

Signaling, Investment Opportunities, and Dividend Announcements

Pyung Sig Yoon
Laura T. Starks
University of Texas at Austin

This article examines potential explanations for the wealth effects surrounding dividend change announcements. We find that new information concerning managers' investment policies is not revealed at the time of the dividend announcement. We also find that dividend increases (decreases) are associated with subsequent significant increases (decreases) in capital expenditures over the three years following the dividend change, and that dividend change announcements are associated with revisions in analysts' forecasts of current earnings. These results are consistent with the cash flow signaling hypothesis rather than the free cash flow hypothesis as an explanation for the observed stock price reactions to dividend change announcements.

It is widely accepted that announcements of changes in dividend payouts affect firm value.¹ There is an ongoing debate, however, concerning why dividend

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¹Studies that document the wealth effects of dividend change announcements include Aharony and Swary (1980), Asquith and Mullins (1983), Bajaj and Vijh (1990), Eades, Hess, and Kim (1985), Kalay and Loewenstein (1985, 1986), and Pettit (1972).

changes affect firm value. At the heart of this debate is the question of exactly what information is being conveyed to the market by the dividend change. The primary explanation has been the cash flow signaling hypothesis as developed in theoretical models by Bhattacharya (1979), John and Williams (1985), Kalay (1980), and Miller and Rock (1985). These authors argue that since managers possess more information about the firm's cash flows than do individuals outside the firm, the managers have incentives to unambiguously "signal" that information to investors. According to these models then, dividend changes convey managers' information about future and/or current cash flows.

An alternate, although not mutually exclusive, explanation is that changes in dividends reflect changes in managers' investment policies given their opportunity set [John and Lang (1991) and Lang and Litzenberger (1989)]. This explanation is based on the free cash flow hypothesis suggested by Jensen (1986). The free cash flow hypothesis asserts that managers with substantial free cash flow will invest it at below the cost of capital or waste it on organizational inefficiencies rather than distribute it to shareholders. On the other hand, these managers could change their investment policies and increase dividends, thus paying out current cash that would otherwise be invested in low-return projects or wasted (Jensen (1986), p. 324]. While Jensen (1986) does not explicitly state that changes in dividends reflect changes in the managers' investment policies, his free cash flow hypothesis predicts that changes in wasteful investments for firms with poor investment opportunities should have significant valuation effects.

Lang and Litzenberger (1989) focus on this implication of the free cash flow hypothesis. They argue that the free cash flow hypothesis does a better job of explaining stock price reaction to dividend change announcements than does the cash flow signaling hypothesis. According to their argument, a significant stock price reaction would be observed for dividend changes when the dividends affect the level of cash flows available for wasteful investments. The rationale is that for firms that are overinvesting, a dividend increase implies a reduction in management's policy of overinvesting, while a dividend decrease implies further overinvestment. Thus, the information content of a dividend change announcement depends on the severity of the firm's agency problems, that is, how much the firm is overinvesting.

According to Lang and Litzenberger (1989) a significant stock price response should be observed only when dividend changes affect investors' expectations about the size of the firm's future investment in negative net present-value projects. Note then that this interpretation of the free cash flow hypothesis requires that dividend change an-

nouncements provide information concerning changes in managers' actions.

The difference between the cash flow signaling hypothesis and the Lang-Litzenberger (1989) interpretation of the free cash flow hypothesis can be summarized as follows: Under the cash flow signaling hypothesis, the dividend change provides information about current and/or future cash flows, while under the free cash flow hypothesis, the dividend change provides information about changes in the managers' misuse of cash flows.

Using Tobin's q ratio as a proxy for the overinvestment problem, Lang and Litzenberger (1989) conclude that their empirical results are more consistent with the free cash flow hypothesis than the cash flow signaling hypothesis. They find a differential market reaction between firms that are overinvesting and firms that are not. Based on analysts' earnings forecasts, they also conclude that the dividend change does not provide information about the firm's current cash flows.

A number of other studies have tested the free cash flow and cash flow signaling hypotheses by examining whether the effects of the firm's investment opportunities or the signaling of current and future cash flow is the primary explanation for stock price reaction to firm announcements. Evidence has been mixed. While some empirical studies have presented evidence supporting the free cash flow hypothesis,² others have found evidence counter to its implications³ Our interest is in determining which hypothesis is more appropriate for explaining the information conveyed in dividend change announcements. Accordingly, we analyze the extent to which the dividend changes themselves are related to the firms' investment opportunities and the extent to which the wealth effects from the dividend change announcement are related to the investment opportunities or cash flow signaling.

The results indicate that cross-sectional differences in observed dividend policy are related to investment opportunities. In a sample of firms with large dividend changes we find that firms with poor investment opportunities have higher dividend yields. Such a relationship is consistent with Jensen's (1986) free cash flow hypothesis in which

² For example, evidence in favor of the free cash flow hypothesis is presented by Pilotte (1992) for security offering announcements, Keown, Laux, and Martin (1992) for joint venture announcements, Lang, Stulz, and Walking (1991) for tender offers, Perfect, Peterson and Peterson (1994) for self-tender offers, and Lehn and Poulsen (1989) for going-private transactions.

³ Servaes (1994) finds no evidence of overinvestment on the part of takeover targets. Howe, He, and Kao (1992) find no difference between high- q and low- q firms in the market's reaction to one-time cash flow events such as share repurchase and specially designated dividends. Denis, Denis, and Sarin (1992) report that firms with Tobin's q less than one have significantly greater stock price reactions to dividend change announcements largely because they pay higher dividends and their dividend changes are of greater magnitude.

firms with fewer growth opportunities should have higher dividend yields. It is also consistent with Smith and Watts' (1992) empirical finding that firms with more assets in place and fewer growth options have higher payout ratios.

