What Drives Stock Price Movement?

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First version: May 2007
This version: April 2008‡

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. Using consensus cash flow forecasts, we show that there is a significant component of cash flow news in stock returns, whose importance increases with investment horizons. For horizons over three years, the importance of cash flow news far exceeds that of discount rate news. These conclusions hold at both firm and aggregate levels, and diversification only plays a secondary role in affecting the relative importance of cash flow/discount rate news. The conventional wisdom that cash flow news dominates at the firm level but discount rate news dominates at the aggregate level is largely a myth driven by the estimation methods. Finally, stock returns and cash flow news are positively correlated at both firm and aggregate levels.

JEL Classification: G12, E44
Key Words: Analyst forecast, expected return, discount rate news, cash flow news, predictability

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‡We thank Bo Becker, George Benston, Jeff Callen, Ilan Cooper, Narasimhan Jegadeesh, Timothy Johnson, Raymond Kan, Andrew Karolyi, George Pennacchi, Richard Priestley, Jesper Rangvid, Dan Segal, Jay Shanken, Rene Stulz, Michael Weisbach, Avi Wohl, and seminar participants at the Central Bank of Denmark, Copenhagen Business School, Hebrew University of Jerusalem, Hong Kong University of Science and Technology, McGill University, Norwegian School of Management (BI), Ohio State University, Tel Aviv University, University of Emory, University of Hong Kong, University of Illinois in Urbana Champaign, University of Toronto, Villanova University, and Washington University in St. Louis for their helpful comments. The usual disclaimer applies.

1 Introduction

Understanding why stock prices move up and down is a central issue for financial economists. Do stock prices change because of new information on expected cash flows, or because of time-varying risk aversion and investor sentiment? The crucial question, as Cochrane (2006) puts, is "How much of each?" The relative importance of cash flows (CFs) and discount rates (DRs) 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 use the dividend price ratio (dividend yield) to predict the two components, and draw conclusions on the relative importance based on their relative predictability. The idea is that the dividend yield, by definition, is equal to the expected future cash flows discounted by the expected discount rates; its variation must also reflect the revisions of the two expectation components. While this literature provides important evidence on predictability, its ability to answer the question of "What drives stock price movement?" is limited for at least two reasons.

First, dividend yield variations are not the same as return variations. Imagine a stock with a constant dividend yield and a constant expected dividend growth rate; price changes are matched proportionally by dividends. The dividend growth rate is not predictable. Yet, a price increase is driven by CF news – a higher dividend payout and higher expected future cash flows (i.e., higher dividend level multiplied by a constant expected dividend growth rate). Therefore, there could be plenty of price movement and revisions of expected future cash flows (in dollars), but no dividend growth rate predictability. Second, the predictive power on expected cash flow growth rates/discount rates is small and frequently absent. More important, as we show below, even if predictability can be found, it is difficult to interpret its meaning.

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 (e.g., Pastor, Sinha, and Swaminathan (2006)). 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

[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.

price change (i.e., capital gain return), CF news, and DR news at firm and aggregate levels.

What drives aggregate stock returns? At the aggregate level, the portion of returns attributed to CF news is a significant 16% at quarterly horizon, 26% at annual horizon, 46% at two-year horizon, 63% at three-year horizon, and 80% at seven-year horizon. Therefore, a significant portion of stock price variations is related to CF news, and increasingly more so as investment horizon expands. For horizons more than three years, CF news far exceeds DR news.

Our finding appears to differ sharply from the somewhat disconcerting finding in the classic asset pricing literature that there is almost no CF news at the aggregate level (e.g., Cochrane (1992, 2001, 2006)).[2] Not necessarily so if one realizes that price volatility is not the same as dividend yield volatility. What the current literature really says is that the dividend growth rate is not predictable by the dividend yield.[3] But, as we have argued, there could be plenty of CF news even if the dividend growth rate is not predictable. The finding in the current literature provides direct evidence on predictability, but not directly on return movement.

In contrast, our finding says that a significant portion 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 related to stock price movement. It largely alleviates the concern in the current literature by establishing a strong link between stock return and CF news.

Our finding that the importance of CF news increases with investment horizon is intuitive. Since the DR is stationary, its impact on the cumulative returns must be minimal. That is, as investment horizon expands, returns must reflect CF news increasingly more. 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)). This is a fundamental property that holds irrespective of economic models.

The conventional wisdom that DR news dominates at the aggregate level, if it were true, is incomplete because it should only hold at certain investment horizons. This issue has largely been omitted in the current literature presumably because the dividend growth rate is not predictable by the dividend yield regardless of horizons. Again, the lack of dividend growth rate predictability does not mean there is no CF news. Our results indicate that between two to three years CF news

[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."

[3] Lettau and Ludvigson (2005) argue that expected dividend growth rate can be predictable by variables other than dividend yield.

starts to exceed and dominate DR news.

How are returns and CF news correlated at the aggregate level? Aggregate returns and CF news have a significantly positive correlation of 0.26 at quarterly horizon, 0.41 at annual horizon, 0.86 at three-year horizon, and 0.98 at seven-year horizon. Intuitively, since stock returns must increasingly represent CF news as investment horizon expands, this correlation should rise.

The current literature provides mixed evidence on the relation between returns and *realized* CFs. Many studies find a positive relation (e.g., Roll (1988), Fama (1990), Kothari and Shanken (1992), and Stambaugh (1990)**),** while Kothari, Lewellen, and Warner (2006) document a negative relation. A negative relation suggests that the DR not only goes up at a time when there is positive CF news, but also dominates the CF news and makes returns negative. As Kothari, Lewellen, and Warner (2006) point out, such a finding is counter-intuitive and puzzling.

One limitation of studying the relation between returns and *realized* CFs is that it is difficult to line them up – returns could have responded to earnings news ahead of time. In comparison, it is easier to match the forward-looking CF news (calculated from analyst forecasts) with stock returns. Our results are intuitive and alleviate the concern by Kothari, Lewellen, and Warner (2006). The increasing correlation (with horizon) is also an important property that has largely been missing in the current literature.

What drives firm-level stock returns? At the firm level, on average, the portion of stock returns attributed to CF news is 25% at quarterly frequency, 69% at two-year horizon, 76% at three-year horizon, and 84% at seven-year horizon. These numbers are slightly higher than those for the aggregate portfolio at the short end, suggesting that the CF news is diversified relatively more than the DR news. However, this diversification effect is secondary in that it does not change the relative importance: for short horizons DR news seems more important at both firm and aggregate levels; for long horizons CF news dominates at both firm and aggregate levels.

The finding that there is only a limited *relative* CF/DR diversification effect when moving from individual firms to the aggregate portfolio provides a stark contrast to the prevailing view that, because of diversification, CF news dominates at firm level but DR news dominates at the aggregate level. We further show that the conventional view has little to do with diversification, but is mainly driven by the fundamental difference between cross-sectional and time-series predictability. Basically, the cross-sectional heterogeneity of CFs is persistent (e.g., Lakonishok, Shleifer, and

Vishny (1994) and 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 is usually found to be more important in pure time series regressions – common for the aggregate portfolio analysis.

