Dissecting Earnings Recognition Timeliness

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Abstract

The focus of our paper is on the portion of value change that is recognized in earnings of the period, which we refer to as earnings recognition timeliness (ERT). Our emphasis is on two elements of ERT: recognition in earnings of the effects of (1) news regarding sales of the current period and directly related expenses; and, (2) news that changes expectations regarding earnings in future periods, while having no implications for sales and associated expenses in the current period. Although the vast literature on ERT describes these two elements, we are unaware of any study that identifies them empirically. The distinction is important because the accounting for these elements (and the associated ERT) differs considerably and it follows that the mapping from returns to these elements, which is the empirical manifestation of ERT, may also differ. We show that empirical identification of these elements may provide additional insights in many of the studies that examine differences in ERT across various scenarios (the best known example being the difference between positive return (good news) and negative return (bad news) samples).
1. Introduction

The focus of our paper is on the portion of value change that is recognized in earnings of the period, which we refer to as earnings recognition timeliness (ERT). We identify and empirically estimate elements of ERT that reflect: (1) the recognition in earnings of the effects of news regarding sales of the current period and directly related expenses; and, (2) the effects of news that changes expectations regarding earnings in future periods, while having no implications for sales and associated expenses in the current period.

We emphasize these two elements because the accounting for expenses that are directly related to sales of the period differs fundamentally from the accounting for expenses related to expectations of future sales. A change in value, which reflects news that only affects the sales of the current period, will have a one-to-one mapping to earnings; but, if this change in value reflects a more persistent effect on sales, the mapping from returns to earnings will be less than one-to-one. News that relates only to future sales will also affect earnings through other expenses, such as additional advertising, write-downs, etc., which reflect management decisions and the associated accounting related to changes in expectations about future sales.

A large body of literature has focused on the degree to which accounting earnings contemporaneously capture news that is reflected in market value changes (i.e., ERT).\(^1\) Although this literature sometimes describes (or, at least, alludes to) these two elements of ERT, we are unaware of any study that identifies them empirically. The distinction between the two elements is important because the accounting for each of them differs considerably and it follows that the mapping from returns to these elements, which is the empirical manifestation of ERT, may also differ. We demonstrate and conclude that empirical identification of these elements

\(^1\) A review of the literature that focuses on earnings recognition timeliness may be found in Ball et al. (2009) and Dechow et al. (2010).
may provide additional insights in many of the studies that examine differences in ERT across various scenarios. We discuss, analyze, and identify these elements in the most widely studied comparison of samples of observations; viz., observations with positive annual returns (good news) and observations with negative annual returns (bad news). We show that failing to identify these two elements may lead to incorrect conclusions.

We refer to the element of ERT that reflects the recognition in earnings of the effects of news regarding sales of the current period and directly related expenses as the current sales element; the element that reflects the effects of changes in expectations regarding sales in future periods and associated expenses, while having no implications for sales and associated expenses in the current period, is referred to as the expectations element. This element is comprised of expenses that reflect management’s attempts to affect future earnings (e.g., R&D, advertising), the accounting for these expenses, and generally accepted accounting principles that require recognition of expenses (e.g., asset write-downs and restructuring charges) due to changes in the value of recognized assets of the firm, which are associated with changes in expectations of future earnings. The focus of our paper is on identifying and empirically estimating these two elements of ERT.

We argue that these two elements are distinguishable via the pattern of their association with daily returns within the fiscal year. Specifically, news implicit in daily stock returns at the beginning of the fiscal year will have the entire year to be recognized as sales and sales-related expenses (i.e., the current sales element of recognized earnings). In contrast, news at the end of the year will not be recognized in current-year sales and sales-related expenses, but will be incorporated in earnings of future years. It follows that the association between the current sales element of recognized earnings and news implicit in daily stock returns will be positive at the
beginning of the year and decline to zero at the end of the year. Thus, the change in the earnings/daily returns association over the fiscal year will reflect the *current sales element* of ERT. The *expectations element* of ERT will be captured in the earnings/daily returns association at the end of the year, which will reflect the effect of news that changes expectations regarding sales in future years while having no implications for the *current sales element*.

Our research design is based on cross-sectional regressions in which fiscal-year earnings is the dependent variable and daily returns for each day *within* the fiscal year are the explanatory variables. The coefficients relating earnings to daily returns capture the proportion of news implicit in returns of a given day, which is recognized in earnings of the fiscal year. The key to the method of analysis is that the estimate of the earnings/daily returns coefficient may differ within the fiscal year.

As expected, the estimates of the earnings/daily returns coefficients decline from 0.114 at the beginning of the fiscal year to 0.072 at the end of the fiscal year. This decline in the coefficient of 0.043 over the fiscal year captures the *current sales element* of ERT. The estimate of the coefficient (0.072) at the end of the year reflects the *expectations element*.

Theoretically, if the *current sales element* reflects sales of the current period that are completely transitory (in other words, none of the sales of the period that are directly related to returns of the period persist into the future) and there is no *expectations element*, the *current sales element* of ERT will be manifested in an earnings/daily returns coefficient of one. If the sales of the current period persist into the future, the *current sales element* will be manifested in an earnings/daily returns coefficient of less than one; the more persistent the sales, the lower the

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2 Each of the dependent variables in each of our regressions is deflated by beginning of year market capitalization. Net income after extraordinary items is the earnings variable we use in our analyses. The terms “earnings” and “net income” are synonymous in this paper.
coefficient. In our data, the estimate of the *current sales element* of 0.043 suggests that this element will persist for a considerable time into the future. The estimate of the *expectations element* of 0.072 suggests that news that has arrived during the year, which leads to expenses associated with changes in expectations about future profitability, also reflects a persistent future change.

Numerous studies, following Basu [1997], focus on the difference between ERT when annual returns are negative (a proxy for bad news) and ERT when annual returns are positive (a proxy for good news). The notion of asymmetric timely loss recognition rests on features of accounting that lead to more immediate recognition of downward changes in value when compared to recognition of upward changes in value. Downward revisions in expectations of earnings of future years (associated with negative returns) may, for example, result in asset impairments requiring immediate write-offs while upward revisions, which may lead to an increase in the market/fair value of the assets, generally have not, under US GAAP, lead to an increase in the book value of assets.

This implies that asymmetric timely loss recognition will manifest in the *expectations element* of ERT because it reflects the portion of recognized earnings related to changes in expectations of future earnings. Asymmetric timeliness does not imply, however, that the *current sales element* will have a different relation to returns when returns are positive vis-à-vis when returns are negative. The relative contribution of the *current sales element* to the overall asymmetry of ERT likely reflects the transitory/permanent nature of the good/bad news effect on this element.

Consistent with a large extant literature, we extend our empirical analysis by partitioning observations based on the sign of the annual return of the fiscal year. For the sub-sample of
observations with positive annual returns (i.e., good news), the estimate of the earnings/daily return coefficient decreases from 0.073 at the beginning of the fiscal year to 0.020 at the end of the fiscal year. This decline in the coefficient of 0.053 over the fiscal year reflects the current sales element of ERT when news is good. In contrast, for the sub-sample of observations with negative annual returns (i.e., bad news), the earnings/daily returns coefficient increases slightly from 0.148 at the beginning of the fiscal year to 0.158 at the end of the fiscal year. This increase of 0.010 is not statistically significant and is consistent with earnings primarily reflecting news related to changes in expectations of future earnings (i.e., the expectations element of ERT) when news is bad. The important observation is that the magnitude of the earnings/daily returns coefficient significantly declines over the year for observations with positive annual returns, but does not change significantly for observations with negative annual returns. This suggests that the asymmetry observed in ERT is driven partly by an asymmetry in the current sales element of earnings.

In order to focus on the current sales element and the expectations element, we decompose our dependent variable, annual earnings, into two readily observable components: gross margin (i.e., sales revenue minus cost of sales) and period expenses (i.e., gross margin minus net income). Examining the mapping from returns to each component adds insights into whether or not changes in the net income/daily returns coefficient over the fiscal year reflects the current sales element of ERT and/or the expectations element. We analyze the daily coefficients for regressions with gross margin and with period expenses as the dependent variable and daily returns of the fiscal year as explanatory variables.

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3 That is, period expenses are signed positive.
4 Because net income is equal to gross margin minus period expenses, the estimates of the coefficients from the regression of net income on daily returns will be equal to the estimates of the coefficients from the regression of
The expenses included in the gross margin variable likely reflect expenses that are most directly associated with sales of the current fiscal period (i.e., the current sales element) rather than expenses related to the expectations element of earnings. If the difference in the earnings/daily returns coefficient over the fiscal period mostly reflects the current sales element, the gross margin/daily returns association will start at a positive value at the beginning of the fiscal year and decline to zero at the end of the year.

Consistent with the change in association over the fiscal year reflecting the current sales element, we find that the gross margin/daily return coefficient is positive (0.437) and statistically significant at the beginning of the year, but not significantly different from zero at the end of the year. In other words, news implicit in daily returns at the beginning of the fiscal year has a significant effect on sales and related expenses recognized in earnings of the current year. However, news arriving at the end of the year has relatively no effect on sales and related expenses of the year. In addition, we find that the day-to-day estimates of the gross margin/daily returns coefficients do not differ significantly across samples of observations with positive annual returns and samples with negative annual returns.

Period expenses, as we have defined them, will tend to reflect the expectations element as well as the current sales element of ERT. The observed asymmetry in ERT, if driven by the expectations element, will be reflected in estimates of the average period expense/daily returns coefficients that differ significantly across a good vs. bad news partition of the data. Consistent with this argument, we find that the average period expense/daily returns coefficients differ significantly across this partition.

gross margin on daily returns minus the estimates of the coefficients from the regression of period expenses on daily returns.
Inconsistent with the Basu [1997] notion of asymmetric timely loss recognition, we find that the average period expense/daily returns coefficient is not significantly different from zero for the negative annual returns sample. Examination of the dynamics of the period expense/daily returns coefficient provides a basis for the explanation of this result. The estimate of the period expense/daily returns coefficient declines from significantly positive at the beginning of the year to significantly negative at the end of the year. The change in the estimate of this coefficient captures the current sales element of period expenses while the estimate of this coefficient at the end of the year captures the expectations element. As expected there is a positive relation between the expenses related to sales of the year and annual returns (i.e., the less negative the returns, the higher the sales and sales-related expenses) and there is a negative relation between the expectations element of period expenses (i.e., the less negative the returns the lower the expenses related to changes in expectations of future earnings, such as asset write-downs and restructuring charges) and annual returns.

