How Do Managers Move Firm Value?
Cash Flows vs. Expected Returns

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ABSTRACT

Stock prices are mechanically driven by changes in either expected cash flows or discount rates (expected returns). Fundamentally firm values move with managerial decisions. We explore through which channel managers commonly affect their firms' value. A variance decomposition analysis indicates that when managers have a greater degree of discretion – i.e., when CEO compensation and ownership are high, and in unregulated and heterogeneous industries – cash-flow news becomes significantly more important in driving stock returns, while expected-return news becomes significantly less important. This suggests that managers move firm value mainly by changing expected cash flows and not firm risk.

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1. Introduction

Unexpected stock returns can be expressed as a function of changes in rational expectations of future dividend growth (i.e., cash-flow news) and future discount rates (i.e., expected-return news). Campbell (1991) decomposes the variance of monthly market returns into the variance and covariance terms of these two components, and finds that stock prices are moved primarily by expected-return news. Campbell and Ammer (1993) document similar results when they add bond market data to the model. Vuolteenaho (2002) finds that at the firm-level, however, stock returns are mainly driven by cash-flow news. Other authors have explored the characteristics of these cash-flow and expected-return news components (see Ammer and Mei (1996), Lamont and Polk (2001), Priestley (2001), Campbell and Vuolteenaho (2004), Eisdorfer (2007), and Larrain and Yogo (2007)).

While by mechanical construction stock prices are moved by news about cash flows and discount rates, fundamentally firm value is affected by the management decisions. An interesting question is therefore through which channel managers have stronger incentives and more ability to change firm value? Is it more likely that managers move firm value by changing expected cash flows or by changing expected returns?

The literature does not lead to a clear answer to this question, as managerial incentives relate to both firm risk and cash flows. The primary objective of managers is to increase firm value, which implies that they attempt to increase expected cash flows and/or reduce discount rates. Yet, managers can have other motives to change expected cash flows or discount rates that are not always aligned with the objective of increasing firm value.

Many corporate finance studies, especially in the areas of agency theory and executive compensation, have identified managerial incentives to change the risk of the firm's assets. Managers are assumed to represent shareholders, and thus can choose to engage in risk-increasing projects at the expense of bondholders (See Jensen and Meckling (1976) and Galai and Masulis (1976) on the risk-shifting problem). Managers can also have risk-taking incentives if the value of their compensation package, particularly stock-options holdings, is positively related to firm risk (see Coles, Daniel, and Naveen (2006)). Yet, managers are often assumed to be risk-averse due to their undiversified wealth and human capital invested in the firm; thus, they may tend to make decisions that reduce firm risk (See, e.g., Jensen and Meckling (1976), Treynor and Black (1976), and Parrino, Poteshman, and Weisbach (2005)). Sundaram and Yermack (2007) show that managers holding large pensions tend to pursue strategies that reduce overall firm risk in order to lower the likelihood of default that risks pension payouts.

Beyond the incentives to change firm risk, managers can have their own motives to change expected cash flows. They may overinvest even when there are no valuable investment opportunities (known as the free cash-flow problem; see Jensen's (1986)). Managers also often prefer to generate a high level of cash flow in the short run over a path of lower uncertainty in the long-run. This is due to managerial considerations such as reputation concerns (Narayanan (1985)), dividend-paying objectives (Baker and Wurgler (2004)), and meeting short-term bonus targets (Waegelein (1988)). And finally, managers who represent shareholder interests can have incentives to underinvest in cases where most proceeds will be used to cover debt payments (Myers (1977)).

The theory therefore indicates that managers may constantly seek higher cash flows and lower firm risk in order to increase firm value, but also have their own incentives to change expected cash flows and risk level.

To investigate through what channels managers typically affect firm value, we first use Campbell's (1991) variance decomposition framework to measure the relative dominance of cash-flow and expected-return news in moving stock prices at the firm level. We then examine the relation between the importance of cash-flow/expected-return news and the degree of managerial discretion. We use managerial discretion because managers with more discretion over the firm's operations are likely to have a greater impact on firm value. Managerial discretion is measured at both the firm level by CEO (and all executives') compensation and ownership, and at the industry level by regulation and the degree of industry homogeneity.

All tests strongly indicate that in cases of considerable managerial discretion, cash-flow news becomes more important in driving stock returns, while expected-return news becomes less important. Partitioning sample firms into high and low managerial discretion groups, we find first that the ratio of variance of cash-flow news to the total variance of unexpected return is significantly higher for firms with high managerial discretion. Similarly, the equivalent variance ratio of expected-return news is significantly lower for firms with high managerial discretion. These results are especially strong when the firms are classified by CEO compensation and ownership and industry regulation.

Second, regressions of firm-year measures of the relative importance of cash-flow vs. expected-return news on managerial discretion show a significant positive relation. And,

consistent with the cross-sectional tests, the association is stronger for the CEO's discretion than when all executives are considered. We show further that the effect of managerial discretion on the importance of cash-flow news is not driven by endogeneity – i.e., by the possibility that a firm that ex-ante is highly sensitive to innovations in cash flows chooses to grant managers larger compensation packages. And lastly, a set of robustness tests suggest that the results are not sensitive to estimation procedure.

Given the finding that managers move firm value primarily by controlling expected cash flows, we assess the net value of managerial discretion for cash-flow and expected-return news in terms of stock returns. Controlling for size, growth opportunities, and industry effects, we find that managers with high discretion generate positive cash-flow news that contributes to the value of the firm 2% to 8% a year more than managers with low discretion. And, consistent with the regression results, managerial discretion has only a minor effect on the value generated by expected-return news.

The results in this paper can be viewed as a step forward in understanding the mechanism of stock price movements. Campbell (1991) originally finds that at the market level stock prices move primarily by changes in expected returns, whereas Vuolteenaho (2002) shows that at the firm level, cash-flow news is on average more dominant than expected-return news in driving stock prices. In this study we analyze the variation in the return decomposition structure of individual firms, and show that this structure significantly depends on the extent of managerial discretion.

The paper proceeds as follows. The next section outlines the variance decomposition framework. Section 3 presents the estimates of firm-level variance decomposition.

Section 4 describes the managerial discretion measures. Section 5 presents the empirical tests, and Section 6 concludes.

2. Variance decomposition framework

We follow Campbell's (1991) framework to decompose the variance of unexpected returns. Building on the log-linear dividend-ratio model of Campbell and Shiller (1988), Campbell expresses the unexpected stock return as a function of changes in rational expectations of future dividend growth and future stock returns:

$$h_{t+1} - E_t h_{t+1} = (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - (E_{t+1} - E_t)\sum_{j=1}^{\infty} \rho^j h_{t+1+j} \qquad (1)$$

where h_{t+1} = log of return on a stock from the end of period t to the end of period $t+1$,

d_{t+1} = log of dividend paid during period $t+1$, and

ρ = a number a little smaller than one (follows from Campbell and Shiller's approximation process).