If one wants to understand why stock prices move around, which is 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, at annual horizon, DR news is more important at firm, portfolio, and aggregate levels; but the opposite is found when 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 is more important; if we study the panel of the two portfolios, then CF news is more important. The finding that DR news seems more important (in the time series sense) at annual horizon at all levels is consistent with our results using CF forecasts, suggesting that the role of diversification is secondary.

Another challenge facing the conventional wisdom is that, with relatively long horizons, stock returns should mainly contain CF news at the firm level. Therefore, CF news is likely to remain more important at long horizons even after diversification. This is precisely what we have found.

Link to 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), Jagannathan and Silva (2002), 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 lights on several fundamental issues in asset valuation.

Our findings do not diminish the importance of the literature documenting return/cash flow predictability (see Cochrane (2006) for the references within). This literature aims to detect the

[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.

[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).

time variation of expected returns and cash flow growth rates; but it is only indirectly related to stock price volatility. Our approach complements this literature in the sense that we say nothing about predictability, but is directly related to stock price volatility.

Caveats and what to take away This paper has four findings. First, there is a significant component of CF news in stock returns that is positively correlated with stock returns. Second, the importance of CF news increases with investment horizon. At horizons more than three years, CF news far exceeds DR news in driving stock returns. Third, the first two conclusions hold at both firm and aggregate levels; accordingly, diversification plays a secondary role in affecting the relative importance of CF/DR news in driving stock returns. Fourth, the conventional wisdom that CF news dominates at firm level but DR news dominates at the aggregate level is a myth driven by estimation methods.

A key assumption in our paper is that the analyst earnings forecasts timely reflect the marginal investors' belief regarding future CFs. Any deviation from this assumption, such as stale or too optimistic analyst forecasts, is likely to prevent us from finding a strong role of CF news in driving stock returns. In this sense, our estimates on the importance of CF news in the short run can be regarded as a lower bound – better CF measures should make the results stronger. Our conclusions regarding the importance of the CF news in the longer horizons (more than three years) should not be affected much since the CF news already dominates. Similarly, these biases/deviations are unlikely to affect any of our other conclusions.

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 Sections 3 and 4 we report the evidence at aggregate and firm levels respectively. In Section 5 we conduct robustness checks. A brief conclusion is provided in Section 6.

2 The model and the sample

2.1 The model

Following Pastor, Sinha, and Swaminathan (2006), we define the equity value as the present value of future "dividends" and a terminal value:

$$P_t = \sum_{k=1}^{T} \frac{FE_{t+k}\left(1-b_{t+k}\right)}{\left(1+q_t\right)^k} + \frac{FE_{t+T+1}}{q_t\left(1+q_t\right)^T}, \tag{1}$$

where P_t is stock price, FE_{t+k} is earnings forecast k years ahead, b_{t+k} is the plowback rate (i.e., $1 - b_{t+k}$ is the payout ratio), and q_t is the cost of equity. T is set to be 15 years.

For each firm, the earnings forecasts for $t+1$, $t+2$, $t+3$ are the consensus analyst forecasts for the first three years respectively, and are obtained from the I/B/E/S database. For year $t+4$ to $t+T+1$, we assume the earnings growth rate and the earnings forecasts are

$$g_{t+k} = g_{t+k-1} \times \exp\left[\log\left(g/g_{t+3}\right)/\left(T-1\right)\right] \tag{2}$$

$$FE_{t+k} = FE_{t+k+1} \times \left(1+g_{t+k}\right) \tag{3}$$

Here g_{t+3} is the firm-specific consensus long-term earnings growth forecast; g is the long-term nominal GDP growth, defined as the "steady-state" GDP growth (the historical average of annual GDP growth rate up to that year). The above formulas suggest that the earnings growth rate for each firm mean reverts to the long-term GDP growth by year $t+T+2$.

We also need to forecast the plowback rate b_{t+k}. For the first two years, the plowback rate is calculated from the most recent net payout ratio for each firm. The net payout is common dividends (item 21 in COMPUSTAT) plus stock repurchase (item 115) minus stock issuance (item 108). The net payout is then divided by the net income (item 18) to obtain the net payout ratio. If net income is negative, we replace it by 6% of assets.

The plowback rate then mean reverts between year $t+3$ and $t+T+1$ to a steady-state rate. This is based on the assumption that, in a steady state, the product of the return on investment, ROI, and the plowback rate, b, is equal to the growth rate in earnings: $g = ROI \times b$. If we further assume that the return on investment is equal to the cost of equity, then the steady-state plowback rate is $b = g/q$, i.e., the ratio of GDP growth to cost of equity. Therefore, the plowback rates from $t+3$ to $t+T$ are

$$b_{t+k} = b_{t+k-1} - \frac{b_{t+2} - b}{T-1}. \tag{4}$$

With the forecasted earnings and plowback rates, we then back out the cost of equity using equation (1) for each firm at each point of time. The above set of assumptions follow Pastor, Sinha, and Swaminathan (2006). We examine alternative models in Section 5.

CF news and DR news We can rewrite equation (1) as

$$
\begin{aligned}
P_t &= \sum_{k=1}^{T} \frac{FE_{t+k}\left(1-b_{t+k}\right)}{\left(1+q_t\right)^k} + \frac{FE_{t+T+1}}{q_t\left(1+q_t\right)^T} \\
&= f\left(c^t, q_t\right). \qquad (5)
\end{aligned}
$$

By construction, stock price P_t is a function of the vector of cash flow forecast variables available at time t (with superscript t), c^t, and the discount rate q_t. The proportional price difference between $t+j$ and t is then

$$
\begin{aligned}
r_t &= \frac{P_{t+j} - P_t}{P_t} \qquad (6) \\
&= \frac{f\left(c^{t+j}, q_{t+j}\right) - f\left(c^t, q_t\right)}{P_t} \qquad (7) \\
&= \frac{\left(f\left(c^{t+j}, q_{t+j}\right) - f\left(c^t, q_{t+j}\right)\right)}{P_t} + \frac{\left(f\left(c^t, q_{t+j}\right) - f\left(c^t, q_t\right)\right)}{P_t} \qquad (8) \\
&= CF_t + DR_t, \qquad (9)
\end{aligned}
$$

where

$$
CF_t = \frac{\left(f\left(c^{t+j}, q_{t+j}\right) - f\left(c^t, q_{t+j}\right)\right)}{P_t} \qquad (10)
$$

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,

$$
DR_t = \frac{\left(f\left(c^t, q_{t+j}\right) - f\left(c^t, q_t\right)\right)}{P_t} \qquad (11)
$$

is the DR news; it is so because CFs do not change in the numerator, and the difference is driven by the variation of discount rates in the period. Note DR news and DR go in opposite directions.

We can then study the variance of the capital gain return through CF news and DR news:

$$
\begin{aligned}
VAR\left(r_t\right) &= COV\left(CF_t, r_t\right) + COV\left(DR_t, r_t\right) \qquad (12) \\
1 &= \frac{COV\left(CF_t, r_t\right)}{VAR\left(r_t\right)} + \frac{COV\left(DR_t, r_t\right)}{VAR\left(r_t\right)}, \qquad (13)
\end{aligned}
$$

where VAR and COV are variance and covariance operators. $\frac{COV(CF_t,t_t)}{VAR(t_t)}$ is the slope coefficient of regressing CF_t on r_t; $\frac{COV(DR_t,r_t)}{VAR(r_t)}$ is the slope coefficient of regressing DR_t on r_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 capital gain returns respectively, and draws inferences based on the slope coefficients.