The focus in Jensen (1986) and Smith and Watts (1992) is on the *level* of dividend payments, whereas our focus is on the change in dividends. We find that the information revealed at the time of the dividend change announcement is more consistent with the prediction of the cash flow signaling hypothesis. After controlling for the size of the dividend change, the anticipated dividend yield, and the market value of the firm, there is no difference in the magnitude of stock price reactions to dividend announcements across firms with different investment opportunities (measured by Tobin's q ratio or an alternate proxy, the direction of insider trading). This result is counter to the prediction of Lang and Litzenberger's (1989) version of the free cash flow hypothesis in which they contend that the absolute value of the announcement abnormal return should be' larger for firms with poor investment opportunities than for firms with good investment opportunities.

However, a regression analysis of the observed wealth effects segmented by investment opportunity sets cannot be considered definitive evidence against the free cash flow hypothesis because the control variables (the magnitude of the change, the dividend yield, and the market value of the firm) are also related to the firm's investment opportunities. A more appropriate approach to testing the free cash flow and cash flow signaling hypotheses is to analyze the sources of the wealth effects suggested by those two hypotheses. Consequently we investigate (1) the extent to which dividend changes are related to subsequent changes in wasteful investment (as predicted by the free cash flow hypothesis) and (2) the extent to which dividend changes are associated with changes in cash flow expectations (as predicted by the cash flow signaling hypothesis).

If dividend changes reflect modifications in management's policy toward overinvesting, then we should observe a change in capital expenditures following the dividend increase or decrease. Specifically we should observe overinvesting firms reducing their capital expenditures after dividend increases. However, our results are not consistent with this prediction of the free cash flow hypothesis. We find that, in general, there are significant increases (decreases) in capital expenditures after dividend increases (decreases) for firms regardless of their investment opportunities.

We also conduct a thorough investigation of whether changes in investors' expectations associated with dividend change announce-

ments are related to current and/or future cash flow expectations. Using revisions of analysts' forecasts for current earnings, we provide evidence that announcements of dividend increases and decreases cause analysts to revise their current earnings forecasts in a manner generally consistent with the cash flow signaling hypothesis. In contrast, when we examine revisions of analysts' forecasts *future* earnings, we document significant changes only for dividend decreasing firms. Analysts do not significantly revise their expectations of future earnings for dividend increasing firms. This finding is particularly important because previous researchers have not examined changes in long-run earnings expectations around dividend change announcements, although it has been frequently stated that dividend changes release managers' information about both current and future cash flows. This finding is also consistent with the empirical evidence that a dividend decrease results in a larger stock market reaction than would an equivalent dividend increase.

In the next section we describe the data and explain our proxies for the quality of the investment opportunity set. We then analyze firm characteristics between firms with good investment opportunities versus firms with poor investment opportunities in Section 2. After we examine the wealth effects of dividend change announcements in Section 3, we investigate the sources of these wealth effects by analyzing changes in capital expenditures in Section 4 and changes in cash flow expectations in Section 5. Concluding comments are presented in Section 6.

1. Data and Proxies for Investment Opportunity Set

1.1 Data

The sample of 3748 dividend increase and 431 dividend decrease announcements over the period 1969 to 1988 consists of all NYSE stocks from the Center for Research in Security Prices (CRSP) monthly master file that satisfy the following criteria:

1. We restrict our attention to regular quarterly U.S. cash dividends per share. Based on the naive expectations model, the unexpected dividend change is defined to be the proportional change in dividends from the previous quarter. Warther (1994) argues that due to the coarseness of the signaling equilibrium, not all dividend changes contain information. In order to ensure that any potential information signal is significant, we impose the restriction that the dividend change must be at least 10 percent.

2. The announcement does not represent a dividend initiation or omission.

3. A stock split or stock dividend does not occur during the month before or the month in which the dividend change announcement is made.

4. Daily return data for the 200 trading days surrounding the announcement are available from the CRSP daily return master file.

5. Empirical estimates of Tobin's q ratios are available from the National Bureau of Economic Research (NBER) manufacturing sector master file.⁴

1.2 Proxy for the investment opportunity set

A central issue in any test of the free cash flow hypothesis is the question of a measure for firms' investment opportunities. We employ two proxies, the often-used Tobin's q ratio and the direction of insider trading. As suggested by Lang and Litzenberger (1989) and Lang, Stulz, and Walkling (1991) our first proxy for the investment opportunities available is Tobin's q ratio, defined as the ratio of the market value of the firm's assets to their replacement costs. Although most empirical estimates of Tobin's q ratios are built on Lindenberg and Ross (1981),⁵ the classification of q ratios into high- q and low- q firm varies by author. For example, Lang and Litzenberger define a value-maximizing firm as one with a one year q greater than unity, while Lang, Stulz, and Walkling (1991) define a high- q firm as one with a three year average q greater than one. Since a cutoff of one has some theoretical appeal, we take a one-year q greater than one as a basic cutoff point for high- and low- q firms. We also use two other cutoff points: a three year average q greater than unity and a one year q greater than the median within a calendar year.⁶

Although the estimated Tobin's q ratio is commonly employed as a proxy for the investment opportunity set, it has several potential problems. First, the estimate is of the average q ratio, but as pointed

⁴ Since the NBER file contains only industrial firms, the problems associated with dividend announcements for regulated firms are avoided.

⁵ The empirical estimates of Tobin's q ratios are computed slightly differently by authors, but most of them are built on Lindenberg and Ross (1981). Perfect and Wiles (1994) construct four procedures to estimate q ratios (primarily based on the methodology developed by Lindenberg and Ross). Their results indicate that the methods tend to produce equivalent empirical results with one exception: a q ratio computed using book values of long-term debt and total assets.

