What Drives Stock Price Movement?

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Abstract

A central issue in asset pricing is whether stock prices move due to the revisions of expected future cash flows or/and of expected discount rates, and by how much of each. The current literature relies on return and cash flow predictability to draw inferences on their relative importance, which is limited by the small, frequent absent, predictive power. We use market consensus analyst earnings forecasts, coupled with prices, to back out firm-specific discount rates; in this way the cash flow news and discount rate news can be identified by constructon without resorting to predictability. We find that cash flow news is more important than discount rate news at the firm, protfolio, and aggregate levels; acordingly, there is little relative diversification effect of the two components. In addition, stock returns and cash flow news are strongly positively related.

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1 Introduction

Understanding why stock prices move up and down is a central issue for financial economists. Stock price movement, by definition, is driven by revisions of expected future cash flows and/or of expected discount rates. The crucial question, as Cochrane (2006) puts, is "How much is each?" Do stock prices change because of new information on expected cash flows, or because of time-varying risk aversion and investor sentiment? The relative importance of cash flows and discount rates reveals how the financial market works, and has profound implications for the major blocks of asset valuation – capital budgeting, portfolio allocation, sources of systematic risk, risk management, and so on.[1]

Since neither expected cash flows nor discount rates are observable, a common practice in the current literature is to estimate them using predictive regressions. While this literature provides important direct evidence on predictability, its ability to assess the relative weight of expected cash flows/discount rates is limited by the small, frequently absent, predictive power. Thinking of return volatility as a pie, the small slice we understand through prediction makes it a daunting task to cut the whole pie with meaningful precision.

We avoid the reliance on predictability by using direct expected cash flow measures. Specifically, given stock prices, we use the market prevailing forecasts for future cash flows (from I/B/E/S), for each firm and at each point of time, to back out the firm-specific discount rates. Consequently, a price change can be decomposed into two pieces: the cash flow (CF) news, defined as the price change holding discount rate constant, and the discount rate (DR) news, defined as the price change holding CF constant; this decomposition holds by definition without resorting to predictability. We then study the relation between proportional price change (i.e., capital gain return, which we call return in the rest of the paper), CF news, and DR news at firm, portfolio, and aggregate levels, based on which the following conclusions are reached.

First, at the aggregate level, 59% of value-weighted quarterly return is attributed to CF news; 41% is attributed to DR news. The importance of CF (DR) news generally

[1]For example, to explain the equity premium puzzle, Campbell and Cochrane (1999) focus on modeling the time-varying expected return while Bansal and Yaron (2004) model both expected return and dividend growth.

increases (decreases) with time horizon. At 7-year horizon, 86% (14%) of return can be attributed to CF (DR) news. Therefore, CF news is more important in driving stock returns and is increasingly more so when time horizon expands.

Our finding differs sharply from the somewhat disconcerting finding in the classic asset pricing literature that DR news dominates at the aggregate level for the postwar period (e.g., Cochrane (1992, 2006)).[2] The conclusion in the current literature is reached because CFs are found to be unpredictable and thus command little weight in the return pie. Our result is straightforward and intuitive. It says that the bulk of aggregate stock price movement is accompanied by contemporaneous revisions of market prevailing forecasts on future cash flows. This result says nothing about predictability, but is based on a test directly pertaining to the definition of CF news and DR news.

Our finding that the role of CF news increases with time horizon supports an intuitive, but seldom confirmed, prediction. Since the DR is mean-reverting, the cumulative impact of its revisions on returns, holding CF constant, must be minimal; the stock value changes in the long-run must reflect more of CF changes during the period. In the long-run limit, all return news must be CF news (e.g., Hansen, Heaton, and Li (2005) and Bansal, Dittmar, and Kiku (2006)).

Second, at the firm level, on average, 72% of quarterly return is attributed to CF news; at the 7-year horizon, 94% of return is attributed to CF news. If we take a simple average of firm returns, which is equivalent to an equally-weighted market portfolio, the proportion of the return of this portfolio attributed to CF news is close to that at the firm level: 68% at quarterly frequency and 96% at 7-year frequency. Therefore, remarkably, even though the return volatility of the market portfolio is much lower than that of an average firm, such a diversification effect happens through both CF news and DR news at roughly equal pace. As a result, CF news is almost as important in driving stock returns at the firm level as at the aggregate level.

The finding that there is very limited *relative* CF/DR diversification effect when moving from individual firms to the aggregate portfolio provides a stark contrast to the prevailing view that CF news dominates at firm level, but the opposite is true

[2]As Cochrane (2006) notes, "Excess return forecastability is not a comforting result. Our lives would be so much easier if we could trace price movements back to visible news about dividends or cashflows...But that is where the data have forced us, and they still do so."

at the aggregate level.[3] We further show that this reversal role of CF news in the traditional literature is not caused by diversification; instead, the results are driven by the fundamental difference between cross-sectional and time-series predictability. Basically, the cross-sectional heterogeneity of CFs is persistent (e.g., Fama and French (1995)) and predictable; it is thus easy to find that CF news dominates whenever a panel data – common for firm and portfolio analysis – is studied. However, in the time-series dimension, CFs are less predictable than DRs, and DR news dominates in pure time series regressions – common for the aggregate portfolio analysis.

If we want to understand why stock prices move around, which is more a time series concept, then time-series tests are more suitable.[4] In this case, following the conventional methods using realized return data (and not using forecasts data), we show that DR news "dominates" at firm, portfolio, and aggregate levels; but the opposite is found whenever a panel data is used. As an extreme example, we sort the whole market into two portfolios, – value versus growth – each of which is well diversified. If we apply time series analysis to each portfolio, then DR news "dominates"; if we study the panel of the two portfolios, then CF news "dominates". In other words, the conclusions based on the conventional methods are restricted by the lack of CF predictability in the time-series dimension. Our strong evidence, using analysts forecasts, on the predominant role of CF news suggests that the lack of CF predictability is most likely a statistical issue – it is difficult to argue that there is no CF news when the market prevailing forecasts on future CFs move closely with stock prices.

Third, at the aggregate level, CF news and DR news are positively correlated and are both procyclical: at a good time CF forecasts go up and DR goes down. At the firm and portfolio levels, this correlation varies. However, crucially, the correlation between return and CF news is always strongly positive, with coefficient over 0.70 for all portfolio. This suggests that stock prices move closely with CF news, and the role of DR news,

[3]The limited evidence on the *relative* CF/DR diversification effect from firm to aggregate level does not mean that the relative importance of CF news and DR news in driving returns is homogeneous for all firms. Rather, we document a rich cross-sectional heterogeneity in this regard. We find that, for small firms, value firms, and momentum losers, a much larger portion of returns is due to CF news.

[4]One can think of one example in which there is a rich cross-sectional heterogeneity but no time-series variation, – stock prices never move – and yet strong cross-sectional predictive results can be found.

whatever it is, does not dominate this relation.

The current literature provides mixed evidence on the relation between return and realized CFs. Many studies find a positive relation (e.g., Roll (1988), Fama (1990), Kothari and Shanken (1992), and Stambaugh (1990)**),** while Vuolteenaho (2002) and Kothari, Lewellen, and Warner (2006) document a negative relation. The use of analyst forecasts enables us to decompose return into the forwarding looking CF news and DR news, and add new evidence to this literature.

Our research belongs to the growing literature that uses analyst forecasts to study the nature of asset valuation, including, among others, Kaplan and Ruback (1995), Botosan (1997), Claus and Thomas (2001), Gebhardt, Lee, and Swaminathan (2001), Brav, Lehavy, and Michaely (2005), Lee, Ng, and Swaminathan (2003), Hail and Leuz (2006), Botosan and Plumlee (2005), Easton, Taylor, Shroff, and Sougiannis (2002), Easton (2004), Olson and Juettner-Nauroth (2005), Pastor, Sinha, and Swaminathan (2006), and Chen and Zhang (2006). Our results are consistent with the literature documenting that stock prices respond to revisions of analyst forecasts.[5] Our approach is in the same spirit of Graham and Harvey (2005) who use surveys among CFOs to measure the expected equity premium. Our results suggest that such an approach can shed fresh light on several fundamental issues in asset valuation.

Several caveats are also in order when digesting our findings. First, the use of analyst consensus forecasts contains the implicit assumption that the marginal investors (who determine prices) share the same CF forecasts as analysts. We believe such an assumption is not very restrictive. So long as the marginal investors share to a significant degree the views of analysts – the professionals who are paid to provide forecasts –, most of our results will get through. Second, we do not adjust for the potential biases that might affect the levels of analyst forecasts. We argue that this bias only plays a secondary role because our results depend mainly on the revisions, rather than the levels, of analyst forecasts.

The rest of the paper proceeds as follows. In Section 2 we describe the method to construct CF news and DR news, and report the sample summary. In Section 3 we

[5]This literature includes, among others, Griffin (1976), Givoly and Lakonishok (1979), Imhoff and Lobo (1984), Elton, Martin, and Gultekin (1981), Lys and Sohn (1990), Francis and Soffer (1997), and Park and Stice (2000).

analyze the relation among return, CF news, and DR news at aggregate, portfolio, and firm levels. In Section 4 we provide more analysis and discussion that link our results to the current literature. In Section 5 we conduct portfolio analysis. In Section 6 we discuss robustness checks. A brief conclusion is provided in Section 7.

