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Financial Statement Information and the Pricing of Earnings Changes

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SYNOPSIS AND INTRODUCTION: This study adds to recent research that assesses the value implications of earnings changes. Stock price changes associated with reported earnings innovations (typically assessed by estimating earnings response coefficients) have been characterized as related to the persistence of earnings, which is defined as the revision in expected future earnings that is implied by a current earnings innovation. Permanent earnings innovations are associated with higher multipliers than transitory ones.

This stream of research stems from Kormendi and Lipe (1987) and Easton and Zmijewski (1989). These studies characterize earnings persistence as a stationary, firm-specific phenomenon that describes the evolution of earnings over time. They estimate parameters of earnings persistence from time-series data on earnings and then show that the market's pricing of earnings innovations are related to the persistence measures. Typically, this evaluation involves *ex post* information, so the approach is not relevant for investors' *ex ante* determination of pricing multipliers.

This article reports three findings on the pricing of annual earnings changes. First, pricing multipliers can be evaluated contemporaneously by other information published in annual financial statements along with earnings. An investor who seeks to assess persistence and the price effect of a reported earnings change can do so by referring to other information in the financial statements.

Second, in contrast to previous research, this study shows that the earnings persistence indicated by financial statements is not a fixed attribute, but changes over time and tends to revert to the mean of all firms. Correspondingly, pricing multipliers follow a similar pattern, which requires their periodic updating through financial statement analysis.

Third, the multiplier of earnings changes is also related to information published in the previous year's annual report. To the extent that previous accounting reports provide forecasts of earnings that are already incorporated in prices, multipliers are lower.

The comments of the referees are much appreciated.

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Data Availability: *Financial statement data are available from the author subject to licensing restrictions by COMPUSTAT and CRSP.*

THE presentation proceeds as follows. Section I outlines the differences between this study and previous research. Section II describes the accounting information that indicates earnings persistence, and section III describes the data. Section IV demonstrates how contemporaneous and leading accounting information explains the pricing of earnings innovations. A short summary of the article is provided in section V.

I. Contrast with Previous Research

This study differs from previous research in its characterization of "persistence" and in its specification of the earnings variable for which pricing multipliers are estimated. Most previous research[1] considers earnings persistence as a permanent, firm-specific characteristic of the earnings process. Correspondingly, earnings response coefficients are estimated as firm-specific constants.

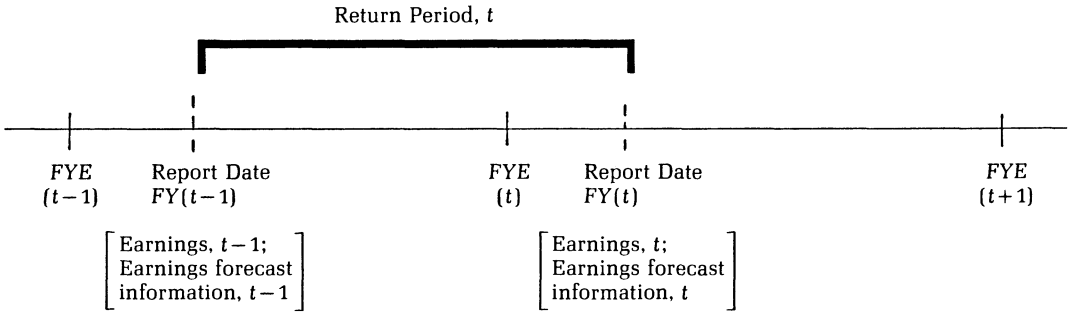
This parametric approach has several problems. To begin with, the construction of earnings persistence as a time-series parameter raises concerns about context validity. Current earnings innovations are deemed persistent to the extent that they are indicative of expected future earnings; otherwise, they are transitory. Projecting future earnings from information limited to the earnings time series does not utilize other information that a rational investor would use to assess persistence. Given this consideration, persistence (and thus earnings multipliers) are identified by the discovery of information that projects future earnings. As this information changes over time, so does the persistence of successive earnings realizations. Thus the assumption of stationarity implicit in the parametric approach is not appropriate.

Accounting statements provide an array of line items other than earnings. This article shows that this information contributes to the evaluation of persistence and the pricing of earnings innovations. The line items change over time and so do persistence measures and pricing multipliers.

Persistence parameters, as typically estimated, are not *ex ante* indicators of earnings pricing. These parameters and the pricing multipliers they imply are usually estimated in time series over the same period. Thus multipliers evaluated at any point prior to the end of the estimation period use persistence measures estimated from data later in time. The predictive ability of parametric persistence measures has not been demonstrated, and thus one must question whether the reported association between persistence measures and pricing multipliers is merely a result of statistical overfitting. With the exception of Jennings (1988a, 1988b), there is little research into the *ex ante* determinants of persistence and multipliers. In contrast, the persistence measures obtained from line-item analysis can be used in investment analysis.

[1] For example, Kormendi and Lipe (1987), Easton and Zmijewski (1989), Collins and Kothari (1989), and Lipe (1990).

Figure 1
Relevant Accounting Information for Pricing an Earnings Innovation for Fiscal Year *t*



Note: *FYE* = fiscal year-end; *FY* = fiscal year.

The study also differs from previous research in the specification of the earnings variable. Most previous work estimates pricing multipliers by relating contemporaneous stock returns (standardized price changes) to standardized unexpected earnings. In this study, actual earnings changes are evaluated, rather than unexpected earnings. This is done for two reasons. First, investors infer value from observed accounting numbers (and other information), not unexpected numbers. Thus, the present research examines the pricing implications of observable, reported earnings changes, and how that might differ with different financial statement information. Second, the specification permits the explicit recognition of prior accounting information in the task of evaluating earnings.

