHG_FCF | 0.000 | 0.507 | 0 | 0 | 8 | 0 | 10 | 0 |
| CHG_DEBT AT | 0.030 | 0.229 | 5 | 1 | 0 | 0 | 18 | 5 |
| CHG_MKTS HR | -0.008 | 0.464 | 1 | 4 | 13 | 1 | 5 | 0 |
| OL | 0.000 | 0.398 | 3 | 0 | 9 | 3 | 9 | 0 |
| Avg. Adj. R2 from annual regressions on CEPS1 | | | | | | | 0.090 | |
| Avg. Annual Durbin-Watson | | | | | | | 1.980 | |

**Next-Year EPS Forecast Revisions ($FY1^{+5}$) Regression Results**

| Fundamental Signals (Independent Variables or "Signals") | Avg. Beta | Avg. Sig. | Total # Yrs Sig. at alpha = .05 | Total # Yrs Sig. at alpha = .10 | # NEG | # NEG SIG ** | # POS | # NEG SIG ** | # SIG** CEPS1 but not SIG** $FY1^{+5}$ | # Si gn <> |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | -0.008 | 0.068 | 14 | 1 | 16 | 14 | 2 | 0 | ------ | ----- |
| CHGEPS | 0.011 | 0.311 | 5 | 4 | 6 | 2 | 12 | 3 | 7 | 4 |
| INV | -0.004 | 0.252 | 4 | 2 | 14 | 4 | 4 | 0 | 0 | 0 |
| AR | 0.003 | 0.510 | 2 | 1 | 6 | 1 | 12 | 1 | 2 | 1 |
| GM | 0.000 | 0.266 | 6 | 0 | 9 | 3 | 9 | 3 | 5 | 1 |
| S&A | -0.002 | 0.400 | 3 | 2 | 8 | 2 | 10 | 1 | 5 | 2 |
| ETR | -0.047 | 0.357 | 4 | 0 | 12 | 3 | 6 | 1 | 2 | 1 |
| LF | 0.000 | 0.472 | 1 | 2 | 11 | 0 | 7 | 1 | 0 | 0 |
| CAPX | 0.001 | 0.469 | 2 | 2 | 5 | 0 | 13 | 2 | 0 | 0 |
| CHG_FCF | 0.000 | 0.507 | 1 | 1 | 7 | 1 | 11 | 0 | 0 | 0 |
| CHG_DEBT AT | 0.006 | 0.465 | 3 | 0 | 6 | 0 | 12 | 3 | 3 | 1 |
| CHG_MKTS HR | 0.002 | 0.450 | 1 | 3 | 10 | 0 | 8 | 1 | 1 | 0 |
| OL | 0.000 | 0.437 | 3 | 1 | 8 | 3 | 10 | 0 | 2 | 1 |
| Total number of occurrences where signal is sig. ** for CEPS1 but is not sig. for $FY1^{+5}$: | | | | | | | | | **27** | |
| Avg. Adj. R2 from annual regressions on $FY1^{+5}$ | | | | | | | | | 0.041 | |
| Avg. Durbin Watson from annual regressions | | | | | | | | | 2.003 | |

| | |
|---|---|
| Avg. # of Firms per Year (same firms used in CEPS1 and $FY1^{+5}$ annual regressions) | 380 |
| **Analysts' Avg. % Use of Fundamental Signals** | **45%** |
| Analysts' Avg. Actual Mean Error Percent | **54%** |
| Std. Dev. Of Analysts' Avg. Actual Error Percent | 276% |

Table 2 shows a total of 27 instances occurred where a signal was significant in predicting "one-year-ahead earnings change" (CEPS1) during a year but was not significant in predicting FY1+5 in that year. GM and S&A were the signals most underutilized by analysts in making their next-year forecast revisions five months after the reference-year earnings announcement, with each of these two signals being used less efficiently in five-of-fourteen years studied.

## C. Long-Term Growth Forecasts Made During the 90 Days Beginning One Month after Current-Year Earnings Release

We produce Table 3 for Long-Term Growth Forecast Revision Made One Month after the reference year earnings announcement (LGT+1) using methodology similar to how we constructed Table 1 for "one-year-ahead forecast revisions" (FY1+1). However, there is no data item in I/B/E/S for firms' actual long-term growth rate. Hence, we use the difference between analysts' long-term growth forecasts and AB-97 five-year "long-term earnings growth" (CEPSL) and computed long-term forecast error percent as:

Actual Forecast Error Percent (i, t) =
| [CEPSL(i, t) – Analyst's I/B/E/S Detail long-term growth forecasts made during the 90 days beginning one month after the earnings announcement for year t] / CEPSL(i, t) |

We used the same firms and independent variables for each year's "long-term earnings growth" CEPSL regression and "Long-Term Growth Forecast Revision" LTG+1 regression. As with the CEPS1-to-FY1+1 and CEPS1-to-FY1+5 analyses, we performed procedures for removing extreme values and outliers.