2 The abnormal earnings model and the sample

2.1 The model

Follow Claus and Thomas (2001), we consider a present value representation in the form of an abnormal earnings model:

$$P_0 = bv_0 + \frac{ae_1}{(1+k)} + \frac{ae_2}{(1+k)^2} + \frac{ae_3}{(1+k)^3} + ..., \tag{1}$$

where P_0 is the value of stock at time 0, bv_0 is book equity at time 0, k is the discount rate, and

$$ae_t = e_t - k \times bv_{t-1} \tag{2}$$

is the expected abnormal earnings for period t, and e_t is the expected earnings forecast for time t. Since book equity is expected to grow at the rate k, ae_t is the abnormal earnings. To link back to the familiar dividend model, we note that, according to the clean surplus relation, dividend d_t is related to earnings and book equity by definition:

$$d_t = e_t - (bv_t - bv_{t-1}). \tag{3}$$

That is, the difference between earnings e_t and retained earnings $(bv_t - bv_{t-1})$ is dividend payout.[6] This means

$$ae_t = d_t + [bv_t - (1+k) \times bv_{t-1}]. \tag{4}$$

In other words, ae_t is dividend payout plus abnormal retained earnings. If we also assume that the current book equity and future abnormal retrained earnings will be converted into dividends by the terminal time, then equation (1), is nothing but an

[6] As Claus and Thomas (2001) point out, under U.S. accounting rules, almost all transactions satisfy the clean-surplus relation. The few violations happen ex post, and are not expected in analysts' forecasts (Frankel and Lee (1998)).

algebraic restatement of the familiar present value formula:

$$P_0 = \frac{d_1}{(1+k)} + \frac{d_2}{(1+k)^2} + \frac{d_3}{(1+k)^3} + ... \tag{5}$$

I/B/E/S contains firm-specific quarterly earnings forecasts for the next four quarters and annual earnings forecast for up to five years. Whenever missing or unavailable, we fill in the forecasts for up to the 5th year (see more details in section 2.2). Following Claus and Thomas (2001), we assume that the expected earnings growth rates converge to the 10-year Treasury rate minus three percents for all horizons beyond the 5th year, which we denote g_{ae}. (We find our conclusions are robust to alternative assumptions, as we discuss in the robustness section.) With these considerations we back out the discount rate k_t from the following equation:

$$P_t = bv_t + \sum_{i=1}^{4} \frac{\alpha e_{t+i*1/4}}{(1+k_t/4)^{i*1/4}} + \sum_{i=2}^{5} \frac{\alpha e_{t+i}}{(1+k_t)^i} + \frac{\alpha e_{t+5}(1+g_{ae})}{(k_t - g_{ae})(1+k_t)^5}. \tag{6}$$

In the actual implementation we numerically search for solutions to equation (5) by starting from the 10-year Treasury rate and search upwards. As in Claus and Thomas (2001), the first number that solves the equation is used as the discount rate.

CF news and DR news We can rewrite Equation (5) as

$$\begin{aligned} P_t &= bv_t + \sum_{i=1}^{4} \frac{\alpha e_{t+i*1/4}}{(1+k_t/4)^{i*1/4}} + \sum_{i=2}^{5} \frac{\alpha e_{t+i}}{(1+k_t)^i} + \frac{\alpha e_{t+5}(1+g_{ae})}{(k_t - g_{ae})(1+k_t)^5} \\ &= bv_t + f\left(\alpha e^t, k_t\right). \end{aligned} \tag{7}$$

By construction, stock price P_t is a function of book equity bv_t, the vector of analyst forecasts available at time t (with superscript t), αe^t, and the discount rate k_t. We separate bv_t from $f\left(\alpha e^t, k_t\right)$ to emphasize the fact that αe^t and k_t are forward-looking expectation variables, bv_t is book equity and thus is not forward-looking.

The proportional price difference between $t+j$ and t is then

$$\begin{aligned}\frac{P_{t+j}-P_t}{P_t} &= \frac{bv_{t+j}-bv_t}{P_t}+\frac{f\left(\alpha e^{t+j},k_{t+j}\right)-f\left(\alpha e^{t},k_{t}\right)}{P_t}\\ &= \frac{bv_{t+j}-bv_t}{P_t}+\frac{\left(f\left(\alpha e^{t+j},k_{t+j}\right)-f\left(\alpha e^{t},k_{t+j}\right)\right)}{P_t}\\ &\quad+\frac{\left(f\left(\alpha e^{t},k_{t+j}\right)-f\left(\alpha e^{t},k_{t}\right)\right)}{P_t}\\ &= RE_t+CF_t+DR_t, \end{aligned} \tag{8}$$

where

$$RE_t=\frac{bv_{t+j}-bv_t}{P_t}$$

is the change of asset in place (i.e., retained equity) scaled by price.

$$CF_t=\frac{\left(f\left(\alpha e^{t+j},k_{t+j}\right)-f\left(\alpha e^{t},k_{t+j}\right)\right)}{P_t} \tag{9}$$

is the CF news; it is so because the numerator is calculated by holding the discount rate constant at $t+j$ and the difference is driven by the CF difference between t and $t+j$. Similarly,

$$DR_t=\frac{\left(f\left(\alpha e^{t},k_{t+j}\right)-f\left(\alpha e^{t},k_{t}\right)\right)}{P_t} \tag{10}$$

is the DR news; it is so because in the numerator it is as if CF never changed between t and $t+j$, and the difference is driven by the variation of discount rates in the period.

In sum, we can decompose the capital gain return for any time horizon into retained equity, CF news, and DR news by construction, which enables us to tackle the relation among them. Denote the capital gain return RETX, we have

$$RETX_t=RE_t+CF_t+DR_t. \tag{11}$$

We do not include RE_t in either CF news or DR news because it does not represent a revision of *expected* CFs or *expected* DRs. For this reason, we can define $RETXAD_t = RETX_t - RE_t$ as the earning-adjusted capital gain, and study the variance of this return through CF news and DR news:

$$VAR\left(RETXAD_t\right) = COV\left(CF_t,RETXAD_t\right)+COV\left(DR_t,RETXAD_t\right) \tag{12}$$

$$1 = \frac{COV\left(CF_t,RETXAD_t\right)}{VAR\left(RETXAD_t\right)}+\frac{COV\left(DR_t,RETXAD_t\right)}{VAR\left(RETXAD_t\right)}, \tag{13}$$

where VAR and COV are variance and covariance operators. $\frac{COV(CF_t, RETXAD_t)}{VAR(RETXAD_t)}$ is the slope coefficient of regressing CF_t on $RETXAD_t$; $\frac{COV(DR_t, RETXAD_t)}{VAR(RETXAD_t)}$ is the slope coefficient of regressing DR_t on $RETXAD_t$. In other words, to understand the portion of return variance that is driven by CF news and DR news, one only needs to regress CF news and DR news on the earnings-adjusted capital gain return respectively, and draws inferences based on the slope coefficients.

In the rest of the paper when we talk about return we mean the earning-adjusted capital gain return. We can alternatively study capital gain return, and all conclusions remain the same.

Link to the literature Campbell and Shiller (1988) show that the log dividend price ratio, suppressing a constant, can be proxied as

$$p_{t-1} - d_{t-1} = \sum_{j=0}^{\infty} \rho^j \left(\triangle d_{t+j} - r_{t+j} \right), \tag{14}$$

where p_{t-1} and d_{t-1} are log price and dividend respectively, and $\triangle d_{t+j}$ and r_{t+j} are log dividend growth and return respectively. If we take expectation on both sides, repeat the same exercise for the one-period forward equation, and take the difference, we obtain

$$\begin{aligned} p_t - p_{t-1} &= (d_t - d_{t-1}) + \left(E_t \left(\sum_{j=0}^{\infty} \rho^j \triangle d_{t+1+j} \right) - E_{t-1} \left(\sum_{j=0}^{\infty} \rho^j \triangle d_{t+j} \right) \right) \\ &\quad + \left(E_t \left(\sum_{j=0}^{\infty} \rho^j r_{t+1+j} \right) - E_{t-1} \left(\sum_{j=0}^{\infty} \rho^j r_{t+j} \right) \right). \end{aligned}$$

The left hand is log capital gain, which can be decomposed into a current cash flow component, a revision of expectation of future dividend growth (i.e., CF news), and a revision of expectation of discount rates (i.e., DR news). The two ways of decomposition are thus quite consistent.

It has become conventional to state that the variation of the price-dividend ratio reflects revisions of expected CFs/DRs. The above formula suggests that this variation actually contains a current cash flow component that does not involve expectations. If we define CF news and DR news in terms of revisions of expectations, then it is more proper to study their relation to cash flow-adjusted capital gain return.

2.2 The sample

To forecast future CFs we need data on both book equity and earnings forecasts. Book equity is obtained using the COMPUSTAT quarterly industrial file. I/B/E/S reports consensus analyst forecasts on earnings as of the middle of each month. To be consistent with book equity, we collect earnings forecast data as of January, April, July, and October each year for all firms. Besides earnings forecasts, we also collect from I/B/E/S share prices and the number of shares outstanding. To be included in the sample, we require non-missing data for the prior quarter's book value, earnings, and dividends; we also require firms to have common equity data in CRSP. We restrict our sample to the 1985-2005 period because I/B/E/S covers too few firms before 1985.

I/B/E/S contains earnings forecasts for the next four quarters, for up to five years ahead, and a long-term growth rate (g_5), which is usually assumed to be a five-year earnings growth rate. For firms with certain quarterly forecasts missing, we fill in the missing numbers based on the seasonality of the firm's forecasted earnings in other years. For example, if the 4th quarter of a firm, on average, contribute 35% of annual earnings, and the 4th quarter earnings forecast is missing, we multiply the sum of forecasted earnings for the other three quarters by 35/65 and use the product as the earnings forecast. We have conducted robustness tests and found that including only firms with complete quarterly earnings forecast for the next four quarters do not change our conclusions. If a firm has missing forecasts for years two to five, we follow the existing literature and project earnings in those years using the long-term growth rate and the prior year's earnings forecast: $e_t = e_{t-1}(1 + g_5)$.[7]

Table 1 provides the year-by-year quarterly statistics for the final sample. The number of firms increases steadily from 796 in 1985 to 1778 in 2005. The sample features relatively larger firms as the average payout ratio, defined as the ratio of dividend to earnings, varies from 34% to 45%. Overall, our sample represents more than 60 percent of the total market capitalization. There is a general downward trend of cost of equity during the sample period, which makes sense because there is also a similar downward trend of the riskfree rate for the same period.