The observation that the two components of ERT have correlations with negative returns that have opposite signs, explains the observation that the estimate of the average period expense/daily returns coefficient is zero. This observation also underscores the importance of separating these two elements empirically.

The remainder of the paper proceeds as follows. In section 2, we elaborate on the motivation for our paper and we outline the method. Section 3 briefly describes the sample selection criteria and the sources of data. We present and discuss the results of our main analyses in section 4. In section 5 we provide some alternate specifications, which ensure the robustness of our results and we conclude with section 6.
2. Method and Motivation

Unlike extant studies of the earnings/return relation, we develop a method that permits the possibility that the earnings/return relation changes over the earnings measurement period. The method facilitates analysis of the earnings/return relation for every sub-interval (e.g., weeks, days, hours, or even shorter intervals) even though the interval over which the earnings metric is measured is limited to relatively longer intervals (e.g., quarters, years, or multiple years). We focus on annual earnings because fiscal-year earnings is the most studied earnings variable in the context of ERT. We focus on daily returns because of the ready availability of these data. We have repeated most of the analyses with monthly return data; these analyses lead to very similar conclusions.

The long-interval earnings/return regression may be written as follows:

\[ NI_{jt} = \alpha_t + \beta_t \cdot RET_{jt} + \varepsilon_{jt} \]  

(1)

where the dependent variable, \( NI_{jt} \), is the annual net income (or earnings) for firm \( j \) during the fiscal year ending in year \( t \) deflated by beginning of fiscal-year market capitalization. The explanatory variable, \( RET_{jt} \), is the stock return of firm \( j \) for fiscal year \( t \). \( \alpha_t \) and \( \beta_t \) are estimated regression parameters and \( \varepsilon_{jt} \) is the regression disturbance term.\(^5\) The coefficient \( \beta_t \) reflects the proportion of the total news implicit in annual returns that is recognized in period \( t \) earnings (i.e., ERT).

We make use of the fact that we can readily obtain data on returns for shorter intervals to test for a change in the earnings/return coefficient within the fiscal year. We argue that there are

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\(^5\) This, fundamentally, is the form of the regression in Beaver, Lambert and Ryan [1987] and Basu [1997], who partitions the regression into observations with negative returns and those with positive returns. The reverse form of this regression, which also restricts the earnings/return coefficient to be the same for all intervals within the fiscal period, was the basis of Beaver, Lambert, and Morse [1980], Easton and Harris [1991], and Easton, Harris, and Ohlson [1992].
reasons to expect the earnings/return coefficient to differ across these shorter interval returns rather than being constrained to be the same $\beta_t$ as in regression (1). Specifically, news implicit in returns at the beginning of the fiscal period will have the entire year to be recognized as sales and sales-related expenses (i.e., the current sales element). In contrast, news at the end of the fiscal period will not be recognized as current sales and sales-related expenses, but will be incorporated in earnings of future years. It follows that the association between recognized net income and news implicit in returns will be stronger at the beginning of the fiscal year relative to the end of the fiscal year. Thus, we expect the earnings/daily returns association to decline significantly over the fiscal period reflecting the current sales element of the news recognized in net income for the year.

We examine the change in the earnings/daily returns coefficient via the following unconstrained coefficient model, which allows the regression coefficient to be different each day:

$$NI_{jt} = \alpha_t + \sum_{\tau=0}^{251} \beta_{\tau t} \cdot ret_{jt\tau} + \epsilon_{jt}$$

The explanatory variable, $ret_{jt\tau}$, is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. The regression parameter, $\beta_{\tau t}$, which may be different on each of the 252 trading days within the fiscal year, reflects the proportion of value change on day $\tau$ that is recognized in net income of the year. Allowing the earnings/daily returns coefficient to vary in this manner allows us to test for changes in the coefficient within the fiscal year. We estimate the unconstrained coefficient model and plot the

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6 The daily timing convention used in the analysis assigns $\tau = 251$ to the last trading day of the fiscal year. We maintain consistency across observations by assuming each fiscal year has exactly 252 trading days. Therefore, $\tau = 0$ is only an approximation of the first day of the fiscal year (i.e., within two days of the first trading day of the fiscal year). Daily returns are calculated as daily price change plus daily dividend payments divided by beginning-of-year price so that the sum of these daily returns is a meaningful construct (i.e., an annual return, which is similar to the annual return metric used in Basu [1997] and related studies); we obtain similar results when we use the log of daily returns as the independent variables.
daily estimates of the 252 coefficients, $\beta_{tt}$. Although this model reveals many interesting patterns in the coefficient estimates throughout the fiscal year, several problems arise in the estimation. In particular, the model requires estimating 252 parameters which reduces the degrees of freedom, and the noisy daily estimates limit our ability to examine/understand intra-period patterns.

We circumvent these problems by placing more restrictive assumptions on the earnings/daily returns coefficients, $\beta_{tt}$. Specifically, we base our primary analyses on the following constrained version of regression (2):

$$NI_{jt} = \alpha_t + \sum_{t=0}^{251} \beta_{tt} \cdot ret_{jt} + \varepsilon_{jt}$$

$$s.t. \beta_{tt} = \beta_{t}^{beg} + \frac{1}{251} \cdot (\beta_{t}^{end} - \beta_{t}^{beg}) \cdot \tau$$

We refer to this as the linear coefficient model because the earnings/daily returns coefficients, $\beta_{tt}$, are constrained to be a linear function of time, $\tau$, within the fiscal year. $\beta_{t}^{beg}$ and $\beta_{t}^{end}$ are the two regression parameters (in addition to the regression intercept, $\alpha_t$) estimated in this model. $\beta_{t}^{beg}$ ($\beta_{t}^{end}$) is the estimate of the earnings/daily returns coefficient on the first (last) trading day of fiscal year $t$, which reflects the proportion of daily change in value at the beginning (end) of the year that is recognized in earnings of the same year.

The difference between these two estimates ($\beta_{t}^{end} - \beta_{t}^{beg}$), which we refer to as $\Delta \beta_t$, reflects the rate of change in this proportion over the entire fiscal year. We expect $\Delta \beta_t$ to be negative if the current sales element of ERT is present because news at the beginning of the year has 252 remaining days to be incorporated in sales and related expenses of the current year while news toward the end of the fiscal year has relatively less time (i.e., only a few remaining days) to be incorporated in current period sales and related expenses. In general, we expect $\beta_{t}^{end}$ to be
positive representing the proportion of news reflected in current period earnings that relates to changes in expectations regarding sales and expenses in future years (i.e., the *expectations element* of ERT).\(^7\)

The coefficient constraint can be amended to fit other parametric specifications. We specifically choose a linear constraint, which requires the estimation of only two parameters \((\beta_t^{beg} \text{ and } \beta_t^{end})\), to describe the dynamics of the earnings/daily returns association within the fiscal year. This two parameter model allows us to identify and estimate the two components (the *current sales element* and the *expectations element*) of ERT.\(^8\)

Our analyses rest on the assumption that changes in the earnings/daily returns association over the year reflect the *current sales element* while the end of period association represents the *expectations element*.\(^9\) To ensure that \(\Delta \beta_t\) reflects the *current sales element* and \(\beta_t^{end}\) reflects the *expectations element*, we separate net income, \(NI_{jt}\), into two observable components: (1) gross margin, \(GM_{jt}\), which equals sales revenue minus cost of sales; and, (2) period expenses, \(PE_{jt}\), which equals gross margin minus net income.\(^10\)

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\(^7\) We revisit this point when we discuss partitions of the data based on the sign of annual returns.

\(^8\) The linear constraint in regression (3) may appear overly restrictive. Consider, however, the following constant coefficient regression model:

\[
NI_{jt} = a_t + \sum_{t=0}^{251} \beta_{te} \cdot ret_{jt} + \varepsilon_{jt},
\]

s.t. \(\beta_{te} = \beta_t^{const}\).

This specification, which is essentially that used in most prior studies, is more restrictive than the linear coefficient model in equation (3) because it restricts the earnings/daily returns coefficient to be constant \((\beta_t^{const})\) throughout the fiscal year; substituting the constant coefficient constraint into regression (4) and using the fact that daily returns summed over the fiscal year equal the total annual return (i.e., \(\sum_{t=0}^{251} ret_{jt} = RET_{jt}\)) shows that the constant coefficient model is equivalent to the long-interval earnings/return regression estimated in prior studies \((\beta_t^{const} = \beta_t)\).

\(^9\) We choose to use our empirical method to identify these elements rather than identifying them as line items on the income statement. Decomposing earnings in such a way as to identify these components as line items on the income statement is difficult, perhaps impossible, because both components are likely: (1) to be spread across different line items; and/or, (2) to be present within some line items. We will return to this point.

\(^10\) This decomposition of net income implies: \(NI_{jt} = GM_{jt} - PE_{jt}\). In other words, increases in period expenses result in a decrease to net income.
Gross margin will tend to primarily reflect the *current sales element* of news because the cost of sales expense item included in this variable is more or less directly associated with sales of the current fiscal period rather than with changes in expectations of expenses related to future sales (i.e., the *expectations element*). Therefore, when net income is replaced by gross margin, $GM_{it}$, as the dependent variable in the linear coefficient model, we predict that the gross margin/daily returns coefficient will decline from positive at the beginning of the fiscal year (i.e., $\beta_{t}^{beg} > 0$) to not significantly different from zero at the end of the year (i.e., $\beta_{t}^{end} \approx 0$). A non-zero coefficient would reflect expenses that are associated with changes in expectations of future sales (i.e., the *expectations element*).

The expenses included in the period expense variable will reflect recognized expenses that tend to capture both the *current sales element* and the *expectations element*. The portion of the period expense/daily returns coefficient that captures the *current sales element* will decline from a positive value at the beginning of the fiscal year to a value of zero at the end of the year. We predict/hypothesize that the portion of this coefficient that represents the *expectations element* will be positive if annual returns are positive and negative if annual returns are negative. Our predictions are based on the idea that when news about the future is good there will be increased expenses associated with expansion to deal with the increased expected sales (i.e., the correlation between returns and expenses will be positive). When news is bad, however, management will take actions that will lead to expenses and GAAP accounting rules will lead to the recording of expenses (such as asset impairments) that are negatively correlated with returns (in other words, the more negative the returns, the greater the expenses).

