This paper examines the impact of a change in analysts’ forecasts of earnings and sales per share on the subsequent price performance of a large sample of Japanese stocks. Changes in earnings and sales estimates affect price and the impact is incorporated slowly over time. This lag can be utilized to construct a portfolio of securities which while acting like an index fund earns an excess (extra) return.

Keywords: Japanese stocks, stock sales, stock earnings.

1. Introduction

A number of articles have appeared which analyze the impact of (earnings and) earnings estimates on security returns. These articles contribute to our understanding of what variables affect security prices, the role of expectations in security price formation and the speed with which information is incorporated into share price. The majority of this literature has been concerned with the relationship between consensus of estimates of earnings and security returns. While the results of this literature are occasionally ambiguous the major conclusions are that:

(1) Actual earnings impact stock returns.
(2) The consensus forecast of growth in earnings is already incorporated in stock price and hence does not impact returns.
(3) Knowing the change in consensus forecast of growth in earnings ahead of time leads to a excess returns.
(4) Changes in consensus ranking of stocks may have an impact on returns after they are made public. The evidence here is more ambiguous than the evidence supporting the first three conditions.

* Both authors are Nomura Professors of Finance at the Stern School of Business at New York University. This paper owes much to our collaboration with the quantitative analysis team of the Nomura Securities group (MERRIT 21). In particular, our research would have been almost impossible without the efforts by two individuals, Mr. Y. Akeda and Mr. Y. Kato of the Nomura Research Institute.

1 See for example Brown et al. (1985) and Dimson and Marsh (1984) for an extensive bibliography.
While the results for consensus earnings forecasts and general performance forecasts are reasonably clear, the results for individual forecasters are much more ambiguous. For example, Elton, Gruber and Grossman (1986) found that past forecast accuracy could not be used to select individual forecasters who would subsequently perform well although consensus data was useful. In contrast, studies of the investment advice of Value Line show superior forecasting ability. 2

The bulk of the research on analysts' predictions and performance has been done on U.S. markets. The purpose of this paper is to examine the impact of forecasts of earnings and sales in the Japanese economy, a topic that has not been examined before. The study is interesting because of the similarity and differences between the Japanese and U.S. markets. The aggregate value of shares listed on the Tokyo Stock Exchange is larger than the value of shares listed on the New York Stock Exchange. Given the volume of shares traded it should be as competitive as the New York Stock Exchange. On the other hand, the number of suppliers (brokerage firms and institutions) of information and in particular forecast data to the market is much smaller in Japan than in the U.S. The average number of analyses supplying forecasts of earnings per share for the 400 largest NYSE stocks according to IBES is 22. While for the 400 largest firms on the Tokyo Stock Exchange IBES reports six estimates. 3 Given the difference in number and the fact that for many Japanese stocks only one forecast exists, the impact of any forecaster can potentially be much more important in Japan than in the United States. The Japanese market may be more informationally inefficient than the U.S. markets.

In this article we examine the forecasts of earnings and sales prepared by Nomura Research Institute for Japanese stocks. We selected a single forecasting source rather than the consensus forecast since there is only a short history for consensus forecasts and for many stocks Nomura is the only forecaster in the consensus. Nomura was selected because it is the largest financial institution in Japan and prepares forecasts for more stocks than any other Japanese or non-Japanese participant in the market.

In section 2 we examine the impact of four types of variables on returns: actual growth, forecasted growth, errors in forecasted growth and changes in forecasted growth. The results indicate that earnings and sales impact share price and that estimates of these variables contain information. To study the impact of forecasts, returns had to be examined as excess returns. Section 2 closes with some evidence that information on changes in analysts' forecasts is not rapidly incorporated in share price. If information is incorporated slowly

2 See for example Black (1973). The Value Line studies as well as many others in this area are suspect because of selection bias. After the fact a forecaster or firm such as Value Line is identified as doing well and then back testing shows that the forecaster did in fact do well.
3 IBES is a collection of analysts' forecasts prepared by Lynch, Jones and Ryan.
in share price then a potential for excess returns exists. This is examined in Section 3.

Section 3 examines the utilization of changes in analysts’ estimates to construct a portfolio, highly correlated with an index, that capitalizes on analysts’ forecasts while controlling risk. Using information that is clearly available to a decision maker, a portfolio is constructed that closely resembles the market and yet earns a consistently higher rate of return. Tests of the performance of this portfolio involve the incorporation of realistic transaction costs.

