The Declining Information Content of Dividend Announcements and the Effect of Institutional Holdings

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Abstract

We propose an explanation for the “disappearing dividend” phenomenon: the decline in the information content of dividend announcements. This reduces the propensity of firms to pay or increase dividends, since dividends are costly. The decline in the information content of dividend, is partly because of the rise in stockholding by institutional investors that are more sophisticated and informed. Our results show a decline in the stock price reaction to announcements of dividend changes since the mid 1970s. Across firms, the price reaction to dividend news is smaller in firms with high institutional holdings. Institutional investors exploit their superior information by buying before dividend increases and selling afterwards. And, firms with high institutional holdings are less likely to raise dividends.

1. Introduction

The phenomenon of the "disappearing dividend" has three aspects. Fama and French (2001) find that companies are less likely now to pay dividends. Grullon and Michaely (2002) document a decline in both the dividend payout ratio and in the dividend yield. And, Allen and Michaely (2003) document that the number of firms that announce dividend increases has declined since 1978.

We propose that a possible reason for the disappearing dividend is the decline in the information content of dividend announcements. It is well known that stock price reaction is positively correlated with dividend changes announced by firms (see Aharony and Swary, 1980 and a survey in Allen and Michaely, 2003). The use of dividends as a means of signaling entails cost of shortfall in resources (Bhattacharya, 1979), higher tax (John and Williams, 1985) and suboptimal investment (Miller and Rock, 1985). These costs are necessary to produce signaling equilibrium.[1] The positive reaction of stock prices to dividend increase announcements, in spite of the higher cost of dividends, reflects the positive information about the firm value that these announcements convey.

We find that since the mid 1970s, there is a decline in the reaction of stock prices to announcements of dividend changes, both in terms of abnormal stock return and volatility before the announcements. This suggests that these announcements convey less information. Given that dividend signaling is costly, firms are less likely to use dividends as means to convey information, which explains the "disappearing dividend" phenomenon.

[1] Altogether, Black (1976) considers payment of dividends a puzzle because they are subject to higher taxes than cash distribution by means of stock repurchase, except for a brief period in the late 1980s-early 1990s.

We further propose that the declining information content of dividend announcements, which reflects a decline in the asymmetry of information about firm values, is due to investors being more informed. It is easier to obtain information about firms due to advances in information technology and to information provided by analysts. Our focus in this paper is on institutional investors, which are considered more informed and sophisticated. It is also well known that their stock holdings have increased over time. We examine the relationship across firms between institutional ownership and dividends and find the following. First, the information content of dividend increase announcements is a declining function of the firms' institutional holdings. Our findings also show that institutional investors exploit the favorable information they have about firms well before the firms announce that they raise dividends. Second, there is a smaller likelihood of dividend increase in firms with high institutional holdings. This suggests that the phenomenon of disappearing dividends over time is associated with the increase over time in institutional holdings, as part of the overall increase in stock ownership by more informed investors.

Another explanation for the disappearance of dividends is offered by Baker and Wurgler's (2002) "catering theory of dividend." Dividend payment by firms responds to investor demand for dividends proxied by the dividend premium, the difference between the market-to-book ratios of dividend payers and non-payers in a given year. Their evidence is consistent with this theory.

The paper proceeds as follows. In Section 2, we present the evidence on the decline in the information content of dividend announcements over time. In Section 3, we relate the information effect of dividend and firms' propensity to raise dividends to the level of institutional ownership. We summarize the results in Section 4 and offer some concluding remarks.

2. Stock price reaction to dividend announcements

Dividend surprises are known to affect stock prices. The evidence shows that stock abnormal returns at the announcements of dividend changes are positively correlated with these changes (Aharony and Swary, 1980). The signaling theory suggests that this effect of dividend change announcements on stock prices reflects information about future firm value. In this section, we estimate the stock price reaction to dividend change announcements and present evidence that it declines over time.

2.1 Sample selection

The sample is drawn from all dividend announcements in the CRSP daily file for NYSE\AMEX stocks, starting in July 1962. The selection criteria satisfy the following:

1. The firm is not in the financial service sector (SIC code from 6000 – 6999) or in the public service (utility) sector (4900-4999).
2. The shares on which the dividends are paid are ordinary common shares of U.S.-incorporated companies. Excluded are closed-end funds, REITs, stock certificates and ADRs.
3. The distribution is a regular quarterly cash dividend paid in U.S. dollars (distribution code 1232). Excluded are dividends defined as special, year-end,

interim or non-recurring and dividends paid at other frequencies or in foreign currency. Also excluded are dividend initiations and resumptions.

4. The dividend announcement must have a valid announcement date.
5. There is no announcement of other distributions in a 30-day window (days -15 to 15 day surrounding the announcement).[2]
6. Excluded are dividend changes that (a) result from mergers or acquisitions, stock splits, and other events that adjust prices, and (b) are smaller than 0.5% of the previous dividend, in order to avoid dividend changes that may be recorded due to rounding errors.

Criteria 1- 5 result in 175,658 dividend announcement events. We focus in this study on announcements of dividend *changes*, whose number is much smaller. Given data availability and satisfying criterion 6, we obtain 16,189 events of dividend changes: 14,911 dividend increases and 1,278 dividend decreases.

To test the time trend of the information content of dividend announcements, we partition the sample over time in two ways: three equal subperiods of thirteen years each and eight subperiods of five years each (except for the first period, 1962-1965). In the figures, we present year-by-year results over the entire sample period.

2.2 Data Definition

The variables for each event of dividend change are constructed as follows.

1. *CAR* is the cumulative abnormal return obtained by summing the abnormal returns over 2 days, days 0 and +1 (day 0 is the dividend announcement day). The abnormal return for each day equals the stock return minus the return on the size-

based portfolio of the decile of stocks to which the stock belongs.[3] The abnormal return is obtained from the daily CRSP file. We also consider *CAR10* and *CAR13* that are, respectively, the cumulative abnormal returns over days -11 to -2 and days -11 to +1 (that is, including the dividend announcement day).

2. *DDIVY*, the change in dividend yield. *DDIVY* =4·[*DIVAMT*of current quarter – *DIVAMT* of previous quarter]/*P*. *DIVAMT* is the dollar quarterly dividend per share (adjusted for stock dividends and splits by the CRSP price-adjusting factor). *P* is the price at the end of the month that precedes the month when the dividend is announced. We eliminate cases where |*DDIVY*| > 0.20 (for example, an increase in the dividend yield from 1% to 21%), which eliminates 6 cases (out of 15,865).

3. *LTYLD*, the long-term dividend yield, is the sum of *DIVAMT* paid over a 12-month period ending in the month prior to the month of the dividend announcement, divided by the average stock price during the 3-month period immediately prior to the beginning of the 12-month period (using end-of-month prices). This ratio is then deflated by 1+return on the S&P 500 index for the same 12-month period to adjust for market-wide stock price movements. (This follows the procedure suggested in Christensen and Prabhala (1995).)

4. *SIZEN* is the firm's stock value (in logarithm) as of the last month prior to the month of the dividend announcement, normalized by the S&P 500 index where the base is the value of the S&P 500 index at the beginning of the study period (July 1962).

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[2] This follows Christensen and Prabhala (1995).

5. *VOLDIV*, the dividend-related volatility before the announcement, is the standard deviation (in logarithm) of the daily excess returns over 20 days, day -21 to -2 (day 0 is the dividend announcement day).
6. *LTVOL*, the long-term return volatility before the dividend announcement, is the standard deviation (in logarithm) of monthly excess returns over months -24 to -1.

2.3 Stock price reaction to dividend changes over time

We examine whether there is a trend over time in the stock price reaction to dividend change announcements, measured by *CAR*. Table 1 documents the values of *CAR* over the sample period for both dividend increases and dividend decreases. Consistent with earlier studies, the mean *CAR* is positive, +0.83%, and highly significant for dividend increases and negative, –4.54%, and highly significant for dividend decreases.

INSERT TABLE 1

The new results here are the decline over time in *CAR*. In each 13-year subperiod, the (absolute) mean *CAR* is smaller than in the previous subperiod. The decline in the (absolute) mean *CAR* is statistically significant, as indicated by the *t*-statistic *Tdif*, which tests the difference between the mean *CAR* in one subperiod and the mean *CAR* in the preceding subperiod. For dividend increases, *CAR* declines from 1.17% to 0.94% to 0.44%. For dividend decreases, *CAR* rises from –6.43% to –4.29% to –2.63%. In both dividend increases and decreases, the pattern of the median *CAR* is similar to that of mean *CAR*.