[7]We do not use negative earnings forecast to project earnings for the missing quarter or year.

3 Analysis

3.1 The aggregate and firm levels

We winsorize all firm-specific variables in the final sample at the 1% and 99% breakpoints. We then collapse the sample into a value-weighted aggregate time series covering 1985-2005. The purpose is to study the relation among return, CF news, and DR news. We note that return, as defined in Equation (7), does not include dividend since our primary goal is to study price volatility. In addition, dividend plays a minor role even in the total return volatility. For example, for the postwar period the average quarterly dividend-included return for the CRSP value-weighted portfolio is 3.03% with a standard deviation of 7.99%; the average quarterly dividend-excluded return is 2.12% with a standard deviation of 7.92%. During 1985-2005 the average dividend-included return is 3.33% with a standard deviation of 8.49%; the average dividend-excluded return is 2.71% with a standard deviation of 8.43%. Therefore, dividend only affects the level of return, but its impact on return volatility is negligible.

In Panel A of Table 2 we report average cumulative return, CF news, and DR news, ranging from one to 28 quarters. Not surprisingly, average return increases monotonically from 1.97% at quarterly frequency to 108.51% at 7-year frequency. The majority of this increasing return is accounted for by CF news: the average CF news is 1.98% at quarterly frequency and 102.67% at 7-year frequency. CF news should be zero if forecasted cashflows do not change. In contrast, here almost all of the average return is matched by similar increases in forecasted cashflows, suggesting that CF news plays a significant role in stock price volatility.

There is also an increasing trend in DR news: average DR news is -0.01% at quarterly frequency but 5.854% at the 7-year horizon. Theoretically, since the DR must be mean-reverting, DR news is expected to be zero on average and is not expected to increase monotonically with horizon if the time series is long enough. This increasing trend is specific to our sample period as the cost of equity has declined significantly since the 1980s. In this sense the role of DR news is likely to be exaggerated: we should expect a smaller role of DR news with a sample longer than what we have.

In the following we address four important issues in sequence.

What drives aggregate stock price volatility?

In Panel B of Table 2, we report the variances, covariances, and correlations of return, CF news and DR news. The following equation should be satisfied:

$$VAR\,(\text{return}) = VAR\,(\text{ CF news}) + 2 \times COV\,(\text{CF news, DR news}) + VAR\,(\text{ DR news})\,. \tag{15}$$

The quarterly return variance is 0.69%, which corresponds to an annualized volatility of 16.61%, typical for the market portfolio. Of the 0.69%, 0.31% is due to CF news variance, and 0.19% is due to DR news variance – CF news is much more volatile and plays a much bigger role. As the time horizon increases, while both the variances of CF news and DR news climb, CF news becomes more and more important. At annual frequency, The CF news variance is 1.06%, versus 0.41% for DR news; at 5-year horizon, the CF news variance is 16.21%, versus 1.24% for DR news; at 7-year horizon, the CF news variance is 28.29%, versus 0.91% for DR news.

The mounting importance of CF news with horizon is intuitive. Since the DR must be stationary, the cumulative impact of its revision – the difference of DR during a period – must be minimal if the CFs are held constant. Put differently, S&P 500 Index fluctuates each quarter due to both CF news and DR news. However, a major reason why S&P 500 Index has been more than doubled in the past 15 years is that the top 500 companies have generated much wealth during the period and the earnings forecasts (in dollars) have jumped. In the long-run limit, all news must be CF news (e.g., Hansen, Heaton, and Li (2005) and Bansal, Dittmar, and Kiku (2006)). While there is a large literature on the relative importance of CF and DR volatilities (see Section 4), little prior evidence has been documented on this relative importance as a function of time horizon. It is thus nice to see the increasing pattern of the relative CF/DR variances as horizon increases.

We formally test the relative importance of CF news/DR news in driving price volatility in Table 3. In particular we regress CF news and DR news on return respectively. The slope coefficients, as shown in equation (12), tell the portion of stock return variance that is driven by each component. Consistent with the relative variance patterns in Table 2, the CF coefficient is 0.59, versus 0.41 for DR at quarterly horizon;

at 5-year horizon, the CF coefficient is 0.79, versus 0.21 for DR; at 7-year horizon, the CF coefficient is 0.86, versus 0.14 for DR.[8] The slope coefficients are estimated with high precision with large Newey-West t-statistics. This is expected because the combined CF news and DR news, by construction, must explain 100% of the return variation.

In sum, for the aggregate portfolio, CF news is more important than DR news in driving stock price movement, and increasingly more so as time horizon rises. This evidence differs dramatically from the one widely documented in the classic asset pricing literature that DR news dominates CF news (e.g., Cochrane (1992, 2006) and Campbell and Ammer (1993)). We provide further analysis linking to this literature in section 4.

How are CF news and DR news correlated?

Standard asset pricing theory predicts that aggregate return, CF news, and DR news are all positively correlated: stock prices go up when expected future CFs go up; in the meantime, DRs are likely to go down because investors can become less risk averse or carry positive sentiment at such a good time.

In Panel B of Table 2, CF news and DR news are positively correlated at 0.40 at quarterly frequency. This correlation increases to 0.51 at annual frequency and 0.91 at 7-year horizon. In addition, aggregate return is strongly positively correlated with both CF news and DR news. The correlation between return and CF (DR) news is 0.93 (0.80) at annual frequency. Therefore, these statistics suggest that stock prices go up along with positive CF news, and discount rate tend to go down at the same time, confirming our prior.

Prior evidence on these correlations is mixed. Many studies find a positive relation between stock return and CF news (e.g., Roll (1988), Fama (1990), Kothari and Shanken (1992), and Stambaugh (1990). On the other hand, Kothari, Lewellen, and Warner (2003) document the robust and yet surprising finding that aggregate return is negatively related to realized earnings news. Since the CF news is positive in this case, the DR must have gone up to such an extent that it dominates CF news and makes return negative. As Kothari, Lewellen, and Warner (2003) point out, this finding is counter-intuitive and

[8]Throughout the paper, the CF and DR coefficients might not add up exactly to one because of the winsorization and value-weighting. There are also similar minor biases in variances, but these biases do not affect any conclusion we draw.

against the asset pricing theory. While it is not hard to imagine that the CF news and DR news can be negatively related at times – this happens when CF news rises more than price – it is difficult to believe that the DR news can dominate at good times and reverse the positive relation between CF news and DR news.

To understand this issue, in Panel A of Graph 1 we plot the time series of quarterly aggregate return and CF news. The obvious pattern is that return and CF news move almost in lock steps: in pretty much every quarter, return goes up when CF news goes up, and they go down together. The immediate conclusion is that even if the DR news could be negative at a time when the CF news is positive, it is of secondary nature and is far from dominating the relation between the return and the CF news. The overwhelming evidence is that return and CF news are positively related.

In Panel B we plot the time series of return and DR news. They again tend to move in the same direction more often than not. This, combined with the fact that the return almost always moves in the same direction of CF news, suggests that the return goes up with positive CF news, and the DR tends to go down at the same time, pushing the return further up. Even in the periods when the return and the DR news go in the opposite directions, it is clear that the DR news has little impact on the positive relation between the return and the CF news.

Why do we get results so different from those in Kothari, Lewellen, and Warner (2003)? In untabulated results, we confirm their finding that, when realized earnings news is used, the contemporaneous correlation between return and earnings news is not positive. Therefore, the difference must mainly stem from our use of analyst forecasts, which we believe contain a clear advantage. In particular, both the return and CF news should be forward-looking incorporating expected cash flows in all future periods. However, realized earnings news is backward-looking; with information constantly updated in the financial market, returns could have reflected future earnings news long before this news is formally reported and realized. In comparison, because both return and analyst forecasts are forward-looking, and it is easier to line them up with respect to time. Therefore, by using forward-looking measures, we are able to alleviate the concern by Kothari, Lewellen, and Warner (2003) and shed fresh light on this literature.

The cyclical property of aggregate CF news and DR news

Standard asset pricing theory predicts that investors adjust cash flow forecasts and required rates of return depending on macroeconomic conditions. CF news is expected to be procyclical – the economic outlook, which is essentially the outlook of future cash flows, is likely to be downwardly adjusted at a bad time, resulting in lower CF-related returns; DR news is also expected to be procyclical – investors, being risk-averse, could require a higher rate of return at a bad time, which is achieved by downwardly adjusting stock prices.

We tests these hypotheses by regressing macroeconomic variables on CF news and DR news separately:

$$\text{MACRO}_t = \alpha + \sum_{i=0}^{1} \beta_i \times \text{NEWS}_{t-i} + \varepsilon_t. \tag{16}$$

We choose three variables representing the macroeconomic conditions: the industrial production growth rate, the real consumption growth rate, and the change of aggregate Baa over Aaa spread, all obtained from the Federal Reserve Board. For the first two variables, we include both the current and lagged news (either CF or DR) as independent variables because financial variables tend to lead the real economy. Because the Baa over Aaa spreads are also from the financial market, the lag term is not included.

