Do Dividends Convey Information About Future Earnings?[*]

Charles Ham[†]

Zachary Kaplan[‡]

Mark Leary[§]

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[†] Washington University in St. Louis, cham@wustl.edu

[‡] Washington University in St. Louis, zrkaplan@wustl.edu

[§] Washington University in St. Louis and NBER, leary@wustl.edu

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Abstract

Yes. Using an "event window approach" which compares earnings after dividend changes to those before we show dividend changes predict unexpected future earnings for horizons up to three years after the dividend change. We also show that there is heterogeneity in the firms' commitment to maintain the dividend and this affects the persistence of the earnings change forecasted by the dividend. Large dividend increases and decreases are maintained less frequently, discounted by the market, and associated with more transitory earnings changes. Smaller dividend increases constitute a firmer commitment to future payout and forecast highly persistent earnings changes. Our results suggest the market reaction to dividend changes reflects, at least in part, new information about future earnings conveyed by the announcement.

1. Introduction

Miller and Modigliani (1961) show that in frictionless markets, firm value is unaffected by dividend policy. Yet, market prices react sharply to dividend changes.[5] A large literature has attempted to identify the frictions generating these market reactions. Early studies speculated markets react to dividend changes because managers use their private information about future profitability in setting the dividend, and investors update their expectations in response (Miller and Modigliani 1961; Bhattacharya 1979; Miller and Rock 1985). However, the empirical evidence has challenged the notion that dividend changes provide incremental information about future realized earnings. Recent studies have found little evidence that dividend changes predict future earnings changes in the same direction. To the extent that some relation with future earnings has been documented, it tends to be only short-lived, seemingly in contrast to the perceived long-term commitment of dividend levels (Brav et al., 2005). As a result, the current consensus in the literature is that the friction leading to the value relevance of dividends lies elsewhere, either in agency costs of free cash flow, investor preferences, or information about risk (Easterbrook 1984; Jensen 1986; Baker and Wurgler, 2004; Grullon et al., 2002; Michaely et al., 2017).[6]

In this paper, we re-examine the information content hypothesis and provide the first robust evidence that dividends contain highly persistent information about future earnings. Three key elements of our empirical design drive the difference between our conclusions and those of prior

[5] Numerous studies document significant stock price reactions to announcements of dividend changes (e.g., Pettit 1972; Aharony and Swary 1980).

[6] The current consensus in review articles is that dividends do not contain information about future earnings. DeAngelo, DeAngelo and Skinner (2009) state "Researchers have struggled to find evidence that dividend increases are reliable signals of future earnings increases" (p. 185), Allen and Michaely (2003) conclude that "the overall accumulated evidence does not support the assertion that dividend changes convey information about future earnings" (p. 73). Kalay and Lemmon (2011) state "In short, there is little evidence that changes in dividends predict future changes in earnings."

studies. First, we delineate more sharply the timing of earnings relative to dividend announcements. Specifically, we calculate future earnings changes using an "event window" approach, in which we compare earnings announced after the dividend change to earnings in the comparable period before the dividend change. This contrasts with the "fiscal year" approach used in prior studies, which groups dividends and earnings into fiscal years and examines changes across fiscal years. Under the fiscal year approach, earnings announced after the dividend declaration, but before the end of the fiscal year, serve as the baseline for comparison with future years. Because there is a strong relation between dividend changes and the earnings change in the quarters following the dividend change, this dampens the measured future earnings change relative to an approach that takes pre-dividend earnings as the baseline. Defining future earnings as all quarterly earnings announced after the dividend change announcement, we find a strong association between dividend changes and unexpected future earnings. By contrast, when we apply the fiscal year approach to our same sample and set of controls for expected earnings, we find no evidence of information content. Because investors will update their expectations of any earnings realization that has not yet been announced, we argue inference should be conducted using an empirical measure of "future" which includes all unannounced earnings realizations.[7]

Second, we demonstrate that the persistence of the information about future earnings varies with the sign and magnitude of the dividend change. The expectation of persistent earnings information emphasized in prior studies is predicated on the idea that when firms change the dividend, this serves as a commitment to maintain the new level (Lintner 1956; Graham et al.

[7] We are not the first to use quarterly data to examine the information content of dividends. However, prior studies using this approach find at best earnings information that dissipates after the first one to three quarters after the dividend change (e.g., Aharony and Dotan, 1994; Carroll, 1995; Lie, 2005).

2005). However, the market reaction to dividend announcements is a non-linear function of the dividend change, suggesting that the future earnings information investors infer from dividend announcements varies with the size and direction of the change. We therefore investigate how the persistence of both earnings information and the dividend changes themselves vary with the nature of the dividend change. Among dividend increases, we find that any attenuation in future earnings information is concentrated in very large increases, which managers partly reverse over time. By contrast, earnings changes and dividends following small and moderate dividend increases are highly persistent. Dividend decreases, on the other hand, are characterized by sharp declines in net income in the year following the dividend change, with partial reversals in both dividends and earnings in the following years.

Third, we show that comparing results across different earnings measures sheds new light on the information contained in dividend announcements. In particular, we show that dividend cuts have very persistent information about future gross profit, but only temporary information about net income. The difference stems from the fact that gross profit includes only those expenses matched to current period revenue, while net income includes accelerated expenses for items that could best be characterized as investments (e.g., research and development). Our results suggest that dividend cuts convey persistent information about profitability, but that firms respond to these profit shocks by cutting investment, generating a partial rebound in earnings measured by net income.

Our main results are summarized as follows. First, we find that over our full sample, dividend changes predict changes in unexpected earnings in the same direction. These results are robust to several proxies for expected earnings, including linear and non-linear functions of past earnings levels, earnings changes, and stock returns (Grullon et al., 2005) and a matched sample

of non-changers (Benartzi et al., 1997). Importantly, this predictability persists for at least three years after the dividend change. However, the magnitude of the relation between dividend changes and future earnings is strongest in the first year following the dividend change and attenuates by about 30% at longer horizons.

We then split dividend changes by their sign, and find that the attenuation in information content is concentrated in dividend cuts (see also Benartzi et al., 1997 and Lie, 2005). By contrast, the relation between dividend increases and future earnings attenuates by only about 15% from the first through the third year after the dividend change. This contrast is understandable, given that the dividend increases themselves are much more persistent than dividend cuts.

We further find that the remaining attenuation among dividend increases is entirely due to very large increases. The distribution of dividend changes is highly skewed and market reactions suggest that investors discount very large increases. We examine the earnings information content of dividend increases using two measures of dividend news that control for this skewness: (i) the percentile rank of the dividend change and (ii) a predicted announcement return for each dividend announcement, constructed as a flexible function of the size and direction of the dividend change. When we do so, we find the earnings information content of dividend increases does not attenuate for at least three years after the change. When we use return on assets and gross profit in place of accounting earnings, we see that positive dividend news is associated with earnings growth, as the dividend change has a more positive association with three year ahead earnings than with one year ahead earnings. Our results are further robust to an alternative measure of expected earnings based on analyst forecasts. Importantly, our evidence

from analyst revisions after dividend changes suggests analysts do seem to infer earnings information from dividend announcements.

Our evidence on the persistence of dividend decreases is more nuanced. While we find significant information content for the dividend decrease in most specifications, we find substantial attenuation at longer horizons using net income. However, the attenuation decreases when we measure earnings using return on assets instead of net income and completely disappears when we use gross profit, which Novy-Marx (2013) argues is "the cleanest accounting measure of true economic profitability." An important difference between the two measures is that net income includes deductions for operating expenses that often constitute investments whose benefits will be realized in later periods (i.e., R&D and advertising). Earlier studies (Koh et al. 2013; Bulan and Hull 2013) show that firms reduce investment in response to adverse news. We find dividend decrease firms reduce operating expenses, with the decline accelerating in the second year after the dividend change. Thus, while economic profits are persistently lower following dividend cuts, firms respond by scaling back investments, resulting in a partial rebound in net income. Our evidence suggests this decline in investment confounds attempts to measure the association of dividend changes with the earnings generated from the core business when using net income.

Finally, we compare the earnings information content of dividends to that of share repurchases. Survey and empirical evidence suggests that managers view repurchases as a more flexible alternative to dividends and are therefore more likely to use repurchases to pay out temporary increases in cash flow, while only increasing dividends in response to more permanent increases (Brav et al., 2005). Consistent with this intuition, we find that announcements of share repurchase programs are significantly positively related to unexpected earnings in the year after

the announcement, but are unrelated to earnings beyond one year in the future. By contrast, when we include both dividend changes and share repurchases in the same regression, we find that dividend changes are positively related to unexpected earnings throughout the three year horizon.

Our primary contribution lies in showing that once we clearly delineate between past and future earnings utilizing an "event window" approach, there is strong evidence that dividend increases predict unexpected earnings well into the future. These findings contrast with the current consensus that there is little empirical support for the information content hypothesis for dividends (see, for example, reviews by Allen and Michaely (2003), DeAngelo et al. (2009) and Kalay and Lemmon (2013)). While there is substantial commonality between our results and several in the prior literature – for example, dividends predict short-horizon earnings changes, particularly for dividend decreases (Aharony and Dotan 1994; Nissim and Ziv 2001; Lie 2005a) – recent review articles have discounted these findings on methodological grounds. Our research design overcomes all of these objections through the use of an expanded set of controls for mean reversion in earnings (Grullon et al., 2005) and by documenting long-term persistence of the information content.

To the extent that there is attenuation in earnings predictability at long horizons, it is driven by very large dividend increases, which we show are different, both in their persistence and in their associated market reactions. Heterogeneity in the commitment to maintain the dividend affects the persistence of the association between dividend changes and future earnings changes.

By contrasting our estimates of persistence using gross profit with those for net income, we show the accounting system's acceleration of expenses into net income potentially conflates estimates of the persistence of the earnings information content of dividends. Our estimates using net income (gross profit) suggest more than half (none) of the earnings information of

dividend decreases is transient. While many studies demonstrate that firms adjust their operations in response to negative news, such as the news that precipitates a dividend decrease, we are the first to show this confounds attempts to estimate the persistence of earnings information content.

Our findings are consistent with the market reaction to dividend change announcements being related to information about future earnings that investors infer from the change in policy. While we do not explicitly show that managers consciously bear dead-weight costs to signal information to investors, as in signaling models such as Bhattacharya (1979) or Miller and Rock (1985), we do find that dividend changes contain substantial information about future earnings changes and that investors do update their earnings expectations following dividend changes.

2. Literature review and hypothesis development

Miller and Modigliani (1961) argue that investors react to dividend changes because they infer some of managers' information about future earnings expectations from the change in payout commitments.[8] This idea has been formalized in a number of dividend signaling models (e.g., Bhattacharya, 1979; Miller and Rock, 1985; John and Williams, 1985). Dividend signaling models, or the information content hypothesis more generally, have several testable implications. First, if dividend decisions are a function of managers' private information about current and future earnings, dividend increases (decreases) should be associated with subsequent increases

[8] We note that other (non-mutually exclusive) explanations have been offered for the price reaction to dividend changes. Following Easterbrook (1984) and Jensen (1986), higher dividends may reduce the free cash flow subject to managerial discretion, thereby increasing the fraction of future earnings captured by investors. Alternatively, Grullon et al. (2002) suggest that dividend increases reflect a reduction in risk, and therefore a lower discount rate, as firms mature. Given our focus on the earnings information content of dividends, we refer the reader to excellent reviews by Allen and Michaely (2003), DeAngelo et al. (2009), and Kalay and Lemmon (2011) for fuller treatments of these alternate views.