Table 3 indicates that, on average, the analysts were 59% efficient in using the studied fundamental signals when they made their long-term forecast revisions during the 90 days that started one month after the current-year earnings announcement date. During this same 90-day period, their average actual error was 328%, with a standard deviation of 661%.

**Table 3**

Analysts' Avg. Percent Use of Fundamental Signals in Making Long-Term Growth Forecasts During Three Months Beginning One Month after the Current-Yr Earnings Announcement ($LTG^{+1}$) (Avg. Adj. R2 for $LTG^{+1}$) / (Avg. Adj. R2 for CEPSL) = Avg. Utilization Percent Same Firms Used in Annual Regressions on CEPSL and on $LTG^{+1}$ Table Shows Averages for Annual Regressions for 1991-2004

**"Long-term earnings growth" (CEPSL) Regression Results**

| Fundamental Signals (Independent Variables or "Signals") | Avg. Beta | Avg. Sig. | Total # Yrs Sig. at alpha = .05 | Total # Yrs Sig. at alpha = .10 | # NEG | # NEG SIG ** | # POS | # POS SIG** |
|---|---|---|---|---|---|---|---|---|
| (Constant) | 0.029 | 0.432 | 3 | 1 | 4 | 0 | 10 | 3 |
| CHGEPS | -1.093 | 0.241 | 4 | 3 | 13 | 4 | 1 | 0 |
| INV | -0.037 | 0.404 | 2 | 2 | 12 | 1 | 2 | 1 |
| AR | 0.002 | 0.446 | 2 | 2 | 7 | 1 | 7 | 1 |
| GM | -0.082 | 0.302 | 2 | 1 | 10 | 1 | 4 | 1 |
| S&A | -0.058 | 0.478 | 3 | 0 | 7 | 3 | 7 | 0 |
| ETR | 0.695 | 0.290 | 2 | 2 | 7 | 1 | 7 | 1 |
| LF | -0.028 | 0.415 | 2 | 1 | 7 | 1 | 7 | 1 |
| CAPX | 0.009 | 0.452 | 1 | 1 | 5 | 0 | 9 | 1 |
| CHG_FCF | 0.000 | 0.469 | 0 | 1 | 6 | 0 | 8 | 0 |
| CHG_DEBTAT | 0.033 | 0.623 | 1 | 0 | 4 | 0 | 10 | 1 |
| CHG_MKTSHR | 0.054 | 0.331 | 2 | 2 | 5 | 0 | 9 | 2 |
| OL | 0.018 | 0.113 | 10 | 0 | 0 | 0 | 14 | 10 |
| Avg. Adj. R2 from annual regressions on CEPSL | | | | | | | 0.077 | |
| Avg. Annual Durbin-Watson | | | | | | | 1.959 | |