[3] We replicate the analysis using abnormal returns relative to CRSP beta-based portfolio. The results are qualitatively similar.

Table 1 also presents a finer partition of the sample period into 8 subperiods. For dividend increases, *CAR* peaks in the period 1971-1975 and declines thereafter, although the decline is not monotonic. The significant decline occurs during the three five-year subperiods between 1976 and 1990. For dividend decreases, mean *CAR* increases after 1966. The median *CAR* show the same pattern as that of the mean *CAR*.

INSERT FIGURE 1

The pattern of decline over time in the (absolute) mean *CAR* is shown in Figure 1. We plot CAR_y, the mean *CAR* in year *y*, over the years 1962 to 2000. The figure shows that the absolute CAR_y generally declines over time after peaking in the mid-1970s. A five-year moving average shows a trend of decline in (absolute) CAR_y over the years. To test the time trend of CAR_y, we estimate the following models where CAR_y is a function of *y*, *y* = 1962, 1963, …., 2000.

(a) For dividend increases:

$$CAR_y = \underset{(4.85)}{0.43} - \underset{(4.79)}{0.0002}\cdot y \qquad R^2 = 0.34 \tag{1}$$

(b) For dividend decreases:

$$CAR_y = \underset{(2.50)}{-2.63} + \underset{(6.80)}{0.0013}\cdot y \qquad R^2 = 0.49 \tag{2}$$

The results show a significant[4] decline over the years in the stock price reaction to announcements of changes in dividend yield.

The pattern over time of CAR_y for dividend increases resembles the pattern over time of the number of companies that announce dividend increases, documented by Allen and Michaely (2003) for the years 1971 to 2001. The number of annual dividend

[4] The standard errors are estimated using the Newy-West (1987) method with MA=2.

increases rises from 1971, peaks in 1978 and declines thereafter. The decline is the greatest during the 1980s. This pattern closely matches the pattern over time of CAR_y. Baker and Wurgler (2002) also show a turning point in firms' propensity to pay dividends after 1978, which again is consistent with our documented pattern of CAR_y. It seems that the decision by companies on dividend increases, and their propensity to pay dividends, are positively correlated over time with the price reaction to dividend increases. This is consistent with our proposition that the disappearing dividend results, at least in part, from the decline in the information content of dividend increase announcements.

The examination of the market abnormal return in a two-day window, days 0 and 1, assumes that there is no available information about the change in dividend before its formal announcement. If information about the dividend change is available to the market before the formal announcement, then the cumulative abnormal return before the announcement should exhibit the same pattern as the one observed for *CAR*. Consider two measures of cumulative abnormal return: *CAR10* and *CAR13*, the cumulative abnormal return over days –10 to –1 and over days –10 to +1, respectively. We calculate their mean over the three consecutive subperiods as we did with *CAR*.

INSERT TABLE 2

The results in Table 2 show that the mean *CAR10* is positive and significant for dividend increases and negative and significant for dividend decreases. This suggests that prior to the dividend announcement day, the market has information that is positively related to the information released by the dividend change. As in Table 1, (absolute) *CAR10* declines over time, with the decline being particularly strong for dividend increases. The results in Table 2 for *CAR13* that includes the event day are similar to those observed in Table 1 for both dividend increases and dividend decreases. The results in Table 2 thus lend further support to our proposition that the information content of dividend announcements declines over time.

2.4 Price reaction to the magnitude of dividend changes

We estimate the response of *CAR* to the information in the magnitude of change in dividends, and then examine whether this response declines over time. We estimate the following model across dividend announcements, indexed by *j*:

$$CAR_j = \alpha_0 + \alpha_1 DDIVY_j + \alpha_2 SIZEN_j + \alpha_3 LTYLD_j + e_j \,. \qquad (3)$$

$DDIVY_j$ is the change in dividend yield. The coefficient α_1 is the dividend response coefficient, which measures the stock price reaction per unit of change in dividend yield. If the magnitude of the dividend change is informative, we should obtain $\alpha_1 > 0$. The two other variables are included as controls. The coefficient of $SIZEN_j$ should be negative, since large firms usually receive more market attention by analysts and investors and therefore the information contained in dividends should be partially known by the time the dividend is announced. The coefficient of $LTYLD_j$ is expected to be positive because dividends are more informative of value in high dividend-paying firms which have lower growth prospects, and because the surprise of dividend increase in such firms is greater (see Christensen and Prabhala, 1995).

If the information content of the magnitude of dividend changes is declining, we should observe that the dividend response coefficient α_1 declines over time. To estimate the changes in α_1 over time we modify model (3) as follows:

$$CAR_j = \alpha_0 + \sum_{s=1}^{S} \alpha_{0s} DUM_s + \sum_{s=1}^{S} \alpha_{1s} DUM_s \cdot DDIVY_j + \alpha_1 DDIVY_j$$
$$+ \alpha_2 SIZEN_j + \alpha_3 LTYLD_j + e_j \ . \qquad (4)$$

DUM_s equals 1 in period s and zero otherwise, where s is an index of the time period. We again present two sets of results that correspond to two breakdowns of the sample period. First we examine three subperiods of 13 years each, 1962-1974, 1975-1987, 1988-2000, in which case $S = 2$. The second breakdown is into 8 subperiods of 5 years each, except the first which is of four years: 1962-1965, 1966-1970, … 1996-2000; then, $S = 7$. In model (4), α_{1s} measures the difference between the effect of $DDIVY_j$ on CAR_j in subperiod s relative to that effect in the last subperiod, estimated by α_1. For example, the dividend response coefficient in subperiod $s = 1$ is $\alpha_{11} + \alpha_1$. Then, the t-statistic of α_{1s} tests whether the dividend response coefficient is subperiod 1, $\alpha_{11} + \alpha_1$, is greater than the dividend response coefficient α_1 in the last subperiod, which is the most recent.

INSERT TABLE 3

The hypothesis tested by model (4) is as follows. If the news on the magnitude of dividend changes becomes less informative over time, the dividend response coefficients α_{1s} should be positive and declining in s. The results in Table 3 support this hypothesis. The coefficients α_{1s} in both models are all positive, meaning that α_1 is larger in earlier subperiods than it is in the last subperiod. In Panel A for dividend increases, the coefficients α_{11} and α_{12} are both positive and highly significant but they are of approximately the same magnitude. That is, the dividend response coefficient is about the same in the first two subperiods and is lower in the last, the decline being large and statistically significant. For dividend decreases, the coefficients α_{1s} are positive and decline over the two subperiods, as expected. Panel B presents estimations for shorter subperiods. For dividend increases, the coefficients α_{1s} generally decline over time, although not monotonically. The pattern is similar for dividend decreases.[5]

INSERT FIGURE 2

Next, we do a year-by-year estimation of model (3) and obtain yearly estimates of the coefficient α_1, denoted α_{1y}, y = 1963, ..., 2000.[6] These coefficients are depicted in Figure 2. The annual model is estimated only for dividend increases, since the sample for dividend decreases is too small in some years. Figure 2 also presents a five-year moving average of the coefficients. The pattern is similar to that obtained from the estimations in Table 3: the dividend response coefficient α_{1y} generally declines over time. We estimate a regression model of the dividend response coefficient on a time trend variable:

$$\alpha_{1y} = \underset{(2.50)}{47.99} - \underset{(2.42)}{0.024}\cdot y \qquad R^2 = 0.07 \qquad (5)$$

The coefficient of y is negative and significant.[7] The results thus show a declining trend in the price reaction to announcements of increases in dividend yield.

2.5 Return volatility around dividend announcements

Dividend changes are events with information flow that has a significant effect on stock return volatility. Kalay and Lowenstein (1985) find a rise in volatility during the time of dividend announcements, which reflects public information. It is reasonable to assume that the volatility just before the dividend announcement reflects private information released by informed traders. If the information content of dividends

[5] We also estimated model (4) replacing $DDIVY_j$ by a variable that estimates the dividend surprise from a Probit model of dividend changes as a function of some explanatory variable, as suggested by Prabhala (1997). The results are qualitatively the same as those reported for $DDIVY_j$. In particular, the coefficient α_{1s}, which measures the effect of dividend surprise on *CAR*, declines over time.

[6] Year 1962 is deleted because of very few observations. CRSP daily files started in the middle of that year.

announcements declines over time, it should also be reflected in a decline of the dividend-related volatility.

