The Information Content of Dividends: Safer Profits, not Higher Profits*

Roni Michaely[†], Stefano Rossi[‡], and Michael Weber[§]

This version: June 2017

Abstract

A large body of empirical literature suggests changes in future earnings do not follow dividend changes. We show theoretically that dividends may signal safer, rather than higher future profits, that is, dividends signal the second moment of future profits rather than the first moment. We use the Campbell (1991) decomposition to estimate changes in cash-flow volatility around dividend events from data on stock returns. We find that cash-flow volatility is significantly lower after dividend increases and higher after dividend decreases. Crucially, consistent with our model, larger changes in dividends are associated with larger changes in cash-flow volatility in the expected direction; and larger changes in volatility following a dividend change are associated with larger announcement returns. We also find that for the same dollar of dividend paid there are larger changes in cash-flow volatility for firms with smaller current earnings, consistent with the model's prediction that the cost of the signal is foregone investment opportunities. Finally, we argue our methodology can be applied to overcome empirical problems in testing theories of corporate financing more generally.

JEL classification:

Keywords:

*We thank Xavier Freixas, Nicola Gennaioli, Jose-Luis Peydro, Victoria Vanasco and seminar participants at Cambridge, London Business School, London School of Economics, Universitat Pompeu Fabra and University of Warwick for valuable comments. Weber acknowledges financial support by the Fama-Miller Center for Research in Finance at the University of Chicago Booth School of Business. We thank Xiao Yin for valuable research assistance.

[†]Johnson@Cornell Tech, Cornell University, NY, USA. e-Mail: rm34@cornell.edu

[‡]Bocconi University, Milan, Italy; CEPR and ECGI. e-Mail: rossi.stefano@unibocconi.it.

[§]Booth School of Business, University of Chicago, Chicago, IL, USA and NBER. e-Mail: michael.weber@chicagobooth.edu.

I Introduction

Dividends represent one of the major financial decisions of corporations and one of the main puzzles for academic economists. Understanding why firms pay dividends has bearings for theories of asset pricing, capital structure, capital budgeting, cost of capital, and also for public economics, in particular for the effects of tax policy. Yet, despite extensive research we still do not fully understand why some firms pay dividends and some others do not. Even firms with very similar observable characteristics such as earnings and level of cash display stark differences in terms of their dividend policies.

One hypothesis, initially postulated by Miller and Modigliani (1961), and later formalized by Miller and Rock (1985) and others, holds that dividends signal future profits. If managers have superior information about the level of firms' future profits, the decision to pay dividends can convey such information to the market. This very appealing and intuitive idea was initially very popular, as it is consistent with the extensive empirical evidence that stock prices systematically increase at the announcement of dividend initiations or increases; and systematically decrease at the announcement of dividend omissions or decreases.[1] Accordingly, a large theoretical literature has formalized the dividend payment decision as one in which firm insiders with superior positive information (e.g., about the firm's future earnings or productivity) pay a dividend at some cost (e.g., foregone investment or deadweight losses due to taxes), to convey such information to the market.[2]

While initially very popular, the dividend signaling idea lost considerable traction in the face of the mounting evidence that, following dividend changes, actual earnings do not change in the same direction. In fact, as stated in several reviews of the literature (see, e.g., Allen and Michaely (2003) and DeAngelo, DeAngelo, and Skinner (2009)), a necessary condition for the dividend signaling hypothesis to explain dividend policy is that dividend changes predict future changes in earnings or cash flows in the same direction. Yet, studies by Watts (1973), Gonedes (1978), Penman (1983), DeAngelo,

[1] See, e.g., Pettit (1972, 1977), Charest (1978), Asquith and Mullins Jr (1983), Brickley (1983), and Eades, Hess, and Kim (1985).

[2] See, e.g., Bhattacharya (1979, 1980), John and Williams (1985), Miller and Rock (1985), and Bernheim (1991).

DeAngelo, and Skinner (1996), Benartzi, Michaely, and Thaler (1997), Grullon, Michaely, and Swaminathan (2002), among others find little or no evidence that dividend changes predict abnormal changes in earnings. DeAngelo et al. (2009) summarize the empirical evidence as follows: "We conclude that managerial signaling motives [...] have at best minor influence on payout policy"

Yet, the notion that dividends convey information about some firm's prospects is intuitive and remains popular. First, Brav, Graham, Harvey, and Michaely (2005) report that almost 80% of managers believe dividend policy convey information. But information about what? Empirical evidence suggest it is not about the level of earnings or cash flows.

In this paper we propose, in the spirit of Lintner (1956), that dividends do not signal the first moment of future profits, that is, the average of expected future profits, but rather their second moment, that is, the volatility of expected future profits. Managers increase dividends when they believe the chance for future cuts are lower, in the spirit of Lintner (1956) and Brav et al. (2005) observations. If dividend initiations or increases signal safer profits going forward, then it is natural to expect future dividend payments to remain stable once they are initiated or increased. Furthermore, if there is a cost to omit or discontinue dividends then naturally when earnings are more stable the risk of having to omit or discontinue dividends is low.

To develop our hypothesis more formally we provide a theoretical framework in which managers have superior information about the volatility of future cash flows relative to investors. Investors care about future cash-flow volatility, because they are risk averse. In the spirit of Miller and Rock (1985), paying dividends is costly to firms because by doing so the firm foregoes future investment opportunities, the more so for the firms with riskier cash flows. In this context, safer firms have an incentive to pay a dividend to signal their low future cash-flow volatility, and riskier firms find it too costly to do the same. In such a separating equilibrium, the market perfectly learns the firm's true type. As a result, dividends perform two functions in our model. First, dividends signal safer future cash flows, thereby increasing the share price today. Second, dividends help investors meet their liquidity needs, at least partially.

The main prediction of our framework is that cash-flow volatility should decrease following a dividend increase (or initiation), and should increase following a dividend decrease (or omission); furthermore, larger dividend payments should carry more information, in the sense that larger dividend increases should be followed by both larger decreases in cash flow volatility and larger cumulative abnormal returns at the announcement.

Our framework predicts another important insight regarding the economic channel underlying our results. Since the cost of the signal is foregone investment opportunities, then following a dividend change we should expect a larger change in future cash flow volatility for firms with smaller current earnings. The intuition for this cross-sectional implication is straightforward. The smaller the current earnings, the larger the foregone future investment opportunities at a given level of dividend. As a result, the same dividend should carry a larger information content.

We test the model's predictions empirically. We begin by observing that corporate earnings are not stationary.[3] This observation is akin to the observation by Fama (1965) and others that stock prices are not stationary, which prompted the field of asset pricing to focus empirically on stock returns rather than on levels of stock prices. Because earnings are not stationary, a naive approach of comparing the realized variance of earnings before and after a dividend event would be uninformative, as the results of such an approach would reflect such non-stationarity rather than any information content of dividends.

We address this challenge by borrowing a methodology from asset pricing and by showing how this methodology can be applied to overcome empirical problems in testing theories of corporate financing. We use a methodology initially proposed by Campbell (1991), Campbell and Shiller (1988a), and Campbell and Shiller (1988b) to study aggregate market return predictability. They argue that unexpectedly high returns come either from positive news about future cash flows or news about lower future discount rates. Vuolteenaho (2002) extends this framework and applies it at the individual firm level. We follow Vuolteenaho (2002) to construct cash-flow and discount-rate news and we examine whether they vary around dividend events.

At the firm level we identify four "dividend events": dividend initiations, omissions,

[3]As mentioned above, a large accounting literature has proposed a variety of adjustments for linear or non-linear trends in corporate earnings. There is currently no consensus on which adjustment to make.

increases, and decreases. Then, for each one of such events we estimate two firm-level vector autoregressions to isolate return and cash-flow news, one for the 60 months before the event and another for the 60 months afterwards, and we compare the variance of cash flow news before and after the dividend event.

We find that the variance of cash flow news is significantly lower after dividend initiations and dividend increases; and we find that the variance of cash-flow news is significantly higher after dividend omissions and dividend decreases. Crucially, consistent with theory, larger changes in dividends are associated with larger changes in cash flow variance in the expected direction; and announcements of larger changes in dividends are associated with larger cumulative abnormal returns in the same direction. We also confirm the model prediction that the signal should be more informative for firms with larger volatility. Dividend changes for firms with higher volatility are associated with larger changes in cash-flow volatility and dividend-event returns. We also revisit the earlier evidence on changes in the first moment of earnings following changes in dividends using our new methodology, and we confirm the previous findings that in general corporate earnings do not change in the same direction as dividend changes. After that, we examine the cross-sectional variation of changes in volatility. Consistent with our framework in which the cost of the signal is foregone investment opportunities, we find that for the same $1 of dividend paid there are larger changes in cash-flow volatility for firms with smaller current earnings.

Finally, we examine share repurchases. In our framework, share repurchases are yet another way to return cash to shareholders. As a result, we expect a similar pattern of changes in cash-flow volatility following share repurchases announcements as we did expect and find following announcements of dividend increases and initiations. Consistent with our hypothesis, we find a strong decline in cash flow volatility following share repurchase announcements (and no changes in the first moment of either cash flow or discount rate news); and larger share repurchase programs are associated with larger reductions in cash flow volatility. Furthermore, again consistent with our hypothesis, we find that larger cumulative abnormal returns on the announcement share repurchases are associated with larger subsequent declines in cash-flow volatility. We conclude that announcements of changes to firms' payout policy convey information about future changes in firms' cash-flow volatility.