**$LTG^{+1}$ Regression Results**

| Fundamental Signals (Independent Variables or "Signals") | Avg. Beta | Avg. Sig. | Total # Yrs Sig. at alpha = .05 | Total # Yrs Sig. at alpha = .10 | # NEG | # NEG SIG ** | # POS | # NEG SIG ** | # SIG** CEPSL but not SIG** $LTG^{+1}$ | # Sign <> |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | -0.627 | 0.295 | 3 | 2 | 10 | 2 | 4 | 1 | ------ | ----- |
| CHGEPS | 5.130 | 0.502 | 2 | 1 | 6 | 1 | 8 | 1 | **4** | 1 |
| INV | -0.527 | 0.491 | 0 | 1 | 10 | 0 | 4 | 0 | 1 | 1 |
| AR | 1.136 | 0.433 | 3 | 1 | 4 | 0 | 10 | 3 | 1 | 0 |
| GM | 3.413 | 0.293 | 2 | 2 | 4 | 0 | 10 | 2 | 2 | 0 |
| S&A | 2.316 | 0.500 | 2 | 1 | 5 | 0 | 9 | 2 | 1 | 1 |
| ETR | 52.149 | 0.438 | 0 | 3 | 5 | 0 | 9 | 0 | 2 | 1 |
| LF | 0.300 | 0.502 | 2 | 1 | 6 | 0 | 8 | 2 | 2 | 1 |
| CAPX | -0.068 | 0.525 | 2 | 0 | 8 | 1 | 6 | 1 | 1 | 1 |
| CHG_FCF | 0.026 | 0.449 | 1 | 2 | 7 | 1 | 7 | 0 | 0 | 0 |
| CHG_DEBTAT | 0.892 | 0.664 | 1 | 0 | 6 | 0 | 8 | 1 | 1 | 0 |
| CHG_MKTSHR | -1.082 | 0.411 | 2 | 0 | 10 | 2 | 4 | 0 | 2 | 2 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| OL | -0.083 | 0.427 | 3 | 1 | 9 | 2 | 5 | 1 | **7** | 5 |
| Total number of occurrences where signal sig. ** for CEPSL but not $LTG^{+1}$ | | | | | | | | 24 | | |
| Avg. Adj. R2 from annual regressions on $LTG^{+1}$ | | | | | | | | .045 | | |
| Avg. Durbin Watson from annual regressions | | | | | | | | 1.991 | | |
| Avg. # of Firms per Year (same firms used in CEPSL and $LTG^{+1}$ annual regressions) | | | | | | | | 159 | | |
| **Analysts' Avg. Utilization % of Fundamental Signals** | | | | | | | | **59%** | | |
| Analysts' Avg. Actual Mean Error Percent | | | | | | | | **328%** | | |
| Std. Dev. Of Analysts' Avg. Actual Error Percent | | | | | | | | 661% | | |

Table 3 shows 24 instances where a signal was significant in predicting "long-term earnings growth" (CEPSL) during a year but was not significant in explaining the analyst's LTG+1 in that year. The signals "current-year change in EPS" (CHGEPS) and OPERATING_LEVERAGE (OL) were the only signals underutilized in more than two years by analysts in making their long-term forecast revisions during the 90-days beginning one month after the reference-year earnings announcement. Table 3 shows the fundamental signal that analysts used the least in making long-term growth forecast revisions (LTG+1) was operating leverage, underutilized in seven-of-fourteen years studied.

Figure 3 lists and plots for each year during 1991-2004 analysts' actual forecast error rates when forecasting five-year, long-term growth forecast revisions (LTG+1) versus the analysts' percent efficient utilization of the studied fundamental signals. Figure 3 shows forecast error rate increased with utilization decreasing for 1992-1997, 1993-1998, and 1995-2000, and forecast error rate decreasing and utilization increasing for 1997-2002 and 1998-2003. These results support Hypothesis 1 since all of the "forecast made" years and "forecasted long-term growth realized" years are outside 1990-1991, 2001, and 2007-2009 recession years shown in Figure 2. The expected inverse relationship between analysts' long-term growth forecast error rates and their utilization of the fundamental signals when making these forecasts holds when there is no recession.

Figure 3 shows 1991-1996 has forecast error rate increasing and signal utilization increasing. This result supports Hypothesis 2 since the 1991 "forecast made" year overlaps with 1991 when the Gulf War Recession occurred, as shown in Figure 2. This finding is consistent with the Gulf War recession adversely affecting the 1991 financial statements and their fundamental signals. This impact altered the expected inverse relationship between signal utilization and forecast error rate so that the forecast error rate increased even as signal utilization increased in 1991 when forecasting 1996 long-term earnings growth.

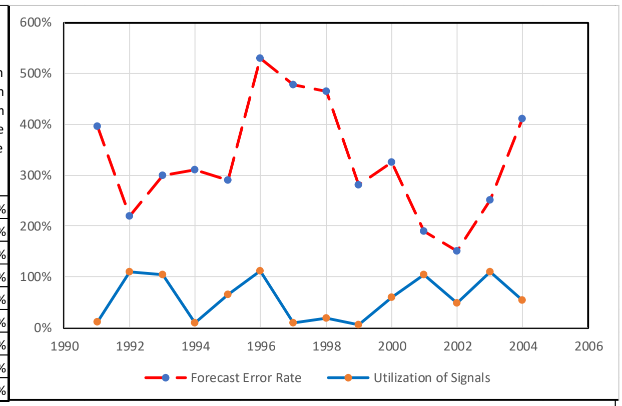
Figure 3 shows 1996-2001 has forecast error rate decreasing and signal utilization decreasing. This finding supports Hypothesis 2, since the future period, 2001, when the forecast earnings occur, overlaps with the 9/11 Recession in 2001, as shown in Figure 2. The recession occurring in the forecasted year (2001) meant the reference year (1996) fundamental signals, though not affected by the recession, were not as useful in predicting future long-term growth due to the unforeseen recession in 2001.

