Stock Price Sensitivity to Dividend Changes *

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Abstract

This paper examines the stock price sensitivity to dividend changes. The Dividend Signaling, the Free-Cash-Flow, the Maturity and the Catering Hypotheses all predict an average positive (negative) reaction to announcement of a dividend increase (decrease). However, these hypotheses have different cross-sectional predictions. This paper documents that the positive stock price response to dividend increases is due primarily to the signaling of higher future earnings, to the managers catering to the time-varying premium assigned by the market to dividend paying stocks, and partially to the reduction of agency problems. On the contrary, the negative price response to dividend decreases is mainly due to the transition from a mature life-cycle stage to a decline stage with higher systematic risk, as maintained by the Maturity Hypothesis.

Keywords: Dividend; Signaling; Overinvestment; Life-Cycle.

JEL Classification Numbers: G14, G35.

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1 Introduction

The impact of dividend change announcements on stock prices has been widely documented. Petit (1972) and many others afterwards show on average a positive correlation between dividend changes and short term abnormal returns. In a recent study, Grullon, Michaely, and Swaminathan (2002) show a 3-day cumulative abnormal return of 1.34% for dividend increases and of -3.71% for dividend decreases. What is more interesting, however, is the dispersion of the returns. The standard deviation of returns is 4.33% for dividend increases and 6.89% for dividend decreases. Among companies that announce a dividend increase, 42% actually have a negative stock price reaction. Similarly, among companies that announce a dividend cut, 37% have a positive stock price reaction. The observed dispersion of returns is due both to daily idiosyncratic and systematic volatility and to the dividend announcement. [1]

In his classic study on dividend policy, Lintner (1956) interviewed a sample of corporate managers. He found that managers demonstrate a "reluctance (common to all companies) to reduce regular rates once established and a consequent conservatism in raising regular rates". LIntner's argument is provided additional empirical support first by Fama and Babiak (1968) and many others afterwards. More recently, Brav, Graham, Harvey, and Michaely (2005) document in their CFO survey of payout policies that 77.9% of companies are"reluctant to make dividend changes that might have to be reversed in the future." Knowing the absolute percentage level of companies that are reluctant to change dividends is only partially informative of the corporate payout rationale. Equally important questions are: what are the characteristics of companies that are or are not reluctant to cut dividends? Which companies are sensitive to dividend changes, and which companies can change their payout policy at will without a significant stock price reaction? Does the price response to a dividend change depend on characteristics that are specific to the company, such as its life-cycle stage, or does it depend on external forces, such as catering to time-varying demand for dividend payout? In this paper, I address these questions by investigating the cross-sectional dispersion of price response to dividend change announcements.

[1] The announcement sample does not include contemporaneous earnings announcements, nor other contemporaneous distribution announcements; thus the observed dispersion is unlikely to be due to concurrent events.

The market reaction to changes in firm payout policies is of critical importance in determining corporate payout dynamics. Over the years, the literature on payout policy has produced many hypotheses to explain payout rationale. The Dividend Signaling Hypothesis asserts that a dividend increase is a signal of unexpected positive and persistent higher future earnings; the Free-Cash-Flow (FCF) Hypothesis states that a dividend increase reduces the agency problems between shareholders and top management; The Maturity Hypothesis maintains that a dividend increase is an indication of a firm entering a mature life-cycle stage of low systematic risk; Finally, the Catering Hypothesis argues that managers are catering to investors by increasing dividends during times when dividend paying stocks are in high demand and therefore rewarded with a return premium.

The objective of this paper is not to rule out one hypothesis in favor of another. The rationales for paying dividends are neither unique nor mutually exclusive. Thus , most, if not all, explanations are plausible, and are likely to occur at one moment or another during the life-cycle of the company. At times these hypotheses act together to reinforce the market response and at other times they conflict with one another. The purpose of this paper is to perform a cross-sectional study to find out where each hypothesis most likely applies. In particular, I test whether the above hypotheses apply for dividend increase and decrease announcements. I consider dividend increases and decreases separately because the rationale and the underlying dynamics that apply to a firm that increases or decreases dividends are drastically different. To my knowledge, this paper is the first comprehensive study that tests all four hypotheses at once.

The main results of cross-sectional regression show that the positive price response to dividend increases is primarily due to the signaling of higher future earnings (Dividend Signaling Hypothesis) and only partially to the reduction of agency problems (FCF Hypothesis). In addition, the stock price reaction to dividend increases is larger in times when the market dividend premium is high, as supported by the Catering Hypothesis. The negative price response to dividend decreases is instead mainly due to the transition from a mature life-cycle stage to a decline stage with higher systematic risk, as supported by the Maturity Hypothesis, while agency problems, signaling and catering are not contributing factors. Multiple interaction regressions show that the larger the dividend change, the more significant the results.

In order to test the four main hypotheses and draw conclusions on firms' payout policies, I first survey the theoretical and empirical literature on dividends (Section 2). Then I perform an event study to capture the cumulative abnormal return to dividend change announcements and describe the data sample and the methodology used (Section 3). I finally formulate the predictions of each dividend hypothesis and test each prediction with multiple interaction regressions (Section 4) to find the determinants of price sensitivity to dividend changes. I conclude with a summary of the findings and thoughts on possible directions for future research (Section 5).

2 Literature on Dividend Payout Policies

2.1 Theoretical Models

The theoretical rationale for corporate payout has been an important topic in corporate finance for more than fifty years. After the payout-irrelevance proposition by Miller and Modigliani (1961), the following theories attempt to explain why and how companies pay out the cash generated by their business operations.[2]

The Dividend Signaling Hypothesis argues that dividends are used by companies to signal higher than expected future free cash flow. If managers have private information about the future or current cash flow, then investors will interpret a current dividend increase (decrease) as a signal that managers expect permanently higher (lower) future free cash flow levels. Because paying dividends is costly, good companies pay dividends to separate themselves from bad companies that cannot afford to pay such a steep price to mimic good companies. Outside financing transaction costs (Bhattacharya (1979)), underinvestment (Miller and Rock (1985)) and taxes (John and Williams (1985)) are some of the costly instruments used to achieve a separating equilibrium in Dividend Signaling models.

[2] An additional theory not tested in this paper is the Wealth Redistribution Hypothesis, that stems from the conflict of interest between bondholders and shareholders as explained by Jensen and Meckling (1976). Paying out dividends, financed either by issuing new senior debt or by reducing investment outlays, increases the risk of the outstanding debt, and reduces the risk of equity. That equals a net wealth transfer from bondholders to shareholders.

The Free Cash Flow Hypothesis, first explained by Jensen (1986), argues that agency problems arise in companies where ownership and control are separated, such as in public companies with disperse shareholding. Managers have an incentive to overinvest relative to their first best optimal level in companies with sizable free cash flows or cash reserves. The overinvestment stems from the empire building or perks-prone attributes embedded in the managers' utility function. An increase in dividend reduces the free cash flow available to managers and therefore limits the overinvestment problem, creating value for the company. Conversely, a dividend cut augments the cash on hand to the managers and therefore aggravates the overinvestment problem.

The Maturity Hypothesis, advanced by Grullon, Michaely, and Swaminathan (2002), Fama and French (2001), and DeAngelo and DeAngelo (2006), argues that, as a company matures, its investment opportunity set shrinks with a consequent decline in systematic risk. A positive price reaction to a dividend increase suggests that the company has entered a mature life-cycle stage of lower profitability and lower risk. According to the Maturity Hypothesis, reaction to news about systematic risk reduction dominates reactions about lower future profits and therefore the stock price response to a dividend increase announcement is positive. Conversely, the decision to decrease dividends signals the transitioning from a mature to a decline stage with higher systematic risk and even lower profitability. The stock price response to a dividend decrease announcement is therefore negative. The Maturity Hypothesis is a conjecture, because Grullon, Michaely, and Swaminathan (2002) do not develop a theoretical model and therefore do not propose a separating equilibrium in which other companies cannot mimic mature companies. Nonetheless, it is an interesting hypothesis that has not been extensively tested empirically.

Lastly, the Catering Hypothesis, proposed by Baker and Wurgler (2004), assumes that for either institutional or psychological reasons, some investors have an uninformed and perhaps time-varying demand for dividend paying stocks. For instance, dividend clientele theories argue that changes in tax code, transaction costs or institutional investment constraint can lead to changes in the demand for dividend paying stocks. Behavioral explanations, such as the bird-in-the-hand or self-control arguments, could also lead to a time-varying demand for dividend paying stocks. The market therefore assigns a time-varying premium to dividend paying stocks. Managers cater to this premium by paying out more dividends when the dividend premium is high, and by holding cash inside the company when the dividend premium is low. Although dividend payers and nonpayers are consistently different in many characteristics, such as size, life-cycle stage and profitability, Baker and Wurgler (2004) provide some evidence that managers cater to investor sentiment, and their conclusions are robust to a variety of alternative explanations.

2.2 Empirical Evidence

Despite extensive empirical testing of the above dividend hypotheses over the last 30 years, the conclusions are surprisingly varied, and a wide consensus on the corporate payout rationale is still lacking.

