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AN EMPIRICAL ANALYSIS OF REACTIONS TO DIVIDEND POLICY CHANGES FOR NASDAQ FIRMS

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Abstract

This study further examines the information content of dividend policy by concentrating on the rationale for the initiation or omission of dividend payments for NASDAQ firms. Cross-sectional weighted least squares regression provides strong support for the dividend signaling hypothesis, and only limited support for the free cash flow argument, in explaining stock price reactions to announcements of dividend policy changes. The use of an improved event study methodology that controls for fluctuations in idiosyncratic risk around the announcement, documents significant wealth and variance effects upon the initiation or omission of dividends by NASDAQ firms.

INTRODUCTION

Miller and Modigliani [17] argue that, in a perfect world, the value of the firm is unaffected by its dividend decision, so there should not be any wealth effect upon the announcement of a change in dividend payout policy. It is well known that stock prices generally move in the direction of the dividend change.[1] The signaling arguments developed by Bhattacharya [4] John and Williams [12] and Miller and Rock [18] present the basis for arguments of asymmetric information between managers and shareholders. Given this environment, management has the incentive to signal positive firm-specific private information to shareholders. Negative information would be withheld until financial constraints force the release of the such information.

Jensen's [11] free cash flow/overinvestment hypothesis (FCF) provides an alternative explanation for the positive relationship between the direction of the dividend change and the stock price reaction. Jensen argues that managers tend to hoard cash to invest in negative NPV projects for their own utility maximization. The agency costs that result from this overinvestment decrease the value of the firm. Like the signaling hypothesis, the FCF argument suggests there should be a positive relationship be the direction of the dividend policy change and the stock price reaction. However, the FCF argument differentiates itself with respect to the level of growth opportunities faced by the firm. If a firm initiated a cash dividend, FCF arguments postulate there are fewer funds available for costly overinvestment. Likewise, with dividend omissions, the strongest form of a decrease would reduce the value of the firm because there are more funds available for overinvestment. The FCF hypothesis predicts larger stock price reactions for firms with few growth opportunities as opposed to firms with many growth opportunities.

Previous studies provide somewhat contradictory results which support Mann's [16] conclusion that the "dividend puzzle" remains. The purpose of this research is to test the dividend signaling and free cash flow hypothesis to determine if either hypothesis better explains stock price reactions to changes in dividend policy for NASDAQ firms.

This study differs from previous research in focus and methodology. Only NASDAQ firms are used, firms that have been excluded in most previous studies. NASDAQ firms yield an alternative test of the signaling and cash flow hypotheses. During the time period of this study, 1976-1991, NASDAQ firms tend to be smaller and less closely scrutinized than their NYSE/AMEX counterparts. In many instances, NASDAQ firms had fewer major press releases, which should increase the relative value of each signal brought to the market. Methodologically, this paper

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applies an event study methodology that disentangles the mean effect from the variance effect when measuring a change in stock prices. This methodology should provide a more accurate test of the wealth effect of dividend announcements.

The choice of dividend initiations and omissions as opposed to changes in dividend payments should allow for a stronger test of the FCF hypothesis. As determined by Asquith and Mullins [1], dividend initiations and omissions reduce the bias in estimating the dividend surprise because the announcements are less likely to be anticipated. This allows for a stronger test of the signaling hypothesis. In addition, for dividend initiations, the ex-ante dividend yield is zero, so stock price reactions to such announcements are unlikely to be distorted by the investor's preference for dividends. Finally, the use of dividend initiations and omissions complements Yoon and Starks [23] and Denis, Denis, and Sarin [8] who examine dividend changes.

Consistent with earlier studies on NYSE/AMEX firms, we find strong support for the signaling hypothesis. Unlike many earlier studies, we find the FCF hypothesis is important in determining the information content of dividend initiation announcements.

