The information content of losses

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Abstract

This study hypothesizes that because shareholders have a liquidation option, losses are not expected to perpetuate. They are thus less informative than profits about the firm's future prospects. The results are consistent with the hypothesis. They also show that the documented increase in the earnings response coefficient as the cumulation period increases appears to be due exclusively to the effect of losses. The liquidation option effect extends to profitable cases where earnings are low enough to make the option attractive. Alternative explanations for the low informativeness of losses such as mean reversal of earnings are not supported by the tests.

Key words: Capital markets; Earnings response coefficients; Losses; Negative earnings

JEL classification: M4

1. Introduction

A large body of research demonstrates that accounting numbers and, in particular, earnings have information content. Yet, earnings appear to explain only a small fraction of the total variation in returns (for a summary of this evidence see Bernard, 1989; Lev, 1989). Different explanations for the weak
association between earnings and returns have been offered in recent years. It has been suggested, for example, that earnings do not reflect the underlying economic events in a timely manner and, therefore, are not synchronized with stock price movements (see, e.g., Beaver, Lambert, and Morse, 1980). 1

Another explanation for the observed weak return–earnings relation is that the earnings contain transitory components that are either value-irrelevant or should have only a limited valuation impact (see Givoly and Hayn, 1993; Gonedes, 1975; Hoskin, Hughes, and Ricks, 1986; Ramesh and Thiagarajan, 1993; Ramakrishnan and Thomas, 1993; Ronen and Sadan, 1981). Another, possibly related, measurement problem which may contribute to the weak return–earnings association is that cross-sectional tests fail to recognize the time-series properties of individual firms’ earnings, a factor likely to be incorporated by investors in projecting future earnings and returns (see Kormendi and Lipe, 1987). Certain specifications of the earnings variable (levels versus changes, deflation by price or earnings, etc.) also appear to have an effect on the measured earnings response coefficient (see Kothari, 1992).

The suggested improvements in the measurement of earnings (e.g., removal of transitory items or improving the specification of the earnings measure) result, however, in an earnings response coefficient that is still lower than its predicted value2 and the explanatory power of annual earnings with respect to annual returns remains fairly weak. 3

In line with the research attempting to identify factors that determine the return–earnings relation, this study posits that reported losses are perceived by investors as temporary. They are thus more weakly associated with returns than profits. Losses are likely to be considered temporary since shareholders can always liquidate the firm rather than suffer from indefinite losses. In other words, equity holders have a put option on the future cash flows of the firm whereby they can sell their shares at a price commensurate with the market value of the net assets of the firm.

1The distinction between timeliness and noise in earnings, however, is not straightforward (see Collins, Kothari, Shanken, and Sloan, 1994).

2When earnings behave as a random walk, the predicted value of the slope coefficient of the return–earnings regression (where the earnings variable is deflated by price and the return includes dividends) is expected to be 1 + 1/r where r is the discount rate used by investors. Plausible values of r lead to expected values for the slope coefficient of 7.0 or higher. For further discussion see Kothari and Zimmerman (1994).

3The $R^2$ value of the return–earnings regression depends, among other things, on the specification of the earnings variable and the window over which earnings and returns are measured. For the earnings-deflated-by-price specification and a window of one year, $R^2$ values reported by past research are generally below 10%.
Assuming an identity between cash flows and earnings and ignoring the liquidation option value, the value of the firm's equity is the higher of the present value of its expected earnings and its liquidation value. This conclusion is independent of the earnings generating function (e.g., random walk or mean reverting). It suggests that when a loss is reported, the stock price will not necessarily drop to zero nor decline proportionally to the change in earnings.

As a result, the inclusion of loss cases in the samples used to estimate the earnings response coefficient and the return-earnings correlation should dampen, perhaps considerably, these measures. In addition, to the extent that there is variation in the incidence of losses across firms and over time, such variation will affect the cross-sectional and the intertemporal variation in the measured earnings response coefficient.

Losses represent only a specific case of a more general situation where the earnings signal indicates future earnings that are sufficiently low (albeit positive) as to make the liquidation option attractive. In these situations, investors do not evaluate firms strictly on the basis of their reported earnings, thus leading to a weak observed return-earnings association. It is, therefore, also of interest to examine the market response to positive earnings that are so low that, if expected to persist, would make the liquidation option preferred.

The notion that the liquidation, or abandonment, option adds to the firm's value has long been recognized in the finance literature (see, for example, Robichek and Van Horne, 1967; Myers and Majd, 1990), but has received only limited attention in the accounting literature. In an early study, Ronen and Sorter (1973) discuss the importance of the assets' exit value for firm valuation. More recently, Berger, Ofek, and Swary (1993) further develop the concept of the abandonment option and provide evidence of its effect on the value of the firm's equity. The liquidation option also plays a role in the model of the return-earnings relation used by Subramanyan and Wild (1993), who show that the informativeness of earnings is inversely related to various characteristics that proxy for the likelihood that the firm will be terminated. Dhaliwal and Reynolds (1994) reach a similar conclusion, finding that the strength of the return-earnings association is inversely related to the default risk of the firm's debt.

The main purpose of this paper is to assess the effect of loss cases on the return-earnings relation and its cross-sectional and intertemporal variation. The paper further examines the effect of losses on other phenomena documented by previous research such as the increase in the strength of the return-earnings association as the cumulation period increases.

The results of the paper show that when only profitable firm-years are considered, stock price movements are much more strongly linked to current-period earnings. Excluding loss cases results in almost a tripling of both the one-year earnings response coefficient and the explanatory power of annual
earnings with respect to contemporaneous returns. In contrast, when the estimation sample consists only of loss cases, the magnitude of reported losses does not appear to be correlated at all with contemporaneous price movements. These results hold regardless of whether levels or changes are used to form the earnings variable.

The findings of the paper further indicate that the increase in the measured earnings response coefficient as the cumulation period lengthens is due exclusively to the effect of loss observations. When losses are excluded, no such pattern exists; further, extending the cumulation period results in a much less dramatic increase in the $R^2$ of the return–earnings regression.

Rather than reflecting the existence of a liquidation option, the finding of a muted stock price response to losses may be due, at least in part, to a mean reversal in earnings and to the fact that losses represent extreme realizations from the earnings distribution. While the random walk model has been found to provide a fair description of the time-series behavior of firms (see, for example, Ball and Watts, 1972; Albrecht, Lookabill, and McKeown, 1977; Watts and Leftwich, 1977), past research has also shown that under certain conditions, earnings behave as a mean-reverting process. In particular, periods with extreme changes in earnings are found to be followed by periods with earnings changes in the opposite direction (see Brooks and Bookmaster, 1976; Beaver, Lambert, and Morse, 1980; Freeman, Ohlson, and Penman, 1982). Recent studies (see Freeman and Tse, 1992; Das and Lev, 1992) find indeed that, consistent with mean reversal in earnings, the stock price response is nonlinear with the magnitude of the earnings change, with weaker responses associated with extreme earnings observations.

The paper tests the validity of mean reversal, as well as of other competing explanations (such as the higher risk of losing firms or the preponderance of transitory components in loss situations) for the findings. The results suggest that the effect of losses on the return–earnings association is, apparently, not due to the extremity of the loss observations and the mean-reversal of earnings which may follow loss incidents. In fact, the results show that the return–earnings association is weak not only in loss situations but also in profitable cases in which reported earnings fall below the threshold that evokes the exercise of the liquidation option. The other competing explanations are also not supported by the data.

The next section of the paper describes the sample and provides descriptive statistics on the incidence of losses. Section 3 shows the effect of loss cases on the measured relation between earnings and returns. Section 4 examines whether the effect of losses on the return–earnings association is due to the phenomenon of a mean reversal of extreme earnings observations (such as loss incidents). Other competing explanations for the findings are considered in Section 5. Concluding remarks and suggestions for future research are presented in the last section.
2. Data and descriptive statistics

2.1. Data

The basic sample consists of all firm-years for which earnings data are available on the 1991 release of Compustat's Primary, Supplementary and Tertiary active and research files. It contains 85,919 firm years over the 29-year period 1962–1990, representing 9,752 distinct firms. Return information is retrieved from the CRSP database. Certain analyses impose data requirements, such as availability of sufficient return data and a minimal number of years with consecutive earnings data, that result in a reduction of the number of firm-years.