The empirical evidence on the Dividend Signaling Hypothesis is mixed at best. On the one hand, Nissim and Ziv (2001) find that using a particular model of earnings expectations, current dividend changes are positively correlated to future earnings changes. Bernheim and Wantz (1995) find strong positive relation between dividend tax rates and the share price response per dollar of positive dividend change (or "bang-for-the-buck"), supporting the Dividend Signaling Hypothesis. On the other hand, other studies (among many, Deangelo, DeAngelo, and Skinner (1996), Benartzi, Michaely, and Thaler (1997) and Grullon, Michaely, Benartzi, and Thaler (2005)) find positive correlation between dividend changes and concurrent or lagged earnings changes, but no correlation with future earnings changes. Even more interesting, they find that companies that cut dividends have higher earnings in the future relative to comparable companies.

The empirical evidence on the Free-Cash-Flow Hypothesis is mixed as well. Using dividend announcement abnormal returns and Tobin's Q ratio less than unity to designate overinvesting, Lang and Litzenberger (1989) find results that are consistent with the FCF Hypothesis over the Dividend Signaling Hypothesis. Denis, Denis, and Sarin (1994) show that with the same data-set and adjusting for the size of the dividend changes, the results uphold the opposite view, supporting the Dividend Signaling Hypothesis over the FCF Hypothesis.

The Maturity Hypothesis is supported not only by Grullon, Michaely, and Swaminathan

(2002), but also by DeAngelo, DeAngelo, and Stulz (2006). In their paper, they show that the fraction of publicly traded industrial firms that pay dividends is high when retained earnings are a large portion of total equity and falls to near zero when most equity is contributed rather than earned. The earned/contributed capital mix is therefore a critical parameter to classify the life-cycle stage of a company.

Although the Catering Hypothesis has been formulated only recently, Li and Lie (2006) show that the stock market reaction to dividend changes depends on the dividend premium associated with dividend paying stocks.

The majority of the empirical studies focus on testing individual hypothesis, or on testing different hypotheses as if mutually exclusive. The objective of this paper is not to rule out one explanation in favor of another, because the rationales for paying dividends are neither unique nor mutually exclusive. For example, testing only the Dividend Signaling Hypothesis, using the entire sample, could be misleading, because this hypothesis could apply only to a subset of the companies with specific characteristics. Most, if not all, explanations are plausible, and likely occur at one moment or another in the life-cycle of a company. Sometimes these hypotheses work together to reinforce the market response and sometimes they conflict with one another. The purpose of this paper is to perform a cross-sectional study to find the situations in which these hypotheses apply.

3 Data Selection, Methodology and Descriptive Statistics

3.1 Data Selection

The data sample is drawn from all dividend announcements made by companies listed on the NYSE, AMEX and NASDAQ stock exchanges from January 1963 to December 2005. I filter the dividend announcements according to the following criteria:

(a) *Data availability*: the company's financial data must be available on the Center for Research in Security Prices (CRSP) and Compustat databases.

(b) *Type of dividend*: I restrict my study to ordinary dividend distributions (DISTCD 1st digit

= 1). Special dividends have different dynamics and payout rationales.[3]

(c) *Type of shares*: the dividends must be paid to holders of common shares, and cannot be paid to shares of Americus Trust Components (ATC), closed-end funds or Real Estate Investment Trusts (REITS)(SHRCD 10,11,12). ATC, closed-end funds and REITS belong to a different asset class and are therefore excluded from the sample.

(d) *Payment method*: Cash in US dollars or converted into US dollars (DISTCD 2nd digit = 2, 3).

(e) *Dividend frequency*: Quarterly (DISTCD 3rd digit = 3). Annual or semiannual payments are infrequent, and subject to misclassification in CSRP.

(f) *Contemporaneous distributions*: the distribution does not occur within a window of [-15,+15] days of a non-cash or a special dividend distribution (DISTCD 1st digit = 2, 3,4,5,6,7). Contemporaneous stock splits, stock dividends and other non cash distributions could influence the dividend announcement.

(g) *Type of announcement*: the announcement is not an initiation or an omission. CRSP does not provide dates on dividend omissions. The initiation of dividends is a special dividend change, and therefore excluded. [4]

(h) *Ex-dividend date*: the announcement date does not occur earlier than 8 days before the ex-dividend date. The ex-dividend date price reaction is observed up to five days before the ex-date. In addition, the previous cash dividend is paid within a window of 20-90 trading days prior to the current dividend announcement.

(i) *Contemporaneous announcement*: Standard practice in the dividend literature is to consider dividend announcements as single independent events. I performed a random search of a sample of dividend change announcements using Lexis/Nexis and found that the majority of the announcements are released without any further comment or contemporaneous release. In few cases, the dividend announcement overlaps with earnings announcements.

[3] I would suggest referring to DeAngelo, DeAngelo, and Skinner (2000) for an extensive study on special dividends.

[4] I would suggest referring to Michaely, Thaler, and Womack (1995) for an extensive study on the effect of omissions and initiations of dividends on stock prices.

Therefore, dividend announcements that occur within a window of 3 days before or after an earnings announcement are dropped from the sample. The earnings announcement dates are provided by the Institutional Brokers' Estimate System (I/B/E/S) database.

The above criteria are drawn from Grullon, Michaely, and Swaminathan (2002) and Bajaj and Vijh (1990)and are generally accepted in the dividend literature.

3.2 Methodology

CRSP provided the company stock returns and the beta-based decile (NYSE/AMEX and NASDAQ) returns as the benchmark portfolio, for a 3-trading-day window (-1,+1). COMPUSTAT provided the current and previous quarterly dividend amounts for each announcement in the sample. I use a 3-day window because sometimes the announcement is made after trading hours, and because the information on dividend changes can leak into the market one day before the announcement. I define the price reaction to a dividend announcement as the difference between the 3-day gross return of the stock and the 3-day gross return of the beta-decile benchmark portfolio, to adjust for the firm's systematic risk premium:

$$CAR_i = \prod_{t=-1}^{1} (1 + r_{i,t}) - \prod_{t=-1}^{1} (1 + r_{beta,t})$$

where $r_{i,t}$ is the return of company i at time t and $r_{beta,t}$ the return of the beta-decile (NYSE/AMEX and NASDAQ) benchmark portfolio m at time t. Robustness tests not reported in the paper are performed using the cap decile returns, the value-weighted market returns and the equally-weighted market returns as the benchmark portfolio, finding similar results both economically significant and statistically robust. I use the market-beta risk adjustment because it is standard practice in the literature and because, as shown in Brown and Warner (1985), methodologies based on the Ordinary Least Square (OLS) market model and standard parametric tests are well-specified under a variety of conditions.

3.3 Descriptive Statistics

[Figure 1 about here.]

From 1963 to 2005, 4,330 companies that satisfy the above criteria announced a dividend decrease, and 33,869 companies announced a dividend increase. As shown in Figure 1, the number of companies that announced a dividend change peaked in the early 80s and then remained relatively constant in the last two decades. Considering that the number of companies listed on the NSYE doubled in the last 20 years, the decline in the number of dividend changes per company is further evidence of both a lower propensity to pay dividends and a shift in the characteristics of the population of publicly traded firms, as shown by Fama and French (2001). Figure 1 shows also that each company in the sample changes its dividend on average 9 times over the years. I control for the auto and cross-sectional correlations induced by the time-varying properties and multiple observations per firm of the panel-data observations in the empirical section of the paper.

For companies that announce a dividend increase, Table 2 presents descriptive statistics of the main characteristics during the fiscal year prior to the announcement, compared to firms that do not. When a company announces a dividend cut (on average a decrease of 28.6%), its stock price drops on average by 1.30% with a standard deviation of 6.04% in a 3-days window relative to the beta-decile benchmark portfolio. Prior to the announcement of a dividend decrease, companies are on average highly leveraged, with low levels of cash reserve and low profitability, suggesting that companies that decrease dividends on average are closer to financial distress than the control sample. Furthermore, dividend decreasing companies have an investment ratio (INVRATIO) similar to the other dividend paying companies. This finding is in conflict with the common practitioners' claim portrayed in the CFO survey by Brav, Graham, Harvey, and Michaely (2005) that "interviewed managers state that they would pass up some positive net present value (NPV) investment projects before cutting dividends".

Table 1 presents similar descriptive statistics for companies that announce a dividend decrease. When a company announces an increase in dividends (on average an increase of 20.5%), its stock price jumps up on average by 0.71%, with a standard deviation of 3.62%. Relative to dividend paying companies, dividend increasing companies are larger both in terms cash, book value of assets and market value of assets. In addition, dividend increasing companies have lower leverage and higher profitability than the control sample.

[Table 1 about here.]

[Table 2 about here.]

4 Empirical Tests of Dividend Hypotheses

The Dividend Hypotheses all predict the same average stock price reaction upon the announcement of a change in dividend distribution. As shown in Tables 2 and 1, the stock price reaction to a dividend increase (decrease) is on average positive (negative), with a larger stock price response to dividend decreases than to dividend increases. However, these hypotheses have different cross-sectional predictions. Responses to positive and negative dividend changes are most likely driven by fundamentally different processes; for this reason, I treat dividend increases and decreases separately.