What should one expect from the model? The model uses analyst forecasts and stock prices to back out the DRs. This means that the DR news captures the residual news. For example, if the updates on analyst forecasts are purely noises, then the burden of explaining returns falls completely on the DR news. In other words, it is not surprising to see a strong role of the DR news; the success of the model depends on how well we can capture the CF news since the DR news will pick up the rest.

A key assumption in the model is that the updates on analyst forecasts timely capture the marginal investors' revisions on expected future CFs. There are good reasons why the reality might deviate from this assumption. For example, some analyst forecasts could be stale because they are not updated in a timely fashion. It is also well known that earnings forecasts tend to be too optimistic. However, note that these violations tend to prevent us from finding strong CF effects – better proxies of expected CFs are likely to yield stronger results. In this sense our estimates of the CF effects can be regarded as a lower bound for the actual CF effects.

The implied discount rate is the same for all horizons. While this provides no information on the term structure of expected returns, it can still capture the DR news. The present value of a stock can be written using either a term structure of DRs or a single DR (just like a bond yield); the single DR is a function of the term structure of the DRs. Holding expected CFs constant, DR news can be captured by using either the changes of the term structure of the DRs, or the change of the single DR.

Finally, CF (DR) news is defined as the proportional price change due to the change of expected CFs (DR). This definition fits the purpose of explaining stock price movement. We do not distinguish between the expected and unexpected versions of returns, CF news, and DR news since we do not want to get involved into the predictability issue (see more discussions on predictability below). Nevertheless, the difference is presumably very small since the majority of the returns are unpredictable.

2.2 The sample

Our main results are based on quarterly data. I/B/E/S reports consensus analyst forecasts on earnings as of the middle of each month. We collect earnings forecast data as of March, June, September, and December of each year for all firms. The accounting data is from COMPUSTAT. We match analyst forecasts with the accounting variables from the previous quarter so that the accounting variables are public information when analyst forecasts are released.

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 one-year ahead earnings forecasts. If a firm has missing forecasts for year two, we follow the existing literature and project earnings in the second year using the long-term growth rate and the prior year's earnings forecast: $FE_{t+2} = FE_{t+1} \times (1 + g_{t+3})$. We also require that the firm has prior year's dividends in COMPUSTAT. We restrict our sample to the 1985-2006 period because I/B/E/S covers too few firms before 1985.

Table 1 provides the year-by-year quarterly statistics for the final sample. The number of firms ranges from 1059 to 2825. The average payout ratio (repurchase and issuance included) ranges from 43% to 53%. Overall, our sample represents more than 78 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.

3 Aggregate level evidence

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 1985-2006. The purpose is to study the relation among returns, CF news, and DR news for the market portfolio.

We note that returns, as defined in equation (6), do not include dividends since our primary goal is to study price volatility. In addition, dividends play a minor role in the total return volatility anyway. For example, for the postwar period the average quarterly total return for the CRSP value-weighted portfolio is 3.03% with a standard deviation of 7.99%; the average quarterly return excluding dividends is 2.12% with a standard deviation of 7.92%. During 1985-2005 the average total return is 3.33% with a standard deviation of 8.49%; the average return excluding dividends is 2.71% with a standard deviation of 8.43%. Therefore, dividends only affect the level of returns, but its impact on return volatility is negligible.

In the following we address two issues in sequence.

3.1 What drives aggregate stock price volatility?

In Panel A of Table 2 we report average cumulative capital gain returns, CF news, and DR news, ranging from one to 28 quarters. The average quarterly return is 2.65%; 0.84% of that is CF news, and 1.80% of that DR news. Theoretically, since the DR is mean reverting, the average DR news – the return due to the change of discount rate – should be zero if the sample is long enough. The

positive average DR news is due to the fact that during our sample period there is a decline of the DR.

As the investment horizon increases, the average CF news grows faster than the average DR news. At quarterly horizon, the average CF news is less than half of the DR news; at seven-year horizon, the average CF news is about three times of the average DR news. That is, as the investment horizon increases, an increasingly larger portion of the capital gain is caused by the CF difference during the period.

We find a similar variance pattern in Panel B, in which case we report the variances, covariances, and correlations of returns, CF news and DR news. The following equation should be satisfied:

$$VAR\,(\text{return}) = VAR\,(\text{ CF news}) + 2 \times COV\,(\text{CF news, DR news}) + VAR\,(\text{ DR news})\,. \quad (14)$$

The quarterly return variance is 0.56%, which corresponds to an annualized volatility of 14.97%, typical for the market portfolio. Of the 0.56%, 0.21% is due to CF news variance, and 0.59% is due to DR news variance – DR news is much more volatile and plays a bigger role. As the time horizon increases, while the variances of both CF news and DR news climb, CF news becomes more and more important. At two-year frequency, the CF news variance is 2.04%, versus 2.48% for DR news; at seven-year horizon, the CF news variance is 30.75%, versus 3.43% for DR news.

Therefore, for both the mean and the variance, the role of the CF news increases with horizon and gradually dominates the 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 through time – must be minimal if the CFs are held constant. Put differently, the S&P 500 Index fluctuates each quarter due to both CF news and DR news. However, a major reason why the S&P 500 Index has more than doubled in the past 15 years is that the expected CFs (in dollars) for the top 500 companies have jumped up.

For the same reason, Bansal, Dittmar, and Kiku (2006) argue that the covariance between stock returns and the stochastic discount factor must represent more and more the CF beta as the time horizon increases. In the long-run limit, all news must be CF news, and all beta must be CF beta (see also Hansen, Heaton, and Li (2005)). The increasing importance of CF news (with horizon) as a portion of stock returns is thus a fundamental property irrespective of economic models. The mean and variance patterns in Table 2 are consistent with this property.

We formally test the relative importance of CF news/DR news in driving price variance in Panel C. In particular we regress CF news and DR news on return respectively. The slope coefficients, as

shown in equation (13), tell the portion of stock return variance that is driven by each component. At quarterly horizon, 16% of the return variation of the market portfolio is explained by CF news. This percentage increases to 26% at annual horizon, 46% at two-year horizon, 63% at three-year horizon, and 80% at seven-year horizon.

All slope coefficients are significant at 1% according to the Newey-West t-statistics. Note that the regressions with horizons more than one quarter use overlapping data. However, unlike the usual long-horizon predictive regressions using overlapping data, here the coefficients and t-statistics do not mechanically increase with horizon (see Boudoukh, Richardson, and Whitelaw (2006)). This is because we do not run predictive regressions. In untabulated results, we simulate and find that using overlapping data (but not predictive regressions) does not lead to biases in the coefficients or t-statistics that vary systematically with investment horizon.

In sum, for the market-portfolio, there is a significant component of CF news in returns, which increases with investment horizons. For horizons more than three years, CF news far exceeds DR news.

Link to the literature

Since neither CF news nor DR news is observable, the common practice in the current literature is to gauge their relative importance based on predictability. The general finding is that, for the postwar period, stock returns are much more predictable than dividend growth rates are. The conventional conclusion based on such a finding is that almost all return variations of the market portfolio are driven by the DR news; almost none by the CF news (e.g., Cochrane (1992, 2001, 2006), Campbell and Ammer (1993), and Campbell and Shiller (1998)). Importantly, note that this conclusion holds even for long investment horizons because both one-period and multi-period returns are much more predictable than dividend growth.