⁶ Servaes (1991) provides reasons why a cutoff of one may not be appropriate. For example, the median Tobin's q may differ from one. Specifically, examining the median Tobin's q across all firms in the NBER file each year over the period 1968 to 1987, we find that the median ranges from 0.61 (in 1975) to 1.93 (in 1969). The median Tobin's q by year for our sample is consistent with these population parameters. Since we find that the equality of the medians across years can be rejected at any reasonable significance level, we checked the robustness of our results by using the median Tobin's q ratio by year as an alternative cutoff point to separate high- q firms from low- q firms. We also test the results with an industry median q ratio as a cutoff point. Our results are not sensitive to the q classification process.

out by Lang and Litzenberger (1989), the differences in investment opportunities would be found in the *marginal q* ratio. Second, measurement errors induce noise in estimated *q* ratios. Third, estimated *q* ratios may be based on outdated information. In calculating Tobin's *q* ratio, the market value of the firm's assets and their replacement cost are evaluated at the year end before the announcement. For example, if one assumed that dividend announcements are made evenly across the following year, the estimated *q* ratios would be six months old, on average, and consequently would not contain any private information developed just prior to the dividend change announcements.

Because of these problems, we also employ a second proxy for the investment opportunities available. John and Lang (1991) suggest that the direction of insider trading activity combined with the dividend announcements may be a better proxy for the investment opportunity set than the average *q* ratio. Following John and Lang, we construct an insider trading index based on insider open market sale and purchase transactions for the period of two quarters prior to the dividend change announcements. Since our results using this alternate proxy are consistent with the Tobin's *q* results, we do not report them here.

2. Differences in Firm Characteristics Between High- *q* and Low- *q* Firms

We begin our empirical analysis by comparing firm characteristics of high- *q* firms with those of low- *q* firms in order to identify any significant differences between the two groups. Previous studies have identified three factors as influential on the stock market reaction to dividend change announcements: the firm's dividend yield, the firm's size, and the magnitude of the dividend change. The first variable, dividend yield, has been suggested as a proxy for clientele effects. Bajaj and Vijh (1990) posit that if investors with preferences for dividends are the marginal investors in high-yield stocks, the price reaction to a dividend change should be larger, the higher the anticipated yield of the stock. They find that for high-yield stocks, price reactions to dividend increases are significantly more positive and to dividend decreases significantly more negative. Fehrs, Benesh, and Peterson (1988) report similar results. The second variable reflects omitted market pricing factors such as the information asymmetry between large versus small firms. Eddy and Seifert (1988) document that abnormal returns from the announcements of large dividend increases are greater for small firms than for large firms. Finally, the third variable is suggested by dividend signaling models which predict that large dividend changes are used to signal large changes in cash flows.

The free cash flow hypothesis predicts that these firm characteristics should systematically differ between high- q versus low- q firms. In particular, Jensen (1986) argues that firms with more growth opportunities should have lower dividend yields. Consistent with this prediction, Smith and Watts (1992) document that firms with more assets-in-place and fewer growth options have higher dividend payout ratios. [This finding is also consistent with Rasterbrook (1984) and Rozeff (1982).] In addition, a firm's size is related to its q . As pointed out by Smith and Watts, size is a function of the firm's investment opportunity set. That is, those firms with more growth opportunities are more likely to become larger. Thus, the free cash flow hypothesis based on contracting arguments predicts a negative relationship between dividend yields and Tobin's q ratios, and a positive relationship between size and Tobin's q .

On the other hand, cash flow signaling models generally do not have direct predictions for differences across high- q and low- q firms in terms of dividend yield, firm size, and the magnitude of dividend changes.

Panel A in Table 1 reports the averages of dividend change, dividend yield, and firm size by the sign of the dividend changes and the level of the Tobin's q ratios.⁷ In our sample there are 3748 dividend increases and 431 dividend decreases announced from 1969 through 1988. While there is not a large difference in the proportion of dividend increase announcements for high- q and low- q firms, for dividend decreases, 87 announcements (20 percent) are classified to a group of high- q firms and 344 (80 percent) to a group of low- q firms. This result is consistent with the view that firms in general cut their dividend payments when their performance is poor [DeAngelo, DeAngelo, and Skinner (1992)].

We find that the characteristics of dividend change announcements for high- q firms tend to be systematically different from those of low- q firms. For both dividend increases and decreases, the means of the anticipated dividend yield and the dividend change for high- q firms are significantly smaller than those for low- q firms. In addition, for dividend increases there is a significant positive relationship between firm size and Tobin's q ratios: the equality of mean firm size between the two groups can be rejected at any reasonable significance level.

⁷The anticipated dividend yield in this article is measured by dividing the sum of all dividend payments for the year preceding the announcement by the end-of-year stock price. The firm's size is measured as the market value of the firm's assets at the end of the year preceding the announcement. The dividend change is computed by dividing the dividend change in dollars by the end-of-month stock price before the announcement.

Table 1
Dividend change, yield, and firm size by sign of dividend change and Tobin's q ¹

Panel A: Characteristics of dividend change announcements				
	No. of observations	Average change	Average size	Average yield
A.1. Dividend increases				
$q < 1$	2062 (55%)	0.0021	1215	0.042
$q > 1$	1686 (45%)	0.0012	2054	0.022
Mean difference ($q < 1$) - ($q > 1$)		0.0009 (25.96)	-839 (-16.32) ²	0.020 (41.68)
A.2. Dividend decreases				
$q < 1$	344 (80%)	-0.0082	1,015	0.072
$q > 1$	87 (20%)	-0.0061	1,194	0.040
Mean difference ($q < 1$) - ($q > 1$)		-0.0021 (-3.20)	-179 (-0.24) ²	0.032 (12.52)
Panel B: Spearman correlation matrix for all sample³				
	Change	Log(size)	Yield	Tobin's q
Change	1.00			
Log(size)	-0.18	1.00		
Yield	0.24	-0.17	1.00	
Tobin's q	-0.37	0.29	-0.65	1.00