4.1 Predictions

According to the four Dividend Hypotheses, the following variables are drivers of price response to dividend changes. The definitions of the variables are listed in the appendix. As is standard in the literature, the variables apply to the fiscal year prior to the announcement of the dividend change to avoid spurious concurrent correlations.

Dividend Signaling Hypothesis: According to the Dividend Signaling Hypothesis, a dividend increase (decrease) is a signal of higher (lower) future earnings. Information asymmetry theories predict that firms with high degree of asymmetric information should have a larger stock price response to unexpected dividend changes.

1. *PIN.* The degree of asymmetric information is measured by the Probability of Information-based Trading (PIN) (Easley, Hvidkjaer, and O'Hara (2002)). The higher the PIN, the

more unexpected a dividend change. The Dividend Signaling Hypothesis would therefore predict a positive coefficient for the PIN for dividend increase and a negative coefficient for dividend decrease announcements.

2. *THETA.* According to Bernheim and Wantz (1995), the lower the relative-after-tax income from dividends vs retained earnings (THETA) in a year -a proxy of the marginal tax rate of the aggregate investor- the higher the "bang for the buck". As the costs of signaling increase, the same sized signal should elicit a larger response. Therefore the Dividend Signaling Hypothesis predicts a negative coefficient for THETA for dividend increases and a positive coefficient for dividend decreases.

3. *Growth Variables: MTB, INVRATIO,AGR.* As in Lang and Litzenberger (1989), investors anticipate and therefore expect large dividend increases and higher future earnings from companies with high growth opportunities. Once we control for the degree of asymmetric information, the market-to-book ratio (MTB), the investments over asset ratio (INVRATIO) and the asset growth rate (AGR) are all proxies for the growth opportunities of firms. Growing firms are expected to pay more dividends in the future. Therefore, the Dividend Signaling Hypothesis predicts a negative coefficient for both dividend increase and decrease announcements.

Free-Cash-Flow Hypothesis: According to the Free-Cash-Flow Hypothesis, a dividend increase (decrease) reduces (increases) agency problems between shareholders and managers. The higher the severity of the agency problem, the larger the response to a dividend change.

4. *GOVINDEX.* The corporate governance of a company deeply affects the relationship between shareholders and managers. The governance index is provided by the Investor Responsibility Research Center (IRRC) and follows the definition introduced by Gompers, Ishii, and Metrick (2003). A high governance index level is a proxy of weak governance and a low index level is a proxy of strong governance. The FCF hypothesis would therefore predict a positive coefficient for the GOVINDEX variable for dividend increase and a negative coefficient for dividend decrease announcements.

5. *INDDIR.* Independent directors have interests that are more aligned with those of shareholders, and therefore we would expect that agency problems are less severe when independent directors comprise a large percentage of total directors. Since the fraction of independent directors is not used in the GOVINDEX, it is an alternative measure of corporate governance. The FCF hypothesis would therefore predict a negative coefficient for the INDDIR variable for dividend increase and a positive coefficient for dividend decrease announcements.

6. *FCF Variables: PROF, CASHRATIO.* For a given level of dividend, a company that is highly profitable (PROF) or has high levels of cash reserves (CASHRATIO) is subject to a high level of agency costs. Thus the FCF hypothesis predicts a positive coefficient for dividend increase and a negative coefficient for dividend decrease announcements.

Maturity Hypothesis: According to the Maturity Hypothesis, a dividend increase signals that a firm is entering into a more mature life-cycle stage with lower systematic risk.

7. *RETE.* The ratio between the retained earnings equity and the total equity (RETE) is a good proxy for the maturity of the firm. As shown by DeAngelo, DeAngelo, and Stulz (2006), companies with high RETE have a higher propensity to pay dividends. The announcement of a dividend increase signals the transition from a life-cycle stage of high to low systematic risk. A dividend increase would be unexpected good news if the RETE variable is low. Conversely, the announcement of a dividend decrease signals an increase in firm systematic risk. A dividend decrease would be unexpected bad news if the RETE variable is high. The Maturity Hypothesis therefore predicts a negative coefficient for both dividend increase and decrease announcements.

8. *PAYRATIO.* The dividend payout ratio has also been used in the literature to identify the maturity of a firm. High levels of payout ratio are associated with a more mature firm in which dividends are expected to increase. A negative coefficient is therefore expected for both dividend increase and decrease announcements.

9. *AGE.* Age is also a proxy for maturity. An older company is expected to pay more dividends. Thus, an old company increasing negative coefficient is expected both for dividend increase and decrease announcements.

Catering Hypothesis: According to the Catering Hypothesis, in times of high market dividend premium, managers cater to the market by paying out more dividends.[5]

10. *DIVPREM.* I computed a monthly measure of the dividend premium (DIVPREM) associated with dividend payers relative to nonpayers. The monthly frequency permits the use of year fixed effects in the regressions. According to the Catering Hypothesis, when DIVPREM is high, the price response to a dividend increase is positive, and to a dividend decrease is negative.

Control Variables: A set of control variables are employed to control for other drivers of response to dividend changes, that are not related to any specific hypothesis.

11. *LEV.* Jensen (1986) showed that debt is used as an alternative to dividends to reduce the FCF problem. Unfortunately the prediction on leverage can go either way, depending on who, between the board of directors (principal) and the management (agent), is in charge of setting the firm's leverage ratio.[6] I therefore keep the leverage in the model as a control variable, but it is not used as a predicting variable.

12. *Size Variables: SALES, ASSETS.* Total sales and total assets are used as proxy for size. Size might matter in the response to dividend changes, because large companies have

[5] Baker and Wurgler (2004) use four different measures of dividend premium: (1) the log of the ratios of average market to books of payers relative to nonpayers; (2) the log of the ratio of the Citizens Utilities cash dividend class share price to the stock dividend class share price; (3) the dividend initiation announcement abnormal return and (4) future (t+1) relative returns for value weighted indices of dividend payers and nonpayers. As expected, all four measures are roughly correlated , and the log of the market to book ratio seems to be the single best measure of the common factor among the four measures. For this reason, I use the difference in the logs between the average market to book ratios of dividend payers and non payers, that is the log of the ratio of average market to books, as my measure of market dividend premium.

[6] If the board of directors sets the leverage ratio, companies with a high leverage ratio are subject to more agency costs ex-ante and therefore highly sensitive to dividend changes. If the managers set the capital structure policy, companies with low leverage are exposed to severe agency problems ex-post, and therefore low-leveraged companies have high sensitivity to dividend changes. Most likely, the capital structure policy is a commonly shared decision between management and boards, and therefore the prediction is uncertain.

easier access to financial resources, and therefore have a more aggressive dividend policy. In addition, size could proxy both for asymmetric information and agency problems.

Table 3 summarizes the predictions for each hypothesis.

[Table 3 about here.]

4.2 Results from Multiplicative Interaction Regressions

I use a multiplicative interaction model with Ordinary Least Squares (OLS) regressions to test the Dividend Hypotheses predictions for dividend increases and decreases announcements. The regression follows the form: $Y = \beta_0 + \beta_1 X + \beta_2 Z + \beta_3 XZ + \varepsilon$. The marginal effect of the independent and control variables (X) on the stock price response (Y) to dividend changes is a function of the magnitude of the dividend yield change (Z). Interacting the independent variables with the dividend yield change, I can measure the marginal effect and the significance of the independent variables under a wide range of dividend changes. Both the interaction term (XZ) as well as all the constitutive terms (X and Z) must be included when specifying multiplicative interaction models. In fact, omitting some of the constitutive terms could bias the other coefficients.

An additional step is required to interpret the results of the interaction model, because the dividend yield change variable (Z) by definition does not have a natural zero and it is not a dichotomous variable. The coefficient β_1 of the independent variable (X) is just the marginal effect of X on Y when the dividend yield change is zero, and not, as a naive interpretation of the results might suggest, the unconditional marginal effect of a change of X on Y. The coefficient β_1 of the independent variable (X) is therefore substantially meaningless, because we want to observe the effect exactly when the dividend change is not zero. In addition, the coefficient β_3 of the interaction term (XZ) is not by itself sufficient to convey the significance of the marginal effect of the independent variable and does not throw enough light on the tested hypotheses.

The true marginal effect and standard errors of X on Y are calculated as

$$\frac{\partial Y}{\partial X} = \beta_1 + \beta_3 * Z$$
$$\sigma = \sqrt{Var(\hat{\beta_1}^2 + \hat{\beta_3}^2 + 2ZCov(\hat{\beta}1, \hat{\beta_3}))}$$

For each independent variable, I therefore plot the marginal effect and the 95% confidence interval across the observed range of dividend yield change. The plot of the marginal effect, rather than the results of the table, convey the best information on the effect of X on Y. For a detailed survey on multiplicative interaction models, refer to Brambor, Clark, and Golder (2006).

