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Why So Much Error in Analysts' Earnings Forecasts?

Vijay Kumar Chopra

Wall Street analysts tend to be too optimistic about the earnings prospects of companies they follow. The average consensus 12-month EPS growth forecast is 17.7 percent, which is more than twice the actual growth rate. In aggregate, forecasts are 11.2 percent above actual earnings at the start of a year and are revised downward continuously in the course of the year. For the full study period reported here, the percentage of 12-month earnings estimates revised downward exceeded the percentage revised upward, on average, by 4.4 percent every month. Since 1993, however, the quality of analyst forecasts seems to have improved. This article provides an intuitive explanation of the change and suggests ways in which analysts can use the explanation to improve portfolio performance.

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Use of earnings estimates is an integral part of equity valuation by fundamental and quantitative analysts, and the estimates have even become an integral part of financial reporting in the popular press. The behavior and uses of earnings estimates have been widely studied. I/B/E/S International has published an excellent bibliography of earnings expectation research (Brown 1996). Studies that have shown that analysts tend to overestimate earnings include Clayman and Schwartz (1994), Dreman and Berry (1995), and Olsen (1996). Clayman and Schwartz attributed the positive bias to analysts' tendency to "fall in love" with their stocks. In addition, they proposed that investment banking relationships of investment houses and the prospect of being cut off from access to company managers make issuing negative or critical reports on companies difficult for analysts. Dreman and Berry examined quarterly earnings estimates and found that the average forecast errors tend to be high; in their study, only a small percentage of estimates fell into an acceptable error range. Olsen ascribed the positive bias and lack of accuracy in earnings estimates to herding behavior among forecasters. Francis and Philbrick (1993) argued that analysts make optimistic forecasts to maintain relationships with company managers.

The data for the studies reported here are from the I/B/E/S Global Aggregates database, which aggregates bottom-up analyst earnings forecasts to create forecasts at the market level. The specific forecasts analyzed were for the earnings of the S&P 500 Index. I/B/E/S uses market-capitalization weights to combine the mean earnings forecasts for each company in the S&P 500 into an index of earnings estimates. The data are available on a monthly basis beginning with January 1985; the cutoff point for this study is December 30, 1997.

Forecast Changes during a Year

This study focused on how the forecasts for the S&P 500 earnings for the current fiscal year vary over the course of the year. **Figure 1** shows the "calendarized" current fiscal year (Calendar FY1 in I/B/E/S terminology) forecasts and actual earnings per share for the entire study period, January 1985 through December 1997.[1] Because of the delay in reporting earnings, the actual earnings are not known until after the year has ended. To make sure that all companies have reported, I used the actual earnings for a calendar year from the I/B/E/S computation made in July of the following year. Therefore, the July 1996 calculation of calendarized 1995 earnings is taken to be the actual earnings for calendarized 1995.

The calendarized actual earnings follow a stair-step pattern. The long-term upward trend and the cyclicality in actual earnings are both evident from Figure 1: Earnings tend to increase over the long run. The cumulative annualized growth rate in earnings for the period is 8 percent, but earnings