The second point is explained with reference to figure 1. After the end of fiscal year t, designated as $FYE(t)$, an annual report for the year is published, and investors assess the pricing implication of the reported earnings change. This is evaluated here by observing returns over the period indicated in the figure. The primary finding is that this evaluation depends on other information in the financial statement for year t, which forecasts earnings for year $t+1$ and beyond and thus gives an indication of whether the reported earnings will persist. However, this will also depend on information in financial reports for year $t-1$, which forecast the earnings change in year t being evaluated. To the extent that those earnings are forecasted at the beginning of the return period, they will be discounted by the market, and a lower multiplier will be applied.

This approach is compatible with the logic of specifying unexpected earnings as the variable of interest because they discount the earnings number for beginning-of-period forecast information. It is also compatible with the view that multipliers of earnings changes are conditional on the information in price (at $t-1$) that leads earnings (see, e.g., Collins and Kothari 1989). However, the approach here permits explicit examination of the incoming information that determines the multiplier of *actual* earnings changes. This is apparently what Lipe (1990) has in mind by suggesting that earnings response coefficients are affected by information, other than earnings, that predicts

earnings. In sum, the multiplier is described as determined by accounting information at the end of the period that indicates persistence of the current earnings, and by accounting information at the beginning of the period that already has informed the investor about the forthcoming reported earnings. In assessing the weight to put on an *observed* earnings change, an investor would consider both sets of information.

II. Financial Statement Indicators of Future Earnings

Ou (1990) an Ou and Penman (1989a, 1989b) have identified financial statement line items that project future earnings. These items are evaluated on their ability to predict the direction of one-year-ahead earnings (minus a drift estimate) and are then combined into a scalar, *Pr*. This ranges from zero to 1 and is an estimate of the probability of a one-year-ahead earnings increase conditional upon available financial statement information. Formally, for firm i in fiscal year t,

$$Pr_{it} = \text{Probability}[(\Delta eps_{it+1} - estimated\ eps\ drift_{it+1})] > 0, \quad (1)$$

given financial statement information, which is assumed to be generated by the logistic distribution such that,

$$Pr_{it} = [1 + \exp\{-y_{it}\}]^{-1},$$

where:

$$y_{it} = \sum_{j=1}^{n} \theta_j X_{jit}.$$

The X_{jit} are the identified accounting items from the annual report, and θ_j is the weight for the jth item. Coefficients are estimated (from data pooled over firms in periods prior to year $t+1$) by using LOGIT with the dependent variable as the increase or decrease in one-year-ahead earnings over the estimated drift. This drift is estimated as the mean changes in earnings per share (*eps*) in the preceding four years to obtain a predictable trend in *eps*.

A *Pr* value of 0.5 from financial statement information predicts future earnings at the level of current earnings, which indicates that the current earnings change will have a persistent effect. For *Pr* values away from 0.5 (toward zero or unity), financial statement information indicates that current earnings are not representative of future earnings and, on average, are different from the past as well (Ou and Penman 1989b). That is, these *Pr* values identify earnings that are temporarily high or low (i.e., transitory). This indicates that *Pr* is a suitable summary of information in financial statements about persistence and the earnings change multiplier. The accounting items included in estimating *Pr* are listed in the Ou and Penman articles. They include inventories, capital expenditures, depreciation, dividends, book value of equity, and sales, with most of them standardized in ratio calculations.

III. Data

The analysis is carried out over the 11 years, 1973–83, for which *Pr* values were calculated in Ou and Penman (1989a). The number of firms in each year varied from 1,482 to 1,677. *Pr* values were calculated for firms with the relevant accounting data in the COMPUSTAT annual and research files. For each year, the coefficients that were

applied to the accounting variables to obtain *Pr* were estimated in prior periods, so estimated *Pr* is always an ex *ante* measure. Stock returns and prices were obtained from CRSP files. The final sample is representative of the industry composition on COMPUSTAT, with the exception that there are relatively few electric and gas utilities and financial firms.

IV. Earnings Multipliers and Financial Statement Information

This section presents the results in three sub-sections. First, it documents the relationship between earnings multipliers and persistence information that is published in financial statements along with earnings (for $FYE(t)$ in fig. 1). Secondly, it demonstrates that indications of persistence in financial statements vary in time and, correspondingly, so do earnings multipliers. Finally, it describes the effect of prior accounting information (for $FYE(t-1)$ in fig. 1) on the multiplier.

The analysis involves the estimation of a simple cross-sectional regression equation of the form,

$$R_{it}^{a} = a_t + b_t \Delta eps_{it}/P_{it-1} + u_{it}, \tag{2}$$

for each year of the sample period. Estimates of the multiplier, b_t, are then compared over different *Pr* values. R_{it}^{a} is the market-adjusted rate of return on the stock of firm i over the 12-month period during which the change in annual *eps* (before extraordinary items) in fiscal year t (Δeps_{it}) is reported.[2] This 12-month period begins in month four of the relevant fiscal year and ends three months after the end of the year, the period during which earnings and *Pr* information are published in the annual report. The Δeps_{it} and the price changes plus dividends in the calculation of the dependent variable, R_{it}^{a}, are standardized by P_{it-1}, the price per share at the beginning of the 12-month period. The coefficient, b_t, is a multiplier of dollar changes in earnings and is referred to as an earnings change multiplier.[3] The subscript indicates that it varies in time.

Multipliers and Contemporaneous Information

In each year, firms are identified with one of ten groups, according to the Pr_{it} ranges in the second column of table 1. The first panel of table 1 presents findings for these groups. The second panel summarizes results for combined groups 1, 2, 9, and 10 (with $Pr_{it} > 0.8$ or $Pr_{it} \leq 0.2$), groups 3, 4, 7, and 8 (with $0.8 \geq Pr_{it} > 0.6$ or $0.4 \geq Pr_{it} > 0.2$), and groups 5 and 6 (with $0.6 \geq Pr_{it} > 0.4$). For easy reference, these groups are labeled 11, 12, and 13, respectively. This clustering is based on the distance of Pr_{it} from its central value of 0.5. The results from pooling all observations are in group 14.