The paper proceeds as follows. Section II presents the theoretical framework; Section III presents our method for estimating cash flow and discount rate news and their variances around dividend events; Section IV presents the data; Section V presents our empirical results; Section VI concludes.

II The Theoretical Framework

In this section we develop our testable hypotheses. We begin by showing in Section 2.A that a simple framework with symmetric information and a precautionary savings motive is sufficient to generate our main prediction that dividend payments should correlate negatively with subsequent changes in cash flow volatility. Such a simple framework, however, cannot account for 1) cross-sectional variation in the response of cash flow volatility changes to dividend changes, and 2) the announcement return evidence. Therefore, in Section 2.B we add asymmetric information about future cash flow volatility, we solve the asymmetric information model in Section 2.C and we then develop our additional testable hypotheses in Section 2.D.

A. Basic Setting

Consider a corporation run by a manager and operating for three dates ($t = 0, 1, 2$) and two periods. At $t = 0$, the manager starts out with some cash reserves, ω_0, and invests, $I_0 \leq \omega_0$. At $t = 1$, the manager decides to pay dividends D_1. After that, cash flows are realized, $Y_1 = f(I_o) + \upsilon$, where f is a production function with $f' > 0$, $f'' < 0$, and $f''' > 0$; is distributed according to some function G, with expected value $\mathbb{E}(\upsilon)$ that we normalize to 0 and some known variance σ^2. After dividends are paid and cash flows are realized, the manager invests any remaining cash, setting $I_1 = Y_1 - D_1 + (\omega_0 - I_0)$. At $t = 2$, the manager pays out the final cash flows $Y_2 = f(I_1) + \upsilon$.[4] The interest rate equals zero.

[4]All values I_0, I_1, Y_1, Y_2, D_1 can be thought as being *per share*, without loss of generality.

We assume that the manager chooses dividends to maximize the expected value of the firm on behalf of the firm's investors. The manager thus maximizes the expected utility function

$$\mathbb{E}\left[U\left(W\right)\right]=\mathbb{E}\left[W\right]-\frac{a}{2}\cdot\sigma^{2}\left(W\right)$$

where $\mathbb{E}[W]$ is the expected value of the investors' wealth, $\sigma^2(W)$ is the variance of wealth and a is a risk aversion parameter. One way to interpret this utility function is to assume that the firm is owned by institutional shareholders whose risk aversion reflects institutional or legal constraints, such as for example institutional charter and prudent man rule restrictions.

We maintain throughout the analysis the existence of some financial constraints. To illustrate our results in a more stark manner, we completely shut down the firm's access to financial markets, although our results just require that external financing is not perfectly costless. Similarly, we maintain that managers cannot perfectly hedge the risk of the firm's future cash flows.[5]

In this setting, the manager chooses the dividend payment to maximize

$$\begin{aligned}
&\max_{D_1} D_1+\mathbb{E}\left[U\left(Y_2\right)\right]\\
&\text{subject to}\\
&Y_2=f\left(I_1\right)+\upsilon\\
&\mathbb{E}\left[Y_1\right]=D_1+I_1
\end{aligned}$$

which implies

$$\max_{D_1} D_1+f\left(Y-D_1-\frac{a}{2}\cdot\sigma^{2}\right)$$

where $\mathbb{E}[Y_1]=Y$, $\mathbb{E}\left[U\left(\mathbb{E}[Y_1]-D_1\right)\right]=f\left(Y-D_1-\frac{a}{2}\cdot\sigma^2\right)$ and a is the risk aversion coefficient. The F.O.C. is $1-f'\left(Y-\frac{a}{2}\cdot\sigma^2-D_1\right)\geq 0$.

[5] With financial risk management and hedging, a firm's earnings become more informative about the firm's future prospects, thereby limiting any information content of dividend policy (see, e.g., Duffie and De Marzo (1995)).

Prediction 1. It is straightforward to see that

$$\frac{\partial \sigma^2}{\partial D_1} = -\frac{2}{a} < 0$$

Larger dividends should be associated with subsequent lower cash flow volatility. Because managers pay dividends before the cash flows are realized, they take into account, in a certainty equivalence sense, that paying higher dividends will make it more likely to have to pass up future investment opportunities, the higher the (expected) volatility of future cash flows.

This stylized model already delivers the main hypothesis of our paper that dividend changes should be followed by changes in cash flow volatility in the opposite direction. Of course, this model is too stylized. First and foremost, because it is based upon a symmetric information setting, it cannot account for the stock returns evidence that dividend announcements are taken by the investors to be "good news". Furthermore, it only delivers a time series, "before-after" prediction, with no cross sectional variation (e.g., in this basic setting, $\left.\frac{\partial^2 \sigma^2}{\partial D_1 \partial Y_1}\right|_{\widehat{D}_1} = 0$). More generally, one can think of several alternative ways in which dividend changes and cash flow volatility changes might be negatively correlated. For example, more mature firms might both pay a higher dividend and experience lower cash flow volatility going forward. To address these issues and sharpen our understanding of the economic mechanism, to our basic setting in the next section we add asymmetric information about future cash flow volatility. Our purpose is to account for the announcement returns evidence, as well as generate additional empirical predictions, which we will then take to the data.

B. A Signalling Model of Dividends

Consistent with the signaling literature (e.g., Miller and Rock (1985)), we assume that some investors are hit by an idiosyncratic liquidity shock at $t = 1$ and as a result must sell their shares. To be precise, we assume that a fraction k of these investors sell after dividends D_1 are paid and before cash flows Y_2 are realized, while the remaining $(1 - k)$ will hold their shares until $t = 2$. Investors may trade shares continuously between $t = 0$

and $t = 2$.

We assume that the manager acts in the interest of investors who own the firm at $t = 1$. In addition, we assume that the manager learns σ^2 at $t = 1$ before paying dividends, while investors observe only D_1. As a result, at $t = 1$ there is asymmetric information about the variance of the firm's cash flows, σ^2, By contrast, both the investors and the manager know that $\mathbb{E}(\upsilon) = 0$. they have asymmetric information about the variance of the firm's cash flows, σ^2, which is distributed according to some function Ξ over $[\sigma^2_{\min}, \sigma^2_{\max}]$. In particular, the manager knows the true σ^2, while the investors attempt to infer σ^2 from the manager's dividend policy. Prior to $t = 1$, investors and the manager have symmetric information on σ^2 with $\mathbb{E}[\sigma^2] = \sigma^2_p$, i.e., the prior.

Therefore the manager maximizes:

$$\max_{D_1} D_1 + \mathbb{E}[U(Y_2)] - k \cdot \frac{a}{2} \cdot \sigma^2(D_1) - (1-k) \cdot \frac{a}{2} \cdot \sigma^2$$

subject to

$$Y_2 = f(I_1) + \upsilon$$

$$\mathbb{E}[Y_1] = D_1 + I_1$$

which implies

$$\max_{D_1} D_1 + f\left(Y - \frac{a}{2} \cdot \sigma^2 - D_1\right) - k \cdot \frac{a}{2} \cdot \sigma^2(D_1) - (1-k) \cdot \frac{a}{2} \cdot \sigma^2.$$

In the Appendix we show that the concavity of the production funcion guarantees that the single-crossing property of signaling games is satisfied. More generally, we show that this problem satisfies the Riley (1979) conditions for games of incomplete information.

C. Solving the Model

The first order condition yields:

$$1 - f'\left(Y - \frac{a}{2} \cdot \sigma^2 - D_1\right) - k \cdot \frac{a}{2} \cdot \frac{\partial \sigma^2(D_1)}{\partial D_1} = 0,$$

which is an ordinary differential equation that uniquely describes the schedule, $\sigma^2(D_1)$, given the boundary condition

$$\sigma^2(D^*) = \sigma^2_{\max}$$

which says that the lowest type with $\sigma^2(D^*) = \sigma^2_{\max}$ will choose dividends as in the full information case, thereby pinning down the Pareto dominant valuation schedule.

In this model, dividends are a signal to the market about the volatility of cash flows.

Because managers care about risk-averse short-term institutional investors, they would like to signal that their cash flows have low volatility and therefore higher value. For this signal to be credible and thus generate a separating equilibrium, it must be costly. To prevent imitation, the signal has to be costlier for the low types than for the high types. This follows from the concavity of the production function, as riskier rms have more to lose in terms of foregone investment if they pay a larger dividend in an attempt to mimic safer firms.

D. Comparative Statics and Testable Implications

We derive the main comparative statics, which will guide our empirical analysis in the next section. The first comparative statics, says that dividend changes should be followed by changes in future cash flow volatility in the opposite direction,

$$\frac{\partial\sigma^2}{\partial D_1} = -\frac{2}{a} + k \cdot \frac{\partial^2\sigma^2(D_1)}{\partial D_1^2} \cdot \frac{1}{f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)} < 0.$$

As in the basic setting, paying higher dividends will make it more likely to have to pass up future investment opportunities, the higher the (expected) volatility of future cash flows. There is also an additional effect that goes in the same direction, which is due to asymmetric information, namely, safer firms will be better able to afford to pay higher dividends.