(decreases) in earnings realizations. Second, if investors recognize the earnings news reflected in dividend announcements, dividend changes should be greeted by price changes in the same direction. Related, investors should update their expectations about future earnings following announced dividend changes.

A lengthy literature tests whether dividends contain information about unexpected future earnings changes. While a few studies support the information content view of dividends (Ofer and Siegel 1987; Aharony and Dotan 1994; Yoon and Starks 1995; Nissim and Ziv 2001), most large sample empirical studies argue dividend changes contain little or no information about future earnings (Watts 1973; Gonedes 1978; Penman 1983; Lang and Litzenberg 1989; DeAngelo et al. 1996; Benartzi et al. 1997; Grullon et al. 2002; Grullon et al. 2005).[9] Recent review papers (Allen and Michaely 2003; DeAngelo et al. 2009; Kalay and Lemmon 2011) characterize this latter view as the current consensus.

Our review of the empirical literature suggests one research design choice has a dramatic influence on whether a study confirms or rejects the information content hypothesis. The pivotal choice is whether the study computes earnings changes using an event window approach or over fiscal years. In the event window methodology, earnings announced after the dividend declaration are compared to earnings in the comparable period just prior to the dividend declaration. In the fiscal year methodology, dividend changes are aggregated over a fiscal year. These studies then compute earnings changes by comparing earnings in the fiscal year following the dividend declaration to earnings in the year in which the firm declared the dividend change.

[9] We exclude studies from our review that use a small subset of dividend paying stocks, such as Brickley (1983), which studies earnings changes for thirty-five firms that change their dividend. We also exclude studies examining dividend omissions and dividend initiations.

Almost all of the studies employing the "fiscal year" approach do not support the information content hypothesis.[10]

Perhaps the most comprehensive of these studies is Benartzi et al. (1997), who show that dividend changes are highly correlated with earnings in the current or past fiscal years. However, dividend increases are uncorrelated with earnings growth in the subsequent fiscal years, while dividend cuts are actually followed by earnings increases. Nissim and Ziv (2001) argue that controlling for mean reversion in earnings, by including lagged return on equity and earnings changes as control variables, produces results more consistent with the information content of dividends. However, Grullon et al. (2005) show these findings are highly sensitive to the manner of controlling for mean reversion and demonstrate that controlling for non-linearity in mean reversion in the manner recommended by prior studies (Fama and French 2000), restores the conclusions of Benartzi et al. (1997). In addition, Nissim and Ziv (2001) find information content only for dividend increases, while dividend decreases have larger market reactions, so their results are inconsistent with information content driving the market reactions to dividends.

Two studies with results that support the information content hypothesis and have not been challenged are Aharony and Dotan (1994) and Lie (2005a), both of which use an event window methodology and show short-lived information content. Such short-term information content is hard to reconcile with the perceived long-term commitment of a dividend change (Lintner 1956; Brav et al. 2005). We offer methodological refinements, which we argue allow us to better capture how market participants would update their expectations of future earnings in response to the dividend change and these refinements affect inference, as we find evidence of

[10] Specifically, seven studies find no information content (Watts 1973; Gonedes 1978; Penman 1983; DeAngelo et al. 1996; Benartzi et al. 1997; Grullon et al. 2002; Grullon et al. 2005), while only Nissim and Ziv (2001) find supportive evidence. Several of these studies consider dividend changes in the first quarter of the subsequent fiscal year as part of the prior fiscal year's earnings.

long-horizon information content. Aharony and Dotan (1994) use a regression approach and show positive information content for only two quarters after the dividend change and negative information content in the fourth quarter. We expand on the methodology in Aharony and Dotan (1994) in two ways: first, we compute changes in unexpected earnings using pre-dividend earnings and return information, whereas at longer horizons Aharony and Dotan (1994) do not. Second, we include extensive controls for pre-dividend declaration earnings and returns, which allows us to isolate the unexpected information content in the dividend change. We expand on the matching methodology in Lie (2005a), by using a propensity score approach. In contrast to Lie (2005a), our approach effectively eliminates any significant differences in performance between control firms and dividend change firms in the pre-declaration period. In addition, our use of several approaches (i.e., matching, regression analysis and analyst forecasts) provides additional support for our conclusions.

We also make several additional contributions. First, we highlight the source of discrepancy with the bulk of the related literature. Second, we show how the persistence of dividends and their information content varies with the sign and magnitude of the dividend change. Third, we demonstrate how dividend announcements affect investor expectations by linking the information content of dividends to analyst forecast revisions and announcement period returns. Fourth, we contrast the information content of dividend and repurchase announcements over both long and short horizons.

In contrast to studies examining information content using actual earnings changes, where the fiscal year approach is the norm, the three studies of which we are aware using analyst forecasts all use an event window methodology. Two of the three studies find significant information content (Ofer and Siegel 1987; Yoon and Starks 1995), while one does not (Lang

and Litzenberg 1989). However, all these studies use summary files, which offer only approximate information about the timing of forecast revisions. As a result, these studies cannot rule out the possibility that the revision was driven by (i) a concurrent earnings release, or (ii) information released before the dividend declaration (Allen and Michaely 2003; DeAngelo et al. 2009). By using the I/B/E/S detail file, we are able to ensure that we compare only forecasts made after the previous earnings release but before the dividend change to forecasts made between the dividend change and the next earnings release. Further, we remove the impact of biases associated with slow updating, by including controls for lagged returns and lagged forecast errors (Lys and Sohn 1990; Abarbanell and Bernard 1992).

3. Sample selection and descriptive statistics

We obtain data on dividend declarations from the CRSP events database. We first select all ordinary quarterly dividend declarations (distribution code 1232) over the period 1972 – 2015 for which the firm made a previous quarterly dividend declaration in the past 180 days.[11] This allows us to compute the percentage dividend change. We limit the sample to: (i) firms listed on the NYSE, AMEX, or Nasdaq exchanges, (ii) ordinary common stocks (i.e., those with share code 10 or 11), and (iii) non-financial firms (we exclude firms with a four digit SIC beginning with six). We also exclude: (i) dividend declarations for which the firm declared a distribution other than a quarterly dividend between the declaration dates of the current and prior quarterly dividends, to focus our analysis on the information content of quarterly dividends (Benartzi et al. 1997; Nissim and Ziv 2001), and (ii) firms that split their shares between the month of the prior dividend declaration and the month of the current dividend declaration, as splits are correlated with dividend changes and also convey information about future earnings (Nayak and Prabhala

[11] The first year earnings announcements were available on Compustat is 1972.

2001; Ikenberry and Ramnath 2002). We require data on CRSP to compute past returns. We require earnings data from the CRSP/Compustat Merged database for the eight quarters before the dividend declaration to construct controls for expected earnings changes (Fama and French 2000). Tests of one (two, three) year ahead earnings information content of dividends require earnings realizations for four (eight, twelve) consecutive quarters after the dividend declaration. We also require non-missing earnings announcement dates before and after the declaration to identify the earnings information available to market participants. We winsorize all non-return continuous variables at the top and bottom one percent to mitigate the influence of outliers, except the percentage dividend change for which we set all dividend increases larger than 200% to 200%.[12]

Table 1 presents descriptive statistics for our sample. 85% of dividend declarations maintain the prior dividend level, while 14% (1%) increase (decrease) the dividend. Although dividend decreases are less frequent, they tend to be larger. The average decrease reduces the dividend by 49.2% while the average increase raises the dividend by 18.8%. The average decrease has an announcement window return of -3.3%, compared to 0.9% for the average increase, suggesting a greater reaction to dividend decreases. The positive association between the dividend change and announcement returns suggests that investors update their valuation of the firm in response to the dividend change. Declarations that change the dividend tend to be preceded by returns of the same sign as the dividend change, suggesting at least some of the

[12] Several dividend increase observations are extremely large in percentage terms. To mitigate their influence we winsorize the percentage dividend change at +200%. We do not winsorize dividend decreases because they are bounded at -100% and dividend decrease observations comprise just over 1% of the sample. We winsorize all variables involving earnings at the top and bottom one percent for two reasons: (i) the distribution of changes in earnings values is highly kurtotic and skewed so extreme values account for much of the variance in earnings changes (Gerakos and Grammecy 2014), and (ii) large changes in accounting income have little relation with economic income (Freemen and Tse 1992).

information affecting the decision to change the dividend was released to the market before the dividend declaration.

Examining earnings realizations, we find firms that decrease the dividend have lower earnings the year after the dividend decrease than before and lower earnings after the dividend declaration than firms that do not change the dividend. We find firms that increase the dividend have higher earnings the year after the dividend declaration than before and greater earnings growth than firms that do not change the dividend. The goal of our first set of empirical tests is to identify the portion of the post-dividend declaration earnings change that is unexpected at the time of the dividend change, and is thus forecasted by the dividend change.

4. Do dividend changes predict future earnings changes?

In this section, we test whether dividend changes have information content about future earnings by regressing future earnings changes on the dividend change (our variable of interest) and controls for expected changes in earnings. The central difference between our methodology and the prior literature is that we compute future earnings changes comparing earnings realized after the dividend change to earnings realized before the dividend change ("event window approach"). Most prior studies predict earnings changes between fiscal years t+1 and t, using dividend changes within year t (Watts 1973; Gonedes 1979; Bernatzi et al. 1997; Nissim and Ziv 2001; Bernatzi et al. 2005). The fiscal year approach includes both pre- and post-dividend change earnings from year t, altering current year earnings relative to what investors expect prior to the dividend change. Modeling earnings expectations at all horizons using pre-dividend information allows us to sketch out how the horizon of earnings expectations change in response to the average dividend change. Because market participants will update expectations of any

earnings realizations which have not been reported, the fiscal year approach could falsely reject the hypothesis that dividends have information content about future earnings. We present two main findings: first, we show using an event window approach that dividends have information content about future earnings three years into the future. Second, we show the fiscal year approach rejects earnings information content of dividends because it does not classify all earnings realized after the dividend change as future earnings.

Showing that dividends have information about future earnings informs the debate over why markets react to dividend changes. The current consensus in the literature, that dividends do not forecast future earnings changes has been used to reject the theory market reactions arise because dividends affect expectations of future cash flows. Our evidence in this section is consistent with dividend announcement returns reflecting, at least in part, expectations of future earnings, as conjectured by early dividend studies (Modigliani and Miller 1961).