Our finding that the DR news is more important than the CF news in the short run is consistent with this literature. Our finding that the CF news gradually dominates the DR news as the investment horizon increases represents a major improvement over the current literature, for two reasons. First, it largely mitigates the concern that little CF news seems to exist at the aggregate level; "How nice it would be", in Cochrane's (2001, 2006) words.

Second, the dominance of the CF news at the long horizon is an intuitive property that should be satisfied, which provides an important yardstick to assess the success of the estimates. That is, it's not just about whether CF news or DR news is more important; it's about which component

at what horizon is more important, and at which point CF news starts to dominate. By providing a set of estimates that satisfy this property, with varying investment horizons, our results enrich the understanding on this subject.

But why are our results different from the current literature? The key difference is that the current literature relies on predictability to draw conclusions on the relative importance of CF news and DR news (e.g., Campbell (1991), Campbell and Ammer (1993), Campbell and Shiller (1988, 1998), Campbell, J. and Vuolteenaho (2004), Cochrane (1992, 2001, 2006), Ang (2002), Goyal and Welch (2003), Lettau and Ludvigson (2005), Lettau and Nienwerburgh (2006), Ang and Bekaert (2007), Larrain and Yogo (2008), Chen and Zhao (2006), Binsbergen and Koijen (2007), and Chen (2008)). As we have discussed earlier, while this literature provides important evidence on predictability, there are at least two reasons of why tests of predictability are not best suited to answer the question of "What drives stock price movement?" First, the lack of predictability, either at short or at long horizons, can coexist with lots of CF news. Second, the empirical evidence on predictability has been fragile. There are still heated debates regarding whether there is any short-run or long-run predictability (e.g., Stambaugh (1999) and Boudoukh, Richardson, and Whitelaw (2006)).

In contrast, since we have direct expected CF measures, we do not need to resort to predictability. Our results say nothing about predictability, but complement the predictability literature by providing direct answers to "What drives stock price movement?"

3.2 How are CF news and stock return related?

Standard asset pricing theory predicts that aggregate returns and CF news are positively correlated: stock prices go up when expected future CFs go up. In addition, this positive correlation must increase with horizon because, in the long run, most news contained in returns must be CF news.

We present the empirical evidence in Panel B of Table 2. The following patterns are noteworthy.

First, consistent with the theoretical prior, the correlation between aggregate returns and CF news is significantly positive and increases with the investment horizon. In particular, the correlation is 0.26 at quarterly horizon, 0.41 at annual horizon, 0.73 at two-year horizon, and 0.98 at four-year horizon.

Second, the correlation between CF news and DR news is negative (-0.35) at quarterly horizon. It could be because the actual DR goes up when there is positive CF news. It could also be because the stock prices underreact to revisions on earnings forecasts for differences of opinions between the

marginal investors and financial analysts. Crucially, since the correlation between CF news and returns is positive, this suggests that stock prices do go up, but not to the full extent, when there is positive CF news, thus forcing a negative DR news at the same time. Therefore, regardless of the interpretation, the key point is that the negative DR news does not dominate the CF news and does not make the correlation between return and CF news negative.

Third, the correlation between CF news and DR news becomes 0.27 at three-year horizon and steadily increases to 0.58 at seven-year horizon. This suggests that, at business cycle frequencies, the CF news an DR news are positively correlated, and are also positive correlated with the stock returns. That is, when there is positive CF news, the DR goes down, and both CF news and DR news contributes to stock price in the same direction.

Link to the literature

Prior evidence on the correlation between stock returns and CF news is mixed. Some studies find a positive relation between stock returns and *realized* CF news (e.g., Roll (1988), Fama (1990), Kothari and Shanken (1992), and Stambaugh (1990)). On the other hand, Kothari, Lewellen, and Warner (2006) document the robust and yet surprising finding that aggregate returns are 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 returns negative. As Kothari, Lewellen, and Warner (2006) point out, this finding is counter-intuitive and 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 returns and CF news.[6]

Our finding sheds new lights in two ways to this literature. First, we find a significantly positive correlation between stock return and CF news even in the short run. Crucially, even though the CF news and DR news could be negatively related in the short run, the DR news does not dominate the CF news. This finding largely mitigates the puzzle raised in Kothari, Lewellen, and Warner (2006).

Second, the correlation between stock returns and CF news should be positive in the long run. Therefore, any conclusion regarding this correlation must be conditional on the investment horizon. That is, if a negative relation is found, the remaining challenge is to show how this relation turns positive with longer investment horizons (Similarly, if one finds that the DR news plays a dominant

[6] A significantly negative relation between the aggregate return and the CF news would suggest a procyclical expected risk premium, which seems counter-intuitive.

role in stock returns, the remaining challenge is to show how the DR news yields to CF news in terms of importance as the investment horizon increases). This issue of investment horizon has been largely omitted in the current literature. We fill in this void with intuitive results.

Why do we get results so different from those in Kothari, Lewellen, and Warner (2006)? 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 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, it is easier to line them up with respect to time. Therefore, by using forward-looking measures, we are able to reach an intuitive conclusion and alleviate the concern by Kothari, Lewellen, and Warner (2006).

4 Firm level evidence

How are returns, CF news, and DR news related at firm level? If returns are 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 nature of the financial market and portfolio management.

To examine these issues, 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 Table 3.

We first note that stock returns and CF news have a correlation of 0.25 (significant) at quarterly horizon, 0.52 at annual horizon, and 0.79 at seven-year horizon. Therefore, consistent with the evidence at the aggregate level, stock returns and CF news are significantly positively correlated at the firm level, and this correlation increases monotonically with investment horizon.

At quarterly horizon, a significant 25% of firm stock returns is related to CF news. In comparison, the corresponding number at the aggregate level is 16% (Table 2). Therefore, CF news is diversified a bit more than the DR news, but this relative diversification is secondary in that it does not reverse the overall pattern. At quarterly horizon, DR news is more important in driving

stock returns at both the firm and aggregate levels.

At annual-horizon, 52% of firm stock return is related to CF news; this number increases to 76% at three-year horizon and 84% at seven-year horizon. In comparison, the corresponding numbers at the aggregate level are 26%, 63%, and 80% respectively. So CF news becomes more important at the firm level as the investment horizon increases, the same pattern as we observe at the aggregate level.

The bottom line is that we observe very similar patterns at the firm and aggregate levels. DR news seems to be more important at short horizons, but CF news dominates at the long horizons. There seems relatively more diversification of CF news from the firm to the aggregate level, but this effect is secondary in that it does not change the overall patterns.

Link to the literature

The widely cited view, based on the literature on return volatility at firm and portfolio levels (e.g., Vuolteenaho (2002), Cohen, Polk, and Vuolteenaho (2003), Callen and D. Segal (2004), Callen, Hope and Segal (2005), and Callen, Livnat and Segal (2006)), and the literature on the aggregate portfolio, is that CF news dominates at firm level, but most 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.[7] There is a complete flip of the relative importance of CF news and DR news because of diversification.