We examine whether there is a decline over time in the effect of $DDIVY_j$ on $VOLDIV_j$, the return volatility 20 days before the dividend announcement. Since most of the differences in volatility across stocks are unrelated to dividend announcements, we control for the stock long-term volatility $LTVOL_j$. (Both volatility measures are in logaritm.) We estimate the following model across stocks:

$$VOLDIV_j = \alpha_0 + \sum_{s=1}^{S} \alpha_{0s} DUM_s + \sum_{s=1}^{S} \alpha_{1s} DUM_s \cdot DDIVY_j + \alpha_1 DDIVY_j + \alpha_2 LTVOL_j + e_j \ . \tag{6}$$

If larger dividend changes (in absolute value) signify more new information, the return volatility before the dividend announcement should be an increasing function of the (absolute) dividend change. This implies the following regarding the coefficient α_1. For $DDIVY_j > 0$, we expect that $\alpha_1 > 0$ and for $DDIVY_j < 0$ we expect that $\alpha_1 < 0$. Of course, we expect that $\alpha_2 > 0$.

Our hypothesis that the information content of dividends declines over time implies the following hypotheses. For dividend increases, $\alpha_{1s} > 0$ and it *declines* over time. For dividend decreases, $\alpha_{1s} < 0$ and it *rises* over time. We present results for a three-subperiods breakdown.

INSERT TABLE 4

The results, presented in Table 4, are consistent with our hypothesis about the declining information content of dividend announcements. Dividend increase announcements had no information content in the last 13-year period, as implied by α_1

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[7] The standard errors are estimated using the Newy-West (1987) method with MA=2.

being practically zero. In earlier periods, there was greater volatility before dividend announcements. Both α_{11} and α_{12} are significantly positive and declining: $\alpha_{11} > \alpha_{12} > 0$. That is, the information content of dividend increase announcements declines over time. For dividend decreases, the results are again consistent with our hypothesis. $\alpha_1 < 0$ and in addition $\alpha_{11} < \alpha_{12} < 0$.

The results on the decline over time of volatility before dividend change announcements provide additional evidence that the information content of dividend news declines over time. If return volatility is a measure of asymmetric information and arrival of new information to the market before the formal announcement, our results show that the extent of this information is significantly lower recently compared to its level in the past. The question is why it is so. The next section offers an explanation.

3. Institutional investors and price reaction to dividend announcements

One possible reason for the decline in the reaction of stock prices to dividend announcements is the increased involvement of institutional investors in the stock market. There are two reasons why institutional investors should reduce the effect of dividend announcements on stock prices. Institutional investors are considered more informed since they expend more resources on collecting and processing information about companies.[8] They do so more than individual investors since they hold much larger blocks of stock, thus a given amount of information may produce greater benefit by applying to a greater size investment. Institutional investors enjoy economies of scale and professional expertise that give them lower marginal costs in acquiring information. And they can expend more resources on obtaining and analyzing corporate information than small investors can.

The information that institutional investors obtain about the firm enables them to trade on it before this information is conveyed to investors by the dividend announcement. They buy undervalued stocks and sell overvalued ones and thus affect their prices. Then, if a dividend serves as a signal about future value,[9] its usefulness as a means to convey information is lower when there is extensive institutional holding of the firm's stock. Indeed, Jiambalvo et al (2002) find that in firms with higher institutional holding, stock prices better reflect information about future earnings. This relationship may be endogenous if institutions prefer to invest in stocks with better disclosure, in which case the stock prices also will reflect more information about the firm. Healy et al (1999) find that firms that expand their disclosure attract additional institutional holdings. Chidambaran and John (2001) show that the presence of large shareholder monitoring is positively associated with managerial compensation contracts that provide incentives for greater voluntary disclosure of information. By this analysis, high institutional holding of a firm's stock indicates better information disclosure by the firm. This, in turn, diminishes the need for dividends as a means of conveying information in such firms.

A second effect of institutional investors is that some of them engage in active monitoring of the management or can potentially do so (Gillan and Starks, 2001). Easterbrook (1984) proposes that dividends enable better monitoring of management by

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[8] See, for example, Jennings, Schnatterly and Seguin (1997), Bartov, Radhakrishnan and Krinski (2000), Bushee and Noe (2000), Jiambalvo, Rajgopal, Venkatachalam (2002).

reducing the firm's free cash flow, which is one reason why stockholders welcome increases in dividend. If monitoring by large institutional investors can substitute for the monitoring role of dividends, the value of dividends is diminished in firms with large institutional holdings.

Over the last decades, institutional investors began to hold an increasingly larger share of the equity of public companies in the U.S. (see Gompers and Metrick, 2001). We propose that this increase in institutional holdings may explain in part the declining reaction of stock prices to dividend change announcements, which is documented in Section 2. However, the mere negative correlation over time between the two series – institutional holdings and price reaction to dividends – is insufficient to establish a causal relationship.

In this study, we do a cross-section analysis of the effects of institutional holdings on the reaction of stock prices to dividend announcements. Our hypothesis is that *the greater the institutional ownership, the smaller the reaction of stock prices to dividend news*. We follow this analysis by estimating the behavior of institutional investors before and after the announcements of dividend increases. Our hypothesis is that *institutional investors increase their holdings in companies with positive dividend news well before the announcement, and do not change or reduce their holdings after the announcement.* Finally, we examine the effect of institutional investors on the propensity of firms to raise their dividends. Our hypothesis is that *firms with greater institutional holdings are less likely to raise dividends*.

There is evidence that institutional ownership is negatively related to the information content of both dividends and earnings announcements. Alangar, Bathala

[9] Bhattacharya (1979), John and Williams (1985), Miller and Rock (1985).

and Rao (1999) find for a sample of extreme changes in dividends that the *absolute* abnormal stock return on the announcement day is negatively related to institutional ownership. Our study tests the effects of institutional holdings on the stock price response to dividend announcements using two measures: stock value change, measured by cumulative abnormal return (not its absolute value), and the return volatility immediately *before* the dividend announcement. Bartov et al (2000) find that abnormal stock returns at earnings announcements are negatively related to institutional ownership. One of our models produces similar results with respect to dividends.

3.1 Data and variable definitions

Our data on institutional holdings of stocks are based on the reports in Form 13F to the SEC. A 1978 amendment to the Securities and Exchange Act of 1934 requires all institutions with more than $100 million of securities under discretionary management to report their holdings to the SEC. Holdings are reported quarterly on the SEC's Form 13F. All common stock positions greater than 10,000 shares or $300,000 must be disclosed. Our data source is CDA/Spectrum (as provided by Thomson Financial), based on the Disclosure Database.[10] Throughout our paper, "institution" means "institution that files a 13F." Institutional investors include banks, insurance companies, investment companies (mutual funds), investment advisors,[11] pension funds and university endowment funds. Our data are the quarterly reports on institutional holdings from the second quarter of 1980 through the third quarter of 1998 excluding three quarters,

[10] In a comparative study of the reliability of ownership data from several databases, Anderson and Lee (1996) conclude that the ownership data on Disclosure Database ranks above its peers.
[11] Includes investment managers (usually in brokerage firms) holding less than 50% of their assets in mutual funds. See Gompers and Metrick (2001) for details.

4Q1993, 1Q1994 and 2Q1994, for which data are missing. In sum, our data on institutional holdings include 71 quarters.

To be included in the sample, a dividend change announcement must satisfy the conditions specified in section 2.1 above and must have valid institutional holding data for the company that makes the announcement. These criteria result in a sample of 7,212 dividend change announcements that include 4,910 dividend increases and 448 dividend decreases. Since the sample of dividend decreases is rather small for the tests that we conduct, we henceforth focus on dividend increases.

INSERT TABLE 5

The extent of institutional holdings is measured by $INST_j$, the proportion of shares outstanding owned by institutional investors in the firm that makes the dividend announcement j. Table 5 presents the mean and median of the annual average of $INST_j$ for firms that announce dividend increases, which are the focus of our analysis. The results show a clear trend of increase over time. The mean $INST_j$ almost doubles between 1980 and 1998 from 0.2901 to 0.5351, and the median $INST_j$ increases in a similar way. Institutional holdings are larger for stocks with greater market capitalization (size). The average of $Corr(INST_j, SIZEN_j)$, calculated for each quarter across the stocks in our sample, is 0.44, statistically significant. The positive correlation between $INST_j$ and $SIZEN_j$ is because of liquidity considerations and because of economies of scale in obtaining and processing information by institutions. Since large-size stocks are more liquid, institutions can have larger holdings in large stocks since it is easier for these large investors to divest when needed. And, for a given investment in information about a firm (and assuming that the cost of obtaining information increases less than proportionally with the firm's size), a larger holding provides a greater gain from information since the institution uses the information for a larger-size investment.