In addition to estimated earnings multipliers, table 1 summarizes attributes of Pr_{it} groups that demonstrate properties of *Pr*. Of particular interest are the mean values of $\Delta eps_{it}/P_{it-1}$ and $\Delta eps_{it+1}/P_{it}$. Pr_{it}, which is an earnings predictor, orders one-year-ahead earnings changes, $\Delta eps_{it+1}/P_{it}$. However it inversely orders contemporaneous

[2] The market adjustment to returns is unnecessary if all firms have the same fiscal year-end. However, for a given calendar year, firms with different fiscal year-ends are pooled. Thus, the dependent variable return covers different calendar periods. Results were similar when unadjusted returns were used as the independent variable with only December 31 fiscal-year firms.

[3] This terminology distinguishes it from an "earnings response coefficient" applied to unexpected earnings in other studies.

Table 1

Estimated Earnings Change Multipliers and Other Attributes of Pr_{it} Groups

Pr_{it} Group	Range of Pr_{it}	No. of Firms	Mean Pr_{it}	Mean $\Delta eps_{it}/P_{it-1}$	Mean $\Delta eps_{it+1}/P_{it}$	$\bar{\hat{\gamma}}_{1t}$	$t(\bar{\hat{\gamma}}_{1t})$	No. $\hat{\gamma}_{1t}>0$	$\bar{\hat{a}}_t$	$t(\bar{\hat{a}}_t)$	$\bar{\hat{b}}_t$	$t(\bar{\hat{b}}_t)$	Mean R^2	No. $\hat{b}_t>0$	Mean $\hat{\beta}_{it}$
1	$Pr_{it}>.9$	571	.95	−.2176	.1827	−.360	−4.16	0	−.123	−3.86	.364	5.15	.11	11	1.14
2	$.9\geq Pr_{it}>.8$	884	.85	−.1043	.0864	−.334	−4.70	1	−.103	−5.13	.395	7.00	.10	11	1.08
3	$.8\geq Pr_{it}>.7$	2,120	.74	−.0161	.0296	−.078	−1.27	4	−.048	−3.96	.617	7.36	.11	11	1.06
4	$.7\geq Pr_{it}>.6$	4,264	.65	.0175	.0034	.078	1.61	8	−.025	−1.86	1.080	6.76	.15	11	1.04
5	$.6\geq Pr_{it}>.5$	4,690	.55	.0285	−.0051	.010	.17	6	−.021	−1.48	1.451	8.28	.16	11	1.03
6	$.5\geq Pr_{it}>.4$	2,922	.46	.0439	−.0088	.078	1.49	8	−.027	−2.68	1.839	6.61	.19	11	1.01
7	$.4\geq Pr_{it}>.3$	1,128	.36	.0546	−.0225	−.060	−.80	5	−.029	−1.82	1.461	5.59	.15	11	1.00
8	$.3\geq Pr_{it}>.2$	394	.26	.0609	−.0277	.040	.23	6	−.062	−2.32	2.262	5.46	.34	11	1.09
9	$.2\geq Pr_{it}>.1$	146	.16	.0934	−0.367	−.332	−2.54	2	.079	1.86	1.129	2.63	.24	8	1.11
10	$Pr_{it}\geq.1$	76	.05	.1072	−0.151	−.198	−1.36	4	−.017	−.22	1.073	2.66	.25	6	1.25
11	$Pr_{it}>.8$; $Pr_{it}\leq.2$	1,677	.77	−.1080	.0981	−.377	−6.35	0	−.066	−3.50	.473	7.84	.14	11	1.11
12	$.8\geq Pr_{it}>.6$; $.4\geq Pr_{it}>.2$	7,906	.61	.0164	.0049	−.021	−.46	5	−.017	−1.54	.963	8.50	.14	11	1.04
13	$.6\geq Pr_{it}>.4$	7,612	.52	.0337	−.0062	.031	.68	7	−.022	−1.77	1.556	9.07	.17	11	1.00
14	All Pr_{it}	17,195	.59	.0113	.0097	−.160	−5.23	0	−.011	−1.22	.894	9.07	.13	11	1.00

Notes: All means values are calculated from those observed for each of the 11 years 1973–83 (i.e., they are the means of annual means).

$\Delta eps_{it}/P_{it-1}$ is the change in earnings per share for firm i for fiscal year t, deflated by per-share stock price at the end of the third month of fiscal year t.

The estimations for group 10 involve small numbers of firms in some years.

$\bar{\hat{\gamma}}_{1t}$ is the mean estimate of γ_{1t} in equation (3), $\bar{\hat{a}}_t$ and $\bar{\hat{b}}_t$ are mean estimates of a_t and b_t in equation (2) over years; $\hat{\beta}_{it}$ is estimated systematic risk for each stock in the group.

earnings changes, $\Delta eps_{it}/P_{it-1}$. Thus, as in Ou and Penman (1989b), Pr_{it} identifies *ex ante* earnings reversals; for high *Pr* values current earnings are down but will be up in the future (on average), and vice versa. For *Pr* values away from 0.5, the current earnings change produces a transitory level of earnings. This is the behavior of a mean-reverting (non-persistent) innovation.[4]

To demonstrate this point further and to indicate a correspondence between Pr_{it} and the parameters of earnings persistence that were estimated in previous studies, equation (3) was estimated each year for each Pr_{it} group:[5]

$$\Delta eps_{it+1}/P_{it} = \gamma_{0t} + \gamma_{1t}\Delta eps_{it}/P_{it-1} + v_{it+1}. \tag{3}$$