¹ Our sample consists of 3748 dividend increases and 431 dividend decreases announced over the period 1969 to 1988 that meet the following criteria: (1) The announcement date is available from the CRSP monthly master file. (2) Daily return data for the 200 trading days surrounding the announcements are available. (3) The announcement does not represent a dividend initiation or omission. (4) A stock split or stock dividend does not fall a month before or during the month in which the announcement is made. (5) The dividend change is at least 10 percent compared with the previous quarter. (6) Empirical estimates of Tobin's q ratios are available from the NBER manufacturing sector master file. Tobin's q ratios are estimated as the market value of the firm's assets divided by replacement costs, both are evaluated at the year end before the announcement from the NBER tape. The change is computed by dividing dividend change in dollars by the end-of-month stock price before the announcement. The size is the year-end market value of the firm (in million \$) obtained from the NBER tape. The yield is measured by dividing all dividend payments for a year before the announcement by the end-of-year stock price. T -statistics are in parentheses.

² T -statistics are based on the logarithm of firm size.

³ All correlations are significant at the 0.01% level.

However, for dividend decreases, the mean differences in firm size between the two groups are not significant.

The evidence to this point indicates that there are cross-sectional differences in dividend changes that are related to a firm's investment opportunities: low- q firms have higher dividend yields and larger dividend changes, and are smaller in size. These relationships indicate a potential problem in testing the free cash flow hypothesis directly against the cash flow signaling hypothesis. For example, while dividend yield reflects dividend clientele effects, it could also be regarded as another proxy for investment opportunities. In the extreme case, firms with tiny good investment opportunities would pay no dividends at all. This point is further reflected in the Spearman rank

correlations between the Tobin's q ratios and the three control variables presented in Panel B of Table 1. The correlations between the q ratio and dividend yield, dividend change, and firm size are all statistically significant, being -0.65, -0.37, and 0.29, respectively, suggesting that the control variables may also be proxying for investment opportunities.

In this section we have pointed out that the dividend change itself depends on a firm's investment opportunities. In the next section we measure the stock market reaction to the dividend change announcement, conditional on the market's prior information concerning the firm's investment opportunities.

3. Investment Opportunities and Abnormal Returns

The free cash flow hypothesis implies that dividend changes by low- q firms will lessen or aggravate the overinvestment and accordingly affect the market value of the firm. On the other hand, dividend changes by high- q firms would not be expected to have a particular effect on stock prices. There is no reason that a change in the dividend should affect the level of the optimal investment because the firms are not assumed to be overinvesting [see Lang and Litzenberger (1989)]. Thus, according to their hypothesis, dividend change announcements for high- q firms should not have information content, not because they are fully anticipated, but because dividend changes do not affect the market's assessment of managers' investment policies. (Under some plausible assumptions, Lang and Litzenberger derive these predictions in their model.) Thus, for either dividend increases or decreases, the prediction is that announcements of dividend changes by high- q firms should have no significant impact on the firms' stock prices, whereas announcements of dividend changes by low- q firms should have a substantial effect on stock prices, implying that the absolute value of the abnormal return is larger for low- q firms than for high- q firms. In contrast, the cash flow signaling hypothesis predicts significant price reactions regardless of the level of q ratios, implying a symmetrical impact between high- q and low- q firms for either dividend increases or decreases.

Table 2 reports three day cumulative average abnormal returns (CAAR), summed over days -1 to +1 relative to the announcement date, and average abnormal returns on the announcement day by the sign of the dividend changes and by the level of the Tobin's q ratios. Abnormal returns are estimated from the market model using the CRSP equally weighted index and Scholes-Williams betas.⁸ We find

⁸The estimation period covers days -100 to -8 and days +8 to +100 (a total of 186 days).

significant cumulative average abnormal returns for all four groups, ranging in absolute value from 0.67 percent for dividend increases of high- q firms to 5.30 percent for dividend decreases of low- q firms. Note that the free cash flow hypothesis implies that for high- q firms, dividend changes should have no impact on the managers' investment policies, and therefore no impact on firms stock prices. The significance of abnormal returns for all four groups is consistent with the predictions of the cash flow signaling hypothesis.⁹ The results for the average abnormal returns on the announcement day are consistent with those for the cumulative average abnormal returns.

We find a larger share price reaction for dividend decreases than for increases. This result is consistent with the cash flow signaling models of Bhattacharya (1979) and Kalay (1980). Bhattacharya assumes that the cost of making up a cash flow deficit is more than the benefit of a cash flow surplus of the same size. Kalay argues that managers' reluctance to cut dividends is a necessary condition for dividends to convey information. Thus, both papers suggest that dividend decreases are more costly. On the other hand, as posited by Lang and Litzenberger (1989), the free cash flow hypothesis implies that for high- q firms, neither dividend increase nor decrease announcements should have any impact on stock prices.

For dividend decreases, the cumulative average abnormal return for high- q firms is not significantly different from that of low- q firms; a result counter to the free cash flow hypothesis. In contrast, for dividend increases, the cumulative average abnormal return for low- q firms is significantly larger than that of high- q firms. This result is not

The announcement period abnormal returns are summed over days -1 to +1 due to possible information leakage and announcements being made after trading hours on the announcement day. Our results remain qualitatively the same with the CRSP value-weighted index rather than the CRSP equal-weighted index as our market proxy. Similar results are also obtained when we calculate the two day cumulative abnormal returns.