2.2. Frequency of losses

The earnings variable is defined as income (loss) from continuing operations, before extraordinary items, discontinued operations, and the cumulative effect of accounting changes. Table 1 presents the relative frequency of losses. Losses are fairly common, appearing in 19.6% of all firm-years. There is a dramatic increase in the frequency of losses over time, from about 3% in the early 1960's to over 30% in the late 1980's. The increase is only partially due to the changing composition of firms covered by Compustat. When a constant composition of firms is maintained, as shown in the right-most three columns of Table 1, a similar, although less pronounced, pattern exists. The loss frequency for these firms has increased from an average of 4.2% in the first half of the period to an average of almost 12% in the last half of the period.\(^4\)

The incidence of losses is shared by almost all firms. As Table 2 indicates, the majority of firms with at least eight years of data (2,547 out of 4,148, or 61.4%) report at least one loss and one-fifth of them have two to three losses during the 29-year sample period.

2.3. Losses and firm size

The loss phenomenon is strongly linked to firm size. Table 3 shows the probability of a loss for ten equal-sized portfolios of firm-years ordered by the market value of the firms' equity.\(^5\) The results reveal a monotonic relation between firm size and the probability of a loss. The probability of incurring

\(^4\)A similar increase in the frequency of losses also occurs for the smaller group of firms that existed over the entire 29-year period from 1962 to 1990.

\(^5\)Ten portfolios are formed each year based on the market value of the firms' equity at the end of the previous year.
Table 1
Frequency of losses (negative income from continuing operations) by year

<table>
<thead>
<tr>
<th>Year</th>
<th>All firms</th>
<th>Firms present from 1968 through 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total number of firm-years</td>
<td>Number of loss years</td>
</tr>
<tr>
<td>All years</td>
<td>85,919</td>
<td>16,814</td>
</tr>
<tr>
<td>1962–67</td>
<td>878</td>
<td>31</td>
</tr>
<tr>
<td>1968</td>
<td>1,703</td>
<td>95</td>
</tr>
<tr>
<td>1969</td>
<td>1,847</td>
<td>126</td>
</tr>
<tr>
<td>1970</td>
<td>1,931</td>
<td>233</td>
</tr>
<tr>
<td>1971</td>
<td>2,050</td>
<td>231</td>
</tr>
<tr>
<td>1972</td>
<td>2,784</td>
<td>207</td>
</tr>
<tr>
<td>1973</td>
<td>3,119</td>
<td>184</td>
</tr>
<tr>
<td>1974</td>
<td>3,129</td>
<td>341</td>
</tr>
<tr>
<td>1975</td>
<td>3,101</td>
<td>394</td>
</tr>
<tr>
<td>1976</td>
<td>3,084</td>
<td>292</td>
</tr>
<tr>
<td>1977</td>
<td>3,081</td>
<td>268</td>
</tr>
<tr>
<td>1978</td>
<td>3,252</td>
<td>257</td>
</tr>
<tr>
<td>1979</td>
<td>3,534</td>
<td>399</td>
</tr>
<tr>
<td>1980</td>
<td>3,634</td>
<td>517</td>
</tr>
<tr>
<td>1981</td>
<td>3,904</td>
<td>707</td>
</tr>
<tr>
<td>1982</td>
<td>3,949</td>
<td>992</td>
</tr>
<tr>
<td>1983</td>
<td>4,322</td>
<td>1,117</td>
</tr>
<tr>
<td>1984</td>
<td>4,434</td>
<td>1,182</td>
</tr>
<tr>
<td>1985</td>
<td>4,445</td>
<td>1,424</td>
</tr>
<tr>
<td>1986</td>
<td>4,678</td>
<td>1,546</td>
</tr>
<tr>
<td>1987</td>
<td>4,995</td>
<td>1,674</td>
</tr>
<tr>
<td>1988</td>
<td>5,928</td>
<td>1,594</td>
</tr>
<tr>
<td>1989</td>
<td>4,855</td>
<td>1,616</td>
</tr>
<tr>
<td>1990</td>
<td>984</td>
<td>1,233</td>
</tr>
</tbody>
</table>

*The mean number of firm-years, the mean number of losses per year, and the mean percentage of losses per year are presented for the subperiod 1962–67.

A loss in a given year is only 2.5% for the largest firms (portfolio 10), compared with 50.8% for the smallest firms (portfolio 1).

The results relating loss frequency to firm size suggest that if the presence of losses induces a downward bias in the earnings response coefficient, the magnitude of that bias must vary by firm size: It should be more pronounced for small firms and almost nonexistent for large firms. Therefore, these results may have implications for studies on the effect of firm size on the information content of earnings.6

### Table 2
Distribution of firms with at least eight years of data, by the number of years with losses (negative income from continuing operations)

<table>
<thead>
<tr>
<th>Number of loss years</th>
<th>Number of firms</th>
<th>% of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>All firms</td>
<td>4,148</td>
<td>100.0</td>
</tr>
<tr>
<td>0</td>
<td>1,601</td>
<td>38.6</td>
</tr>
<tr>
<td>1</td>
<td>618</td>
<td>14.9</td>
</tr>
<tr>
<td>2</td>
<td>450</td>
<td>10.8</td>
</tr>
<tr>
<td>3</td>
<td>392</td>
<td>9.5</td>
</tr>
<tr>
<td>4</td>
<td>308</td>
<td>7.4</td>
</tr>
<tr>
<td>5</td>
<td>243</td>
<td>5.9</td>
</tr>
<tr>
<td>6</td>
<td>184</td>
<td>4.4</td>
</tr>
<tr>
<td>7</td>
<td>133</td>
<td>3.2</td>
</tr>
<tr>
<td>8</td>
<td>86</td>
<td>2.1</td>
</tr>
<tr>
<td>9</td>
<td>66</td>
<td>1.6</td>
</tr>
<tr>
<td>10 or more</td>
<td>67</td>
<td>1.6</td>
</tr>
</tbody>
</table>

### Table 3
Probability of losses by portfolios ordered by firm size, where firm size is measured as the market value of equity at the end of each year

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Number of firm-years</th>
<th>Number of loss years</th>
<th>% of loss years</th>
</tr>
</thead>
<tbody>
<tr>
<td>All portfolios</td>
<td>85,919</td>
<td>16,814</td>
<td>19.6</td>
</tr>
<tr>
<td>1 (smallest firms)</td>
<td>8,592</td>
<td>4,361</td>
<td>50.8</td>
</tr>
<tr>
<td>2</td>
<td>8,592</td>
<td>3,150</td>
<td>36.7</td>
</tr>
<tr>
<td>3</td>
<td>8,592</td>
<td>2,486</td>
<td>29.0</td>
</tr>
<tr>
<td>4</td>
<td>8,592</td>
<td>2,033</td>
<td>23.7</td>
</tr>
<tr>
<td>5</td>
<td>8,592</td>
<td>1,621</td>
<td>18.9</td>
</tr>
<tr>
<td>6</td>
<td>8,592</td>
<td>1,191</td>
<td>13.9</td>
</tr>
<tr>
<td>7</td>
<td>8,592</td>
<td>830</td>
<td>9.7</td>
</tr>
<tr>
<td>8</td>
<td>8,592</td>
<td>512</td>
<td>6.0</td>
</tr>
<tr>
<td>9</td>
<td>8,592</td>
<td>418</td>
<td>5.0</td>
</tr>
<tr>
<td>10 (largest firms)</td>
<td>8,591</td>
<td>212</td>
<td>2.5</td>
</tr>
</tbody>
</table>

2.4. The distribution of profits versus losses

Fig. 1 shows the cross-sectional, pooled over time, distribution of the earnings-per-share to price (at the beginning of the year) ratio.\(^7\) The figure is based on

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\(^7\)An alternative measure, earnings divided by total assets, has similar distributional properties.
Fig. 1. The distribution of earnings-per-share to price ratio for the period 1963–1990 (n = 75,878). Earnings are defined as earnings from continuing operations for year t and the price is that prevailing at the end of year t – 1.

on 75,878 observations for which the price data were available. The distribution of the earnings-to-price ratio is not significantly different from a normal distribution (at the 5% significance level, using the Kolmogorov goodness-of-fit test) with a mean ratio of 0.051 (a median of 0.077) and a standard deviation of 0.191. This is in line with the distribution of other financial ratios (see Foster, 1986, Ch. 4).