3.2 The effect of institutional holding on price reaction to dividend announcements

Our hypothesis is that larger institutional holdings reduce the price increases in response to dividend increase announcements. We test this hypothesis using two models. The first model is

$$CAR_j = \alpha_0 + a_1 DDIVY_j + a_2 INST_j + a_3 SP500_j + a_4 SIZEN_j + a_5 LTYLD_j + \sum_{n=1}^{70} a_{6n} QTR_{nj} + \sum_{m=1}^{56} a_{7m} IND_{mj} + e_j \,. \tag{7}$$

$INST_j$ is the proportion of institutional holdings in the firm, measured at the end of the quarter that precedes the quarter when the dividend increase announcement is made. $SP500_j$ is a dummy variable that equals 1 if the stock is included in the S&P 500 index. QTR_{nj} is a dummy variable that equals 1 if event j is in quarter n and zero otherwise, n = 1, 2, … 70 (our data include 71 quarters). IND_{mj} is an industry dummy variable that equals 1 if announcement j is in a firm that is classified in industry m, using two-digit SIC, and zero otherwise (our data include firms from 57 industries). The model is estimated for three measures of cumulative abnormal returns: CAR_j for days 0 to +1, $CAR10_j$ for days –11 to –2, and $CAR13_j$ for days –11 to +1, that is, including the announcement day.

Our hypothesis is tested by the coefficient a_2. We propose that the stock price reaction to dividend increase announcements, which is usually positive, is smaller in firms with large institutional holdings. This implies that $a_2 < 0$. The variable $SP500_j$ controls for the fact that high values of $INST_j$ in S&P 500 stocks do not imply that these stocks obtain the same institutional attention as do other stocks with the same *$INST_j$* that are not included in the S&P 500 index. This is because some institutional holdings in S&P 500[12] represent passive investments that do not induce the collection and analysis of information about the firm. Ideally, we would like to include in $INST_j$ only the *active* institutional holdings and exclude the passive ones, but this is infeasible. We therefore include in the model the dummy variable $SP500_j$.[13] We expect to obtain $a_3 > 0$.

The other variables are included as controls. We of course expect that $a_1 > 0$ since greater dividend increase leads to a greater stock price reaction. $SIZEN_j$ should have a negative effect, $a_4 < 0$, since large-value stocks receive greater attention by more investors and analysts and more information is available about them. Therefore, less new information about the firm is conveyed by the dividend announcement. The inclusion of $SIZEN_j$ prevents confounding of the effect of size with the effect of institutional holdings, given that institutional holdings and firm size are positively correlated. $LTYLD_j$, the long-term dividend yield, is included as a control variable since it is observed to affect abnormal returns at dividend announcements (Christensen and Prabhala, 1995).

INSERT TABLE 6

Our hypothesis that high institutional holdings reduce the dividend announcement effect on prices is strongly supported by the estimation results of model (7), presented in Table 6, Panel A. The coefficient of $INST_j$, a_2, is *negative* and significant for all three measures of cumulative abnormal return, *CAR*, *CAR10* and *CAR13*. Also, a_3 is *positive* and significant, as expected. By the time the dividend increase is announced, most of the

[12] See Bushee and Noe (2000).

[13] We also examine an alternative specification of model (7) where the variable $SP500_j$ is replaced by $INST_j\ SP500_j$. The interpretation of the coefficient here is similar: if a stock is included in the S&P 500

information that it conveys is already included in the stock prices of companies with high institutional holdings.

The second test of our hypothesis examines the effect of institutional holdings on the dividend response coefficient, which measures the reaction of stock price to the magnitude of the dividend increase. We estimate the following model:

$$CAR_j = b_0 + b_1 DDIVY_j + b_2 DDIVY_j \cdot INST_j + b_3 DIVY_j \cdot SP500_j + b_4 SIZEN_j + b_5 LTYLD_j + \sum_{n=1}^{70} b_6 QTR_{nj} + \sum_{m=1}^{56} b_7 IND_{mj} + e_j \,, \tag{8}$$

By our hypothesis that institutional holdings reduce the dividend response coefficient we should obtain that $b_2 < 0$. If there are institutional holdings of S&P 500 stocks which are passive, we should obtain $b_3 > 0$.

The estimation results of model (8), presented in Table 6, Panel B, again support our hypothesis. We obtain that b_2 is negative and significant for *CAR* and *CAR13* and negative but insignificant for *CAR10* (the pre-announcement *CAR*). In addition, b_3 is positive and significant for *CAR* and *CAR13* and positive but insignificant for *CAR10*. We thus conclude that, as hypothesized, there is a smaller effect of dividend increase announcements on stock prices in firms with high institutional holdings.

3.3 Institutional holdings and return volatility before dividend announcements

The return volatility just before the dividend announcement reflects in part arrival of new private information about the upcoming event. We propose that in firms with high institutional holdings, the information conveyed by the dividend news is already incorporated in the stock price by the time of the announcement. It follows that return

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index, then the effect of $INST_j$ on CAR_j should be less negative, i.e., the coefficient of $INST_j\ SP500_j$ is volatility soon before the dividend announcement should be a decreasing function of institutional holdings. This is the hypothesis tested in this section. We estimate the following model:

$$VOLDIV_j = c_0 + c_1 DDIVY_j + c_2 INST_j + c_3 SP500_j + c_4 SIZEN_j + c_5 LTYLD_j + c_6 LTVOL_j + \sum_{n=1}^{70} c_{7n} QTR_{nj} + \sum_{m=1}^{56} c_{8m} IND_{mj} + e_j \,. \qquad (9)$$

$VOLDIV_j$ is the standard deviation of daily excess returns just *before* the dividend increase announcement, days –21 to –2, and $LTVOL_j$ is the long-term volatility, measured as the standard deviation of monthly excess return over months -1 to -24. Model (9) estimates the effect of $INST_j$ on stock return volatility before the dividend announcement, controlling for the stock's normal volatility $LTVOL_j$. Thus, the estimated effect of $INST_j$ on $VOLDIV_j$ in this model does not reflect the risk preference of institutional investors, which is measured by the covariance between $INST_j$ and $LTVOL_j$ in the multiple regression. The model also includes as controls the variables $SIZEN_j$ and $LTYLD_j$, which are correlated with $INST_j$.

By our hypothesis that high institutional holdings reduce the asymmetry in information or new information just prior to the dividend announcement, we should obtain $c_2 < 0$. We also expect that $c_3 > 0$ if there are passive institutional holdings of S&P 500 stocks. The estimation results of model (9), presented in Table 7, support our hypothesis: c_2 is negative and significant. In addition, c_3 is positive and significant (by a one-tail test).

INSERT TABLE 7

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positive. These are indeed the results that we obtain.

These results help distinguish between two explanations of the negative effect of institutional holdings on the stock price reaction to dividend increase announcements. One explanation is the new information that would be conveyed by the dividend news is already incorporated into the stock price of firms with high institutional holdings by the time of the announcement. Another explanation is that if institutions monitor corporate managers, the disciplining role of dividends is smaller in firms with high institutional holdings. Our findings on the negative relationship between institutional holdings and return volatility prior to dividend announcements is consistent with the first explanation, since return volatility reflects in part asymmetric information.

3.4 Trading by institutional investors around dividend increase announcements

The results so far are consistent with the proposition that institutional investors obtain positive information about the firm well before the dividend increase is announced. By the time of the announcement, this information is already incorporated in the stock price; hence the smaller price reaction to the news. It follows that institutions may be trading on their favorable information well before it is made public. We now test this hypothesis.

Institutional investors that have early information about the good news that is conveyed by the dividend increase may want to increase their holdings in the firm before the information becomes public. After the dividend announcement, they may either hold on to the stock, in which case they earn normal returns, or divest it and move on to another investment where they can exploit their advantageous information. Since nearly all institutional investors cannot borrow,[14] they must divest some investments if they wish to increase their holdings in other, more advantageous investments.