We report the combined slope coefficients ($\sum_{i=0}^{1} \beta_i$) and their Newey-West t-statistics (with up to four lags) in table 4. As expected, both CF news and DR news are significantly positively related to the industrial production growth rate; the combined CF coefficient is 0.07, with a t-statistic of 2.19 and R-squared of 0.08; the combined DR coefficient is 0.10, with a t-statistic of 2.66 and R-squared of 0.08. That is, CF forecasts go up when production grows faster, and the DR goes down. CF news is also positively, albeit insignificantly, related to the real consumption growth rate; DR news, on the other hand, is significantly related to it with a t-statistic of 2.38.

Many previous studies assume that the expected market equity premium is linearly related to the aggregate Baa over Aaa spread (e.g., Jagannathan and Wang (1996) and Petkova and Lu (2004)). A positive change of Baa over Aaa spread can be then regarded as an upward revision of the discount rate. In table 4, the change of Baa over Aaa spread

is significantly negatively related to both CF news and DR news: the CF coefficient is -0.54, with t-statistic of 2.41 and R-squared of 0.07; the DR coefficient is -0.74, with t-statistic of 2.76 and R-squared of 0.07.

Therefore, confirming our theoretical prior, both CF news and DR news are procyclical, and the DR moves with the Baa over Aaa spread, the usual proxy for the expected market risk premium.

CF news and DR news at firm level

How are return, CF news, and DR news related at firm level? If return is driven by both CF news and DR news at the firm level, which component is relatively more diversified away when an increasingly more diversified portfolio is held? These are important issues that help us understand the constitution of the financial market and portfolio management. The widely cited view, based on Vuolteenaho (2002) and the literature on the aggregate portfolio, is that CF news dominates at firm level, but a large proportion of it can be diversified away, leading to the dominance of DR news at the aggregate level; this is consistent with the intuition that CF news is more related to firm-specific risk, but DR news is more related to systematic risk.[9]

We conduct the same time series analysis, as we have done for the aggregate portfolio, for each firm separately. To do so, we require that each firm should have at least 16 quarters of data. We then report the cross-sectional average of firm-specific results in Panel A of Table 5. The average firm return variance is 5.13% at quarterly frequency, equivalent to an annualized volatility of 45.30%. The average variance of quarterly CF news is 3.86% and the variance of quarterly DR news is 1.66%. Accordingly, The slope coefficients indicate that 72% of quarterly stock price movement is driven by CF news, 28% by DR news; and the CF coefficient increases almost monotonically with time horizon. At 5-year horizon, 92% of price movement is driven by CF news. Therefore, CF news appears to be much more important than DR news does, consistent with prior studies.

[9]When summarizing the results in Vuolteenaho (2002), Cochrane (2001) points out, "Much of the expected cashflow varition is idiosyncratic, while the expected return variation is common, which is why variation in the index book/market ratio, like variation in the index dividend/price ratio, is almost all due to varying expected excess returns."

Interestingly, the average correlation between CF news and DR news is close to zero across time horizons. As we show below, this correlation has a rich cross-sectional pattern among portfolios. Nevertheless, regardless of the correlation, DR news plays a secondary role in driving returns. This is shown in the slope coefficients as well as the correlation between return and CF news; return and CF news are 83% correlated at quarterly frequency, which steadily increases to 96% at 7-year horizon. Therefore, consistent with what we have learned from the aggregate portfolio, return and CF news move essentially in lock steps.

In Panel B, we first average, cross-sectionally, the return, CF news, and DR news of all firms, which is equivalent to an equally-weighted market portfolio. For this market portfolio, the variances of quarterly return, CF news, and DR news are 1.07%, 0.64%, and 0.16%; the comparable numbers at firm level are 5.13%, 3.86%, and 1.66%. Therefore, aggregate return variance is much smaller, through reduction of variances for both components. The slope coefficients for quarterly CF news and DR news are 0.68 and 0.32 respectively; in comparison, the corresponding coefficients at firm levels are 0.72 and 0.28 respectively. At 7-year horizon, the CF and DR coefficients are 0.96 and 0.05 respectively; in comparison, the corresponding statistics at firm level are 0.94 and 0.06 respectively. Simply put, there is little sign indicating that the CF news is diversified more than the DR news, contrary to what has been documented.[10] CF news is more important at both firm and aggregate levels.

The hypothesis that DR news is more "systematic" than CF news is based on the assumption that marginal investors hold diversified portfolios. To understand this, imagine that each stock is solely held by a separate investor, in which case both CF news and DR news are likely to be investor/firm-specific. Whether DR news is more "systematic" is related to the degree of diversification, and there is ample evidence suggesting that many investors hold undiversified portfolios (e.g., Goetzmann and Kumar (2005) and Statman (2004)). In addition, given that investors must make cash flow forecasts based on the macroeconomic conditions, and that the operational performances of most firms are cyclical, CF news, even at firm level, could be quite systematic. Indeed, there is a growing literature stressing the systematic nature of

[10]We provide further comparison to the current literature in section 4.

CF risk at firm and portfolio levels (e.g., Campbell and Vuolteenaho (2004), Bansal, Dittmar, and Lundblad (2006), and Lettau and Watcher (2006)). For these reasons, whether CF news and DR news is more systematic at firm level, and which one is more likely to be diversified away, is an empirical issue. By using direct firm-specific CF news and DR news measures, our results suggest small, if any, relative CF/DR diversification effect.

4 Link to the literature

We have found that CF news appears to be more important than DR news in driving returns, at both firm and aggregate levels, and there is little relative CF/DR diversification effect. These findings are very different from the results in the current literature that, even though CF news dominates at the firm and portfolio levels (Vuolteenaho (2002) and Cohen, Polk, and Vuolteenaho (2003)), the pattern flips when the portfolio is diversified to the aggregate (Vuolteenaho (2002)). As a result, DR news dominates at the aggregate level for the postwar period (e.g., Campbell (1991), Campbell and Ammer (1993), Cochrane (1992, 2006), Lettau and Nienwerburgh (2006), and Chen (2007)). Why do our conclusions differ from the existing studies? Our findings can be digested only to the point that we can place it properly in the current literature.

We reconcile our results with the current literature below in two ways. First, we argue that current studies provide direct tests on predictability, but only indirect tests on stock price volatility; in comparison, our results have nothing to do with predictability, but are direct tests on volatility. Second, we show that the "flip" of the role of CF news in the current literature is in fact a statistical issue that has little to do with diversification and thus the current interpretations are questionable.

4.1 Predictability

Stock price is the expected future cash flows discounted by the expected discount rates. Since neither expected cash flows nor discount rates are observable, they are usually estimated through predictive regressions. The Campbell and Shiller (1988)

decomposition leads to

$$dp_t = \text{constant} + E_t \sum_{j=1}^{\infty} \rho^{j-1} r_{t+j} - E_t \sum_{j=1}^{\infty} \rho^{j-1} \triangle d_{t+j}, \tag{17}$$

where dp_t is the log dividend-price ratio, r_t is return, and d_t is dividend growth rate. The equation says that the variation of the dividend-price ratio must be driven by revisions of expected returns (i.e., DR news) and/or of expected cash flows (i.e., CF news). In a similar vein, Vuolteenaho (2002) shows that

$$bm_t = \text{constant} + \sum_{j=1}^{\infty} \rho^{j-1} r_{t+j} - \sum_{j=1}^{\infty} \rho^{j-1} ROE_{t+j-1}, \tag{18}$$

where bm_t is the log book-to-market and ROE_t is return on equity, defined as the ratio of earnings to the lagged book equity. Therefore, the ability to pin down the relative importance of CF news and DR news comes down to return and cash flow predictability by the dividend-price ratio, book-to-market ratio, or other variables. Many studies rely on return predictability to calculate DR news and back out CF news as the residual (e.g., Campbell (1991) Campbell and Ammer (1993), Vuolteenaho (2002), Campbell and Vuolteenaho (2004)); many others compare the relative return and cash flow predictability.[11]

While the current literature provides important direct tests on predictability, its ability to assess the relative importance of CF news and DR news is bounded by the predictive power. Unfortunately, detecting predictability is a nontrivial task. There is a large literature questioning the statistical reliability of predictability (see, for example, Boudoukh, Richardson, and Whitelaw (2006) and the papers therein). Even if there is predictability on return and cash flows, it is usually small, with R-squared typically lower than 10%. We can think of return volatility as a pie and the task is to cut it into CF news and DR news. In the spirit of Roll (1977), the slice of pie we know through predictability is too small to cut the pie with precision (see also Chen and Zhao (2006)).

[11]The large literature that predicts return and/or cash flow growth includes, among others, Rozeff (1984), Keim and Stambaugh (1986), Fama and French (1988), Harvey (1989), Campbell and Shiller (1988, 1998), Ferson and Harvey (1991), Cochrane (1992, 2006), Campbell and Ammer (1993), Pesaran and Timmermann (1995), Kothari and Shanken (1997), Pontiff and Schall (1998), Lettau and Ludvigson (2001, 2005), Ang (2002), Lewellen (2004), Campbell and Yogo (2005), Campbell and Thompson (2005), Ang and Bekaert (2005), Larrin and Yogo (2006), and Chen (2007).

Therefore, the current literature provides direct tests on predictability; but they have very limited power in identifying CF news and DR news.

In contrast, our method enables us to decompose return into CF news and DR news by construction. This is because we have data on both return and expected cash flows, and thus can nail down each component with precision without relying on predictability. Our method is thus best suited to tackle the relative importance of CF news and DR news. On the other hand, our method say nothing about predictability; nor is it required for our purposes. Our method sheds fresh light largely because it gets around the challenge of predictability.

4.2 Is there a "flip" of CF news?

We show below that the "flip" of CF news in the current literature has little to do with diversification, but is driven by the fundamental difference between cross-sectional and time-series predictability. Put differently, the conventional view is mainly due to a statistical issue and should not be interpreted as it is.