It follows that when the dependent variable in the *linear coefficient model* is period expense, $PE_{it}$, the daily coefficient will decline by $\Delta \beta_{t}$ over the year from a positive value at the
beginning of the fiscal year (i.e., $\beta_t^{beg} > 0$) to a negative value at the end of the year (i.e., $\beta_t^{beg} < 0$). The notion that news (i.e., value change) at the end of the year is unlikely to be reflected in the sales and related expenses of the year suggests that the coefficient relating current sales element to daily returns will be zero at the end of the year. Two things follow from this notion. First, the average proportion of change in value that is captured in current sales element is equal to $-\Delta \beta_t/2$ because the coefficient changes by $\Delta \beta_t$ to zero over the year. Second, a non-zero estimate of the period expenses/daily returns coefficient at the end of the year (i.e., $\beta_t^{end} < 0$) reflects the expectations element of period expenses.

Our key predictions are: (1) the portion of the period expense coefficient that reflects the expectations element will be positive if annual returns are positive and negative if annual returns are negative; and, (2) the current sales element of ERT that is captured in either or both period expenses and gross margin may differ across positive and negative annual returns subsamples. In order to investigate these predictions, we run regression (4) separately for subsamples with positive annual returns and subsamples with negative annual returns.

3. Data and sample selection

To construct our sample, we begin with all firm-year observations from 1973 to 2007 in the Compustat Fundamentals Annual File with sufficient data to calculate net income before extraordinary items (Compustat $IB$) and gross margin (Compustat $SALE$ less $COGS$). We require each observation to have four available quarterly earnings announcement dates within the fiscal year (i.e., fourth quarter of the previous fiscal year and the first three quarters of the current fiscal
We exclude firms with insufficient data on the daily CRSP files to compute daily stock returns on all 252 days within the current fiscal year and a market value of equity at the beginning of the fiscal year. Finally, we exclude utility (4900 ≤ sic code ≤ 4999) and financial (6000 ≤ sic code ≤ 6999) firms and we remove observations with a market value of equity less than $10M or a share price less than $1 at the beginning of the fiscal year.

Our final sample includes 74,029 firm-years over the 35 years from 1973 to 2007 and comprises 9,957 firms. 44,216 of the firm-year observations (6,309 firms) have a fiscal year ending in December, which represents 59.7 percent of the entire sample.

4. Results of Main Analyses

Figure 1 and the first column of Table 1 present the results for both the constant coefficient model (Panel A) and the linear coefficient model (Panel B) when the dependent variable is net income. For the full sample of observations, the constant coefficient model estimate of the average net income/daily returns coefficient $\beta_{t}^{const}$ is 0.091 (t-statistic of 11.86) indicating that 9.1 percent of news implicit in returns of the fiscal year is recognized in net income. For the linear coefficient model, presented in Panel B, the coefficient at the beginning of the fiscal year, $\beta_{t}^{end}$, is 0.114 (t-statistic of 10.28) and the coefficient at the end of the fiscal year, $\beta_{t}^{end}$, is 0.072 (t-statistic of 9.31). While the average net income/daily returns coefficient is nearly identical across models, the linear coefficient model reveals a significant decline of 0.043 (t-statistic of -3.57) throughout the fiscal year capturing the current sales element of ERT. The estimate of the end of year coefficient of 0.072 captures the contribution of the expectations element of ERT. Figure 1 plots the net income/daily returns coefficient estimates for both

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11 We include this sample selection criterion in order to facilitate analyses of changes in the earnings/daily returns coefficient on earnings announcement dates (see section 5.1).
models as a function of the number of days relative to the beginning of the fiscal year. The significant change in the net income/daily returns association is evident in this figure.

The remaining columns of Table 1 summarize the results for the analyses of the sub-sample of observations with a positive annual returns (column 2), the sub-sample of observations with a negative annual returns (column 3), and the difference between the two sub-samples (column 4). For the constant coefficient model in Panel A, the estimate of the average net income/daily returns coefficient is 0.049 (t-statistic of 5.83) for positive annual return observations and 0.151 (t-statistic of 17.37) for negative annual return observations. Consistent with prior studies (e.g., Basu, 1997), the difference between these coefficient estimates is large (0.102 with at-statistic of 10.05) indicating that a greater proportion of value change over the fiscal year is recognized in current earnings when news is bad relative to when news is good.

For the linear coefficient model, for the sub-sample of observations with positive annual returns, the estimate of the coefficient at the beginning of the fiscal year is 0.073 (t-statistic of 5.35) and the estimate of the coefficient at the end of the fiscal year is 0.020 (t-statistic of 2.53). The decline in the net income/daily returns association, which reflects the current sales element of ERT is 0.053 (t-statistic of -3.51) over the fiscal year. For the sub-sample of negative annual return observations, the net income/daily returns coefficient is 0.148 (t-statistic of 13.77) at the beginning of the fiscal year and 0.158 (t-statistic of 12.78) at the end of the fiscal year. This slight increase is not statistically significant (t-statistic of 0.67) indicating that total recognized bad news does not reflect a current sales element of ERT; rather it reflects an expectations element.

In summary, the asymmetry in ERT across the positive and negative annual return partition is not completely driven by the asymmetry in the expectations element. The plot of the
net income/daily returns coefficients for both sub-samples in Figure 2 illustrates this point. The difference in the coefficient estimates at the end of the fiscal year, reflecting the asymmetry in ERT due to the *expectations element*, is larger than the average asymmetry throughout the period, which reflects the average of both components; the difference between the average asymmetry and the total asymmetry reflects the asymmetry in the *current sales element* of ERT. This illustrates how our method facilitates a focus on the cumulative effect of good/bad news of the period on the *expectations element* of net income, which appears to be the focus of many studies that follow from Basu [1997].

Table 2 replicates the analysis of Table 1, except that gross margin (GM) replaces net income as the dependent variable. For the constant coefficient model (Panel A), the average gross margin/daily returns coefficients are similar for positive annual return observations (0.178; t-statistic of 4.60) and negative annual return observations (0.175; t-statistic of 4.21). The difference across groups is -0.003 (t-statistic of -0.05).

Further analysis shows that, as predicted, the pattern of these gross margin/daily returns coefficients is very similar across positive annual return and negative annual return observations. When annual returns are positive, the gross margin/daily returns coefficient is 0.354 (t-statistic of 4.60) at the beginning of the fiscal year and 0.025 (t-statistic of 0.91) at the end of the fiscal year, which represents an annual decline of 0.319 (t-statistic of -3.56). Similarly, when annual returns are negative, the gross margin/daily returns coefficient is 0.332 (t-statistic of 5.19) at the beginning of the fiscal year and -0.022 (t-statistic of -0.55) at the end of the fiscal year reflecting an annual decline of 0.354 (t-statistic of -5.13). For both sub-samples, the gross margin/daily returns coefficient is significantly positive at the beginning of the year, but declines to a value not significantly different from zero suggesting, as we predicted, that the portion of the net
income/daily returns coefficient that changes over the fiscal year reflects the \textit{current sales component} of recognized news. In other words, news arriving on the last day of the fiscal year will not have time to be reflected in sales and associated expenses of the period, but will instead be reflected in sales and associated expenses in future periods. Figure 3 illustrates these results.

Table 3 summarizes the parameter estimates for both regression models when period expense (PE) is the dependent variable.\footnote{Since net income is equal to gross margin minus period expenses, the estimates of the coefficients in the various net income/daily returns regressions may be obtained either from the regression where net income is the dependent variable or by taking the difference between the estimates of the coefficients when gross margin is the dependent variable and the corresponding estimates of the regression coefficients when period expense is the dependent variable. Taking this perspective enables us to highlight the key features of the similarities and differences in the net income/daily returns relations when returns are positive vis-à-vis when returns are negative.} For the constant coefficient model (Panel A), the average period expense/daily returns coefficient is 0.130 (t-statistic of 3.90) when annual returns are positive and 0.025 (t-statistic of 0.62) when annual returns are negative. The difference across groups is -0.105 (t-statistic of -1.87). The observation that the average period expense/daily returns coefficient of 0.025 is not significantly different from zero when annual returns are negative is noteworthy because this appears to be inconsistent with the concept of conservative accounting (Basu, 1997). Conservative accounting would predict a stronger relation between period expenses (due to, for example, write-downs, restructuring charges) when annual returns are negative relative to when annual returns are positive. Taken at face value, these results from the constant coefficient model suggest that period expenses are not recorded in a timely fashion when the news is bad. The results from the linear coefficient model help to explain this seemingly inconsistent result.

Table 3, Panel B presents the results from estimation of the linear coefficient model with period expense as the dependent variable. For the sample of positive annual return observations, a similar pattern to the gross margin results emerges. The period expense/daily returns
coefficient declines by 0.275 (t-statistic of -3.43) from a value of 0.281 (t-statistic of 4.25) at the beginning of the fiscal year to a value of 0.006 (t-statistic of 0.15) at the end of the year. The estimate of zero for the coefficient at the end of the year suggests that none of the good news implicit in returns on the last day of the year is recognized in earnings of the year. The positive coefficient at the beginning of the year is consistent with good news recognized in sales of the current period being associated with higher expenses that are directly related to current period sales. In other words, when news for the year is good, period expenses primarily reflect the positive association with the current sales element of ERT and a negligible association with the expectations element.

For the sample of negative annual return observations, a different pattern emerges in the period expense/daily returns coefficient. The estimated period expense/daily returns coefficient is 0.184 (t-statistic of 2.98) at the beginning of the fiscal year and it declines by 0.365 (t-statistic of -5.77) to -0.180 (t-statistic of -5.02) at the end of the fiscal year. We interpret the negative coefficient at the end of the year (-0.180) as reflecting expenses that are negatively associated with expectations about future profitability (i.e., more negative news will, ceteris paribus, imply lower future sales and/or higher future expenses, leading to higher asset impairments and restructuring charges in the current period). In other words, expenses that are incurred in the current period because of changes in expectations about future profitability will be negatively correlated with news implicit in returns. This result is consistent with the notion of conservatism and underscores the main point of Basu [1997], that conservatism in accounting requires write-downs, restructuring charges, etc., when expectations about the future change in such a way that asset values decline while increases in asset value are generally not recognized in the current period.
The decline in the period expense/daily returns coefficient from a positive value (0.184) at the beginning of the year to a negative value (-0.180) at the end of the year reflects both: (1) a positive association with the current sales element of ERT (consistent with the previously discussed results for the sample of positive annual returns observations); and, (2) a negative correlation with the expectations element. The positive coefficient at the beginning of the fiscal year reflects the net of a positive 0.365 (t-statistic of 5.77) association from the current sales element and a negative 0.180 (t-statistic of -5.02) from the expectations element. Because period expenses reflect both of these elements of ERT, the average period expense/daily returns coefficient (as estimated in the constant coefficient model) masks the associations between each of these components and the news implicit in returns of the current period. Our linear coefficient model permits separation of these components. Figure 4 illustrates these results.