The second comparative statics provides the more nuanced cross-section prediction of our model,

Prediction 2.

$$\frac{\partial^2 \sigma^2 (D_1)}{\partial D_1 \partial Y_1} = \frac{-k \cdot \frac{\partial^2 \sigma^2 (D_1)}{\partial D_1^2} \cdot f''' \left(Y - \frac{a}{2} \cdot \sigma^2 - D_1\right)}{\left[f'' \left(Y - \frac{a}{2} \cdot \sigma^2 - D_1\right)\right]^2} > 0$$

Prediction 2 states that the cross derivative of cash-flow volatility with respect to dividends and (current) earnings is positive. That is, cross-sectionally, following a dividend increase (re. decrease), we should expect a larger decrease (re. increase) in cash flow volatility for firms with smaller (re. larger) current earnings. The intuition is that, the smaller the current earnings, the larger are the foregone investment opportunities for a given level of dividend payment. Therefore, the same dividend should carry a larger information content for decreases in future cash-flow volatility, the smaller the current earnings. Note that this empirical implication crucially depends on asymmetric information about future cash flow volatility and does not obtain in the basic setting with precautionary savings of Section II.A.

Our next predictions relate to the effect of dividend announcements on firm valuation. In a fully separating equilibrium, investors perfectly learn the firm's type, σ^2, from the dividend announcement. Then, recalling that σ_p^2 indicates the prior investor belief about cash flow volatility, we obtain the change in firm value upon the dividend announcement, ΔV, as follows:

$$\Delta V = D_1 - \mathbb{E}[D_1] + \mathbb{E}[U(Y_2|D_1)] - \mathbb{E}[U(Y_2)] - \frac{a}{2}\left(\sigma^2 - \sigma_p^2\right),$$

where $\mathbb{E}[D_1]$ indicates the prior expectation of dividends and $\mathbb{E}[U(Y_2|D_1)]$ indicates the posterior expectation of the value of future cash flow upon observing dividend D_1. As in the dividend signaling literature, $\frac{\Delta V}{\Delta D_1} > 0$, reflecting the fact that larger dividend announcements represent news about better future prospects. Contrary to the extant literature, in our framework better future firm prospects refer not to the first but to the second moment of future cash flows. This leads us to two additional testable predictions.

Prediction 3. Denote with $\Delta\sigma^2 = \left(\sigma^2 - \sigma_p^2\right)$ the change in (expected) future cash flow volatility. Then we have:

$$\frac{\Delta V}{\Delta \sigma^2} = -\frac{a}{2} < 0,$$

that is, larger dividend announcement returns should be associated with larger subsequent reductions of cash flow volatility.

Prediction 4. We also obtain

$$\frac{\partial}{\partial \sigma_p^2} \Delta V = \frac{a}{2} > 0,$$

namely, the larger the prior cash flow volatility, the larger should be the dividend announcement return.

Predictions 3 and 4 are mirror images of one another. Announcements of dividend changes should carry a larger information content (i.e., have a larger announcement return), the larger the prior cash flow volatility, and the larger the expected reduction in future cash flow volatility. Note that also Predictions 3 and 4 do not obtain in the basic setting of Section II.A, as that setting was based on fully symmetric information.

We conclude this section by noticing that in our framework dividends and share repurchases are two equivalent ways to return cash to shareholders. As a result, Predictions 1-4 should also apply to share repurchases.[6]

III Method

To test our hypotheses on cash flow volatility changes following dividend changes we need, first and foremost, a measure of cash flow volatility. We begin by observing that corporate earnings are not stationary.[7] Because corporate earnings are not stationary, measuring cash-flow volatility using the realized variance of earnings would pick up such non-stationarity rather than any information content of dividends. A large accounting

[6]Note, however, that Prediction 2, which is about percent changes in cash payout, is not defined for dividend initiations and for share repurchases, as in those cases the starting level of cash returned to shareholders is zero.

[7]We use the terms earnings and cash flow interchangeably for much of this paper. In robustness tests we attempt to weed out the discretionary component of earnings to focus on cash flows, consistent with theoretical predictions.

literature has implicitly recognized this non-stationarity and has adopted a variety of adjustments for linear or non-linear trends in corporate earnings[8]. Here we also note that the observation that earnings are not stationary is akin to the observation by Fama (1965) and others that stock prices are not stationary, which prompted the field of asset pricing to focus empirically on stock returns, i.e., stock price changes, rather than stock price levels. Therefore, we address this challenge by borrowing a methodology from asset pricing to estimate the first and second moment of expected future cash flows and discount rates, and by showing how this methodology can be applied to test our hypotheses and, more generally, to overcome empirical problems in testing theories of corporate financing.

To see the intuition for our methodology, consider a simple discounted cash flow model of firm valuation, in which at the numerator there are future expected cash flows and at the denominator future expected discount rates. In this framework, a firm's stock return is jointly determined by shocks to cash flow news – the numerator – and shocks to discount rate news – the denominator. Therefore, by using this methodology we will be able to 1) test our hypotheses on expected cash flow volatility changes (proxied by the second moment of cash flow news) following dividend changes; 2) revisit the prior literature on earnings changes (proxied by the first moment of cash flow news) following dividend changes; and 3) examine whether discount rates (proxied by discount rate news) change following dividend changes.

A large literature in economics and finance employs a VAR methodology first developed in Campbell (1991) to decompose returns into news originating from cash flows and discount rates. Bernanke and Kuttner (2005) find cash-flow news are as important as discount-rates news for stock returns to monetary policy shocks following FOMC announcements. Vuolteenaho (2002) extends the VAR methodology to the individual firm level and finds cash-flow news are the main driver of stock returns at the firm level.[9]

[8]E.g., see DeAngelo, DeAngelo, and Skinner (1996), Grullon, Michaely, and Swaminathan (2002), however, no consensus has been achieved on which adjustment is more appropriate, e.g., see DeAngelo et al. (2009)

[9]Cash-flow news are almost uncorrelated across firms which explains why discount-rate news are a main driver for stock returns of broad indices (see Campbell (1991), Cochrane (1992), and Cochrane (2008)).

A. Stock Return Decomposition

We employ the framework Vuolteenaho (2002) lays out to decompose stock returns into estimates of cash-flow and discount rate news before and after dividend announcements. Because this method has so far not been applied in a corporate finance context, we first review the basic ingredients and closely follow the original notation.

Vuolteenaho (2002) takes the dividend-discount model of Campbell and Shiller (1988a) for the aggregate market return as starting point and applies it to the individual firm. He adapts the present-value formula to accounting data, because many individual firms do not pay dividends. Three main assumptions are necessary to achieve this goal. First, the clean surplus identity holds, that is, earnings (X) equal the change in the book-value of equity (ΔB_t) minus dividends (D). Second, the book value of equity, dividends, and the market value of equity (M) are strictly positive. Third, log book and market equity and log dividends and log book equity are cointegrated.[10]

These assumptions allow us to write the log book-to-market ratio, θ as

$$\theta_{t-1} = k_{t-1} + \sum_{s=0}^{\infty} \rho^s r_{t+s} = \sum_{s=0}^{\infty} \rho^s (roe_{t+s} - f_{t+s}), \tag{1}$$

roe is log return on equity which we define as $roe_t = \log(1+X_t/B_{t-1})$, r_t denotes the excess log stock return, $r_t = \log(1+R_t+F_t)-f_t$, R_t is the simple excess return, F_t is the interest rate, f_t is log of 1 plus the interest rate, and k summarizes linearizion constants which are not essential for the analysis. The book-to-market ratio can be low, because market participants expect low future discount rates, that is, they discount a given stream of cash flow at a low rate (first component on the right-hand side of equation (1)), or because they expect high future cash flows (second component on the right-hand side of equation (1)).

We can follow Campbell (1991) to get return news from changes in expectations from

[10]We use small letters to denote the log of a variable unless specified otherwise.

$t-1$ to t and reorganizing equation (1)

$$r_t - \mathbb{E}_{t-1}\, r_t = \Delta\, \mathbb{E}_t \sum_{s=0}^{\infty} \rho^s (roe_{t+s} - f_{t+s}) - \Delta\, \mathbb{E}_t \sum_{s=1}^{\infty} \rho^s r_{t+s}. \tag{2}$$

$\Delta\, \mathbb{E}_t$ denotes the change in expectations operator from $t-1$ to t, that is, $\mathbb{E}_t(\cdot) - \mathbb{E}_{t-1}(\cdot)$. Therefore, returns can be high, if we have news about higher current and future cash flows or lower future excess returns.

Let's introduce some notation and write unexpected returns as the difference in cash-flow news, $\eta_{cf,t}$, and discount-rate news, $\eta_{r,t}$

$$r_t - \mathbb{E}_{t-1}\, r_t = \eta_{cf,t} - \eta_{r,t}. \tag{3}$$

B. Vector Autoregression

A vector autoregression (VAR) provides a simple time series model to infer long-horizon properties of returns from a short-run model and to implement the return decomposition. Let $z_{i,t}$ be a vector at time t containing firm-specific state variables. Let's assume a first-order VAR describes the evolution of the state variables well.[11] We can then write the system as

$$z_{i,t} = \Gamma z_{i,t-1} + u_{i,t}. \tag{4}$$

Σ denotes the variance-covariance matrix of u_{t+1} and we assume it is independent of the information set at time $t-1$.

Let's assume the state vector z contains firm returns as first component and let's define the vector $\boldsymbol{e1'} = [1\ 0\ \ldots\ 0]$. We can now write unexpected stock returns as

$$r_{i,t} - \mathbb{E}_{t-1} = \boldsymbol{e1'} u_{i,t}. \tag{5}$$

[11] The assumption of a first-order VAR is not restrictive, because we can add lags of the state variables and adjust the notation accordingly.