As shown in Figure 1, the number of dividend changes is not constant over the years. I therefore add a year-fixed effect to control for this time-varying effect. Moreover, Figure 1 shows that each firm changes dividends more than 9 times on average over the years. I control for panel covariances in the residuals and in the independent variables by clustering at the firm and year level using the double-clustering method of Peterson (2006). Several specifications of the multiplicative interaction model have been performed. Specification (1) is the full-sample regression with year fixed effect and clustering by year and firm; Specification (2) adds the THETA variable, without the year fixed effect because of the multicollinearity induced by the yearly frequency of the THETA variable; Specification (3) adds the firm fixed effect to specification (1) without the clustering by year, to test for within-company effects; Specification (4) includes the INDDIR and GOVINDEX variables, with a subset of observations; Specification (5) includes the PIN, and represents the full-model with the least number of observations. Results are robust to different specifications. The results are also robust to replacing Sales with Total Assets to control for the firm size (not reported in the tables).

[Figure 2 about here.]

[Figure 3 about here.]

[Figure 4 about here.]

[Figure 5 about here.]

[Figure 6 about here.]

[Figure 7 about here.]

Dividend Signaling Hypothesis: The Dividend Signaling Hypothesis predicts that companies with a high degree of asymmetric information should have a large positive price response to announcement of a dividend increase and a large negative response to announcement of a dividend decrease. The results in Table 5 and in Figures 2 and 3 strongly support the Dividend Signaling Hypothesis for dividend increases. All variables associated with this hypothesis are statistically significant in the direction predicted by the hypothesis, across the observed range of dividend changes. In addition, the larger the dividend increase, the stronger the signaling effect becomes. The results shown in Table 4 and in Figures 2 and 3 do not, however, support the Dividend Signaling Hypothesis for dividend decreases. THETA is the only variable that is statistically significant, and only for large dividend decreases. The inability of the Dividend Signaling Hypothesis to explain the empirical evidence on dividend cuts is in agreement with Grullon, Michaely, Benartzi, and Thaler (2005), who find that companies that cut dividends have higher earnings in the future relative to comparable companies. The applicability of the Dividend Signaling Hypothesis to dividend decreases is also questionable on theoretical grounds, since no separating equilibrium exists in which a manager would be inclined to send a costly negative signal knowing that the market would react negatively.

FCF Hypothesis: The FCF Hypothesis predicts that companies with a high degree of agency problems are more sensitive to dividend changes. The results in Table 5 and in Figures 4 and 5 only partly support the FCF hypothesis for dividend increases. Even though the coefficient on the PROF variable is highly statistically significant, the GOVINDEX variable is significant only in a limited range of dividend changes, whereas the other two variables, INDDIR and CASHRATIO, are not significant at all. Furthermore, the marginal effect does not seem to increase with the amount of dividend change. The results in Table 4 and in Figures 4 and 5 do not support the FCF hypothesis for dividend decreases. None of the coefficients is statistically significant, and for some variables the sign of the coefficient is even in the opposite direction from the predicted one. This evidence supports the idea that companies cut their dividends usually when they are in financial distress, and they need cash to support the operations of the company. These companies, as seen in the descriptive statistics, are close to financial distress, and therefore the managers already have high powered incentives not to waste cash on pet projects.

Maturity Hypothesis: The Maturity Hypothesis assumes that companies entering a mature life-cycle stage are subject to lower systematic risk. There is weak evidence to support the Hypothesis for dividend increase announcements. The results in Table 5 and in Figure 6 show that the RETE coefficient is only weakly significant, the PAYRATIO coefficient is not significantly different from zero, and the AGE coefficient is significant only for large dividend changes. The Maturity Hypothesis instead holds for dividend decreases, as shown in Table 4 and in Figure 6. The RETE coefficient is significant for all but the smallest dividend changes. The PAYRATIO coefficient is also negative and significant. Thus, the negative stock price reaction to dividend decreases is driven by the increase in the systematic risk of the company.

Catering Hypothesis: The Catering Hypothesis predicts that during years of high market dividend premium, the market is very sensitive to dividend changes. The results in Table 5 and in Figure 7 support the Catering Hypothesis for dividend increases and confirm the conclusions of Li and Lie (2006) that the price response is higher during periods of high market dividend premium. In addition, the larger the dividend change, the larger the marginal effect of the catering variable. The results in Table 4 and in Figure 7 do not, however, support the Catering Hypothesis for dividend decreases. Even if the coefficient is negative, it is not statistically significant.

Overall, the multiple interaction regressions show that the positive price response to dividend increases is due primarily to the the signaling of higher future earnings and partially to the reduction of agency problems. In addition, the stock price reaction to dividend increases is larger in times when the market dividend premium is high. The negative price response to dividend decreases is instead mainly due to the transition from a mature life-cycle stage to a decline stage with higher systematic risk, as supported by the Maturity Hypothesis, while agency problems, signaling and catering seem not to be a factor. The results are robust to different specifications:

the coefficients are economically and statistically significant not only between companies with different characteristics, but also within the same company. Specification (3) shows that results are very similar even after controlling for firm fixed effects in the regressions. The addition of firm dummies to the regression has the effect of focusing the regression on the the dividend changes of the same company across time, as if we were following its business evolution over time and measuring the stock price reaction under different life-cycle stages.

[Table 4 about here.]

[Table 5 about here.]

5 Conclusions and Future Research

This paper investigates the price sensitivity to announcement of dividend changes. The Dividend Signaling, the Free-Cash-Flow, the Maturity and the Catering Hypotheses are tested by performing a multiplicative interaction cross-sectional regression of cumulative abnormal returns over the characteristics of the companies. To my knowledge, this paper is the first comprehensive study that tests the four dividend distribution hypotheses all at once.

The main results of the paper are that the positive price response to dividend increases is primarily due to the signaling of higher future earnings and only partially due to the reduction of agency problems. In addition, the stock price reaction to dividend increases is highly sensitive to the market dividend premium, as stated by the Catering Hypothesis, and it is robust to controlling for other hypotheses and other variables. The entrance to a low-risk stage, as implied by the Maturity Hypothesis, does not play a role in the stock price reaction to dividend increases.

The negative price response to dividend decrease announcements, however, is due mainly to the transition from a mature life-cycle stage to a decline stage resulting in higher systematic risk, as supported by the Maturity Hypothesis, while agency problems, future earnings signaling and catering do not contribute to the observed abnormal returns.

A Appendix

A.1 Variable Definitions in the Descriptive Statistics

Most of the definitions follow the measures used in Frank and Goyal (2003) and are considered standard in the literature. Data are available from Compustat and CRSP databases over the period Jan 1963 - Dec 2005. The Compustat data refer to the end of the fiscal year prior to the announcement of the dividend change. The item # in parenthesis refers to the corresponding item in the Annual Compustat Industrial Data.

Age AGE (in Years)=Announcement Date - Foundation Date. As in Grullon, Michaely, and Swaminathan (2002), the first date the company has been listed on CRSP has been used as a proxy of the foundation date.

CAR Cumulative Abnormal Return. See chapter 3.2

Cash Cash and Short term investments (item 1)

Cash over Assets $COA = \frac{Cash}{TA}$

D $D_{i,t}$: Dividend Amount paid by company i at time t

Dividend Change $DC_{i,t} = \Delta D_{i,t} = \frac{D_{i,t} - D_{i,t-1}}{D_{i,t-1}}$ The dividend change is relative to the dividend declared on the previous quarter.

Dividend Yield $DY_{i,t} = \frac{D_{i,t}}{P_{i,t}}$

Dividend Yield Change $DYC_{i,t} = \frac{DY_{i,t} - DY_{i,t-1}}{DY_{i,t-1}}$

E $E_{i,t}$: Annual Earnings of company i made during the fiscal year prior to the announcement at time t

Governance Index GOVINDEX is the average over the years of the governance index for each company as defined in Gompers, Ishii, and Metrick (2003).