Interestingly, there is a point of discontinuity around zero. Specifically, there is a concentration of cases just above zero, while there are fewer than expected cases (assuming the above normal distribution) of small losses (i.e., just below zero). The frequency of observations in both the region just above and that just below zero departs significantly from the expected frequency under the normal distribution at the 1% significance level using the binomial test. These results suggest that firms whose earnings are expected to fall just below the zero earnings point engage in earnings manipulations to help them cross the ‘red line’ for the year.

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Note that the sloping lower tail of the earnings distribution is inconsistent with the presence of ‘big-bath’ behavior which would have been evidenced by a ‘fat’ lower tail of the distribution.
3. The incidence of losses and the return–earnings association

3.1. Firm valuation in the presence of losses

Consider the following simple model in which the firm's value, \( V \), is determined by its earnings (time subscripts omitted for ease of exposition):

\[
V = kX \quad \text{for} \quad X \geq X^*, \\
= L \quad \text{for} \quad X < X^*,
\]

where \( X \) is the expected earnings per period in perpetuity, \( k \) is the appropriate earnings multiplier, \( L \) is the liquidation value of the firm, and \( X^* \) is the level of expected earnings below which the liquidation option is triggered, \( X^* = L/k \). The value of the firm, so determined, is consistent with a random walk behavior of the earnings series, and is described in Fig. 2.

Earnings informativeness, as captured by the correlation between expected earnings and firm values, is a function of the level of expected earnings. Conditional upon earnings being above (below) \( X^* \), there is a perfect (zero) correlation between earnings of the firm and its value. In general, the correlation coefficient between \( X \) and \( V \) approaches 1 as the probability of triggering the liquidation option approaches 0.

Somewhat similar conclusions are reached from an econometric perspective. Estimating an earnings response coefficient based on a sample pooled across observations from the regions above and below \( X^* \) (see Fig. 2) is expected to result in a downward-biased estimate of \( k \). The degree of bias depends on the relative frequency of observations in the region below \( X^* \) and on their
In the same vein, when the true relation is that described in Fig. 2, any regression estimated from the entire range of \( X \) and constrained to have a single set of coefficients would result in a lower explanatory power than that of the unrestricted regressions that allow the coefficients to vary across \( X \)'s regions.

### 3.2. The effect of losses on the informativeness of earnings

The effect of losses on the estimated earnings response coefficient (ERC) and on the information content of earnings (as measured by the \( R^2 \) of the return-earnings regression) is assessed through the analysis of different specifications of the regression whose general form is (firm identifier omitted to simplify the notation)

\[
R_t = \alpha + \beta \frac{X_t}{P_{t-1}} + \epsilon_t, \tag{2}
\]

where \( R_t \) is the return over the 12-month period commencing with the fourth month after the end of the firm's fiscal year \( t - 1 \).\(^{10}\) \( X_t \), the earnings variable, is, alternately, the level of primary earnings-per-share (EPS) of year \( t \) or the change in EPS in that year, and \( \epsilon_t \) is an error term. The earnings measure is deflated by \( P_{t-1} \), the share price at the end of fiscal year \( t - 1 \). The regression is estimated for both a pooled sample of firm-years and individual firms. Both the pooled sample of firm-years and the sample of individual firms are partitioned into subgroups in order to examine the effect of losses on the regression estimates. Specifically, the pooled sample is divided into profitable and loss firm-years, and the firm sample is divided into groups of firms according to the frequency of losses in the firm's history. Regression (2) is then estimated for each subgroup, using both the earnings levels and earnings changes specifications.\(^{11,12}\)

If loss cases have a dampening effect on the measures of the information content of earnings, the following relation between the regression parameters of the subgroups should hold:

\[
ERC(R^2)_{\text{losses}} < ERC(R^2)_{\text{full sample}} < ERC(R^2)_{\text{profitable}}. \tag{3}
\]

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\(^9\)Proof is available from the author.

\(^{10}\)This time interval is used to ensure that the return period captures the market response to year \( t \)'s earnings and not to the earnings for year \( t - 1 \).

\(^{11}\)Similar to other studies on the return-earnings association (see, for example, Collins and Kothari, 1989; Kothari, 1992; Lys, Ramesh, and Thiagarajan, 1993), the earnings variable is truncated. In this study, the deflated earnings variable is truncated at the top and bottom 1% of this variable's distribution.

\(^{12}\)When the pooled sample is used for earnings changes, a loss firm-year is defined as a year in which a loss is reported in either the current or the preceding year. The reason is that if a loss is perceived by investors as temporary, then a loss in either year \( t \) or year \( t - 1 \) would make the earnings change from year \( t - 1 \) to year \( t \) less informative.
Table 4

Regression results of returns on the earnings/price ratio

\[ R_t = \alpha + \beta \frac{X_t}{P_{t-1}} + \epsilon_t \]

where \( R_t \) is the return over the 12-month period commencing with the fourth month of fiscal year \( t \), \( X_t \) is the earnings per share variable in year \( t \) (specified as either levels or changes), \( P_{t-1} \) is the share price at the end of year \( t - 1 \), and \( \epsilon_t \) is an error term.

<table>
<thead>
<tr>
<th>Specification of the earnings variable</th>
<th>Levels</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression specification</td>
<td>( \beta )</td>
<td>( \text{Adj. } R^2 ) (%)</td>
</tr>
<tr>
<td>Pooled across firm-years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All cases</td>
<td>75,878</td>
<td>0.95</td>
</tr>
<tr>
<td>Loss cases(^a)</td>
<td>14,512</td>
<td>0.01</td>
</tr>
<tr>
<td>Profit cases(^b)</td>
<td>61,366</td>
<td>2.62</td>
</tr>
<tr>
<td>Time-series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All firms</td>
<td>4,148</td>
<td>2.15</td>
</tr>
<tr>
<td>Firms with no losses</td>
<td>1,601</td>
<td>3.35</td>
</tr>
<tr>
<td>1 loss</td>
<td>618</td>
<td>2.36</td>
</tr>
<tr>
<td>2-3 losses</td>
<td>842</td>
<td>1.63</td>
</tr>
<tr>
<td>4-5 losses</td>
<td>551</td>
<td>0.94</td>
</tr>
<tr>
<td>6 or more losses</td>
<td>536</td>
<td>0.63</td>
</tr>
</tbody>
</table>

\(^a\)Under the earnings-change specification, this group also \textit{includes} profitable cases in which a loss is reported in the previous year, leading to a total number of 18,919 cases in this group.

\(^b\)Under the earnings-change specification, this group \textit{excludes} cases in which a loss is reported in the previous year, resulting in a total number of cases of only 56,959 in this group.

The main results, summarized in Table 4, show that both \( \beta \) (the \textit{ERC}) and \( R^2 \) are considerably depressed by the inclusion of loss cases. The first panel of the table presents the parameters from a pooled regression. The coefficient of the earnings variable is 0.95 for levels and 0.78 for changes. These values are consistent with the values for \textit{ERC} reported in other studies. When only profitable years are considered, the \textit{ERC} increases dramatically to 2.62 and 2.64, respectively. Similar increases are obtained for the adjusted \( R^2 \) of the regression, a statistic often viewed as a measure of the information content of earnings: from values of \( R^2 \) for the full sample of 9.3\% (levels) and 5.8\% (changes), the \( R^2 \) of the regression increases to 16.9\% (levels) and 13.7\% (changes). When only loss cases are considered, the association between earnings and returns is extremely low. The \textit{ERC}s are 0.01 (which is insignificant) and 0.50 for levels and changes. The \( R^2 \) is close to 0 using both levels and changes.