2. The importance of growth in sales and earnings

The purpose of this section is to analyze the impact of estimates of growth in sales and earnings on share prices. In order to do so we need to employ a model of return expectations.

2.1. Estimating expected returns

In most studies of earnings surprises in the U.S. market, excess returns from following any strategy are measured relative to expectations formed from a single-index (market) model. While a single-index model may do an adequate job of describing risk in the U.S. market (debate continues as to whether it does or does not) empirical evidence strongly suggest one index is not a sufficient description of the risk structure of the Tokyo Stock Exchange. For example, the empirical work of Elton and Gruber (1988) and Hamao (1988) indicates that four indexes are necessary to describe risk. Some of the problems involved with the single-index model are shown in Elton and Gruber (1988) who find that using the single-index model:

(a) Return is inversely related to Beta in the Japanese market.
(b) Explanatory power decreases dramatically as the size (market capitalization) of companies decreases. One index accounts for less than 25% of the return on the smallest 20% of the stocks included in the Nomura Research Institute 400 security stock index. The four-index model accounts for better than 70% of the return on these same stocks.

These problems have motivated us to use the four-index model rather than the market model to adjust for risk in all the research which follows.

The four-index model we employ is derived using factor analysis on historical data. The detailed description of the methodology behind the four-index model is beyond the scope of this paper. The reader interested in a detailed description of how these indexes are developed is referred to Elton and Gruber (1988). However, in the last section of this paper the validity of
the four-index model will be demonstrated by its usefulness in constructing an index fund.

2.2. Tests

Having constructed a model of return expectations we now turn to the impact of earnings and sales as well as earnings estimates and sales estimates on price.

The tests in this section are based on all companies listed on the Tokyo Stock Exchange which had a March fiscal year and for which Nomura Research Institute prepared earnings and sales forecasts for the fiscal years 1985 and 1986. We chose March since more firms had a March fiscal year than any other. Thus the choice of March gave us the largest number of firms in our sample. We chose a common fiscal year because for some of our tests we wanted all firms to be subject to the same economic influences. Our sample consisted of 941 firms for fiscal year 1984 and 864 firms for fiscal year 1985.

To examine the importance of sales and earnings growth as variables affecting price we ranked all stocks from highest to lowest value on the variable being examined. The stocks were then divided into three groups equal in number of stocks. The return on each portfolio was calculated by taking an equally weighted average of the return on each stock in a group.

We then calculated an excess return for each group relative to the excess return for the whole sample. As discussed earlier expected return was calculated using the four-factor model. In each case the four-factor model was fit by regressing the actual return of the three ranked portfolios on the return on the four factors for the five-year period prior to the period being analyzed. Expected return was calculated using actual return on the factors during the sample period and the coefficients estimated in the prior five-year period. Excess return is the difference between actual return of the three ranked groups and the expected return estimated from the four-factor model. The excess return was adjusted by subtracting out the average percentage excess return for the whole sample. This last adjustment has the effect of making the excess return net to zero across the three subsamples and adjusts for abnormal performance for the stocks for which earnings and sales are forecasted.

We will now discuss the definition of each of our variables in more detail. The first variable we analyzed was actual growth. If actual growth does not impact share prices then estimated growth, even if the estimate is correct, should not impact share prices. If growth in earnings and sales impact share price, then knowledge about the future value of these variables should lead to excess returns. Actual growth in earnings and sales were calculated as follows:

\[ \text{Actual growth} = \text{Actual earnings growth} + \text{Actual sales growth} \]

4 In all cases we deleted firms with negative earnings or such small earnings that growth in excess of 100% was found. This is consistent throughout.
Table 1
Cumulative excess return.