Investment Ratio INVR is the ratio between (Research and Development Expenses (item 46)+ Capital Expenditure (item 128)) and total assets (item 6)

Market Dividend Premium DIVPREM: The market dividend premium is measured as the difference in the logs of the average market to book ratios of payers and non payers, as used in Baker and Wurgler (2004)

MTB Market to Book Ratio = $MTB = \frac{MVA}{TA}$

MVA Market Value of Assets = $MVA_{i,t}$ is the sum of the market value of equity (price-close (item 99) x number of shares outstanding (item 54))+ debt in current liabilities (item 34) + long term debt (item 9) + preferred liquidation value (item 10) - deferred taxes and investment tax credit (item 35)

P $P_{i,t}$: Price of company i at time t

Payout Ratio PAYRATIO = Cash dividends declared on common stocks (item 21) divided by Income before extraordinary items (item 18)

PIN PIN = Probability of informed Traders. The sample covers stocks from the NYSE/AMEX from 1983 to 2001, as used in Easley, Hdvidkjaer, and O'Hara (2005)

Profitability PROF = income before extraordinary items is the ratio between the income before extraordinary items (item 18) and the total assets (item 6)

Sales Sales (Net) (item 12)

Tangibility TANG is the ratio between the Net Property, Plant and Equipment (item 8) and the total assets (item 6)

Total Assets TA (item 6)

Total Debt over Assets TDA is the ratio of the total debt (debt in current liabilities (item 34) + long term debt (item 9)) and the total assets (item 6)

THETA THETA measures the relative after tax income from dividends vs retained earnings, as defined in Poterba (1987). The data on Theta from 1964 to 2003 are taken from Poterba (2004)

Z-Score Z-SC is the unleveraged Z-Score and it is calculates as (3.3 x Pretax income (item 170) + Sales (item 12) + 1.4 x retained earnings (item 36) + 1.2 x (current assets (item 4) - current liabilities (item 5)))/Total assets (item 6)

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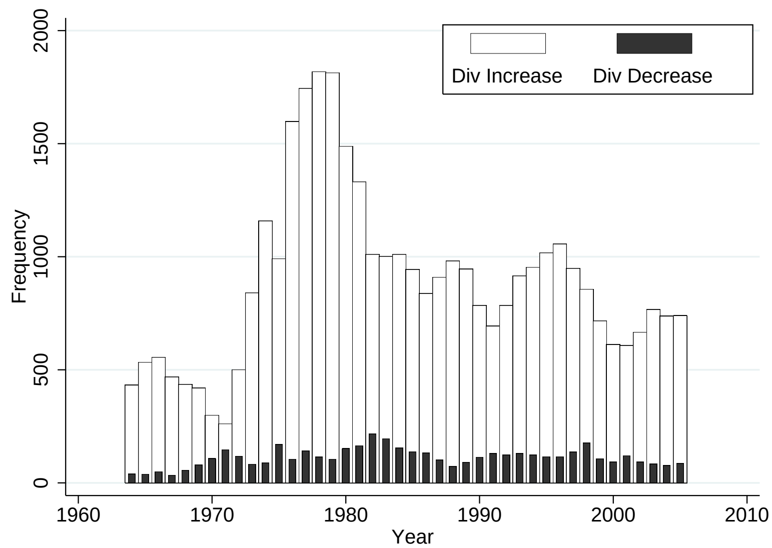
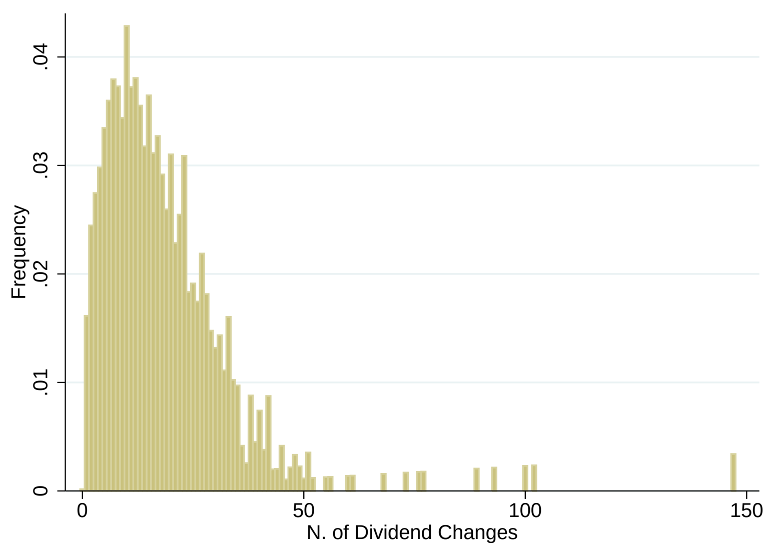
Figure 1: Frequency of Dividend Changes by Year and Firm