The dampening effect that the inclusion of losses has on the \textit{ERC} and the \( R^2 \) of the return–earnings regression is best illustrated when regression (2) is
estimated for individual firms. The second panel of Table 4 shows summary results for regression (2) estimated for 4,148 individual firms for which at least eight years of returns and earnings data are available. The ERC and $R^2$ decline with the frequency of loss years in the firm's time series. For earnings levels, the median ERC for all firms is 2.15 and the median $R^2$ is 17.4%. The ERC and the $R^2$ decline monotonically with the number of years in which the firm experiences a loss. Firms that enjoy only profitable years exhibit the highest estimated values of these parameters (3.35 and 23.8%, respectively), while firms with more than six years of losses experience the lowest values (0.63 and 3.6%, respectively). Similar patterns are found when the earnings change specification is used.

3.3. The effect of losses on the return–earnings relation over long cumulation periods

Previous studies on the information content of earnings show that while the ERC and the $R^2$ of the annual return–earnings regression are low, cumulating earnings over longer horizons results in much higher values for these parameters (see Easton, Harris, and Ohlson, 1992; Lys, Ramesh, and Thiagarajan, 1993). The increase in the explanatory power of the return–earnings regression is attributed, in general, to the lack of timeliness in reporting the effects of economic events on the financial statements and by the noise reduction resulting from the aggregation of earnings over time. This increase in the slope coefficient as the cumulation period increases is not readily explained, however. As Easton, Harris, and Ohlson conclude: 'Unfortunately we know of no easy and direct explanation as to why this pattern occurs ... future research needs to address this issue' (ibid, p. 138).

Note, however, that as long as the occurrence of a loss in consecutive periods is not perfectly autocorrelated, longer cumulation periods mean a lower likelihood that the aggregated earnings variable is negative. Given the dampening effect of losses on the measured information content of earnings, the increased ERC and $R^2$ in longer cumulation periods may simply be explained by the prevalence of profitability over longer periods. To examine this explanation, regression (2) is estimated for cumulation periods ranging from one to ten years.13

13The sample for the n-period cumulation period consists of observations pooled across firms. The observations contributed to the sample by each firm are the cumulative return and cumulative earnings levels (or their n-lagged changes) measured over the n-year overlapping intervals available for the firm's time series. Note that a particular firm's observations for any given cumulation period are not independent because of the overlapping years. While this is not a serious problem given the large number of firms, no attempt is made to draw statistical inferences.
For each cumulation period, the regression is estimated separately for cases with positive and negative cumulative earnings.\textsuperscript{14}

The results are reported in Table 5. The first three columns show the results from estimating regression (2) for all cases, regardless of the sign of the cumulative earnings. The results are consistent with those reported by previous research – both the ERC and the $R^2$ increase as the cumulation period increases. The ERC increases from 0.95 for the one-year period to 2.29 for the ten-year cumulation period; respective values for the $R^2$ are 11.3% and 63.4%.

The next three columns of Table 5 show the results for cumulation periods for which the aggregate earnings are positive and the last three columns present the results for cumulation periods over which aggregate earnings are negative. The table shows that the likelihood of a cumulative loss declines with the cumulation period. The probability of a loss in the one-year cumulation period is 0.144 (8,825/61,452).\textsuperscript{15} This probability declines monotonically to 0.081 (2,024/25,049) for the ten-year cumulation period.

The most interesting finding that emerges from the table is that the positive association between the magnitude of the ERC and the length of the cumulation period is due only to the decreasing likelihood of incurring a cumulative loss as one extends the cumulation window. When the analysis is restricted to cumulation periods with aggregate profits, the ERC is, as expected, high. Furthermore, it is fairly constant and appears to be independent of the length of the cumulation period. Panel A (levels specification) shows that the ERC for positive earnings cases is quite high (2.39) for the one-year cumulation period – a magnitude that is reached only for the ten-year cumulation period when all cases (including losses) are considered. In contrast, the ERC for every cumulation period with an aggregate loss is close to 0 or even negative. The effect of losses on the $R^2$ of the regression is also evident, yet less pronounced than their effect on the ERC. The increase in $R^2$ as one moves from one- to ten-year cumulation period is 4.61-fold [$(63.4 - 11.3)/11.3$] for all cases and only 2.57-fold [$(67.8 - 19.0)/19.0$] for cases with aggregate profits. The $R^2$ values of the regressions estimated for cumulation periods with aggregate losses are all close to 0. Similar results occur when the change specification of earnings is used (see panel B of the table).

\textsuperscript{14}To ensure some stability in the composition of the sample firms as the cumulation period increases, only firms with at least eight years of data participate in this analysis. Note that the results for the different aggregation periods are not independent since the shorter periods are subsumed by the longer ones.

\textsuperscript{15}This probability is lower than the probability of a loss reported in Table 1 (0.196) due to the fact that the results in Table 5 are based on a subset of the full sample (i.e., firms with at least eight years of earnings and return data).
Table 5
Regression results of returns on the earnings/price ratio, estimated for different cumulation periods, by the sign of cumulative earnings

\[ R_t = \alpha + \beta X_t / P_{t-1} + \epsilon_t \]

where \( R_t \) is the return over the 12-month period commencing with the fourth month of fiscal year \( t \), \( X_t \) is the earnings per share variable in year \( t \) (specified as either levels or changes), \( P_{t-1} \) is the share price at the end of year \( t - 1 \), and \( \epsilon_t \) is an error term.

<table>
<thead>
<tr>
<th>Cumulation period (years)</th>
<th>All cases</th>
<th></th>
<th>Cases with positive cumulative earnings</th>
<th></th>
<th>Cases with negative cumulative earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n )</td>
<td>( \beta )</td>
<td>( R^2 ) (%)</td>
<td>( n )</td>
<td>( \beta )</td>
</tr>
<tr>
<td>(A) Levels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>61,452</td>
<td>0.95</td>
<td>11.3</td>
<td>52,627</td>
<td>2.39</td>
</tr>
<tr>
<td>2</td>
<td>57,154</td>
<td>1.20</td>
<td>21.2</td>
<td>48,385</td>
<td>2.31</td>
</tr>
<tr>
<td>3</td>
<td>52,888</td>
<td>1.40</td>
<td>31.0</td>
<td>45,038</td>
<td>2.20</td>
</tr>
<tr>
<td>4</td>
<td>48,652</td>
<td>1.58</td>
<td>38.7</td>
<td>41,723</td>
<td>2.19</td>
</tr>
<tr>
<td>5</td>
<td>44,456</td>
<td>1.73</td>
<td>44.5</td>
<td>38,484</td>
<td>2.24</td>
</tr>
<tr>
<td>6</td>
<td>40,287</td>
<td>1.87</td>
<td>50.2</td>
<td>35,312</td>
<td>2.29</td>
</tr>
<tr>
<td>7</td>
<td>36,146</td>
<td>1.94</td>
<td>54.1</td>
<td>32,094</td>
<td>2.30</td>
</tr>
<tr>
<td>8</td>
<td>32,029</td>
<td>2.04</td>
<td>57.4</td>
<td>28,819</td>
<td>2.36</td>
</tr>
<tr>
<td>9</td>
<td>28,369</td>
<td>2.22</td>
<td>60.6</td>
<td>25,816</td>
<td>2.51</td>
</tr>
<tr>
<td>10</td>
<td>25,049</td>
<td>2.29</td>
<td>63.4</td>
<td>23,025</td>
<td>2.54</td>
</tr>
<tr>
<td>(B) Changes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>61,452</td>
<td>0.74</td>
<td>2.2</td>
<td>49,282</td>
<td>2.98</td>
</tr>
<tr>
<td>2</td>
<td>52,888</td>
<td>1.34</td>
<td>8.0</td>
<td>41,579</td>
<td>3.22</td>
</tr>
<tr>
<td>3</td>
<td>44,456</td>
<td>1.78</td>
<td>14.2</td>
<td>35,421</td>
<td>3.23</td>
</tr>
<tr>
<td>4</td>
<td>36,146</td>
<td>2.27</td>
<td>24.0</td>
<td>29,491</td>
<td>3.21</td>
</tr>
<tr>
<td>5</td>
<td>28,368</td>
<td>2.00</td>
<td>21.8</td>
<td>23,834</td>
<td>4.34</td>
</tr>
<tr>
<td>6</td>
<td>22,070</td>
<td>2.13</td>
<td>26.8</td>
<td>19,005</td>
<td>4.24</td>
</tr>
<tr>
<td>7</td>
<td>16,989</td>
<td>2.24</td>
<td>29.8</td>
<td>14,833</td>
<td>3.84</td>
</tr>
<tr>
<td>8</td>
<td>12,945</td>
<td>2.90</td>
<td>35.9</td>
<td>11,345</td>
<td>3.48</td>
</tr>
<tr>
<td>9</td>
<td>9,402</td>
<td>2.81</td>
<td>36.0</td>
<td>8,336</td>
<td>3.00</td>
</tr>
<tr>
<td>10</td>
<td>6,488</td>
<td>3.56</td>
<td>46.1</td>
<td>5,778</td>
<td>3.72</td>
</tr>
</tbody>
</table>
3.4. Losses and the intertemporal variation in the earnings response coefficient