4.1. Event window tests for the information content of dividends

In our main empirical specification, we regress earnings changes on the percentage dividend change (ΔDIV) and a series of control variables.

$$\Delta E_{it+n} = \beta_0 + \beta_1 \Delta DIV_{it} + \Sigma \beta_j Controls + \varepsilon \quad (1)$$

ΔE is the change in earnings using income before extraordinary items (*IBQ*) from the CRSP/Compustat merged quarterly file. All earnings changes are computed as the difference between the sum of the four quarterly earnings announced before the dividend change and earnings for four consecutive quarters after the dividend change. We compute earnings changes over the one, two and three years after the dividend change to provide evidence on the persistence of the dividend information content. The first (second, third) year's earnings changes begin with the first (fifth, ninth) quarters after the dividend change. We scale by the market

value of equity one year before the dividend announcement, similar to Benartzi et al. (1997). Refer to Figure 1 for a more detailed description of the earnings change calculations and a visual depiction of the timing of earnings realizations relative to dividend changes. If a dividend declaration occurs the day of an earnings announcement, we classify the earnings announced at the time of the dividend change as the prior quarter's earnings. We cluster all standard errors by the year of the dividend declaration unless otherwise noted.

In all specifications, we include controls for earnings changes that would have been expected in the absence of the dividend change. Specifically, we include as independent variables the four past quarterly earnings changes, four past earnings levels, non-linear functions of past annual earnings changes and levels (Fama and French 2000; Grullon et al. 2005),[13] as well as five variables capturing returns over the 240 trading days before the dividend announcement because returns impound information about future earnings (Ball and Brown 1968).

We present the results from estimating equation (1) using the event window approach in Table 2, Panel A. The dependent variable in column (1) is the change in earnings the first year after the dividend change ($\Delta E_{(y+1)}$). We find a highly significant coefficient on the dividend change (β=0.025; t=5.1). The coefficient magnitude suggests the average dividend change of 20% corresponds to an increase in expected earnings equal to 0.5% of the market value of equity of the firm over the one year period after the dividend change. Because the average dividend paying firm in our sample trades at a forward earnings to price ratio of 9.4%, our regression

[13] The past earnings level (earnings change) is the sum of the four quarterly earnings levels (earnings changes) before the dividend announcement. Specifically, we include a total of six variables, three each for the earnings change and level: (i) an interaction between the variable and an indicator equal to one if the variable is negative, (ii) an interaction between a positive indicator and the variable squared, and (iii) an interaction between a negative indicator and the variable squared. We exclude the main effect because it will be multi-collinear with our four quarterly earnings change and levels variables. In unreported analysis, results are similar when including non-linear controls for each quarterly change and level.

estimates suggest dividend changes have economically meaningful information about future earnings.

In column (2), we estimate equation (1) using the second year after the dividend change as the dependent variable ($\Delta E_{(y+2)}$), to provide evidence on the persistence of the future earnings forecasted by the dividend change. We again find a highly significant coefficient on the dividend change (β=0.018; t=3.2). Approximately 70% of the year one earnings change forecasted by the dividend change persists.[14] In column (3), we show that for the horizon three years ahead, dividends contain a similar amount of information about future earnings as in year two (β=0.018; t=2.7). Our finding of long-horizon information content is novel to the literature. The only other study to find long-horizon information content (Nissim and Ziv 2001) has been refuted by the subsequent literature (Grullon et al. 2005) and discounted by subsequent review studies (Allen and Michaely 2003; DeAngelo et al. 2009).

The choice of deflator and control variables affects whether dividend changes predict future earnings using the fiscal year approach (Nissim and Ziv 2001; Grullon et al. 2005). The choice of deflator has no effect using the event window approach. In untabulated analyses, we use the book value of common equity and total assets, and compute these deflators both the quarter before the dividend change and the year before the dividend change. Across all horizons and deflators our inferences are unaffected – dividend changes have an association with future earnings changes which persist up to three years in the future. Our results are also unaffected by

[14] Prior literature commonly measures earnings changes on a year-by-year basis, where each subsequent year's earnings are subtracted from the prior year's (e.g., Benartzi, Michaely, and Thaler (JF 1997), Nissim and Ziv (JF 2001), and Grullon, Michaely, Benartzi, and Thaler (JB 2005)). However, because our interest is in identifying how much information about future earnings the dividend change predicts – the information that market participants would impound into price at the announcement if dividend announcement returns were a function of earnings news, we model the association between the dividend change and earnings news at each horizon using an ex-ante expectation of earnings. Our results suggest dividends have significant information about long-horizon earnings.

the inclusion of firm fixed effects, year fixed effects, industry x year fixed effects and/or the removal of all control variables.

4.2. Fiscal year approach tests for the information content of dividends

To examine whether the discrepancy between our findings and those of the prior literature are attributable to computing earnings changes over the fiscal year, in Panel B of Table 2, we calculate earnings changes as in the prior literature – earnings in fiscal years after the dividend declaration less earnings in the fiscal year of the dividend declaration (which includes earnings announced both before and after the dividend declaration). We include control variables similar to those in Panel A, so that any difference in the coefficients arises as a result of the difference in the calculation of earnings changes. In column (1), when we calculate the dependent variable subtracting earnings the fiscal year of the dividend declaration from those after, we find an insignificant coefficient on the dividend change. The coefficient is economically small, only 4% of the magnitude in Panel A. In columns (2) and (3), we compute the dependent variable subtracting the fiscal year of the dividend change from those the second and third fiscal year after the dividend change, respectively. We find no significant positive association between the dividend change and future earnings changes at either horizon, although in column (3), we do find a significantly negative association.

To test whether the difference in results from the fiscal year and event window approaches arises because the fiscal year approach includes earnings realized after the dividend declaration as pre-dividend earnings, we separately tabulate results for dividend changes announced in fiscal quarters one through four. In Panel C, columns (1) – (3), we show negative and insignificant information content for quarters one to three, where the fiscal year approach includes at least one quarter after the dividend change as a part of the current year's earnings. In

column (4), we show significantly positive information content for dividend changes occurring in the fourth quarter. Note that the fiscal year and event window methodologies are the most similar for dividends announced in quarter four, but differences still exist. Namely, fourth quarter earnings is considered post-dividend (pre-dividend) earnings under the event window (fiscal year) approach because there is a delay between the fiscal period end and the earnings announcement. Thus, measuring information content using the fiscal year approach has two effects relative to the event window approach. First, earnings announced soon after the dividend declaration are excluded from the future earnings calculation. Second, earnings announced soon after the dividend declaration also become the new baseline against which future earnings changes are calculated. As a result, unexpected earnings that result from earnings changes starting in the first few quarters *after* the dividend change are masked by grouping quarters into fiscal years. As market participants will create expectations of earnings at the dividend announcement using only pre-dividend declaration information, we argue approaches which exclude post-dividend earnings realizations are better suited to understanding whether information about future earnings plausibly drives market reactions to dividend news.

4.3 Matched sample results

To confirm our results are robust to matching on time and industry, as well as to graphically illustrate the horizon of dividend information content, in Figures 1 and 2, we report results from a matched sample comparison of earnings changes and levels for firms that change dividends and similar firms that leave dividends unchanged. Specifically, we estimate a propensity score model of the probability the firm will change the dividend as a function of the past four quarterly earnings changes and levels. We estimate the model separately for dividend increases and decreases and match each dividend increase or decrease firm to a non-changing

firm with the closest propensity score within the same dividend declaration year and industry (two digit SIC).[15]

The results indicate earnings levels are significantly higher (lower) for firms that increase (decrease) dividends, relative to non-changers, though for dividend decreases the magnitude decreases slightly with horizon. These differences in earnings levels between dividend changers and non-changers persist for three years after the dividend change. In untabulated analyses, we find these differences are statistically significant. Firms that increase (decrease) the dividend have significantly higher (lower) earnings than matched firms in each of the twelve (eleven of the twelve) quarters following the dividend change. We find no significant differences in any of the four quarters before the dividend change.

These results provide additional intuition for the disparate findings under the event window and fiscal year methodologies. Because the shift to higher (lower) earnings levels occurs largely through earnings changes in the first several quarters after the dividend change, including these quarters in pre-dividend earnings (which occurs when using the fiscal year approach) biases the estimated relation between dividend and earnings changes toward zero. Overall, our results highlight the importance of timing in measuring future earnings changes when estimating the information content of dividend changes.

5. Persistence of the information content of dividends

[15] Matching is performed with replacement and we impose a caliper distance of 0.03 (Shipman et al. 2016). Our approach of propensity score matching on past performance differs from Lie (2005a), who matches on past performance without using a propensity score approach. Our approaches yield different results. Lie (2005a) shows only significant differences in the month of the dividend declaration, while our matching approach shows persistent differences. However, Lie (2005a) finds significant differences in the pre-dividend declaration period, suggesting his approach may not fully control for differences in pre-event performance. In addition, our regression analysis and use of analyst forecasts as an alternative benchmark further support the results of our matching design. Lie (2005a) also does not examine dividend increase firms.

Since dividends tend to be viewed as a long-term commitment to pay out cash flows (Brav et al., 2005), we could expect dividend changes to be associated with persistent cash inflows to fund the change in payout. Although our results show that dividends have long-horizon information about future earnings, at least a portion of the information about short-horizon earnings does not persist. In this section, we conduct tests to better identify the source of attenuation in our previous results.

Prior studies have shown that the market reaction to dividend change announcements is a non-linear function of the dividend change. For example, Baker et al. (2016) show that the market reaction to dividend increases (decreases) is initially increasing in the magnitude of the change, but flattens out for larger changes. Further, announcement returns are larger in absolute value for dividend cuts than increases. This suggests that, to the extent that these announcement returns reflect new information about future earnings, the information investors infer varies with the sign and magnitude of the dividend change.

We begin by documenting that these patterns in announcement returns hold in our sample. To do so, we estimate the following regression:

$$CAR_{it} = \beta_0 + \beta_1 I(\Delta DIV_{it}>0) + \beta_2 I(\Delta DIV_{it}<0) + \beta_3 \Delta DIV_{it} + \beta_4 \Delta DIV_{it} * abs(\Delta DIV_{it}) + \varepsilon \quad (2),$$

where CAR_{it} is the cumulative abnormal return (relative to a market model) over the five day window centered on the dividend announcement. Results reported in the first column of Table 3 confirm previous findings. The positive coefficient on the dividend change indicates that larger (more positive) dividend changes are met on average with more positive market reactions. However, the significantly negative estimate of β_4 shows that the incremental market reaction diminishes with the size of the dividend change. This suggests that very large dividend changes may not contain any more information about long-run earnings than more moderate changes.

Finally, comparing coefficients on the indicators for positive and negative dividend changes shows sharper reactions to dividend decreases than increases. In the next section, we explore the extent to which the magnitude and persistence of future earnings and dividend realizations are consistent with these patterns in announcement returns.

5.1. Heterogeneity in dividend persistence

The expectation that dividend changes have persistent information content about future earnings relies on the expectation that dividend changes have persistent information about future dividends. In this section, we test whether some dividend changes have less persistent information about future dividends by re-estimating equation (2) with future dividends as the dependent variable in place of the announcement return.