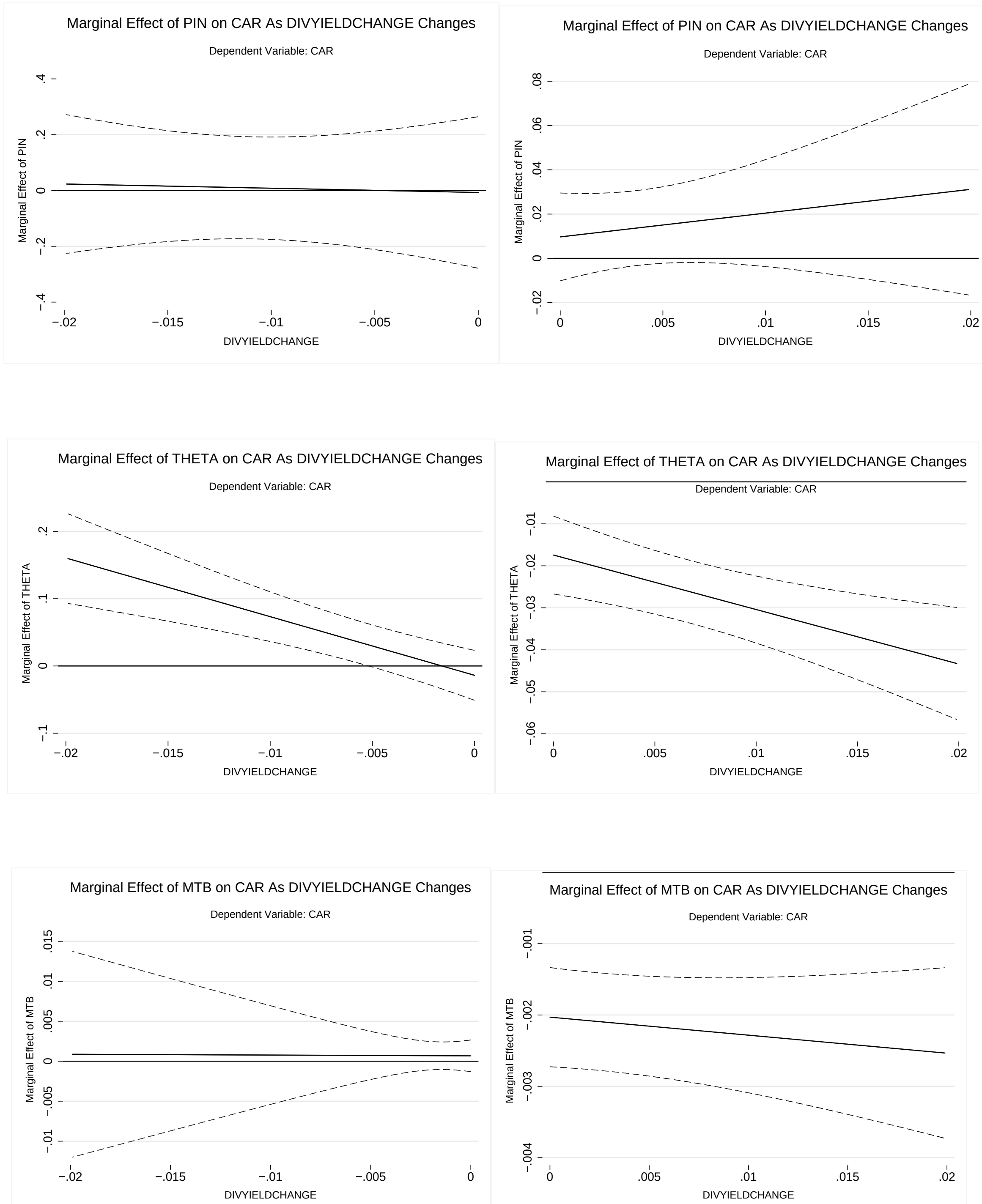


(a) By Year



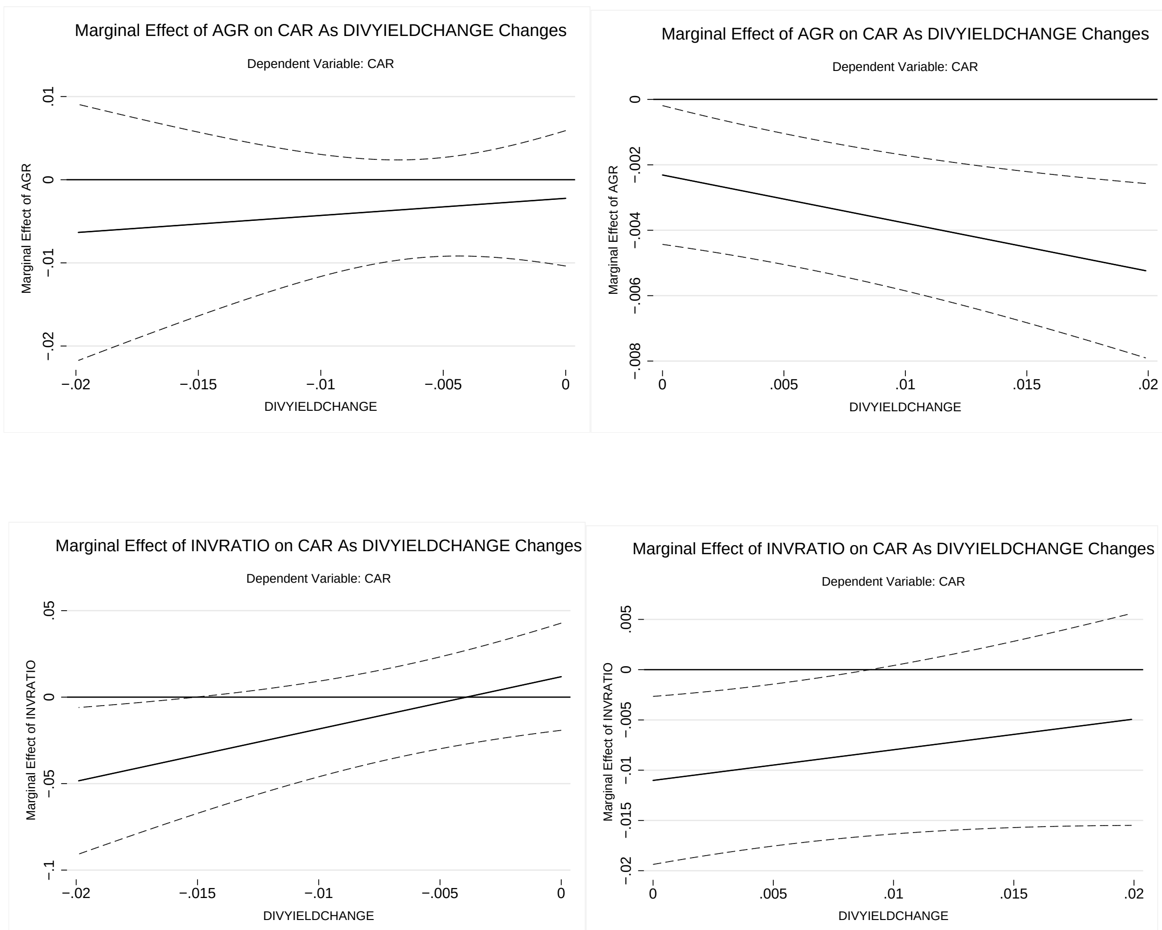
(b) By Firm

Figure 2: Marginal Effects of Signaling variables on CAR as Dividend Yield Changes



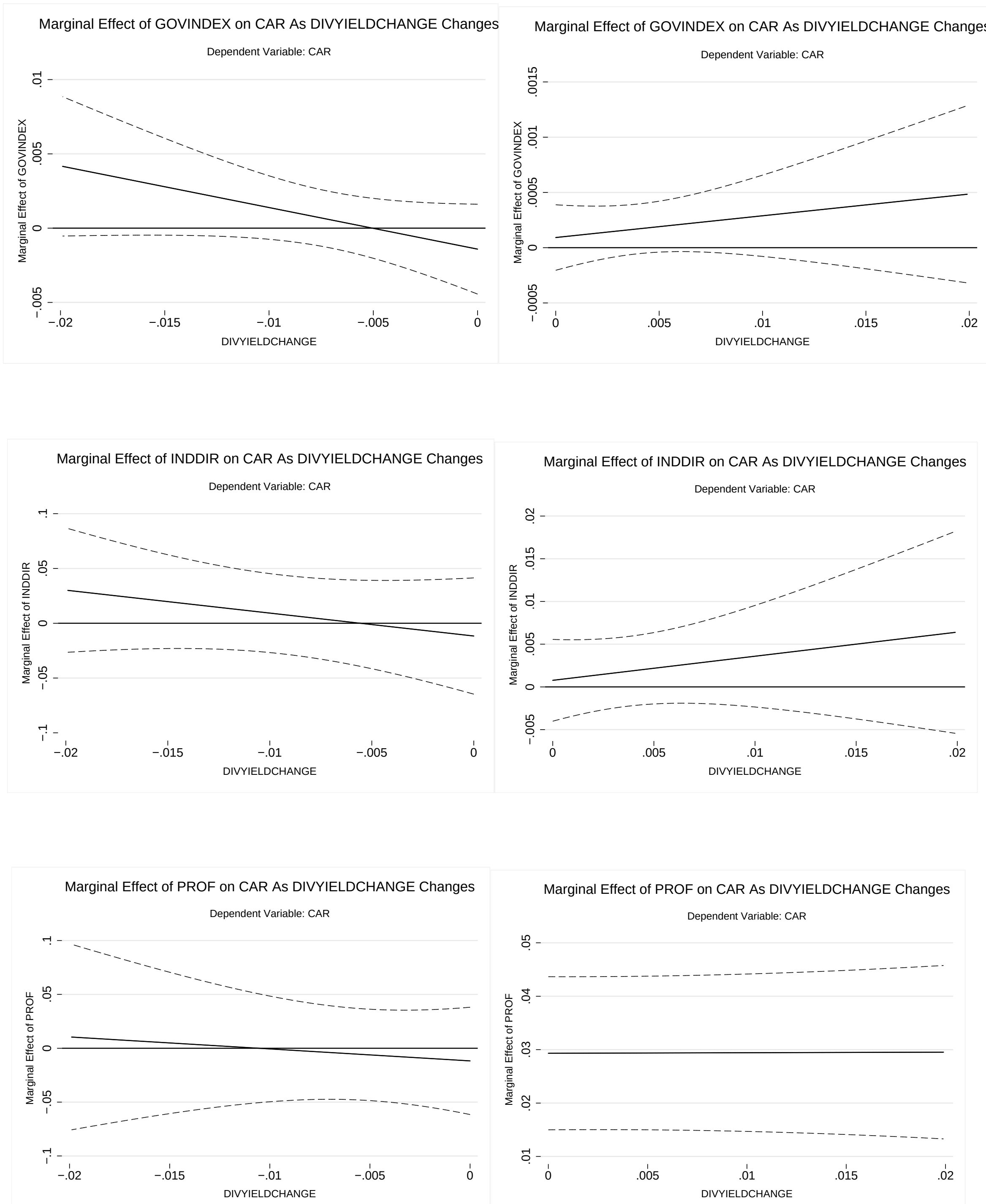
NOTE: The solid line is the average marginal effect, and the dotted lines delimit the 95% confidence interval. The data are taken respectively from the regression specification (4), (2) and (1)

Figure 3: Marginal Effects of Signaling variables on CAR as Dividend Yield Changes (CONT)



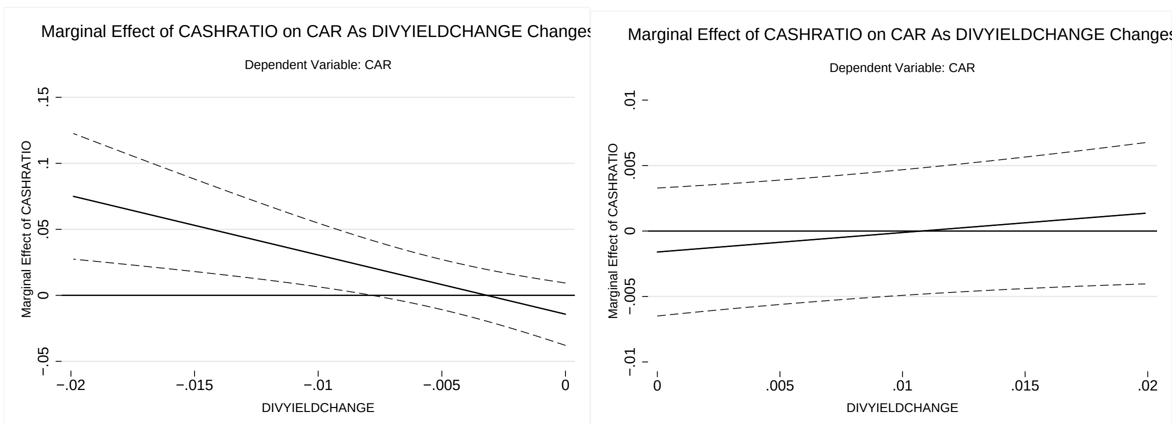
NOTE: The solid line is the average marginal effect, and the dotted lines delimit the 95% confidence interval. The data are taken from the regression specification (1)