Specifically, we therefore hypothesize the following. Before the dividend increase announcement, institutional investors increase their holdings in the firms that will increase dividends. After the announcement, they either leave unchanged or reduce their holdings in these firms. We test this hypothesis by the following model:

$$\Delta INST_{j,q} = d_0 + d_1 INST_{j,0} + d_2 SP500_j + d_3 SIZEN_j + d_4 LTYLD_j + d_5 LTVOL_j + \sum_{n=1}^{70} d_{6n} QTR_{nj} + \sum_{m=1}^{56} d_{7m} IND_{mj} + e_j\,, \qquad (10)$$

$\Delta INST_{j,q}$ is the net change in institutional holdings of stock j in quarter q, $\Delta INST_{j,q} = INST_{j,q} - INST_{j,q-1}$. We estimate the model separately for each of the quarters $q = -2$ to $q = +1$, where $q = 0$ is the quarter during which the dividend increase announcement is made. By our hypothesis we expect the following:

(i) 0 for $q = -2$ and $q = -1$, during which the institutions increase their holdings in anticipation of good news about the firm, and

(ii) $d_1 \leq 0$ for $q = 0$ and $q = +1$. After the dividend announcement, the institutional investors no longer have dividend-related information advantage. They either hold on to their investment, implying $d_1 = 0$, or they divest and switch to other investments, in which case $d_1 < 0$.

The other variables are expected to have the following coefficients. The sign of the coefficient d_2 of the S&P 500 dummy should be opposite the sign of d_1, as before, because stocks included in this index have large institutional holdings that are *passive* (due to indexing), whereas our analysis pertains to *active* institutional investing.

[14] There are regulatory constraints on the ability of most institutional investors to borrow or short sell.

The signs of the coefficient d_3 of $SIZEN_j$ before the dividend announcement should be the opposite of that of *INSTj*. We observe in Table 3 and in Table 7 that in large firms dividend announcements are less informative. Since large firms are followed by many investors and analysts, some dividend-related information may be incorporated in the stock price before the announcements. Therefore, in large firms institutional investors do not have as great an information advantage as they have in smaller firms, and they do not increase their holdings by as much as they do in smaller firms prior to the dividend increase announcement. The signs of the coefficient d_5 of VOL_j before the dividend announcements should be the same as that of d_1 since institutional investors can best exploit their information advantage in firms with greater volatility, which reflects in part asymmetric information and uncertainty.

INSERT TABLE 8

The estimation results of model (10), presented in Table 8, support our hypotheses. The coefficient d_1 of $INST_j$ is *positive* and highly significant in the two quarters before the dividend increase announcement, and it is *negative* and highly significant in the quarter of the announcement (recall that the holdings are recorded at the *end* of the quarter) and in the quarter that follows. That is, institutional investors exploit the positive information that they have about the firm, which is conveyed in the dividend increase, well before the announcement. They increase their holdings of the stock before the information is made public and divest after the announcement, when their dividend-related information advantage disappears. This effect is mitigated in part if the institutional investment is held passively in S&P 500 index investments, as reflected by the opposite sign of the coefficient d_2 of $S\&P500_j$. The coefficients of $SIZEN_j$ and $LTVOL_j$ have the expected signs before the dividend announcement quarter.

3.4 The effect of institutional holding on the firms' dividend decisions

Our explanation of the phenomenon of the disappearing dividend is that it is due to the decline in the information content of dividend announcements, which we tie to the increase in investments by institutions. Since dividends are costly, it is not worth raising them for the purpose of signaling information if they do not provide informational benefit.[15] We then find that the information content of dividend announcements is lower in firms with institutional holdings. This completes our proposition that the disappearing dividend phenomenon is tied to the increase in institutional investments.

It follows that *firms with high institutional holdings should be less likely to raise dividend*. This is the hypothesis tested in this section. We test the effect of institutional holdings on the likelihood of dividend increase by estimating a model that follows Prabhala (1997) with an added variable, $INST_j$, which is the focus of our test:

$$L_j = \theta_0 + \theta_1 INST_j + \theta_2 SP500_j + \theta_3 LTYLD_j + \theta_4 DIFYLD_j + \theta_5 SIZEN_j + \theta_6 PRC_j + \theta_7 LTVOL_j + \sum_{n=1}^{3} \theta_{8n} QTR_{nj} + \sum_{m=1}^{M} \theta_{9m} IND_{mj} + e_j . \qquad (11)$$

L_j equals +1, 0 or –1 if the dividend announcement ***j*** is, respectively, an increase, no change or decrease compared to the dividend in the previous quarter. $DIFYLD_j = STYLD_j - LTYLD_j$ is the difference between short term and long term dividend yield,[16] where *STYLD* is the short-term dividend yield, the most recent quarterly dividend divided by the

[15] There are other reasons, beyond signaling, for firms to raise dividends. For example, if a firm does not have profitable investment opportunities, it may distribute the excess cash it has to its shareholders.
[16] We eliminate 9 announcements, 0.06% of the sample, with *DIFYLD* > 20%.

stock price at the end of the month prior to the dividend announcement and multiplied by four (annualized). PRC_j is the stock price (in logarithm) at the end of the quarter before the dividend announcement. Notably, this estimation uses *all* dividend announcements for which data on $INST_j$ are available, including those with no change in dividends, which are by far the great majority of all dividend announcements.

INSERT TABLE 9

Our hypothesis is that $\theta_1 < 0$, that is, the likelihood of a dividend increase is smaller in firms with high institutional holding. The results, presented in Table 9, support our hypothesis. The coefficient of $INST_j$ is negative and significant. This suggests that across firms, those with higher institutional holdings are less likely to raise dividends. This suggests that in general, the dividend decision of firms is affected in part by the composition of their investors. In particular, this finding is consistent with our hypothesis that the phenomenon of disappearing dividends are tied to the increase in institutional holdings of stocks.

4. Conclusion

In this paper we propose the following.

A. The "disappearing dividend" phenomenon is partly due to the decline in the information content of dividend announcements. If dividends provide investors with less information about the firm's value, then given that they are costly, firms may refrain from initiating them or from raising them and may even reduce them.

B. Dividend announcements are becoming less informative due to the increase in stockholding by institutional investors, who are more sophisticated and informed than average individual investors. Thus, by the time the dividend news is announced, the information that it is intended to convey is already incorporated in the stock price. Consequently, the disappearing dividends are partly a result of the increase in institutional holdings.

Based on a number of tests conducted, the results are consistent with our hypotheses. With respect to Proposition A, we fine the following:

(i) There is a decline since the mid-1970s in the absolute value of the cumulative abnormal return, *CAR*, at the announcement of dividend changes. The *CAR* for dividend increases, which is positive, declines towards zero and the *CAR* for dividend decreases, which is negative, increases towards zero. This pattern is consistent with the decline in the propensity of firms to pay dividends or increase dividends, which peaks in the 1970s and has declined ever since then.

(ii) The dividend response coefficient -- the sensitivity of *CAR* to the magnitude of the dividend change -- declines over time for both dividend increases and decreases.

(iii) Return volatility immediately before dividend change announcements, which partly reflects information asymmetry, declines over time, after controlling for the stocks' normal, long-term volatility.

With respect to proposition (B), we find the following.

(i) Institutional holdings of shares of firms as a proportion of their outstanding shares, *INST*, monotonically increase over the nineteen years 1980-1998.

(ii) Across stocks, the price response to dividend increase announcements, *CAR*, is significantly lower in firms with higher *INST*. Also, the dividend response coefficient is significantly declining as a function of *INST*.

(iii) The volatility of stock returns immediately before dividend increase announcements is lower in firms with higher *INST*, after controlling for the firms' normal, long-term volatility.

(iv) *INST* rises significantly in the two quarters before dividend increase announcements and declines significantly by the end of the quarter of the announcement and in the quarter that follows, as a function of the institutional holding of the stock. That is, institutions increase their holdings in stocks that will raise dividends and divest after the dividend information is released.

(v) The likelihood of a dividend announcement being an increase is a declining function of the firm's *INST*. That is, higher institutional holdings induce firms to refrain from raising dividends.

By this analysis, the disappearance of dividends reflects the declining role of dividends as a means to convey information, which is a result of the increase in holdings by investors who are informed and sophisticated, such as institutional investors.

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Table 1
Statistics of two-day cumulative abnormal return, *CAR*, in events of dividend changes

This table reports the cumulative abnormal returns for announcements of dividend increase and dividend decrease. The sample consists of NYSE\AMEX stocks for the years 1962-2000 and excludes all dividend changes that arise from stock dividends/splits, merger/acquisition, and other non-cash distributions that change shares outstanding, and dividend changes that are smaller than 0.5% in absolute value. There are 14,911 dividend increase announcements and 1,278 dividend decrease announcements.
CAR is the two-day cumulative abnormal return, the sum of abnormal returns for days 0 (the dividend announcement day) and day +1 relative to a return on a portfolio of the size decile to which the stock belongs. *Tdif* is the *t*-statistic that tests the difference between the mean in one period and the mean in the previous period. The numbers in parentheses under the mean *CAR* are *t*-statistics testing the hypothesis that the mean is different from zero.