In line with the findings of previous research, there is a drop in the ERC between the 1960's and the 1980's. For this sample (consisting of 75,878 observations), the ERC for earnings levels drops from an annual mean of 2.43 in the 1963–1972 decade to 0.99 in the following decade and to 0.81 in the years 1983–1990. A similar drop in the ERC is registered when earnings changes are used. The variations in the frequency of losses over time (as reported in Table 1) may explain, in part or in full, the decline in the earnings response coefficient and the information content of earnings over years.

To test the association between the frequency of losses and the decrease in the earnings response coefficient, the following time-series regression is estimated:

\[
ERC_t \text{ or } RSQ_t = \delta_0 + \delta_1 FREQ_t + \omega_t
\]

where \(ERC\) and \(RSQ\) are, respectively, the earnings response coefficient (\(\beta\)) and the \(R^2\) from regression (2) estimated for year \(t\). \(FREQ\) is the relative frequency of losses in year \(t\) and \(\omega\) is an error term.

The results obtained from regression (4) (not shown) confirm the above expectation that the earnings response coefficient is a function of the prevalence of losses. The slope coefficients of regression (4) are negative (i.e., the higher is the frequency of losses in the year, the lower is the ERC and the \(R^2\) for that year) and significant at the 1% significance level. Further, the variation in the frequency of losses over the years appears to explain over a third of the intertemporal variability in the ERC.

The increased frequency of losses, however, does not fully explain the decline in the ERC (and \(R^2\)) over time since this decline is also observed when only profitable firms are considered in the estimation each year. Thus, while the variability in the frequency of losses explains some of the intertemporal variation in the ERC, the decline in ERC over time is not fully explained by this study's findings.

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16 See Beaver, Lambert, and Ryan (1987), Board and Walker (1990), Rayburn (1986), Easton and Harris (1991), and Ramesh and Thiagarajan (1994). A related finding, a gradual decline over the last 40 years in the relative magnitude of the permanent component of earnings, is reported by Ramakrishnan and Thomas (1993).

17 For profitable firms using the levels specification, the mean ERC is 5.23 in the 1963–72 subperiod, 2.41 in the 1973–82 subperiod, and 2.96 in the years 1983–1990.

18 It has also been suggested that the ERC has declined due to the increase in the cross-sectional variability of earnings (see Ramesh and Thiagarajan, 1994). While both a decline in the ERC and an increase in earnings variability are observed over the last three decades, there are some subperiods over which the ERC declines while the earnings variability increases. Thus the increase in earnings variability does not provide a complete explanation for the decline in the ERC over time.
4. Liquidation option vs. mean reversal as an explanation for the effect of losses on the return-earnings association

The fact that shareholders have a liquidation option is a plausible explanation for the effect of losses on the measured information content of earnings. Yet, this effect could also be due to the mean reversal of earnings. Previous studies suggest a mean-reverting tendency of earnings, particularly after large earnings changes (see, for example, Brooks and Buckmaster, 1976; Freeman, Ohlson, and Penman, 1982). Past research also finds a nonlinear return-earnings association and, in particular, a muted market response to extreme earnings changes (see, for example, Das and Lev, 1992; Freeman and Tse, 1992; a less pronounced nonlinearity is reported by Beneish and Harvey, 1994). Losses represent extreme observations of the earnings level distribution (see Fig. 1), while an earnings change in the loss year may represent an extreme observation of the earnings change distribution.\(^{19}\) The finding of a lower $ERC$ during loss years (under both the level and change specifications) could thus be due to the extremity of loss observations rather than to the liquidation option held by shareholders.

Several tests are conducted to assess the validity of the liquidation option explanation. First, the results for the sample of losses are compared with those obtained for profits of the same extremity as the loss cases. Second, the proximity to the exercise price of the losing firm is added as an explanatory variable in regression (2). Finally, the validity of the liquidation option explanation is evaluated by examining the extent to which it can also explain the stock price response to profits that are sufficiently low so as to trigger the exercise of this option. These tests are not designed to determine the exact relative contribution of each alternative explanation for the effect of losses on the return-earnings association. Such a determination requires a more accurate specification of the mean-reverting process than is currently available.

The tests and their results are described below. The main thrust of the results is that, while the mean-reversal phenomenon contributes to the effect of losses on the measured information content of earnings, the major explanation for this effect is the presence of the liquidation option.

4.1. Effect of mean reversion

To assess the extent to which mean reversion is behind the findings of Table 4, regression (2) is estimated for losses and profitable cases of the same degree of 'extremity'. The degree of extremity of a profit observation is determined by its standardized distance from its firm's mean earnings, expressed in terms of

\(^{19}\)The absolute magnitude of the earnings change variable (e.g., the change in earnings standardized by price) is much larger for loss cases than for profit cases. The median and the third quartile values of this magnitude are, respectively, 0.044 and 0.117 for losses and 0.026 and 0.073 for profit cases.
number of standard deviations. Eight 'equal-extremity' portfolios are created and regression (2) is estimated separately for the loss and the profit cases in each portfolio. In addition, regression (2) is estimated for two pooled samples, one consisting of all loss cases and the other consisting of profitable observations selected so that their distribution across extremity portfolios is identical to that of the sample of losses.

If mean reversal is behind the lower information content measures observed for loss cases, we should expect to find

\[ ERC(R^2)_{\text{losses}} = ERC(R^2)_{\text{equally extreme profit sample}}. \]  

The results reported in Table 6 show that, in line with the findings of earlier studies cited above on the nonlinearity of the return–earnings association, the \( ERC \) and \( R^2 \) of the extreme cases is considerably lower than that of the entire population presented in the first panel of Table 4. (In this and the following tables, the results are presented only for the level specification; results for the change specification are similar.)

More important to the issue at hand, however, is the finding in Table 6 that the low informativeness of losses is not due to their extremity. The \( ERC \) and \( R^2 \) for profitable observations are much larger than for loss observations, within each extremity portfolio. In fact, the \( ERC \) for loss observations is insignificantly different from 0 for every portfolio, regardless of its extremity level. The same conclusions are drawn from the results from estimating regression (2) for the sample of pooled losses and the equal-extremity sample of profitable observations, which are reported in the last line of Table 6.

4.2. The information content of losses as a function of the likelihood of liquidation

In the presence of a liquidation option, losses will not be allowed to perpetuate. Nonetheless, as long as the current stock price is above the net liquidation value of the firm, a reported loss may reasonably be expected to recur for some time without evoking liquidation. That is, a reported loss is likely to trigger a price reaction whose extent depends on the likelihood of exercising the liquidation option, with an upper bound equal to the excess of the stock price (at the beginning of the response period) over the liquidation value of the firm per share. This observation also holds for cases of sufficiently low, but positive, levels of earnings.