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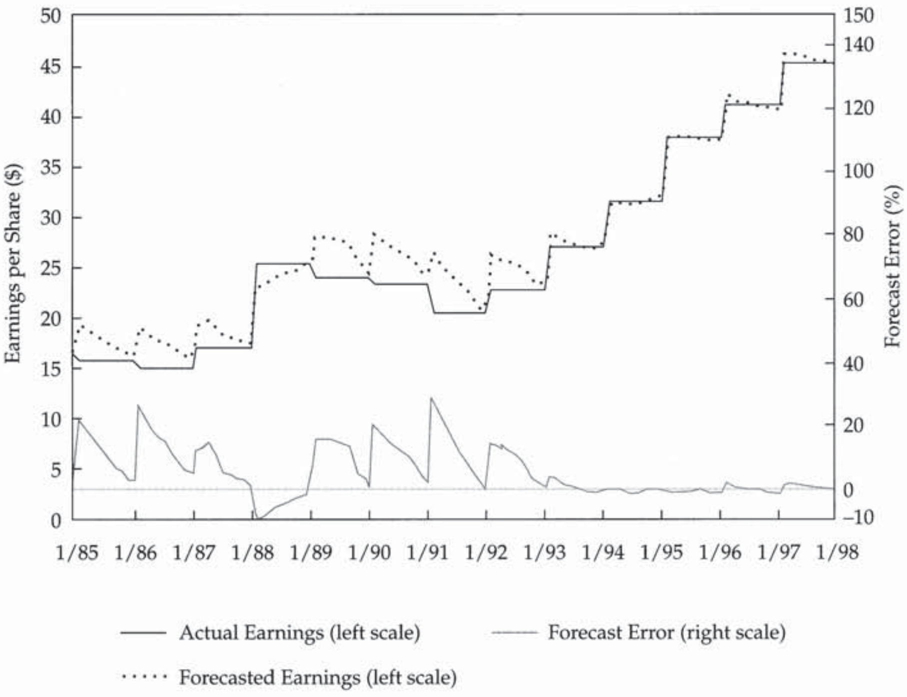
Figure 1. Calendarized FY1 Actual Earnings, Forecasted Earnings, and Forecast Errors for the S&P 500: 1985–97



have declined in some periods, such as 1986 and 1989–1991. The earnings recovery since 1992 has produced a steady step-up pattern.

In general, Figure 1 shows that earnings forecasts are very optimistic at the start of the year and decline toward actual values as the year progresses. The decline in full-year forecasts occurs as quarterly numbers are released and an increasing portion of the fiscal-year earnings becomes known. In addition, as the year progresses, company managers comment on the outlook for their companies in future quarters and analysts gather additional information that may lead them to revise their estimates. On rare occasions, analysts underestimate earnings, such as in 1988. For most years, however, analysts revise their initial estimates downward. Future research will have to separate the effect of time from the effect of better visibility for the late quarters of each year.

On average, the Street overestimated current-year earnings by 6.1 percent in the 1985–97 period. In some periods, such as around February 1991, the overestimation was as high as 30 percent, and in other periods, such as February 1988, earnings were underestimated by more than 8 percent. The average overestimation in the 1985–92 period was 9.4 percent.

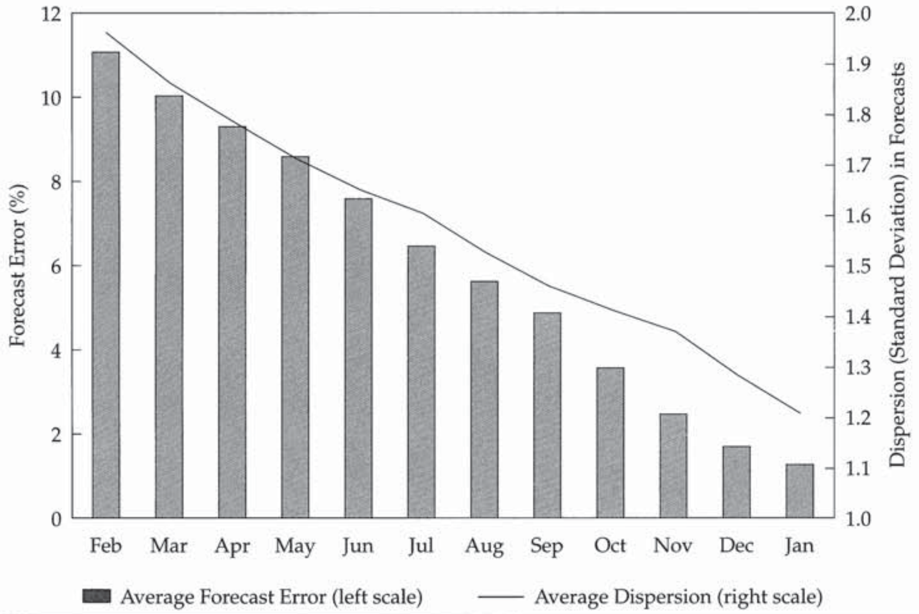
Since 1993, analyst forecasts have been much closer than in the past to actual earnings. The average forecast error since January 1993 has been remarkably small, an average overestimation of less than 1 percent.