Period	Dividend increases				Dividend decreases			
	Mean (*t*-stat.)	*Tdif*	Median	N	Mean (*t*-stat.)	*Tdif*	Median	N
1962-2000	0.87% (31.60)		0.58%	14911	-4.58% (-24.38)		-3.68%	1278
Three subperiods:								
1962-1974	1.17% (20.82)		0.81%	3934	-6.43% (-19.55)		-5.97%	416
1975-1987	0.94% (23.05)	-3.31	0.65%	7251	-4.29% (-15.33)	-4.94	-3.55%	548
1988-2000	0.44% (8.97)	-7.85	0.23%	3726	-2.63% (-7.31)	-3.64	-1.77%	314
Eight subperiods:								
1962-1965	0.96% (10.75)		0.68%	1027	-5.26% (-8.08)		-4.99%	76
1966-1970	1.13% (11.95)	1.29	0.81%	1202	-6.82% (-13.63)	1.91	-6.88%	175
1971-1975	1.41% (15.92)	2.19	0.97%	2147	-6.24% (-13.54)	-0.86	-5.29%	239
1976-1980	1.03% (18.92)	-3.72	0.72%	4106	-5.00% (-9.48)	-1.77	-3.76%	173
1981-1985	0.68% (9.84)	-3.90	0.44%	2088	-3.85% (-10.14)	-1.77	-3.43%	251
1986-1990	0.44% (6.42)	-2.55	0.26%	1704	-2.73% (-4.49)	-1.56	-2.38%	104
1991-1995	0.49% (6.31)	0.49	0.28%	1493	-2.75% (-5.10)	0.02	-1.81%	151
1996-2000	0.47% (4.65)	-0.12	0.23%	1144	-2.19% (-3.59)	-0.68	-1.49%	109

Table 2
Statistics on cumulative abnormal returns that cover a period before the announcement of dividend

CAR10 is the cumulative abnormal return over days –11 to –2 before the dividend announcement day, day 0. *CAR13* is the cumulative abnormal return over days –11 to +1. *Tdif* is the *t*-statistic that tests the difference between the mean in one period and the mean in the previous period. The numbers in parentheses under the mean *CAR* are *t*-statistics testing the hypothesis that the mean is different from zero.

Period	Dividend increases				Dividend decreases			
	CAR10		*CAR13*		*CAR10*		*CAR13*	
	Mean (*t*-stat)	*Tdif*	Mean (*t*-stat)	*Tdif*	Mean (*t*-stat)	*Tdif*	Mean (*t*-stat)	*Tdif*
1962-2000	0.52% (10.84)		1.52% (27.88)		-1.42% (6.65)		-6.25% (21.97)	
Three subperiods:								
1962-1974	0.87% (9.16)		2.21% (20.64)		-1.71% (5.40)		-8.44% (19.23)	
1975-1987	0.48% (6.92)	-3.37	1.56% (19.92)	-4.91	-1.68% (5.21)	-0.07	-6.14% (14.83)	-3.80
1988-2000	0.23% (2.47)	-2.14	0.70% (6.67)	-6.51	-0.60% (1.16)	-1.79	-3.55% (5.35)	-3.31

Table 3
The effect on *CAR* of changes in dividend yield over time

Estimates the model across all events of dividend changes, indexed by *j*,

$$CAR_j = \alpha_0 + \sum_{s=1}^{S} \alpha_{0s} DUM_s + \sum_{s=1}^{S} \alpha_{1s} DUM_s \cdot DDIVY_j + \alpha_1 DDIVY_j + \alpha_2 SIZEN_j + \alpha_3 LTYLD_j + e_j \quad . \tag{2}$$

CAR_j is the two-day abnormal return on days 0 (the dividend announcement day) and +1, relative to the return on a portfolio of the size decile to which the stock belongs. DUM_s has a value of 1 in period *s* and zero otherwise. The index *s* is for time periods. In Panel A, the sample is split into three equal subperiods of 13 years each, 1962-1974, 1975-1987 and 1988-2000. Then, $S = 2$. In Panel B, the sample is split into 8 subperiods: 1962-1965, 1966-1970, … 1991-1995. Then, $S = 7$. $DDIVY_j$ is the change in the dividend yield compared to the dividend yield in the quarter before the change. $SIZEN_j$ is the stock capitalization normalized by the S&P 500 index. $LTYLD_j$ is the stock's long-term yield, calculated as the ratio of the sum of the cash dividend in the year before the dividend announcement to the stock price at the beginning of the year.
The sample covers announcements of increases and decreases in quarterly dividends for NYSE\AMEX stocks during 1962-2000. The *t*-statistics are in parentheses, calculated using White's (1980) robust estimation of standard errors.

Panel A: Three subperiods

Coefficient Variable	Dividend increases	Dividend decreases
α_0	0.006 (3.25)	-0.016 (1.71)
α_{01}, *1962-74* DUM_1	-0.0006 (0.46)	-0.021 (2.60)
α_{02}, *1975-87* DUM_2	-0.0050 (4.43)	-0.0039 (0.60)
α_{11}, *1962-74* $DUM_1 \cdot DDIVY_j$	0.75 (2.52)	0.67 (2.10)
α_{12}, *1975-87* $DUM_2 \cdot DDIVY_j$	0.89 (3.33)	0.31 (1.41)
α_1, *1988-2000* $DDIVY_j$	0.76 (3.30)	0.21 (1.14)
α_2 $SIZEN_j$	-0.0008 (4.68)	0.0009 (0.75)
α_3 $LTYLD_j$	0.14 (7.89)	-0.27 (2.42)
Adjust R^2	6.3%	9.3%
No. of Obs	14481	1204

Panel B: Eight subperiods

Coefficient Variable	Dividend increases	Dividend decreases
α_0	0.007 (3.76)	-0.013 (-0.96)
α_{01} DUM_1	-0.004 (-1.30)	0.005 (0.34)
α_{02} DUM_2	-0.004 (-1.80)	-0.014 (-0.97)
α_{03} DUM_3	-0.002 (-1.32)	-0.022 (-2.01)
α_{04} DUM_4	-0.010 (-5.94)	0.005 (0.41)
α_{05} DUM_5	-0.005 (-3.19)	-0.012 (-1.14)
α_{06} DUM_6	-0.004 (-2.32)	-0.005 (-0.46)
α_{07} DUM_7	-0.002 (-2.33)	-0.001 (-0.13)
α_{11}, *1962-65* $DUM_1 \cdot DDIVY_j$	0.74 (1.25)	2.1 (2.79)
α_{12}, *1966-70* $DUM_2 DDIVY_j$	1.51 (2.97)	1.3 (2.13)
α_{13}, *1971-75* $DUM_3 \cdot DDIVY_j$	1.20 (2.74)	0.4 (0.87)
α_{14}, *1976-80* $DUM_4 \cdot DDIVY_j$	1.40 (3.52)	1.1 (2.19)
α_{15}, *1981-85* $DUM_5 \cdot DDIVY_j$	0.92 (2.12)	0.0 (-0.06)
α_{16}, *1986-90* $DUM_6 \cdot DDIVY_j$	0.66 (1.39)	-0.1 (-0.33)
α_{17}, *1991-95* $DUM_7 \cdot DDIVY_j$	0.36 (0.79)	0.0 (0.06)
α_1, $DDIVY_j$	0.43 (1.17)	0.2 (0.65)
α_2 $SIZEN_j$	-0.0008 (-4.60)	0.0003 (0.28)
α_3 $LTYLD_j$	0.15 (8.39)	-0.22 (-1.95)
Adjust R^2	6.6%	10.5%
No. of Obs	14481	1204

Table 4
The effect on return volatility before dividend announcements of changes in dividend yield over time

Estimates the model across all events of dividend changes, indexed by *j*,

$$VOLDIV_j = \alpha_0 + \sum_{s=1}^{2} \alpha_{0s} DUM_s + \sum_{s=1}^{2} \alpha_{1s} DUM_s \cdot DDIVY_j + \alpha_1 DDIVY_j + \alpha_2 LTVOL_j + e_j \ . \qquad (6)$$

$VOLDIV_j$ is the standard deviation of stock return over days -21 to -1 before the announcement of a change in dividend yield, and $LTVOL_j$ is the monthly return volatility of the stock over months -24 to -1, measuring long-term volatility (both are in logarithms). DUM_s has a value of 1 in period *s* and zero otherwise. The sample is split into three equal subperiods of 13 years each, and s = 1 is for 1962-1974 and s = 2 is for 1975-1987.
The sample covers announcements of increases and decreases in quarterly dividends for NYSE\AMEX stocks during 1962-2000. The *t*-statistics are in parentheses, calculated using White's (1980) robust estimation of standard errors.