To examine the extent to which the likelihood of exercising the liquidation option affects the information content of losses, two proxies for the (unobservable) likelihood of liquidation are used. One is based on the rating of the firm's

\[^{20}\text{Two alternative measures of extremity were used, } E/P \text{ and the absolute distance of the earnings observation from the regression of current on lagged earnings-per-share. The results from using these measures are very similar to those based on the standardized distance measure.}\]
Table 6
Regression results of returns on the earnings/price ratio, by portfolios ordered by the extremity of the earnings observation

\[ R_t = \alpha + \beta X_t / P_{t-1} + \epsilon_t \]

where \( R_t \) is the return over the 12-month period commencing with the fourth month of fiscal year \( t \), \( X_t \) is the earnings per share variable in year \( t \) (specified as either levels or changes), \( P_{t-1} \) is the share price at the end of year \( t - 1 \), and \( \epsilon_t \) is an error term. Results for the levels specification of the earnings measure are presented.

<table>
<thead>
<tr>
<th>Extremity of the observation measured by the standardized difference from the mean, DIFF(^a)</th>
<th>All firm years</th>
<th>Profitable firm years</th>
<th>Loss firm years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n )</td>
<td>( \beta )</td>
<td>Adj. ( R^2 ) (%)</td>
</tr>
<tr>
<td>All firm years(^b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0 \leq \text{DIFF} \leq 0.25 ) (least extreme)</td>
<td>11,032</td>
<td>2.30</td>
<td>18.0</td>
</tr>
<tr>
<td>( 0.25 &lt; \text{DIFF} \leq 0.50 )</td>
<td>10,208</td>
<td>2.19</td>
<td>16.8</td>
</tr>
<tr>
<td>( 0.50 &lt; \text{DIFF} \leq 0.75 )</td>
<td>9,615</td>
<td>1.64</td>
<td>12.8</td>
</tr>
<tr>
<td>( 0.75 &lt; \text{DIFF} \leq 1.00 )</td>
<td>7,812</td>
<td>1.57</td>
<td>13.3</td>
</tr>
<tr>
<td>( 1.00 &lt; \text{DIFF} \leq 1.25 )</td>
<td>4,914</td>
<td>1.68</td>
<td>18.0</td>
</tr>
<tr>
<td>( 1.25 &lt; \text{DIFF} \leq 1.50 )</td>
<td>2,989</td>
<td>1.18</td>
<td>14.3</td>
</tr>
<tr>
<td>( 1.50 &lt; \text{DIFF} \leq 2.00 )</td>
<td>3,488</td>
<td>0.64</td>
<td>11.4</td>
</tr>
<tr>
<td>( \text{DIFF} &gt; 2.00 ) (most extreme)</td>
<td>2,525</td>
<td>0.60</td>
<td>18.2</td>
</tr>
</tbody>
</table>

\(^a\)DIFF = |\( \text{EPS}_t \) – Mean(\( \text{EPS} \))|/Std(\( \text{EPS} \)) for each year.

\(^b\)Firms with negative Mean(\( \text{EPS} \)) are excluded from the analysis.
public debt. The other is the gap between the firm’s current share price and its estimated liquidation value, expressed in terms of the number of standard deviations of earnings. The latter measure yields the magnitude of the earnings drop (expressed in terms of number of standard deviations of earnings) that would (according to the prevailing P/E ratio in the firm’s industry) bring about a decline in the share price and cause the liquidation option to be ‘in the money’. The greater is the drop, the lower is the probability of liquidation.

The first proxy is based on the Standard & Poor’s Corporate Bond Rating applicable to the firm-year. The variable, $L_1$, receives values ranging from 1 (corresponding to the lowest grades, CCC + to D) to 6 (corresponding to the highest grades, AAA to AA –).

The second proxy, $L_2$, is measured as

$$L_2 = \left[ \frac{(P - A)/PE_{IND}}{Std} \right],$$

(6)

where $P$ is the price per share, $A$ is the liquidation value per share measured as the market value of the firm’s assets\(^{21}\) less its liabilities, $PE_{IND}$ is the median price-to-earnings ratio in the firm’s industry, and $Std$ is the standard deviation of the firm’s earnings per share. $P$, $A$, and $PE_{IND}$ are measured at the beginning of the period. Deflating $(P - A)$ by $PE_{IND}$ transforms the excess of the price over liquidation value into an earnings dimension. Dividing this ratio by the standard deviation of the earnings per share yields the magnitude of the earnings drop (expressed in terms of number of standard deviations of earnings) that is needed (based on the $P/E$ ratio in the firm’s industry) to bring about a decline in the share price from $P$ to $A$.

Each of the two proxies for the likelihood of liquidation is alternately introduced in regression (2) as an additional interactive independent variable to form the following regression:

$$R_t = \alpha + \beta X_t/P_{t-1} + \gamma (X_t/P_{t-1}) L_t + \eta_t,$$

(7)

where $R$, $X$, and $P$ are as defined earlier. $L$ assumes either the $L_1$ or the $L_2$ definition, and $\eta_t$ is an error term. Under the ‘liquidation-option’ explanation, $\gamma$ is expected to be positive. That is, a more pronounced stock price response to a reported loss is expected when the likelihood of exercising the liquidation option is smaller.

The results from estimating regression (7) are reported in Table 7. The coefficient $\gamma$ is positive and very significant for both versions of the interactive variable. (Note that the different magnitude of the $\gamma$ coefficient under the two versions reflects only the different dimension in which $L_1$ and $L_2$ are expressed.) These results are consistent with the liquidation option having an effect on earnings informativeness.

\(^{21}\)The procedure used to estimate the market value of the firm’s assets is described in the Appendix.
Table 7
Regression results of returns on the earnings/price ratio and its interaction with the likelihood of liquidation, estimated for loss observations

\[ R_t = \alpha + \beta \frac{X_t}{P_{t-1}} + \gamma \left( \frac{X_t}{P_{t-1}} \right) L_t + \eta_t, \]

where \( R_t \) is the return over the 12-month period commencing with the fourth month of fiscal year \( t \), \( X_t \) is the earnings per share variable in year \( t \) (specified as either levels or changes), \( P_{t-1} \) is the share price at the end of year \( t - 1 \), and \( \eta_t \) is an error term. \( L_t \) takes on the values of \( L_1 \) and \( L_2 \) described in the footnotes. Results for the levels specification of the earnings measure are presented.

<table>
<thead>
<tr>
<th>Likelihood of liquidation proxied by:</th>
<th>( n )</th>
<th>( \beta )</th>
<th>( \gamma )</th>
<th>Adj. ( R^2 ) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( L_1 ): Bond rating(^a)</td>
<td>1,208</td>
<td>0.02</td>
<td>0.10</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.45)(^c)</td>
<td>(4.42)</td>
<td></td>
</tr>
<tr>
<td>( L_2 ): Estimated distance from liquidation option(^b)</td>
<td>6,462</td>
<td>0.03</td>
<td>1.18</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.20)</td>
<td>(6.03)</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)\( L_1 \) is the bond rating expressed as a number ranging from 6 (best rating) to 1 (poorest rating). The six rating groups are AAA to AA - , A + to A - , BBB + to BBB - , BB + to BB - , B + to B - , and CCC + to D.

\(^b\)\( L_2 \) is calculated as \([ (P - A)/PE_{IND} ]/Std\), where \( P \) is the price per share, \( A \) is the liquidation value per share measured as the market value of the firm's net assets, \( PE_{IND} \) is the median price-to-earnings ratio in the firm's industry, and \( Std \) is the standard deviation of the firm's earnings per share.

\(^c\)The t-values are provided in parentheses.

4.3. The return–earnings association in cases of ‘temporarily depressed’ earnings

As discussed in Section 3.1, if the ‘liquidation-option’ explanation for the low information content of losses holds, it should also extend to cases where earnings, while positive, are too low to be reasonably expected to be allowed to recur. In this situation, reported earnings would be so low as to make the liquidation of the firm (and the realization of its exit value) a preferred alternative to the perpetuation of the currently reported earnings level.