Discount rate news are

$$\eta_{r,t} = \Delta\,\mathbb{E}_t \sum_{s=1}^{\infty} \rho^s r_{t+s}, \tag{6}$$

which we can now simply write as

$$\eta_{r,t} = \boldsymbol{e1'} \sum_{s=1}^{\infty} \rho^s \Gamma^s u_{i,t+s} \tag{7}$$

$$= \boldsymbol{e1'} \rho\Gamma(\mathbb{1} - \rho\Gamma)^{-1} u_{i,t} \tag{8}$$

$$= \lambda' u_{i,t}, \tag{9}$$

where $\mathbb{1}$ is an identity matrix of suitable dimension and last line defines notation.

It now follows we can write cash-flow news as

$$\eta_{cf,t} = (\boldsymbol{e1'} + \lambda')u_{i,t}. \tag{10}$$

and the variance of cash-flows as

$$\text{var}(\eta_{cf,t}) = (\boldsymbol{e1'} + \lambda')\Sigma(\boldsymbol{e1} + \lambda). \tag{11}$$

Armed with the above quantities, we now turn to our data on the intensive margin (increases and decreases) and extensive margin (initiations and omissions) of dividends.

IV Data

We use balance sheet data from the quarterly Compustat file and stock return data from the monthly CRSP file. We follow Grullon, Michaely, and Swaminathan (2002) and Michaely, Thaler, and Womack (1995) in defining quarterly dividend changes and dividend omissions and initiations and Vuolteenaho (2002) in the sample and variable construction of the state variables of the VAR we defined in Section III. We detail both below. The sample period is 1962 to 2015.

A. Cash Flow and Return News: Sample Screens

We follow Vuolteenaho (2002) and impose the following data screens. A firm must have quarter $t-1$, $t-2$, and $t-3$ book equity, $t-1$ and $t-2$ net income and long-term debt data. Market equity must be available for quarters $t-1$, $t-2$, and $t-3$. A valid trade exists during the month immediately preceding quarter t return. A firm has at least one monthly return observation during each of the preceding five years. We excluse firms with quarter $t-1$ market equity less than USD 10 million and book-to-market ratio of more than 100 or less than 1/100.

B. Cash Flow and Return News: Variable Definitions

The simple stock return is the 3-month cumulative monthly return, recorded from m to $m+2$ for $m \in \{Feb, May, Aug, Nov\}$. If no return data are available, we substitute zeros for both returns and dividends. We follow Shumway (1997) and assume a delisting return of -30% if a firm is delisted for cause and has a missing delisting return. Market equity is the total market equity at the firm level from CRSP at the end of each quarter. If quarter t market equity is missing, we compound the lagged market equity with returns without dividends.

Book equity is shareholders' equity, plus balance sheet deferred taxes and investment tax credit (item TXDITCQ) if available, minus the book value of preferred stock. Depending on availability, we use stockholders' equity (item SEQQ), or common equity (item CEQQ) plus the carrying value of preferred stock (item PSTKQ), or total assets (item ATQ) minus total liabilities (item LTQ) in that order as shareholders' equity. We use redemption value (item PSTKRQ) if available, or carrying value for the book value of preferred stock. If book equity is unavailable, we proxy it by the last period's book equity plus earnings, less dividends. If neither earnings nor book equity is available, we assume the book-to-market ratio has not changed and compute the book equity proxy from the last period's book-to-market and this period's market equity. We set negative or zero book equity values to missing.

GAAP ROE is the earnings over the last period's book equity, measured according to the U.S. Generally Accepted Accounting Principles. We use earnings available for common, in the ROE formula. When earnings are missing, we use the clean-surplus formula to compute a proxy for earnings. In either case, we do not allow the firm to lose more than its book equity. Hence, the minimum GAAP ROE is truncated to -100%. We calculate leverage as book equity over the sum of book equity and book debt. Book debt is the sum of debt in current liabilities, total long-term debt, and preferred stock.

Each quarter, we log transform market equity, stock returns, and return on equity and cross-sectionally demean it. Log transformation may cause problems if returns are close to -1 or if book-to-market ratios are close to zero or infinity. We mitigate these concerns redefining a firm as a portfolio of 90 percent common stock and 10 percent Treasury bills using market values. Every period, the portfolio is rebalanced to these weights.

C. Dividend Changes

We use the CRSP daily file to identify dividend changes and follow Grullon, Michaely, and Swaminathan (2002) in the sample screens and to construct quarterly dividends changes. We use all dividend changes for common stocks of U.S. firms listed on NYSE, Amex, and Nasdaq which satisfy the following criteria. The distribution is a quarterly taxable cash dividend and the previous cash dividend payment was within a window of 20–90 trading days prior to the current dividend announcement. We focus on dividend changes between 12.5% and 500%. The lower bound ensures we include only economically meaningful dividend changes, and the upper bound eliminates outliers. We also ensure no other non-dividend distribution events such as stock splits, stock dividends, mergers, and so on, occurs within 15 trading days surrounding the dividend announcement.

D. Initiations and Omissions

We follow Michaely, Thaler, and Womack (1995) to construct our dividend initiation and omission sample. We require the following criteria for initiations to be in our sample. We focus on common stocks of U.S. companies which have been traded on the NYSE or AMEX for two years prior to the initiation of the first cash dividend. This screen eliminates new listings of firms which had previously traded on NASDAQ or on another exchange and switched the exchange with the pre-announced intention of paying dividends in the near future.

For omissions, the sample must meet one of the following three criteria: i) the company declared at least six consecutive quarterly cash payments and then paid no cash payment in a calendar quarter; ii) the company declared at least three consecutive semi-annual cash payments and then paid no cash payments in the next six months; iii) the company declared at least two consecutive annual cash payments and then paid no cash payments in the next year. We first identify potential omission quarters using the three conditions. We then use the Wall Street Journal (WSJ) Index to extract all information about dividend omissions. We enrich the WSJ Index data with searches on Factiva and ProQuest for any additional information regarding dividend omissions.

E. Share Repurchases

We use Thomson ONE to construct our share repurchases sample. We use all repurchases of common stock announcemed between 1980 and 2015 for which we can determine the amount announced. Our procedure follows Jagannathan and Weisbach (2000) but they also study repurchases of preferred stock, which is not relevant for our purpose of studying payout policy to common stockholders; and to Grullon and Michaely (2002) who use the Compustat definition of share repurchases and report a correlation of 0.97 between the Compustat and the SDC measures of share repurchases.

We ensure across specifications that we have non-overlapping data for the two VARs before and after dividend events and share repurchases, that is, two events at the firm level are at least 10 years apart.

V Results

In this section we report our empirical results. In Section V.A we report the estimates of the VAR and the VAR implied importance of cash-flow news and expected return news for our sample of firms using the method we detail in Section III which closely follows Vuolteenaho (2002). In Section V.B we report our univariate tests of Prediction 1. In Section V.C we present tests of the more nuanced predictions of our mechanism, including Prediction 2. In Section V.D we examine cumulative abnormal returns to the announcements of dividend events and we present tests of our Predictions 3 and 4. In Section V.E we examine share repurchases.

A. Estimates of the VAR System

Following our discussion in Section III, a central ingredient for our analysis is an estimate of the transition matrix γ of the VAR system and the discount factor ρ. We follow Vuolteenaho (2002) and estimate ρ as a regression coefficient of the excess log ROE minus the excess log stock return, plus the lagged book-to-market ratio on the book-to-market ratio. We find an estimate of 0.986 which is almost identical to the estimate of Vuolteenaho (2002).

Table 1 reports point estimates of a constant VAR across firms and time with t-stats in parenthesis. Consistent with findings in the literature, we find returns are positively autocorrelated, load positively on the log book-to-market ratio, and log profitability. The quarterly book-to-market ratio is highly autocorrelated and loads positively on lagged returns, and negatively on lagged profitability. Profitability is autocorrelated at the quarterly frequency, loads positively on lagged returns, and negatively on the lagged bool-to-market ratio. The dynamics of our state variables are broadly consistent with findings in the literature and especially Vuolteenaho (2002).

B. Dividend Events and Cash-flow Variance

We estimate a VAR before and after each dividend event-quarter using all available firm observations with non-missing balance-sheet data but requiring at least 5 years of data. We then use equation (11) to calculate the cash-flow variance and compare the variability of cash flows after dividend events relative to before. According to our Prediction 1 in Section II, we would expect announcements of dividend increases and dividend initiations to result in lower cash-flow volatility after the announcement relative to before and higher cash-flow volatilities for announcements of dividend cuts and dividend omissions. To ensure overlapping dividend events do not drive our results, we randomly drop one of the two events.[12]

Table 2 reports changes in cash-flow news and discount-rate news after dividend events relative to before separately for dividend increases, decreases, initiations, and omissions. We estimate for each dividend event two VARs before and after the quarter of the event using all firm observation with non-missing data. We then create cash-flow and discount rate news, winsorize the data at the 1% and 99% level, and report the average changes across events in the table.

We begin by revisiting with our novel methodology the earlier literature examining changes in the first moment of earnings following dividend changes. In Panel A we find that positive dividend changes, dividend initiations, negative dividend changes or dividend omissions or pooling across events do not result in a statistically significant change in cash-flow news after the event relative to before. These findings are consistent with the earlier literature which does not detect any predictive power of dividend events for the first moment of future realized earnings.

In Panel B, we find that dividend events are not followed by changes in discount rates.

We then turn to testing our main hypothesis. Consistent with our hypothesis we find in Panel C that dividend increases are followed by a decrease in the variance of cash-flow news in the five years after the event relative to the variance of cash-flow news in the five years before. Similarly, for dividend decreases, we see an increase in the variability of cash-flow news after the event relative to before. Changes in dividends are followed by changes in cash flow volatility in the opposite direction, consistent with our Prediction 1 in Section II.