The coefficient, γ_{1t}, is an earnings revision parameter (in the language of Easton and Zmijewski 1989) estimated from matched pairs of sequential earnings changes in the cross-section within each Pr_{it} group rather than from a time-series. The *t* subscript connotes time-varying rather than firm constants. Mean values of $\hat{\gamma}_{1t}$ over the 11 years are given in table 1 with values of $t(\bar{\hat{\gamma}}_{1t})$.[6] These coefficients are different over the Pr_{it} groups.[7] For groups with Pr_{it} close to 0.5, values of $\bar{\hat{\gamma}}_{1t}$ are close to zero. Financial statement information incorporated in Pr_{it} indicates future earnings at current levels, and thus current earnings are persistent. In contrast, for Pr_{it} values away from 0.5, the values for $\bar{\hat{\gamma}}_{1t}$ are increasingly negative with the distance from 0.5. The value of $\bar{\hat{\gamma}}_{1t}$ and $t(\bar{\hat{\gamma}}_{1t})$ for the extreme Pr_{it} values in group 11 are -0.377 and -6.35, respectively, indicating considerable mean reversion in earnings. Here, the changes in expected future and current earnings are different. The revision parameter is negative, which indicates transitory changes in current earnings that are likely to be reversed in the future. In short, Pr_{it} is a measure of "earnings persistence."

Table 1 reports $\bar{\hat{b}}_t$, the mean estimate of the cross-sectional slope coefficient in equation (2) for each Pr_{it} group over the 11 years, the associated *t*-statistic, mean estimated intercepts, $\bar{\hat{a}}_t$ and *t*-statistics, and means values of adjusted R^2. The number of $\hat{b}_t$ observed as positive in the 11 years is also indicated. These multipliers differ over Pr_{it} groups in a similar way to $\hat{\gamma}_{1t}$. For all firms (gp.14), the mean value of $\hat{b}_t$ is 0.894. However, for Pr_{it} close to 0.5 (gp. 13), the estimated values are considerably higher, but decline for Pr_{it} values away from 0.5.

The significance of these differences is demonstrated by estimating (for each year with observations for all firms) an equation of the form,

$$\begin{aligned} R^a_{it} = {} & a_{0t} + a_{1t}D_{1it} + a_{2t}D_{2it} + b_{0t}\Delta eps_{it}/P_{it-1} + b_{1t}D_{1it}\Delta eps_{it}/P_{it-1} \\ & + b_{2t}D_{2it}\Delta eps_{it}/P_{it-1} + w_{it}, \end{aligned} \tag{4}$$

where D_{1it} is equal to 1 if a firm's Pr_{it} value is in group 12, and zero otherwise, and D_{2it} is equal to 1 if a firm's Pr_{it} value is extreme (in gp. 11), and zero otherwise. Over the 11

[4] Pr identifies earnings reversals in part because of the subtraction of the "drift" term in equation (1). This takes out predictable drift in eps (e.g., due to earnings retention). However, it compares future earnings changes with past earnings changes so that, if earnings do have a mean-reverting element, the implied earnings reversals will be identified by the specification.

[5] The estimations in table 1 (and elsewhere) reject outliers when the absolute value of $\Delta eps_{it}/P_{it-1}$ is greater than a predetermined 1. The results are not sensitive to this rejection rule.

[6] All *t*-statistics reported for estimated regression coefficients are calculated as the mean of the yearly cross-sectional coefficient estimates divided by their estimated standard error calculated from the time series of estimated coefficients.

[7] Tests indicated that these differences are statistically significant.

years, the value of $\bar{b}_{0t}$ was 1.556 (t=9.07), which corresponds to the estimated multiplier for earnings reported with Pr_{it} close to 0.5 (gp. 13). The value of $\bar{b}_{1t}$ was −0.594 (t=−6.22) and $\bar{b}_{2t}$ was −1.084 (t=−8.04).[8] The mean adjusted R^2 for the regression was 0.16. Earnings change multipliers differ significantly over levels of Pr_{it} in a direction that is consistent with the market's incorporating the persistence information in Pr. The implication for accounting and financial statement analysis is that earnings multipliers can be derived from information, other than earnings, that is in financial statements.

Although these findings indicate that earnings multipliers are lower for Pr_{it} values different from 0.5, a comparison of estimated multipliers, over Pr_{it} groups 1 through10, indicates an asymmetry. Estimates of b_t are relatively low for high Pr_{it} values but not consistently so for low Pr_{it} values, although there is considerably more variation in coefficient estimates for low values, as indicated by the t-statistics. Further tests indicated that mean estimated multipliers for the most extreme low Pr_{it} values in groups 9 and 10 are significantly lower than those in groups 5 and 6, but only marginally so; however, those for groups 7 and 8 are not.[9] Further, mean R^2 values are higher for low Pr values than for high ones, although the variation in R^2 is greater.[10] This asymmetry is unexplained. Of course 46 percent of the sample falls in the high Pr_{it} groups (1–4) and only 10 percent in the low Pr_{it} groups (7–10), so when extreme Pr_{it} values are identified, they are associated with low multipliers a high proportion of the time.

Easton and Zmijewski (1989) characterize pricing multipliers as negatively related to risk and positively related to earnings persistence. The last column of table 1 gives mean betas for Pr_{it} groups estimated over a period of up to 60 months prior to year t. Extreme Pr_{it} are associated with higher betas than average, so this may be the reason they imply lower multipliers. However, equation (4) was estimated for a number of partitions on estimated beta, and coefficient estimates were quite similar over these partitions. For example, for firms whose estimated beta is greater than 1, $\bar{b}_{1t}$ is −0.507 (t=−3.16) and $\bar{b}_{2t}$ is −1.209 (t=−6.44); the corresponding values for firms whose estimated beta are less than or equal to 1 are −0.561 (−5.63) and −0.927 (−6.21), respectively. Indeed, the relationship between estimated coefficients and estimated betas is not a strong one. Estimating equation (4) with D_{1it} set to 1 if $\hat{\beta}_{it} \geq 1.5$ and D_{2it} set to 1 if $\hat{\beta}_{it} < 0.5$ (and zero otherwise) produced $\bar{b}_{1t}$ of 0.050 (t=0.67) and $\bar{b}_{2t}$ of 0.257 (t=1.05), and similar results were found with other beta ranges. Of course, measurement error in $\hat{\beta}_{it}$ biases these estimates toward zero, and beta risk presumably does not capture all aspects of firm risk that determine discount rates.[11]

[8] The estimated first-order serial correlations of $\bar{b}_{0t}$, $\bar{b}_{1t}$, and $\bar{b}_{2t}$ are −0.048, 0.114, and −0.039, so the assumption of serially uncorrelated coefficients implicit in the calculation of the t-statistics (see fn. 6) appears to be satisfied.