<table>
<thead>
<tr>
<th></th>
<th>1985</th>
<th></th>
<th>1984</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top</td>
<td>Middle</td>
<td>Low</td>
<td>Top</td>
</tr>
<tr>
<td>Earnings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Actual growth</td>
<td>8.96</td>
<td>0.63</td>
<td>-9.59</td>
<td>2.49</td>
</tr>
<tr>
<td>2. Forecasted growth</td>
<td>-3.62</td>
<td>3.74</td>
<td>-0.12</td>
<td>-3.74</td>
</tr>
<tr>
<td>3. Error in forecast</td>
<td>11.54</td>
<td>-0.10</td>
<td>-11.44</td>
<td>9.65</td>
</tr>
<tr>
<td>4. Change in forecast</td>
<td>12.41</td>
<td>-0.04</td>
<td>-12.37</td>
<td>5.26</td>
</tr>
<tr>
<td>5. Forecast revision</td>
<td>4.00</td>
<td>-0.34</td>
<td>-3.65</td>
<td>1.88</td>
</tr>
<tr>
<td>Sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Actual growth</td>
<td>4.06</td>
<td>-0.42</td>
<td>-3.64</td>
<td>1.89</td>
</tr>
<tr>
<td>2. Forecasted growth</td>
<td>-7.52</td>
<td>4.35</td>
<td>3.18</td>
<td>-7.48</td>
</tr>
<tr>
<td>3. Error in forecast</td>
<td>8.27</td>
<td>-0.30</td>
<td>-7.95</td>
<td>3.90</td>
</tr>
<tr>
<td>4. Change in forecast</td>
<td>4.67</td>
<td>4.91</td>
<td>-9.59</td>
<td>-0.54</td>
</tr>
</tbody>
</table>

\[ G_E^A = \frac{E_i^{A+1}}{E_i^A} - 1, \]  
\[ G_S^A = \frac{S_i^{A+1}}{S_i^A} - 1, \]

where

\( G_E^A \) = actual growth in earnings,
\( G_S^A \) = actual growth in sales,
\( E_i^A \) = actual earnings in \( t \),
\( S_i^A \) = actual sales in \( t \).

For example, for the 1984 sample period actual sales for the fiscal year ending March, 1985 was divided by actual sales for the fiscal year ending March, 1984.

Table 1 shows the results for actual earnings growth and sales growth. The results are the cumulative excess return for 13 months, starting two months after the end of the earlier fiscal year (\( t \)). For example, for the year titled 1984
the results are the cumulative returns for the 13 months beginning June, 1984 and ending June, 1985. An investor would not know actual growth over this period so that if growth in earnings or sales affects security prices, knowledge about the future value of these variables should lead to excess return. The period during which we cumulated excess returns was selected for the following reason. First, we start cumulating returns in June because the fiscal year ends in March and by June data on prior year earnings and sales is public. We present results ending in June of the subsequent year because analyzing monthly returns for 24 months after the start of the sample period showed that in all cases any impact was fully captured by the end of June.

Table 1 shows that knowledge concerning actual earnings leads to excess returns being earned. The one third of the stocks with the highest actual growth in earnings had excess returns which exceeded those of the lowest one third by over eight percent in 1984 and over eighteen percent in 1985. This is evidence that earnings growth is an important factor in determining share price. If we had performed the same analysis with a variable that did not affect share price, excess returns would not have been earned. While the results are consistent for both years they are much weaker in the 1984 sample period.

We also earn excess returns with knowledge concerning sales growth. What is surprising, and the same result consistently shows up in our other tests, is that the importance of sales growth is less than earnings growth. This is consistent with U.S. results but is inconsistent with popular beliefs about the Japanese markets. The popular belief is that Japanese share prices are driven by sales, while U.S. prices are driven by earnings. Here we find evidence that in Japan earnings is the more important variable effecting share prices. This is consistent with results using U.S. data.

The second variable we examined is expectations about earnings growth. The variables we examined were:

\[ G_E^F = \frac{E_{t+1,June}^F}{E_t^A} - 1, \]  
\[ G_S^F = \frac{S_{t+1,June}^F}{S_t^A} - 1, \]  

where

\( G_E^F \) = the forecasted earnings growth,

\( G_S^F \) = the forecasted sales growth,

\( E_{t+1,June}^F \) = the forecast of earnings reported in June for period \( t + 1 \),

\( S_{t+1,June}^F \) = the forecast of sales reported in June for period \( t + 1 \), and other symbols are as before.
We used the June forecast since we believe by June the prior year's actual figures are known. To clarify the dates the 1984 figures are calculated by taking the June, 1984 forecast of earnings for the fiscal year ending March of 1985 and dividing by actual earnings for the fiscal year 1984. We would expect that forecasts were fully incorporated into share price so that no excess return could be earned. When consensus data is used for an analysis of U.S. security markets we find no excess return. However, here we are examining the forecasts prepared by a single firm in the Japanese market. The results could be different.