The numbers in Panel C are difficult to interpret. We therefore scale the changes in cash-flow news variance around the dividend events by the average variance in cash-flow news before the event in Panel D. We see the variance of cash-flow news drops by on average 15% of the average variance before the event after announcements of dividend

[12]Results are robust to which event we drop and to not dropping any event.

increases (see column (1)) but increases by more than 7% after dividend cuts (see column (4)). Dividend initiations result in a variance of cash-flow news which is on average 5$ lower than the average variance before the dividend event but is not statistically significant. Dividend omission lead to an increase in the cash-flow variance of similar magnitude (see columns (2) and (5)).

Vuolteenaho (2002) argues that large amounts of data are necessary to get precise estimates of the transition matrix Γ of the VAR. So far, we use separate estimates for the transition matrix to get residuals for the five years before and after each dividend event. In Table 3, we impose more stringent restrictions on Γ trading off efficiency with precision. At the same time, we use a limited sample, because we impose the same restrictions as Vuolteenaho (2002), Grullon et al. (2002), Michaely et al. (1995). We now also report results for a specification in which we do not impose some of the restrictions of the initial papers we follow to increase our sample sizes.

Table 3 directly reports the change in the variance of cash-flow news after the dividend event relative to before as a fraction of the average variance before the event. In Panel A, we estimate one VAR for the whole sample period and then use the estimate for Γ to calculate both residuals in the five years before and after the dividend event and the cash flow news.[13] In Panel B, we combine the previous two approaches and estimate one VAR across all firms and events to get an estimate of Γ, but then estimate separate VARs before and after each dividend events to get residuals. Panel C requires only 12 non-missing quarters within five years before and after the dividend event and we do not restrict our sample to non-overlapping event windows within firms. We find the variance of cash flow news decreases for dividend increases, initiations, and both jointly after the event relative to before, whereas the variance increases for cuts in dividends, omissions, and both event types jointly.

All three panels confirm our baseline results. Announcements of dividend increases or initiations result in lower volatility of cash flows after the announcement relative to before, whereas announcements of dividend cuts or omissions result in an increased cash-flow volatility.

[13]Recall cash-flow news are a function of the transition matrix Γ of the VAR because it is a transformation of the residuals from the VAR.

Structural breaks have happened during our sample period and one concern might be that our results are concentrated in the first half of our sample. For example, return predictability decreased in the 1990s (see Lettau and Van Nieuwerburgh (2007)), clean surplus accounting might be more likely to be violated in the same period, and many firms stopped paying dividends (Fama and French (2001)). Table 4 splits our sample in half and repeats our baseline analysis.[14]

We see in Panel A results for the early part of our sample are similar to our baseline results: dividend increases and initiations result in lower future volatility of cash flows, whereas dividend cuts and omissions are associated with increases in the volatility of cash-flow news. More importantly, we find in Panel B very similar results despite the various potential structural changes.

C. Cross-Sectional Heterogeneity

Our results so far confirm the unconditional version of Prediction 1 from our basic setting in Section II. Our model implies a monotonicity in the relation between cash flow volatility and dividend changes. Accordingly, we now want to test whether the sensitivity of the variance of cash-flow news to changes in dividends is larger for larger changes in dividends and for firms with ex ante more volatile cash flows.

Table 5 reports the results. In Panel A, we splits the announcements into small and large announcements based on the median dividend change within increases and decreases during the announcement quarter. We see in column (1), for large increases in dividends, the variance of cash-flow news drops by more than 19% on average after the announcement. The drop in variance is 8% smaller in column (2) when we instead study increases in dividends which are below the median increase. Column (3) shows the difference is highly statistically significant. We bootstrap the difference to calculate standard errors. Columns (4) and (5) instead show announcements of large dividend cuts drive the increase in cash-flow news variance. The difference is again highly statistically significant (see column (6)).

[14] We estimate a constant γ matrix within each sample to ensure we have enough data points for reliable estimates.

In Panel B, we split firms by their idiosyncratic volatility. Specifically, we first calculate a firms' idiosyncratic volatility on a four-quarter rolling basis relative to a Fama & French three-factor model using daily data. We then assign a firm into the large idiosyncratic volatility sample if it had a volatility above the 30% percentile of firm volatility in the respective Fama & French 17 industry in the quarter before the dividend event. Large heterogeneity exists in firms' idiosyncratic volatility and our procedure ensures we do not simply split our sample based on industry. We see in columns (1) and (2), dividend increases for firms with large idiosyncratic volatility results in a drop in the average cash-flow variance of 17% which is almost 5% larger than the drop for firms with low idiosyncratic variance. The bootstrapped difference between the changes in variance of cash-flow news within high- and low-volatility firms is again highly statistically significant. Similar to Panel A, we see firms with large idiosyncratic volatility largely drive the increase in cash-flow news variance after announced cuts in dividends with the difference being statistically significant (see columns (4) to (6)).

The results in Table 5 confirm these monotonic univariate predictions of our model. We now turn to a regression framework where we will be able to adjust for confounding factors. Specifically, we now estimate a regression of changes in cash flow volatility, $\Delta\sigma$, from the interval $(t-1,t)$ to $(t,t+1)$ on the changes in dollar dividends from $t-1$ to t, ΔD,

$$\Delta\sigma = \alpha + \gamma \cdot \Delta D_{i,t} + \varepsilon, \tag{12}$$

where from our Prediction 1 we should expect to find an estimated coefficient $\widehat{\gamma} < 0$.

Next, we aim at teasing out the cross-sectional predictions of our model. Specifically, we estimate the following specification

$$\Delta\,\mathbb{Var}(\eta_{cf,i,t}) = \alpha + \beta_1 \Delta D_{i,t} + \beta_2 eps_{i,t} + \beta_3 \Delta D_{i,t} \times eps_{i,t} + \varepsilon_{i,t}, \tag{13}$$

where *eps* is the earnings per share. Our main coefficient of interest here is β_3. According to both the baseline setting of Section II.A with precautionary savings but no asymmetric information, and also according to the signaling model of Section II.B, we should expect $\beta_3 = 0$. In addition, from our signaling model of Section II.B (but not from the baseline model) we should also expect $\beta_3 > 0$. We should also expect $\widehat{\beta}_1 < 0$ as per our baseline Prediction 1, and also $\widehat{\beta}_2 < 0$, reflecting a scale effect.

Table 6 reports our estimates. Column (1) confirms our baseline finding in a regression framework: positive dividend changes result in a drop in the variance of cash-flow news. In column (2), we add earnings per share (*eps*) as an additional covariate. Adding *eps* slightly increases the drop in variance following dividend increases. Firms with higher *eps* have a smaller variance in cash flow news. Column (3) confirms our novel Prediction 2, consistent with our signaling model: dividend increases result in a drop in the variance of cash-flow news but this drop is muted for firms with higher *eps*. Column (4) adds a host of potential determinants of cash-flow volatility and dividend payments such as firm age, size, book-to-market, and financial leverage. None of these additional covariates has a large impact on our main estimates of interest. Positive dividend changes are followed by a decline in cash flow volatility, which is muted for firms with higher earnings per share. Columns (5) to (8) add year and industry fixed effects at the Fama & French 17 industry-level definition and confirm our basic findings.

We show in the Online Appendix results are robust when we add the initial variance of cash-flow news (see Table A.1) and when we use a different definition of cash (see Table A.3).

D. Returns around Dividend Events

So far, we have shown that dividends changes are associated with a reduction in future cash-flow volatility. Consistent with Prediction 2 of our signaling model, the extent of the reduction depends on the current level of earnings. We also find that the reduction in cash-flow volatility is larger for larger dividend increases and decreases relative to small dividend changes, and for dividend changes of firms with higher idiosyncratic risk. While it is well documented that on average dividend-change announcements are accompanied by like changes in prices, an important and yet unanswered question is whether market participants recognize the link between dividend changes and subsequent changes in cash-flow volatility, as per our Predictions 3 and 4.

To this end, we study how the immediate market reaction to dividend changes is related to the subsequent change in cash-flow volatility (and to the dividend change itself). To construct the dividend events sample, we follow Grullon et al. (2002) and Michaely et al. (1995) but also rely on Vuolteenaho (2002) in the sample definition for the VAR. First, in Table 7 we document the univariate market response to dividend changes in a three-day window bracketing the dividend event. In columns (1) to (3) we find a positive announcement returns for dividend increases, dividend initiations, and the pooled sample ranging between 0.7% and 2.7%. For cuts in dividends, we find a negative announcement returns of 0.7% and a negative return of 8.7% for omissions.[15]

To test our Predictions 3 and 4, Table 8 reports announcement day returns, separately for large and small dividend changes and firms with high and low idiosyncratic volatility. Consistent with our Predictions, we find larger announcement day returns in absolute value for larger dividend increases and decreases relative to small dividend changes and for dividend changes of firms with higher idiosyncratic volatilities.

E. Repurchases

We now turn to examining share repurchases. Unlike dividend, which are sticky and regular, share repurchases tend to be lumpy and infrequent. However, because share repurchases are yet another way to return cash to shareholders, from our framework in Section II we would expect to find similar patterns of cash flow volatility following announcements of share repurchases as we did following announcements of dividend increases and initiation.