The difference between cross-sectional and time-series predictability is sometimes mentioned in the current literature, but never given enough attention. Basically, the cross-sectional heterogeneity in earnings is persistent, a fact widely documented with respect to value versus growth stocks (e.g., Lakonishok, Shleifer, and Vishny (1994), Fama and French (1995), and Cohen, Polk, and Vuolteenaho (2003)). It is thus relatively easy to predict CF growth cross sectionally – growth firms tend to have higher CF growth in the following period. As a result, panel data studies, as usually used for firm and portfolio analysis, tend to find that CF news is more important. On the other hand, CF is difficult to predict in a pure time series regression, and this lack of CF predictability results in the finding that DR news dominates, a conclusion often found at the aggregate level. We show below that if pure time series regressions are used, DR news "dominates" at all three levels using the traditional methods. In other words, the existing conclusions at various levels are not comparable, because they are more related to the cross-sectional and time-series differences than related to diversification.

To illustrate this point, following Vuolteenaho (2002), we first rewrite equation (18)

as

$$e_{t+1} = (\mathrm{E}_{t+1} - \mathrm{E}_t) \sum_{j=0}^{N} \rho^j ROE_{t+1+j} - (\mathrm{E}_{t+1} - \mathrm{E}_t) \sum_{j=1}^{N} \rho^j r_{t+1+j}, \tag{19}$$

where e_{t+1} is the unexpected equity return. We then assume that the vector, $z_t = [r_t \; ROE_t \; bm_t]'$, following a first order VAR:

$$z_{t+1} = \Gamma z_t + u_{t+1}.$$

We choose the vector because these variables are mechanically related and it is consistent with the literature on the aggregate portfolio (e.g., Cochrane (1992, 2006)). Return and ROE can then be predicted through the VAR and the DR news and CF news can be estimated.[12] We then report the following statistics: (i) the VAR coefficient of r_t on bm_{t-1} and its t-statistic; (i) the VAR coefficient of ROE_t on bm_{t-1} and its t-statistics (iii) the DR news variance; (iv) the CF news variance; and (vi) the ratio of DR/CF variance.

Following Vuolteenaho (2002) and Cohen, Polk, and Vuolteenaho (2003), we combine the COMPUSTAT annual tape with the CRSP annual data. We include in this analysis only firms that have at least 16 year's available data, and firms that have at least one of the t-statistics (for either return or ROE) above 1.8 since we do not want to draw inference on the other firms where neither return nor ROE is predictable.

We first conduct a time-series analysis for each firm and then report the cross-sectional mean of the above statistics in the first row of Panel A, Table 6. The cross-sectional mean t-statistic for return is 1.92 and the mean z-statistic for ROE is -1.26. That is, return is much more likely to be predictable relative to ROE. Accordingly, the mean variance ratio is 2.93. Therefore, at the firm level, when pure time-series analysis is conducted, return is more predictable and the DR news is more important. We next repeat the above analysis using a panel VAR, as in the current literature, and report the results in the second row of the same panel. There the ROE coefficient is much larger and more significant, and the variance ratio become 0.16 – one would conclude that CF news dominates at firm level, exactly opposite to the time-series analysis.

Panel B reports similar comparisons at the portfolio level. In Panel B1, we first sort

[12]For details see Vuolteenaho (2002), Campbell and Vuolteenaho (2004), and Chen and Zhao (2006).

firms into ten book-to-market portfolios and repeat the time-series analysis for each of them. Except for the growth firms, (in which case the variance ratio is 0.60, suggesting that CF news is more important), the variance ratio is between 2.14 and 16.50 for the other nine portfolios. In other words, for most portfolios DR news plays a bigger role at the portfolio level if time-series analysis is conducted. We then conduct the panel analysis using the ten portfolios as a set of panel data, and report the results in the last row of panel B1. Here again ROE becomes much more predictable and the variance ratio is 0.60 – one would conclude that CF news is more important at the portfolio level if panel data is used.

In Panel B2, we sort firms into two book-to-market portfolios. The variance ratio for the growth firms is 7.14 and for the value firms is 6.94 – DR news dominates in both time series. When we pool the two portfolios as a panel, the variance ratio is 0.75; the result is again reversed. Finally, we analyze the market portfolio in panel B3; there the variance ratio is 5.12: DR news dominates for the aggregate portfolio.

It is now clear that previous results are mainly driven by whether a panel or time-series analysis is conducted. If panel data is used, then CF news is always more important; if time-series analysis is conducted, then DR news is more important at the firm, portfolio, and aggregate level. These results have little to do with diversification. When the market is divided into two portfolios, each portfolio is very diversified, and yet we still find that CF news is more important if a panel regression is used.

Therefore, if the purpose is to study why stock prices move, which is more in a time series sense, then one would conclude, using conventional methods and realized return data, that DR news is more important at all levels. The fact that we find strong opposite evidence at all levels using analyst data suggests that the lack of CF predictability in the time series dimension is primarily a statistical issue – it is difficult to argue that there is no CF news if stock price move closely with analyst forecasts at all levels. Since our analysis does not require predictability, we get around its limitation and generate different results.

While our main purpose is to reconcile our results with the current literature, our results on the critical difference between the cross-sectional and time-series predictability in driving opposite conclusions regarding the importance of CF news are new.

5 Portfolio analysis

Following Fama and French (1993), in June of each year, we sort firms into ten size portfolios, based on the market capitalization in June, and ten book-to-market portfolios, based on the book-to-market ratio at the end of last year. The sorting then applies to the next four quarters. In addition, in the first month of each quarter, we sort firms into ten momentum portfolios, based on the cumulative return from month $t-12$ to $t-2$. The sorting then applies to the current quarter. Using analyst data, we then study the relation among return, CF news, and DR news for each of the thirty portfolios. We discuss the results in sequence.

Size

In Figure 2, the variance of quarterly CF news drops almost monotonically from small to large firms. In comparison, the variance of DR news is much smaller than the variance of CF news and is relatively flat. Therefore, CF news is more important in driving returns than DR news is, but much more so for small stocks. Accordingly, there is a clear downward trend, from small to large firms, of the CF slope coefficients: the coefficient is 0.85 for the smallest firms and only 0.53 for the largest firms.

These patterns are also reported in Table 7. One interesting pattern, not plotted but reported in the table, is the correlation between the return and the CF news. This correlation is at least 0.83 for all portfolios. Again, as we have found for the aggregate portfolio and an average firm, the return and CF news move almost in lock steps; the role of the DR news is less important.

Book-to-market

The role of CF news also exhibits strong heterogeneity across the portfolios sorted by the book-to-market. In Figure 3, the variance of quarterly CF news rises monotonically from growth to value firms; but the variance of DR news remains flat. In Table 8, the CF slope coefficient is 0.41 for growth stocks, suggesting that the variation of growth stock returns is more driven by DR variation than by CF variation. The CF slope coefficient is above 0.5 for the other nine portfolios, and at 1.18 for value stocks. CF news is still more important for most portfolios.

The correlation between CF news and DR news is negative for four value portfolios, but the correlation between return and CF news is strongly positive and even more so for value stocks. This, combined with the large CF slope coefficients for value stocks, suggests that stock prices move positively to revisions of expected CFs, but not to the full extent for value stocks. When prices do not move as much as CFs, the DR will increase, leading to a negative DR news when the CF news is positive. But this negative DR news only has a secondary effect on return, and the dominant pattern is still the positive relation between return and CF news.

Momentum

In Figure 4, there is a downward trend of CF news variance from momentum losers to winners; and the DR news variance is relatively flat. As shown in both Figure 4 and Table 9, momentum losers have much high CF coefficient (1.10) than momentum winners (0.46). The correlations between the return and the CF news, and the return and the DR news, are large and positive; the correlations between CF news and DR news are small and close to zero. Therefore, a positive return can be driven by either positive CF news or/and positive DR news, and the DR usually does not have an offsetting effect on return when there is positive CF news.

In sum, CF news plays a larger role than DR news in driving return for almost all portfolios. In addition, there is a cross-sectional dispersion: for small stocks, value stocks, and momentum losers, CF news is even more important. The correlation between CF news and DR news also varies across portfolios, but regardless of the direction and magnitude of this correlation, DR news usually only plays a secondary role in that the return and the CF news are strongly positively related.

Cross-sectional dispersion and diversification

The cross-sectional dispersion of the relative importance of CF/DR news will affect portfolio characteristics, depending on how the portfolio is formed. For example, CF news is more important for an equally-weighted market portfolio (Panel B of Table 4) than for a value-weighted portfolio (Table 3). This is because the former weighs relatively more on smaller firms, in which case CF news is more important.

It is important to note that this cross-sectional dispersion is not directly related to the diversification effect. The diversification effect says that idiosyncratic shocks cancel each other because they go in random directions. Thus the more diversified a portfolio is, the less noisy the return. As we have shown in Table 4, the equally-weighted market portfolio is very diversified, yet there is no relative CF/DR diversification effect.

6 Further robustness checks

We provide further robustness checks to the main results in the paper. For brevity, we only discuss them below without reporting.

Long-term expected earnings growth rate We have assumed, following Claus and Thomas (2001), that the expected earnings growth rates converge to the 10-year Treasury rate minus three percents for all horizons beyond the 5th year. We also tried two alternatives. The first, following Pastor, Sinha, Swaminathan (2006), is to assume that the long-run steady state growth rate is the nominal GDP growth rate. The second, following Gebhardt, Lee, and Swaminathan (2001), is to assume that the long-run steady state growth rate converges to the industrial median growth rate. We find that our major conclusions are not affected by these alternative assumptions.

Monthly data We have used quarterly data throughout the paper to match analyst forecasts with quarterly book equity. Since analyst forecasts are available at monthly frequency, we also tried to match monthly analyst forecasts with the most recent quarterly book equity data, and thus conduct all analysis at monthly frequency. We find all conclusions are robust.