We construct our measure of future dividends by computing the percentage change from the prior quarter, in a manner analogous to the way we calculate *ΔDIV*, comparing the current dividend to the prior dividend. Specifically, we calculate the change in dividend for the first year after the dividend change by summing the next four quarterly dividends and then subtract the prior dividend multiplied by four, scaled by the prior dividend multiplied by four $\frac{\sum_{i=1}^{i=4} Div_{t+i} - 4 * Div_{t-1}}{4 * Div_{t-1}}$. Similar to our regressions for earnings information content, we construct our measure of future dividend changes for each of the next three years, with the second (third) year's dividend change constructed similarly except we begin summing future dividend amounts with the fifth (ninth) dividend declaration after the current dividend.

As in equation (2), our independent variables include an indicator for positive (negative) dividend changes, the dividend change and the signed squared dividend change (the dividend change multiplied by the absolute value of the dividend change). If dividend changes are

perfectly persistent and follow a random-walk thereafter, we would expect a coefficient of one on the dividend change and a coefficient of zero on all other terms.

In column (2) of Table 3, we compute future dividend changes over the next year. We have two main findings. First, the average dividend *decrease* firm then ***increases*** their dividend aggressively after the initial decline. Survey evidence suggests managers commit to maintaining the dividend (Lintner 1956; Brav et al. 2005), so dividend decreases represent an abrogation of a prior commitment. Our evidence suggests firms act aggressively to restore payout so that the lower dividend does not constitute a renewed commitment.

Second, the dividend information content of dividend changes declines with the percentage change, as we find a significantly negative coefficient on the signed squared dividend change[16] Thus, the muted market reaction to large dividend changes suggests that investors correctly infer that these changes are less likely to be maintained.

In columns (3) and (4), we show these findings are not specific to the year after the dividend as the differences in the coefficients mentioned above become larger as we measure the dividend change in future years.

5.2. Heterogeneity in the persistence of future earnings information

Our main findings from the previous section are that the market reactions to dividend changes and the persistence of the changes themselves vary with (i) the sign of the dividend change and (ii) the percentage change in the dividend. In this next section, instead of measuring dividend news as a linear function of the percentage change in the dividend, we develop functions which take into account the non-linearities in the persistence of and market reaction to

[16] In our tabulated regressions, we require subsequent quarterly dividend declarations for each of the future quarters (so firms omitting dividends are excluded). In untabulated analyses, we confirm none of our findings are sensitive to this sample selection criteria. In addition, our findings are insensitive to including controls for the dividend yield, past dividend changes, past returns and size.

dividend changes. Specifically, we introduce three functions of dividend news. Our regression specification is similar to that in Table 2, Panel A in all other respects.

$$\Delta E_{it+n} = \beta_0 + \beta_1 f(\Delta DIV_{it}|\Delta \text{DIV}_{it}>0) + \beta_2 f(\Delta DIV_{it}|\Delta \text{DIV}_{it}<0) + \Sigma\beta_j Controls + \varepsilon, \quad (3)$$

First, we estimate equation (3), using as our two variables of interest *abs(ΔDIV>0)* (*abs(ΔDIV<0)*), computed as the absolute value of *ΔDIV* multiplied by an indicator if the dividend change is positive (negative). The difference in the coefficients on these variables will capture the difference in earnings information content between increases and decreases but the functional form assumes dividend news increases linearly with the percentage dividend change. We also use two measures that capture the non-linearities in the information about prices and future dividends. To compute our second measure, we separately percentile rank dividend increases (*rank(ΔDIV>0)*) and dividend decreases (*rank(ΔDIV<0)*). Because dividend changes have a skewed distribution, using the percentile rank as our measure of dividend news rather than the percentage change increases the variation in dividend news accounted for by small changes, consistent with our findings in Table 3.[17] Third, we use imputed market returns as our measure of dividend news. Specifically, we regress announcement returns over the five day window centered on the dividend change on (i) the dividend change, (ii) the signed-squared dividend change and (iii) indicators for positive and negative dividend changes (equation (2)) and then use the predicted value as our measure of imputed returns. We impute returns out of sample, so the predicted values are only estimated including dividend changes from prior months. We then multiply imputed returns by our positive and negative dividend change indicators to calculate *pret(ΔDIV>0)* and *pret(ΔDIV<0)*.

[17] For example, the median dividend increase is 12%, while a 100% dividend increase is the ninety-ninth percentile. Measuring dividend news in percentiles, the shift from a 12% increase to a 100% increase is 100% higher. Measuring dividend news using percentage changes the 100% increase is 800% higher.

Table 4 columns (1) – (3) present estimates of equation (3) for the years one through three after the dividend change using independent variables calculated using the percentage change of the dividend. While we find significant information content for both our variables of interest across all horizons, we find substantial differences between increases and decreases in terms of the persistence of the information content. Dividend increases have more persistent information content. The coefficient on *abs(ΔDIV>0)* when the dependent variable is the two (three) year ahead earnings change is 85.7% (85.7%) of the magnitude when the dependent variable is the one year ahead earnings change. In contrast, dividend decreases have more transitory information; when the dependent variable is the two (three) year ahead earnings change *abs(ΔDIV<0)* is 40.4% (46.8%) of its one year ahead magnitude. We find that dividend decreases have larger information content at short horizons than increases, consistent with the more pronounced announcement returns, but similar information content at longer horizons. Overall, our results suggest that firms raise the dividend in response to persistent information about future earnings while firms decrease the dividend in response to negative but often transitory information about future earnings.

In columns (4) – (6), we present estimates using our percentile rank variables. Switching to a measure of dividend news for which smaller changes account for a greater fraction of the variation, we find more persistent information content for dividend increases. When the dependent variable is the two (three) year ahead earnings change, *rank(ΔDIV>0)* is 94.4% (94.4%) of the magnitude when the dependent variable is the one year ahead earnings change.

In columns (7) – (9), we present our estimates of equation (3) using imputed returns in place of the dividend change. We now find no evidence of attenuation in the earnings

information from one to three years after the dividend change. If anything, the estimated coefficients on *pret(ΔDIV>0)* grow slightly with the horizon.

The main takeaway from contrasting the results in columns (1) – (3) to those in columns (4) – (9) for dividend increases, is that large dividend increases tend to have less persistent earnings information than small increases. This is consistent with the non-linear pattern in announcement returns documented earlier. Using the percentage change as our measure of dividend news, large increases receive a lot of weight and there is substantial attenuation. When we use measures of dividend news more consistent with market reactions which discount large increases, we do not find evidence of mean reversion.[18] For negative dividend changes, however, we continue to find attenuation in our estimates of information content using all three measures. We explore the reasons for this in the following section.

5.3 Comparing net income to other measures of earnings

Our results thus far suggest that positive dividend changes have persistent information content when (i) using an event window approach to measure unexpected earnings and (ii) using a measure of dividend news for positive increases that discounts large dividend increases. In this section, we examine whether these findings are robust to using alternative measures of unexpected earnings: gross profit and return on assets.

A potential issue with using accounting income to measure changes in the amount of economic income the firm generates each period is that accounting standards accelerate expenses

[18] In addition, our coefficient estimates of the earnings information content of positive dividend news are economically large. The coefficients are approximately one, which suggests a ten percent change in market value is associated with a nearly ten percent change in earnings. As the average earnings to price ratio in our sample is around 10%, this would predict coefficients near 10% instead of 100%. The high coefficient on imputed returns is perhaps expected given the evidence that dividend increases generate substantial post-dividend change drift (Bernatzi et al. 1997), so that only a portion of the information about future earnings gets impounded into returns at the announcement.

into earnings.[19] These accelerated expenses often constitute investments, such as advertising or R&D (which are expensed as incurred although the benefits are recognized into revenue in subsequent periods), and these investments could be positively correlated with the dividend change (or the shock to economic income that prompted it). The acceleration of certain types of expenses in net earnings potentially contributes to the transitory information content measured in Table 2.

In Table 5, Panel A, we present estimates of the earnings information content of dividends using gross profit to measure earnings, computed as revenues minus cost of goods sold scaled by total assets. Because cost of goods sold are matched explicitly to the revenues they generate, gross profit will remove all expenses not incurred in the production of revenues, so our estimates of information content should be unaffected by accounting standards which accelerate investments into accounting income.[20] Our regression specification modifies equation (3) by replacing all earnings amounts in the dependent and independent variables with gross profit. In columns (1) – (3) we use as our measure of dividend news the percentile rank of the dividend change. For dividend increases, examining the difference in the coefficients across horizons we find growth in information content, as two (three) year ahead estimates are 153% (184%) of those for one year ahead. In columns (4) – (6), when using imputed returns we continue to find highly persistent information content.

In contrast to our results for net income, when using gross profit to measure earnings we also find persistent information content for dividend decreases. Across both percentile ranks and imputed returns, dividend increases have larger information about the second and third year

[19] Two well documented reasons why accounting income differs from economic income are: (i) the accounting system requires immediate expensing of investments such as advertising and research and development, even though the firm realizes the benefits of these expenses over a period of years (Enache and Srinivasta 2016), and (ii) the accounting system requires assets to be written down when impaired (Basu 1997).

[20] Novy-Marx (2013) argues that "gross profits is the cleanest accounting measure of true economic profitability."

ahead earnings than the one year ahead earnings. The difference between our persistence results using net income and gross profit are economically significant, providing initial evidence accounting standards of accelerating negative news into earnings contributes to the finding of transitory earnings information content using net income (Basu 1997).

In Panel B of Table 5, we provide more detail on how operating expenses vary with dividend changes by replacing all earnings variables with period expenses, computed as the difference between gross profit and income before extraordinary items (positive values indicate more expense). If asset write-downs and investments in items such as research and development or advertising are positively related to the dividend change, but change with a lag because of cost stickiness (Andersen et al. 2003; Banker and Chen 2006), the slow adjustment of operating expenses could explain a portion of the transitory dividend information content in Table 2.

Using percentile ranks and imputed returns, we find firms that increase (decrease) their dividends increase (decrease) their operating expenses in each year after the dividend change. The decline in operating expenses accelerates in the second year after the dividend change. The coefficient on the ranked dividend change or imputed return more than doubles when the dependent variable changes from one-year-ahead to two-year-ahead expenses for dividend decreases (compare columns (1) and (2) or (4) and (5)). The notion that firms adjust cost structure in response to adverse news that also causes dividend cuts is not new to the literature (Bulan and Hull 2013; Koh et al. 2015). However, our evidence suggests that this decline in investment confounds attempts to measure the earnings changes associated with the dividend change. Because operating expenses are subtracted from gross profit to calculate net income, the variation in operating expenses explains why some of the change in gross profit does not hit the income statement in subsequent years.

In untabulated analyses, we also examine the earnings information content of dividends using return on assets, calculated as operating income before depreciation scaled by total assets (Nissim and Ziv 2001). Return on assets excludes transitory items such as asset write-downs, restructuring charges and earnings from discontinued operations. However, it includes more persistent operating expenses such as R&D and SG&A. Using ROA, for both dividend increases and decreases we find results with persistence in between those of net income and gross profit. We find persistent information content for dividend increases, as the two (three) year ahead earnings change is larger than the one year ahead for both measures of dividend news. For dividend decreases, our estimates with ROA show earnings information content that is not fully persistent, though the attenuation is smaller relative to Table 4.