Overestimations typically correct in the course of a year. **Figure 2** shows the decline toward reality of analyst optimism. On average, earnings are overestimated by about 11.2 percent at the start of the fiscal year. (The largest forecast errors occur in February because of the I/B/E/S convention of rolling over a calendar year at the end of January instead of at the end of December.) The overestimation declines to 8.7 percent three months later. Another quarter later, the estimate declines to only 6.6 percent above the actual. By the end of the third quarter, the overoptimism is only 3.6 percent. With attention shifting to the next fiscal year, the final overestimation is only slightly more than 1 percent on average. (Complete convergence does not occur at year end because of the delay in reporting earnings.)

The pattern of declining overestimation was more pronounced before 1993; in the pre-1993 period, the average forecast errors in February were almost 17 percent. At the end of July, they were still well over 10 percent. Since 1993, the error has been as low as 2 percent in February, fading to small negative values from September on.

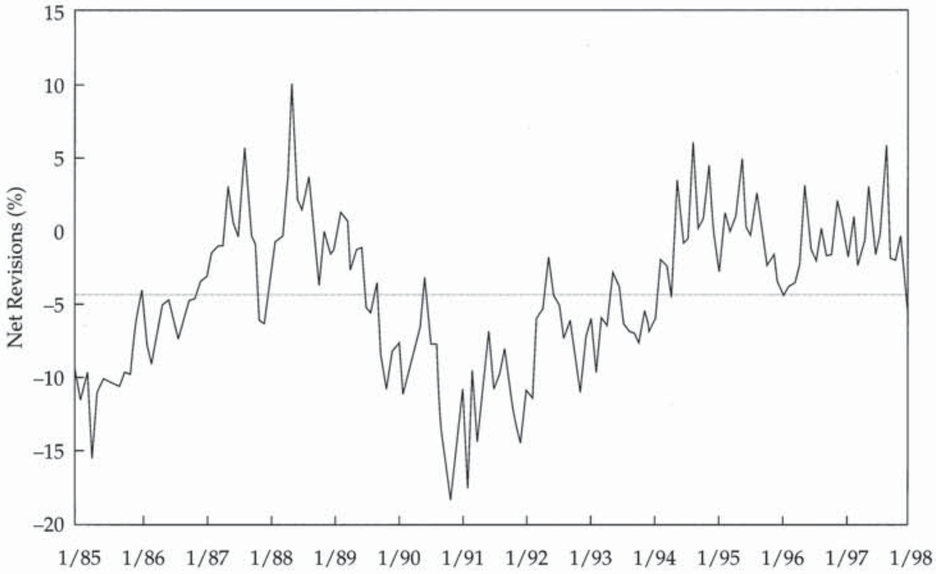
Another perspective on analyst optimism can be gained by looking at the percentage of estimates of 12-month-forward earnings that are revised upward or downward every month.[2] **Figure 3**

Figure 2. Analyst Overoptimism and Dispersion in EPS Estimates: Monthly Pattern, Averages for 1985–97



Note: Estimates are from February of a calendar year to January of the following year because of the I/B/E/S February rollover. The initial estimate for Calendar FY1 is made in February, and the final estimate is made in January of Calendar FY2.

Figure 3. Net EPS Estimate Revisions



shows the net positive revisions of 12-month-forward earnings.[3] This series is volatile, but its overall trend is important. Most of the net revisions are negative, which is to be expected; analysts are constantly adjusting their estimates downward because the initial estimates are too optimistic. The average net revision for the entire period, indicated by the shaded line in Figure 3, is –4.4 percent—that is, the percentage of estimates revised downward exceeds the percentage revised upward by 4.4 percent each month. Since 1994, however, net revisions have been close to zero, which confirms the other evidence that analyst forecasts have improved in accuracy since that time.