⁹ While, on average, our results indicate that stock prices react favorably to dividend increases and unfavorably to dividend decreases, these results are not uniform across the sample. The stock price reactions to dividend increase announcements for 43 percent of the high- q firms and 34 percent of the low- q firms are negative. Similarly, 24 percent of the high- q firms and 18 percent of the low- q firms have positive stock price reactions to dividend decrease announcements. While these results could be interpreted as evidence counter to the cash flow signaling hypothesis, they may be due to the problem of determining the market's *conditional* expected dividend, especially for dividend increases. In our empirical analysis, we have adopted the naive dividend expectation model, which implies that the expected dividend change is zero on average. However, this model may not be realistic not only because many firms tend to increase dividends in the same quarter every year, but also because the model does not incorporate the market's most recent expectation since the last dividend payment. The lower percentage of stock price reactions in the opposite direction for dividend decreases than dividend increases supports the view that the problem of determining the market's conditional expected dividend is more serious for dividend increases. Regardless, the fact that there are a number of reactions in the opposite direction to the dividend change does not present a serious problem in testing which hypothesis is more consistent with the observed market reactions because the competing free cash flow hypothesis also does not predict negative reactions to dividend increases and positive reactions to dividend decreases.

Table 2
Cumulative average abnormal returns by sign of dividend changes and level of q ratios¹

	Dividend increases	Dividend decreases	Differences in absolute values of means (decreases - increases)
$q < 1$			
No. of obs.	2062	344	
CAAR	1.537 (17.41)	-5.299 (-14.67)	3.762 (10.11)
Percent positive	66%	18%	
AAR	0.969 (16.70)	-3.197 (-12.24)	2.228 (8.33)
$q > 1$			
No. of obs.	1686	87	
CAAR	0.670 (7.18)	-4.599 (-6.14)	3.929 (5.21)
Percentage positive	57%	24%	
AAR	0.350 (6.13)	-2.689 (-5.13)	2.339 (4.44)
$(q < 1) - (q > 1)$			
Mean difference on CAAR	0.867 (6.75)	-0.700 (-0.86)	
Mean difference on AAR	0.619 (7.61)	-0.508 (-0.87)	

¹ Our sample consists of 3748 dividend increases and 431 dividend decreases announced over the period 1969 to 1988 that meet the following criteria: (1) The announcement date is available from the CRSP monthly master file. (2) Daily return data for the 200 trading days surrounding the announcements are available. (3) The announcement does not represent a dividend initiation or omission. (4) A stock split or stock dividend does not fall a month before or during the month in which the announcement is made. (5) The dividend change is at least 10 percent compared with the previous quarter. (6) Empirical estimates of Tobin's q ratios are available from the NBER manufacturing sector master file. Tobin's q are estimated as the market value of the firm's assets divided by replacement costs, both are evaluated year end before the announcement from the NBER tapes. Abnormal returns are estimated from the market model using the CRSP equally weighted index and Scholes-Williams betas. The estimation period is over days -100 to -8 and days 8 to 100. CAAR refers to the three day (day -1, day 0, and day 1) cumulative average abnormal returns. AAR refers to the average abnormal returns on the announcement day. Percent positive refers to the percentage of positive cumulative abnormal returns. T -statistics are reported in parentheses.

predicted by the cash flow signaling hypothesis, but is predicted by the free cash flow hypothesis.

Previous articles document that the abnormal returns to dividend increase announcements are positively related to dividend change and dividend yield, but negatively related to the firm size. We have shown in Table 1 that for dividend increases, low- q firms have higher dividend change, higher dividend yield, and smaller firm size than high- q firms. Accordingly, we include these three control variables along with a dummy for high- q firms, $D_{\text{high } q}$, in a regression of the cumulative abnormal returns of the dividend increase announcements.

$$F\text{-statistic} = 4.75, \quad R^2 = 0.05.$$

The regression indicates that the relationships between the abnormal returns and each of the three control variables are consistent with the findings of previous studies, and that Tobin's q ratios are not significantly related to abnormal returns once the three control variables are considered.

These results indicate that a differential price reaction between high- q and low- q firms for dividend increases may be caused by a difference in firm characteristics rather than differences in investment opportunities. Our regression results are not definitive evidence against the free cash flow hypothesis because dividend change, dividend yield, and firm size are all related to a firm's investment opportunity. Accordingly, in the next section we directly examine the sources of the wealth effects suggested by the two hypotheses.

4. The Effect of Dividend Change Announcements on Capital Expenditures

We have presented evidence that the information revealed in the dividend change announcement appears to be more of a reflection of cash flows than a reaction to managers actions in the context of the free cash flow hypothesis. A further test of this conjecture can be obtained by examining whether changes in the firm's investment policies after the announcements are consistent with the free cash flow hypothesis predictions. Under the free cash flow hypothesis, an announcement of a dividend change will have an effect on the firm's stock price if the size of the firm's future investment in negative net present value projects is expected to change. Thus: since low- q firms invest in negative net present value projects, there should be a decrease in wasteful capital expenditures after dividend increases and an increase in wasteful investment after dividend decreases. The implication is that a change in capital expenditures would cause significant stock price reactions for low- q firms. It also predicts no significant change in capital expenditures for high- q firms, implying no effect on stock prices.

We use capital expenditures (COMPUSTAT data item 128) to measure new investment by the dividend change firms. The analysis measures the percentage changes in capital expenditures in the first three full fiscal years after a dividend change (years +1, +2, and +3) compared to the last fiscal year before a dividend change (year -1). We measure capital expenditures in levels and as a fraction of the end-of-period total assets. To control for industry effects, we also present an industry-adjusted percentage change in capital expendi-

Table 3
Relations between dividend change announcements and subsequent capital expenditures¹

Panel A: Dividend increases and $q < 1$

	From year t to year j		
	-1 to +1	-1 to +2	-1 to +3
A.1. Capital expenditures	$n = 1626$	$n = 1626$	$n = 1517$
Percentage change	39.68%***	52.10%***	65.87%***
Industry adjusted percentage change	8.31%***	1.13%***	1.11%***
A.2. Capital expenditures/Assets	$n = 1626$	$n = 1626$	$n = 1517$
Percentage change	12.22%***	11.54%***	11.13%***
Industry adjusted percentage change	4.59%***	0.30%***	0.70%***