Table 9 reports the results for scaled changes in the variance of cash-flow news after the repurchase announcement relative to before. We see in column (1) the variance of cash-flow news is on average 15% lower after the repurchase announcement relative to before. Consistent with our results for changes in dividends and predictions of our model, we see in columns (2) to (5) that large repurchase announcements lead to a drop in cash-flow volatility which is more than 4% large than the drop in variance for repurchase announcements below the median. In columns (5) to (7), we see the drop in variance is almost twice as large for firms which have higher idiosyncratic volatility compared to

[15] All results are almost identical when we look at market-adjusted returns.

other firms in the same Fama & French industry.

Table 10 confirms our baseline announcement return results for repurchases. We see in column (1) an announcement return of about 2% for all repurchase announcements. In columns (2) to (4), we see the announcement return is almost 1.5% larger for large repurchases relative to other announcements and in columns (5) to (7), we see returns are larger for firms announcing repurchases with more volatile returns relative to other firms in the same industry.

VI Conclusion

The notion that changes in dividend policy convey information to the market is intuitive and is supported by managers. The strong market reaction to announcements of dividend changes further suggests it *does* contain value-relevant information. But empirical research so far has found no support to this idea. It has found no meaningful relation between dividend changes and future earnings. This paper suggests that perhaps both theories and empirical research were blindsided. We have mostly hypothesized and searched for the relationship between dividend changes and future increases in earnings—the first moment, rather than between dividend changes and future change in earnings volatility—the second moment (and as so often the case, Lintner (1956) is a notable exception).

In this paper we have proposed a theoretical framework in which firms use payout policy to signal the riskiness of their future cash flows. To test our predictions, we have used the Campbell (1991) return decomposition to estimate cash-flow volatility from data on stock returns. Consistent with the model's predictions, we have shown that cash flow volatility decreases following dividend increases (and initiations), and cash flow volatility increases following dividend decreases (and omissions). Furthermore, larger dividend changes are followed by larger changes in cash-flow volatility in the expected direction. In the cross section, we find that the same dollar of dividend paid carries a larger information content for future changes in cash flow volatility the smaller the current earnings, consistent with the model's prediction that the cost of the signal is foregone investment opportunities.

Crucially, the stock market reactions to dividend announcements support our theoretical notion that expected changes in cash flow volatility represent the information content of dividends. In fact, we find that larger changes in cash flow volatility are associated with larger announcement returns in the expected direction.

Strikingly, also our results on changes in cash-flow volatility and on the stock market reaction to share repurchase announcements mirror those around announcements of dividend increases and initiations. We conclude that payout policy announcements do convey information about the riskiness of future cash flows.

More broadly, our paper shows how a methodology to measure the volatility of cash flows and discount rates from data on stock returns, originally developed in the field of asset pricing, can have potentially broad applicability to test theories of corporate finance and potentially shed light on many corporate decisions, well beyond those examined in our paper.

References

Allen, F. and R. Michaely (2003). Payout policy. *Handbook of the Economics of Finance 1*, 337–429.

Asquith, P. and D. W. Mullins Jr (1983). The impact of initiating dividend payments on shareholders' wealth. *Journal of business*, 77–96.

Benartzi, S., R. Michaely, and R. Thaler (1997). Do changes in dividends signal the future or the past? *The Journal of Finance 52*(3), 1007–1034.

Bernanke, B. S. and K. N. Kuttner (2005). What explains the stock market's reaction to federal reserve policy? *The Journal of finance 60*(3), 1221–1257.

Bernheim, B. D. (1991). Tax policy and the dividend puzzle. *The RAND Journal of Economics 22*(4), 455–476.

Bhattacharya, S. (1979). Imperfect information, dividend policy, and "the bird in the hand" fallacy. *Bell journal of economics 10*(1), 259–270.

Bhattacharya, S. (1980). Nondissipative signaling structures and dividend policy. *The quarterly journal of Economics 95*(1), 1–24.

Brav, A., J. R. Graham, C. R. Harvey, and R. Michaely (2005). Payout policy in the 21st century. *Journal of Financial Economics 77*(3), 483–527.

Brickley, J. A. (1983). Shareholder wealth, information signaling and the specially designated dividend: An empirical study. *Journal of Financial Economics 12*(2), 187–209.

Campbell, J. and R. Shiller (1988a). The dividend-price ratio and expectations of future dividends and discount factors. *The Review of Financial Studies 43*(3), 661–676.

Campbell, J. and R. Shiller (1988b). Stock prices, earnings, and expected dividends. *Journal of Finance 43*(3), 661–676.

Campbell, J. Y. (1991). A variance decomposition for stock returns. *The Economic Journal 101*(405), 157–179.

Charest, G. (1978). Dividend information, stock returns and market efficiency-ii. *Journal of Financial Economics 6*(2-3), 297–330.

Cochrane, J. H. (1992). Explaining the variance of Price-Dividend ratios. *The Review of Financial Studies 5*(2), 243–280.

Cochrane, J. H. (2008). The dog that did not bark: A defense of return predictability. *Review of Financial Studies 21*(4), 1533–1575.

DeAngelo, H., L. DeAngelo, and D. J. Skinner (1996). Reversal of fortune dividend signaling and the disappearance of sustained earnings growth. *Journal of financial Economics 40*(3), 341–371.

DeAngelo, H., L. DeAngelo, and D. J. Skinner (2009). Corporate payout policy. *Foundations and Trends® in Finance 3*(2–3), 95–287.

Eades, K. M., P. J. Hess, and E. H. Kim (1985). Market rationality and dividend announcements. *journal of Financial Economics 14*(4), 581–604.

Fama, E. F. (1965). The behavior of stock-market prices. *The Journal of Business 38*(1), 34–105.

Fama, E. F. and K. R. French (2001). Disappearing dividends: changing firm characteristics or lower propensity to pay? *Journal of Financial Economics 60*(1), 3–43.

Gonedes, N. J. (1978). Corporate signaling, external accounting, and capital market equilibrium: Evidence on dividends, income, and extraordinary items. *Journal of Accounting Research*, 26–79.

Grullon, G. and R. Michaely (2002). Dividends, share repurchases, and the substitution hypothesis. *The Journal of Finance 57*(4), 1649–1684.

Grullon, G., R. Michaely, and B. Swaminathan (2002). Are dividend changes a sign of firm maturity? *The Journal of Business 75*(3), 387–424.

Jagannathan, Murray, C. P. S. and M. S. Weisbach (2000). Financial flexibility and the choice between dividends and stock repurchases. *Journal of Financial Economics 57*(3), 355–384.

John, K. and J. Williams (1985). Dividends, dilution, and taxes: A signalling equilibrium. *the Journal of Finance 40*(4), 1053–1070.

Lettau, M. and S. Van Nieuwerburgh (2007). Reconciling the return predictability evidence. *Review of Financial Studies*.

Lintner, J. (1956). Distribution of incomes of corporations among dividends, retained earnings, and taxes. *The American Economic Review 46*(2), 97–113.

Michaely, R., R. H. Thaler, and K. L. Womack (1995). Price reactions to dividend initiations and omissions: Overreaction or drift? *The Journal of Finance 50*(2), 573–608.

Miller, M. H. and F. Modigliani (1961). Dividend policy, growth, and the valuation of shares. *the Journal of Business 34*(4), 411–433.

Miller, M. H. and K. Rock (1985). Dividend policy under asymmetric information. *The Journal of finance 40*(4), 1031–1051.

Penman, S. H. (1983). The predictive content of earnings forecasts and dividends. *The Journal of Finance 38*(4), 1181–1199.

Pettit, R. R. (1972). Dividend announcements, security performance, and capital market efficiency. *The Journal of Finance 27*(5), 993–1007.

Pettit, R. R. (1977). Taxes, transactions costs and the clientele effect of dividends. *Journal of Financial Economics 5*(3), 419–436.

Shumway, T. (1997). The delisting bias in CRSP data. *The Journal of Finance 52*(1), 327–340.

Vuolteenaho, T. (2002). What drives firm-level stock returns? *The Journal of Finance 57*(1), 233–264.

Watts, R. (1973). The information content of dividends. *The Journal of Business 46*(2), 191–211.

Table 1: **Estimate of Transition Matrix of VAR System**

This table reports point estimates of a constant VAR for all firms and the whole sample period from 1963 till 2015.

	r	θ	e
	(1)	(2)	(3)
r	0.02	0.01	0.28
	(2.12)	(9.87)	(13.61)
θ	0.10	0.94	-0.65
	(4.07)	(223.29)	(-9.67)
e	0.01	-0.02	0.36
	(2.02)	(-29.49)	(28.85)

Table 2: **Change in Cash-Flow and Discount-Rate News Around Dividend Events**

This table reports changes in cash-flow and discount rate news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III. Our sample period is 1963 till 2015.

	$\Delta Div > 0$ (1)	Initiation (2)	Pooled (3)	$\Delta Div < 0$ (4)	Omission (5)	Pooled (6)
	Panel A. Δ Cash-flow News: $\Delta\eta\_cf$					
	-0.0001	0.0000	0.0000	-0.0003	0.0001	-0.0002
	(-0.22)	(0.10)	(-0.22)	(-1.08)	(0.85)	(0.82)
	Panel B. Δ Discount-rate News: $\Delta\eta\_dr$					
	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000
	(-0.70)	(-0.29)	(-0.65)	(-0.81)	(0.93)	(-0.15)
	Panel C. Δ Variance Cash-flow News: $\Delta\,\mathbb{Var}(\eta\_cf)$					
	-0.0015	-0.0006	-0.0013	0.0006	0.0005	0.0006
	(-9.65)	(-1.16)	(-8.35)	(4.38)	(2.42)	(4.95)
	Panel D. Δ Scaled Variance Cash-flow News: $\Delta\,\mathbb{Var}(\eta\_cf)/mean(\eta\_cf)$					
	-14.86%	-4.56%	-13.04%	7.29%	6.06%	6.09%
	(-9.65)	(-1.16)	(-8.87)	(4.38)	(2.42)	(4.95)
Nobs	2,441	552	2,993	2,461	1,233	3,694

Table 3: **Scaled Change in Variance of Cash-Flow News Around Dividend Events: Robustness**

This table reports changes in cash-flow and discount rate news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III estimating constrained VAR systems. Our sample period is 1963 till 2015.