Consider now another interesting aspect of analyst forecasts—the degree of disagreement among the estimates. Figure 2 shows the decline in the dispersion of estimates over the course of a typical year. The dispersion is greatest in February and declines systematically to its lowest value the following January. This decline can be attributed to quarterly earnings releases and the resulting increase in the visibility of the company's prospects. For the whole study period, dispersion in estimates at the level of the S&P 500 exhibits the sawtooth pattern shown in **Figure 4**. Analyst estimates of Calendar FY1 earnings show the greatest disagreement at the start of the year. As companies report interim quarterly results, the proportion of the fiscal year for which earnings have to be forecasted declines, which reduces the divergence in Calendar FY1 estimates as the year proceeds. This pattern has been particularly strong since 1988 and does not show any signs of fading in recent years. Although analysts may have gotten better at estimating the year's overall level of earnings, the disagreement among analysts over earnings estimates has not diminished over the years.

Forecasted versus Actual EPS Growth

Analysts' earnings growth rate forecasts provide another perspective on the overoptimism evident in their forward estimates of EPS. **Figure 5** shows the rolling 12-month-forward actual and forecasted growth in S&P 500 earnings. For example, the 12-month forecasted growth rate in March 1986 was 16.6 percent whereas the actual growth rate for the subsequent 12 months was –2 percent.

Figure 5 provides three key insights into analyst behavior. First, earnings growth forecasts are always positive. The forecasts lie roughly in the 10–30 percent range, with an average of 17.7 percent, whereas actual growth averages 8.6 percent, almost 9 percent below the forecasts on an annual basis. Therefore, on average, analysts' forecasts are double the actual growth rate in earnings.

Second, actual earnings growth rates vary a lot more than the forecasted rates. Actual earnings growth varies between –15 percent and 40 percent, whereas the forecasts lie within a much narrower range, 10–30 percent. The standard deviation of forecasted growth rates is only 5.4 percent, compared with a 12 percent standard deviation for actual earnings growth rates. Note that, in aggregate, analysts never forecast an absolute decline in earnings, but actual earnings have fallen for extended periods of time (e.g., January 1985 to June 1986, which coincided with a rapid decline in the pace of economic activity and a collapse in the price of oil, and again from January 1989 through June 1991, which was a time of brief economic recession).

Third, Figure 5 shows that, as with EPS levels, actual and forecasted EPS growth rates have been much closer since January 1993. **Table 1** summarizes the forecasting behavior of analysts for the