5.4. Dividend changes and analyst forecasts

To measure unexpected future earnings, our previous tests rely on a flexible function of past earnings and past returns to control for earnings that would be expected in the absence of a dividend change (Grullon et al., 2005). In our next set of analyses, we compute the association between the dividend change and unexpected earnings using an alternative benchmark, analyst forecasts of earnings. First, we test whether dividend changes predict errors in forecasts, as a robustness check. Second, we examine whether analysts revise their earnings forecasts in the direction of the dividend change, which provides some evidence that market participants update earnings expectations in response to the dividend change.

5.4.1. Do dividend changes predict errors in analyst forecasts?

We obtain analyst forecasts of earnings per share for the fiscal year of the dividend change and the fiscal year after.[22] We require the initial analyst forecast be issued between the most recent earnings announcement and two days before the dividend declaration, inclusive, to

[22] Forecasts of earnings at horizons longer than next year are published infrequently and are optimistically biased.

ensure the initial forecast incorporates information from the previous earnings announcement.[23] We winsorize forecast errors at the top and bottom one percent.[25] We control for prior returns as well as past forecast error to control for the empirical fact that analysts respond slowly to stale information (Abarbanell 1991; Abarbanell and Bernard 1992).

If dividend changes contain new information about future earnings, then dividend changes should be positively correlated with forecast errors – i.e., when firms increase (decrease) the dividend, realized future earnings are higher (lower) than expectations. To test this prediction, we regress analyst forecast errors on positive and negative functions of the dividend news.

$$FE_{it+n} = \beta_0 + \beta_1 f(\Delta DIV_{it}|\Delta \text{DIV}_{it}>0) + \beta_2 f(\Delta DIV_{it}|\Delta \text{DIV}_{it}<0) + \Sigma\beta_j Controls + \varepsilon \quad (5)$$

We report the forecast error results in Table 6 columns (1) – (2). We find *rank(ΔDIV>0)* significantly predicts forecast error for both the current year and next year (t=5.0 and t=4.7). In addition, the coefficient estimates increase across the horizon, so that positive dividend changes predict 66% more error in next year's forecasts. Although some of the current year's earnings will have already been reported, the growth in information content is consistent with our persistence results from Table 5. In columns (5) – (6), we obtain similar results using imputed returns as our measure of dividend news. Dividend decreases have significant information content in year one, but less persistence than increases.

5.4.2. Do analysts update expectations of earnings in response to dividend changes?

[23] Controlling for the timing of earnings announcements allows our study to address DeAngelo et al.'s (2009) criticism of prior research studying analyst revisions: "Because they are measured over the month surrounding the dividend announcement, these forecast revisions are noisy measures of analysts' responses to dividend changes per se given that firms may have reported quarterly earnings during the measurement period."

[25] Because we require (i) a gap between the dividend declaration and the prior earnings announcement for the analyst to issue the pre-dividend forecast, and (ii) active analyst following, we report results for a subset of the dividend declarations in Table 2. Another factor limiting our sample is the fact that the I/B/E/S detail file has much more limited coverage of firms in the early part of our sample.

While prior evidence documents that markets update valuation in response to dividend news, it is unclear whether the market reactions reflect earnings or discount rate news. In this section, we examine whether analysts revise their expectations of future cash flows around the dividend change, which would lend further support to the interpretation that revisions of cash flow expectations lead to the positive association between announcement returns and dividend changes.

We investigate the relation between analyst revisions and dividend changes by regressing the difference in analyst estimates before and after the dividend declaration on positive and negative functions of the dividend news.

$$REV_{it+n} = \beta_0 + \beta_1 f(\Delta DIV_{it}|\Delta \text{DIV}_{it}>0) + \beta_2 f(\Delta DIV_{it}|\Delta \text{DIV}_{it}<0) + + \Sigma\beta_j Controls + \varepsilon \quad (5)$$

The revision is the difference between the post-declaration forecast and the pre-declaration forecast, scaled by price at the prior earnings announcement. If the analyst does not revise the forecast in the post-declaration period, the revision is set to zero. In columns (3) – (4), we find significant associations between dividend changes and revisions, for both dividend increases and decreases. In columns (7) – (8), we obtain similar inferences using imputed returns to measure the news in the dividend change. Overall, our evidence suggests analysts revise their expectations of future earnings around dividend changes in a manner consistent with the dividend change, supporting the notion that the market reaction to dividend changes reflects revised expectations of future cash flows.

5.5 Do dividends convey information about the persistence of past earnings changes?

Prior studies have also provided evidence that dividends are associated with greater persistence of past earnings changes (DeAngelo et al. 1992; DeAngelo et al. 1996; Koch and Sun 2004). Review studies argue that this is the primary channel through which dividends are related

to future earnings (Allen and Michaely 2003; DeAngelo et al. 2009). Our descriptive statistics reveal that firms that change their dividends have pre-dividend declaration earnings changes in the same direction as the dividend change. It remains possible that the information content of dividend changes arises because dividend changes reflect the persistence of past earnings changes rather than new information about future earnings changes.

To differentiate between these alternatives, we modify equation (1) to include the interaction between the dividend change (ΔDIV) and the change in the previous four quarters' earnings ($\Delta E_{(y-1)}$). If dividends only have information content because they are related to the persistence of past earnings changes we would expect (i) a significant positive coefficient on the interaction $\Delta DIV * \Delta E_{(y-1)}$, and (ii) substantial attenuation in the coefficient on the main effect of the dividend change (ΔDIV).

Results are shown in Table 7. In Column (1), we first show that when using the fiscal year approach, as the majority of the prior literature has done, dividend changes contain information about the persistence of the current fiscal year's earnings. Our variable of interest, the interaction of ΔDIV and the current year's earnings has a significant coefficient.

In column (2), we estimate the same specification computing earnings changes using the event window approach. We find an insignificant coefficient on the interaction. The dividend change however, continues to significantly predict future unexpected earnings. In column (3), we use the full set of controls for past earnings changes and returns to provide a better measure of unexpected earnings. We again find an insignificant coefficient on the interaction with a magnitude 11% of the coefficient in column (1). In addition, the coefficient on ΔDIV is identical to that in Table 2, so we find no attenuation. Overall, our evidence suggests dividends convey

information about future earnings and the information is not proportional to past earnings changes.

6. Buybacks and the information content of dividends

Firms increasingly return cash to shareholders in the form of repurchases, and these repurchases can substitute for dividends as a means of paying out cash (Grullon and Michaely 2002).[26] Survey evidence (Brav et al. 2005) suggests that managers view dividends as a more permanent commitment to pay out cash and are much more likely to use repurchases in response to a temporary earnings increase. In that case, we expect dividends should have greater and more persistent information content about future earnings than do share repurchases. In this section, we assess whether managers match the form of payout with the duration of their private information about future earnings, by contrasting the information content of dividends with the information content of buybacks.

6.1. Do buybacks have information about future earnings?

We first test if the authorization of a share repurchase program has information content about future earnings, using a similar research design to that for dividends. Prior literature provides mixed evidence on this question. Grullon and Michaely (2004) use a fiscal year approach and find repurchase authorizations contain little or no information about future earnings. Lie (2005b) uses an event window approach and finds repurchase authorizations contain positive information about future performance which persists for at least two years. Guay and Horford (2000) show that repurchase authorizations coincide with a period of abnormal positive earnings, but that the abnormal performance is transitory.

[26] The dollar volume of shares repurchased increased markedly during our sample period from approximately $5 billion in 1980 to $349 billion in 2005.

Our sample includes all firm-quarters with at least one share buyback over the sample period. Buybacks include all open market repurchase authorizations on SDC. In this section, to create coefficient estimates comparable across buybacks and dividend changes, we percentile rank both the dividend change and buyback amount from zero to one.

Results are presented in Table 8.[27] Column (1) shows a significant positive relation between repurchase authorizations and earnings changes over the next year (sum of the four quarterly earnings following the authorization minus the sum of the four quarterly earnings before). The coefficient magnitude (β=0.008) suggests the earnings of a firm with the largest repurchase authorization will outperform the average firm without a repurchase authorization by 0.8% of the market value of equity of the firm.

In columns (2) – (3) we examine whether the relation between repurchase authorizations and future earnings changes extends beyond the four quarters after the authorization. The relation between the buyback authorization and future earnings completely attenuates by year two, so that the coefficient estimate is 0.0% and becomes insignificantly negative in year three. Overall, our evidence suggests that buyback announcements have information content about future earnings, but the associ ated earnings news is entirely transitory.

In addition, the fact that we find only transitory earnings information content for share buybacks mitigates concerns that our finding of persistent earnings information for dividends is a mechanical function of our methodology.

6.2. Do dividend paying firms match the form of payout to the duration of their earnings information?

[27] Specification and control variables are the same as in column (1) of Table 2, with the exception that the return variables are calculated relative to the prior quarter earnings announcement date rather than the repurchase authorization date, because many of the firm-quarters do not contain a repurchase authorization.

Skinner (2008) notes the emergence of two classes of firms with respect to payout form: those that pay out using both dividends and buybacks and those that use only buybacks. Those that use both forms appear to use them in different ways, with repurchases responding more to temporary fluctuations in earnings. Combined with managers' views that repurchases are the more flexible form of payout, we expect dividend payers to use dividend changes to respond to persistent earnings changes and repurchases to pay out temporary cash flows or excess cash on the balance sheet.

In columns (4) – (6), we select only the sample of dividend paying firms who also have a share buyback and examine the difference in the information content of these two forms of payout. Column (4) shows that over a one-year horizon, both buyback authorizations and dividend changes have information content. Dividend changes have slightly more information content and the difference is statistically significant. Further, columns (5) and (6) show that while the information content of dividends persists through the second and third years after the dividend change, the information content of buybacks disappears after one year. These results suggest dividend changes convey persistent information about future earnings while buybacks convey transitory information. Overall, our evidence suggests dividend paying firms substitute between payout methods depending on their expectations for future earnings. While our findings are similar to the prior literature that shows buybacks respond to transitory earnings (Guay and Harford 2000; Skinner 2008), our results demonstrate that a portion of these earnings are realized after the authorization.

7. Conclusion

Grullon et al. (2005) argue that "one of the most important issues in corporate finance is whether dividend changes contain information about future earnings" (p. 1659). While the

prevailing view in the literature is that they do not, we provide robust evidence in this paper which challenges that view. Using an event window approach to clearly delineate the timing of earnings relative to dividend announcements, we find that dividend changes predict unexpected earnings changes in the same direction. While this predictability is strongest in the year after the dividend change, we show that once we control for the non-linear relation between dividend changes and announcement returns, dividend increases are followed by persistently higher unexpected earnings for up to three years. Further, the apparent attenuation in information content following dividend cuts is attributable to increases in period expenses such as R&D, while changes in gross profit are highly persistent.