METHODOLOGY AND DATA

Cross Sectional Regression

To initially assess the FCF and signaling arguments, the following general form weighted least squared regression analyses are run:

Equation 1

$$CAR_{j,t} = \alpha + \beta_1 x_{j,1} + \ldots + \beta_n x_{j,n} + e_t \text{ for i=1 to N}$$

where,

$CAR_{j,t}$ = the two-day CAR for firm j,
$x_{j,1}$ = the n^{th} independent regressor variable for firm j,
β_n = the slope coefficient

Bajaj and Vijh [2] show the dividend yield should be considered in the dividend decision. The dividend omission sample is segmented by the anticipated dividend yield to examine the investor's preference for dividends. The change in dividend yield, CHGYLD, is defined as:

Equation 2

$$CHGYLD = (D_1 - D_0)/P_{t-5}$$

where,

D_1-D_0 = the magnitude of the annualized dividend change, and
P_{t-5} = the closing stock price five days preceding the announcement

This standardization provides a relative measure of dividend changes that can be compared across firms regardless of size. With dividend initiations and omissions, the absolute value of CHGYLD is the dividend yield.

Computation of Tobin's Q

The proxy for growth opportunities is the Tobin's q ratio (Q), which is the ratio of the market value of the firm's equity and debt over the replacement cost of assets. It is recognized there are some difficulties using average Q to distinguish between high and low growth firms; however, Perfect and Wiles [19] argue Tobin's Q is the best proxy readily available to measure growth opportunities. Although the relationship between Tobin's q and marginal profitability of growth opportunities is not unambiguous, Barclay and Litzenberger [3] suggest this relationship is

positive. In addition, Lang and Litzenberger [13] demonstrate that an average q greater than one is a necessary condition for a firm that invests in positive NPV projects. Further, they indicate that an average q less than one is the sufficient condition for the firm to lack such projects. Therefore, we define firms with a Tobin's q greater than one as value maximizers and less than one as overinvestors, consistent with Lang and Litzenberger.

We follow the methodology of Lindenberg and Ross [15], with modifications similar to those in Lang, Stulz, and Walkling [14] to compute the Q ratio. The market value of common stock is computed using price and number of shares outstanding data from the CRSP daily return file. The market value of preferred stock is computed by dividing the per share preferred stock dividend from the Compustat Annual file, by the per share preferred stock yield from the Standard and Poor's Corporate Series. All variables are computed at the end of the fiscal year prior to the dividend initiation or omission announcement.

In calculation of the denominator of the Q ratio, the replacement cost of plant and inventory are assumed to be equal to book value, and the technological parameter is zero. Then, adopting the Lindenberg and Ross [15] algorithm, inflation data from the Producer Price Index Capital Goods Series from the Bureau of Labor Statistics are used to compute the replacement cost of assets.

Event Study Methodology

Ross [21] shows that increases in the rate of idiosyncratic information flow may increase the residual variance of stock returns, rather than their mean value, which is a measure of the wealth effect. Without allowing for possible increases in residual variance, i.e., the variance effect, one may misinterpret the apparent stock price reaction as a wealth effect.[2] As a result, a positive wealth effect may be ascribed when there is really no true wealth effect, but rather a strong variance effect. Sanders and Robins [22], following Collins and Dent [7], develop both a conditional test statistic which allows for heteroskedastic abnormal returns across events, and an unconditional test statistic, which allows for both heteroskedasticity and changes in residual variance upon announcement. This allows for the separation of the wealth and variance effects. We use these test statistics to test both the *conditional* and *unconditional* wealth effects of NASDAQ dividend announcements on stock returns.

A two-day market model prediction error is used to measure the abnormal return of stock j for period t, that is, $AR_{j,t}$. The announcement period is defined as the two-day period composed of the *Wall Street Journal* (WSJ) announcement date (t=0) and the preceding day (t=-1). The 90 two-day periods from t=-261 to t=-82 are used to estimate the market model parameters. The CRSP equally weighted index is used as the market proxy.[3]

The average standardized abnormal return, AR_t, is:

Equation 3

$$AR_t = \frac{\sum_{j=1}^{N} AR_{j,t} / S_{j,t}^2}{\sum_{j=1}^{N} 1 / S_{j,t}^2}$$

where,

$AR_{j,t}$ = the two-day abnormal return for firm j,
$S^2_{j,t}$ = the residual variance of firm j,
N = the number of announcements, and
t = -1,0.