Figure 4. Dispersion in Analyst EPS Estimates over Time

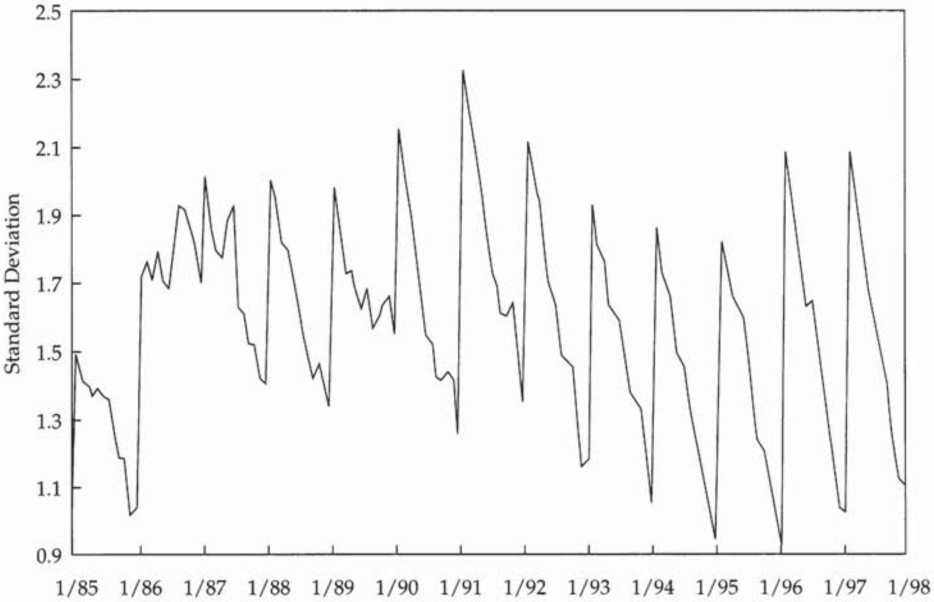


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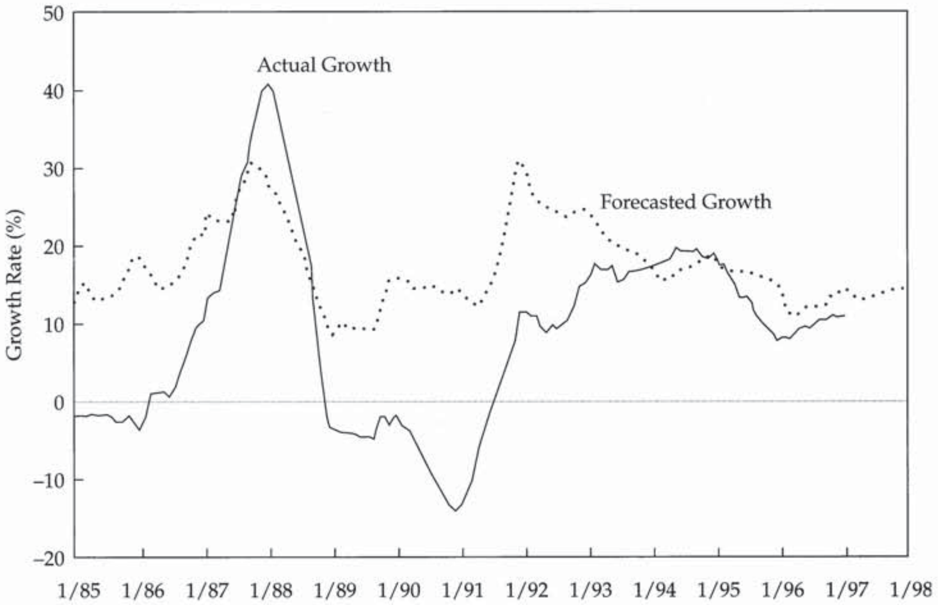
Figure 5. Forecasted versus Actual EPS Growth Rates



Note: The actual growth rates end in December 1996, whereas the forecasted growth rates are available through the end of 1997 because the actual growth rate is not known until 12 months after a given month-end. For example, the actual growth rate for March 1986 comes from March 1987 data.

Table 1. Twelve-Month-Forward Forecasted and Actual Earnings Growth Rates: Summary Statistics

Period/Statistic	Forecasted Growth Rate	Actual Growth Rate	Difference in Rates
January 1985 to December 1996			
Mean	17.7%	8.6%	9.1%
Standard deviation	5.4	12.0	9.3
Maximum	31.2	41.0	28.7
Minimum	8.4	–14.0	–13.1
January 1993 to December 1996			
Mean	16.5	14.4	2.1
Standard deviation	3.2	3.9	2.8
Maximum	24.3	19.5	8.3
Minimum	10.9	7.7	–2.9

Note: The difference between forecasted and actual growth rates is a new series. The last column shows the mean, standard deviation, maximum, and minimum for this series.

whole study period and the post-1993 periods. The average forecasted growth rate of 16.5 percent since January 1993 reported in Table 1 is only about 2 percent higher than the actual increase of 14.4 percent. The standard deviations have also been closer, at 3.2 for the forecast versus 3.9 for the actual.

The correlation between average forecasted and actual EPS growth rates for the total period is 0.67, which indicates that analysts have done a moderately good job of capturing changes in EPS growth rates over time. The correlation for the 1993–97 period was 0.70.