[9] When equation (4) was estimated with observations in groups 5 through 10 only, the estimate of $\bar{b}_{1t}$ (gps. 7 and 8) was 0.123, with a t-statistic of 0.64, and the estimate of $\bar{b}_{2t}$ (gps. 9–10) was −0.533 with a t-statistic of −1.87. The latter is significant at the 0.05 level for a one-tailed test.

[10] For groups 1, 2, and 3, the ranges of R^2 values are 0.03 to 0.23, 0.02 to 0.24, and 0.06 to 0.20, respectively. For groups 8, 9, and 10 the respective ranges are 0.02 to 0.58, 0.0 to 0.62, and 0.01 to 0.63.

[11] The dependent variable in equation (2) is not adjusted for risk, so both earnings changes and returns (relative to the market) may reflect common return factors (see Freeman 1987b). Adding $\hat{\beta}_{it}$ as a control variable in equation (2) did not significantly change estimates of earnings multipliers, however.

Table 2

Mean Values of Attributes of Pr_{it} Groups in Years Following Pr_{it} Year

Group	Year (j) Following Year t				
	$t+j$ $(j=1)$	$t+j$ $(j=2)$	$t+j$ $(j=3)$	$t+j$ $(j=4)$	$t+j$ $(j=5)$
Panel A. Mean Earnings Persistence Measures, Pr_{ij}:					
1	.73	.64	.59	.57	.59
2	.72	.65	.60	.58	.60
3	.68	.64	.60	.58	.57
4	.62	.61	.58	.56	.56
5	.56	.57	.56	.56	.55
6	.51	.54	.56	.56	.57
7	.46	.52	.54	.56	.55
8	.46	.54	.57	.57	.58
9	.43	.53	.57	.61	.61
10	.48	.58	.65	.65	.61
Panel B. Mean Standardized Earnings Changes, $\Delta eps_{ij} / P_{ij-1}$:					
1	.1827	.0607	.0571	−.0104	−.0372
2	.0864	.0624	.0341	.0114	−.0319
3	.0296	.0355	.0320	.0135	−.0030
4	.0034	.0181	.0211	.0112	.0073
5	−.0051	.0045	.0084	.0117	.0108
6	−.0088	−.0040	−.0008	.0021	.0140
7	−.0225	−.0154	−.0044	.0089	.0145
8	−.0277	−.0262	.0106	.0177	.0030
9	−.0367	−.0226	−.0485	.0308	.0376
10	−.0151	−.0290	−.0532	.0370	.0708
Panel C. Mean Estimated Earnings Autoregressive Coefficients, $\bar{\hat{\gamma}}_{1j}$, $(t(\bar{\hat{\gamma}}_{1j}))$:					
11	−.015	−.167	−.194	−.021	−.220
	(−2.99)	(−2.47)	(−3.31)	(−.54)	(−3.08)
12	−.221	−.168	−.134	−.185	−.104
	(−6.12)	(−4.10)	(−3.61)	(−2.56)	(−3.17)
13	−.134	−.126	−.146	−.105	−.216
	(−3.81)	(−5.33)	(−3.01)	(−1.94)	(−1.84)
14	−.160	−.154	−.152	−.142	−.162
	(−5.54)	(−5.18)	(−4.39)	(−3.30)	(−2.97)
Panel D. Mean Estimated Earnings Change Multipliers, $\bar{\hat{b}}_j (t(\bar{\hat{b}}_j))$:					
11	.513	.728	.843	.819	.897
	(8.29)	(5.10)	(5.20)	(4.76)	(4.01)
12	1.017	.923	.923	.921	.903
	(7.89)	(7.09)	(6.73)	(6.00)	(4.44)
13	1.227	.913	.890	.985	1.012
	(8.30)	(7.11)	(6.35)	(5.13)	(5.02)
14	.866	.867	.888	.899	.916
	(8.47)	(7.54)	(7.00)	(6.06)	(5.02)

Note: Pr_{it} groups are defined in the second column of table 1. For the meaning of $\bar{\hat{\gamma}}_{1t}$ and $\bar{\hat{b}}_t$, refer to the notes in table 1.

Time-Series Variation in Earnings Change Multipliers

This section demonstrates that persistence measures and estimated earnings change multipliers vary over time. This complements findings in earlier research. Not only do earnings change coefficients (estimated over time) vary cross-sectionally, but also, for a given firm, vary over time. Information in financial statements tracks this variation.

Panel A of table 2 presents mean *Pr* values for firms in each of the ten *Pr* groups (formed in year t) for each of the five following years, $t+j$, $j=1,2,\ldots,5$.[12] Although some mean reversion is expected if *Pr* values are measured with error in the base year t, the results indicate that *Pr* is not a permanent characteristic of firms. Positive serial correlation in *Pr* is evident, but the cross-sectional variation in mean *Pr* across the groups disappears by year $t+3$, and all values in this year are close to those in table 1 for all firms (gp. 14) in year t. The mean estimated Spearman rank correlations between portfolio mean *Pr* values in year t, and those in year $t+j$, $j=1,2,\ldots,5$, are 0.87, 0.67, 0.28, −0.03, and 0.22, respectively. The associated t-statistics are significant at the .05 level in years $t+1$ to $t+3$ only.