The variance of the standardized abnormal return, $S^2_{j,t,}$ is:

Equation 4

$$S_{j,t}^2 = S_j^2 \left[1 + \frac{1}{T} + \frac{(R_{m,t} - R_m)^2}{\sum_{i=1}^{T} (Rm,i - R_m)^2} \right]$$

where,

$S^2_{j,t}$ = the residual variance of firm j,
$R_{m,t}$ = the market return in the event period,
$R_{m,i}$ = the market return for the i^{th} period,
R_m = the average market return over the estimation period, and
T = the length of the estimation period (90 two-day periods).

The conditional variance, which assumes the dividend announcement has no impact on the residual variance of stock returns, for the average standardized abnormal return, V^2_t, is:

Equation 5

$$V_t^2 = 1/\left[\sum_{j=1}^{N}(1/S_{j,t}^2)\right]$$

Under the null hypothesis that dividend announcements have no conditional wealth effect on stock returns, the test statistic for the *conditional* wealth effect is:

Equation 6

$$Z = (AR_t - m)/V^t$$

which has a limiting unit normal distribution.

To capture the impact of the announcement on the variances of abnormal returns, we use the unconditional variance of AR_t:

Equation 7

$$S_t^2 = \frac{\sum_{j=1}^{N}(AR_{j,t} - AR_t^2)/S_{j,t}^2}{(N-1)\sum_{j=1}^{N}1/S_{j,t}^2}$$

to test the hypothesis that dividend announcements have no unconditional wealth effect on stock returns. The test statistic for the *unconditional* wealth effect is:

Equation 8

$t = (AR_t - m)/S_t$ distributed $t_{(n-1)}$.

To test the significance of the residual variance upon the announcement, the ratio of the unconditional variance, S^2_t, to the conditional variance, V^2_t, is computed. A sample specific empirical distribution of 200 two-day ratios from day +131 to day +230 is generated as a comparison group. The event day variance ratio is then compared to the critical percentile (1%, 5%, or 10%) to determine whether there was a significant increase in residual variance upon announcement of the dividend initiation or omission. If a variance effect exists, the ration, S^2_t/V^2_t will be significantly different from one.

Sample Construction and Selection

All NASDAQ dividend initiations and omissions were pulled from the CRSP NASDAQ daily files between 1976 and 1991. From there, we eliminate those dividend initiating companies that paid a dividend in the past five years. To be considered a true dividend omission, the company must have paid a steady stream of dividends for at least the

past five years. To be included for examination, the date of the dividend initiation or omission must be verifiable and must not be contaminated in the 10 days around the event. Finally, the small sample of regulated firms and financial services firms were eliminated due to different accounting practices. The final sample consisted of 69 NASDAQ dividend initiations and 42 NASDAQ dividend omissions.

EMPIRICAL RESULTS

Cross Sectional Regression

In WLS regression analyses, the two-day CAR is the dependent variable and the proxy for Tobin's q (Q), the change in dividend yield (CHGYLD), and a dummy variable for the dividend yield (DYDUM) are the explanatory variables. The results are presented in Table 1. Regressions #1 and #5 are tests of the FCF hypothesis—the Tobin's q regressed against the two-day CAR. The FCF hypothesis predicts a negative(positive) relationship between Q and dividend initiations (omissions). Both regressors are of the predicted sign (-.03 and .01, respectively), however they are not statistically significant. This initial test cannot support FCF arguments.