Figure 4: Marginal Effects of FCF variables on CAR as Dividend Yield Changes



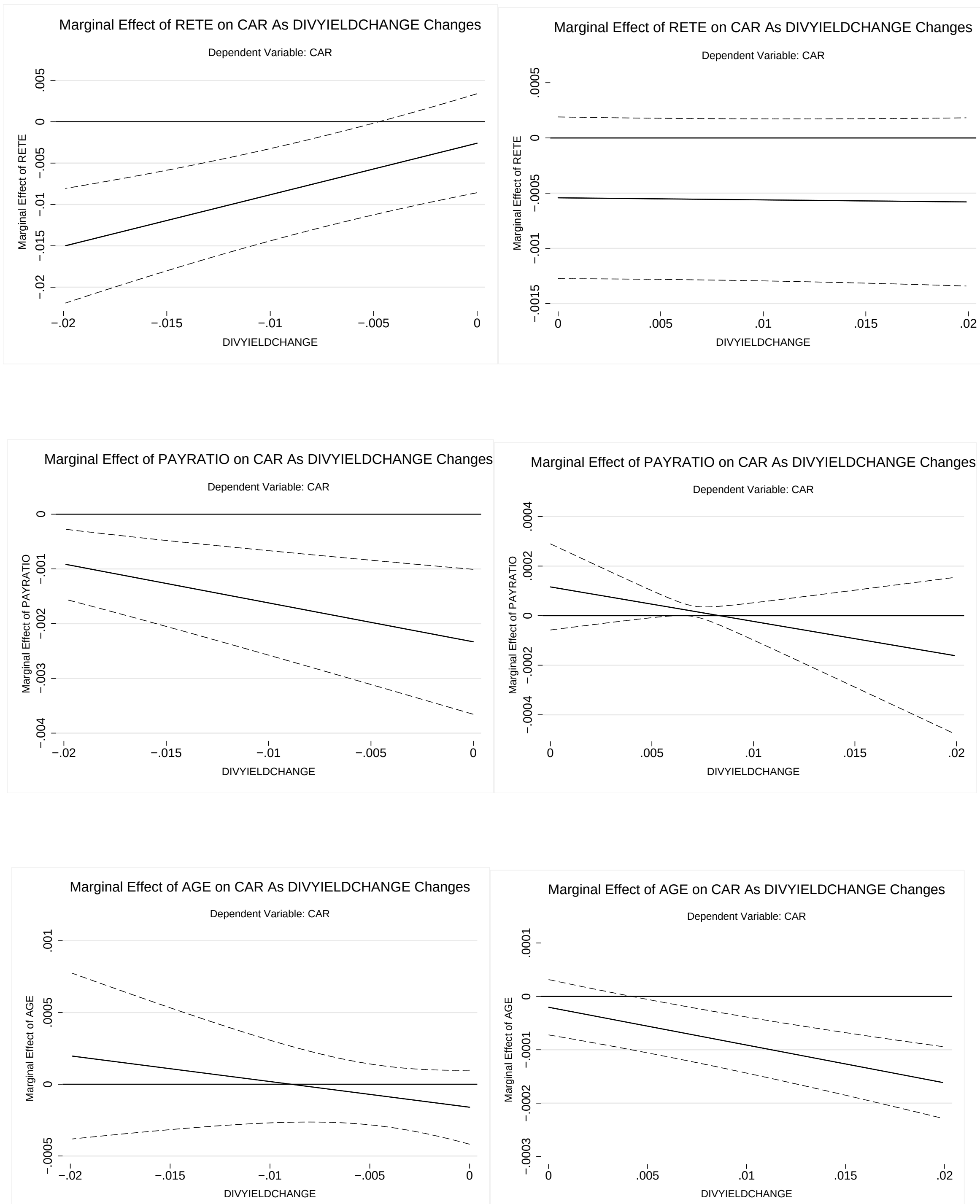
NOTE: The solid line is the average marginal effect, and the dotted lines delimit the 95% confidence interval. The data are taken respectively from the regression specification (3), (3) and (1)

Figure 5: Marginal Effects of FCF variables on CAR as Dividend Yield Changes (CONT)



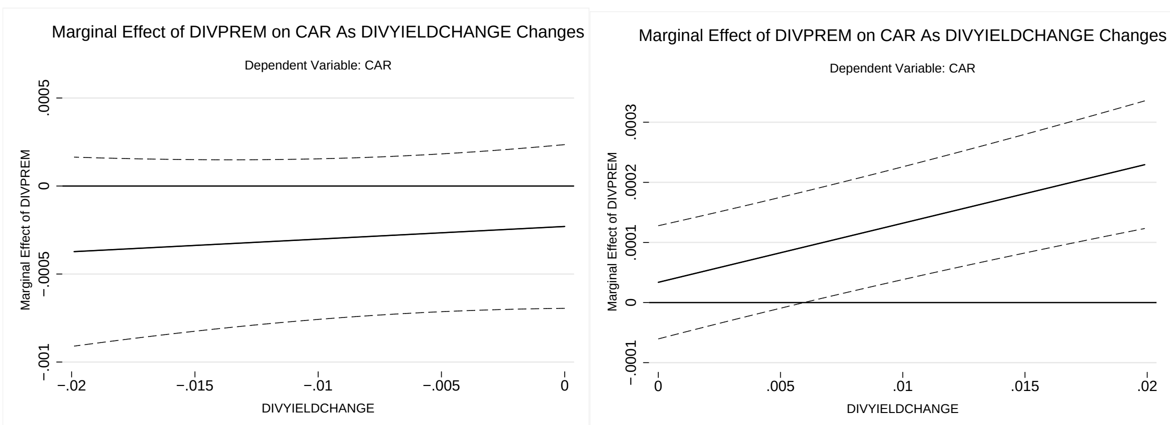
NOTE: The solid line is the average marginal effect, and the dotted lines delimit the 95% confidence interval. The data are taken from the regressio specification (1)

Figure 6: Marginal Effects of Maturity variables on CAR as Dividend Yield Changes



NOTE: The solid line is the average marginal effect, and the dotted lines delimit the 95% confidence interval.

Figure 7: Marginal Effects of Catering variables on CAR as Dividend Yield Changes



NOTE: The solid line is the average marginal effect, and the dotted lines delimit the 95% confidence interval.

List of Tables

Table 1: Descriptive Statistics of Dividend Decreasing Firms

Variable	Obs.	Mean	Std. Dev.	Min	Max	Dividend Payers Mean
Dividend Decreases						
CAR	4,330	-0.0130	0.0604	-0.7462	0.6116	0.0021***
Dividend Change	4,330	-0.2863	0.2337	-1.0000	0.0000	
Dividend Yield	4,330	0.0317	0.0215	0.0000	0.2734	0.0379***
Dividend Yield Change	4,330	-0.0085	0.0095	-0.1360	0.0000	
Age	4,330	13.5143	8.7762	2.0000	43.0000	13.8175***
AGR	4,330	0.1197	0.2548	-0.6569	5.2022	0.1327*
Cash	4,330	225	1,583	0.0000	68,128	312***
Cash Ratio	4,330	0.0836	0.1095	0.0000	0.9668	0.8556
Dividend Premium	4,330	-8.4592	15.5258	-60.1800	32.9000	-7.5999
Governance Index	811	9.5215	2.6497	2.0000	16.0000	9.8446*
Independent Directors	1,127	0.6612	0.1664	0.0000	0.9354	0.6735*
Invratio	4,330	0.0714	0.0670	0.0000	0.7411	0.0726
Leverage	4,330	0.1847	0.1432	0.0000	0.7700	0.1754***
MTB	4,330	0.9599	1.0221	0.0417	14.7677	0.9555***
MVA	4,330	2,251	13,599	2	700,864	2,570
Payout Ratio	4,330	0.6250	4.0565	-63.5732	200.7029	0.4865
PIN	1,064	0.2025	0.0728	0.0419	0.5472	0.1857***
Profitability	4,330	0.0466	0.0581	-0.5228	0.5548	0.0559***
RETE	4,330	0.6073	0.3470	-4.9864	4.1425	0.6723***
Sales	4,330	1,618	5,885	0.0000	162,412	1,676
Theta	4,176	0.7833	0.0601	0.6620	0.9200	0.7806
Total Assets	4,330	3300	15441	2	406105	3564

NOTE: This table reports the characteristics of the companies during the fiscal year prior to the announcement of the dividend change according to the criteria listed in section 3.1. The definition and the source of the characteristics can be found in the appendix. The last column reports the mean of the characteristics of the companies that do not announce a similar dividend change. I perform a Student's t-test to find whether the characteristics between companies that change dividends and companies that don't change dividends are statistically different at the 5% level (*), 1% level (**) and 0.1% level (***).

Table 2: Descriptive Statistics of Dividend Increasing Firms

Variable	Obs.	Mean	Std. Dev	Min	Max	Dividend Payers Mean
Dividend Increases						
CAR	33,896	0.0071	0.0362	-0.3693	0.5608	0.0007***
Dividend Change	33,896	0.2046	0.5194	0.0000	39.0000	
Dividend Yield	33,896	0.0378	0.0260	0.0006	1.6381	0.0376***
Dividend Yield Change	33,896	0.0086	0.2488	0.0000	43.4103	
Age	33,896	13.4009	8.8797	2.0000	43.0000	13.9441***
AGR	33,896	0.1490	0.2154	-0.9803	8.6036	0.1289***
Cash	33,896	414	3,025	-9.1740	132,657	295***
Cash Ratio	33,896	0.0906	0.1015	-0.0096	0.9649	0.0845***
Dividend Premium	33,896	-7.0045	15.8668	-60.1800	32.9000	-7.7672***
Governance Index	14,206	9.8215	2.6442	2.0000	17.7500	9.8204*
Independent Directors	17,134	0.6762	0.1535	0.0000	0.9412	0.6730
Investment Ratio	33,896	0.0688	0.0637	0.0000	0.8740	0.0731***
Leverage	33,896	0.1644	0.1410	0.0000	0.9115	0.1779***
MTB	33,896	1.0278	1.0239	0.0018	15.0088	0.9418***
MVA	33,896	3,448	20,528	0.2470	914,604	2,453***
Payout Ratio	33,896	0.4927	15.5190	-213.9312	2,006.7500	0.4881
PIN	8,855	0.1799	0.0684	0.0000	0.7590	0.1870***
Profitability	33,896	0.0635	0.0504	-0.5228	0.5503	0.0539***
RETE	33,896	0.6833	0.4410	-8.1768	49.4395	0.6685***
Sales	33,896	1,814	6,714	-11	245,308	1,668
Theta	32,440	0.7772	0.0632	0.6620	0.9200	0.7812***
Total Assets	33,896	4,496	25,436	2	1,110,457	3,448***

NOTE: This table reports the characteristics of the companies during the fiscal year prior to the announcement of the dividend change according to the criteria listed in section 3.1. The definition and the source of the characteristics can be found in the appendix. The last column reports the mean of the characteristics of the companies that do not announce a similar dividend change. I perform a Student's t-test to find whether the characteristics between companies that change dividends and companies that don't change dividends are statistically different at the 5% level (*), 1% level (**) and 0.1% level (***).