Since our finding suggests that such a flip does not exist, we proceed to reconcile our results with the current literature. We show below that the widely accepted flip in the current literature is a myth driven by the difference between cross-sectional and time-series predictability. 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, using annual data, that if pure time series regressions are

[7]When summarizing the results in Vuolteenaho (2002), Cochrane (2001) points out, "Much of the expected cashflow variation 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."

used, DR news is more important at all levels. 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.

Vuolteenaho (2002) shows that one can linearize the book-to-market ratio as

$$bm_t = \text{constant} + \sum_{j=1}^{\infty} \rho^{j-1} \left(r_{t+j-1} - roe_{t+j-1} \right), \tag{15}$$

where bm_t is the log book-to-market, r_t is stock return and roe_t is the log return on book equity (ROE). It is the parallel version of the well-known Campbell-Shiller (1988) decomposition with the dividend-price ratio replaced by the book-to-market ratio and the dividend growth replaced by ROE.

We then assume that the vector, $z_t = [r_t \; roe_t \; bm_t]'$, following a first order VAR:

$$z_{t+1} = \Gamma z_t + u_{t+1}. \tag{16}$$

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.[8] We 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-statistic; and (iii) the ratio of DR/CF variance. A ratio higher than one means that the DR news is more important than the CF news.

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.

We first conduct a VAR analysis for each firm and then report the cross-sectional mean of the above statistics in the first row of Panel A of Table 4. The average return coefficient is 0.28 (t-statistic 1.68) and the average ROE coefficient is -0.11 (t-statistic 1.13). Therefore, return is much more likely to be predictable than earnings; accordingly, the average DR/CF variance ratio is 2.71. That is, when time series analysis is conducted firm by firm, DR news is more important at the firm level.

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 more significant,

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

and the variance ratio become 0.14 – one would conclude that CF news dominates at firm level, exactly opposite to the time-series analysis. We reach the same conclusion in the third row with the variables cross-sectionally demeaned.

Panel B reports similar comparisons at the portfolio level. In Panel B1, we first sort firms into ten book-to-market portfolios and repeat the time-series analysis for each of them. Except for the growth firms, the variance ratio is between 2.14 and 16.36. 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 panel, 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.

To further clarify our point that the previous results using panel data are driven by the cross-sectional difference in CFs, we conduct two more exercises. First, as in Cohen, Polk, and Vuolteenaho (2003), we first demean the variables in the cross-sectional dimension, and then run the panel VAR. In this case the ratio of DR to CF news variance is 0.18 – again the CF news is more important. Second, we first demean the variables in the time-series dimension for each portfolio, and then run the panel VAR. This exercise is equivalent to a fixed-effect panel regression. Now the variance ratio is 3.73; that is, once the average cross-sectional differences of CFs are taken away, DR news becomes more important.[9]

In Panel B2, we sort firms into two book-to-market portfolios. The variance ratio for the growth firms is 7.10 and for the value firms is 6.88 – DR news is more important in both time series. When we pool the two portfolios as a panel, the variance ratio is 0.76; the result is again reversed. When we run the panel VAR with variables cross-sectionally demeaned, the variance ratio is 0.14. By contrast, when we run the panel VAR with variables time-seriesly demeaned, the variance ratio is 6.89. Finally, we analyze the market portfolio in panel B3; there the variance ratio is 5.43 – DR news is more important 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 more important; if time-series analysis is conducted, then DR news is more important at the firm, portfolio, and aggregate levels. Crucially, the panel results are driven by the average cross-sectional differences in CFs, rather than by the

[9]Note we did not run the panel VAR, with variables time-seriesly demeaned, at firm level. This is because different firms have different sample sizes. The time-series means of different firms would cover different sample periods and thus are difficult to compare. At portfolio level all time series have equal length, and thus the time-series means cover the sample periods.

variations of CFs in the time-series dimension. As a result, once the time-series means are taken away, we will find that the DR news is more important even when we run the panel VAR. 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 should conclude that DR news is more important at firm, portfolio, and aggregate levels at annual horizon. This is precisely what we have found earlier at annual horizon. There is no flip of the relative importance.

Another difficulty in believing the flip story is that it cannot be true at the long horizons. This is because the long-run returns at the firm level must be mainly driven by CF news. As a result, even after diversification, CF news should still be more important at the aggregate level. Therefore, a flip, if exists, can only happen at relatively shorter horizons. Our evidence using earnings forecasts as well as realized earnings suggests that there is no clear flip even at short horizons.

Is DR news diversifiable?

If there is no flip, then diversification must happen for both CF news and DR news. Indeed, the average quarterly return variance is 4.57% at firm level and 0.56% at the aggregate level. As shown in Tables 2 and 3, this reduction of return variance is achieved through the reduction of both the CF and DR variances.

The conventional view is that DR news tends to be more systematic than CF news. It is thus natural to ask how to diversify DR news. We can think of at least two channels through which the DR news can be diversified. First, depending on the nature of systematic risk, the DRs of different firms can change in different directions given the same macro shocks. As such, even if DR news is all driven by systematic risk, one can still diversify this risk by holding more stocks.

Second, 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 systematic depends on 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)).

On the other hand, given that investors must make cash flow forecasts based on 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 CF risk at firm and portfolio levels (e.g., Campbell and Vuolteenaho (2004), Bansal, Dittmar, and Lundblad (2005), and Lettau and Watcher (2005)). For these reasons, whether CF news or DR news is more systematic at firm level, and which one is more likely to be diversified away, is an empirical issue.

5 Robustness checks

We conduct a set of robustness checks to gain further insights into the sources from which our main results come.

5.1 Decomposition of CF news

Equation (1) suggests that the CF news can be decomposed into four parts: the revisions of cash flow forecasts for one year ahead, two years ahead, three years ahead (which uses the long-term growth rate), and for the rest of the years (which uses the long-term earnings growth rate and the GDP growth rate). Naturally one asks whether the updates on these forecasts are consistent, and whether they all contributes to the positive relation between stock returns and CF news.

Table 5 reports the correlation between the aggregate return and the four CF news components, from one quarter to seven years. All correlations are positive and mostly significant. For example, the correlation between aggregate returns and the CF news for two-year ahead is 0.27 at quarterly horizon. This correlation increases to 0.42 at two-year horizon, and 0.89 at seven-year horizon. This pattern is fairly consistent for all the four CF news components.

We also report the correlation between aggregate returns and simple changes of earnings per share forecasts for one year ahead, two years ahead, and simple changes of the long term earnings growth rate. These simple changes do not go through present value calculations and thus can give us a good sense of the robustness of our results. Again, the correlation between the aggregate returns and the simple forecast changes are mostly significantly positive, and increases with investment horizon. For example, the correlation for long-term CF forecasts is 0.12 at quarterly horizon, and increases to 0.84 at seven-year horizon.

Overall, the evidence in Table 5 suggests that the importance of the CF news comes from consistent revisions of cash flow forecasts across horizons.

5.2 Monthly horizon

Thus far all conclusions are based on analyst forecasts at quarterly frequency. Since these forecasts are provided by I/B/E/S at monthly frequency, we can also estimate CF news and DR news at monthly frequency. We follow the same procedure as before and trails accounting data to the previous quarter.