Reliability of data Ljungqvist, Malloy, and Marston (2007) find abnormal analyst stock recommendation changes for the I/B/E/S data, which raises concerns for the reliability of data. While caution needs to be exercised, we believe this concern is likely to be secondary for our results. First, we use analyst forecasts for earnings growth, not recommendations. Second, we find consistent and strong results at firm, portfolio, and aggregate levels. It seems unlikely that such consistent results are driven by bad data

on certain stocks.

7 Conclusion

A central issue in asset pricing is whether stock prices move due to the revisions of expected future cash flows or/and of expected discount rates, and by how much. Since neither expectation item is observable, the traditional literature usually relies on return and cash flow predictability to draw inference on their relative importance. Such a method is challenged by the small, usually absent, predictive power, and is sensitive to the fundamental difference between cross-sectional and time-series predictability. The small amount of return volatility we understand through predictability makes it a daunting task to assess the relative importance of cash flow news and discount rate news with precision.

We avoid the reliance on predictability by using direct expected cash flow measures. In particular, we use firm-specific market consensus analyst forecasts, coupled with price, to back out the discount rates; in this way the cash flow news and discount rate news can be identified by construction without resorting to predictability. We find that the cash flow news is more important at the firm, portfolio, and aggregate levels; that stock returns and cash flow news are strongly positively related, and that there is little relative diversification effect (of the two components) when a more diversified portfolio is used.

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Table 1 : Sample Summary by Year

The sample consists of firms, at quarterly frequency, on the I/B/E/S Summary files with earnings forecasts for the next three quarters, years +1, +2, and a five-year earnings growth estimate. Book values of equity for quarter 0 are obtained from the COMPUSTAT quarterly file. All per share numbers are multiplied by the number of shares outstanding (from I/B/E/S) to obtain amounts at the firm level. This table reports the aggregate amount at the market level for each year. Cost of equity is estimated using the earnings residual model. All amounts, except for dividend payout and cost of equity, are in millions of dollars.

Year	Number of Firms	Quarterly Earnings	Dividend Payout	Book Value	Market Capitalization	Cost of Equity
1985	796	18,466	40%	660,967	961,062	13.91%
1986	869	20,950	41%	814,667	1,276,376	11.44%
1987	843	24,266	39%	829,316	1,532,975	11.38%
1988	801	31,627	35%	895,374	1,403,127	12.74%
1989	882	30,006	36%	970,327	1,608,482	12.42%
1990	935	28,177	40%	1,044,808	1,758,109	13.02%
1991	978	25,681	45%	1,090,834	2,027,445	11.79%
1992	1,128	28,484	42%	1,173,464	2,395,855	10.72%
1993	1,303	36,559	39%	1,221,192	2,754,661	10.02%
1994	1,428	50,109	36%	1,414,168	3,038,262	10.71%
1995	1,567	60,856	34%	1,581,590	3,658,509	10.92%
1996	1,756	70,071	34%	1,821,300	4,666,708	10.51%
1997	1,902	74,498	35%	2,069,214	6,414,567	9.96%
1998	2,109	76,971	35%	2,173,368	7,509,752	10.01%
1999	2,037	91,879	36%	2,412,582	8,608,844	10.42%
2000	1,613	96,027	35%	2,630,292	8,454,710	11.54%
2001	1,503	59,306	39%	3,109,347	9,924,646	9.91%
2002	1,607	93,420	35%	3,441,666	9,271,923	9.31%
2003	1,827	128,129	35%	3,860,833	9,383,910	8.66%
2004	1,759	158,365	34%	4,449,075	11,277,260	7.97%
2005	1,778	181,823	34%	4,965,420	12,192,840	8.01%

Table 2 : Aggregate Cash Flow News and Discount Rate News

Panel A reports, for the value-weighted market portfolio, the mean of cumulative capital gain return (CG), cash flow (CF) news, discount rate (DR) news, from one quarter up to 28 quarters. Panel B reports the variances, covariances, and correlations of these three components. The means, variances, and covariances are all in percentage. The correlations are in actual digits. The sample is quarterly from 1985 to 2005.

Panel A: Means of aggregate return and components (%)

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
CG return	1.97	3.90	8.25	17.68	28.19	43.18	61.13	82.97	108.51
CF news	1.98	3.94	8.17	16.87	27.15	41.42	58.21	78.86	102.67
DR news	-0.01	-0.04	0.08	0.81	1.04	1.76	2.92	4.11	5.85

Panel B: Variance and covariances of aggregate return components

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
Var(CG)	0.69	1.20	2.14	5.08	10.65	17.79	25.42	29.60	38.39
Var(CF)	0.31	0.63	1.06	2.49	5.89	10.44	16.21	19.99	28.29
Var(DR)	0.19	0.25	0.41	0.64	0.91	1.12	1.24	1.19	0.91
Cov(CF, DR)	0.10	0.16	0.34	0.98	1.93	3.09	3.98	4.20	4.60
Corr(CF, DR)	0.40	0.41	0.51	0.78	0.83	0.89	0.89	0.86	0.91
Corr(CG, CF)	0.88	0.91	0.93	0.97	0.99	0.99	0.99	0.99	1.00
Corr(CG, DR)	0.79	0.75	0.80	0.90	0.91	0.94	0.93	0.91	0.93

Table 3 : Aggregate Return Decomposition

We report the proportion of aggregate return variance that is explained by cash flow (CF) news and discount rate (DR) news respectively. This is obtained by regressing CF news and DR news on return respectively. We report the slope coefficients, Newey-West t-statistics (controlling for four lags), and R-squared, for regressions ranging from one quarter to 28 quarters.

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
CF news	0.59	0.66	0.65	0.68	0.73	0.76	0.79	0.82	0.86
T-stat	9.15	11.74	15.74	32.85	26.30	37.02	49.66	46.42	63.54
R-squared	0.77	0.83	0.86	0.95	0.97	0.99	0.99	0.99	1.00
DR news	0.41	0.34	0.35	0.32	0.27	0.24	0.21	0.18	0.14
T-stat	6.45	6.04	8.44	15.29	9.56	11.65	12.86	10.35	10.63
R-squared	0.62	0.56	0.63	0.80	0.83	0.87	0.86	0.82	0.87

Table 4 : Cyclicality of Cash Flow News and Discount Rate News

We regress the macroeconomic variables on cash flow (CF) news and discount rate (DR) news separately:

$$\text{MACRO}_t = \alpha + \sum_{i=0}^{1} \beta_i \times \text{NEWS}_{t-i} + \varepsilon_t.$$

We choose three variables representing the macroeconomic conditions: the industrial production growth rate, the real consumption growth rate, and the change of aggregate Baa over Aaa spread. We report the combined slope coefficients ($\sum_{i=0}^{1} \beta_i$), their Newey-West t-statistics (with up to four lags), and the R-squared in the table.

Statistics	Industrial Growth	Consumption Growth	Change of Baa over Aaa
Panel A: Cash flow news			
Coefficient	0.07	0.01	-0.54
T-stat	2.19	0.77	-2.41
R-squared	0.08	0.03	0.07
Panel B: Discount rate news			
Coefficient	0.10	0.02	-0.74
T-stat	2.66	2.38	-2.76
R-squared	0.08	0.03	0.07

Table 5 : Cash Flow News and Discount Rate News at Firm Level

Panel A reports the average firm-specific variances, covariances, and correlations of return, cash flow (CF) news, discount rate (DR) news, from one quarter up to 28 quarters; it then reports the slope coefficients of regressing CF news and DR news on return respectively. The variances and covariances are in percentage, and the correlations are in actual digits. In panel B we first calculate the cross-sectional average of return, CF news, and DR news, thus creating an equally-weighted market portfolio. We then repeat the reporting as in panel A.

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
Panel A: Firm level									
Var(CG)	5.13	9.16	18.86	39.35	66.19	92.41	133.21	182.25	268.58
Var(CF)	3.86	7.35	15.68	35.10	60.55	84.83	123.43	171.26	255.28
Var(DR)	1.66	2.42	3.27	3.81	4.07	4.17	4.17	3.89	3.89
Cov(CF, DR)	-0.20	-0.31	-0.05	0.22	0.78	1.70	2.80	3.55	4.70
Corr(CF, DR)	-0.01	-0.01	0.05	0.06	0.06	0.07	0.10	0.10	0.12
Corr(CG, CF)	0.83	0.85	0.89	0.93	0.91	0.95	0.95	0.96	0.96
Corr(CG, DR)	0.48	0.45	0.42	0.36	0.33	0.32	0.32	0.30	0.30
CF news	0.72	0.76	0.80	0.87	0.90	0.91	0.92	0.94	0.94
DR news	0.28	0.23	0.19	0.13	0.10	0.09	0.08	0.07	0.06
Panel B: Equally-weighted portfolio									
Var(CG)	1.07	1.68	2.73	4.45	6.92	8.74	15.33	20.31	38.13
Var(CF)	0.64	1.21	1.57	2.89	4.32	7.06	12.14	19.33	23.98
Var(DR)	0.16	0.21	0.32	0.45	0.75	0.97	1.27	1.46	2.03
Cov(CF, DR)	0.13	0.13	0.42	0.56	0.93	0.35	0.96	-0.24	1.06
Corr(CF, DR)	0.42	0.26	0.59	0.49	0.52	0.14	0.24	-0.05	0.13
Corr(CG, CF)	0.94	0.95	0.97	0.96	0.96	0.95	0.96	0.96	0.97
Corr(CG, DR)	0.70	0.55	0.78	0.71	0.73	0.44	0.50	0.22	0.35
CF news	0.68	0.74	0.74	0.81	0.85	0.88	0.91	0.96	0.96
DR news	0.32	0.26	0.26	0.20	0.16	0.12	0.10	0.05	0.05