During 1994-1999, forecast error rate decreased -30%, and signal utilization decreased by -5%, even though no recession occurred in these years. In addition, during 1999-2004, there is no official recession to explain why forecast error rates unexpectedly increased by 130% as signal utilization increased by 49%. We note that the 2003-2004 anomaly previously discussed for Figure 1 also encompassed 2004. In addition, 1999 is common to 1994-1999 and 1999-2004. Future research may explain these anomalies.

**Figure 3**

Analysts' Annual Utilization of Fundamental Signals and Forecast Accuracy for Forecasting Five-Year, Long-Term Growth within Three Month after Earnings Release
1991 - 2004

| Year | Forecast Error Rate | Utilization of Signals | Change in Analysts Actual Forecast Error Rate From Reference Year (Five Years Prior) | Change in Utilization Rate From Reference Year (Five Years Prior) |
|---|---|---|---|---|
| 1991 | 395% | 12% | | |
| 1992 | 220% | 109% | | |
| 1993 | 300% | 104% | | |
| 1994 | 310% | 10% | | |
| 1995 | 290% | 65% | | |
| 1996 | 530% | 112% | 135% | 100% |
| 1997 | 478% | 10% | 258% | -99% |
| 1998 | 465% | 19% | 165% | -85% |
| 1999 | 280% | 5% | -30% | -5% |
| 2000 | 326% | 59% | 36% | -6% |
| 2001 | 190% | 105% | -340% | -7% |
| 2002 | 150% | 49% | -328% | 39% |
| 2003 | 250% | 109% | -215% | 90% |
| 2004 | 410% | 54% | 130% | 49% |
| Average | 328% | 59% | | |




## VI. SUMMARY

Using modified AB-97 procedures, we study the impact of the last three macroeconomic recessions that occurred before 2020 on the relationship between analysts' forecast error rates and their use of fundamental signals when making next-year earnings forecasts and long-term growth projections. For next-year EPS forecasts, we find 10 of the 17 forecast-year/forecasted-year pairs studied have the expected inverse relationship between efficient utilization of fundamental signals and forecast error rates when the forecast and forecasted years are outside the three recessions' period ranges. Similarly, we find this inverse relationship exists for 2006-2007 and 2007-2008 that are wholly within The Great Recession timeframe. These results are consistent with the inverse relationship existing during periods of extended economic growth or prolonged recession that span the forecast's reference year and the realization of the forecasted, next-year EPS. In contrast, for 1991-1992, when the Gulf War Recession affected the 1991 fundamental signals and 2001-2002 when the 9/11 Recession impacted the 2001 fundamental signals, we find the relationship changed with both forecast error rate decreasing and efficient utilization of the fundamental signals decreasing.

For five-year, long-term growth projections, we find analysts' forecast error rates increased as their utilization of fundamental signals decreased for 1992-1997, 1993-1998, and 1995-2000. Moreover, analysts' forecast error rate decreased as their utilization of fundamental signals increasing for 1997-2002 and 1998-2003. All of these forecasts and forecasted years are outside the recession periods. For 1991-1996, analysts' forecast error rate increased, and their signal utilization increased, with the 1991-forecast year intersecting with when the Gulf War Recession occurred. Also, 1996-2001 has forecast error rate decreasing and signal utilization decreasing, with the 2001 forecasted future period occurring during the 9/11 Recession in 2001.

These findings are consistent with analysts' forecast error rates varying inversely with their efficient use of the studied fundamental signals when no recession happens in either the forecast, reference year, or the forecasted year. We also find this inverse relationship occurring during The Great Recession that spanned the reference year for the next-year EPS forecasts and the realization of the forecasted EPS in the next year. Hence, we find that similar macroeconomic conditions, whether recession or economic expansion, during the forecast year and forecasted year have the expected inverse relationship between fundamental signal utilization and forecast accuracy. However, if an unforeseen recession occurs in the forecasted year but not in the reference year, or a recession occurs in the reference year but not in the forecasted year, analysts' forecast error rates increase (decrease) even though analysts' increase (decrease) their utilization of fundamental signals. This evidence suggests that the earnings relevance of fundamental signals and the financial statements on which they are based may be better understood in the context of macroeconomic conditions that exist during the reference year when the fundamental signals are determined and the future year when the forecasted earnings are known.