	$\Delta Div > 0$ (1)	Initiation (2)	Pooled (3)	$\Delta Div < 0$ (4)	Omission (5)	Pooled (6)
			Panel A. Constant Gamma			
	−14.06%	−6.18%	−12.80%	17.70%	10.50%	15.27%
	(−9.39)	(−1.64)	(−9.10)	(8.13)	(2.42)	(9.01)
			Panel B. Mezzanine Gamma			
	−15.96%	−12.59%	−15.18%	10.72%	14.10%	11.84%
	(−11.47)	(−3.98)	(−11.80)	(6.57)	(5.79)	(8.70)
Nobs	2,441	552	2,993	2,461	1,233	3,964
			Panel C. Extended Sample			
	−11.93%	−1.52%	−9.66%	4.19%	7.15%	8.44%
	(−7.33)	(−0.31)	(−5.78)	(2.16)	(2.11)	(4.95)
Nobs	3,986	1,108	5,094	3,918	1,233	5,151

Table 4: **Scaled Change in Variance of Cash-Flow News Around Dividend Events: Sample Split**

This table reports changes in cash-flow and discount rate news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III. Panel A reports results for the first half of the sample and Panel B reports results for the second half of the sample.

	$\Delta Div > 0$ (1)	Initiation (2)	Pooled (3)	$\Delta Div < 0$ (4)	Omission (5)	Pooled (6)
			Panel A. 1963 − 1988			
	−12.53%	−11.97%	−12.55%	8.23%	11.19%	9.36%
	(−6.34)	(−1.66)	(−6.55)	(3.90)	(3.79)	(5.46)
Nobs	1,155	114	1,269	1,175	715	1,890
			Panel B. 1989 − 2015			
	−15.47%	−4.80%	−12.89%	16.61%	8.43%	13.16%
	(−6.69)	(−1.09)	(−6.29)	(6.02)	(2.54)	(6.23)
Nobs	1,286	438	1,724	1,286	904	2,190

Table 5: **Scaled Change in Variance of Cash-Flow News Around Dividend Events: Heterogeneity**

This table reports changes in cash-flow and discount rate news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III. Panel A splits dividend events by the size of the dividend change. Panel B splits events by firms' idiosyncratic volatility. Our sample period is 1963 till 2015.

	$\Delta Div > 0$			$\Delta Div < 0$		
	Large Increase	Small Increase	Δ	Large Cut	Small Cut	Δ
	(1)	(2)	(3)	(4)	(5)	(6)
	−19.02%	−10.56%	−8.11%	8.64%	5.95%	2.42%
	(−8.28)	(−5.18)	(−22.98)	(3.61)	(2.57)	(6.01)
Nobs	1,243	1,198		1,230	1,231	

	$\Delta Div > 0$			$\Delta Div < 0$		
	Large Vol	Small Vol	Δ	Large Vol	Small Vol	Δ
	(1)	(2)	(3)	(4)	(5)	(6)
	−17.27%	−12.89%	−4.73%	11.43%	3.07%	8.41%
	(−6.98)	(−6.66)	(−12.57)	(4.60)	(1.38)	(25.76)
Nobs	1,102	1,339		1,244	1,217	

Table 6: **Regression of Changes in Variance of Cash-Flow News Around Dividend Events**

This table reports results of regressing changes in the variance of cash-flow news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III an the dividend change, earnings per share, as well as the interaction with t-statistics in parentheses. Our sample period is 1963 till 2015.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDiv	−0.26	−0.24	−0.37	−0.35	−0.15	−0.14	−0.25	−0.23
	(−5.55)	(−5.31)	(−5.94)	(−6.06)	(−4.92)	(−4.66)	(−5.01)	(−5.00)
eps		−0.17	−0.12	−0.17		−0.14	−0.10	−0.11
		(−1.56)	(−1.87)	(−2.71)		(−1.41)	(−1.75)	(−1.76)
$\Delta Div \times eps$			0.24	0.21			0.19	0.18
			(3.12)	(3.19)			(2.64)	(2.51)
Age				0.00				0.00
				(1.37)				(1.20)
Book-to-market				28.21				132.62
				(0.33)				(2.41)
Leverage				−0.35				−0.14
				(−2.54)				(−1.13)
Size				0.05				0.01
				(3.06)				(1.10)
Constant	0.03	0.12	0.08	−0.86				
	(0.45)	(1.22)	(1.01)	(−2.75)				
Year FE					X	X	X	X
Industry FE					X	X	X	X
R2	2.06%	2.89%	3.89%	5.11%	30.60%	31.15%	31.80%	32.24%
Nobs	3,127	3,127	3,127	3,127	3,127	3,127	3,127	3,127

Table 7: **Announcement Returns**

This table reports returns on dividend event days for a sample period from 1963 till 2015.

	$\Delta Div > 0$ (1)	Initiation (2)	Pooled (3)	$\Delta Div < 0$ (4)	Omission (5)	Pooled (6)
	0.72%	2.73%	1.09%	-0.70%	-8.68%	-3.38%
	(7.69)	(8.69)	(11.27)	(-6.11)	(-29.77)	(-24.37)
Nobs	2,441	552	2,993	2,461	1,233	3,694

Table 8: **Announcement Returns: Heterogeneity**

This table reports returns on dividend event days for a sample period form 1963 till 2015. Panel A splits dividend events by the size of the dividend change. Panel B splits events by firms' idiosyncratic volatility. Our sample period is 1963 till 2015.

	$\Delta Div > 0$			$\Delta Div < 0$		
	Large Increase (1)	Small Increase (2)	Δ (3)	Large Cut (4)	Small Cut (5)	Δ (6)
	0.76% (5.68)	0.67% (5.19)	0.05% (2.46)	−1.14% (−6.09)	−0.25% (−1.97)	−0.85% (−37.62)
Nobs	1,243	1,198		1,230	1,231	

	$\Delta Div > 0$			$\Delta Div < 0$		
	Large Vol (1)	Small Vol (2)	Δ (3)	Large Vol (4)	Small Vol (5)	Δ (6)
	0.79% (4.78)	0.65% (6.47)	0.16% (6.58)	−0.83% (−4.34)	−0.57% (−4.55)	−0.27% (−11.09)
Nobs	1,243	1,198		1,230	1,231	

Table 9: **Change in Cash-Flow and Discount-Rate News Around Repurchases**

This table reports changes in cash-flow and discount rate news around share repurchases using the methodology of Vuolteenaho (2002) which we describe in Section III. Our sample period is 1980 till 2015.

	Baseline	Large Repurchase	Small Repurchase	Δ	Large Vol	Small Vol	Δ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	−14.79%	−18.42%	−13.00%	−4.32%	−21.61%	−10.20%	−11.98%
	(−6.51)	(−4.46)	(−3.06)	(−7.30)	(−4.24)	(−3.20)	(−22.75)
Nobs	2,662	1,331	1,331		1,286	1,376	

Table 10: **Announcement Returns: Repurchases**

This table reports returns on announcements of repurchases for a sample period from 1980 till 2015.

	Baseline	Large Repurchase	Small Repurchase	Δ	Large Vol	Small Vol	Δ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	1.91%	2.62%	1.19%	1.41%	2.55%	1.30%	1.32%
	(12.11)	(10.15)	(6.68)	(36.01)	(9.19)	(8.28)	(33.70)
Nobs	2,662	1,331	1,331		1,286	1,376	

Online Appendix: The Information Content of Dividends: Safer Profits, not Higher Profits

Roni Michaely, Stefano Rossi, and Michael Weber

Not for Publication

I Model Proofs

Proof of Single-Crossing. The utility function is:

$$U\left(D_1,\sigma^2\right) = D_1 + f\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\sigma^2\left(D_1\right) - (1-k)\cdot\frac{a}{2}\cdot\sigma^2$$

Here we prove that this objective function satisfies the single crossing property, in that

$$\frac{\partial U\left(D_1,\sigma^2\right)}{\partial\sigma^2} < 0 \text{ and } \frac{\partial^2 U\left(D_1,\sigma^2\right)}{\partial D_1\partial\sigma^2} < 0$$

Indeed:

$$\begin{aligned}
\frac{\partial U\left(D_1,\sigma^2\right)}{\partial\sigma^2} &= -\frac{a}{2}\cdot f'\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - (1-k)\cdot\frac{a}{2} < 0 \\
\frac{\partial^2 U\left(D_1,\sigma^2\right)}{\partial D_1\partial\sigma^2} &= \frac{\partial\left(\frac{U\left(D_1,\sigma^2\right)}{\partial\sigma^2}\right)}{\partial D_1} \text{ by continuity of U} \\
&= \frac{a}{2}\cdot f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) < 0
\end{aligned}$$

Paying more dividends is more costly to a low type - the one with high variance - because it implies larger foregone investment opportunities. ■

Proof of Riley (1979) conditions.