For simplicity, define:

$$U_{r,t+1} \equiv h_{t+1} - E_t h_{t+1} \qquad \equiv \text{unexpected return,} \qquad (2)$$

$$N_{cf,t+1} \equiv (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} \equiv \text{news about future cash flows, and} \qquad (3)$$

$$N_{er,t+1} \equiv (E_{t+1} - E_t)\sum_{j=1}^{\infty} \rho^j h_{t+1+j} \qquad \equiv \text{news about future returns.} \qquad (4)$$

The variance of unexpected return can therefore be decomposed into the variance and covariance terms of cash-flow news and expected-return news:

$$Var(U_{r,t+1}) = Var(N_{cf,t+1}) + Var(N_{er,t+1}) - 2Cov(N_{cf,t+1}, N_{er,t+1}) \qquad (5)$$

By assuming that stock return is the first element in a first-order vector autoregression (VAR) system of the form $z_{t+1} = Az_t + w_{t+1}$ (where z is the vector of the VAR variables, A is the matrix of the VAR parameters, and w is the vector of the error terms with a covariance matrix Σ), Campbell shows that:

$$N_{cf,t+1} = (e1' + \lambda')w_{t+1}, \tag{6}$$

$$N_{er,t+1} = \lambda' w_{t+1}, \tag{7}$$

where $\lambda \equiv e1'\rho A(I - \rho A)^{-1}$, and

$e1$ is a vector whose first element is one and whose other elements are zero.

Equations (6)-(7) allow the specific expressions of the three components of the variance of the unexpected return (Equation 5):

$$Var(N_{cf}) = (e1' + \lambda')\Sigma(e1 + \lambda), \tag{8}$$

$$Var(N_{er}) = \lambda'\Sigma\lambda, \text{ and} \tag{9}$$

$$-2Cov(N_{er}, N_{cf}) = -2(e1' + \lambda')\Sigma\lambda. \tag{10}$$

3. Firm-level variance decomposition estimation

As in Campbell (1991), we include three predictive variables in the VAR system: (i) the log of the realized monthly stock return, (ii) the monthly dividend yield, which is computed using the returns with and without dividends from CRSP, as described in Fama and French (1988), and (iii) the relative bill rate, which is the difference between a one-month T-bill rate and its one-year backward moving average (see Fama and Schwert (1977)).[1] The data are taken from CRSP and Compustat for all firms listed on the NYSE, Amex, and Nasdaq between 1963 and 2008. We run the VAR model for each firm

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[1] For robustness, later we use the net payout yield as an alternative to the dividend yield.

separately, and use the firm-specific VAR coefficients to estimate the variance decomposition terms.

Note that this procedure is different from the one Vuolteenaho (2002) uses to generate firm-level decomposition. Vuolteenaho (2002) assumes that the VAR coefficients are constant across firms, and thereby uses constant marketwide VAR coefficients to decompose the unexpected returns of all firms. Our procedure, however, allows the VAR coefficient to vary across firms, and uses the firm-specific coefficients to derive the variance decomposition terms of the firm.

The upper section of Table 1 presents descriptive statistics of the VAR variables, and the bottom section shows averages of the firm-specific VAR coefficient estimates and R-squares. As expected, the dividend yield and relative bill rate are more predictable than stock returns, indicated by relatively high R-squares. Yet, while stock return is assumed to be unpredictable in the variance decomposition framework, the mean R-square of returns is 3.2%. This indicates that estimation of the coefficients may be noisy, which can result in an upward bias of the effect of expected-return news. Campbell (1991) addresses this concern by simulating a VAR system that restricts returns to be non-predicted, and shows that the decomposition structure is robust with respect to this issue.

Table 2 reports the mean and median of firm-specific variance decomposition structures. The results are presented for the entire sample period, 1964-2008, and also for the subperiod 1992-2008, for which data on corporate executives is available. First, the decomposition pattern in the late period is very similar to that in the entire sample period. Second, the level of the variance of cash-flow news is significantly higher than that of expected-return news. This relation is consistent with Vuolteenaho (2002).

Third, and most important, the results show that news about future cash flows is the most dominant factor in moving stock prices. On average, the variance of cash-flow news is around 95% of the total variance of the unexpected return, where the variance of expected-return news accounts for 20% to 24% of the variance of unexpected return. For comparison, Vuolteenaho (2002) shows that, at the firm level, the variance of cash-flow news is more than twice than that of expected-return news.

4. Managerial discretion measures

We estimate the extent to which managers have discretion over the firm's operations using both firm-level and industrywide proxies. The firm-level proxies are based on managerial compensation and ownership. That is, executives are more likely to earn higher wages and bonuses (compensation) and to hold more stock (ownership) when the nature of their jobs requires higher managerial skills and discretion (see, for example, Demsetz and Lehn (1985), Morck, Shleifer, and Vishny (1989), Jensen and Murphy (1990), Finkelstein and Boyd (1998), He, Mukherjee, and Wei (2009)).

Information on executive compensation and ownership is obtained from ExecuComp, and finance and accounting data are taken from the CRSP/Compustat intersection. Managerial compensation and ownership are measured both at the CEO level and for all top executives (between five and eight for most firms). CEO compensation is estimated by the sum of current salary and bonus of the CEO, scaled by firm size (market value of equity). All executives' compensation is estimated by the sum of the average salary and average bonus of the top executives, scaled by firm size. CEO ownership is the number of shares held by the CEO divided by the firm's total shares outstanding, and all

executives' ownership is the sum of the average number of shares held by the top executives divided by total shares outstanding.

We use two proxies for managerial discretion at the industry level. The first one is industrywide regulation. Smith (1986) argues that managers of regulated firms have less discretion over investment decisions than managers of unregulated firms. Following Hermalin and Weisbach (1988), we consider public utilities (SIC code 49), airlines and railroads (SIC codes 40-47), and financial institutions (SIC codes 60-69) as regulated industries. The second proxy is the degree of homogeneity across firms in the industry, as managers have less operational flexibility in more homogeneous industries. We use Parrino's (1997) proxy for industry homogeneity. This measure is based on the average of the correlations between the firm-specific returns and the industry-index return. Industries in the most homogeneous quintile are, for example, metal mining, and oil and gas extraction; those in the least homogeneous quintile are, for example, wholesale trade, and industrial and commercial machinery and computer equipment. Using the homogeneity measure, we divide all two-digit SIC codes industries into two equal-sized groups of homogeneous and heterogeneous industries.

Table 3 presents descriptive statistics and correlations of managerial compensation and ownership, and industry regulation and homogeneity indicators. We also include in the table firm size and market-to-book ratio. Both can be associated with firm risk, and thereby the variance decomposition structure, and with the extent of managerial compensation and ownership, and are thus used as control variables in all regressions.

Note first that the means of both managerial compensation and ownership terms are significantly higher than the medians, and often are higher than the 75th percentiles,

suggesting non-normal distributions. In robustness tests we examine the results using the natural log of these measures in the regressions.

More interestingly, the different measures of managerial discretion are positively, yet not strongly correlated. For example, the correlation between CEO compensation and CEO ownership is 0.14, while the correlations between managerial-based measures and the industry-based measures range between 0.05 and 0.13 in absolute value. Firm size is somewhat negatively correlated with managerial compensation and ownership (correlations are between -0.06 and -0.16) and seems uncorrelated with industry regulation and homogeneity, while market-to-book ratio seems uncorrelated with all measures of managerial discretion.