Table 6 : Cash Flow News and Discount Rate News Using Return Data

The unexpected equity return can be presented as

$$e_{t+1} = (\mathrm{E}_{t+1} - \mathrm{E}_t) \sum_{j=0}^{N} \rho^j ROE_{t+1+j} - (\mathrm{E}_{t+1} - \mathrm{E}_t) \sum_{j=1}^{N} \rho^j r_{t+1+j},$$

where e_{t+1} is the unexpected equity returns, ROE is return on equity, and r is return. We assume that a vector of [r ROE Log of book-to-market] following a first order VAR:

$$z_{t+1} = \Gamma z_t + u_{t+1}.$$

Then both the cash flow news and discount rate news can be estimated. We report the VAR coefficient of R and ROE on lagged book-to-market and their z-statistics respectively. We then report the discount rate (DR) news variance, cash flow (CF) news variance, and the DR/CF variance ratio. In panel A we conduct the above exercise for every firm separately, and report the cross-sectional means of the above statistics. To be included a firm should have at least 16 quarters of data and at least one of the r and ROE coefficients has a t-statistic over 1.80. We then estimate a panel VAR with all firms included and report the results. In panel B2 we sort firms into ten book-to-market portfolios. As in panel A we report the analysis for each portfolio and for the panel of portfolios. In panel B2 we sort firms into two book-to-market portfolios and repeat the analysis. In panel B3 we report the results for the value-weighted market portfolio.

	Coe(r)	t(r)	Coe(ROE)	Z(ROE)	Var(DR)	Var(CF)	Ratio
Panel A: Firm level analysis							
Mean	0.31	1.92	-0.12	-1.26	4.35	4.50	2.93
Panel	0.07	34.70	-0.11	-73.85	0.03	0.16	0.16
Panel B: Portfolio analysis							
Panel B1: Ten book-to-market portfolios							
Growth	0.16	1.66	-0.27	-5.47	0.02	0.03	0.60
2	0.13	1.90	-0.03	-1.79	0.02	0.01	2.14
3	0.08	1.27	0.00	-0.10	0.02	0.00	16.50
4	0.11	1.40	0.04	1.86	0.05	0.01	5.80
5	0.11	1.67	-0.02	-1.03	0.01	0.00	4.78
6	0.18	2.59	0.00	0.24	0.02	0.00	12.10
7	0.22	3.08	0.02	0.95	0.03	0.00	7.10
8	0.30	4.01	0.00	-0.17	0.02	0.00	7.34
9	0.33	3.64	0.01	0.40	0.03	0.00	7.83
Value	0.08	1.56	-0.01	-0.54	0.02	0.01	3.76
Panel	0.06	4.86	-0.07	-13.78	0.01	0.01	0.60
Panel B2: Two book-to-market portfolios							
Growth	0.13	1.85	0.00	-0.29	0.02	0.00	7.14
Value	0.18	2.64	0.00	-0.25	0.02	0.00	6.94
Panel	0.08	2.42	-0.03	-4.38	0.01	0.01	0.75
Panel B3: Value-weighted market portfolio							
	0.15	2.06	0.00	-0.09	0.02	0.00	5.12

Table 7 : Variance Decomposition as a Function of Firm Size

We sort firms into ten size portfolios. For each portfolio, we report the variances, covariances, and correlations of quarterly return, cash flow (CF) news, and discount rate (DR) news. The variances and covariances are in percentage, but the correlations are in actual digits. We also report the slope coefficients and Newey-West t-statistics (four lags) of regressing CF news on return.

	Var(cf)	Var(dr)	Cov(Cf,DR)	Corr(Cf,Dr)	Corr(CG,Cf)	Corr(CG,Dr)	CF Coef	T-stat
Small	1.72	0.51	-0.25	-0.27	0.85	0.28	0.85	19.51
2	1.14	0.19	0.19	0.41	0.95	0.67	0.78	16.17
3	0.92	0.23	0.23	0.49	0.94	0.75	0.72	18.61
4	0.69	0.26	0.26	0.62	0.94	0.84	0.65	19.79
5	0.62	0.27	0.21	0.52	0.92	0.81	0.63	12.34
6	0.45	0.24	0.21	0.64	0.94	0.87	0.60	15.99
7	0.49	0.25	0.13	0.37	0.88	0.76	0.62	11.71
8	0.59	0.22	0.09	0.25	0.89	0.67	0.69	10.48
9	0.45	0.16	0.08	0.30	0.90	0.69	0.69	8.67
Large	0.25	0.21	0.08	0.33	0.83	0.80	0.53	8.42

Table 8 : Variance Decomposition as a Function of Book-to-Market

We sort firms into ten book-to-market portfolios. For each portfolio, we report the variances, covariances, and correlations of quarterly return, cash flow (CF) news, and discount rate (DR) news. The variances and covariances are in percentage, but the correlations are in actual digits. We also report the slope coefficients and Newey-West t-statistics (four lags) of regressing CF news on return.

	Var(cf)	Var(dr)	Cov(Cf,DR)	Corr(Cf,Dr)	Corr(CG,Cf)	Corr(CG,Dr)	CF Coef	T-stat
Growth	0.25	0.40	0.09	0.29	0.75	0.85	0.41	7.27
2	0.35	0.32	0.14	0.40	0.84	0.83	0.51	9.08
3	0.44	0.30	0.08	0.21	0.82	0.73	0.58	8.38
4	0.45	0.19	0.07	0.22	0.87	0.67	0.67	11.60
5	0.55	0.13	0.07	0.28	0.93	0.62	0.76	19.30
6	0.60	0.13	0.02	0.08	0.91	0.47	0.81	14.98
7	0.81	0.13	-0.07	-0.23	0.92	0.17	0.93	10.74
8	1.17	0.20	-0.29	-0.60	0.92	-0.24	1.12	14.18
9	2.16	0.14	-0.18	-0.33	0.97	-0.07	1.02	30.69
Value	5.27	1.40	-1.87	-0.69	0.86	-0.23	1.18	9.50

Table 9 : Variance Decomposition as a Function of Return Momentum

We sort firms into ten return momentum portfolios. For each portfolio, we report the variances, covariances, and correlations of quarterly return, cash flow (CF) news, and discount rate (DR) news. The variances and covariances are in percentage, but the correlations are in actual digits. We also report the slope coefficients and Newey-West t-statistics (four lags) of regressing CF news on return.

	Var(cf)	Var(dr)	Cov(Cf,DR)	Corr(Cf,Dr)	Corr(CG,Cf)	Corr(CG,Dr)	CF Coef	T-stat
Loser	5.56	2.88	-3.10	-0.78	0.70	-0.09	1.10	5.42
2	1.33	0.61	-3.64	-0.40	0.76	0.29	0.79	6.91
3	0.79	0.26	0.03	0.06	0.87	0.54	0.74	7.79
4	0.50	0.19	0.02	0.08	0.86	0.57	0.71	9.04
5	0.40	0.24	0.04	0.13	0.82	0.68	0.61	7.01
6	0.40	0.19	0.01	0.21	0.86	0.68	0.65	8.46
7	0.32	0.24	0.01	0.24	0.82	0.76	0.55	6.88
8	0.34	0.23	0.08	0.29	0.84	0.76	0.57	9.29
9	0.43	0.36	0.12	0.31	0.83	0.79	0.54	9.49
Winner	0.58	0.66	0.19	0.31	0.80	0.82	0.46	12.40

Figure 1 : Aggregate Return, Cash Flow News, and Discount Rate News

We plot the quarterly aggregate return, cash flow news and discount rate news for the 1985-2005 period.