TABLE 1
WLS Regression Analysis
(t statistics are provided in parentheses)

	Dividend Initiations				Dividend Omissions				
Regression	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Intercept	0.08 (1.24)	-0.03 (-0.73)	-0.03 (-0.42)	-0.03 (-0.63)	-0.06 (-4.43)	-0.08 (-4.14)	-0.01 (0.60)	-0.09 (-3.67)	-0.08 (-4.13)
Q	-0.03 (-0.53)		0.01 (0.05)		0.01 (0.91)			0.01 (0.87)	
CHGYLD		7.06** (2.17)	7.11** (2.08)			-0.29 (-1.21)		-0.54 (-1.37)	
CHGYLD-HQ				7.13** (2.17)					-0.57 (-0.95)
CHGYLD-LQ				6.13 (1.23)					-0.28 (-1.16)
DYDUM							-1.36* (-4.26)		
F Statistic Adjusted R^2	0.28 0.00	4.72** 0.07	2.31*** 0.05	2.34*** 0.05	0.82 0.01	1.46 0.01	18.14* 0.25	1.36 0.02	0.85 0.01

*, ** and *** indicate significance at the .01 level, .05 level, and .10 level, respectively.

Regression #2 is an initial test of the signaling hypothesis. The change in yield, CHYYLD is regressed against the two-day CAR. The signs are as predicted, however, the CHGULD is only significant for the NASDAQ dividend initiations (7.06). This is surprising, given Bajaj and Vijh. [2], so an additional proxy of dividend yield was developed based on Black and Scholes [5] version of historical dividend yield. The purpose of this variable is to provide a measure of anticipated dividend yield. The annualized dividend for months t=-14 to t=-2 prior to the announcement is divided by the closing stock price 5 trading days prior to the omission announcement. The regression equation is:

Equation 9

$$CAR_{,t} = \alpha + \beta_5 D_1 + \varepsilon_t \text{ for i=1 to N}$$

where,

D_1 = 1 if dividend yield is below the median yield and 0 otherwise.

By definition, the anticipated dividend yield is zero for dividend initiations, therefore, the dummy regressor can only be computed for the dividend omission sample. Regression equation #7 reflects a highly significant dividend dummy variable as predicted, (-1.36). This indicated that investors of high yielding securities react negatively to dividend omissions, whereas, lower yielding securities are not as surprised by the dividend omission.

Regression equations #3 and #8 measure CHGYLD after controlling for Q. In the dividend initiation sample, CHGYLD maintains significance, but loses all statistical power in the omissions sample (7.11 and -0.54 respectively). Regression equations #4 and #9 break down CHGYLD by Tobin's q. In the initiation sample, the change in dividend yield for high q firms emerges as the stronger variable while neither variable is significant in the omissions sample.

For the NASDAQ dividend initiations, there is a strong positive relationship between stock price reactions and change in dividend yield, which is a proxy for the level of information conveyed. In the omissions sample, the dummy variable for dividend yield is significant. While the above provides support for signaling arguments, there are some mixed results when the data are divided by q. The change in dividend yield is significant for the high Q firms but not the low Q firms for the initiations sample. This implies the magnitude of the dividend is more significant for higher Q firms.

The regression analysis suggests the level of information conveyed, as measured by the change in the dividend yield and the dividend yield dummy variable, is the driving force behind the differential stock price reactions for overinvestors and value maximizers. Firms with a low dividend yield that omit the dividend convey less information, therefore, the stock price reaction is smaller. The event analysis should cast more light on this picture.

Event Study Results

Stock price reactions to NASDAQ dividend initiations and omissions are reported in Tables 2 and 3 respectively. Four time periods are examined; a two- and three- day event window and well as three-day pre- and three-day post-announcement windows. Day 0 is the date the event was announced in the Wall Street Journal; thus, depending on the time the announcement reached the market, the stock might react on day -1 or day 0. The pre- and post-announcement cumulative abnormal returns (CAR's) were examined to determine the effect of any possible leakage or post-event reaction.

The full NASDAQ initiations sample, reflected in Table 2, Panel A, indicates a positive abnormal return of 4.09% for event window (-1,0) and 5.13% for the three-day period (-1,+1). Both are unconditionally significant at the 1% level (t values of 5.52 and 5.64, respectively). These initial results are supportive of the existing literature (see Asquith and Mullins [1] and Healy and Palepu [10]; however, prior studies such as these focused on NYSE/AMEX firms and it is possible the NASDAQ firms provide more information vis-à-vis a dividend initiation. The pre-announcement CAR of 2.52% is unconditionally significant at the 5% level (t=2.01). The post-announcement CAR of 1.60% is not conditionally significant (t=1.63) despite being conditionally significant (z=2.38), an example of how an unconstrained variance may result in an excessive Type I error.