Panel A of Table 6 reports the slope coefficients of regressing the CF news and DR news on the aggregate return. At monthly horizon, the CF news coefficient is 0.07 and the DR news coefficient is 0.94. So compared to quarterly horizon, even a smaller portion of return is related to CF news at monthly horizon. The CF news coefficient grows to 0.23 at annual horizon, 0.62 at three-year horizon, and 0.79 at five-year horizon. These patterns are very similar to those obtained using quarterly forecasts.

Panel B reports the correlation between aggregate returns and CF news across horizons. This correlation is 0.16 at monthly horizon; it increases to 0.85 at three-year horizon, and 0.96 at six-year horizon. That is, returns and CF news are always positively related, and the correlation increases monotonically with horizon.

Panel C reports the average slope coefficients at firm level. At monthly horizon, the CF news coefficient is 0.11, very close to the 0.07 at the aggregate level. At three-year horizon, the CF slope coefficient is 0.65, again very close to the 0.62 at the aggregate level. This suggests that diversification plays a secondary role in the relative importance of CF/DR news in driving stock price movement.

In sum, using monthly data would reach the same conclusions as using quarterly data.

5.3 Steady state growth rate

We have followed Pastor, Sinha, and Swaminathan (2006) by assuming that the steady state earnings growth rate is the long-term GDP growth rate for all firms. Since this assumption is to some extent ad hoc, it is important to check whether our conclusions are driven by this assumption. Gebhardt, Lee, and Swaminathan (2001) alternatively assume that the steady state growth rate is the median industry growth rate. We adopt this assumption to modify the model and report the results in Table 7.

The difference caused by this change is quite small in the short horizon. For example. In Panel A of Table 7, at quarterly horizon, the CF news slope coefficient is 0.18, compared to 0.16 in Table 2. At three-year horizon, the CF coefficient is 0.88, compared to 0.63 in Table 2; at seven-year

horizon, the CF coefficient is 0.94, compared to 0.80 in Table 2.

In Panel B of Table 7, the correlations between aggregate return and CF news are almost identical to those in Table 2. In Panel C, the average CF coefficient at firm level is 0.26 (0.25 in Table 3) at quarterly horizon, 0.81 (0.76 in Table 3) at three-year horizon, and 0.86 (0.84 in Table 3) at seven-year horizon.

Overall, using the industrial growth rate as the steady state growth rate leads to a slightly stronger role for CF news. But all conclusions stay the same.

5.4 Steady state plowback rate

We have followed Pastor, Sinha, and Swaminathan (2006) by assuming that the steady state plowback rate is equal to the long-term GDP growth rate divided by the cost of equity (g/q). To ensure that this is not the key assumption driving our results, we alternatively assume that the steady state plowback rate is the corresponding industry median plowback rate for each firm; the industry median plowback rate is estimated using COMPUSTAT data. We adopt this assumption to modify the model and report the results in Table 8.

Comparing Table 8 with Table 2 and Table 3, we find that the CF slope coefficients are slightly lower for very long horizons. Otherwise, the other results are very similar. We reach the same conclusions as before: there is a significant component of CF news in stock returns, whose importance increases with investment horizon. For investment horizons over three years, CF news far exceeds DR news in driving stock returns. These conclusions hold at both firm and the aggregate levels. Diversification plays a secondary role in driving the relative importance of CF/DR news.

Therefore, our main conclusions are not driven by the particular assumption in the original model regarding the steady state plowback rate.

5.5 Other issues

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, I/B/E/S has restored its original data. All our results are based on the most recent version of the data. Second, we use analyst forecasts for earnings growth, not recommendations. Third, we find consistent and strong results at firm and aggregate levels. It seems unlikely that such consistent results are driven by bad data on certain stocks.

A key assumption of our approach is that marginal investors (who determine prices) and financial analysts share similar views on expected future CFs. We do not need them to have identical forecasts on CFs; so long as the changes of the forecasts of the two groups are significantly related, our main messages are likely to get through. This is a reasonable assumption since the financial analysts are the professionals paid to predict CFs. It is difficult to imagine that their forecasts on CF changes deviate completely from investors' forecasts.

Nor do we assume that stock prices respond to changes in analyst forecasts. It could be the other way around. So long as the changes of financial analyst forecasts pick up changes of expected CFs as projected by investors, our results are likely to hold.

Finally, since we decompose returns into CF news and DR news by definition, any bias/imprecision in the expected CF measures will be forced into the "DR news" and work against our finding of the importance of CF news. As we have discussed earlier, this suggests that our estimates on the importance of the CF news should be regarded as a lower bound.

6 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. However, the lack of predictability is not equivalent to the lack of price volatility. In addition, tests based on predictability are challenged by the small, usually absent, predictive power, and are sensitive to the fundamental difference between cross-sectional and time-series predictability.

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 prices, 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 reach four conclusions in this paper. First, there is a significant component of CF news in stock returns. Second, the importance of CF news increases with investment horizon. At horizons more than three years, CF news far exceeds DR news in driving stock returns. Third, the first two conclusions hold at both firm and aggregate levels; accordingly, diversification plays a secondary role in affecting the relative importance of CF/DR news in driving stock returns. We further show that the conventional wisdom that CF news dominates at firm level but discount rate news

dominates at the aggregate level is a myth driven by estimation methods.

A key assumption in our paper is that the analyst earnings forecasts timely reflect the marginal investors' belief regarding future CFs. Any deviation from this assumption will prevent us from finding a strong role of CF news in driving stock returns. In this sense, our estimates on the importance of CF news in the short run should be regarded as a lower bound – better CF estimates should make the results stronger. Our conclusions regarding the importance of the CF news in the longer horizons (more than three years) should not be affected much since the CF news already dominates. Similarly, these biases/deviations are unlikely to affect any of our other conclusions.

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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 years +1, +2, and a long-run earnings growth estimate. The net payout ratio includes dividends, equity repurchases, and issuances. 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 present value model in Pastor, Sinha, and Swaminathan (2006). All amounts, except for the net payout ratio and cost of equity, are in millions of dollars.

Year	Number of Firms	Quarterly Earnings	Net Payout(%)	Market Capitalization	Cost of Equity(%)
1985	1,076	23,984	46	1,195,240	13.95
1986	1,184	25,106	46	1,553,134	11.83
1987	1,059	28,601	48	1,766,071	12.34
1988	1,130	38,074	49	1,652,185	13.22
1989	1,189	36,033	47	1,984,368	12.63
1990	1,248	35,413	46	2,060,453	13.39
1991	1,300	29,249	50	2,402,193	11.96
1992	1,443	32,901	48	2,765,262	11.28
1993	1,674	44,503	46	3,216,490	10.99
1994	1,925	58,326	43	3,600,743	11.61
1995	2,135	71,622	44	4,440,807	11.38
1996	2,324	81,811	44	5,551,846	11.07
1997	2,633	90,361	46	7,755,864	10.90
1998	2,825	98,078	47	9,588,017	11.53
1999	2,623	113,165	50	10,930,810	12.23
2000	2,139	122,833	53	13,199,870	12.77
2001	2,054	49,914	50	11,731,150	11.21
2002	2,145	107,733	47	10,892,410	10.57
2003	2,267	152,788	47	11,814,770	9.65
2004	2,339	199,037	47	14,189,760	9.17
2005	2,376	229,067	49	15,413,340	9.31
2006	2,105	264,351	53	16,534,530	9.70

Table 2 : Cash Flow News and Discount Rate News at Aggregate Level

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. Panel C reports the slope coefficients of regressing CF news or DR news on the aggregate return; the row beneath the coefficients reports the Newey-West t-statistics. The sample is quarterly from 1985 to 2006.