5. Empirical tests

5.1 Firm-level managerial discretion: Cross-sectional analysis

We first examine cross-sectional differences in variance decomposition structures between firms with high and low managerial discretion. We divide all firms into two equal-sized groups based on their time series averages of CEO compensation and CEO ownership. Table 4 reports the firm-specific variance decomposition structures separately for high and low compensation and ownership groups.

The results show significant differences between the groups. The effect of cash-flow news on stock price movement becomes more dominant for the high managerial discretion firms, while the effect of expected-return news declines. For firms with high CEO compensation, the variance of cash-flow news accounts on average for 99% of the variance of unexpected return, compared to 83% for firms with low CEO compensation. The variance of expected-return news however accounts on average for only 20% of the

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variance of unexpected return for the high CEO compensation firms, compared to 29% for firms with low CEO compensation. There are also meaningful differences between high and low CEO ownership. The average figures for cash-flow news variance are 97% for high ownership firms and 86% for low ownership firms, while the figures for expected-return news are 21% and 28%, respectively. All these differences are statistically significant at any conventional level.

Figure 1 shows ratios of the variances of cash-flow and expected-return news to the variance of unexpected return for five equal-sized groups, based on both CEO and all executives' compensation and ownership. The compensation/ownership measures are used in actual values and when adjusted to the two-digit industry-year medians.

Consistent with the results in Table 4, the importance of cash-flow news increases monotonically with managerial discretion in almost all cases, while the importance of expected-return news declines monotonically. Averaging all eight measures in figures, the variance of cash-flow news accounts for 103% of the variance of unexpected return in the top managerial discretion quintile, compared to 81% for the bottom managerial discretion quintile. Similarly, the variance of expected-return news accounts for 19% of the variance of unexpected return in the top managerial discretion quintile, compared to 30% in the bottom managerial discretion quintile. ANOVA tests indicate that the differences across the quintiles are significant at any conventional level for all eight measures (not reported).

Table 4 and Figure 1 therefore suggest a strong association between managerial discretion and the importance of cash-flow news in driving stock return. This finding

provides the first strong indication that managers are more likely to affect the value of their firms by controlling expected cash flows than by changing firm risk.

5.2 Time series cross-sectional analysis

To account for firm-level time series variation in managerial discretion, we examine how the firm's extent of discretion in a given year affects the importance of cash-flow news vs. expected-return news in that year. We use the firm-specific VAR coefficients to estimate firms' monthly innovations in cash flows and expected returns (defined in Equations 6 and 7). We then calculate the cash-flow news variance ratio for each year separately; that is, the variance of the monthly cash-flow innovations during the year, scaled by the variance of the monthly unexpected returns in that year. Similarly, we calculate the variance ratio of the expected-return news. We measure the relative importance of cash-flow vs. expected-return news in each year by the difference between the cash-flow and expected-return variance ratios; referred to this difference as $Pcf - Per$. We then run the pooled firm-year regression:

$$[Pcf - Per]_{i,t} = \beta_0 + \beta_1 Mgmt\ Discretion_{i,t} + Log(Size)_{i,t} + MtB_{i,t} + \varepsilon_{i,t} \qquad (11)$$

where i is the firm index and t is the year index. *Mgmt Discretion* is the proxy for managerial discretion, including CEO and all executives' compensation and ownership.

$Pcf - Per$ and *Mgmt Discretion* are both used in raw and industry-adjusted data (calculated by subtracting the year-specific industrywide medians of the measures from the firm's raw numbers). To control for firm-specific characteristics that might affect the balance between the dominance of cash-flow and expected-return news, we include in the regression firm size and market-to-book ratio (see Cohen, Gompers, and Vuolteenaho

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(2002) and Campbell and Vuolteenaho (2004)). As this regression relies on time series cross-sectional data, the standard errors are clustered by individual firms.[2]

The regression results in Table 5 indicate a strong positive relation between managerial discretion and the relative importance of cash-flow vs. expected-return news. The coefficients of all discretion measures are positive, where those of CEO compensation, CEO ownership, and all executives' compensation are statistically significant (p-values of 0.003 and lower). The effect of all executives' ownership, however, is much weaker (p-values of 0.089 and 0.437). The results, first, provide further support for the notion that managers affect firm value typically through cash flows and not expected returns, and second, indicate that CEO discretion has a greater impact on the relative importance of cash-flow than the discretion of all top executives.

We recognize that the observed strong association between managerial discretion and the dominance of cash-flow news over expected-return news could involve endogeneity. That is, a firm that ex-ante is highly sensitive to innovations in cash-flow may choose to provide its managers with larger compensation packages and stock holdings. We address this endogeneity concern using a two-stage least squares (2SLS) regression. In the first stage, we run a regression of managerial compensation and ownership on two instrumental variables that are expected to affect compensation and ownership, and are not likely to be affected by the firm's relative sensitivity to cash-flow or expected-return news. For CEO compensation and ownership we use the CEO's tenure (i.e., the period between becoming CEO and the current year) as an instrumental variable; for all executives' compensation and ownership, we use the average age of the executives. This regression generates predicted values of managerial compensation and ownership.

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[2] Using the Newey-West (1987) procedure for panel data yields similar results.

In the second stage we run a similar regression to that in Table 5. We regress the difference between the variance ratios of cash-flow and expected-return news on the predicted managerial compensation and ownership. The results of the second-stage regression reported in Table 6 are consistent with the results in Table 5. The coefficients of the generated CEO compensation and ownership and all executives' compensation are positive and strongly significant (p-values of 0.006 and lower), where the effect of all executives' ownership is also positive but not significant. These results suggest that the positive effect of managerial discretion on the dominance of cash-flow news in moving stock prices is not driven by endogeneity.

5.3 Industry-level managerial discretion

We next examine whether the importance of cash-flow and expected-return news in driving stock returns is different across industries that are characterized by different degrees of managerial discretion. As discussed above, firms operating in regulated and more homogeneous industries require less managerial discretion. Table 7 shows the variance decomposition structures separately for firms operating in regulated and unregulated industries, and in homogeneous and heterogeneous industries (using the proxies outlined in Section 4).

The results indicate that cash-flow news is more important in industries with higher managerial discretion, and expected-return news is less important. For firms operating in regulated industries, the variance of cash-flow news is on average 84% of the total variance of unexpected return, compared to 102% for firms operating in unregulated industries. The variance of expected-return news, however, accounts for 35% of the unexpected return variance in regulated industries, compared to only 17% in unregulated

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industries. A similar pattern, although of a lower magnitude, is found when we look at industry homogeneity; cash-flow news becomes more important for firms operating in heterogeneous industries, while expected-return news becomes less important. All these differences are statistically significant at any conventional level.

These results are consistent with those of the managerial compensation/ownership tests, implying that when managers have more discretion over firms' operations, the value of the firm moves primarily as a result of changes in expected cash flows, and less by changes in expected returns. The industrywide tests thus provide further support for the hypothesis that managers affect the value of their firms typically by controlling expected cash flows, and not by changing firm risk.