To explore the similarity between the two situations (a loss and ‘temporarily depressed’ earnings) in terms of the strength of the return–earnings relation, regression (2) is re-estimated for a sample of firm-years with positive, but depressed, earnings. Cases of ‘temporarily depressed’ earnings are defined as those where the estimated exit value of the firm exceeds the value that investors would have assigned to it had they naively applied the earnings multiple of the firm’s industry to the firm’s reported earnings. The exact procedure used to identify ‘temporarily depressed’ earnings is explained and illustrated in the Appendix.

The results are reported in Table 8. The table shows that both the \( ERC \) and the \( R^2 \) of regression (2) are higher for firm-years with ‘normal’ profits (that is, firm-years with positive, nondepressed earnings) than for those with temporarily depressed
Table 8
Regression results of returns on the earnings/price ratio for firms with positive, temporarily depressed earnings

\[ R_t = \alpha + \beta X_t/P_{t-1} + \epsilon_t \]

where \( R_t \) is the return over the 12-month period commencing with the fourth month of fiscal year \( t \), \( X_t \) is the earnings per share variable in year \( t \) (specified as either levels or changes), \( P_{t-1} \) is the share price at the end of year \( t-1 \), and \( \epsilon_t \) is an error term. Results for the levels specification of the earnings measure are presented.

<table>
<thead>
<tr>
<th>Profitable years classified as:</th>
<th>No. of cases</th>
<th>( \beta )</th>
<th>Adj. ( R^2 ) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Normal' (nondepressed) earnings</td>
<td>29,341</td>
<td>3.08</td>
<td>21.4</td>
</tr>
<tr>
<td>Temporarily depressed earnings</td>
<td>19,025</td>
<td>2.20</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Temporarily depressed earnings years classified by \( \theta^a \)

- \( 0.75 \leq \theta < 1.00 \) | 5,257 | 2.51 | 19.7 |
- \( 0.50 \leq \theta < 0.75 \) | 5,934 | 2.14 | 17.4 |
- \( 0.25 \leq \theta < 0.50 \) | 5,552 | 2.06 | 11.6 |
- \( \theta < 0.25 \) | 2,282 | 1.65 | 9.3 |

Loss years | 13,622 | 0.01 | 0.0 |

\( \theta \) is the ratio of the product of reported earnings times the mean \( P/E \) in the firm’s industry, to the liquidation value of the firm. The likelihood of liquidation is a decreasing function of \( \theta \). (When the earnings-change specification is used, the \( \theta \) value used to assign the firm-year to one of the 'depressed earnings’ groups is the lower of the \( \theta \) values received by either \( EPS \) or \( EPS_{t-1} \)).

5. Other alternative explanations for the low informativeness of losses

5.1. Firm risk

Losing firms are smaller (see Table 3) and may have more volatile earnings streams and, in general, be riskier than profitable firms. Since the discount rate

\[^{22}\text{These findings are not the result of a time-period effect (see Section 3.4). The representation of the different years in each of the groups in the table is similar.}\]
of future earnings increases with firm risk and hence the earnings response coefficient decreases (see, for example, Collins and Kothari, 1989), the lower informativeness of losses could be a reflection of the higher risk of losing firms.

Two tests of the effect of firm risk on the informativeness of losses are employed. In the first, the sample firms are grouped into six portfolios according to their bond rating. Bond ratings, obtained from Standard and Poor's Corporation Bond Rating, were available for 8,072 firm-years. Regression (1) is then estimated within each portfolio for all firm-years, and separately for profitable and loss firm-years in each portfolio.

The results of this test are reported in Table 9. They confirm the expectation that losing firms are riskier than profitable firms. The percentage of losses out of all firm-years represented in a given portfolio is a decreasing function of the bond rating of the firms in the portfolio. The frequency of losses in the portfolio consisting of firms with the highest bond rating (Portfolio 1) is only about 1% (22/1,646). This frequency increases monotonically with the riskiness of the portfolio and reaches 68% (338/503) for the portfolio representing the firms with the poorest bond rating.

The table also shows that the \( \text{ERC} \) declines with risk. Yet, the main result of the table is that, within each risk portfolio, the \( \text{ERC} \) associated with losses is much lower than that associated with profits. Thus, the higher risk of the losing firms cannot, in itself, explain the low informativeness of losses. The validity of this conclusion hinges on the quality of bond ratings as a proxy for risk. Most empirical evidence, however, is consistent with bond ratings being associated with firm risk (see, for example, Fisher, 1959; Kaplan and Urwitz, 1979; Lamy and Thompson, 1988). Further, the same conclusions of Table 9 are derived when firm risk is proxied by the number of losses incurred by the firm over the sample period of 29 years. The results (not presented) are consistent with those obtained from using the first proxy: namely, the gap between the informativeness of profits and losses is maintained within each risk group.

5.2. Transitory components in reported losses

A reported loss may be the result of transitory events or accounting accruals, such as write-downs, write-offs, or provisions for losses. In fact, the evidence in the literature concerning ‘big bath’ behavior (see, for example, Elliot and Shaw, 1988) lends support to this notion. Since some of these earnings components are value-irrelevant or, being transitory, have only limited relevance for firm valuation, their preponderance in loss situations may explain the observed low return–loss association. To examine this explanation, the main results of Tables 4 and 5 are replicated using earnings numbers that are devoid of transitory accounting items of the nature described above. The extraction of these items was done by removing from the ordinary earnings number the amount of ‘special items’ (Compustat variable \# 17). The results obtained from the use of
Table 9
Regression results of returns on the earnings/price ratio, by risk portfolios

\[ R_t = \alpha + \beta X_t / P_{t-1} + \varepsilon_t, \]
where \( R_t \) is the return over the 12-month period commencing with the fourth month of fiscal year \( t \), \( X_t \) is the earnings per share variable in year \( t \) (specified as either levels or changes), \( P_{t-1} \) is the share price at the end of year \( t - 1 \), and \( \varepsilon_t \) is an error term. Results for the levels specification of the earnings measure are presented.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Risk (bond rating)</th>
<th>All firm years</th>
<th>Profitable firm years</th>
<th>Loss firm years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>( n )</td>
<td>( \beta )</td>
<td>Adj. ( R^2 ) (%)</td>
</tr>
<tr>
<td>All firm years</td>
<td>AAA to D</td>
<td>8072</td>
<td>0.58</td>
<td>13.0</td>
</tr>
<tr>
<td>1</td>
<td>AAA to AA</td>
<td>1646</td>
<td>1.43</td>
<td>9.4</td>
</tr>
<tr>
<td>2</td>
<td>A+ to A</td>
<td>2441</td>
<td>1.54</td>
<td>15.2</td>
</tr>
<tr>
<td>3</td>
<td>BBB+ to BBB</td>
<td>1450</td>
<td>0.91</td>
<td>12.6</td>
</tr>
<tr>
<td>4</td>
<td>BB+ to BB</td>
<td>675</td>
<td>0.90</td>
<td>12.3</td>
</tr>
<tr>
<td>5</td>
<td>B+ to B</td>
<td>1356</td>
<td>0.61</td>
<td>12.7</td>
</tr>
<tr>
<td>6</td>
<td>CCC+ to D</td>
<td>503</td>
<td>0.36</td>
<td>13.3</td>
</tr>
</tbody>
</table>

*Bond ratings are obtained from Standard and Poor's Corporation Bond Rating.*
the 'clean' earnings measure (not reported here) are very similar to those reported under the earnings measure that includes the 'special items'. This finding suggests that prevalence of transitory items in situations of reported losses could not explain the low informativeness of losses (and, interestingly, nor could it explain, according to Das and Lev, 1993, the nonlinear earnings-return association).

Further, the evidence shows that a loss, once incurred, persists for several years. The probability of incurring a loss in year $t$ given a loss in year $t-1$ is about three times higher than the unconditional probability of a loss.\(^{23}\) This evidence suggests that losses are not induced by one-time accruals, further supporting the liquidation option explanation for the muted market reaction to losses.