Does the recent convergence between analyst forecasts and actual EPS indicate a sudden increase in analyst forecasting ability? Possibly, but the more likely explanation is that analysts have continued to predict optimistic growth rates but those predictions turned out to be in line with actual rates that were high by historical standards. That is, because of restructurings during the previous decade, when the economy started strengthening in 1992, earnings per share grew strongly to match the usual analyst optimism. This explanation is supported by a comparison of rates since January 1993 with rates for the whole period. The forecasted growth rates are very close, 16.5 for the recent period and 17.7 for the whole period, which indicates that analyst optimism did not decline; the actual growth rate for the recent period, however, was almost 6 percentage points higher than growth for the whole period. In short, the actual growth rate for January 1993 through December 1997 has been close to the long-term average growth forecast in what has been one of the longest economic expansions in the history of the United States.

Economic Growth and Earnings Growth

At the aggregate level, company earnings are likely to be tied to the state of the economy. Strong economic growth should, therefore, lead to strong growth in EPS, and indeed, a comparison of growth in industrial production with earnings growth for the S&P 500 supports that expectation.[4]

Figure 6 provides plots of the year-on-year growth in industrial production and the year-on-year growth in actual earnings. Earnings growth lags industrial production growth by between 9 and 18 months, with an average of about 12 months. In order to highlight the close link between growth in industrial production and EPS growth, the earnings growth has been shifted back by 12 months; that is, for example, the June 1996 growth in industrial production is the growth for June 1995 to June 1996 and the June 1996 earnings growth is the growth from June 1996 to June 1997.

Figure 6 suggests that investment analysts could predict aggregate earnings using industrial production data. The correlation between the growth of the two series is 0.77. When industrial production is lagged by one additional month to account for the late release of the data, the correlation is still very high, 0.73. In comparison, the correlation between forecasted and actual earnings growth rates has been averaging 0.67.

An exploration of the link between the strength of the economy and earnings growth estimates will shed considerable light on why earnings estimates are consistently off the mark and why they have been closer to actual earnings since 1993. **Figure 7** shows the year-on-year growth in industrial production and plots the error in the 12-month-forward earnings growth forecast (the difference between the 12-month-forward forecasted earnings growth and actual earnings growth). The clear inverse relationship between the two series indicates that forecast errors are greatest when industrial production growth is at a peak or trough. Furthermore, when industrial production growth accelerates, forecast errors decline, and when industrial production decelerates, forecast errors increase. When growth in industrial production accelerates, earnings grow strongly and the gap between the optimistic growth forecasts and actual earnings growth narrows, which results in more-accurate forecasts. When growth in industrial production decelerates, earnings growth declines