## REFERENCES

Abarbanell, J., and B. Bushee, 1997, "Fundamental Analysis, Future Earnings, and Stock Prices," *Journal of Accounting Research,* 35(1), 1-24.

Banker, R. D., and L. Chen, 2006, "Predicting Earnings Using a Model Based on Cost Variability and Cost Stickiness," *The Accounting Review,* 81(2): 285–307.

Barufaldi, D., and J. Chappelow, 2020, "A Review of Past Recessions," *Investopedia,* available at https://www.investopedia.com/articles/economics/08/past-recessions.asp

Beaver, W., Cornell, B., Landsman, W., and S. Stubben, 2008, "The Impact of Analysts' Forecast Errors and Forecast Revisions on Stock Prices," *Journal of Business Finance & Accounting,* 35(5/6), 709-740.

Bochkay, K., and C. B. Levine, 2019, "Using MD&A to Improve Earnings Forecasts," *Journal of Accounting, Auditing & Finance,* 34(3), 458-482.

Brown, L.D., Richardson, G., and S. Schwager, 1987, "An Information Interpretation of Financial Analyst Superiority in Forecasting Earnings," *Journal of Accounting Research,* 25(1), *49-67.*

Ciftci, M., Mashruwala, R., and D. Weiss, 2016, "Implications of Cost Behavior for Analysts' Earnings Forecasts," *Journal of Management Accounting Research*, 28(1), 57-80.

Darrough, M., and J. Ye, 2007, "Valuation of Loss Firms in a Knowledge-Based Economy," *Review of Accounting Studies,* 12(1), 61-93.

Fairfield, P., R. Sweeney, and T. Yohn, 1996, "Accounting Classification and the Predictive Content of Earnings," *The Accounting Review,* 71(3), 337-355.

Hayn, C., 1995, "The Information Content of Losses," *Journal of Accounting and Economics,* 20(2), 125–153.

Joos, P., and G. Plesko, 2005, "Valuing Loss Firms," *The Accounting Review,* 80(3), 847–870.

Jung, M. J., Keeley, J. H., and J. Ronen, 2019, "The Predictability of Analyst Forecast Revisions," *Journal of Accounting, Auditing & Finance,* 34(3), 434-457.

Klein, A., and C. Marquardt, 2006, "Fundamentals of Accounting Losses," *The*

*Accounting Review*, 81(1), 179–206.
Lambert, S. L., 2020, "Earnings Relevance of Accounting-Guided Fundamental Signals," International *Journal of Business*, 25(2), 178-194.
Lambert, S. L., Krieger, K., and N. Mauck, 2019, "Analysts' Forecasts Timeliness and Accuracy Post-XBRL," *International Journal of Accounting and Information* Management, 27(1): 151-188.
Lev, B., and S.R. Thiagarajan, 1993, "Fundamental Information Analysis," *Journal of Accounting Research*, 31(2), 190-215.
O'Brien, P.C., 1988, "Analysts' Forecasts as Earnings Expectations," *Journal of Accounting and Economics*, 10(1), 53–83.
Pae, J., and S. Yoon, 2012, "Determinants of Analysts' Cash Flow Forecast Accuracy," *Journal of Accounting, Auditing and Finance*, 27(1), 123-144.
Wahab, S., Teitel, K., and B. Morzuch, 2017, "How Analysts and Whisperers Use Fundamental Accounting Signals to Make Quarterly EPS Forecasts," *Journal of Accounting, Auditing & Finance*, 32(3), 401-422.
Wahlen, J., and M. Wieland, 2011, "Can financial statement analysis beat consensus analysts' recommendations?" *Review of Accounting Studies*, 16(1), 89-115.
Weiss, D, 2010, "Cost Behavior and Analysts' Earnings Forecasts," *The Accounting Review*, 85(4), 1441–1471.
Wieland, M, 2011," Identifying Consensus Analysts' Earnings Forecasts that Correctly and Incorrectly Predict an Earnings Increase," *Journal of Business Finance & Accounting*, 38(5/6), 574-600.
Yao, T., 2015, "Analyst Following and Analyst Forecast Accuracy for Loss Firms," *Academy of Business Research Journal*, 3, 26-38.