Panels B and C break down the NASDAQ dividend initiation sample by Tobin's Q per the Lindenberg and Ross [15] algorithm. The results indicate a significant positive unconditional wealth effect in both the two- and three- day event windows. Interestingly, low Q firms (overinvestors) experience significantly greater wealth effects for both event windows. These results are consistent with Lang and Litzenberger [13]. This lends some credence to the free cash flow argument as a partial explanation for the information content of dividends, however, these results may be driven by the correlation between growth opportunities and dividend yield. For the NASDAQ dividend initiation sample, it appears as though the free cash flow argument complements the signaling argument in explaining the stock price reaction.

The sample specific rank test, S^2/V^2, of 12.48 for the full sample, and 13.41 and 10.51 for value maximizers and overinvestors, respectively indicates increased residual variance upon the announcement of the dividend initiation . All residual variance figures are significant at the 1% level and provide additional support for the signaling

hypothesis which implies the announcement of a dividend initiation provides unanticipated firm-specific information.

TABLE 2
Stock Price Reactions to Dividend Initiations

Panel A: All Dividend Initiations (n=69)

Event Window	CAR (%)	Unconditional Test (t)	Conditional Test (Z)	S^2/V^2
-1, 0	4.09	5.52*	7.31*	12.78*
-1,+1	5.13	5.64*	7.43*	
-5,-2	2.52	2.01**	3.15*	
+2,+5	1.60	1.63	2.38*	

Panel B: Separation by Tobin's Q - Value Maximizers (Tobin's Q > 1, n=29)

Event Window	CAR (%)	Unconditional Test (t)	Conditional Test (Z)	S^2/V^2
-1, 0	2.48[1]	2.13**	2.64*	13.41*
-1,+1	2.69[1]	1.89***	2.32**	
-5,-2	2.31	1.18	1.72***	
+2,+5	1.11	0.82	1.03	

Panel C: Separation by Tobin's Q - Overinvestors (Tobin's Q < 1), n=40)

Event Window	CAR (%)	Unconditional Test (t)	Conditional Test (Z)	S^2/V^2
-1, 0	4.98	5.26*	7.15*	10.51*
-1,+1	6.49	5.67*	7.54*	
-5,-2	2.65	1.60	2.65*	
+2,+5	1.91	1.39	2.22**	

*, ** and *** indicate significance at the .01 level, .05 level, and .10 level, respectively.
[1] Significantly different from overinvestors (firms with low Tobin's Q) at the .01 level.

Fewer NASDAQ firms omit dividends than initiate them and often when the firms omitted a dividend the event is clouded with multiple events such as bankruptcy filings, change in control, or a buyout.[4] As shown in Table 3, the overall NASDAQ dividend omission sample generated a negative wealth effect of -1.83% for the two-day window (-1,0) and -5.66% for (-1,+1), respectively. Both are unconditionally significant, the (-1,0) window at the 5% level (t=-2.26) and the (-1,+1) window at the 1% level (t=-4.85). These initial results are supportive of the signaling hypothesis. Consistent the semi-strong efficient markets, the omissions sample does not see a significant wealth change immediately prior to or after the omission.

While the direction of the wealth effect is consistent with the literature, the magnitude of the conditional wealth effects is smaller. Dielman and Oppenheimer [9] and Healy and Palepu [10] observed day CAR's of -8.1% and -9.5% for the omissions sample. This comparison of abnormal returns might imply that the NYSE/AMEX dividend omissions are not as much of a surprise to the market as are the NASDAQ omissions, or, it could simply be the results of slightly different sampling procedures or time periods.