Examining table 1 shows that while excess returns are earned it is the low forecasted growth firms which have positive excess returns. This is evidence that investors have overreacted to the forecast. However, not much importance should be placed on these results since the month-by-month pattern is very unstable. For all other variables we analyzed the month-by-month pattern is very consistent. The results for sales are even more ambiguous than the results for earnings.

The third variable we examined was errors in the forecast. If expectations are important then knowledge that forecasts are in error should lead to excess return. We computed percentage error. The measures were:

\[
\epsilon_E = \frac{E_{t+1}^A - E_{t+1}^F}{E_t},
\]

\[
\epsilon_S = \frac{S_{t+1}^A - S_{t+1}^F}{S_t^A},
\]

where

\(\epsilon_E = \) error in the forecast of earnings,
\(\epsilon_S = \) error in the forecast of sales, and
other symbols are as before.

For example, the number shown for 1984 uses the forecast of earnings prepared in June of 1984 for earnings reported in March of 1985 and compares this forecast with the actual earnings reported for March, 1985.

Knowledge that forecasts were in error produced larger positive excess returns than knowledge of the actual values of the variables themselves. The excess return differential between the top and bottom portfolio was over 18 percent in 1984 and 22 percent in 1985. This is evidence of the importance of the variables (earnings and sales) and that expectations drive security prices. Note that the use of sales forecasts rather than earnings forecasts once again produces positive but smaller differentials between portfolios.

The fourth variable we analyzed is change in the forecast. If we are analyzing variables that affect share price, and if expectations are important in
determining share price then knowledge concerning changes in expectations should be more important than knowledge about the actual values of the variable itself. The variables we examined were:

\[
\Delta E_{t+1}^F = \frac{E_{t+1, Dec}^F - E_{t+1, June}^F}{E_{t+1, June}^F},
\]

\[
\Delta S_{t+1}^F = \frac{S_{t+1, Dec}^F - S_{t+1, June}^F}{S_{t+1, June}^F},
\]

where

\[
\Delta E_{t+1}^F = \text{change in the earnings forecast,}
\]

\[
\Delta S_{t+1}^F = \text{the change in the sales forecast,}
\]

\[
E_{t+1, Dec}^F = \text{the earnings forecast for } t + 1 \text{ made in December,}
\]

\[
S_{t+1, Dec}^F = \text{the sales forecast for } t + 1 \text{ made in December, and}
\]

other symbols are as before.

For example the number shown under 1984 utilizes the difference between the December, 1984 forecasts and the June, 1984 forecasts. Both forecasts are of earnings reported March, 1985. In this case excess returns are examined from June, 1984 to June, 1985.

Table 1 shows the results. Knowing how earnings forecasts will change leads to greater excess returns than knowledge of actual growth. This is strong evidence that expectations affect share price and that in particular Nomura’s forecasts impact share price. Once again knowledge concerning earnings is more important than knowledge concerning sales.

The effects of these four variables in the Japanese market are remarkably similar to their effects in United States markets. In both markets the pattern across variables is the same. Thus, in both markets knowledge about expectations is more important than knowledge about the variables themselves. This is evidence that expectations drive security prices. The results analyzed here are for forecasts prepared by one firm rather than consensus forecasts used in U.S. studies but these results show that this firm has an important influence on share price. The surprising result given general beliefs is that earnings growth is more important than sales growth. This is the result shown in U.S. studies but popular belief is that it differs in Japan. Here we see it does not.

Before leaving this section we will re-examine the change in forecasted earnings to see if some of the impact of the change is captured in market price after it becomes public. This is a topic that will be examined in great detail in later sections of the paper where we examine month-by-month changes. To get a rough idea of the phenomenon let us return to the change in forecast variables. Let us look at the excess returns which would accrue to an investor
who bought after the change in estimates was realized (in 1985.1 or 1986.1) and held for three months.

Examining the row labeled Forecast revision in table 1 indicates that a considerable amount of the excess returns associated with a revision of analysts' estimates is realized after the date of the revision. In fact, approximately one third of the excess returns accrued after the revision is made. We now turn to a further exploration of this phenomenon.

3. An indexed earnings estimate change model

The analysis in section 2 indicated that market prices do not instantly reflect the informational content of a change in analysts' estimates. If the market is not efficient with respect to a change in analysts' beliefs buying and selling on these beliefs might lead to excess returns. Even if this is true the question remains as to whether these excess returns are sufficient to cover transaction costs.