Our findings help inform payout policy choices by shedding light on the drivers of the market reaction to dividend changes. We show that investors and analysts understand the earnings information contained in dividend announcements and update their expectations accordingly. While other factors such as agency conflicts may also contribute to the value effects of dividend decisions, we find the evidence is supportive of an earnings information channel. Our results also further our understanding of how payout choices shape the information environment. We provide evidence that managers match the duration of their changes in payout to the duration of the expected earnings changes.

Our evidence raises several questions for future research that may deepen our understanding of the drivers of payout decisions. First, theories based on the agency costs of free cash flow receive the majority of support in recent review articles (Allen and Michaely 2003; DeAngelo et al. 2009; Kalay and Lemmon 2011). Asymmetric information models provide a potential reconciliation between our findings and governance-based theories (Fundenberg and Tirole 1995; DeMarzo and Sannikov 2016). In these models, managers map earnings

information into dividends to maximize the probability of retaining control. If directors and outside investors "manage by exception," in which their degree of involvement is a decreasing function of payout, with decreases leading to asymmetrically more supervision (Hilton and Platt 2014), managers have an incentive to increase dividends when they foresee a sustainable increase in earnings. However, they will do so conservatively to minimize the probability of having to decrease dividends in case of an unexpected earnings shortfall.

Second, while much of our evidence is consistent with dividend signaling models, a few caveats are in order. For one, we do not show direct evidence that managers consciously bear dissipative costs to communicate information to investors or, if so, which are the most relevant costs. Related, a remaining challenge for signaling models is the observation that dividend payers tend to be concentrated among those firms we would expect to face the least information asymmetry (e.g., older, larger, more profitable firms). However, if dividends are costly due to the increased need for external finance, then both the cost and benefit of signaling may be decreasing in firm size and transparency. If the costs decrease faster than the benefits, we may observe established firms making a disproportionate share of dividend payments.

Lastly, we argue that from a methodological standpoint, future studies investigating the information content of dividends or other corporate actions should follow the "event window" approach. Because earnings changes mean revert, if an event has information content, that information content will be strongest in the short window after the event. Thus, mean reversion of earnings requires careful delineation of earnings before and after an event to establish or refute that the event has information content about future earnings.

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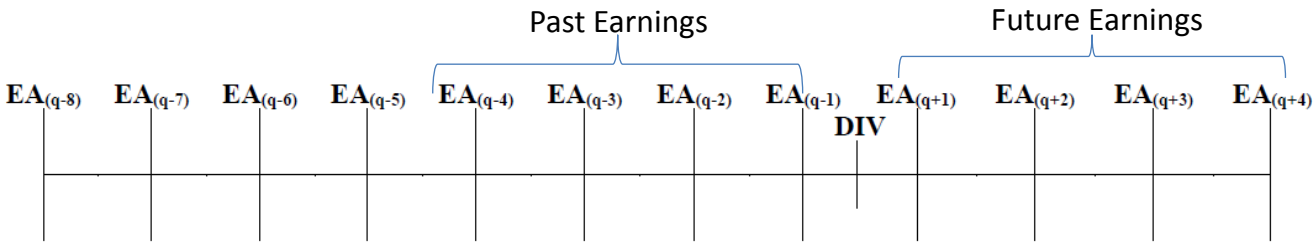
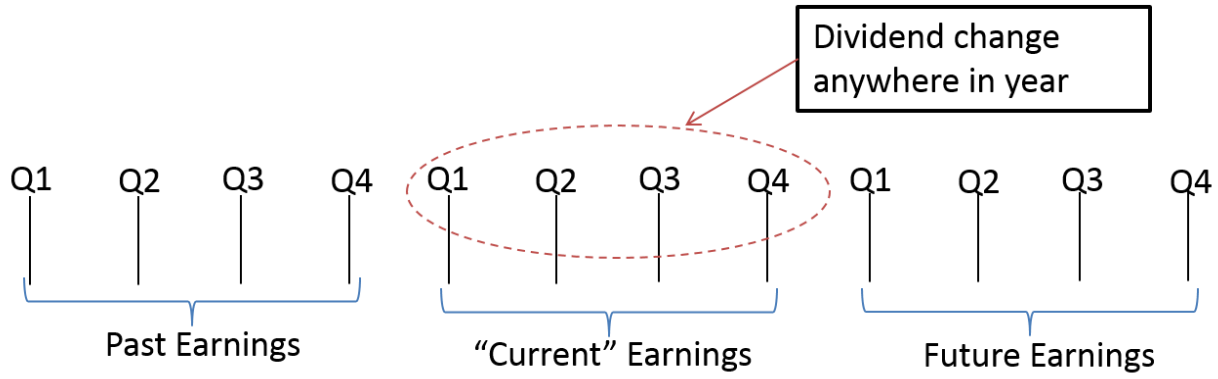
Figure 1: Timeline
Panel A: Event Study Approach



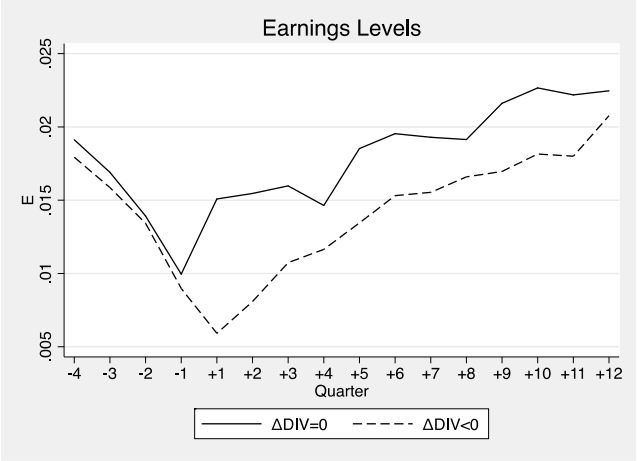
Panel B: Fiscal Year Approach



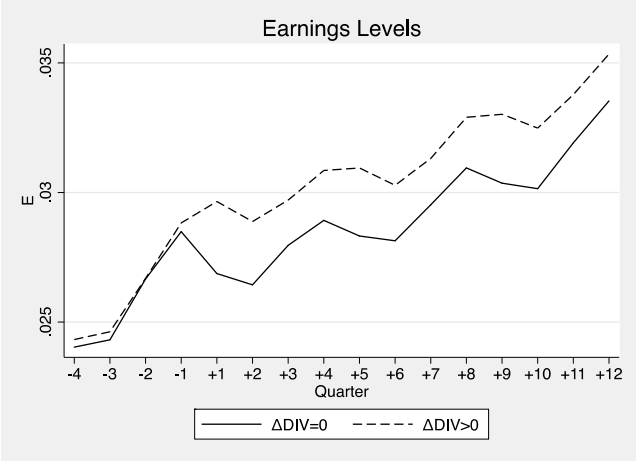
This figure reports a timeline to depict the sample and variable construction. Using the event study approach (Panel A), all dividend declarations in the sample occur between two consecutive earnings announcements. We refer to the lower (upper) bound earnings announcement quarter as quarter q-1 (q+1). If the dividend declaration falls on an earnings announcement date we consider that earnings announcement as quarter q-1. All quarterly earnings definitions follow accordingly. For example, $E_{(q-1)}$ refers to earnings announced at $EA_{(q-1)}$. All annual earnings calculations sum four consecutive quarterly earnings figures. For example, $E_{(y+1)}$ is the sum of the four quarterly earnings figures announced at $EA_{(q+1)}$ through $EA_{(q+4)}$ and $E_{(y-1)}$ is the sum of the four quarterly earnings figures announced at $EA_{(q-4)}$ through $EA_{(q-1)}$. All annual earnings change calculations sum four consecutive quarterly earnings figures less the sum of the four consecutive quarterly earnings figures before the dividend declaration. For example, $\Delta E_{(y+1)}$ is the sum of the four quarterly earnings figures announced at $EA_{(q+1)}$ through $EA_{(q+4)}$ less the sum of the four quarterly earnings figures announced at $EA_{(q-4)}$ through $EA_{(q-1)}$. $\Delta E_{(y+2)}$ is the sum of the four quarterly earnings figures announced at $EA_{(q+5)}$ through $EA_{(q+8)}$ less the sum of the four quarterly earnings figures announced at $EA_{(q-4)}$ through $EA_{(q-1)}$. Using the fiscal year approach (Panel B), the change in earnings is the difference in the sum of earnings over the four quarters of the future fiscal year minus the sum of earnings over the four quarters of the current fiscal year (when the dividend is declared).

Figure 2: Relation Between Dividend Changes and Future Earnings – Matching Analysis

Panel A: Dividend Decreases



Panel B: Dividend Increases



This figure reports the matching analysis results. In Panel A (B) each dividend decrease (increase) observation is matched to a firm in the same industry and quarter with no dividend change. Observations are matched via the level and change in earnings over quarters q-4 to q-1. Both Panels report graphs that illustrate the earnings levels (E) over quarters q-4 to q+12. Appendix A reports variable definitions. Figure 1 depicts the timeline for quarter and year designations.

Table 1: Descriptive Statistics

	ΔDIV=0 (N=140,733)		ΔDIV<0 (N=1,746)		ΔDIV>0 (N=23,079)	
Variable	Mean	Median	Mean	Median	Mean	Median
ΔDIV	0.000	0.000	-0.492	-0.500	0.188	0.118
$\Delta E_{(v-2)}$	0.081	0.071	0.080	0.073	0.087	0.073
$\Delta E_{(v-1)}$	0.087	0.075	0.049	0.049	0.107	0.086
$\Delta E_{(v+1)}$	0.091	0.078	0.028	0.034	0.121	0.093
$\Delta E_{(v+2)}$	0.099	0.083	0.057	0.052	0.128	0.097
$\Delta E_{(v+3)}$	0.109	0.089	0.073	0.059	0.138	0.103
$Ret_{(-2,+2)}$	0.001	0.000	-0.033	-0.019	0.009	0.006
$Ret_{(-2,-20)}$	0.000	-0.004	-0.021	-0.022	0.007	0.002
$Ret_{(-21,-40)}$	0.000	-0.004	-0.018	-0.021	0.004	0.001
$Ret_{(-41,-60)}$	0.003	-0.001	-0.011	-0.011	0.007	0.002
$Ret_{(-61,-120)}$	0.003	-0.005	-0.038	-0.045	0.015	0.005
$Ret_{(-121,-240)}$	0.009	-0.009	-0.028	-0.048	0.040	0.016

This table reports descriptive statistics. Columns 1-2 report observations without a dividend change, columns 3-4 report observations with a decrease in the dividend, and columns 5-6 report observations with an increase in the dividend. Appendix A reports variable definitions. Figure 1 depicts the timeline for quarter and year designations.