Panels B and C in Table 3 present the CAR's for value maximizers and overinvestors, respectively. Interestingly, the value maximizers event period return is unconditionally significant -2.13% and -5.05% for (-1,0) and (-1,+1) respectively. For overinvestors (Tobin's Q<1), the two-day CAR of -1.73% is unconditionally significant at the 10% level (t=-1.67). The wealth effect is captured in the three-day window with a CAR of -5.86% which is unconditionally significant at the 1% level (t=-4.05). These results indicate that both value maximizers and overinvestors experience significant price decreases upon the announcement of a dividend omission.

TABLE 3
Stock Price Reactions to Dividend Omissions

Panel A: All Dividend Omissions (n=42)

Event Window	CAR (%)	Unconditional Test (t)	Conditional Test (Z)	S^2/V^2
-1, 0	-1.83	-2.26**	-3.35*	6.70*
-1,+1	-5.66	-4.85*	-8.37*	
-5,-2	-0.16	-0.18	-0.20	
+2,+5	-1.76	-0.69	-0.89	

Panel B: Separation by Tobin's Q - Value Maximizers (Tobin's Q > 1, n=10)

Event Window	CAR (%)	Unconditional Test (t)	Conditional Test (Z)	S^2/V^2
-1, 0	-2.13	-2.33*	-2.96*	3.75*
-1,+1	-5.05	-2.84*	-3.75*	
-5,-2	-0.05	-0.06	-0.10	
+2,+5	-2.26[1]	-1.85***	-2.35*	

Panel C: Separation by Tobin's Q - Overinvestors (Tobin's Q < 1), n=32)

Event Window	CAR (%)	Unconditional Test (t)	Conditional Test (Z)	S^2/V^2
-1, 0	-1.73	-1.67***	-2.74*	7.71*
-1,+1	-5.86	-4.05*	-7.50*	
-5,-2	-0.16	-0.18	-0.17	
+2,+5	2.60	-2.51*	3.01*	

*, ** and *** indicate significance at the .01 level, .05 level, and .10 level, respectively.
[1] Significantly different from overinvestors (firms with low Tobin's Q) at the .01 level.

These results are supportive signaling but not the free cash flow arguments. Not only are the differences between value maximizers and overinvestors insignificant, the signs appear to be opposite of what free cash flow would predict for overinvestors. If management were investing shareholders money in negative NPV projects, overinvestors should not expect to see the observed negative price reaction. This being the case, support is provided for the general signaling argument. Further support for the signaling argument is provided by the consistently significant sample specific rank test, S^2/V^2 of 6.70 for the full sample, and 3.75 and 7.71 for value maximizers and overinvestors, respectively.

In general, the event study findings strongly support the dividend signaling hypothesis in explaining the negative stock price reactions to dividend omissions. The results indicate that NASDAQ firms are no exception: the stock price will move in the direction of the dividend change. However, one cannot summarily reject free cash flow as a partial explanation for some price reactions at least for dividend initiations.

CONCLUSION

While there is very strong support for signaling arguments in the explanation of dividend changes for NASDAQ firms, one cannot rule out free cash flow arguments as a partial complement to the general signaling hypothesis. Cross-sectional weighted least squares regression analysis found strong support for the dividend signaling hypothesis, and limited support for the free cash flow argument. Further analysis using an improved event study methodology to control for fluctuations in idiosyncratic risk around the announcement documented significant wealth and variance effects upon the initiation or omission of dividends by NASDAQ firms, again supportive of

signaling but not free cash flow. The consistency of free cash flow influence in NASDAQ dividend initiations remains a question for future work.

ENDNOTES

1. Asquith and Mullins [1], Dielman and Oppenheimer [9], Healy and Palepu [10], Lang and Litzenberger [13], and Bajaj and Vijh [2] and others document such results.

2. Peterson [20] provides an excellent overview of several event study methodologies.

3. The CRSP value-weighted market proxy did not produce qualitatively different results. We also tested the methodology of Boehmer, Musumeci, and Poulsen [6] as well as a one day event window. Again, the results were qualitatively indifferent.

4. The sample size did not increase significantly when some of the constraints were relaxed; thus the authors could not justify deviating from the original screening criteria. For example, when relaxing the time period the company had to pay a dividend from 5 years to 3 years, only 4 additional observations were gained.

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