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
Panel A: Means of aggregate return and components (%)									
CG return	2.65	5.40	11.37	24.06	37.74	54.36	72.74	96.11	123.91
CF news	0.84	2.27	5.83	14.89	25.13	37.46	52.34	70.14	90.10
DR news	1.80	3.11	5.52	9.14	12.57	16.86	20.40	25.96	31.78
Panel B: Variance and covariances of aggregate return components									
Var(CG)	0.56	1.12	1.99	5.16	10.15	17.99	27.14	36.36	46.04
Var(CF)	0.21	0.43	0.78	2.04	5.33	9.71	16.53	24.03	30.75
Var(DR)	0.59	0.90	1.75	2.48	2.79	2.79	2.78	2.57	3.43
Cov(CF, DR)	-0.12	-0.11	-0.27	0.32	1.03	2.78	3.97	4.95	6.01
Corr(CF, DR)	-0.35	-0.17	-0.23	0.14	0.27	0.53	0.59	0.63	0.58
Corr(CG, CF)	0.26	0.47	0.41	0.73	0.86	0.94	0.97	0.98	0.98
Corr(CG, DR)	0.82	0.79	0.79	0.78	0.72	0.78	0.78	0.78	0.75
Panel C: Slope coefficients									
CF news	0.16	0.29	0.26	0.46	0.63	0.69	0.75	0.80	0.80
T-stat	(3.42)	(4.44)	(2.11)	(4.70)	(9.63)	(17.68)	(29.73)	(21.08)	(16.85)
DR news	0.84	0.71	0.74	0.54	0.37	0.31	0.25	0.21	0.20
T-stat	(18.24)	(10.96)	(6.13)	(5.55)	(5.76)	(7.90)	(9.88)	(5.47)	(4.34)

Table 3 : Cash Flow News and Discount Rate News at Firm Level

Panel A reports the average firm-specific variances, covariances, and correlations of return (CG), cash flow (CF) news, discount rate (DR) news, from one quarter up to 28 quarters. The variances and covariances are in percentage, and the correlations are in actual digits. Panel B reports the slope coefficients of regressing CF news and DR news on return respectively. The row beneath the slope coefficients reports the Newey-West t-statistics. The sample is quarterly from 1985 to 2006.

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
Panel A: Variances and covariances of firm return components (%)									
Var(CG)	4.57	9.21	19.98	48.21	86.09	128.79	188.23	262.73	367.02
Var(CF)	5.34	11.41	23.97	58.64	100.63	142.50	206.01	290.74	405.92
Var(DR)	7.61	13.07	20.15	28.97	34.80	37.14	41.83	41.37	46.03
Cov(CF, DR)	-4.19	-7.63	-12.07	-19.70	-24.67	-25.43	-29.81	-34.70	-42.46
Corr(CF, DR)	-0.56	-0.50	-0.40	-0.34	-0.32	-0.30	-0.29	-0.29	-0.27
Corr(CG, CF)	0.25	0.37	0.52	0.66	0.71	0.73	0.75	0.78	0.79
Corr(CG, DR)	0.61	0.55	0.49	0.37	0.31	0.29	0.27	0.23	0.22
Panel B: Slope coefficients									
CF news	0.25	0.38	0.52	0.69	0.76	0.78	0.81	0.84	0.84
T-stat	(1.59)	(2.56)	(4.11)	(6.86)	(9.00)	(10.78)	(12.39)	(14.23)	(15.50)
DR news	0.75	0.62	0.47	0.30	0.24	0.22	0.19	0.16	0.16
T-stat	(5.32)	(4.64)	(4.29)	(3.29)	(2.77)	(2.56)	(2.29)	(1.96)	(1.90)

Table 4 : Cash Flow News and Discount Rate News Using Return Data

Vuolteenaho (2002) shows that

$$bm_t = \text{constant} + \sum_{j=1}^{\infty} \rho^{j-1} \left(r_{t+j-1} - roe_{t+j-1} \right),$$

where bm_t is the log book-to-market, r_t is stock return, and roe_t is the log return on book equity (ROE). We assume that a vector of [r roe bm] 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 (see Campbell and Vuolteenaho (2004) and Chen and Zhao (2006)). We report the VAR coefficient of r and roe on the lagged book-to-market and their t-statistics respectively. We then report the ratio of discount rate (DR) news variance to cash flow (CF) news variance. The tests are conducted at annual frequency using the combined COMPUSTAT and CRSP data, covering 1954-2006. On the first row of 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 years of data. We then estimate a panel VAR with all firms included and report the results on the second row; we repeat the panel VAR with all variables cross-sectionally demeaned and report the results on the third row. In panel B1 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. We then repeat the panel VAR with all variables cross-sectionally demeaned and the panel VAR with all variables time-seriesly demeaned. In panel B2 we sort firms into two book-to-market portfolios and repeat the analysis as in Panel B1. In panel B3 we report the results for the value-weighted market portfolio.

	Coe(r)	t(r)	Coe(roe)	t(roe)	Var(DR)/Var(CF)
Panel A: Firm level analysis					
Firm	0.28	1.68	-0.11	-1.13	2.71
Panel	0.06	31.33	-0.10	-70.00	0.14
Panel cross-sectionally demeaned	0.04	20.94	-0.11	-75.40	0.05
Panel B: Portfolio analysis					
Panel B1: Ten book-to-market portfolios					
Growth	0.15	1.46	-0.27	-5.37	0.51
2	0.13	1.90	-0.03	-1.79	2.14
3	0.08	1.29	0.00	-0.10	16.36
4	0.11	1.40	0.04	1.86	5.81
5	0.11	1.68	-0.02	-1.05	4.74
6	0.18	2.59	0.00	0.23	12.10
7	0.22	3.08	0.02	0.95	7.10
8	0.30	4.01	0.00	-0.17	7.34
9	0.33	3.64	0.01	0.40	7.83
Value	0.08	1.74	-0.01	-0.44	3.42
Panel	0.05	4.79	-0.06	-13.20	0.60
Panel cross-sectionally demeaned	0.03	4.19	-0.07	-14.29	0.18
Panel time-seriesly demeaned	0.13	5.69	-0.04	-4.29	3.73
Panel B2: Two book-to-market portfolios					
Growth	0.13	1.84	0.00	-0.30	7.10
Value	0.19	2.86	-0.01	-0.34	6.88
Panel	0.08	2.50	-0.03	-4.53	0.76
Panel cross-sectionally demeaned	0.00	0.02	-0.08	-11.33	0.14
Panel time-seriesly demeaned	0.16	3.20	-0.01	-0.44	6.89
Panel B3: Value-weighted market portfolio					
	0.15	2.18	0.00	-0.10	5.43

Table 5 : Correlations between Returns and Cash Flow Components

We decompose the CF news into four parts: the revisions of cash flow forecasts for one year ahead, two years ahead, three years ahead, and for the rest of the years. We then report the correlation between the aggregate return and the four CF news components, from one quarter to seven years. We also report the correlation between aggregate return and simple changes of earnings per share forecasts for one year ahead, two years ahead, and simple changes of the long-term growth rate. The sample is quarterly from 1985 to 2006.