Panel B: Dividend increases and $q > 1$

	From year t to year j		
	-1 to +1	-1 to +2	-1 to +3
B.1. Capital expenditures	$n = 1168$	$n = 1175$	$n = 1083$
Percentage change	41.63%***	51.05%***	69.80%***
Industry adjusted percentage change	9.82%***	0.76%***	1.37%***
B.2. Capital expenditures/Assets	$n = 1168$	$n = 1175$	$n = 1083$
Percentage change	6.38%***	0.70%	-0.57%
Industry adjusted percentage change	5.25%***	0.00%	0.00%

** Significance at the 5 percent level.

*** Significance at the 1 percent level.

¹Median percentage change and industry adjusted change in capital expenditures and in capital expenditures as a percentage of assets by sign of dividend changes and q ratios. Year -1 is the fiscal year ending prior to dividend change announcements. Year +1 is the first full fiscal year after dividend change announcements. Significance levels are based on two-tailed Wilcoxon signed rank tests. Industry adjusted change for a given period equals the difference between the change for dividend change company and the median change for a sample of companies in the same industry during that period. The firms in the same industry are those that have the same four-digit SIC code. The observation was excluded if there are less than three firms in the same industry.

tures. The industry-adjusted percentage change is defined as the percentage change in capital expenditures minus the median percentage change over the same period for all firms in the same four-digit SIC code as the dividend change firm.¹⁰ The results by sign of dividend changes and level of q ratio are reported in Table 3.

Table 3 shows that there are significant increases (decrease) in the level of capital expenditures after dividend increases (decreases). This result holds regardless of the industry adjustment. The change in capital expenditures is more pronounced for low- q firms than high-

¹⁰ When there were fewer than three firms in the same industry, that observation was excluded. The results remain the same under the "same industry" definition with the two-digit SIC code.

Table 3
(Continued)

Panel C: Dividend decreases and $q < 1$

	From year t to year j		
	-1 to +1	-1 to +2	-1 to +3
C.1. Capital expenditures	$n = 269$	$n = 266$	$n = 245$
Percentage change	-37.76%***	-18.49%***	-3.70%
Industry adjusted percentage change	-24.92%***	-19.71%***	-15.51%***
C.2. Capital expenditures/Assets	$n = 269$	$n = 266$	$n = 245$
Percentage change	-33.39%***	-20.38%***	-10.50%***
Industry adjusted percentage change	-16.30%***	-8.16%***	-2.76%***

Panel D: Dividend decreases and $q > 1$

	From year t to year j		
	-1 to +1	-1 to +2	-1 to +3
D.1. Capital expenditures	$n = 67$	$n = 72$	$n = 68$
Percentage change	1.29%	-4.53%	16.26%**
Industry adjusted percentage rate	-14.53%***	-17.32%***	-13.19%
D.2. Capital expenditures/Assets	$n = 67$	$n = 72$	$n = 68$
Percentage change	-13.47%	-21.00%**	-9.63%**
Industry adjusted percentage change	-3.19%	-5.35%***	0.00%

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

q firms for both dividend increases and decreases. This is in sharp contrast to the implication of the free cash flow hypothesis that dividend increases would reduce overinvestment and dividend decreases would increase wasteful investment." For low- q firms with dividend increases (shown in Panel A), the level of investment significantly increases in years +1, +2, and +3 relative to year -1. The industry-adjusted changes are also significant for all periods, although they are small in years +2 and +3. For completeness, Panel B contains the changes in capital expenditures for high- q firms with dividend increases. These results are similar to those for the low- q firms. Panels C and D indicate that for both high- and low- q firms that decrease their dividends, there are reductions in capital expenditures over the next three years. In particular, for the low- q firms, the industry-adjusted changes are all negative and significant, equal to -24.92 percent, -19.71 percent, and -15.51 percent.

¹¹ If the firm issues debt or equity to finance a dividend increase, a change in dividends will not induce a corresponding change in investment. The conclusions are not affected by the exclusion of those cases from our sample.

The analysis provided in this section directly examines the source of the valuation effects suggested by the free cash flow hypothesis. We find no evidence that dividend increase (decrease) firms reduce (increase) their level of investment.¹² On the other hand, our finding is not inconsistent with the cash flow signaling hypothesis; if dividend changes signal management's belief about the firm's future prospects, dividend increase firms are able to invest more and dividend decrease firms could be expected to cut capital expenditures.

5. Dividend Change Announcements and Current versus Future Earnings Expectations

Theories and empirical tests of the cash flow signaling model as an explanation for stock market reaction to dividend announcements typically state that dividend announcements provide information about current and/or future cash flows. According to Miller and Rock (1985, p. 10371, dividend announcements act as "the missing piece of the sources/uses constraint which the market needs to establish the firm's *current* earnings." According to their model, although dividend announcements may provide information about future expected earnings, it is only indirectly. In this section we investigate the extent to which the dividend announcement provides information about current and future earnings expectations. To do so, rather than inferring these changes from observed stock price reactions which are also affected by other factors, we use a direct measure of changes in investors' expectations: changes in analysts' earnings forecasts.