5.4 Assessing the value of managerial discretion for cash flows and expected returns

The findings in this study suggest that managers move firm value primarily through cash flows. The primary objective of managers is to increase the value of their firms. Hence, we should expect that firms with higher managerial discretion will have more positive cash-flow news than firms with low managerial discretion. In this section we examine the value of managerial discretion for cash-flow news and expected-return news in terms of stock returns.

Each month we sort all firms independently into five equal-sized groups by size and into five equal-sized groups by market-to-book ratio, both as of the beginning of the month. Within each of the 25 size/value groups, we sort all firms into five equal-sized quintiles by CEO compensation and ownership (both actual and industry-adjusted values).[3] We then calculate the average of the monthly cash-flow and expected-return

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[3] Size/value groups with fewer than ten observations are excluded.

innovations (derived from Equations 6 and 7) separately for each compensation and ownership quintile. This procedure thus assesses the effect of managerial discretion on the value of cash-flow and expected-return shocks, controlling for size and value effects on these shocks.

The results in Table 8 show that the value of cash-flow news increases monotonically with the extent of managerial discretion. The difference between the values of cash-flow news in the top and the bottom quintiles of CEO compensation is 0.57% a month (0.68% a month when industry-adjusted compensation is used). That is, in annual terms, managers with higher compensation generate positive cash-flow news that contributes to the value of the firm 6.9% to 8.1% more than managers with lower compensation.

Consistent with the findings so far, there are much smaller differences in the values of expected-return news across the managerial discretion quintiles. The differences between the top and bottom CEO compensation quintiles are -0.075% and -0.098%. That is, in annual terms, managers with higher compensation generate negative discount rate news that increases the value of the firm by 0.9% to 1.2% more than managers with lower compensation.

The patterns are similar for CEO ownership but to a lesser extent. The differences in the values of cash-flow news between the top and bottom ownership quintiles are 0.21% and 0.14%, which translated into annual returns of 2.5% and 1.6%. And, as expected, the differences in the values of expected-return news are minor and not statistically significant. The results in Table 8 suggest therefore that a significantly more valuable cash-flow news is created when managers have more discretion; while news regarding firm risk depends less on the extent of managerial discretion.

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Figure 2 illustrates the value of the cumulative cash-flow and expected-return news over time for high and low values of CEO compensation and ownership. Firms with high CEO compensation have cumulative value of cash-flow news higher by more than 110% than that of firms with low CEO compensation. The difference in the cumulative value of expected-return news is much lower, around 14%. In the case of high and low CEO ownership, the difference in cumulative cash-flow news is also significant, around 40%. The difference in the cumulative values of expected-return news is much lower again, around 5%.

5.5 Robustness tests

To examine the robustness of the effect of managerial discretion on the importance of cash-flow news, we replicate the regressions in Table 5 using four alternative procedures. First, to address the concern that the managerial compensation and ownership measures exhibit positive skewness, we use the natural log of these measures in the regressions. Second, the variance decomposition estimates can be sensitive to the choice of the predictive variables. We follow Larrain and Yogo (2007) and replace the dividend yield with the net payout yield, which is the dividend plus equity repurchase, net of issuance.[4]

The third procedure concerns the timing of the variances of cash-flow and expected-return news. While the regressions in Table 5 are informative, they limit the effect of managerial discretion on the relative importance of cash-flow or expected-return news to a one-year horizon. Because managers' decisions in one year can affect stock prices in

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[4] As in Boudoukh, Michaely, Richardson, and Roberts (2007), the net payout yield for firm i in month t is:
$dividend\ yield_t + (shrout_{t-1} \times cfacshr_{t-1} - shrout_t \times cfacshr_t) \times (prc_t / cfacpr_t + prc_{t-1} / cfacpr_{t-1}) / 2$
where *shrout* is number of shares outstanding, *cfacshr* is the cumulative factor to adjust shares, *prc* is month-end share price, and *cfacpr* is the cumulative factor to adjust price (all are taken from CRSP).

subsequent years, we examine the results using cash-flow and expected-return variances in the next three years as inputs for the dependent variable. Finally, we have shown that industry regulation and homogeneity have a significant effect on the relative importance of cash-flow/expected-return news. To eliminate other potential effects of industry-specific properties on changes in asset risk that are not considered by the model, we include in the regressions industry and year fixed effects.

Table 9 shows the coefficient and *p*-value of the managerial discretion measure in each new regression. The results are comparable with the regressions in Table 5. All the coefficients of CEO and all executives' compensation are positive and significant. For the regressions with the log terms and the net payout yield, the *p*-values are 0.003 and lower; for the regressions with three-year variance ratios, the *p*-values are 0.075 and lower; and for the fixed effects regressions, the *p*-values are 0.037 and lower. Similarly, the coefficients of CEO ownership are strongly significant in all regressions (*p*-values of 0.03 and lower in seven of eight regressions), except in the case of net payout yield when industry-adjusted ownership is used (*p*-value of 0.163). And as in Table 5 regressions, the coefficients of all executives' ownership are positive, but not significant for the most part. The regression results in Table 9 therefore suggest that the main findings in this study are not sensitive to estimation procedure.

6. Conclusions

Conventional asset pricing models suggest that stock prices move as a result of changes in either expected cash flows or discount rates. Fundamentally the value of a firm depends greatly on the quality of the decisions made by its managers. This study explores how managers typically move firm value, by changing expected cash flows vs.

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changing firm risk. We first apply a variance decomposition procedure at the firm level to estimate the extent to which cash-flow and expected-return news move stock prices. We then examine how the relative importance of cash-flow/expected-return news is changing with degree of managerial discretion, measured by CEO and all executives' compensation and ownership, and industry regulation and homogeneity.

In firms whose managers have more operational discretion, and therefore a greater impact on firm value, we find that cash-flow news becomes more dominant in driving stock returns, while expected-return news becomes less dominant. These results are particularly strong when only the CEO's discretion is considered. These findings suggest that managers move firm value primarily by controlling expected cash flows, and less by changing firm risk.

We further assess the extent to which managerial discretion contributes to firm value through cash-flow and expected-returns news. Managers with a high level of discretion generate positive cash-flow news that increases the value of the firm by 2% to 8% a year more than managers with less discretion. In contrast, managerial discretion does not produce significant firm value through changes in expected returns.

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Table 1. VAR parameters

We estimate the following vector-autoregressive model for each firm: $Z_{t+1} = AZ_t + \omega_{t+1}$, $\omega_t \sim N(0, \Sigma)$, where the variables used in the model are the log of monthly stock return (LR), the dividend yield (DP), and the relative bill rate (RB), which is the difference between a short-term T-bill and its one-year backward moving average. The first section of the table shows the mean, standard deviation, and the 25th, 50th, and 75th percentiles of each variable. The second section shows the averages of the VAR coefficient estimates (standard errors are in parentheses) and R-squares. The results are based on 13,932 firms over 1964-2008.