The effect of the bad news about future profitability, which affects the end of year period expense/daily returns coefficient will reflect news that arrives more or less randomly over the year so that we expect the coefficient relating this element of period expenses (i.e., the expectations element of the expenses) to earnings to be more or less the same throughout the year. It follows that the estimate of the coefficient on the portion of expenses that change more or less with sales of the period (i.e., current sales element) is 0.365 at the beginning of the year declining to zero at the end of the year. Interestingly, a greater portion of change in value is reflected in these current sales element when annual returns are negative than when annual returns are positive (reflected in the higher coefficient estimate at the beginning of the year for negative return observations (0.365) than for positive annual return observations (0.281)). This result is also consistent with a secondary aspect of Basu-type analyses; bad news tends to be
more transitory than good news and hence the effect on expenses that are related to sales of the period is greater when the news is bad.

5. Alternative Specifications

5.1. Changes in Earnings/daily returns Coefficients on Quarterly Earnings Announcements Days

Our interpretation of the annual earnings/daily returns coefficient is that it is the portion of the daily change in value that is captured in earnings of the period. On earnings announcement days, when the news primarily reflects the announcement of earnings and items such as sales revenue, which are closely related to earnings of the period, we may expect a different earnings/daily returns coefficient than on other days when the news is less closely related to earnings of the period. With this in mind, we modify our linear coefficient model to allow the earnings/daily returns coefficient to change on each of the four quarterly earnings announcement days within the fiscal year.\(^\text{13}\)

We note that it is possible that our observation of a decline in the earnings/daily returns coefficients over the fiscal year could be due to a much higher coefficient mapping from daily returns to earnings on earnings announcement days early in the year than on earnings announcements later in the year. Alternatively, the results, which show a decrease in the earnings/daily returns coefficient over the year, may be muted if earnings/daily returns coefficients are higher on earnings announcement days later in the year. Without further analyses we note that such a difference may be somehow due to the fact that the first earnings

\(^{13}\) Our goal in this section is to ensure our primary result is robust to potential changes in the net income/daily return coefficients on earnings announcement dates. An extensive analysis of changes in the association around earnings announcement dates in the spirit of Ball and Shivakumar [2008] may be an interesting extension of these analyses.
announcement of the fiscal year is the announcement of annual earnings of the previous year, whereas the later earnings announcements are for interim quarters within the current fiscal year.

Our analysis of the earnings/daily returns coefficients, which permits the estimate of the coefficient to change on earnings announcement days, is based on the following *linear with EA coefficient* regression model:

\[
NI_{jt} = \alpha_t + \sum_{t=0}^{251} \beta_{t\tau} \cdot ret_{jt\tau} + \varepsilon_{jt},
\]

\[
s.t. \quad \beta_{t\tau} = \beta_t^{beg} + \frac{1}{251} \cdot (\beta_t^{end} - \beta_t^{beg}) \cdot \tau + \beta_t^{q4} \cdot ea_{jt\tau}^{q4} + \beta_t^{q1} \cdot ea_{jt\tau}^{q1} + \beta_t^{q2} \cdot ea_{jt\tau}^{q2} + \beta_t^{q3} \cdot ea_{jt\tau}^{q3}.
\]

\(ea_{jt\tau}^{q4}\) is an indicator variable equal to 1 if day \(\tau\) is within a 3-day window centered on the prior fiscal year's fourth quarter earnings announcement date of firm \(j\), \(ea_{jt\tau}^{q1}\), \(ea_{jt\tau}^{q2}\) and \(ea_{jt\tau}^{q3}\) are indicator variables equal to 1 if day \(\tau\) is within a 3-day window centered on the current fiscal year's first, second, and third quarter earnings announcement dates, respectively, of firm \(j\). The estimated parameters \(\beta_t^{q4}\), \(\beta_t^{q1}\), \(\beta_t^{q2}\) and \(\beta_t^{q3}\) reflect the incremental change in the net income/daily return coefficient during each of the four quarterly earnings announcements within the fiscal year.

The results from estimation of the linear with EA coefficient model are summarized in Table 4 and illustrated in Figure 5 for the full sample of observations and Figure 6 for the sub-samples partitioned by the sign of the annual return. We first note that the estimate of the change in the net income/daily returns coefficient over the year remains significantly negative (-0.048; t-statistic of -3.00) for the sample of observations with positive annual returns and is not significantly different from zero (0.012; t-statistic of 0.72) for the sample of observations with negative annual returns. The estimates of the parameters \(\beta_t^{q4}\), \(\beta_t^{q1}\), \(\beta_t^{q2}\) and \(\beta_t^{q3}\), which capture
the incremental change in the earnings/daily returns coefficient on earnings announcement days relative to non-earnings announcement days, are positive and statistically significant at the 0.05 level. For example, the estimate of $\beta_t^{q4}$, which captures the shift in the earnings/daily returns coefficient around the first earnings announcement date for the fiscal year is 0.091 (t-statistic of 9.96) for the full sample of observations. These higher earnings/daily returns coefficients on the earnings announcement days show that the value change on the earnings announcement days (much of which may be due to the announcement of a portion of current period earnings per se) has a less persistent effect on earnings when compared to the portion of value change on non-earnings announcement days.

5.2. Change in the Variance of Daily Returns

Following Ball and Shivakumar [2008] we note that information implicit in daily returns may affect the sign of daily returns, the magnitude of daily returns, and the cross-sectional variance of daily returns. The estimates of the net income/daily returns coefficients in the previous analyses are equal to the covariance of annual net income and daily returns divided by the variance of daily returns. The mapping from earnings to daily returns is captured by the covariance rather than the variance. In order to ensure that our estimates of the changes in the daily earnings (and earnings components)/returns coefficients reflect changes in the covariance during the fiscal year rather than changes in the variance of daily returns (e.g., Ball and Shivakumar [2008] show that this variance is higher on earnings announcement days), we control for the effects of this change in variance.

Figure 7 plots the cross-sectional variances of daily returns for each day within the fiscal year. The daily return variance increases over the fiscal period (on average) for the positive annual return sample. This is consistent with the observation in Patatoukas and Thomas [2010]
that there is a positive correlation between price levels and the variance of returns. Because the variance is the denominator of the earnings/daily returns coefficient, this increasing variance may bias toward finding a decline in the earnings/daily returns coefficient over the year. Conversely, the daily return variance, for the observations with negative annual returns, decreases over the year, possibly biasing against finding a decline in the earnings/daily returns coefficient.

To control for potential influence of changes in the daily return variance throughout the fiscal year, we normalize each of the observations of daily returns by dividing by the cross-sectional standard deviation of returns on the day on which the return is calculated. We re-estimate the regressions with these normalized returns as the independent variables. We limit our analysis to observations with December fiscal year end in order to maximize (and thus better understand) the likely effect of the return variance if we do not control for differences across the year. We find that none of the conclusions from the previous analyses change if we limit our analyses to firms with December fiscal year end and that the conclusions from the analyses stand, even after we control for the considerable changes in the cross-sectional variance of daily returns.

Table 5 summarizes and Figure 8 illustrates the results from estimating the linear coefficient model with variance-normalized daily returns and net income as the dependent variable. The estimates of the net income/variance-adjusted daily returns coefficient for observations of with positive annual returns continues to decline by 0.101 (t-statistic of -2.17) over the fiscal year. For the sample of observations with negative annual returns the estimates of the net income/variance-adjusted daily returns coefficient declines slightly by 0.025 (t-statistic of 0.32), but is still not significantly different from zero. When the dependent variable is gross
margin or period expense, results from the variance-adjusted linear coefficient model are consistent with the unadjusted return results reported in Tables 2 and 3. Therefore, our previous results are not due to either to the intra-year decrease in the variance of returns for the negative annual return sample nor the intra-year increase in the variance of daily returns for the positive annual return sample.

5.3 Inclusion of Next Year Earnings in the Dependent Variable

In order to further examine the idea that news regarding sales of the year (and related expenses) that is implicit in returns at the beginning of the year will have the remainder of the year to be incorporated in earnings of the year while news at the end of the year will not be incorporated in earnings of the year, we repeat our analyses, changing the dependent variables to net income (and components of net income) for the current fiscal year plus the net income (and components of net income) for the next year (the independent variables continue to be daily returns of the fiscal year).

As expected the estimates of the two-year gross margin/daily returns coefficients are significantly higher than the estimates of the one-year gross margin/daily returns coefficients at both the beginning of the current fiscal year (the difference is 0.506 with a t-statistic of 7.71) and at the end of the current fiscal year (the difference is 0.231 with a t-statistic of 5.15) because gross income in the next year is related to returns of all days of the current fiscal year; this result is observed for both the positive annual returns and negative annual returns sub-samples.

The estimates of the two-year period expense/daily returns coefficients are also significantly higher than the estimates of the one-year period expense/daily returns coefficients at both the beginning of the current fiscal year (the difference is 0.369 with a t-statistic of 5.15) and at the end of the current fiscal year (the difference is 0.078 with a t-statistic of 1.94) for the positive annual returns sub-sample. For the negative annual returns sub-sample, the estimate of the two-year period expense/daily returns coefficient is significantly higher than the estimates of the one-year period expense daily returns coefficient at the beginning of the year (the difference is 0.243 with a t-statistic of 3.39). However,
consistent with the observation that the expectations element of period expenses is negatively correlated with returns when returns are negative, the estimate of the end-of-year two-period expense/daily returns coefficient is lower (difference of -0.115) than the estimate of the end-of-year one-period expense/daily returns coefficient, though this difference is not significantly different from zero at conventional levels of significance (t-statistic of -0.81).