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
1-year CF news	0.08	0.14	0.07	0.27	0.40	0.54	0.75	0.83	0.88
P-value	(0.46)	(0.19)	(0.53)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
2-year CF news	0.27	0.41	0.28	0.42	0.51	0.65	0.82	0.86	0.89
P-value	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
3-year CF news	0.27	0.43	0.32	0.51	0.63	0.75	0.86	0.89	0.90
P-value	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Rest of CF news	0.30	0.46	0.38	0.72	0.86	0.92	0.95	0.95	0.95
P-value	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Chg. in 1-year CF forecast	0.21	0.29	0.08	0.14	0.20	0.19	0.19	0.19	0.11
P-value	(0.06)	(0.01)	(0.49)	(0.21)	(0.08)	(0.12)	(0.11)	(0.13)	(0.39)
Chg. in 2-year CF forecast	0.21	0.34	0.18	0.23	0.27	0.25	0.28	0.28	0.19
P-value	(0.05)	(0.00)	(0.11)	(0.04)	(0.02)	(0.03)	(0.02)	(0.03)	(0.14)
Chg. in LT CF forecast	0.12	0.30	0.47	0.69	0.75	0.80	0.84	0.86	0.84
P-value	(0.27)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table 6 : Robustness Check Using Monthly Data

We use the Pastor, Sinha, and Swaminathan (2006) model with monthly analyst forecast data. Panel A reports, for the value-weighted market portfolio, the slope coefficients of regressing cash flow (CF) news and discount rate (DR) news on return respectively. Panel B reports the correlation between returns and CF news. Panel C reports the average firm-level slope coefficients of regressing CF news and DR news on returns respectively. The row beneath the slope coefficients reports the Newey-West t-statistics. The sample is quarterly from 1985 to 2006.

	Horizons (Months)								
	1	3	6	12	24	36	48	60	72
Panel A: Slope coefficients for the value-weighted market portfolio									
CF news	0.07	0.16	0.25	0.23	0.45	0.62	0.69	0.75	0.79
T-stat	(2.29)	(4.02)	(3.97)	(2.70)	(6.50)	(12.97)	(20.45)	(36.45)	(32.98)
DR news	0.94	0.84	0.74	0.77	0.55	0.39	0.31	0.25	0.21
T-stat	(30.09)	(20.38)	(11.34)	(9.10)	(7.92)	(8.08)	(9.16)	(12.05)	(9.05)
Panel B: Correlation between return and CF news for the value-weighted portfolio									
Corr(CG, CF)	0.16	0.31	0.44	0.38	0.71	0.85	0.93	0.96	0.98
P-value	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel C: Slope coefficients for an average firm									
CF news	0.11	0.22	0.36	0.49	0.63	0.65	0.65	0.66	0.72
T-stat	(1.40)	(2.55)	(4.07)	(6.36)	(10.21)	(12.54)	(15.11)	(17.69)	(20.65)
DR news	0.89	0.77	0.64	0.50	0.36	0.34	0.34	0.34	0.28
T-stat	(11.63)	(9.70)	(8.23)	(7.72)	(5.98)	(5.27)	(4.99)	(5.02)	(4.33)

Table 7 : Robustness Check Using Industrial Growth Rate

Pastor, Sinha, and Swaminathan (2006) assume that the steady-state earnings growth rate is the long-term GDP growth rate. We modify the model by assuming that the steady-state earnings growth rate is the median long-term industry earnings growth rate. Panel A reports, for the value-weighted market portfolio, the slope coefficients of regressing cash flow (CF) news and discount rate (DR) news on returns respectively. Panel B reports the correlation between returns (CG) and CF news. Panel C reports the average firm-level slope coefficients of regressing CF news and DR news on returns respectively. The row beneath the slope coefficients reports the Newey-West t-statistics. The sample is quarterly from 1985 to 2006.

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
Panel A: Slope coefficients for the value-weighted market portfolio									
CF news	0.18	0.30	0.36	0.65	0.88	0.91	0.93	0.95	0.94
T-stat	(3.64)	(3.45)	(2.12)	(3.95)	(7.28)	(13.00)	(22.86)	(34.59)	(20.64)
DR news	0.82	0.70	0.64	0.35	0.13	0.09	0.07	0.05	0.06
T-stat	(16.78)	(8.03)	(3.79)	(2.11)	(1.05)	(1.31)	(1.74)	(1.88)	(1.44)
Panel B: Correlation between return and CF news for the value-weighted portfolio									
Corr(CG, CF)	0.26	0.40	0.42	0.71	0.86	0.94	0.97	0.98	0.97
P-value	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel C: Slope coefficients for an average firm									
CF news	0.26	0.39	0.55	0.73	0.81	0.82	0.83	0.87	0.86
T-stat	(1.49)	(2.33)	(3.71)	(6.09)	(8.00)	(9.48)	(10.95)	(12.95)	(14.56)
DR news	0.74	0.61	0.45	0.26	0.19	0.18	0.17	0.13	0.14
T-stat	(4.85)	(4.17)	(3.62)	(2.61)	(2.09)	(1.91)	(1.75)	(1.53)	(1.57)

Table 8 : Robustness Check Using Industrial Plowback Rate

Pastor, Sinha, and Swaminathan (2006) assume that the steady-state plowback rate is the ratio of long-term GDP growth rate to the cost of equity. We modify the model by assuming that the steady-state plowback rate is the median long-term industry plowback rate. Panel A reports, for the value-weighted market portfolio, the slope coefficients of regressing cash flow (CF) news and discount rate (DR) news on return respectively. Panel B reports the correlation between returns (CG) and CF news. Panel C reports the average firm-level slope coefficients of regressing CF news and DR news on returns respectively. The row beneath the slope coefficients reports the Newey-West t-statistics. The sample is quarterly from 1985 to 2006.

	Horizons (Quarters)								
	1	2	4	8	12	16	20	24	28
Panel A: Slope coefficients for the value-weighted market portfolio									
CF news	0.16	0.28	0.25	0.45	0.61	0.66	0.70	0.73	0.72
T-stat	(3.50)	(3.95)	(2.03)	(4.17)	(9.15)	(15.17)	(27.37)	(19.68)	(13.52)
DR news	0.84	0.72	0.75	0.55	0.40	0.34	0.30	0.27	0.28
T-stat	(18.31)	(10.30)	(6.02)	(5.11)	(5.84)	(7.78)	(11.78)	(7.73)	(5.33)
Panel B: Correlation between return and CF news for the value-weighted portfolio									
Corr(CG, CF)	0.25	0.44	0.40	0.69	0.85	0.93	0.96	0.98	0.97
P-value	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel C: Slope coefficients for an average firm									
CF news	0.25	0.38	0.52	0.67	0.73	0.75	0.76	0.79	0.78
T-stat	(1.58)	(2.56)	(4.08)	(6.69)	(8.66)	(10.20)	(11.61)	(13.32)	(14.43)
DR news	0.75	0.62	0.48	0.33	0.27	0.25	0.23	0.20	0.22
T-stat	(5.40)	(4.78)	(4.53)	(3.70)	(3.30)	(3.24)	(3.17)	(3.07)	(3.25)