	Mean	StdD	P25	P50	P75
LR	0.001	0.141	-0.061	0.000	0.065
DP	0.022	0.032	0.000	0.007	0.034
RB	-0.004	0.091	-0.053	0.002	0.053

	Intercept	LRt	DPt	RBt	R-square
LRt+1	-0.011	-0.025	0.310	-0.004	0.032
	(0.000)	(0.001)	(0.011)	(0.002)	
DPt+1	0.001	-0.017	0.573	0.001	0.904
	(0.000)	(0.000)	(0.004)	(0.000)	
RBt+1	0.002	-0.015	-0.075	0.736	0.578
	(0.000)	(0.001)	(0.007)	(0.001)	

Table 2. Firm-level variance decomposition

The table reports the mean and median of firm-specific variance decompositions of unexpected return. The components of the unexpected return variance are estimated using Campbell's (1991) vector autoregressive (VAR) approach. We first estimate the parameters and the covariance matrix of the residuals of the first-order VAR model: $Z_{t+1} = AZ_t + \omega_t$, $\omega_t \sim N(0,\Sigma)$, where the variables used in the model are the log of monthly stock return, the dividend yield, and the relative bill rate. The variance and covariance terms are estimated as: $Var(N_{er}) = \lambda'\Sigma\lambda$, $Var(N_{cf}) = (e1' + \lambda')\Sigma(e1+\lambda)$, and $-2Cov(N_{er},N_{cf}) = -2(e1' + \lambda')\Sigma\lambda$, where N_{er} and N_{cf} denote expected-return news and cash-flow news, $\lambda \equiv e1' \rho A(I - \rho A)^{-1}$, and $e1$ is a vector whose first element is one and whose other elements are zero; the parameter ρ represents the average ratio of the market price to the sum of the market price and the dividend. The variance decomposition terms appear both in level and as a percentage of the variance of unexpected return, *V(ur)*, where standard errors are in parentheses. The results are based on 13,932 firms for the period 1964-2008, and 10,248 firms for the period 1992-2008.

| | 1964-2008 | | | | 1992-2008 | | | |
| | Level | | % of V(ur) | | Level | | % of V(ur) | |
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
V(ur)	2.275	1.818	1.000	1.000	2.487	1.843	1.000	1.000
Se	(0.016)	(0.019)	-	-	(0.025)	(0.027)	-	-
V(Ncf)	2.376	1.842	0.950	0.949	2.594	1.843	0.950	0.949
Se	(0.019)	(0.023)	(0.003)	(0.004)	(0.028)	(0.031)	(0.004)	(0.004)
V(Ner)	0.365	0.177	0.235	0.116	0.317	0.123	0.203	0.083
Se	(0.005)	(0.003)	(0.003)	(0.002)	(0.007)	(0.003)	(0.003)	(0.002)
-2Cov	-0.465	-0.099	-0.185	-0.077	-0.424	-0.053	-0.153	-0.047
Se	(0.011)	(0.006)	(0.004)	(0.004)	(0.000)	(0.007)	(0.004)	(0.004)

Table 3. Descriptive statistics and correlations of managerial discretion measures

CEO compensation is estimated by the sum of current salary and bonus of the CEO, scaled by firm size (market value of equity). All executives' compensation is estimated by the sum of the average salary and average bonus of the top executives, scaled by firm size. CEO ownership is the number of shares held by the CEO divided by total shares outstanding, and all executives' ownership is the sum of the average number of shares held by the top executives divided by total shares outstanding. Industry regulation indicator equals one for public utilities (SIC code 49), airlines and railroads (SIC codes 40-47), and financial institutions (SIC codes 60-69), and zero otherwise. Industry homogeneity indicator equals one for two-digit code industries with a homogeneity degree higher than the median, and zero otherwise; the degree of homogeneity is measured using Parrino's (1997) proxy, based on the average of the correlations between the firm-specific returns and the industry-index return. Firm size (in millions of dollars) is measured by the market value of equity, calculated by the stock price times the number of shares outstanding. Market-to-book ratio is equity market value divided by equity book value. The results are based on 24,454 firm-years over 1992-2008.

	Mean	StdD	P25	P50	P75
Compensation: CEO	0.137	0.203	0.031	0.071	0.154
Compensation: All executives	0.082	0.187	0.017	0.039	0.084
Ownership: CEO	2.430	5.853	0.086	0.323	1.399
Ownership: All executives	1.052	2.744	0.058	0.184	0.753
Industry regulation indicator	0.229	0.420	0.000	0.000	1.000
Industry homogeneity indicator	0.372	0.483	0.000	0.000	1.000
Firm size	5.898	20.625	0.456	1.215	3.706
Market-to-book ratio	2.597	36.201	1.542	2.426	4.078

	Comp. CEO	Comp. All exec.	Own. CEO	Own. All exec.	Ind. reg.	Ind. hom.	Firm size	Market-to-book
Compensation: CEO	1.000	0.805	0.142	0.145	-0.127	-0.071	-0.163	-0.020
Compensation: All executives		1.000	0.094	0.115	-0.083	-0.054	-0.109	-0.016
Ownership: CEO			1.000	0.721	-0.038	-0.072	-0.075	0.000
Ownership: All executives				1.000	-0.052	-0.081	-0.063	0.001
Industry regulation indicator					1.000	0.676	-0.009	-0.001
Industry homogeneity indicator						1.000	0.014	-0.031
Firm size							1.000	0.015
Market-to-book ratio								1.000

Table 4. Variance decomposition by CEO compensation and ownership

All firms are classified into two equal-sized groups, based on the firm's time series average of CEO compensation and ownership. The table reports the mean and median of the firm-specific variance decomposition structures among the two compensation- and ownership-based groups (the estimation procedure is outlined in Table 2). The results are based on 2,363 firms over 1992-2008.

	Low CEO Compensation				High CEO Compensation			
	Level		% of V(ur)		Level		% of V(ur)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
V(ur)	1.345	0.943	1.000	1.000	2.195	1.800	1.000	1.000
Se	(0.032)	(0.032)	-	-	(0.042)	(0.048)	-	-
V(Ncf)	1.321	0.736	0.834	0.810	2.413	1.913	0.994	0.997
Se	(0.042)	(0.043)	(0.011)	(0.015)	(0.061)	(0.064)	(0.010)	(0.011)
V(Ner)	0.268	0.170	0.287	0.184	0.370	0.174	0.201	0.103
Se	(0.011)	(0.007)	(0.009)	(0.010)	(0.017)	(0.010)	(0.007)	(0.006)
-2Cov	-0.244	-0.010	-0.121	-0.013	-0.587	-0.174	-0.195	-0.103
Se	(0.022)	(0.011)	(0.011)	(0.011)	(0.000)	(0.024)	(0.011)	(0.011)