5.4 Exclusion of Special Items from Period Expenses

Arguably, a more direct way of providing evidence that a negative end-of-year expense/daily returns coefficient is evidence of period expenses such as write-offs and restructuring charges taken when news is bad, would be to use, say, special items as the dependent variable in regressions (3) and (5). We do not do this because: (1) this variable is zero for the vast majority of firms and its distribution is extremely skewed; and (2) these two items capture only a portion of the expenses that are related only to future sales with no relation to current sales. That said, we observe a significantly less negative end-of-year coefficient estimate when we replace the variable that we call period expenses with this same variable purged of special items (the difference in the end-of-year coefficients is 0.033 with a t-statistic of 6.72).

5.5 An Alternate Partition: Cash Flow and Accruals

An alternate partition of earnings is that of cash flows and accruals. Arguably cash flows tend to be unaffected by accounting while accruals are, indeed, the outcome of accounting methods that are designed to provide an indicator of value change (i.e., earnings), which will not be apparent in cash flows; perhaps the best example of this is accounts receivable which capture the change in value due to a sales that has occurred but payment (cash) has not been received at the end of the accounting period. We do not use this partition because we expect both of these components of earnings to have both of the elements of ERT, whereas our results based on gross margin and period expense provide a clearer emphasis on these variables. Nevertheless, in view
of the pervasive use of this partition, we estimate regressions (2) and (3) with cash flow and accruals as the dependent variable.

Recall that the earnings/daily returns coefficient for the positive annual returns sample declines significantly from 0.073 at the beginning of the year to 0.020 at the end of the year while for the negative annual returns sample it increases insignificantly from 0.148 to 0.158. The decline in this coefficient for the positive annual returns sample is mostly manifested in a decline in the accruals/daily returns coefficient from 0.057 to 0.013 (though this decline is not significantly different from zero at conventional levels (t-statistic of -1.27). For the negative returns sample the accruals/daily returns coefficient declines insignificantly from 0.068 to 0.047 (t-statistic of -0.61) and the cash flow/daily returns coefficient increases insignificantly from 0.077 to 0.110.

6. **Summary**

Our analyses are based on regressions of annual earnings and components of annual earnings on daily returns. Our focus is on the timeliness of the incorporation of value change (i.e., change in the independent variable) in earnings; an earnings/daily returns coefficient of one implies complete recognition/incorporation of the value change in earnings while a coefficient of zero implies no recognition. We predict and show that the earnings/daily returns coefficient declines over the fiscal year consistent with the notion that news at the beginning of the year has the entire year to be incorporated in earnings while news at the end of the year is likely to have a much lesser effect on earnings of the year.

We show that much of the difference between the average coefficient relating earnings to daily returns for observations with negative annual returns and the average coefficient for
observations with positive annual return is due to period expenses (i.e., net income minus gross margin) and little of this difference is due to gross margin. Further, we show that the average period expenses/daily returns coefficient for observations with negative annual returns is not significantly different from zero. This result, which is at odds with the prediction from Basu [1997], is due to the fact that period expenses have two elements, one of which (viz., the current sales element, i.e., expenses that change with sales of the period) is positively correlated with returns while the other (viz., the expectations element, i.e., expenses associated with change in expectations about future profitability) is negatively correlated with returns.

We show that most of the difference in the earnings/return relation across observations with positive returns and observations of negative returns reflects the strong negative correlation between expenses related to changes in expectations of future profitability rather than due to expenses related to sales of the fiscal year. The correlation between these expenses and returns is negative when returns are negative and positive when returns are positive. Nevertheless, some of the difference is due to expenses related to sales of the period. These results provide some context for the vast literature that examines this difference as evidence of the timeliness of recognition of news in earnings.
References


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EASTON, P.; P. SHROFF; AND G. TAYLOR. “Permanent and Transitory Earnings, Accounting
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300.


Table 1
Estimates of Net Income (NI) / Daily Return Coefficients for Constant Coefficient and Linear Coefficient Regression Models

<table>
<thead>
<tr>
<th>Parameter</th>
<th>All Obs.</th>
<th>Positive</th>
<th>Negative</th>
<th>Neg. – Pos.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Panel A: Constant coefficient model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$ (intercept)</td>
<td>0.047</td>
<td>0.071</td>
<td>0.045</td>
<td>-0.026</td>
</tr>
<tr>
<td></td>
<td>(4.97)</td>
<td>(8.24)</td>
<td>(5.36)</td>
<td>(-6.92)</td>
</tr>
<tr>
<td>$\beta_{constant}$</td>
<td>0.091</td>
<td>0.049</td>
<td>0.151</td>
<td>0.102</td>
</tr>
<tr>
<td></td>
<td>(11.86)</td>
<td>(5.83)</td>
<td>(17.37)</td>
<td>(10.05)</td>
</tr>
<tr>
<td>Avg. Adj. R²</td>
<td>0.138</td>
<td>0.043</td>
<td>0.113</td>
<td></td>
</tr>
<tr>
<td><strong>Panel B: Linear coefficient model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$ (intercept)</td>
<td>0.047</td>
<td>0.070</td>
<td>0.046</td>
<td>-0.024</td>
</tr>
<tr>
<td></td>
<td>(5.03)</td>
<td>(8.42)</td>
<td>(5.62)</td>
<td>(-6.94)</td>
</tr>
<tr>
<td>$\beta_{beg}$</td>
<td>0.114</td>
<td>0.073</td>
<td>0.148</td>
<td>0.075</td>
</tr>
<tr>
<td></td>
<td>(10.28)</td>
<td>(5.35)</td>
<td>(13.77)</td>
<td>(5.94)</td>
</tr>
<tr>
<td>$\beta_{end}$</td>
<td>0.072</td>
<td>0.020</td>
<td>0.158</td>
<td>0.139</td>
</tr>
<tr>
<td></td>
<td>(9.31)</td>
<td>(2.53)</td>
<td>(12.78)</td>
<td>(10.79)</td>
</tr>
<tr>
<td>$\Delta \beta = \beta_{end} - \beta_{beg}$</td>
<td>-0.043</td>
<td>-0.053</td>
<td>0.010</td>
<td>0.064</td>
</tr>
<tr>
<td></td>
<td>(-3.57)</td>
<td>(-3.51)</td>
<td>(0.67)</td>
<td>(3.85)</td>
</tr>
<tr>
<td>Avg. Adj. R²</td>
<td>0.147</td>
<td>0.054</td>
<td>0.120</td>
<td></td>
</tr>
</tbody>
</table>

This table presents the mean (t-statistic) parameter estimates from the following regression model estimated annually from 1973 to 2007:

$$NI_{jt} = \alpha_t + \sum_{t=0}^{251} \beta_{t \tau} \cdot ret_{j \tau t} + \varepsilon_{jt}$$

The dependent variable, $NI_{jt}$, is firms $j$'s annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{j \tau t}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{t \tau}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. Panel A presents mean (t-statistic) parameter estimates for the constant coefficient model, which constrains $\beta_{t \tau}$ as follows:

$$\beta_{t \tau} = \beta_{t \tau}^{const} \quad \text{(Constant constraint)}$$

where $\beta_{t \tau}^{const}$ is the estimated net income / daily return coefficient for all days in the fiscal year $t$. Panel B presents mean (t-statistic) parameter estimates for the linear coefficient model, which constrains $\beta_{t \tau}$ as follows:

$$\beta_{t \tau} = \beta_{t \tau}^{beg} + \frac{1}{251} \left( \beta_{t \tau}^{end} - \beta_{t \tau}^{beg} \right) \cdot \tau \quad \text{(Linear constraint)}$$

where $\beta_{t \tau}^{beg}$ ($\beta_{t \tau}^{end}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Column 1 summarizes parameter estimates for the entire sample of 74,029 observations. Column 2 presents parameter estimates for the subsample of 41,706 observations with a positive fiscal year return ($\sum_{t=0}^{251} ret_{j \tau t} \geq 0$). Column 3 presents parameter estimates for the subsample of 32,323 observations with a negative fiscal year return ($\sum_{t=0}^{251} ret_{j \tau t} < 0$). Column 4 presents the incremental difference between columns 2 and 3.
Table 2

Estimates of Gross Margin (GM) / Daily Return Coefficients for Constant Coefficient and Linear Coefficient Regression Models

<table>
<thead>
<tr>
<th>Parameter</th>
<th>All Obs.</th>
<th>Positive</th>
<th>Negative</th>
<th>Neg. – Pos.</th>
</tr>
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<tr>
<td><strong>Panel A: Constant coefficient model</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$ (intercept)</td>
<td>0.646</td>
<td>0.685</td>
<td>0.613</td>
<td>-0.073</td>
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<tr>
<td></td>
<td>(14.95)</td>
<td>(15.22)</td>
<td>(15.79)</td>
<td>(-5.26)</td>
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<tr>
<td>$\beta^{\text{constant}}$</td>
<td>0.251</td>
<td>0.178</td>
<td>0.175</td>
<td>-0.003</td>
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<td></td>
<td>(6.79)</td>
<td>(4.60)</td>
<td>(4.21)</td>
<td>(-0.05)</td>
</tr>
<tr>
<td>Avg. Adj. $R^2$</td>
<td>0.043</td>
<td>0.023</td>
<td>0.018</td>
<td></td>
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<tr>
<td><strong>Panel B: Linear coefficient model</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>$\alpha$ (intercept)</td>
<td>0.642</td>
<td>0.675</td>
<td>0.607</td>
<td>-0.068</td>
</tr>
<tr>
<td></td>
<td>(15.15)</td>
<td>(15.44)</td>
<td>(15.88)</td>
<td>(-4.78)</td>
</tr>
<tr>
<td>$\beta^{\text{beg}}$</td>
<td>0.437</td>
<td>0.354</td>
<td>0.332</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>(7.08)</td>
<td>(4.60)</td>
<td>(5.19)</td>
<td>(-0.24)</td>
</tr>
<tr>
<td>$\beta^{\text{end}}$</td>
<td>-0.018</td>
<td>0.025</td>
<td>-0.022</td>
<td>-0.047</td>
</tr>
<tr>
<td></td>
<td>(-0.97)</td>
<td>(0.91)</td>
<td>(-0.55)</td>
<td>(-1.11)</td>
</tr>
<tr>
<td>$\Delta \beta = \beta^{\text{end}} - \beta^{\text{beg}}$</td>
<td>-0.455</td>
<td>-0.329</td>
<td>-0.354</td>
<td>-0.026</td>
</tr>
<tr>
<td></td>
<td>(-4.82)</td>
<td>(-3.56)</td>
<td>(-5.13)</td>
<td>(-0.45)</td>
</tr>
<tr>
<td>Avg. Adj. $R^2$</td>
<td>0.053</td>
<td>0.032</td>
<td>0.032</td>
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</tr>
</tbody>
</table>