Figure 6. Industrial Production Growth and Aggregate EPS Growth

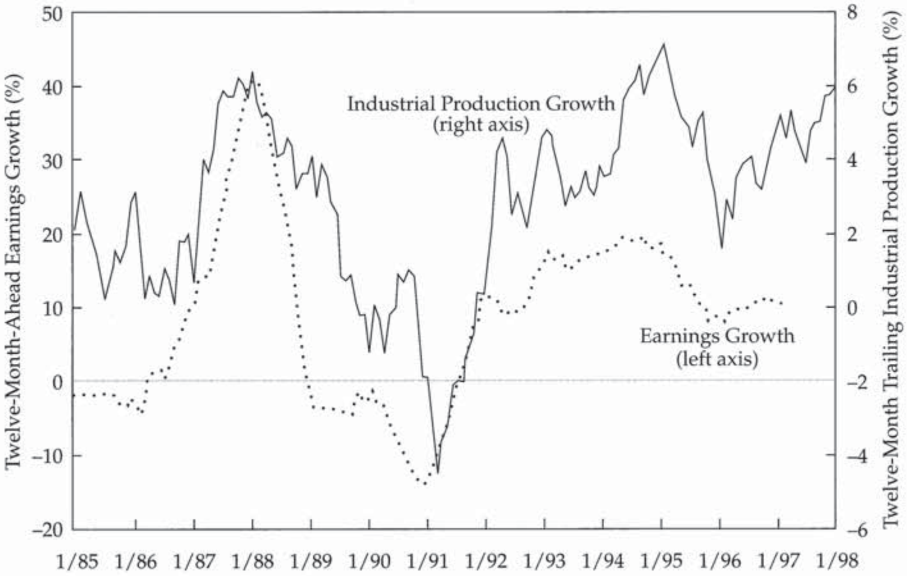
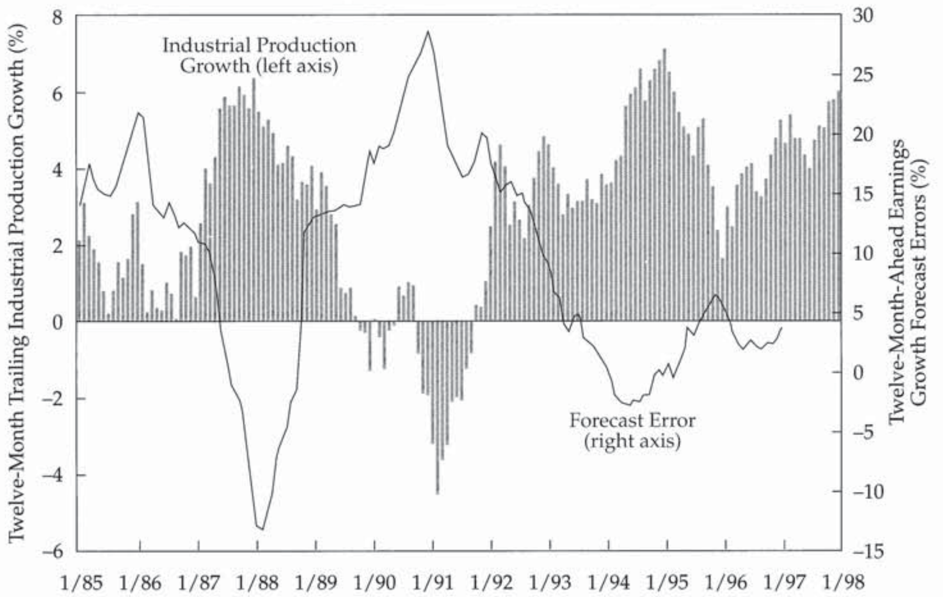


Figure 7. Industrial Production Growth and Errors in EPS Growth Forecasts



(with a 12-month lag) and the gap between the optimistic forecasts and actual earnings growth widens, which results in inaccurate forecasts. When industrial production growth is at its peak, the forecast errors overshoot on the downside and are large but negative. An example is the fourth quarter of 1987 through the first quarter of 1988. On the other hand, when the growth in industrial production started declining in January 1988 from 6.4 percent down to –4.5 percent in March 1991, the forecast errors went from –13 percent to almost 29 percent.

In light of this evidence on growth in the economy and analysts' forecasts, the aggregate behavior of analysts can be described as follows: They are normally very optimistic. When economic growth strengthens, actual earnings accelerate toward the normally optimistic forecasts, so forecast errors decline. If economic growth is very strong, earnings rise well beyond the forecasts, so analysts end up underforecasting earnings for a while. When the economy slows down, earnings start declining but the analysts' optimism prevents them from reducing their estimates far enough. Therefore, the size of forecast errors increases. If forecast errors are negative when the economy starts to slow down, as in January 1988, the errors become less negative at first; then, as the economy continues to decelerate and moves into a recession, the forecast errors move into the positive range and continue to grow. In December 1990, the errors hit a peak of almost 29 percent.