Table 3: Dividend Hypotheses Predictions

Independent Variables	Prediction of Price Reaction: Dividend Decreases	Dividend Increases
Dividend Signaling		
- PIN	−	+
- THETA	+	−
- MTB	−	−
- Asset Growth Rate (AGR)	−	−
- Investment Ratio (INVRATIO)	−	−
Free-Cash-Flow		
- Governance Index (GOVINDEX)	−	+
- Ratio of Independent Directors (INDDIR)	+	−
- Profitability (PROF)	−	+
- Cash Ratio (CASHRATIO)	−	+
Maturity		
- Ret. Earn Ratio (RETE)	−	−
- Payout Ratio (PAYRATIO)	−	−
- Age	−	−
Catering		
- Dividend Premium (DIVPREM)	−	+

NOTE: The table shows the prediction of the price reaction to the announcement of a dividend change as a function of an increase in the independent variable.

Table 4: Regression of Price Response to Dividend Decrease Announcement

Dependent Variable: Cumulative Abnormal Return (CAR)					
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
DIVYIELDCHANGE	2.1088***	8.7742***	2.3029***	7.1166**	8.6449
Dividend Signaling Hypothesis Variables					
PIN					-0.0071
PINDYC					-1.5184
THETA		-0.0139			
THETADYC		-8.7179***			
MTB	0.0007	0.0003	-0.0007	0.0061	-0.0010
MTBDYC	-0.0097	0.3593	-0.2320	-0.4266	-2.1435**
AGR	-0.0022	-0.0012	-0.0029	0.0056	0.0286**
AGRDYC	0.2061	0.3026	0.2632	0.1055	3.8906***
INVRATIO	0.0118	0.0123	0.0144	-0.1164*	-0.1631
INVRATIODYC	3.0243***	2.6591**	3.3062**	-8.5597	-7.9715
FCF Hypothesis Variables					
GOVINDEX				-0.0014	-0.0046***
GOVINDEXDYC				-0.2799**	-0.4008**
INDDIR				-0.0116	-0.0243
INDDIRDYC				-2.0928	-3.4894
PROF	-0.0117	-0.0061	0.0057	0.0096	0.0885
PROFDYC	-1.1114	-1.4759	0.6348	-2.9081	-1.5511
CASHRATIO	-0.0143	-0.0199*	-0.0232*	-0.0186	-0.0672
CASHRATIODYC	-4.4863***	-5.6516***	-4.8578***	-1.5130	-8.5676
Maturity Hypothesis Variables					
RETE	-0.0026	-0.0042	-0.0023	-0.0037	-0.0007
RETEDYC	0.6229***	0.4430***	0.5188***	-0.4618	0.0371
PAYRATIO	-0.0023***	-0.0023***	-0.0023***	-0.0020	-0.0039***
PAYRATIODYC	-0.0711***	-0.0694***	-0.0664***	-0.0677*	-0.1287***
AGE	-0.0002	0.0000	-0.0004**	-0.0003	0.0008
AGEDYC	-0.0179	-0.0051	-0.0319*	-0.0311	0.0735
Catering Hypothesis Variables					
DIVPREM	-0.0002	-0.0001	-0.0002	-0.0007	-0.0003
DIVPREMDYC	0.0072	0.0017	-0.0070	0.0035	-0.0283
Control Variables					
LEV	-0.0281***	-0.0225**	-0.0220**	-0.0095	0.0230
LEVDYC	-2.5427**	-2.5613**	-2.2226*	-0.4467	-2.6039
SALES	0.0000	0.0000	0.0000	0.0000*	0.0000
SALESDYC	0.0000	0.0000	0.0000	-0.0001***	-0.0001
Year Fixed Effect	Yes	No	Yes	Yes	Yes
Firm Fixed Effect	No	No	Yes	No	No
Cluster By Year	Yes	Yes	No	Yes	Yes
Cluster By Firm	Yes	Yes	Yes	Yes	Yes
N. of Obs	4,330	4,176	4,330	692	344
R-Squared	0.1003	0.0839	0.0977	0.1258	0.1813

NOTE: Multiplicative Interaction Regression Model of Cumulative Abnormal Returns (CAR) relative to the beta-decile benchmark portfolio on a [-1,+1] day window upon announcement of a dividend decrease. The definitions of the independent and control variables are listed in the appendix. The independent variable names ending in DYC are the independent variables interacted with the dividend yield change. Statistical significance is defined at the 10% level (*), 5% level (**) and 1% level (***).

Table 5: Regression of Price Response to Dividend Increase Announcement

Dependent Variable: Cumulative Abnormal Return (CAR)					
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
DIVYIELDCHANGE	0.2463***	1.3088***	0.2287***	-0.0385	-0.2432
Dividend Signaling Hypothesis Variables					
PIN					0.0097
PINDYC					1.0750
THETA		-0.0174***			
THETADYC		-1.2977***			
MTB	-0.0020***	-0.0024***	-0.0020***	0.0000	0.0006
MTBDYC	-0.0253	-0.0121	-0.0322	-0.4586***	-0.3607*
AGR	-0.0023**	-0.0026**	-0.0022**	-0.0006	-0.0032
AGRDYC	-0.1471**	-0.0816	-0.1357**	-0.2924	0.5261*
INVRATIO	-0.0110**	-0.0074	-0.0095*	-0.0101	0.0166
INVRATIODYC	0.3050	-0.0758	0.2321	0.5552	-3.4482*
FCF Hypothesis Variables					
GOVINDEX				0.0001	-0.0002
GOVINDEXDYC				0.0197	0.0308
INDDIR				0.0008	0.0028
INDDIRDYC				0.2821	-0.4036
PROF	0.0293***	0.0352***	0.0189**	-0.0154	-0.0360
PROFDYC	0.0103	-0.2746	0.0538*	6.1962***	7.7581***
CASHRATIO	-0.0016	-0.0028	-0.0006	0.0077	-0.0096**
CASHRATIODYC	0.1488	0.2028**	0.1464*	-0.9909	2.0877**
Maturity Hypothesis Variable					
RETE	-0.0005	-0.0005	-0.0005*	-0.0011	-0.0015**
RETEDYC	-0.0019	0.0030	-0.0026	0.1865	0.3687***
PAYRATIO	0.0001*	0.0000	0.0001	-0.0002*	0.0000
PAYRATIODYC	-0.0139	0.0027	-0.0125	0.0331	-0.0268
AGE	0.0000	-0.0001**	0.0000	0.0000	-0.0001
AGEDYC	-0.0071***	-0.0044***	-0.0063***	-0.0013	-0.0032
Catering Hypothesis Variable					
DIVPREM	0.0000	0.0000	0.0000	0.0001	0.0002
DIVPREMDYC	0.0098***	0.0096***	0.0092***	0.0116**	0.0160**
Control Variables					
LEV	0.0050***	0.0060***	0.0037*	-0.0007	-0.0097**
LEVDYC	-0.0092	-0.1025	-0.0007	1.1228**	1.9208**
SALES	0.0000*	0.0000*	0.0000***	0.0000***	0.0000
SALESDYC	0.0000***	0.0000	0.0000***	0.0000	0.0000***
Year Fixed Effect	Yes	No	Yes	Yes	Yes
Firm Fixed Effect	No	No	Yes	No	No
Cluster By Year	Yes	Yes	No	Yes	Yes
Cluster By Firm	Yes	Yes	Yes	Yes	Yes
N. of Obs	33,896	32,440	33,896	12,482	5,102
R-Squared	0.0234	0.0227	0.0230	0.0350	0.0186

NOTE: Multiplicative Interaction Regression Model of Cumulative Abnormal Returns (CAR) relative to the beta-decile benchmark portfolio on a [-1,+1] day window upon announcement of a dividend increase. The definitions of the independent and control variables are listed in the appendix. The independent variable names ending in DYC are the independent variables interacted with the dividend yield change. Statistical significance is defined at the 10% level (*), 5% level (**) and 1% level (***).