This table presents the mean (t-statistic) parameter estimates from the following regression model estimated annually from 1973 to 2007:

$$GM_{jt} = \alpha_{t} + \sum_{\tau=0}^{251} \beta_{\tau} \cdot ret_{jt\tau} + \epsilon_{jt}$$

The dependent variable, $GM_{jt}$, is firms $j$’s annual gross margin (i.e., sales less cost of goods sold) in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{jt\tau}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_{t}$ is the regression intercept and $\beta_{\tau}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal periods ending in year $t$. Panel A presents mean (t-statistic) parameter estimates for the constant coefficient model, which constrains $\beta_{\tau}$ as follows:

$$\beta_{\tau}^{\text{const}} = \beta_{\tau}^{\text{beg}}$$  \hspace{1cm} (Constant constraint)

where $\beta_{\tau}^{\text{const}}$ is the estimated net income/daily return coefficient for all days in the fiscal year $t$. Panel B presents mean (t-statistic) parameter estimates for the linear coefficient model, which constrains $\beta_{\tau}$ as follows:

$$\beta_{\tau} = \beta_{\tau}^{\text{beg}} + \frac{1}{251} \left( \beta_{\tau}^{\text{end}} - \beta_{\tau}^{\text{beg}} \right) \cdot \tau$$  \hspace{1cm} (Linear constraint)

where $\beta_{\tau}^{\text{beg}}$ ($\beta_{\tau}^{\text{end}}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Column 1 summarizes parameter estimates for the entire sample of 74,029 observations. Column 2 presents parameter estimates for the subsample of 41,706 observations with a positive fiscal year return ($\sum_{\tau=0}^{251} ret_{jt\tau} \geq 0$). Column 3 presents parameter estimates for the subsample of 32,323 observations with a negative fiscal year return ($\sum_{\tau=0}^{251} ret_{jt\tau} < 0$). Column 4 presents the incremental difference between columns 2 and 3.
### Table 3
Estimates of Period Expense (PE) / Daily Return Coefficients for Constant Coefficient and Linear Coefficient Regression Models

<table>
<thead>
<tr>
<th>Parameter</th>
<th>All Obs.</th>
<th>Positive</th>
<th>Negative</th>
<th>Neg. – Pos.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Constant coefficient model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$ (intercept)</td>
<td>0.599</td>
<td>0.614</td>
<td>0.568</td>
<td>-0.047</td>
</tr>
<tr>
<td></td>
<td>(17.07)</td>
<td>(16.33)</td>
<td>(17.69)</td>
<td>(-3.57)</td>
</tr>
<tr>
<td>$\beta_{\text{constant}}$</td>
<td>0.160</td>
<td>0.130</td>
<td>0.025</td>
<td>-0.105</td>
</tr>
<tr>
<td></td>
<td>(5.07)</td>
<td>(3.90)</td>
<td>(0.62)</td>
<td>(-1.87)</td>
</tr>
<tr>
<td>Avg. Adj. $R^2$</td>
<td>0.022</td>
<td>0.018</td>
<td>0.004</td>
<td></td>
</tr>
</tbody>
</table>

| **Panel B: Linear coefficient model** |          |          |          |             |
| $\alpha$ (intercept)       | 0.595    | 0.605    | 0.561    | -0.044      |
|                           | (17.22)  | (16.48)  | (17.72)  | (-3.21)     |
| $\beta_{\text{beg}}$      | 0.323    | 0.281    | 0.184    | -0.097      |
|                           | (6.09)   | (4.25)   | (2.98)   | (-1.15)     |
| $\beta_{\text{end}}$      | -0.090   | 0.006    | -0.180   | -0.186      |
|                           | (-1.83)  | (0.15)   | (-5.02)  | (-3.96)     |
| $\Delta \beta = \beta_{\text{end}} - \beta_{\text{beg}}$ | -0.417   | -0.275   | -0.365   | -0.089      |
|                           | (-4.76)  | (-3.43)  | (-5.77)  | (-1.20)     |
| Avg. Adj. $R^2$            | 0.030    | 0.025    | 0.017    |             |

This table presents the mean (t-statistic) parameter estimates from the following regression model estimated annually from 1973 to 2007:

$$PE_{ijt} = \alpha_t + \sum_{\tau=0}^{251} \beta_{t} \cdot r_{j\tau t} + \varepsilon_{ijt}$$

The dependent variable, $PE_{ijt}$, is firms $j$’s annual period expenses (equal to net income less gross margin) in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $r_{j\tau t}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{t}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal periods ending in year $t$. Panel A presents mean (t-statistic) parameter estimates for the constant coefficient model, which constrains $\beta_{t}$ as follows:

$$\beta_{t} = \beta_{t}^{\text{const}} \quad (\text{Constant constraint})$$

where $\beta_{t}^{\text{const}}$ is the estimated net income / daily return coefficient for all days in the fiscal year $t$. Panel B presents mean (t-statistic) parameter estimates for the linear coefficient model, which constrains $\beta_{t}$ as follows:

$$\beta_{t} = \beta_{t}^{\text{beg}} + \frac{1}{251} \left( \beta_{t}^{\text{end}} - \beta_{t}^{\text{beg}} \right) \cdot \tau \quad (\text{Linear constraint})$$

where $\beta_{t}^{\text{beg}}$ ($\beta_{t}^{\text{end}}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Column 1 summarizes parameter estimates for the entire sample of 74,029 observations. Column 2 presents parameter estimates for the subsample of 41,706 observations with a positive fiscal year return ($\sum_{\tau=0}^{251} r_{j\tau t} \geq 0$). Column 3 presents parameter estimates for the subsample of 32,323 observations with a negative fiscal year return ($\sum_{\tau=0}^{251} r_{j\tau t} < 0$). Column 4 presents the incremental difference between Column 2 and 3.
Table 4: Estimates of Net Income (NI) / Daily Return Coefficients for Linear with Earnings Announcements (EA) Coefficient Regression Model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>All Obs.</th>
<th>Positive</th>
<th>Negative</th>
<th>Neg. – Pos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha$ (intercept)</td>
<td>0.047</td>
<td>0.070</td>
<td>0.047</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>(5.18)</td>
<td>(8.59)</td>
<td>(5.80)</td>
<td>(-6.87)</td>
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<tr>
<td>$\beta^{beg}$</td>
<td>0.101</td>
<td>0.061</td>
<td>0.140</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td>(9.15)</td>
<td>(4.51)</td>
<td>(12.70)</td>
<td>(6.38)</td>
</tr>
<tr>
<td>$\beta^{end}$</td>
<td>0.065</td>
<td>0.013</td>
<td>0.152</td>
<td>0.138</td>
</tr>
<tr>
<td></td>
<td>(8.37)</td>
<td>(1.53)</td>
<td>(11.91)</td>
<td>(10.32)</td>
</tr>
<tr>
<td>$\beta^{en,q4}$</td>
<td>0.091</td>
<td>0.105</td>
<td>0.065</td>
<td>-0.041</td>
</tr>
<tr>
<td></td>
<td>(9.96)</td>
<td>(12.33)</td>
<td>(4.60)</td>
<td>(-3.45)</td>
</tr>
<tr>
<td>$\beta^{en,q1}$</td>
<td>0.096</td>
<td>0.092</td>
<td>0.082</td>
<td>-0.010</td>
</tr>
<tr>
<td></td>
<td>(10.63)</td>
<td>(8.89)</td>
<td>(4.91)</td>
<td>(-0.53)</td>
</tr>
<tr>
<td>$\beta^{en,q2}$</td>
<td>0.086</td>
<td>0.096</td>
<td>0.078</td>
<td>-0.018</td>
</tr>
<tr>
<td></td>
<td>(7.58)</td>
<td>(7.61)</td>
<td>(3.36)</td>
<td>(-0.88)</td>
</tr>
<tr>
<td>$\beta^{en,q3}$</td>
<td>0.055</td>
<td>0.056</td>
<td>0.038</td>
<td>-0.018</td>
</tr>
<tr>
<td></td>
<td>(5.68)</td>
<td>(6.12)</td>
<td>(1.93)</td>
<td>(-0.91)</td>
</tr>
<tr>
<td>$\Delta \beta = \beta^{end} - \beta^{beg}$</td>
<td>-0.037</td>
<td>-0.048</td>
<td>0.012</td>
<td>0.059</td>
</tr>
<tr>
<td></td>
<td>(-3.01)</td>
<td>(-3.00)</td>
<td>(0.72)</td>
<td>(3.49)</td>
</tr>
<tr>
<td>Avg. Adj. $R^2$</td>
<td>0.164</td>
<td>0.082</td>
<td>0.131</td>
<td></td>
</tr>
</tbody>
</table>

This table presents the mean (t-statistic) parameter estimates from the following regression model estimated annually from 1973 to 2007:

$$ NI_{jt} = \alpha_t + \sum_{t=0}^{251} \beta_t^* \cdot ret_{jtt} + \epsilon_{jt} $$