	Low CEO Ownership				High CEO Ownership			
	Level		% of V(ur)		Level		% of V(ur)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
V(ur)	1.519	1.048	1.000	1.000	2.020	1.646	1.000	1.000
Se	(0.037)	(0.039)	-	-	(0.041)	(0.044)	-	-
V(Ncf)	1.556	0.860	0.856	0.837	2.177	1.669	0.971	0.977
Se	(0.051)	(0.052)	(0.011)	(0.015)	(0.057)	(0.060)	(0.010)	(0.012)
V(Ner)	0.297	0.176	0.282	0.170	0.342	0.169	0.208	0.110
Se	(0.013)	(0.008)	(0.009)	(0.010)	(0.016)	(0.009)	(0.007)	(0.007)
-2Cov	-0.334	-0.028	-0.138	-0.025	-0.498	-0.139	-0.179	-0.094
Se	(0.029)	(0.013)	(0.012)	(0.011)	(0.000)	(0.021)	(0.011)	(0.012)

Table 5. Pooled regressions of variance gap of cash-flow and expected-return news on managerial compensation and ownership

The dependent variable is the difference between the firm-specific ratio of cash-flow news variance to unexpected return variance in a given year and the ratio of expected-return news variance to unexpected return variance in that year (the cash-flow and expected-return news are defined in Equations 6 and 7). The independent variables are the firm-year compensation of the CEO all executives, ownership of the CEO and all executives, natural log of firm size, and market-to-book ratio. In the left section the variance-ratio gap and the compensation and ownership terms appear in actual values, and in the right section they are adjusted to industry-year medians, based on two-digit SIC codes. The table reports regression coefficients and p-values based on standard errors clustered by individual firms. *, **, *** indicate significance at 10%, 5%, and 1%, respectively. The results are based on 24,189 firm-years over 1992-2008.

	Actual values				Industry-adjusted values			
Intercept	1.574*** (0.000)	1.692*** (0.000)	1.731*** (0.000)	1.766*** (0.000)	0.601*** (0.000)	0.670*** (0.000)	0.698*** (0.000)	0.729*** (0.000)
Compensation: CEO	17.926*** (0.000)				13.080 (0.002)			
Compensation: All executives		11.540*** (0.000)				8.496*** (0.003)		
Ownership: CEO			0.666*** (0.000)				0.495*** (0.001)	
Ownership: All executives				0.771* (0.089)				0.347*** (0.437)
Log size	-0.070*** (0.000)	-0.077*** (0.000)	-0.080*** (0.000)	-0.082*** (0.000)	-0.059*** (0.000)	-0.063*** (0.000)	-0.066*** (0.000)	-0.067*** (0.000)
Market-to-book	0.000 (0.957)	0.000 (0.978)	0.000 (0.815)	0.000 (0.884)	0.000 (0.546)	0.000 (0.544)	0.000 (0.390)	0.000 (0.444)
R-square	0.056	0.055	0.059	0.056	0.041	0.040	0.042	0.040

Table 6. 2SLS regressions of variance gap of cash-flow and expected-return news on managerial compensation and ownership

The table shows the results of a second-stage regression of a 2SLS procedure. In the first stage we run regressions of compensation and ownership on instrumental variables: CEO tenure for CEO compensation and ownership, and average age of all executives for all executives' compensation and ownership. These regressions generate predicted values of CEO and all executives' compensation and ownership. In the second stage we run similar regressions to those reported in Table 5, while replacing the observed managerial compensation and ownership with the predicted values. The coefficients and *p*-values (based on standard errors clustered by individual firms) of the second-stage regression are reported below. *, **, *** indicate significance at 10%, 5%, and 1%, respectively. The results are based on 20,516 firm-years over 1992-2008.

	Actual values				Industry-adjusted values			
Intercept	1.652*** (0.000)	1.657*** (0.000)	1.786*** (0.000)	1.748*** (0.000)	0.669*** (0.000)	0.635*** (0.000)	0.751*** (0.000)	0.711*** (0.000)
Compensation: CEO	16.820*** (0.000)				12.549*** (0.006)			
Compensation: All executives		12.971*** (0.000)				9.833*** (0.001)		
Ownership: CEO			0.790*** (0.000)				0.628*** (0.000)	
Ownership: All executives				0.752 (0.125)				0.281 (0.557)
Log size	-0.076*** (0.000)	-0.075*** (0.000)	-0.085*** (0.000)	-0.081*** (0.000)	-0.064*** (0.000)	-0.061*** (0.000)	-0.070*** (0.000)	-0.066*** (0.000)
Market-to-book	0.000 (0.970)	0.000 (0.881)	0.000 (0.865)	0.000 (0.810)	0.000 (0.757)	0.000 (0.631)	0.000 (0.646)	0.000 (0.596)
R-square	0.061	0.051	0.066	0.052	0.046	0.036	0.049	0.037

Table 7. Variance decomposition by industry regulation and homogeneity

The table shows the variance decomposition structures separately for firms in regulated and unregulated industries, and in homogeneous and heterogeneous industries. Regulated industries include public utilities (SIC code 49), airlines and railroads (SIC codes 40-47), and financial institutions (SIC codes 60-69), and unregulated industries include all other SIC codes. Homogeneous industries include two-digit codes with degree of industry homogeneity higher than the median, and heterogeneous industries those with degree lower than the median. The degree of homogeneity is measured using Parrino's (1997) proxy of industry homogeneity, based on the average of the correlations between the firm-specific returns and the industry-index return. The results are based on 9,403 firms over 1992-2008.

| | Regulated industries (# firms = 2,565) | | | | Unregulated industries (# firms = 6,838) | | | |
| | Level | | % of V(ur) | | Level | | % of V(ur) | |
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
V(ur)	1.045	0.628	1.000	1.000	2.860	2.510	1.000	1.000
Se	(0.024)	(0.017)	-	-	(0.023)	(0.029)	-	-
V(Ncf)	1.040	0.479	0.837	0.806	3.085	2.600	1.022	1.002
Se	(0.029)	(0.021)	(0.008)	(0.011)	(0.029)	(0.034)	(0.004)	(0.004)
V(Ner)	0.239	0.123	0.346	0.219	0.384	0.174	0.173	0.078
Se	(0.008)	(0.004)	(0.007)	(0.008)	(0.007)	(0.004)	(0.003)	(0.002)
-2Cov	-0.235	-0.026	-0.183	-0.058	-0.609	-0.183	-0.195	-0.091
Se	(0.015)	(0.006)	(0.009)	(0.010)	(0.000)	(0.011)	(0.005)	(0.005)

| | Homogeneous industries (# firms = 4,130) | | | | Heterogeneous industries (# firms = 2,467) | | | |
| | Level | | % of V(ur) | | Level | | % of V(ur) | |
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
V(ur)	1.579	1.070	1.000	1.000	2.973	2.669	1.000	1.000
Se	(0.028)	(0.029)	-	-	(0.029)	(0.038)	-	-
V(Ncf)	1.627	0.983	0.915	0.891	3.224	2.752	1.027	1.011
Se	(0.035)	(0.036)	(0.008)	(0.009)	(0.037)	(0.044)	(0.005)	(0.005)
V(Ner)	0.300	0.155	0.262	0.154	0.386	0.172	0.161	0.072
Se	(0.010)	(0.005)	(0.006)	(0.006)	(0.009)	(0.006)	(0.003)	(0.003)
-2Cov	-0.348	-0.055	-0.178	-0.057	-0.636	-0.196	-0.188	-0.089
Se	(0.020)	(0.010)	(0.008)	(0.009)	(0.000)	(0.015)	(0.006)	(0.006)

Table 8. Value of managerial discretion for cash flows and expected returns
Each month we sort all firms independently into five equal-sized groups by size and into five equal-sized groups by market-to-book ratio, both as of the beginning of the month. Within each of the 25 size/value groups, we sort all firms into five equal-sized quintiles by CEO compensation and ownership (both in actual values and when adjusted to the two-digit code industry-year median). The table shows the means of the firm-month cash-flow and expected-return news, as defined in Equations (6) and (7), for the five compensation/ownership quintiles (standard errors are in parentheses). The last column shows the difference between the top and the bottom compensation/ownership quintiles. *, **, *** indicate that the difference is significant at 10%, 5%, and 1%, respectively. The results are based on 282,445 firm-months over 1992-2008.