Table 2: Dividend Changes and Future Earnings Changes
Panel A: Event Window Approach

	(1) $\Delta E_{(y+1)}$	(2) $\Delta E_{(y+2)}$	(3) $\Delta E_{(y+3)}$
ΔDIV	0.025***	0.018***	0.018**
	(5.134)	(3.183)	(2.674)
$Ret_{(-2,-20)}$	0.086***	0.100***	0.095***
	(15.299)	(10.811)	(9.616)
$Ret_{(-21,-40)}$	0.078***	0.091***	0.094***
	(11.451)	(10.512)	(9.138)
$Ret_{(-41,-60)}$	0.074***	0.084***	0.079***
	(11.624)	(9.359)	(8.256)
$Ret_{(-61,-120)}$	0.063***	0.070***	0.071***
	(11.197)	(10.056)	(9.508)
$Ret_{(-121,-240)}$	0.033***	0.037***	0.040***
	(8.258)	(8.161)	(8.901)
$E_{(q-1)}$	0.412***	0.341***	0.332***
	(13.156)	(4.740)	(3.732)
$E_{(q-2)}$	0.066*	0.079	0.128
	(1.781)	(1.097)	(1.364)
$E_{(q-3)}$	0.021	0.030	0.060
	(0.563)	(0.415)	(0.643)
$E_{(q-4)}$	-0.099**	-0.061	0.007
	(-2.051)	(-0.809)	(0.070)
$\Delta E_{(q-1)}$	0.452***	0.298***	0.257***
	(8.527)	(4.273)	(3.220)
$\Delta E_{(q-2)}$	0.161***	0.078	0.039
	(4.386)	(1.191)	(0.486)
$\Delta E_{(q-3)}$	0.075	0.017	-0.047
	(1.558)	(0.232)	(-0.559)
$\Delta E_{(q-4)}$	0.035	-0.035	-0.159
	(0.666)	(-0.421)	(-1.358)
Intercept	-0.007***	0.000	0.004
	(-2.745)	(0.000)	(0.820)
Non-linear Controls	Included	Included	Included
Observations	165,558	154,945	145,042
R-squared	0.187	0.114	0.093

Panel B: Fiscal Year Approach

	(1) $\Delta E_{(fy+1)}$	(2) $\Delta E_{(fy+2)}$	(3) $\Delta E_{(fy+3)}$
ΔDIV	0.001	-0.002	-0.011**
	(0.278)	(-0.663)	(-2.338)
$Ret_{(-2,-20)}$	0.036***	0.043***	0.042***
	(7.683)	(7.015)	(5.276)
$Ret_{(-21,-40)}$	0.036***	0.041***	0.050***
	(7.852)	(5.959)	(5.719)
$Ret_{(-41,-60)}$	0.028***	0.027***	0.035***
	(6.146)	(4.037)	(4.115)
$Ret_{(-61,-120)}$	0.022***	0.025***	0.032***
	(7.671)	(5.112)	(5.137)
$Ret_{(-121,-240)}$	0.012***	0.012***	0.013**
	(5.650)	(3.553)	(2.321)
$E_{(fq4)}$	0.249***	0.189**	0.149
	(5.290)	(2.440)	(1.544)
$E_{(fq3)}$	0.192***	0.180**	0.159*
	(4.273)	(2.470)	(1.834)
$E_{(fq2)}$	-0.031	0.051	0.049
	(-0.453)	(0.443)	(0.322)
$E_{(fq1)}$	0.005	0.004	0.143
	(0.078)	(0.037)	(1.036)
$\Delta E_{(fq4)}$	0.358***	0.240***	0.221***
	(7.451)	(3.468)	(2.710)
$\Delta E_{(fq3)}$	0.308***	0.261**	0.126
	(4.651)	(2.465)	(1.262)
$\Delta E_{(fq2)}$	0.120	0.111	-0.006
	(1.313)	(0.749)	(-0.034)
$\Delta E_{(fq1)}$	-0.060	-0.308**	-0.523***
	(-0.548)	(-2.146)	(-2.987)
Intercept	-0.009***	-0.003	0.004
	(-3.333)	(-0.684)	(0.732)
Non-linear Controls	Included	Included	Included
Observations	176,757	166,052	155,903
R-squared	0.131	0.107	0.103

Panel C: Fiscal Year Approach by Fiscal Quarter

	(1)	(2)	(3)	(4)
	$\Delta E_{(fy+1)}$	$\Delta E_{(fy+1)}$	$\Delta E_{(fy+1)}$	$\Delta E_{(fy+1)}$
ΔDIV	-0.004	-0.005	-0.002	0.010***
	(-1.038)	(-1.142)	(-0.288)	(2.709)
$Ret_{(-2,-20)}$	0.016**	0.013*	0.044***	0.071***
	(2.499)	(1.700)	(5.174)	(9.975)
$Ret_{(-21,-40)}$	0.016**	0.018**	0.036***	0.078***
	(2.306)	(2.255)	(4.326)	(9.896)
$Ret_{(-41,-60)}$	0.018***	0.018**	0.030***	0.048***
	(2.956)	(2.286)	(4.892)	(6.917)
$Ret_{(-61,-120)}$	0.018***	0.019***	0.017***	0.040***
	(4.170)	(4.461)	(3.395)	(7.057)
$Ret_{(-121,-240)}$	0.006**	0.011***	0.016***	0.017***
	(2.044)	(3.184)	(4.946)	(5.560)
$E_{(fq4)}$	0.271***	0.244***	0.252***	0.216***
	(5.079)	(4.532)	(5.257)	(4.388)
$E_{(fq3)}$	0.207***	0.196***	0.197***	0.146***
	(4.323)	(3.848)	(3.760)	(3.235)
$E_{(fq2)}$	-0.001	-0.030	-0.053	-0.034
	(-0.019)	(-0.450)	(-0.715)	(-0.466)
$E_{(fq1)}$	0.034	0.000	0.003	-0.034
	(0.457)	(0.006)	(0.048)	(-0.460)
$\Delta E_{(fq4)}$	0.367***	0.353***	0.363***	0.336***
	(6.549)	(7.267)	(7.138)	(6.874)
$\Delta E_{(fq3)}$	0.309***	0.331***	0.326***	0.239***
	(4.215)	(4.982)	(4.472)	(3.803)
$\Delta E_{(fq2)}$	0.103	0.136	0.127	0.103
	(0.992)	(1.447)	(1.344)	(1.148)
$\Delta E_{(fq1)}$	-0.059	-0.086	-0.033	-0.012
	(-0.542)	(-0.706)	(-0.293)	(-0.104)
Intercept	-0.010***	-0.009***	-0.009***	-0.007**
	(-3.785)	(-3.211)	(-3.002)	(-2.373)
Non-linear Controls	Included	Included	Included	Included
Quarter	Q1	Q2	Q3	Q4
Observations	43,736	44,769	44,243	44,009
R-squared	0.129	0.132	0.134	0.136

This table reports OLS regression results. The dependent variable is the earnings change for the time period denoted in the variable name. Standard errors are clustered by year of the dividend declaration. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. Appendix A reports variable definitions. Figure 1 depicts the timeline for quarter and year designations.

Table 3: Dividend Change Market Reactions and Persistence

	(1)	(2)	(3)	(4)
	$Ret_{(-2,+2)}$	$\Delta Div_{(y+1)}$	$\Delta Div_{(y+2)}$	$\Delta Div_{(y+3)}$
I(ΔDIV>0)	0.003***	-0.078***	-0.115***	-0.140***
	(4.900)	(-10.313)	(-12.083)	(-14.146)
I(ΔDIV<0)	-0.023***	0.178***	0.394***	0.513***
	(-6.791)	(8.994)	(11.790)	(14.084)
ΔDIV	0.028***	1.633***	2.302***	2.729***
	(5.903)	(26.387)	(30.689)	(31.029)
ΔDIV*abs(ΔDIV)	-0.011***	-0.561***	-0.876***	-1.114***
	(-3.705)	(-7.895)	(-13.790)	(-17.017)
Intercept	0.001***	0.063***	0.160***	0.266***
	(4.718)	(11.681)	(13.939)	(15.011)
Observations	165,558	152,681	139,858	128,325
R-squared	0.012	0.249	0.156	0.111

This table reports OLS regression results. In column (1), the dependent variable is the five day return centered on the dividend announcement. In columns (2)-(4), the dependent variable is the percentage dividend change one-three years ahead. Standard errors are clustered by year of the dividend declaration. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. Appendix A reports variable definitions.

Table 4: Affect of the Dividend Change Sign and Magnitude on Information Content

	(1) $\Delta E_{(y+1)}$	(2) $\Delta E_{(y+2)}$	(3) $\Delta E_{(y+3)}$	(4) $\Delta E_{(y+1)}$	(5) $\Delta E_{(y+2)}$	(6) $\Delta E_{(y+3)}$	(7) $\Delta E_{(y+1)}$	(8) $\Delta E_{(y+2)}$	(9) $\Delta E_{(y+3)}$
abs(ΔDIV>0)	0.021***	0.018***	0.018**						
	(4.938)	(2.706)	(2.186)						
abs(ΔDIV<0)	-0.047***	-0.019**	-0.022**						
	(-5.284)	(-2.181)	(-2.155)						
rank(ΔDIV>0)				0.018***	0.017***	0.017***			
				(10.130)	(5.767)	(4.249)			
rank(ΔDIV<0)				-0.043***	-0.018**	-0.021**			
				(-5.462)	(-2.258)	(-2.212)			
pret(ΔDIV>0)							0.934***	0.983***	1.039***
							(13.563)	(7.310)	(5.670)
pret(ΔDIV<0)							-0.537***	-0.143	-0.105
							(-6.661)	(-1.431)	(-0.932)
Intercept	-0.007**	0.000	0.004	-0.007***	-0.001	0.004	-0.007***	-0.001	0.003
	(-2.629)	(0.003)	(0.826)	(-2.842)	(-0.136)	(0.711)	(-2.851)	(-0.172)	(0.654)
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	165,558	154,945	145,042	165,558	154,945	145,042	165,558	154,945	145,042
R-squared	0.187	0.114	0.093	0.189	0.114	0.093	0.189	0.115	0.094

This table reports OLS regression results. The dependent variable is the earnings change for the time period denoted in the variable name. Standard errors are clustered by year of the dividend declaration. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. Appendix A reports variable definitions. Figure 1 depicts the timeline for quarter and year designations.