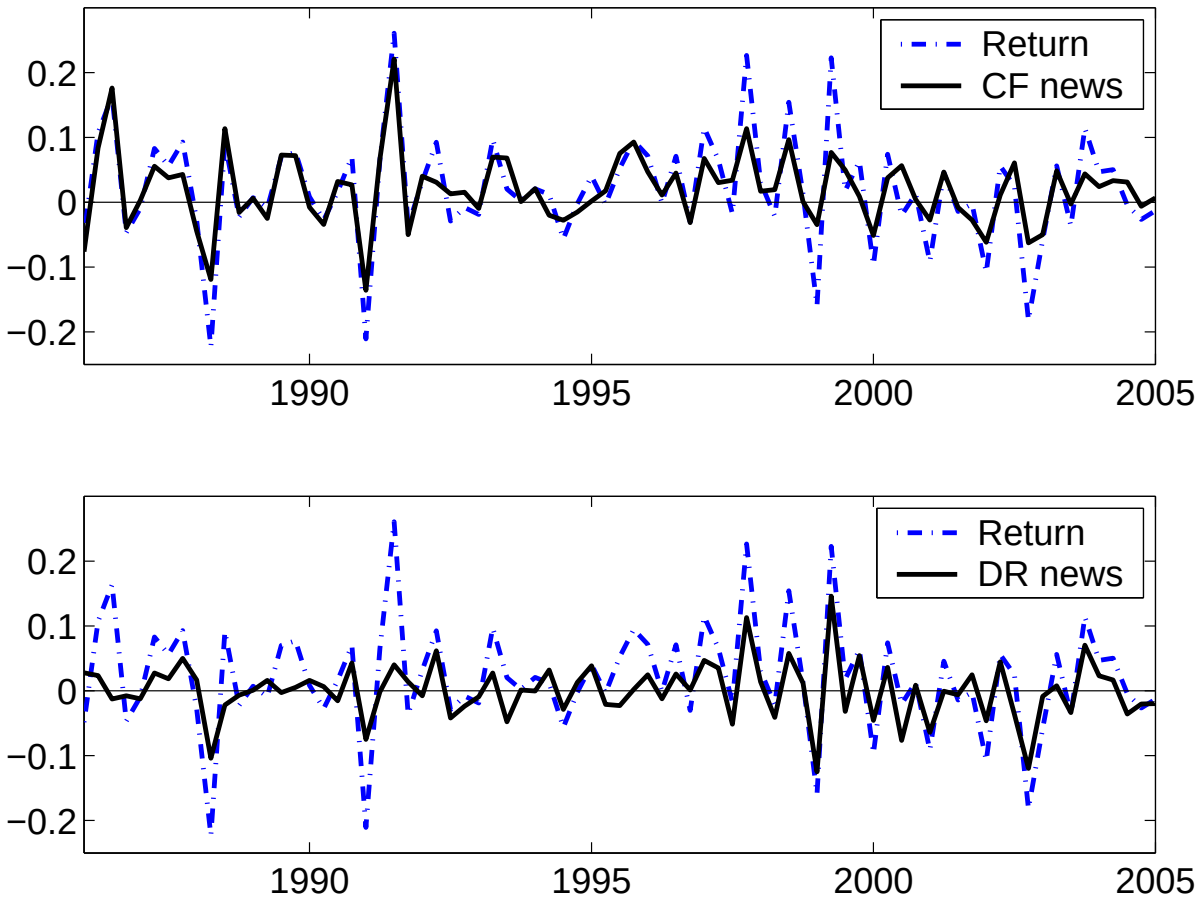

Figure 2 : Cash Flow News and Discount Rate News for Size Portfolios

We sort firms into ten size portfolios. We then plot the variances, covariances, and correlations of quarterly cash flow (CF) news and discount rate (DR) news across portfolios. We also plot the slope coefficient of regressing CF news on return.

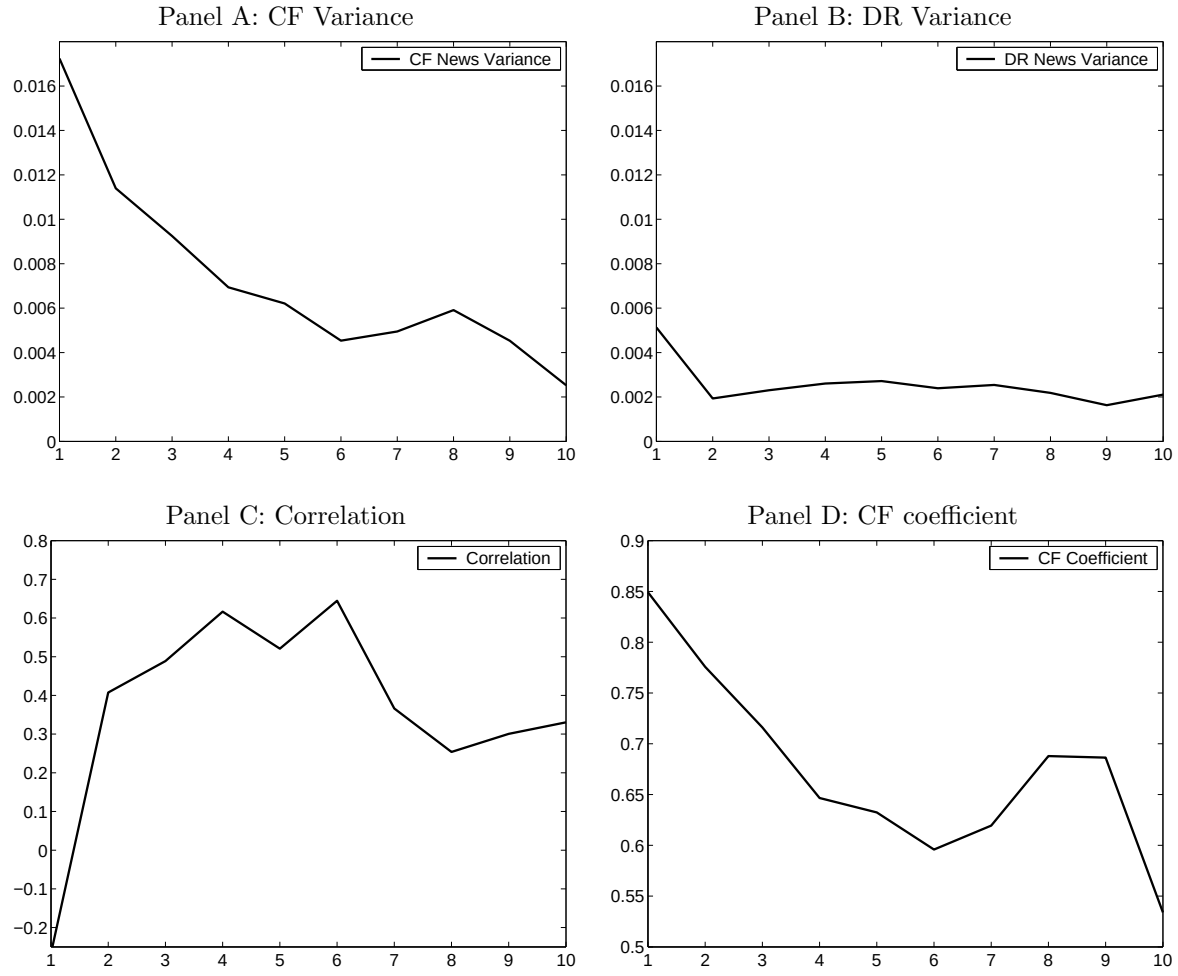

Figure 3 : Cash Flow News and Discount Rate News for Book-to-Market Portfolios

We sort firms into ten book-to-market portfolios. We then plot the variances, covariances, and correlations of quarterly cash flow (CF) news and discount rate (DR) news across portfolios. We also plot the slope coefficient of regressing CF news on return.

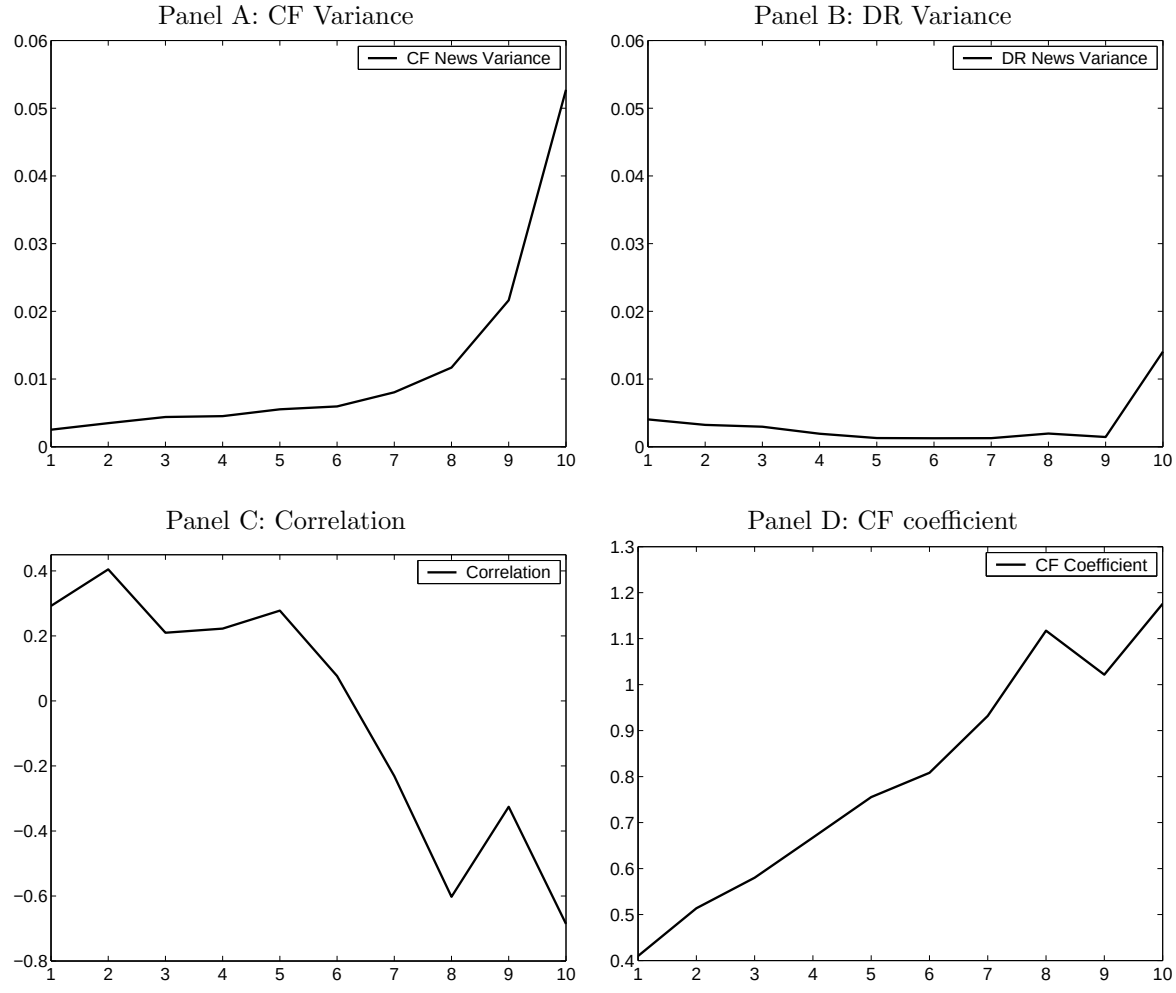

Figure 4 : Cash Flow News and Discount Rate News for Momentum Portfolios

We sort firms into ten return momentum portfolios. We then plot the variances, covariances, and correlations of quarterly cash flow (CF) news and discount rate (DR) news across portfolios. We also plot the slope coefficient of regressing CF news on return.