The dependent variable, $NI_{jt}$, is firm $j$’s annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{jtt}$ is the daily stock return of firm $j$ on day $t$, where $t$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_t^*$ is the net income/daily return coefficient on day $t$ estimated for firms with annual fiscal period ending in year $t$. The net income/daily return coefficient is constrained as follows:

$$ \beta_t^* = \beta_{t}^{beg} + \frac{1}{251} \left( \beta_{t}^{end} - \beta_{t}^{beg} \right) \cdot \tau + \beta_{t}^{q4} \cdot ea_{jtq4} + \beta_{t}^{q1} \cdot ea_{jtq1} + \beta_{t}^{q2} \cdot ea_{jtq2} + \beta_{t}^{q3} \cdot ea_{jtq3} $$

where $ea_{jtq4}$ is an indicator variable equal to 1 if day $t$ is within a 3-day window centered on the prior fiscal year’s fourth quarter earnings announcement date of firm $j$. $ea_{jtq1}$, $ea_{jtq2}$ and $ea_{jtq3}$ are indicator variables equal to 1 if day $t$ is within a 3-day window centered on the current fiscal year’s first, second, and third quarter earnings announcement dates, respectively, of firm $j$. $\beta_{t}^{beg}$ ($\beta_{t}^{end}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. $\beta_{t}^{q4}$ is the estimated incremental net income / daily return coefficient on the 3-days centered on the prior fiscal year's fourth quarter earnings announcement date of firm $j$. $\beta_{t}^{q1}$, $\beta_{t}^{q2}$ and $\beta_{t}^{q3}$ are the estimated incremental net income / daily return coefficient on the 3-days centered on the current fiscal year's first, second, and third quarter earnings announcement dates, respectively, of firm $j$. Column 1 summarizes parameter estimates for the entire sample of 74,029 observations. Column 2 presents parameter estimates for the subsample of 41,706 observations with a positive fiscal year return ($\sum_{t=0}^{251} ret_{jtt} \geq 0$). Column 3 presents parameter estimates for the subsample of 32,323 observations with a negative fiscal year return ($\sum_{t=0}^{251} ret_{jtt} < 0$). Column 4 presents the incremental difference between Column 2 and 3.
Table 5
Estimates of Net Income (NI) / Variance-adjusted Daily Return Coefficients
Constant Coefficient and Linear Coefficient Regression Models

<table>
<thead>
<tr>
<th>Sign of Annual Return</th>
<th>All Obs.</th>
<th>Positive</th>
<th>Negative</th>
<th>Neg. – Pos.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Constant coefficient model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$ (intercept)</td>
<td>0.054</td>
<td>0.081</td>
<td>0.005</td>
<td>-0.076</td>
</tr>
<tr>
<td></td>
<td>(4.97)</td>
<td>(7.95)</td>
<td>(0.50)</td>
<td>(-14.73)</td>
</tr>
<tr>
<td>$\beta_{\text{constant}}$</td>
<td>0.299</td>
<td>0.162</td>
<td>0.462</td>
<td>0.300</td>
</tr>
<tr>
<td></td>
<td>(11.31)</td>
<td>(6.16)</td>
<td>(10.74)</td>
<td>(5.93)</td>
</tr>
<tr>
<td>Avg. Adj. $R^2$</td>
<td>0.139</td>
<td>0.047</td>
<td>0.112</td>
<td></td>
</tr>
</tbody>
</table>

| **Panel B: Linear coefficient model** |         |          |          |             |
| $\alpha$ (intercept) | 0.054   | 0.081    | 0.005    | -0.076      |
|                        | (4.97)  | (7.95)   | (0.50)   | (-14.73)    |
| $\beta_{\text{beg}}$ | 0.360   | 0.214    | 0.472    | 0.258       |
|                        | (8.53)  | (4.85)   | (6.38)   | (3.01)      |
| $\beta_{\text{end}}$ | 0.235   | 0.113    | 0.448    | 0.335       |
|                        | (8.52)  | (4.54)   | (10.42)  | (7.86)      |
| $\Delta \beta = \beta_{\text{end}} - \beta_{\text{beg}}$ | -0.124  | -0.101   | -0.025   | 0.076       |
|                        | (-2.57) | (-2.17)  | (-0.32)  | (0.92)      |
| Avg. Adj. $R^2$ | 0.147   | 0.058    | 0.120    |             |

This table presents the mean (t-statistic) parameter estimates from the following regression model estimated annually from 1973 to 2007:

$$ NI_{jt} = \alpha_t + \sum_{\tau=0}^{251} \beta_{t\tau} \cdot \text{ret}_{jt\tau}^{adj} + \varepsilon_{jt} $$

The dependent variable, $NI_{jt}$, is firms’ annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $\text{ret}_{jt\tau}^{adj}$ is a variance-adjusted daily return of firm $j$ on day $\tau$ within fiscal year $t$ equal to $\text{ret}_{jt\tau} / \sigma_{t\tau}$, where $\text{ret}_{jt\tau}$ is the daily return of firm $j$ on day $\tau$ and $\sigma_{t\tau}$ is the cross-sectional standard deviation of daily returns on day $\tau$ for all firms with a fiscal year ending in year $t$. $\alpha_t$ is the regression intercept and $\beta_{t\tau}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. Panel A presents mean (t-statistic) parameter estimates for the constant coefficient model, which constrains $\beta_{t\tau}$ as follows:

$$ \beta_{t\tau} = \beta_{t\tau}^{\text{const}} $$

(Constant constraint)

where $\beta_{t\tau}^{\text{const}}$ is the estimated net income/daily return coefficient for all days in the fiscal year $t$. Panel B presents mean (t-statistic) parameter estimates for the linear coefficient model, which constrains $\beta_{t\tau}$ as follows:

$$ \beta_{t\tau} = \beta_{t\tau}^{\text{beg}} + \frac{1}{251} \left( \beta_{t\tau}^{\text{end}} - \beta_{t\tau}^{\text{beg}} \right) \cdot \tau $$

(Linear constraint)

where $\beta_{t\tau}^{\text{beg}}$ ($\beta_{t\tau}^{\text{end}}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Column 1 summarizes parameter estimates for the entire sample of 44,216 observations with a fiscal year ending in December. Column 2 presents parameter estimates for the subsample of 26,096 observations with a positive fiscal year return ($\sum_{\tau=0}^{251} \text{ret}_{jt\tau}^{adj} \geq 0$). Column 3 presents parameter estimates for the subsample of 18,120 observations with a negative fiscal year return ($\sum_{\tau=0}^{251} \text{ret}_{jt\tau}^{adj} < 0$). Column 4 presents the incremental difference between Column 2 and 3.
Estimates of Net Income (NI) / Daily Return Coefficients for Constant Coefficient and Linear Coefficient Regression Models

This figure plots the annual time series mean of the net income/daily return coefficient estimate, $\beta_t$, as a function of the number of trading days relative to the first day of the current fiscal year, $\tau$. The annual time series of coefficients are from the following regression model estimated annually from 1973 to 2007:

$$ NI_{jt} = \alpha_t + \sum_{t=0}^{251} \beta_{tt} \cdot ret_{jtt} + \varepsilon_{jt} $$

The dependent variable, $NI_{jt}$, is firm $j$’s annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{jtt}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{tt}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. The constant coefficient model constrains $\beta_{tt}$ to be constant throughout the fiscal year as follows:

$$ \beta_{tt} = \beta_t^{const} \quad (\text{Constant constraint}) $$

where $\beta_t^{const}$ is the estimated net income/daily return coefficient for all days in the fiscal year $t$. The linear coefficient model constrains $\beta_{tt}$ to be a linear function of the number of trading days relative to the first day of the fiscal year, $\tau$, as follows:

$$ \beta_{tt} = \beta_t^{beg} + \frac{1}{251} \cdot (\beta_t^{end} - \beta_t^{beg}) \cdot \tau \quad (\text{Linear constraint}) $$

where $\beta_t^{beg}$ ($\beta_t^{end}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. 
Estimates of Net Income (NI) / Daily Return Coefficients for Constant Coefficient and Linear Coefficient Regression Models Partitioned by the Sign of the Annual Return of the Fiscal Year

This figure plots the annual time series mean of the net income/daily return coefficient estimate, $\beta_t$, as a function of the number of trading days relative to the first day of the current fiscal year, $\tau$. The annual time series of coefficients are from the following regression model estimated annually from 1973 to 2007:

$$NI_{jt} = \alpha_t + \sum_{\tau=0}^{251} \beta_{tt} \cdot ret_{j\tau} + \epsilon_{jt}$$

The dependent variable, $NI_{jt}$, is firm $j$'s annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{j\tau}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{tt}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. The constant coefficient model constrains $\beta_{tt}$ to be constant throughout the fiscal year as follows:

$$\beta_{tt} = \beta_{t}^{const} \quad \text{(Constant constraint)}$$

where $\beta_{t}^{const}$ is the estimated net income / daily return coefficient for all days in the fiscal year $t$. The linear coefficient model constrains $\beta_{tt}$ to be a linear function of the number of trading days relative to the first day of the fiscal year, $\tau$, as follows:

$$\beta_{tt} = \beta_{t}^{beg} + \frac{1}{251} \cdot (\beta_{t}^{end} - \beta_{t}^{beg}) \cdot \tau \quad \text{(Linear constraint)}$$

where $\beta_{t}^{beg}$ ($\beta_{t}^{end}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Both models are estimated separately for a subsample of 41,706 observations with a positive fiscal year return ($\sum_{\tau=0}^{251} ret_{j\tau} \geq 0$) and a subsample of 32,323 observations with a negative fiscal year return ($\sum_{\tau=0}^{251} ret_{j\tau} < 0$).
Figure 3
Estimates of Gross Margin (GM) / Daily Return Coefficients for Constant Coefficient and Linear Coefficient Regression Models Partitioned by the Sign of the Annual Return of the Fiscal Year

This figure plots the annual time series mean of the gross margin/daily return coefficient estimate, $\beta_t$, as a function of the number of trading days relative to the first day of the current fiscal year, $\tau$. The annual time series of coefficients are from the following regression model estimated annually from 1973 to 2007:

$$GM_{jt} = \alpha_t + \sum_{\tau=0}^{251} \beta_{\tau} \cdot ret_{j \tau t} + \epsilon_{jt}$$

The dependent variable, $GM_{jt}$, is firm $j$’s annual gross margin (i.e., sales less cost of goods sold) in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{j \tau t}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{\tau}$ is the gross margin/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. The constant coefficient model constrains $\beta_{\tau}$ to be constant throughout the fiscal year as follows:

$$\beta_{\tau} = \beta_{\tau}^{const} \quad \text{(Constant constraint)}$$

where $\beta_{\tau}^{const}$ is the estimated gross margin/daily return coefficient for all days in the fiscal year $t$. The Linear coefficient model constrains $\beta_{\tau}$ to be a linear function of the number of trading days relative to the first day of the fiscal year, $\tau$, as follows:

$$\beta_{\tau} = \beta_{\tau}^{beg} + \frac{1}{251} \left( \beta_{\tau}^{end} - \beta_{\tau}^{beg} \right) \cdot \tau \quad \text{(Linear constraint)}$$

where $\beta_{\tau}^{beg}$ ($\beta_{\tau}^{end}$) is the estimated gross margin/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Both models are separately estimated for a subsample of 41,706 observations with a positive fiscal year return ($\sum_{\tau=0}^{251} ret_{j \tau t} \geq 0$) and a subsample of 32,323 observations with a negative fiscal year return ($\sum_{\tau=0}^{251} ret_{j \tau t} < 0$).
Figure 4