	Dividend increases	Dividend decreases
α_0	-2.66 (104.39)	-2.36 (24.72)
α_{01} DUM_1	0.0002 (0.02)	-0.15 (2.60)
α_{02} DUM_2	-0.042 (3.79)	-0.17 (3.71)
α_{11} $DUM_1 \cdot DDIVY_j$	13.81 (5.63)	-4.60 (2.31)
α_{12} $DUM_2 \cdot DDIVY_j$	7.92 (3.35)	-1.74 (1.46)
α_1 $DDIVY_j$	-0.75 (0.35)	-1.92 (2.32)
α_2 $LTVOL_j$	0.60 (65.49)	0.63 (17.69)
Adjust R^2	0.26	0.24
No. of Obs	14748	1260

Table 5
Statistics on institutional holdings over time

The table presents statistics on *INST*, the proportion of the firm's stock held by institutional investors. The observations are for firms that announce dividend increase. The variable *INST* is for the end of the quarter when dividend increase is announced. Data are missing for three quarters, 4Q1993-2Q1994. The averages for the respective years are over the quarters for which data are available.

Year	Number of cases	INST	
		Mean	Median
1980	283	0.2901	0.2946
1981	373	0.3150	0.3320
1982	265	0.3215	0.3366
1983	259	0.3403	0.3575
1984	335	0.3567	0.3713
1985	264	0.3918	0.4025
1986	198	0.4264	0.4350
1987	253	0.4365	0.4514
1988	326	0.4601	0.4807
1989	315	0.4603	0.4754
1990	261	0.4836	0.5006
1991	203	0.4825	0.4909
1992	228	0.4823	0.5091
1993	195	0.4885	0.5296
1994	156	0.4983	0.5063
1995	323	0.5104	0.5453
1996	309	0.4934	0.5075
1997	231	0.5131	0.5264
1998	130	0.5351	0.5447

0.

Table 6
The effect of institutional holdings on stock price reaction to dividend increases

In the following models, CAR_j is the two-day abnormal return on days 0 (the dividend announcement day) and +1, relative to the return on a portfolio of the size decile to which the stock belongs. $CAR10_j$ is the cumulative abnormal return over days –10 to –1 and $CAR13_j$ is the cumulative abnormal return over days –10 to +1.
$DDIVY_j$ is the increase in dividend yield of firm j, $INST_j$ is institutional holding as a fraction of firm's j outstanding shares as of the end of the quarter prior to the dividend announcement, $SP500_j$ is a dummy variable that equals 1 if firm j is included in the S&P 500 index, $SIZEN_j$ is the firm size deflated by the S&P 500 index (the base is 1962), $LTYLD_j$ is the firm's long-term yield, calculated as the yield in the yield prior to the dividend announcement. QTR_{nj} is a quarter dummy variable and IND_{mj} is an industry dummy variable (there are 71 quarters and 57 industries in the sample).

Panel A.

$$CAR_j = a_0 + a_1 DDIVY_j + a_2 INST_j + a_3 SP500_j + a_4 SIZEN_j + a_5 LTYLD_j + \sum_{n=1}^{70} a_{6n} QTR_{nj} + \sum_{m=1}^{56} a_{7m} IND_{mj} + e_j \,. \tag{7}$$

Variable	*CAR*	*CAR10*	*CAR13*
a_1 $DDIVY_j$	1.03 (7.60)	0.72 (2.85)	1.76 (6.27)
a_2 $INST_j$	-0.007 (2.28)	-0.011 (1.92)	-0.019 (3.06)
a_3 $SP500_j$	0.003 (2.15)	0.002 (0.97)	0.007 (2.46)
a_4 $SIZEN_j$	-0.001 (3.38)	-0.001 (1.04)	-0.003 (3.15)
a_5 $LTYLD_j$	0.12 (3.42)	0.16 (2.39)	0.29 (3.98)
Adjust R^2	8.9%	4.7%	7.2%
No. of Obs	4507	4507	4507

Panel B.

$$CAR_j = b_0 + b_1 DDIVY_j + b_2 DDIVY_j \cdot INST_j + b_3 DDIVY_j \cdot SP500_j + b_4 SIZEN_j + b_5 LTYLD_j + \sum_{n=1}^{70} b_{6n} QTR_{nj} + \sum_{m=1}^{56} b_{7m} IND_{mj} + e_j \,, \tag{8}$$

Variable	*CAR*	*CAR10*	*CAR13*
b_1 $DDIVY_j$	1.41 (7.41)	0.99 (2.80)	2.49 (6.34)
b_2 $DDIVY_j \cdot INST_j$	-1.79 (3.23)	-1.18 (1.15)	-3.41 (2.98)
b_3 $DDIVY_j \cdot SP500_j$	0.74 (2.76)	0.55 (1.11)	1.52 (2.74)
b_4 $SIZEN_j$	-0.001 (3.91)	-0.001 (1.61)	-0.003 (3.81)
b_5 $LTYLD_j$	0.12 (3.22)	0.15 (2.29)	0.28 (3.79)
Adjust R^2	7.3%	4.9%	7.2%
No. of Obs	4507	4507	4507

Table 7
Stock volatility and institutional holdings

$$VOLDIV_j = c_0 + c_1DDIVY_j + c_2INST_j + c_3SP500_j + c_4SIZEN_j + c_5LTYLD_j + c_6LTOL_j + \sum_{n=1}^{N} c_{7n}DQ_{nj} + \sum_{m=1}^{M} c_{8m}IND_{mj} + e_j\,, \qquad (9)$$

Where $VOLDIV_j$ is the standard deviation of daily returns from day –21 to day –2 (day 0 is the dividend announcement day), and $LTVOL_j$ is the standard deviation of the monthly returns from month –24 to month –1. (Both volatility measures are in logarithm.) $DDIVY_j$ is the increase in dividend yield of firm j compared to the previous quarter, $INST_j$ is the institutional holding as a fraction of firm's j outstanding shares as of the end of the quarter prior to the quarter of the dividend increase announcement, $SP500_j$ is a dummy variable that equals 1 if firm j is included in the S&P 500 index, $SIZEN_j$ is the firm size deflated by the S&P 500 index (the base is 1962), $LTYLD_j$ is the firm's long-term yield, calculated as the yield in the yield prior to the dividend announcement. QTR_{nj} is a quarter dummy variable and IND_{mj} is an industry dummy variable (there are 71 quarters and 57 industries in the sample).

Variable	Coefficient (*t*-statistic)
c_1 $DDIVY_j$	4.34 (2.78)
c_2 $INST_j$	-0.11 (3.25)
c_3 $SP500_j$	0.028 (1.92)
c_4 $SIZEN_j$	-0.007 (1.37)
c_5 $LTYLD_j$	-1.90 (4.50)
c_6 $LTVOL_j$	0.50 (23.32)
Adjust R^2	33.1%
No. of obs	4507

Table 8
Institutional trading surrounding dividend announcements

$$\Delta INST_{j,q} = d_0 + d_1 INST_{j,0} + d_2 SP500_j + d_3 SIZEN_j + d_4 LTYLD_j + d_5 LTVOL_j + \sum_{n=1}^{70} d_{6n} QTR_{nj} + \sum_{m=1}^{56} d_{7m} IND_{mj} + e_j . \qquad (10)$$

The model is estimated for each of the quarters q = -2 to q = +1 where q = 0 is the quarter during which the dividend increase is announced. $INST_{j,0}$ is the institutional holding as a fraction of firm's j outstanding shares at the end of quarter q = 0. $\Delta INST_{j,q} = INST_{j,q} - INST_{j,q-1}$. $SP500_j$ is a dummy variable that equals 1 if stock j is included in the S&P 500 index, $SIZEN_j$ is the firm size deflated by the S&P 500 index (the base is 1962), $LTYLD_j$ is the firm's long-term yield, calculated as the yield in the yield prior to the dividend announcement, $LTVOL_j$ is the standard deviation of the monthly returns from month –24 to month –1. QTR_{nj} is a quarter dummy variable and IND_{mj} is an industry dummy variable (there are 71 quarters and 57 industries in the sample).