	Low	CEO compensation			High	High-Low
Cash-flow news	-0.323	-0.259	-0.220	-0.159	0.248	0.571***
Se	(0.050)	(0.050)	(0.052)	(0.052)	(0.053)	(0.073)
Expected-return news	-0.090	-0.101	-0.114	-0.150	-0.165	-0.075***
Se	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)	(0.028)
	Low	Ind-adj CEO compensation			High	High-Low
Cash-flow news	-0.498	-0.165	-0.158	-0.079	0.178	0.675***
Se	(0.053)	(0.052)	(0.051)	(0.050)	(0.052)	(0.074)
Expected-return news	-0.093	-0.060	-0.108	-0.169	-0.191	-0.098***
Se	(0.020)	(0.020)	(0.019)	(0.019)	(0.020)	(0.028)
	Low	CEO ownership			High	High-Low
Cash-flow news	-0.288	-0.256	-0.107	-0.099	-0.080	0.208***
Se	(0.057)	(0.050)	(0.052)	(0.052)	(0.055)	(0.079)
Expected-return news	-0.119	-0.160	-0.147	-0.120	-0.096	0.023
Se	(0.021)	(0.020)	(0.020)	(0.021)	(0.020)	(0.028)
	Low	Ind-adj CEO ownership			High	High-Low
Cash-flow news	-0.213	-0.234	-0.245	-0.059	-0.076	0.136***
Se	(0.056)	(0.053)	(0.050)	(0.052)	(0.055)	(0.052)
Expected-return news	-0.150	-0.104	-0.190	-0.105	-0.095	0.055
Se	(0.021)	(0.020)	(0.020)	(0.021)	(0.020)	(0.068)

Table 9. Robustness tests

The table replicates the regressions in Table 5 using different measures, where only the coefficients and *p*-values (based on clustered standard errors) of the compensation/ownership measures are reported. The first set of columns shows regression results using the natural log of compensation and ownership. The second set of columns shows the results basing the variance decomposition estimates on the net payout yield instead of dividend yield in the VAR system; the net payout is defined as the dividend plus equity repurchase, net of equity issuance. The third set of columns shows results when the dependent variable is the gap between the cash-flow and expected-return variance ratio in the subsequent three years. The last set of columns shows regression results with fixed two-digit code industry and year effects. *, **, *** indicate significance at 10%, 5%, and 1%, respectively. The results are based on 24,189 firm-years over 1992-2008.

	Log(comp/own)		Net payout in VAR		3-year variance ratio		Fixed effects	
	Actual values	Ind-adjusted	Actual values	Ind-adjusted	Actual values	Ind-adjusted	Actual values	Ind-adjusted
Compensation: CEO	18.050***	13.157***	11.102***	7.296***	15.629***	10.666**	11.041**	11.717***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.002)	(0.034)	(0.012)	(0.009)
Compensation: All executives	11.763***	8.639***	7.044***	4.918***	11.310***	7.679*	6.153**	6.567**
	(0.000)	(0.003)	(0.000)	(0.000)	(0.010)	(0.075)	(0.037)	(0.031)
Ownership: CEO	0.778***	0.579***	0.123**	0.076	0.723***	0.515***	0.603***	0.602***
	(0.000)	(0.001)	(0.030)	(0.163)	(0.000)	(0.001)	(0.000)	(0.000)
Ownership: All executives	0.963**	0.483	0.140	0.016	0.854*	0.354	0.563	0.547
	(0.048)	(0.314)	(0.231)	(0.892)	(0.088)	(0.475)	(0.232)	(0.248)

Figure 1. Cash-flow and expected-return variance ratios by managerial compensation and ownership