Estimates of Period Expense (PE) / Daily Return Coefficients for Constant Coefficient and Linear Coefficient Regression Models Partitioned by the Sign of the Annual Return of the Fiscal Year

This figure plots the annual time series mean of the period expense/daily return coefficient estimate, $\beta_t$, as a function of the number of trading days relative to the first day of the current fiscal year, $\tau$. The annual time series of coefficients are from the following regression model estimated annually from 1973 to 2007:

$$PE_{jt} = \alpha_t + \sum_{t=0}^{251} \beta_{t\tau} \cdot ret_{jt\tau} + \epsilon_{jt}$$

The dependent variable, $PE_{jt}$, is firms $j$'s annual period expenses (i.e., net income less gross margin) in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{jt\tau}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{t\tau}$ is the period expenses/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. The constant coefficient model constrains $\beta_{t\tau}$ to be constant throughout the fiscal year as follows:

$$\beta_{t\tau} = \beta_{t\tau}^{const} \quad (\text{Constant constraint})$$

where $\beta_{t\tau}^{const}$ is the estimated period expense/daily return coefficient for all days in the fiscal year $t$. The linear coefficient model constrains $\beta_{t\tau}$ to be a linear function of the number of trading days relative to the first day of the fiscal year, $\tau$, as follows:

$$\beta_{t\tau} = \beta_{t\tau}^{beg} + \frac{1}{251} \cdot (\beta_{t\tau}^{end} - \beta_{t\tau}^{beg}) \cdot \tau \quad (\text{Linear constraint})$$

where $\beta_{t\tau}^{beg}$ ($\beta_{t\tau}^{end}$) is the estimated period expense/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Both models are estimated separately for a subsample of 41,706 observations with a positive fiscal year return ($\sum_{\tau=0}^{251} ret_{jt\tau} \geq 0$) and a subsample of 32,323 observations with a negative fiscal year return ($\sum_{\tau=0}^{251} ret_{jt\tau} < 0$).
Figure 5
Estimates of Net Income (NI) / Daily Return Coefficients for Unconstrained, Linear and Linear with Earnings Announcement (EA) Coefficient Regression Models

This figure plots the annual time series mean of the net income/daily return coefficient estimate, $\beta_t$, as a function of the number of trading days relative to the first day of the current fiscal year, $\tau$. The annual time series of coefficients are from the following regression model estimated annually from 1973 to 2007:

$$NI_{jt} = \alpha_t + \sum_{t=0}^{251} \beta_{t\tau} \cdot ret_{jt\tau} + \epsilon_{jt}$$

The dependent variable, $NI_{jt}$, is firms $j$'s annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{jt\tau}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{t\tau}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. The linear coefficient model constrains $\beta_{t\tau}$ as follows:

$$\beta_{t\tau} = \beta_t^{beg} + \frac{1}{251} \cdot (\beta_t^{end} - \beta_t^{beg}) \cdot \tau$$

(Linear constraint)

where $\beta_t^{beg}$ ($\beta_t^{end}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. The linear with EA coefficient model constrains $\beta_{t\tau}$ as follows:

$$\beta_{t\tau} = \beta_t^{beg} + \frac{1}{251} \cdot (\beta_t^{end} - \beta_t^{beg}) \cdot \tau + \beta_t^{q4} \cdot ea_{jtq4} + \beta_t^{q1} \cdot ea_{jtq1} + \beta_t^{q2} \cdot ea_{jtq2} + \beta_t^{q3} \cdot ea_{jtq3}$$

(Linear with EA constraint)

where $ea_{jtq4}$ is an indicator variable equal to 1 if day $\tau$ is within a 3-day window centered on the prior fiscal year's fourth quarter earnings announcement date of firm $j$. $ea_{jtq1}$, $ea_{jtq2}$ and $ea_{jtq3}$ are indicator variables equal to 1 if day $\tau$ is within a 3-day window centered on the current fiscal year's first, second, and third quarter earnings announcement dates, respectively, of firm $j$. $\beta_t^{beg}$ ($\beta_t^{end}$) is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. $\beta_t^{q4}$ is the estimated incremental net income/daily return coefficient on the 3-days centered on the prior fiscal year's fourth quarter earnings announcement date of firm $j$. $\beta_t^{q1}$, $\beta_t^{q2}$ and $\beta_t^{q3}$ are the estimated incremental net income/daily return coefficient on the 3-days centered on the current fiscal year's first, second, and third quarter earnings announcement dates, respectively, of firm $j$. 

Number of Trading Days Relative to First Day of the Fiscal Year, $\tau$
This figure plots the annual time series mean of the net income/daily return coefficient estimate, $\beta_t$, as a function of the number of trading days relative to the first day of the current fiscal year, $\tau$. The annual time series of coefficients are from the following regression model estimated annually from 1973 to 2007:

$$NI_{jt} = \alpha_t + \sum_{\tau=0}^{251} \beta_{\tau} \cdot ret_{j\tau} + \epsilon_{jt}$$

The dependent variable, $NI_{jt}$, is firms $j$’s annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{j\tau}$ is the daily stock return of firm $j$ on day $\tau$, where $\tau$ is the number of trading days relative to the first day of fiscal year $t$. $\alpha_t$ is the regression intercept and $\beta_{\tau}$ is the net income/daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. The linear coefficient model constrains $\beta_{\tau}$ as follows:

$$\beta_{\tau} = \beta_{t}^{beg} \cdot \tau$$

where $\beta_{t}^{beg}$ is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. The linear with EA coefficient model constrains $\beta_{\tau}$ as follows:

$$\beta_{\tau} = \beta_{t}^{beg} \cdot \tau + \frac{1}{251} \cdot \left( \beta_{t}^{end} - \beta_{t}^{beg} \right) + \beta_{t}^{q4} \cdot ea_{j\tau}^{q4} + \beta_{t}^{q1} \cdot ea_{j\tau}^{q1} + \beta_{t}^{q2} \cdot ea_{j\tau}^{q2} + \beta_{t}^{q3} \cdot ea_{j\tau}^{q3}$$

where $ea_{j\tau}^{q4}$ is an indicator variable equal to 1 if day $\tau$ is within a 3-day window centered on the prior fiscal year's fourth quarter earnings announcement date of firm $j$. $ea_{j\tau}^{q1}$, $ea_{j\tau}^{q2}$ and $ea_{j\tau}^{q3}$ are indicator variables equal to 1 if day $\tau$ is within a 3-day window centered on the current fiscal year's first, second, and third quarter earnings announcement dates, respectively, of firm $j$. $\beta_{t}^{beg}$ is the estimated net income/daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. $\beta_{t}^{q4}$ is the estimated incremental net income/daily return coefficient on the 3-days centered on the prior fiscal year's fourth quarter earnings announcement date of firm $j$. $\beta_{t}^{q1}$, $\beta_{t}^{q2}$ and $\beta_{t}^{q3}$ are the estimated incremental net income/daily return coefficient on the 3-days centered on the current fiscal year's first, second, and third quarter earnings announcement dates, respectively, of firm $j$. Each model estimated separately for a subsample of 41,706 observations with a positive fiscal year return ($\sum_{\tau=0}^{251} ret_{j\tau} \geq 0$) and a subsample of 32,323 observations with a negative fiscal year return ($\sum_{\tau=0}^{251} ret_{j\tau} < 0$).
Figure 7
Standard Deviation of Daily Returns:
Unconditional and Partitioned by the Sign of the Fiscal Year Return

This figure plots the standard deviation of daily returns, $\sigma_x$, as a function of the number of trading days, $\tau$, relative to the first day of the fiscal year. $\sigma_x$ is the annual time series average of $\sigma_{\tau x}$, which is the cross-sectional standard deviation of daily returns on day $\tau$ for all firms with a fiscal year ending in December of year $t$. 
This figure plots the annual time series mean of the net income/variance-adjusted daily return coefficient estimate, $\beta_t$, as a function of the number of trading days relative to the first day of the current fiscal year, $\tau$. The annual time series of coefficients are from the following regression model estimated annually from 1973 to 2007:

$$NI_{jt} = \alpha_t + \sum_{\tau=0}^{251} \beta_{t\tau} \cdot ret_{adj}^{jt} + \epsilon_{jt}$$

The dependent variable, $NI_{jt}$, is firm $j$'s annual net income in fiscal year $t$ scaled by stock price at the beginning of fiscal year $t$. $ret_{adj}^{jt}$ is a variance-adjusted daily return of firm $j$ on day $\tau$ within fiscal year $t$ equal to $ret_{jt}/\sigma_{jt}$, where $ret_{jt}$ is the daily return of firm $j$ on day $\tau$ and $\sigma_{jt}$ is the cross-sectional standard deviation of returns on day $\tau$ for all firms with a fiscal year ending in year $t$. $\alpha_t$ is the regression intercept and $\beta_{t\tau}$ is the net income/variance-adjusted daily return coefficient on day $\tau$ estimated for firms with annual fiscal period ending in year $t$. The constant coefficient model constrains $\beta_{t\tau}$ to be constant throughout the fiscal year as follows:

$$\beta_{t\tau} = \beta^\text{const}_t$$

(Constant constraint)

where $\beta^\text{const}_t$ is the estimated net income/variance-adjusted daily return coefficient for all days in the fiscal year $t$. The linear coefficient model constrains $\beta_{t\tau}$ to be a linear function of the number of trading days relative to the first day of the fiscal year, $\tau$, as follows:

$$\beta_{t\tau} = \beta_t^{beg} + \frac{1}{251} \cdot (\beta_t^{end} - \beta_t^{beg}) \cdot \tau$$

(Linear constraint)

where $\beta_t^{beg}$ ($\beta_t^{end}$) is the estimated net income / variance-adjusted daily return coefficient on first (last) day of the annual fiscal period ending in year $t$. Both models are estimated separately for a subsample of 26,096 observations with a positive fiscal year return ($\Sigma_{\tau=0}^{251} ret_{jt} \geq 0$) and a subsample of 18,120 observations with a negative fiscal year return ($\Sigma_{\tau=0}^{251} ret_{jt} < 0$).