	Dependent Variables: changes in institutional holdings			
	q = –2	q = –1	q = 0	q = 1
d_1 $INST_{j,0}$	0.02 (6.34)	0.03 (8.09)	-0.01 (3.93)	-0.01 (4.21)
d_2 $SP500_j$	-0.0012 (1.03)	-0.0041 (3.03)	0.0016 (1.18)	0.0008 (0.59)
d_3 $SIZEN_j$	-0.0011 (2.6)	-0.0014 (3.16)	-0.0001 (0.29)	-0.0003 (0.69)
d_4 $LTYLD_j$	0.07 (1.96)	0.03 (0.67)	-0.01 (0.27)	-0.02 (0.47)
d_5 $LTVOL_j$	0.0054 (3.04)	0.0045 (2.27)	0.0003 (0.14)	0.0009 (0.45)
R^2	6.29%	7.26%	4.57%	5.49%
No. of Obs	4261	4262	4267	4269

Table 9
The determinants of the likelihood of dividend changes

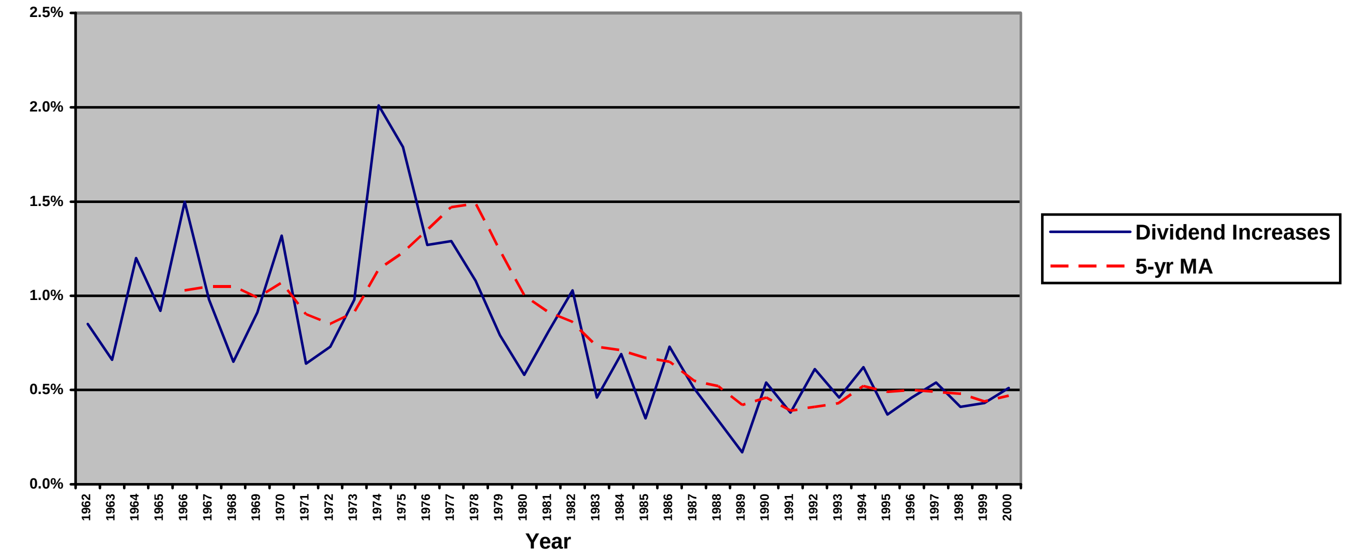
$$L_j = \theta_0 + \theta_1 INST_j + \theta_2 SP500_j + \theta_3 LTYLD_j + \theta_4 DIFYLD_j + \theta_5 SIZEN_j + \theta_6 PRC_j + \theta_7 LTVOL_j + \sum_{n=1}^{70} \theta_{8n} QTR_{nj} + \sum_{m=1}^{56} \theta_{9m} IND_{mj} + e_j . \qquad (11)$$

L_j equals +1, 0 or –1 if the dividend announcement for company *j* is, respectively, an increase, no change or decrease in dividend compared to the dividend in the previous quarter. $INST_j$ is the institutional holding as a fraction of the outstanding shares of firm's *j* as of the end of the quarter when the dividend announcement is made. $SP500_j$ is a dummy variable that equals 1 if firm *j* is included in the S&P 500 index. $LTYLD_j$ is the firm's long-term yield, calculated as the yield in the yield prior to the dividend announcement, $DIFYLD_j$ is the difference between the dividend yield of the last quarter before the dividend announcement and the long-term yield. $SIZEN_j$ is the firm size deflated by the S&P 500 index (the base is 1962). PRC_j is the stock price (in logarithm) at the end of the quarter before the dividend announcement. $LTVOL_j$ is the standard deviation of the monthly returns from month –24 to month –1. QTR_{nj} is a quarter dummy variable and IND_{mj} is an industry dummy variable (there are 71 quarters and 57 industries in the sample).

Parameter	Coefficient
θ_1 $INST_j$	-0.15 (3.01)
θ_2 $SP500_j$	-0.03 (1.60)
θ_3 $LTYLD_j$	-10.56 (19.15)
θ_4 $DIFYLD_j$	-31.22 (48.28)
θ_5 $SIZEN_j$	0.07 (8.52)
θ_6 PRC_j	0.13 (7.23)
θ_7 $LTVOL_j$	-0.19 (6.62)
No. of Obs	44160

Figure 1
The pattern of CAR_y over time for dividend increases and decreases.

CAR_y is the yearly average of two-day cumulative abnormal return, days 0 and +1 (day 0 is the dividend announcement day). There are two figures, one for dividend increases and one for dividend decreases.
The solid line depicts CAR_y for the year. The dashed line is the five-year moving average.



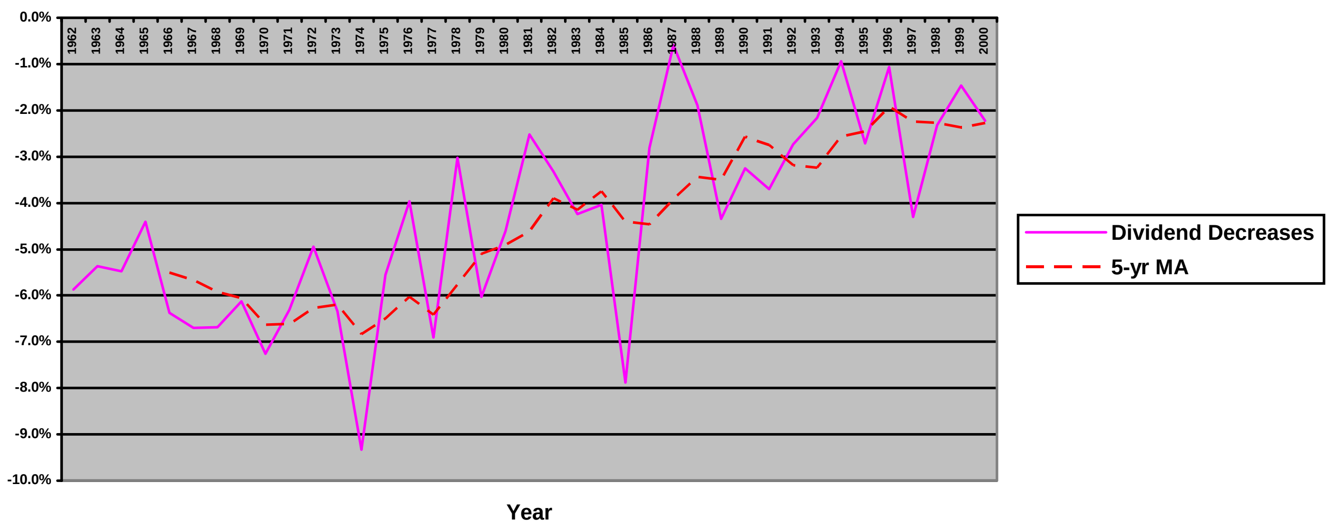


Figure 2
The pattern of the dividend response coefficient over time for dividend increases

The figure plots the dividend response coefficient, α_1, from the regression model

$$CAR_j = \alpha_0 + \alpha_1 DDIVY_j + \alpha_2 SIZEN_j + \alpha_3 LTYLD_j + e_j \;.$$

The model is estimated annually across all dividend increase announcements. CAR_j is the average two-day cumulative abnormal return, days 0 and +1 (day 0 is the dividend announcement day). $DDIVY_j$ is the change in the dividend yield compared to the dividend yield in the quarter before the change. $SIZEN_j$ is the stock capitalization normalized by the S&P 500 index. $LTYLD_j$ is the stock's long-term yield, calculated as the ratio of the sum of the cash dividend in the year before the dividend announcement to the stock price at the beginning of the year.
The solid line is the estimated α_1 for the year. The dashed line is the fine-year moving average.