All firms are classified into five equal-sized groups, based on time series average of CEO and all executives' compensation and ownership. The left-hand boxes are based on actual values and the right-hand boxes on adjustment to industry-year medians, based on two-digit SIC code. The figures report the averages of the ratios of variances of cash-flow and expected-return news to the variance of unexpected return: V(Ncf)/V(ur) and V(Ner)/V(ur), respectively. The results are based on 2,363 firms over 1992-2008.
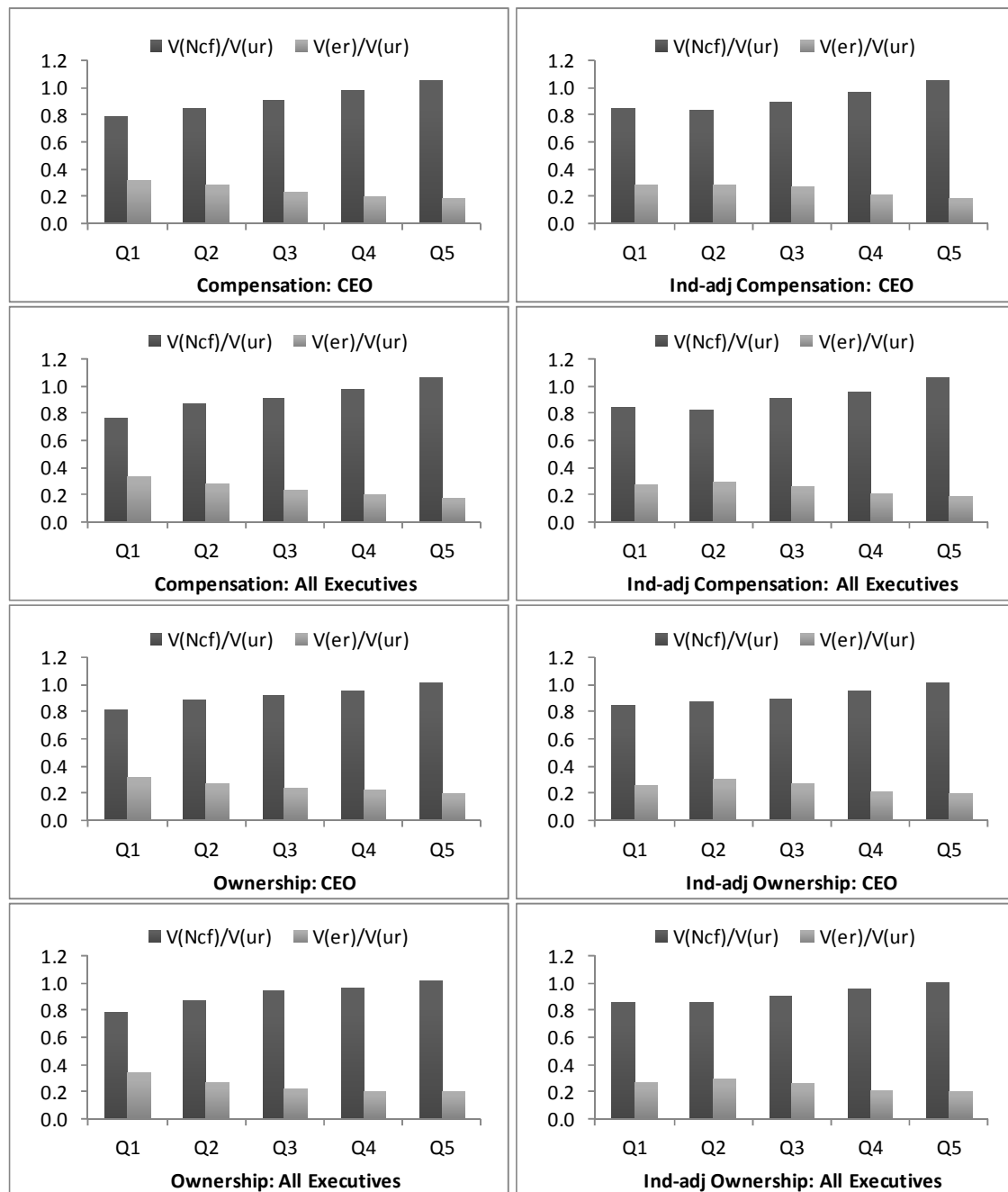
Figure 2a. Cumulative cash-flow and expected-return news by CEO compensation
Each month we sort all firms independently into five equal-sized groups by size and into five equal-sized groups by market-to-book ratio, both as of the beginning of the month. Within each of the 25 size/value groups, we sort all firms into five equal-sized quintiles by CEO compensation. The figure shows the cumulative average cash-flow and expected-return news of the top quintile (high CEO compensation) and the bottom quintile (low CEO compensation) over the sample period. The results are based on 282,445 firm-months.
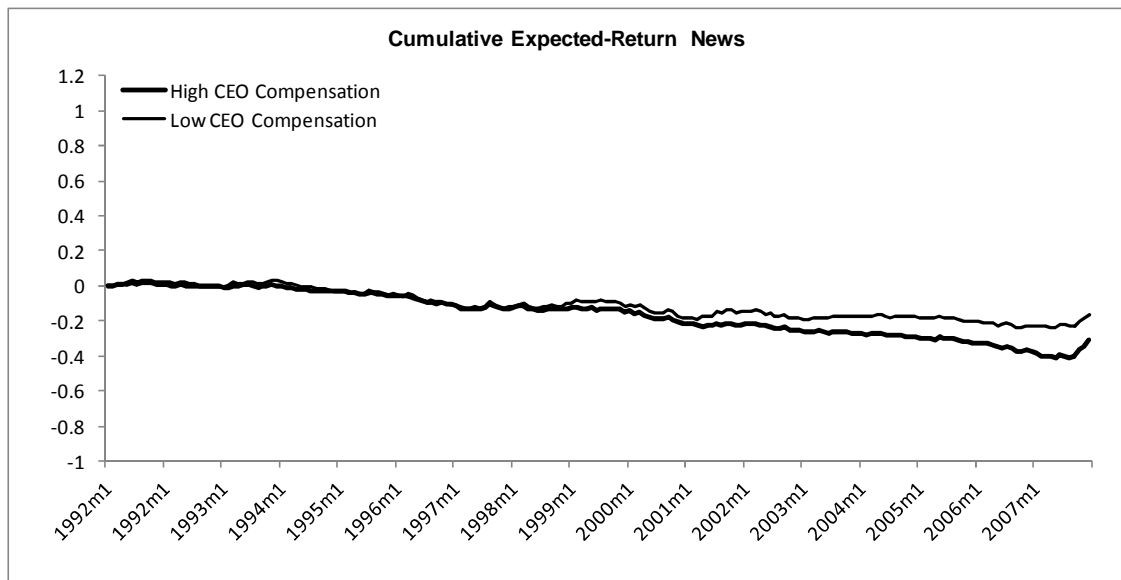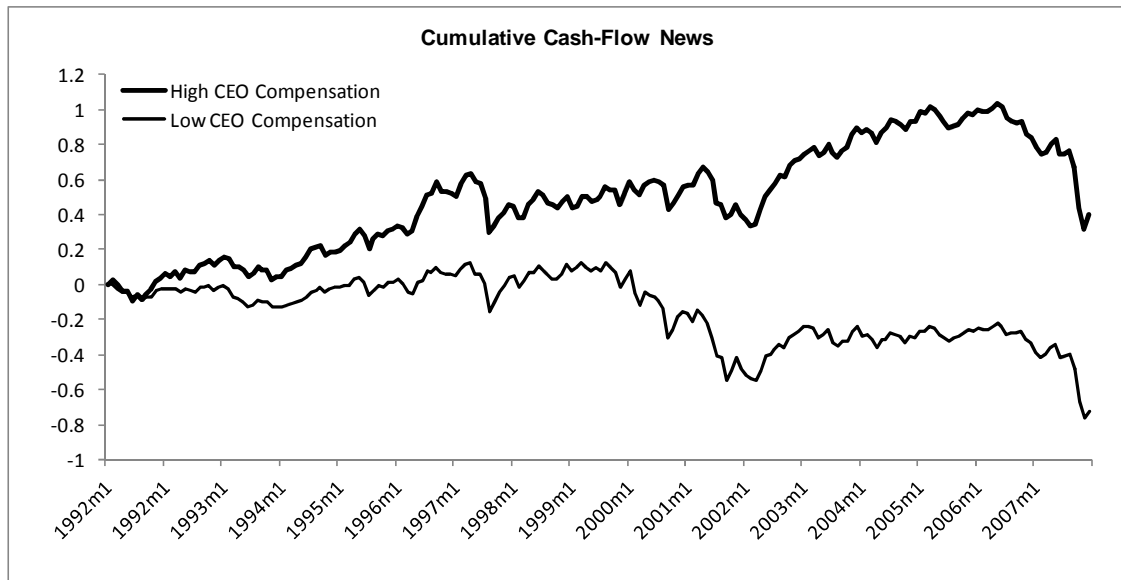

Cumulative Cash-Flow News

Cumulative Expected-Return News

Figure 2b. Cumulative cash-flow and expected-return news by CEO ownership

Each month we sort all firms independently into five equal-sized groups by size and into five equal-sized groups by market-to-book ratio, both as of the beginning of the month. Within each of the 25 size/value groups, we sort all firms into five equal-sized quintiles by CEO ownership. The figure shows the cumulative average cash-flow and expected-return news of the top quintile (high CEO ownership) and the bottom quintile (low CEO ownership) over the sample period. The results are based on 282,445 firm-months.