Mean reversion in the indicators of earnings persistence is supported by the displays in panels B and C of table 2. Panel B gives mean standardized earnings changes for the ten Pr_{it} groups for years $t+j$, $j=1,2,\ldots,5$. Earnings reversals are evident from year t to $t+1$ for Pr_{it} groups away from 0.5 (table 1), but not in subsequent years. Up to year $t+3$, earnings changes in table 2 are rank-ordered over levels of *Pr* in the same direction as in year $t+1$.[13] *Pr* indicates future reversals (transitory current earnings), but not as a continuing phenomenon. (Incidentally, the ordering of the changes in *eps* in years $t+1$ to $t+5$ indicates that *Pr* predicts earnings changes for up to three years ahead.) Panel C gives mean estimated earnings revision parameters, $\bar{\hat{\gamma}}_{ij}$, for years following year t for *Pr* groups 11, 12, and 13, as well as for all firms combined (gp. 14). Unlike those for year t in table 1, these values are similar over the *Pr* groups and similar to those for all firms (gp. 14), which indicates that differential earnings revision parameters are indicated only by current *Pr* values.[14] The parameter describing the transition from one earnings innovation to the next is time-varying, and its variation is described by contemporaneous financial statement information.

Panel D of table 2 presents the mean estimated multipliers of earnings changes, $\bar{\hat{b}}_j$, for Pr_{it} groups 11 through 14 for each year $t+j$, $j=1,2,\ldots,5$. With the exception of group 11 for year $t+1$, these mean values are quite similar over groups 11 through 13 in all years following year t, and are similar to those for all firms in group 14, as indicated by significance tests performed by estimating equation (4) in the relevant years. The findings are in contrast to those for year t in table 1: the multipliers are time-varying and revert to those of the typical firm.[15]

[12] Values for each $t+j$ are pooled over calendar years. The table reports means of mean *Pr* values for those years. As *Pr* values are calculated for a fixed period of time, 1973–83, the number of firm-years in the calculation declines as j increases, and the precision in the mean values also declines. Results are similar when the analysis is for year $t+j$ when that year is 1983 or a prior year. Thus, the firms in the calculation for year $t+j$ are the same as the firms in year t.

[13] The reversal in the other direction in year $t+5$ is not explored here.

[14] These inferences are supported by statistical tests similar to those conducted in the estimation of equation (4).

[15] Further tests revealed that the central tendency in multipliers over time is primarily identified with firms in groups 1 through 4, rather than those in groups 7 through 10. This is expected, given that multipliers for groups 7 through 10 are closer to the central value in year 0 (as indicated in table 1).

This evidence indicates that the earnings persistence captured by *Pr* measures is not a permanent characteristic of firms. Transitory earnings indicated by *Pr* dissipate quickly. Correspondingly, earnings valuation multipliers also change over time. A practical implication is that financial statement analysis needs to be updated annually to identify transitory earnings and adjust multipliers.

Earnings Change Multipliers and Prior Information

In table 1, earnings multipliers are evaluated with contemporaneous financial statement information. This information (for year t) predicts earnings for $t+1$. Similar information in financial statements for year $t-1$ will predict earnings for year t. Thus, the market valuation of earnings changes in year t may be affected by prior financial statement information. To the extent that earnings are predicted by that information (and that information is reflected in price prior to the return period), reported earnings will be discounted and earnings multipliers will be lower.

Panel A of table 3 evaluates this description. Earnings multipliers are evaluated not only by the contemporaneous *Pr* value (Pr_{it}, indicated by rows in table 3), but also by the prior year's *Pr* value (Pr_{it-1}, indicated by column headings). The analysis is based on years 1974–83 because no *Pr* values are available prior to 1973, and the number of *Pr* groups is reduced to four to provide a reasonable number of observations in each cell. Panel B of the table provides mean values of the deflated earnings ($\Delta eps_{it}/P_{it-1}$) along with the number of observations in each cell (in parentheses).[16]

Panel B shows that, just as Pr_{it} is negatively related to contemporaneous earnings changes (in year t) for a given level of Pr_{it-1} (reading down the columns), Pr_{it-1} is positively related to earnings changes in year t for a given level of Pr_{it} (reading across the rows). This describes the ability of Pr_{it-1} to predict earnings in t. Correspondingly, multiplier estimates in panel A are related not only to Pr_{it} but also to Pr_{it-1}. When Pr_{it} is held constant (in a given row in table 3), estimated multipliers differ over Pr_{it-1} (displayed over columns).[17] The significance of the differences over Pr_{it-1} is assessed by estimating equation (4) for each row of the table. The mean estimates of b_{1t} and b_{2t} are given in the last two columns of panel A. Except when $Pr_{it}>0.8$ (for which the estimated multipliers are low for all Pr_{it-1} values), significant differences are observed and indicate that prior financial statement information affects the pricing of one-year-ahead earnings changes.

If multipliers are related to prior *Pr* values and *Pr* values are positively serially correlated, the lower multipliers for the extreme Pr_{it} values noted earlier could be attributable to extreme Pr_{it-1}, that is, prior prices will have discounted the earnings. However, within a given column in panel A of table 4, earnings change multipliers vary over Pr_{it} with controls for Pr_{it-1}. The mean estimates of b_{1t} and b_{2t} in equation (4) reported in the rows of panel A provide the appropriate significance tests.

In summary, earnings change multipliers are evaluated with both contemporaneous and leading financial statement information. Evaluating the pricing of earnings as it evolves over time involves assessing how financial statement information also

[16] The pattern of the observation count over cells in panel B (with fewer observations off the diagonal) is due to the serial correlation in *Pr* that is indicated in panel A of table 2.