5.1 Analysts' earnings forecasts as a proxy for cash flow expectations

There is mixed evidence concerning whether analysts change their forecasts of current earnings after dividend announcements. Ofer and Siegel (1987) report that analysts revise their earnings forecasts fol-

¹² The relationship between the previously observed wealth effects and the investment opportunity set depends to some extent on how we define high- and low- q firms. For example, if we happen to assign low- q firms to the high- q firm category by mistake, we could erroneously observe a significant stock price reaction to dividend change announcements of high- q firm. In contrast, our results employing capital expenditure changes are not diminished by a poor proxy. The free cash flow hypothesis predicts a significant change in wasteful capital expenditures in the direction opposite to that of dividend changes for low- q firms. It also predicts no particular change in capital expenditures for high- q firms. In this case, if we assign low- q firms into the high- q firm category, we may observe a significant decrease in capital expenditures after dividend increases and a significant increase after dividend decreases for both high- and low- q firms. Conversely, if we assign high- q firms into the low- q firm category, we may observe an insignificant change in a capital expenditures for high- and low- q firms. Our evidence that dividend increase (decrease) firms increase (reduce) their level of investment significantly for both high- and low- q firms is not related to how we determine high- and low- q firms. This is strong evidence against the free cash flow hypothesis as an explanation for the wealth effects of dividend change announcements.

lowing the announcement of an unexpected dividend change. They find that the revision is positively related to the size of the unexpected dividend change. Similarly, Healy and Palepu (1987) show that dividend initiations and omissions are leading indicators of superior and inferior earnings performance, respectively. On the other hand, Lang and Litzenberger (1989) report that announcements of sizable dividend changes are not significantly related to changes in analysts' forecasts. In this section we analyze the extent to which the announcement of an unexpected dividend change has a significant effect on the revision of current and future cash flow expectations. The proxies for investors' cash flow expectations are analysts' forecasts for the current year earnings and their five year growth forecasts. These forecasts are obtained from the Institutional Broker Estimate System (IBES) database developed by IBES Inc. The IBES database used here contains summary statistics of analysts' earnings forecasts made by major brokerage firms for about 2000 firms listed on the NYSE and AMEX over the period 1976 to 1989. Since the IBES database short-term analysts' earnings forecasts covers the period 1976 to 1989, our sample is reduced to 2505 dividend increases and 205 dividend decreases. Similarly, the forecasts of the five year earnings growth rates are available from 1981 to 1989, so that the sample is further reduced to 883 increases and 131 decreases.

5.2 Revisions of short-term analysts' earnings forecasts

The cash flow signaling hypothesis predicts that dividend change announcements will cause investors to revise their cash flow expectations in the same direction as the dividend surprise. To test this implication we measure the elasticity of the change in the median of analysts' current earnings forecasts with respect to dividend changes, computed by dividing the percentage change of the postannouncement median earnings forecast (compared to the preannouncement median earnings forecast) by the percentage dividend change. The use of the median provides more conservative statistics than the mean because the median is less sensitive to extreme earnings revisions.

Table 4 reports the mean elasticity of the change in the median of analysts' forecasts with respect to dividend changes. Similar to the Healy and Palepu (1987) and Ofer and Siegel (1987) results, and in contrast to the Lang and Litzenberger (1989) results, we find that both dividend increases and decreases are associated with positive mean elasticity. In addition, consistent with the observed larger stock price reaction to dividend decreases, the magnitude of forecast revisions is greater for the dividend decreases than the increases. We also divide the dividend increases and decreases into two groups according to their investment opportunities (i.e., Tobin's q ratio). Three of the

Table 4
The impact of dividend change announcements on current cash flow expectations¹

	$q < 1$	$q > 1$	$(q < 1) - (q > 1)$
Panel A: Dividend increases			
No. of observations	1284	1221	
Average elasticity	0.08	0.01	0.07
(t-stat p-value)	(0.00)	(0.06)	(0.00)
Positive/0/negative	636/313/335	468/400/353	
Panel B: Dividend decreases			
No. of observations	171	34	
Average elasticity	0.56	0.27	0.29
(t-stat p-value)	(0.00)	(0.00)	(0.00)
Positive/0/negative	145/14/12	22/7/5	

¹ Our sample consists of 2505 dividend increases and 205 dividend decreases announced over the period 1976 to 1988 that meet the following criteria: (1) The announcement date is available from the CRSP monthly master file. (2) Daily return data for the 200 trading days surrounding the announcements are available. (3) The announcement does not represent a dividend initiation or omission. (4) A stock split or stock dividend does not fall a month before or during the month in which the announcement is made. (5) The dividend change is at least 10 percent compared with the previous quarter. (6) Empirical estimates of Tobin's q ratios are available from the NBER manufacturing sector master file. (7) Firms should be included in the Investment Broker Estimation System (IBES) database. The elasticity is measured by dividing percentage change of postannouncement median earnings forecast compared to preannouncement median earnings forecast by the percentage dividend change. The elasticity is set to 1 (–1) if it is greater (less) than 1 (–1).

four groups have significantly positive mean elasticities. The one exception is the group of high- q firms that increased dividends. Note that positive elasticity implies that the medians of analysts' earnings forecasts change in the same direction as the dividend changes. The most significant effect on cash flow expectations occurs for low- q firms with dividend decreases. The mean elasticity is 0.56. Further, out of 171 announcements, 145 have positive elasticity. For high- q firms that decrease their dividend, the mean elasticity is 0.27. Out of the 34 announcements, there were only 5 in which analysts revised their forecasts in the direction opposite to the dividend change. Low- q and high- q firms that increase their dividends have mean elasticities of 0.08 and 0.01, respectively.¹³

According to the cash flow signaling hypothesis, the magnitudes of signaling will be differentiated by the level of asymmetry in information between managers and shareholders. As shown in Table 1, low- q firms tend to be smaller in size and have a larger dividend change.

¹³ Brous (1992) and O'Brien (1988) have found that analysts tend to be overly optimistic in their initial annual earnings forecasts. Consequently, analysts earnings forecasts are systematically lowered each month up to the fiscal year end. The results reported in Table 4 do not control for this optimism bias. To check for the extent to which an optimism bias may effect our results, we follow the procedure discussed in Brous and Kini (1993) and find qualitatively similar results.

Since asymmetry in information is greater for smaller firms and larger dividend changes, the results that the magnitude of forecast revisions is greater for low- q than high- q firms should be expected.