Let

$$\begin{aligned}
W\left(-\sigma^2; D_1, V^m\right) &= k\cdot V^m + (1-k)\cdot V^d \\
V^m\left(-\sigma^2, D_1\right) &= D_1 + f\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - \frac{a}{2}\cdot\sigma^2\left(D_1\right) \\
V^d\left(-\sigma^2, D_1\right) &= D_1 + f\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - \frac{a}{2}\cdot\sigma^2\left(D_1\right)
\end{aligned}$$

so that

$$W\left(-\sigma^2; D_1, V^m\right) = D_1 + f\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\sigma^2\left(D_1\right) - (1-k)\cdot\frac{a}{2}\cdot\sigma^2 \quad \text{(A.1)}$$

Riley (1979) assumptions:

A1. The unobservable attribute, σ^2, is distributed on $\left[\underline{\sigma^2}, \overline{\sigma^2}\right]$ according to a strictly increasing distribution function

A2. The functions $W(\sigma^2; D_1, V^m)$, $V^d(\sigma^2, D_1)$ are infinitely differentiable in all variables

A3. $\frac{\partial W}{\partial V^m} > 0$

A4. $V^d(-\sigma^2, D_1) > 0$; $\frac{\partial V^d\left(-\sigma^2, D_1\right)}{\partial -\sigma^2} > 0$

A5. $\frac{\partial}{\partial(-\sigma^2)}\left(\frac{-\frac{\partial W}{\partial D_1}}{\frac{\partial W}{\partial V^m}}\right) < 0$

A6. $W\left(-\sigma^2; D_1, V^d(-\sigma^2, D_1)\right)$ has a unique maximum over D_1

Assumptions **A1-A4** are immediate.

Condition **A5** is that $\frac{\partial}{\partial\sigma^2}\left(\frac{-\frac{\partial W}{\partial D_1}}{\frac{\partial W}{\partial V^m}}\right) < 0$

$\frac{\partial W}{\partial D_1} = 1 - f'\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\frac{\partial\sigma^2(D_1)}{\partial D_1}$

$\frac{\partial W}{\partial V^m} = k$

hence:

$$\frac{\partial}{\partial(-\sigma^2)}\left(\frac{-\frac{\partial W}{\partial D_1}}{\frac{\partial W}{\partial V^m}}\right) = \frac{\partial}{\partial(-\sigma^2)}\left(\frac{-1 + f'\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) + k\cdot\frac{a}{2}\cdot\frac{\partial\sigma^2(D_1)}{\partial D_1}}{k}\right) = \frac{a\cdot f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)}{2k} \tag{A.2}$$

whereby the second equality follows because $\frac{\partial^2\sigma^2(D_1)}{\partial\sigma^2\partial D_1} = 0$ as long as $\sigma^2(D_1)$ is single valued.

Condition **A6** requires that $V^d(\sigma^2, D_1)$ has a unique maximum over D_1, which it does at the point $f'\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1^*\right) + k\cdot\frac{a}{2}\cdot\left|\frac{\partial\sigma^2(D_1)}{\partial D_1}\right|_{D_1 = D_1^*} = 1$ ■

Proof of Comparative Statics. The F.O.C. of this problem is

$$1 - f'\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2} = 0.$$

Let

$$G\left(\sigma^2, D_1\right) = 1 - f'\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2}.$$

The first comparative statics is

$$\begin{aligned}
\frac{\partial \sigma^2(D_1)}{\partial D_1} &= -\frac{\frac{\partial G}{\partial D_1}}{\frac{\partial G}{\partial \sigma^2}} \\
&= -\frac{f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2}}{\frac{a}{2}\cdot f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1 \partial \sigma^2}} \\
&= -\frac{f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right) - k\cdot\frac{a}{2}\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2}}{\frac{a}{2}\cdot f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)} \\
&= -\frac{2}{a} + k\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2}\cdot\frac{1}{f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)} < 0
\end{aligned}$$

whereby the third line follows because $\frac{\partial^2\sigma^2(D_1)}{\partial D_1\partial\sigma^2} = \frac{\partial^2\sigma^2(D_1)}{\partial\sigma^2\partial D_1} = 0$ as long as $\sigma^2(D_1)$ is single valued, and the fourth line follows because at the optimum $-\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2} < 0$.

The second comparative statics is

$$\begin{aligned}
\frac{\partial^2\sigma^2}{\partial D_1 \partial Y} &= \frac{\partial\left(\frac{\partial\sigma^2}{\partial D_1}\right)}{\partial Y} \\
&= \frac{-k\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2}\cdot f'''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)}{\left[f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)\right]^2} = \\
&= \frac{-k\cdot\frac{\partial^2\sigma^2(D_1)}{\partial D_1^2}\cdot f'''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)}{\left[f''\left(Y - \frac{a}{2}\cdot\sigma^2 - D_1\right)\right]^2} > 0
\end{aligned}$$

because $f''' > 0$. ■

Table A.1: **Regression of Changes in Variance of Cash-Flow News Around Dividend Events: Initial Variance**

This table reports results of regressing changes in the variance of cash-flow news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III an the dividend change, earnings per share, as well as the interaction with t-statistics in parentheses. Our sample period is 1963 till 2015.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDiv	−0.26	−0.24	−0.37	−0.13	−0.15	−0.14	−0.25	−0.11
	(−5.55)	(−5.29)	(−5.94)	(−2.76)	(−4.92)	(−4.64)	(−5.04)	(−2.90)
eps		−0.17	−0.12	−0.22		(−0.14)	(−0.10)	(−0.16)
		(−1.59)	(−1.91)	(−4.41)		(−1.43)	(−1.77)	(−3.21)
$\Delta Div \times eps$			0.24	0.17			0.20	0.16
			3.13	3.18			2.67	2.87
$\mathbb{Var}_{t-1}(\eta\_cf)$				−93.65				−80.83
				(−29.17)				(−32.08)
Age				0.00				0.00
				(1.23)				(0.24)
Book-to-market				81.87				112.71
				(0.93)				(1.81)
Leverage				0.16				0.14
				(1.36)				(1.33)
Size				0.04				0.01
				(2.57)				(0.87)
Constant	0.03	0.12	0.08	0.09				
	(0.45)	(1.24)	(1.04)	(0.29)				
Year FE					X	X	X	X
Industry FE					X	X	X	X
R2	2.06%	2.89%	3.89%	39.16%	30.60%	31.15%	31.80%	52.24%
Nobs	3,127	3,127	3,127	3,127	3,127	3,127	3,127	3,127

Table A.2: **Regression of Changes in Variance of Cash-Flow News Around Dividend Events: Initial Variance**

This table reports results of regressing changes in the variance of cash-flow news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III an the dividend change, earnings per share, as well as the interaction with t-statistics in parentheses. Our sample period is 1963 till 2015.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDiv	−0.26	−0.24	−0.37	−0.35	−0.15	−0.14	−0.25	−0.23
	(−5.55)	(−5.31)	(−5.94)	(−6.05)	(−4.92)	(−4.66)	(−5.01)	(−5.03)
eps		−0.17	−0.12	−0.18		−0.14	−0.10	−0.23
		(−1.56)	(−1.87)	(−2.76)		(−1.41)	(−1.75)	(−1.78)
$\Delta Div \times eps$			0.24	0.21			0.19	0.18
			(3.12)	(3.20)			(2.64)	(2.54)
Age				0.00				0.00
				(1.44)				(1.21)
Book-to-Market				34.02				134.39
				(0.40)				(2.44)
Leverage				−0.35				−0.14
				(−2.58)				(−1.12)
Size				0.05				0.02
				(3.35)				(1.23)
Cash				−0.00				(−0.00)
				(−2.35)				(−1.40)
Constant	0.03	0.12	0.08	−0.86				
	(0.45)	(1.22)	(1.01)	(−2.75)				
Year FE					X	X	X	X
Industry FE					X	X	X	X
R2	2.06%	2.89%	3.89%	5.24%	30.60%	31.15%	31.80%	32.27%
Nobs	3,127	3,127	3,127	3,127	3,127	3,127	3,127	3,127

Table A.3: **Regression of Changes in Variance of Cash-Flow News Around Dividend Events: Initial Variance**

This table reports results of regressing changes in the variance of cash-flow news around dividend events using the methodology of Vuolteenaho (2002) which we describe in Section III an the dividend change, earnings per share, as well as the interaction with t-statistics in parentheses. Our sample period is 1963 till 2015.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDiv	−0.26	−0.27	−0.26	−0.25	−0.15	−0.16	−0.15	−0.14
	(−5.55)	(−5.62)	(−5.47)	(−5.71)	(−4.92)	(−5.11)	(−4.82)	(−4.90)
CF		−0.09	−0.11	−0.09		−0.06	−0.08	−0.08
		(−2.54)	(−3.53)	(−2.87)		(−2.47)	(−3.17)	(−3.20)
$\Delta Div \times CF$			0.02	0.02			0.02	0.02
			(3.05)	(2.91)			(2.40)	(2.62)
Age				0.00				0.00
				(1.38]				(1.23)
Book-to-market				57.49				150.01
				(0.62)				(2.55)
Leverage				−0.33				−0.11
				(−2.43)				(−0.95)
Size				0.03				0.00
				(1.92)				(−0.16)
Constant	0.03	0.03	0.02	−0.53				
	(0.45)	(0.34)	(0.32)	(−1.76)				
Year FE					X	X	X	X
Industry FE					X	X	X	X
R2	2.06%	2.61%	2.75%	3.52%	30.60%	30.80%	30.94%	31.45%
Nobs	3,127	3,127	3,127	3,127	3,127	3,127	3,127	3,127