[17] The control for Pr_{it} while analyzing values over Pr_{it-1} (and vice versa) may not be perfect, given the positive serial correlation of *Pr* values. However, mean values of Pr_{it} across rows in table 3 were approximately the same (with the exception, of course, of the "All Pr_{it}" row) as were mean values of Pr_{it-1} displayed down columns.

Table 3

Estimated Earnings Change Multipliers (Panel A) and Standardized Earnings Changes (Panel B) for Joint Pr_{it} and Pr_{it-1} Groups

Values of Pr_{it}	Values of Pr_{it-1}: $Pr_{it-1}>.8$	$.8\geq Pr_{it-1}>.6$	$.6\geq Pr_{it-1}>.4$	$Pr_{it-1}\leq.4$	$\bar{\hat{b}}_{1t}$	$\bar{\hat{b}}_{2t}$
Panel A. Mean Estimated Earnings Change Multipliers, $\bar{\hat{b}}_t$:						
$Pr_{it}>.8$	.335 (5.57)	.433 (6.19)	.252 (1.17)	.605 (2.60)	.057 (.62)	.000 (.00)
$.8\geq Pr_{it}>.6$	.576 (5.66)	1.103 (7.04)	.919 (6.15)	1.067 (4.96)	.129 (1.07)	−.450 (−3.49)
$.6\geq Pr_{it}>.4$	.622 (3.56)	1.729 (7.33)	2.096 (8.66)	1.431 (4.30)	−.288 (−2.04)	−1.526 (−6.67)
$Pr_{it}\leq.4$	.408 (1.10)	1.134 (2.50)	2.267 (5.09)	1.859 (4.04)	−.793 (−2.53)	−1.374 (−3.49)
All Pr_{it}	.500 (8.18)	.982 (7.79)	1.227 (8.30)	1.115 (6.97)	−.206 (−3.46)	−.780 (−7.23)
$\bar{\hat{b}}_{1t}$	−.075 (−.44)	−.586 (−3.97)	−.687 (−4.59)	−.230 (−.81)		
$\bar{\hat{b}}_{2t}$	−.361 (−2.22)	−1.205 (−5.97)	−1.455 (−7.08)	−.609 (−1.95)		
Panel B. Mean Standardized Earnings Changes, $\Delta eps_{it}/P_{it-1}$:						
$Pr_{it}>.8$	−.0138 (418)	−.1911 (561)	−.3302 (215)	−.2182 (85)		
$.8\geq Pr_{it}>.6$	.2142 (486)	.0126 (3047)	−.0569 (1650)	−.0675 (209)		
$.6\geq Pr_{it}>.4$	.2249 (167)	.0694 (1805)	.0191 (4232)	−.0275 (644)		
$Pr_{it}\leq.4$	.0724 (49)	.1297 (193)	.0725 (708)	.0203 (654)		
All Pr_{it}	.1276 (1120)	.0125 (5606)	−.0053 (6805)	−.0262 (1592)		

Note: Figures in parentheses in panel A are *t*-statistics on the mean multiplier estimates, and those in panel B are the number of observations in the respective cells, pooled over years.

evolves over time. Strikingly, the market's valuation of earnings changes is high for the intersection of $0.6\geq Pr_{it-1}>0.4$ and $0.6\geq Pr_{it}>0.4$, where the mean $\hat{b}_t$ is 2.096. Here current and prior financial statements provide little information about the direction of future earnings. In both the current and preceding year, one-year-ahead earnings are expected to be the same as the most recently observed earnings (as described in a "random walk" characterization of earnings), so the observed change is deemed an unpredicted, permanent addition to the level of earnings. Thus, significant weight is placed on the current earnings change in valuation. The estimated multipliers generally decline as Pr_{it} and Pr_{it-1} values radiate out from this central cell in the table,

Table 4

Estimated Earnings Change Multipliers (Panel A) and Standardized Earnings Changes (Panel B) for Joint Pr_{it} and E_{it-1}/P_{it-1} Groups

Values of Pr_{it}	E_{it-1}/Pr_{it-1} Group						
	1 (Low)	2	3	4	5 (High)	$\bar{b}_{1t}$	$\bar{b}_{2t}$
Panel A. Mean Estimated Earnings Change Multipliers, $\bar{b}_t$:							
$Pr_{it} > .8$	.380	.798	.719	.121	.299	−.108	−.189
	(5.08)	(4.76)	(2.82)	(.64)	(1.92)	(−.73)	(−1.32)
$.8 \geq Pr_{it} > .6$	.665	1.472	1.934	1.719	1.051	−.367	−1.206
	(6.20)	(3.58)	(5.55)	(6.78)	(7.30)	(−1.68)	(−3.94)
$.6 \geq Pr_{it} > .4$	.808	3.011	2.467	2.460	1.785	.097	−1.067
	(4.82)	(5.55)	(6.06)	(6.32)	(8.04)	(.27)	(−2.89)
$Pr_{it} \leq .4$	1.344	2.567	2.199	2.800	1.410	.200	−.370
	(4.40)	(4.75)	(3.72)	(3.61)	(5.61)	(.52)	(−.72)
All Pr_{it}	.594	1.511	1.496	1.383	1.190	−.053	−.731
	(8.20)	(6.63)	(7.02)	(7.94)	(7.61)	(−.32)	(−4.64)
$\bar{b}_{1t}$	−.052	−.988	−.374	−.573	−.560		
	(−.36)	(−2.04)	(−.80)	(−2.03)	(−4.42)		
$\bar{b}_{2t}$	−.346	−1.920	−1.701	−1.893	−1.159		
	(−2.35)	(−4.04)	(−5.14)	(−5.24)	(−6.58)		
Panel B. Mean Standardized Earnings Changes, $\Delta eps_{it}/P_{it-1}$:							
$Pr_{it} > .8$	−.0852	−.1476	−.1880	−.2586	−.3473		
	(622)	(201)	(147)	(125)	(178)		
$.8 \geq Pr_{it} > .6$	.1133	−.0015	−.0058	−.0231	−.0861		
	(1256)	(1014)	(989)	(1036)	(1090)		
$.6 \geq Pr_{it} > .4$	.1218	.0306	.0280	.0273	.0122		
	(636)	(1356)	(1521)	(1579)	(1750)		
$Pr_{it} \leq .4$	.1535	.0505	.0519	.0516	.0430		
	(178)	(414)	(330)	(293)	(385)		
All Pr_{it}	.0744	.0123	.0093	.0018	−.0358		
	(2692)	(2985)	(2987)	(3033)	(3403)		