5.3 Revisions of long-term growth rate of earnings

In this section our goal is to determine the extent to which cash flow signaling from dividends reflects future earnings as opposed to current earnings. Analysts' forecasts of current earnings are dominated by the forecasts of earnings from assets in place rather than from growth options. To measure changes in the market's perceptions of growth options we use analysts' forecasts of the long-term growth rate of earnings.

Specifically, for each dividend announcement, we measure forecast revisions from the previous month as the proportional change in the analysts' forecasts of five year earnings growth. The abnormal forecast revision of analysts' five year growth of future earnings is computed by subtracting the average forecast revision estimated over the estimation period (months -24 to -7 and months 7 to 24) from the forecast revision for each month in the event period (months -6 to 6 relative to the dividend month). The results are shown in Table 5 for months -4 to 4 relative to the dividend month. The results are divided by the sign of the dividend change and by the level of investment opportunities.

For both low- and high- q firms, we find that analysts' forecasts of five year earnings growth do not significantly change when firms have a large increase in their dividends. Although this result could be due to firms financing increased dividend payments through the issuance of debt or equity, Long, Malitz and Sefcik (1994) find that firms do not issue debt to increase dividends. Thus, the results suggest that, consistent with Miller and Rock's (1985) signaling model, dividend increases release managers' information about current cash flows rather than future cash flows. This is also consistent with Lintner's (1956) finding that for healthy firms, the current earnings are the major determinant of the dividend change.

We find a somewhat different result for dividend decreases. As shown in Panel B, while the average abnormal forecast revisions are also not significantly different from zero as measured by z -statistics, the proportion of firms with positive abnormal forecast revisions for the announcement month and for the following three months are all significantly less than 50 percent. This result is basically driven by low- q firms. (The results for high- q firms with dividend decreases should be interpreted carefully as there are only 19 observations.) Thus, unlike dividend increases, dividend decreases appear to signal managers' views on both current and long-term cash flows.

Our finding that analysts lower their long-term earnings growth

forecasts following dividend decrease announcements contributes to the existing literature concerning the type of information contained in dividend announcements. DeAngelo, DeAngelo, and Skinner (1992) analyze the dividend reduction decision of firms with current losses. They conclude that dividend changes have some incremental information about future earnings over that conveyed by current earnings in the sense of improving the ability of current earnings to predict future earnings. Our result is complimentary to theirs and provides direct evidence that dividend decrease announcements contain information on future earnings. This result is also consistent with Warther's (1994) coarse dividend signaling model in which he predicts that dividends are more likely to have information when they are decreased than when they are increased. In his model, only the "worst" firms cut dividends, so that firms that do not cut their dividends reveal only that they are not among the worst firms. This implies that dividend reductions are more informative about future earnings prospects than are dividend increases.

Our finding that only dividend decreases release information on long-term earnings growth also provides an empirical explanation as to why dividend decreases are associated with a larger absolute magnitude of stock price reaction than are dividend increases. For our sample, the CAAR of -5.16 percent for the dividend decrease announcements is over four times as large (in absolute value) as the CAAR of 1.15 percent for the dividend increase announcements. This differential stock price reaction between dividend increase and decrease announcements could be due to the problem of determining the market's conditional expected dividend, since dividend decrease firms have greater dividend yields and larger absolute values of dividend changes, and are smaller in size (see Table 1). However, the differential still holds after controlling for these variables. We conclude that the analyst forecast revision result suggests that the differential reaction can be explained in part by information relevant to the long-term earnings growth rate.

6. Concluding Comments

In this article we have provided tests of whether the information revealed by dividend change announcements is more consistent with the cash flow signaling hypothesis or the Lang and Litzenberger (1989) version of the free cash flow hypothesis. We find that the stock price reaction to large (at least 10 percent) dividend change announcements is generally consistent with the predictions of the cash flow signaling hypothesis. Although we find that for dividend increases, the abnormal return for low- q firms is significantly larger than that of high- q

firms, this differential reaction does not persist after controlling for dividend change, dividend yield, and firm size.

Due to the relationships between the three control variables and the investment opportunity set, we take an alternate approach to discriminate between the cash flow signaling and free cash flow hypotheses as explanations of the wealth effects surrounding dividend change announcements. We directly examine the sources of the wealth effects suggested by the two hypotheses. We find that dividend increase (decrease) firms experience significant increases (decreases) in capital expenditures over the three years following the dividend change, a result that is inconsistent with the implications of the free cash flow hypothesis for dividend change announcements. We also provide significant evidence that announcements of dividend increases and decreases cause analysts to revise their current earnings forecasts in a manner generally consistent with the cash flow signaling hypothesis. In addition, we find that analysts tend to lower their long-term earnings growth forecasts following dividend decrease announcements, but not following dividend increase announcements. This result potentially explains why dividend decreases cause a larger stock price reaction than do dividend increases.

A central issue in any test of the free cash flow hypothesis is the question of a measure for a firm's investment opportunities. Our choices for proxies for the investment opportunity set were Tobin's q ratio and the direction of insider trading. If our choices were poor proxies for the investment opportunity set, our results on the market reaction by the investment opportunity set are biased against the free cash flow hypothesis. The examination of the sources of the valuation effects provides clearer evidence than the analysis of the wealth effects, not only because the observed stock price reactions are affected by confounding factors, but also because our conclusion from the examination of capital expenditure changes does not particularly depend on how good a proxy Tobin's q ratio is. That is, we find significant changes in capital expenditures in the direction opposite to the prediction by the free cash flow hypothesis for both high- q and low- q firms, although the magnitude of the changes for high- q firms are smaller than that of low- q firms.

Although our results indicate that the free cash flow hypothesis does not explain the information effects of dividend change announcements, we cannot rule out the possibility that the free cash flow hypothesis explains the observed cross-sectional differences in dividend policy. In particular, the fact that low- q firms have higher dividend yield and larger dividend change than high- q firms is consistent with the implications of the free cash flow hypothesis [Smith and Watts (1992)].

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