This behavior implies that analysts are likely to be most accurate in an environment of continuing strong economic growth, when earnings growth will approach the analysts' usually bullish forecasts—as has been the case since early 1992. The worst economic environment for aggregate analyst forecasts is one of an accelerating or decelerating economy, and the faster the pace of acceleration or deceleration, the greater the deviation between forecasts and actual earnings growth. The bottom line is that analysts will continue to forecast inaccurately as long as business cycles exist.[5]

Investment Implications

Users of EPS estimates will clearly benefit from recognizing the extent of analyst optimism. Valuation models that rely on earnings forecasts are likely to be biased, but if the extent of optimism is similar across industries and sectors, these valuation models will still be useful in evaluating stocks relative to each other.

The finding that forecast errors vary systematically with the business cycle suggests that analysts may focus too much on firm-specific issues and not enough on the overall macroeconomic environment. Portfolio managers could improve portfolio performance, therefore, by adjusting consensus earnings for systematic biases in forecasts.

One of the uses of aggregate estimate data is in global asset allocation, and conventional asset allocation approaches rely on comparing earnings yields with interest rates. Emanuelli and Pearson (1994) described an approach to global asset allocation that relies on estimate revisions. Recognizing that biases in earnings forecasts are linked to the business cycle and adjusting earnings forecasts to reduce the bias will improve the performance of such global asset allocation strategies.

Conclusion

Analysts' forecasts of EPS and growth in EPS tend to be overly optimistic. Calendarized earnings estimates overstate actual earnings by about 11 percent at the start of the year. These estimates are revised downward monotonically as a typical year unfolds. On average, the percentage of 12-month earnings estimates revised downward exceeds the percentage revised up by 4.4 percent a month. Analyst forecasts of 12-month earnings growth rates average 17.7 percent, more than twice the actual growth rate in the past 13 years.

Industrial production is a good predictor of earnings growth for a year in the future; the correlation is 0.77 percent. The analyst forecast for aggregate EPS growth is also a good predictor of actual growth (with a correlation of 0.67), but the forecasted growth rates are generally too optimistic and lie in a narrow (10–30 percent) range whereas the actual growth rates have varied from –10 percent to 40 percent.

Analysts' usual optimism, their tendency to forecast in a narrow and comfortable range, and the business cycle prove to be the bane of their forecasts. Acceleration or deceleration in economic growth tends to catch analysts off-guard. The forecasts are most accurate in an environment of continued strong growth, such as the one the U.S. economy has been in since 1992. Therefore, although the quality of forecasts has improved since 1992, it will deteriorate if and when the U.S. economy slows down and reverts to its historical cyclical pattern.

Notes

1. I/B/E/S uses the "Compustat rule" to calendarize company-level data prior to aggregation. Data for fiscal years ending between January and May are included in the aggregate for the prior calendar year. Data for the fiscal years ending between June and December of the current calendar year are included in the current calendar-year aggregate (Calendar FY1). For example, data for a company with a fiscal year ending in March 1996 are in the 1995 aggregate; data for a company with a fiscal year ending August 1996 are in the 1996 aggregate. I/B/E/S applies a February "rollover"; that is, when the calendar year ends and a new calendar year begins, the data for Calendar FY1 should shift or roll over from the year just ended to the new year, but I/B/E/S lags the shift by one month. Therefore, the current calendar year is not considered Calendar FY1 until February. The rationale for the lag is, presumably, that a majority of the companies with fiscal years ending in December do not report by the end of January.
2. I/B/E/S calculates 12-month-forward estimates for a company by prorating the current and next fiscal year estimates using the formula $[(a/12)(\text{Current fiscal year EPS}] + [(12 - a)]/[12(\text{Next fiscal year EPS})]$, where a is the number of months remaining in the current year. I/B/E/S then aggregates 12-month-forward company estimates to the index level.
3. Net revisions are defined as (Number of estimates revised upward – Number of estimates revised downward)/Total estimates, over the preceding four weeks, in percentage terms.
4. I used industrial production as a measure of economic activity instead of GDP because of the monthly availability of production data. Using GDP produced qualitatively similar results.
5. This link between forecast errors and the business cycle contrasts with the findings of Dreman and Berry, who found that forecast errors are not meaningfully affected by the business cycle.

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