Note: Figures in parentheses in panel A are *t*-statistics on the mean multiplier estimates, and those in panel B are the number of observations in the respective cells, pooled over years. E_{it-1}/P_{it-1} is the earnings price ratio at the beginning of the return period covered by the dependent variable in equation (2).

demonstrating the sensitivity of earnings multipliers to contemporaneous and leading financial statement information.[18]

Because the financial statement information summarized in Pr_{it-1} probably does not contain all prior information, prior price might be a more thorough control to use when assessing multipliers from current *Pr*. Prior price presumably summarizes more information about future earnings than is available in prior financial statements. There-

[18] The asymmetry of estimated multipliers over high and low *Pr* values observed in table 1 is evident here also.

fore, table 4 repeats the analysis in table 3 except that prior information about earnings is indicated by leading E_{it-1}/P_{it-1} rather than Pr_{it-1}.

Beaver and Morse (1978) and Ou and Penman (1989b) demonstrate that earnings/price (E/P) ratios, in the cross section, differentiate one-year-ahead earnings changes, so that, when E/P ratios differ from normal, prices indicate that earnings will be different from current earnings. Thus five E_{it-1}/P_{it-1} groups replace the Pr_{it-1} groups in the column headings of table 4. These are formed for each year from a ranking of firms on E_{it-1}/P_{it-1} at the beginning of the return period.[19] The ability of E/P ratios to differentiate one-year-ahead earnings changes is borne out by comparisons of mean earnings changes across rows in panel B of the table. Correspondingly, earnings change multipliers differ across rows in panel A. The mean estimates of b_{1t} and b_{2t} in the last two columns of panel A again refer to equation (4): the dummy variable, D_{1it} is set at 1 if E_{it-1}/P_{it-1} falls in groups 2 or 4, and D_{2it} is set at 1 if E_{it-1}/P_{it-1} falls in groups 1 or 5, and zero otherwise. These estimates, although not significantly different from zero for some rows, indicate that controls for prior information are captured by E_{it-1}/P_{it-1}. Reading down the columns in panel A, one sees that earnings multipliers differ over Pr_{it} values for given levels of E_{it-1}/P_{it-1}. The Pr_{it} values reported concurrently with earnings do not just reflect the discounting of earnings by prior information, they also provide updated information on earnings valuation.[20]

V. Conclusion

The analysis shows that financial statements provide relevant information for the evaluation of earnings changes. Contemporaneous financial statement information indicates the persistence of earnings in the future, and leading financial statement information indicates the extent to which earnings have been anticipated. Both sets of information are relevant to the pricing of earnings changes in the sample. Further, earnings persistence in general is not a fixed characteristic of firms, but changes over time to become more like that of the typical firm. Correspondingly, earnings change multipliers are mean-reverting.

The reader may recognize a conflict between the results here and those in Ou and Penman (1989a). The results here indicate that the stock market recognizes Pr information and values earnings accordingly, while the Ou and Penman (1989a) study provides evidence of market inefficiency with respect to Pr. There is indeed an inconsistency. This is a disturbing problem with all research that examines contemporaneous associations between accounting numbers and stock returns. However, the inferences here do not require the market to be perfectly efficient. Ou (1990) reports that the market recognizes some of the Pr information when it is published, and this is true also of Ou and Penman (1989a, table 9). Similarly, Ou and Penman (1989b) show that Pr information is captured by contemporaneous E/P ratios (which, of course, reflect price). Thus

[19] The five groups are roughly E_{it-1}/P_{it-1} quintiles. The numbers of firms in groups are not exactly the same because groups were identified from a larger cross section than that which satisfied data requirements to estimate earnings change multipliers.

[20] Another potentially omitted variable is firm size. The results of Freeman (1987a) and Collins et al. (1987) suggest that earnings valuation measures estimated with returns over the 12-month period covered by the dependent variable in equation (2) vary over firm size. However, the positive correlation between Pr and firm size reported in Ou and Penman (1989a) is in the wrong direction to support this omitted-variable conjecture.

the Ou and Penman (1989a) result can be interpreted as the market's being slow to capture all of the information in *Pr*.

The findings here should be interpreted similarly to the classic Ball and Brown (1968) result. That result still indicates the information content of earnings even though "post-earnings drifts" in prices have been robustly documented. Note that the result in Ou and Penman (1989a) works against the inference here because the inefficiency is associated with the noncentral *Pr* values for which lower earnings multipliers are observed. If the market fails to recognize the *Pr* information for these levels of *Pr*, one would expect the estimated earnings multipliers to be higher, that is, closer to those for central *Pr* values.

The present study is helpful in developing a practical approach to the evaluation of earnings changes: it provides an *ex ante* indicator of earnings persistence and recognizes nonstationarity in persistence and the use of financial statement information to track the variation. Further research should seek more refined measures of persistence than the *Pr* instrument. This measure is based on one-year-ahead earnings changes only, and earnings persistence refers to earnings over a longer horizon. Because it is estimated from pooled data, it does not allow for variation in the relationship between financial statement items and future earnings over firms.

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