We wished to investigate buy and sell rules based on changes in analysts' forecasts within a framework which would be relevant for institutional portfolio managers. We selected as our goal investigating a portfolio which closely resembled the first tier of the Tokyo Stock Exchange, where appropriate for institutional ownership stocks, and capitalized on any information in the change in analysts' forecasts of growth rates. 5

The procedure we used involved the following steps. Since we were interested in institutional ownership we desired to consider buying and selling only very liquid stocks. We selected as of December, 1982, 600 highly liquid stocks from among the 1100 stocks making up the first tier of the Tokyo Stock Exchange. The 600 stocks selected were divided into 13 industry sectors. In each month for each stock the rate of change in analysts' estimates of earnings was computed. For each industry sector the one-third of the stocks for which analysts had the largest percentage increase in estimates were considered candidates for the index fund. Using these 200 stocks a quadratic programming problem was solved which formed a portfolio which minimized residual risk from the four-factor model (described in section 2) while matching the TSE index in its sensitivities to each of the four factors and involved holding no more than 100 securities. The portfolio was held for one month, the sample reformed and the quadratic programming problem resolved to develop a new portfolio. The output was the monthly composition and return on a series of portfolios formed from January, 1983 through December, 1987. Each portfolio was formed using only data that was available at the time of its construction and returns recorded for the month subsequent to its formation.

5 The first tier or section of the Tokyo Stock Exchange consists of the 1100 largest stocks (by capitalization) listed on the Tokyo Stock Exchange.
The results of following this portfolio strategy are presented in table 2. Note that we have been fairly successful in matching the index for the first tier of the Tokyo Stock Exchange. Our beta of 1.05 is close to one and the coefficient of determination of 0.927 indicates a close fit. In order to match the index while attempting to capitalize on earnings surprises the amount of turnover incurred in the portfolio is fairly substantial. Over 28% of the portfolio is sold each month and replaced with different stocks. If we examine the return on the portfolio before transaction costs it is obvious that earnings surprises contain information. The average monthly return on the index fund for the period 1983-1987 was 2.76% per month while during the same period of time the monthly return on the first tier of the Tokyo Stock Exchange was only 2.10% per month. The average monthly excess return of more than 0.66% per month is surely of economic significance. The real tests of the trading model and the relevant test of informational efficiency is whether excess returns remain after transaction costs are paid. In table 2 we examine returns after transaction costs. Transaction costs were calculated using the Tokyo Stock Exchange table of transaction costs. The transaction costs differed over time depending on the price and volume of stock traded. 6 Examining table 2 we see that transaction costs accounted for over one third of the pre-cost excess return. However, even when transaction costs were taken into consider-

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6 We use the retail commissions on the Tokyo Stock Exchange. Assuming a portfolio size of 10 billion yen a year. For retail orders the Tokyo Stock Exchange has a table of fixed commissions similar to those which existed on the New York Stock Exchange prior to the introduction of negotiated commissions.
ation excess returns were still larger than 40 basis points per month. Furthermore, the earnings surprise index fund outperformed the first tier of the Tokyo Stock Exchange in over two thirds of the 60 months examined and outperformed it in each calendar year. The minimum average monthly differential over a year holding period is 26 basis points and the maximum is 78 basis points.  

In summary, using only data that is available to an investor we have constructed a portfolio which contains 100 stocks, closely resembles an index fund on the first tier of the Tokyo Stock Exchange, and outperforms such an index fund by over 40 basis points per month on a post-transaction cost basis.

4. Conclusion

In this paper we have examined the impact of one firm’s estimates of earnings and sales on stock prices in the Japanese market. We have shown that, contrary to popular belief, earnings, not sales, drive stock prices in Japan. Analysts’ estimates are incorporated in stock prices but changes in analysts’ estimates are incorporated with a lag. Because of this lag extra returns can be earned by buying stocks immediately after an upward revision in analysts’ earning estimates. Furthermore, using changes in forecasts, a fund which mirrors the first tier of the Tokyo Stock Exchange but which offers a greater return can be created.

References


Subsequent to examining this simple rule for selection more complex rules were examined with different revision intervals and different populations of stocks. While turnover changed the result of superior returns (positive alpha) with high $R^2$ was robust across a wide range of model parameters and samples.