Table 5: Information Content of Dividends Using Other Measures of Earnings

Panel A: Gross Profit

	(1) $\Delta GP_{(y+1)}$	(2) $\Delta GP_{(y+2)}$	(3) $\Delta GP_{(y+3)}$	(4) $\Delta GP_{(y+1)}$	(5) $\Delta GP_{(y+2)}$	(6) $\Delta GP_{(y+3)}$
rank(ΔDIV>0)	0.013***	0.020***	0.024***			
	(5.824)	(4.601)	(3.593)			
rank(ΔDIV<0)	-0.020***	-0.031***	-0.042***			
	(-3.584)	(-3.670)	(-3.423)			
pret(ΔDIV>0)				0.677***	1.120***	1.405***
				(6.464)	(5.547)	(4.904)
pret(ΔDIV<0)				-0.262***	-0.289**	-0.346**
				(-3.520)	(-2.532)	(-2.035)
Intercept	0.005***	0.010***	0.015***	0.005***	0.010***	0.014***
	(4.280)	(4.171)	(4.009)	(4.057)	(3.951)	(3.821)
Controls	Included	Included	Included	Included	Included	Included
Observations	134,439	124,683	115,986	134,439	124,683	115,986
R-squared	0.290	0.199	0.195	0.290	0.200	0.195

Panel B: Operating Expenses

	(1) $\Delta OpExp_{(y+1)}$	(2) $\Delta OpExp_{(y+2)}$	(3) $\Delta OpExp_{(y+3)}$	(4) $\Delta OpExp_{(y+1)}$	(5) $\Delta OpExp_{(y+2)}$	(6) $\Delta OpExp_{(y+3)}$
rank(ΔDIV>0)	0.011***	0.020***	0.030***			
	(5.105)	(5.481)	(5.311)			
rank(ΔDIV<0)	-0.022***	-0.050***	-0.065***			
	(-2.959)	(-4.601)	(-4.840)			
pret(ΔDIV>0)				0.543***	1.058***	1.544***
				(5.900)	(6.278)	(6.544)
pret(ΔDIV<0)				-0.243***	-0.534***	-0.659***
				(-2.855)	(-4.055)	(-3.842)
Intercept	0.006***	0.011***	0.015***	0.006***	0.011***	0.015***
	(7.028)	(5.562)	(5.260)	(6.699)	(5.286)	(5.026)
Controls	Included	Included	Included	Included	Included	Included
Observations	134,439	124,675	115,979	134,439	124,675	115,979
R-squared	0.205	0.195	0.210	0.205	0.195	0.210

This table reports OLS regression results. The dependent variable is the gross profit or operating expenses change for the time period denoted in the variable name. Standard errors are clustered by year of the dividend declaration. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. Appendix A reports variable definitions. Figure 1 depicts the timeline for quarter and year designations.

Table 6: Analyst Forecasts

	(1) $FE_{(y+1)}$	(2) $FE_{(y+2)}$	(3) $REV_{(y+1)}$	(4) $REV_{(y+2)}$	(5) $FE_{(y+1)}$	(6) $FE_{(y+2)}$	(7) $REV_{(y+1)}$	(8) $REV_{(y+2)}$
rank(ΔDIV>0)	0.003***	0.005***	0.000***	0.001***				
	(5.042)	(4.757)	(3.790)	(4.662)				
rank(ΔDIV<0)	-0.010***	-0.010	-0.002***	-0.002**				
	(-2.790)	(-1.460)	(-3.319)	(-2.294)				
pret(ΔDIV>0)					0.133***	0.293***	0.020***	0.031***
					(4.986)	(4.878)	(3.850)	(4.654)
pret(ΔDIV<0)					-0.181***	-0.160	-0.024***	-0.027***
					(-3.580)	(-1.591)	(-4.562)	(-2.775)
$FE_{(y-1)}$	0.793***	1.121***	0.039***	0.019*	0.791***	1.120***	0.039***	0.019*
	(13.589)	(7.414)	(6.740)	(1.979)	(13.583)	(7.421)	(6.740)	(1.961)
$Ret_{(-2,-20)}$	0.018***	0.051***	0.004***	0.007***	0.018***	0.051***	0.004***	0.007***
	(10.750)	(11.582)	(14.929)	(10.056)	(10.719)	(11.579)	(15.049)	(10.090)
$Ret_{(-21,-40)}$	0.014***	0.047***	0.003***	0.005***	0.014***	0.047***	0.003***	0.005***
	(6.841)	(9.873)	(7.749)	(7.022)	(6.809)	(9.837)	(7.756)	(7.022)
$Ret_{(-41,-60)}$	0.013***	0.041***	0.003***	0.005***	0.013***	0.041***	0.003***	0.005***
	(6.479)	(8.463)	(8.259)	(8.006)	(6.410)	(8.432)	(8.221)	(8.010)
$Ret_{(-61,-120)}$	0.011***	0.034***	0.002***	0.003***	0.011***	0.034***	0.002***	0.003***
	(7.804)	(8.550)	(7.365)	(6.740)	(7.770)	(8.544)	(7.338)	(6.716)
$Ret_{(-121,-240)}$	0.007***	0.018***	0.001***	0.001**	0.007***	0.018***	0.001***	0.001**
	(7.139)	(6.903)	(4.937)	(2.687)	(7.148)	(6.887)	(4.938)	(2.680)
Intercept	-0.003***	-0.011***	-0.001***	-0.001***	-0.003***	-0.011***	-0.001***	-0.001***
	(-5.955)	(-6.476)	(-8.233)	(-5.571)	(-5.916)	(-6.453)	(-8.181)	(-5.555)
Observations	413,510	340,364	413,510	340,364	413,510	340,364	413,510	340,364
R-squared	0.096	0.083	0.032	0.036	0.097	0.083	0.032	0.037

This table reports OLS regression results. The dependent variable is analyst forecast errors or analyst forecast revisions for the time period denoted in the variable name. Standard errors are clustered by year of the dividend declaration. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. Appendix A reports variable definitions.

Table 7: Persistence of Past Earnings Changes

	(1) $\Delta E_{(fy+1)}$	(2) $\Delta E_{(y+1)}$	(3) $\Delta E_{(y+1)}$
ΔDIV	-0.013***	0.029***	0.025***
	(-3.018)	(4.551)	(4.707)
$\Delta DIV*\Delta E_{(fy0)}$	0.159**		
	(2.438)		
$\Delta DIV*\Delta E_{(y-1)}$		0.070	0.017
		(1.354)	(0.432)
Intercept	0.008***	0.005**	-0.007***
	(3.318)	(2.632)	(-2.744)
Controls	Excluded	Excluded	Included
Observations	176,757	165,558	165,558
R-squared	0.001	0.003	0.187

This table reports OLS regression results. The dependent variable is the earnings change for the time period denoted in the variable name. Standard errors are clustered by year of the dividend declaration. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. Appendix A reports variable definitions. Figure 1 depicts the timeline for quarter and year designations.

Table 8: Information Content of Buybacks vs. Dividends

	(1) $\Delta E_{(y+1)}$	(2) $\Delta E_{(y+2)}$	(3) $\Delta E_{(y+3)}$	(4) $\Delta E_{(y+1)}$	(5) $\Delta E_{(y+2)}$	(6) $\Delta E_{(y+3)}$
rank(Buyback)	0.008***	0.000	-0.002	0.005***	-0.001	-0.005*
	(6.507)	(0.176)	(-1.150)	(3.134)	(-0.325)	(-2.055)
rank(ΔDIV)				0.009***	0.009***	0.007***
				(6.330)	(4.813)	(3.239)
Intercept	-0.028***	-0.024***	-0.021***	-0.010**	0.002	0.008*
	(-8.560)	(-5.099)	(-4.120)	(-2.329)	(0.609)	(1.917)
P[ΔDIV] – P[Buyback]				p<0.05	p<0.05	p<0.01
Controls	Included	Included	Included	Included	Included	Included
Observations	388,170	343,052	301,749	64,445	59,027	53,352
R-squared	0.243	0.231	0.207	0.229	0.178	0.179

This table reports OLS regression results. The dependent variable is the earnings change for the time period denoted in the variable name. Standard errors are clustered by year of the quarter q-1 earnings announcement. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. Appendix A reports variable definitions. Figure 1 depicts the timeline for quarter and year designations.

Appendix A: Variable Definitions

Dividend Variables	
Name	**Definition**
ΔDIV	Current quarterly dividend less the prior quarterly dividend divided by the prior quarterly dividend.
ΔDIV(y+n)	Percentage change in the dividend n years ahead. The first year's change sums the next four quarterly dividends, subtracts the prior dividend multiplied by four, and scales by the prior dividend multiplied by four. The second (third) year's dividend change begins summing future dividend amounts with the fifth (ninth) dividend declaration after the current dividend.
abs(ΔDIV)	Absolute value of ΔDIV.
I(ΔDIV>0) / I(ΔDIV<0)	Indicator variable equal to one if ΔDIV is positive/negative (greater/less than +/- 0.1%), zero otherwise.
abs(ΔDIV>0) / abs(ΔDIV<0)	Absolute value of ΔDIV if ΔDIV is greater/less than 0.
rank(ΔDIV>0) / rank(ΔDIV<0)	Percentile rank of ΔDIV if ΔDIV is greater/less than 0.
pret(ΔDIV>0) / pret(ΔDIV<0)	Predicted return if ΔDIV is greater/less than 0. The predicted return is estimated as the predicted value from regressing announcement returns over the five day window centered on the dividend declaration on (i) the dividend change, (ii) the signed squared dividend change and (iii) indicators for positive and negative dividend changes.
rank(ΔDIV)	Percentile rank of ΔDIV.
Earnings Variables	
Name	**Definition**
$\Delta E_{(y+n)}$	Difference between the sum of the four quarterly earnings announced before the dividend declaration and earnings for four consecutive quarters after the dividend declaration. The first (second, third) year's earnings changes begin with the first (fifth, ninth) quarters after the dividend declaration. All changes are scaled by the market value of equity one year before the dividend declaration.
$E_{(q-n)}$	Earnings before extraordinary items (IBQ) announced n quarters before the dividend declaration, scaled by the market value of equity one year before the dividend declaration.
$\Delta E_{(q-n)}$	Earnings before extraordinary items (IBQ) announced n quarters before the dividend declaration less earnings before extraordinary items for the same quarter in the prior year, scaled by the market value of equity one year before the dividend declaration.
GP	Gross profit equals revenue (SALEQ) less cost of goods sold (COGSQ) scaled by the market value of equity. The naming convention for the timing of the variable follows that of the earnings variables above.
OpExp	Operating expenses measure the amount of expenses recognized during the quarter and equal gross profit (SALEQ-COGSQ) less earnings before extraordinary items (IBQ). The naming convention for the timing of the variable follows that of the earnings variables above.
$\Delta E_{(fy+n)}$	Difference between the fiscal year earnings during which the dividend is announced and fiscal year earnings for the one, two, and three years after the dividend declaration.
$E_{(fqn)}$	Earnings for fiscal quarter n during the fiscal year of the dividend declaration.
$\Delta E_{(fqn)}$	Earnings for fiscal quarter n during the fiscal year of the dividend declaration less the same quarter's earnings in the prior year.

Other Variables	
Name	**Definition**
$Ret_{(-j,+k)}$	Daily compounded returns from j trading days before the dividend declaration to k trading days after the dividend declaration less the daily compounded return to the value-weighted market portfolio over the same period.
$FE_{(y+n)}$	Analyst forecast errors for the earnings per share forecast n years ahead. The forecast error is the EPS forecast issued between the most recent earnings announcement and two days before the dividend declaration, scaled by price at the prior earnings announcement.
$REV_{(q+n)}$	Analyst revisions to the earnings per share forecast n years ahead. The revision is the difference between the post-declaration forecast and the pre-declaration forecast, scaled by price at the prior earnings announcement. If the analyst does not revise the forecast in the post-declaration period, the revision is set to zero.
rank(Buyback)	Percentile rank of the authorized buyback (shares authorized scaled by shares outstanding).