5.3. Conservatism in accounting

Conservatism in accounting requires that anticipated losses be incorporated in current earnings whereas anticipated gains be recorded only when realized. In other words, unfavorable information is more likely to be reflected fully in current earnings than favorable information. Since all relevant information is immediately captured in stock prices, the \(ERC\) associated with losses would tend to be one whereas that associated with gains would be close to the firm's \(P/E\) multiplier. In a recent study, Basu (1994) provides evidence showing that the distribution of earnings and their relation with cash flows and returns are consistent with the presence of conservatism.

A complete examination of this explanation for the results would have to relate the incurrence of losses more closely to the application of the conservatism principle. A loss may not be the result of conservatism. Likewise, the application of conservatism does not usually result in a loss. Nonetheless, there are some indications in the data that conservatism is not a primary explanation for the results of this paper. For instance, the evidence on the persistence of losses mentioned in the previous section calls into question the notion that unfavorable developments are fully incorporated in earnings on a timely basis. Further, as discussed in Section 5.2, even when loss items that are the most typical outcome of applying conservatism to the financial statements (e.g., provisions for future losses, write-offs, and restructuring charges) are excluded from the sample of losses, the results remain intact.

5.4. The irrelevance of earnings reported by growth companies

For companies in emerging, high-tech, growth industries, current earnings may not be indicative of their future prospects. Not only might current earnings

\(^{23}\)From Table 1, the unconditional probability of reporting a loss is 19.6% for the 1962–90 period. The probability of reporting a loss is 55.2%, given a loss in the previous year. The probability of reporting a loss given a loss in the previous two years increases to 68%. 
fail to convey the future growth potential of these companies but, further, the
current earnings of these firms are likely to be distorted by the expensing of large
intangible investments. Since these circumstances often lead to losses, it might
be argued that the low information content of losses is a reflection of a larger
phenomenon, namely the irrelevance of earnings for growth companies.

To examine this explanation for the low informativeness of losses, all firms are
ordered by their rate of annual growth in sales over the time period for which
data exists. The firms are then partitioned into deciles, or portfolios, and
regression (2) is estimated for the firm-years in each portfolio. The estimation is
done separately for firm-years with positive earnings and losses. If the 'growth'
explanation is valid, the sign of reported earnings (positive or negative) should
be equally irrelevant for the stock valuation of high growth companies. The
results (not presented) show that the informativeness (measured by the ERC or
the $R^2$) of positive earnings, as well as losses, is not significantly different across
growth portfolios. Further, within each growth portfolio, losses are significantly
less informative than profits. These results are inconsistent with the growth
explanation for the low informativeness of losses.

6. Conclusions

Losses have become very frequent: over 25% of the firms reported a loss in
any given year in the last decade. This study hypothesizes that because share-
holders hold a liquidation option, the informativeness of losses with respect
to future cash flows of the firm is limited. Therefore, pooling profitable and loss
observations in samples used by researchers to estimate the information content
of earnings leads to a downward bias in the estimated earnings response
coefficient and the return–earnings association.

The results of the study are consistent with this hypothesis. The extent of the
bias is considerable: Both the earnings response coefficient and the return–
earnings correlation almost triple when loss cases are excluded. Further, the
increase in the measured information content of earnings as the cumulation
period increases reported by previous studies is related to the reduced frequency
of aggregate losses as the measurement period lengthens. The findings of the
study also suggest that some of the cross-sectional and intertemporal variation
in the earnings response coefficient that is attributed to other factors (such as

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24 Kim and Ritter (1994) find that the earnings of companies that have just gone public are of limited
relevance for their stock valuation. Since many of these firms are high-tech, growth companies, the
weak relationship between their earnings and stock prices may be a reflection of the earnings
suppression experienced by these companies.

25 I thank Amy Sweeney for drawing my attention to this potential explanation.
firm-size or variability of the firm’s earnings) can be traced to the variation across firms and years in the frequency of losses.

These findings are consistent with the results of recent studies on the non-linear relation between earnings and returns. Specifically, the return–earnings association appears to be weaker at the bottom of the earnings distribution. Yet, the weaker response to losses is only partially explained by the fact that losses tend to represent extreme earnings levels. Other explanations of the lower informativeness of losses, such as the higher risk of firms with losses or the presumed prevalence of transitory items in loss situations, are not supported by the data. The main explanation for the low information content of losses appears to be that shareholders have the option to liquidate the firm when the current losses are projected to perpetuate if the firm continues to operate. This finding is in line with recent research which suggests that the liquidation option is relevant for stock valuation and earnings informativeness.

Further research is needed to assess the extent to which losses and temporarily depressed earnings obscure or distort patterns of the cross-sectional variation in the return–earnings relation. More can be learned also about the degree of substitution between earnings numbers and alternative accounting variables in instances of reported losses. Preliminary results (not reported here) show that, in the presence of a reported loss, investors assign more weight to alternative accounting information in their evaluation of the firm’s equity.

Finally, two observed phenomena remain without a satisfactory explanation: the increased frequency of losses and the decline in the earnings response coefficient over the last few decades. The intertemporal variation in the earnings response coefficient is only partially explained by the variability in the frequency of losses over time. Structural changes in the economy (resulting from the waves of mergers and acquisitions and the higher leverage levels of firms) and changes in accounting principles (with a greater emphasis on mark-to-market accounting) are two possible explanations for these phenomena that might be explored by future research.

Appendix

Estimation of the market value of the firm’s assets and identification of ‘temporarily depressed’ earnings

TEMPORARILY DEPRESSED EARNINGS are defined as positive earnings whose level is likely to be perceived by investors as temporary because their perpetuation is inferior to liquidating the firm. Specifically, earnings are considered temporarily depressed when the liquidation value of the firm exceeds its earnings-based value.

The liquidation value of the firm is the excess of the market (exit) value of the firm’s assets over the firm’s liabilities. The market value of the firm’s assets is
estimated by adding the book value of current and intangible assets to an approximation of the market value of noncurrent operating assets. The market value of noncurrent operating assets is calculated by finding when these assets were purchased, and adjusting the book value of these assets for inflation that has occurred since their purchase. The timing of the purchase is derived by taking the difference between the gross and net (after depreciation) balances of noncurrent operating assets, and dividing this difference by the depreciation expense for the year. Adjustment for inflation is made using the GNP deflator. The market value of the liabilities is assumed to be equal to their book value. The earnings-based firm value is the firm's earnings multiplied by the mean P/E ratio in the firm's (four-digit SIC code) industry at the end of the reporting year.\textsuperscript{26}

To illustrate the calculation of these values which are used to determine whether a firm's earnings are 'temporarily depressed', consider the following data for Company Z reported for the end of 1991: earnings per share of $1.50, seven million shares are outstanding, the book value of equity is $140 million, the net book value of property, plant, and equipment (PPE) is $50 million, the average age of PPE is estimated to be five years, the cumulative increase in the GNP deflator over the five years from 1987 to 1991 is 32\%, and the mean P/E of the company's industry is 14.0.

\textit{Computational procedure}

(1) To determine the liquidation value of the firm, an estimate of the replacement cost (i.e., the estimate of the market value) of the PPE is derived by indexing the original cost of the PPE ($50 million) to the GNP deflator (32\%), to yield $66 million.

(2) The adjusted equity value per share is found by adding the increase in the PPE ($16 million) to the book value of the equity (to obtain $156 million) and dividing the result by the number of shares (7 million). The result, $22.29, is the liquidation value per share.

(3) The earnings-based firm value is found by multiplying the EPS ($1.50) by the median P/E in the industry (14.0). This value is $21.

In this example, the earnings-based value of the company falls below its liquidation value. This level of earnings, which is estimated to have a capitalized value of $21 per share, is unlikely to be allowed to perpetuate since the shareholders would be better off liquidating the firm and recovering $22.29 per share from the proceeds. In other words, the earnings reported for 1991 are considered 'temporarily depressed'.

\textsuperscript{26}The median P/E in the industry was also used with very similar results.
References


