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Dividend clienteles and the information content of dividend changes

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We reason that dividend-yield surprises are perfectly correlated with dividend surprises. If investors with preference 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. An examination of over 8,500 dividend changes shows that price reactions to dividend increases are significantly more positive and to dividend decreases significantly more negative for high-yield stocks. Also, the price reactions to dividend changes are larger and the yield effect is stronger for low-priced and small-firm stocks, perhaps because of greater information content and higher transaction costs.

1. Introduction and summary

In their seminal work, Miller and Modigliani (1961) show that, in a perfect market with no personal or corporate taxes, a firm's dividend policy does not affect its value. This 'dividend irrelevance proposition' has led to much subsequent research focusing on two related issues – the tax effects of dividend yield on stock valuation and the explanation for the observed price reactions to dividend announcements.

Dividend payments, except for a small exclusion, are taxable income to investors. Increases in the value of the stock due to retained earnings are taxed as capital gains only when the stock is sold. Furthermore, until 1986, capital gains were taxed in the United States at a lower rate than dividend

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income. Based on this reasoning, Brennan (1973) and Litzenberger and Ramaswamy (1979) develop after-tax versions of the Sharpe–Lintner capital asset pricing model (CAPM) postulating that the required rate of return on a firm's stock should increase linearly with its dividend yield.

Black and Scholes (1974), Miller and Scholes (1978), and others argue that despite the tax code, there should be no relation between rate of return and yield. Miller and Modigliani (1961) and Black and Scholes (1974) contend, for example, that some investors may, for institutional or tax reasons, prefer dividends to capital gains. Firms would satisfy demands of these 'clienteles' until, at the margin, no firm could increase its value by changing its dividend payout.

An alternative viewpoint, effectively set forth by Litzenberger and Ramaswamy (1980, 1982), suggests that firms may make incomplete supply adjustments and individuals' portfolio adjustments may be limited by short-sale and margin restrictions. In equilibrium, therefore, the relative prices of dividends and capital gains will reflect the tax situation of the marginal investor in the stock. This 'clientele effect' will lead to a nonlinear relation between yield and return, reflecting a lower premium per unit of yield for high-yield stocks and a higher premium for low-yield stocks.

It is not clear whether the yield effect, if it exists, would be observed in long-term returns or in short-term price behavior around ex-dividend days. If market prices reflect valuation by long-term investors, the compensation for taxes could accrue over a long period. But short-term investors would require the tax effect to be impounded over a short period around the ex-day. Furthermore, the ex-day is usually within a few days of the dividend-announcement day. Given the information content of dividend announcements, it is hard to isolate the tax effect during a period that includes the announcement day.[1] In summary, there seems to be no consensus on the clientele hypothesis.

The second major focus of research on dividend payments has been market price reactions to dividend announcements. According to Modigliani and Miller (1964), the 'information content of dividends' explains the observed price reactions. They suggest that managers, because of their reluctance to cut dividends, increase dividends only when they believe they can maintain the increased payments. Positive average price reactions to dividend increases thus need not imply that investors value dividends per se. Furthermore, Bhattacharya (1979), Heinkel (1978), and others have reasoned that the very costliness of a firm's dividend payout makes it a credible signal of

[1]For further details on these issues, see Elton and Gruber (1970), Kalay (1982), Black and Scholes (1974), Litzenberger and Ramaswamy (1979), Blume (1980), Miller and Scholes (1982), Litzenberger and Ramaswamy (1980, 1982), Hess (1982), Keim (1985), Chen, Grundy, and Stambaugh (1988), and Miller (1986).

firm's prospects in the 'signaling equilibrium' framework developed by Spence (1973).[2]

Despite the attention paid to the effect of yield on the valuation of stocks, stock-price reactions around dividend changes have been explained without regard to the yield effect. In fact, however, dividend surprises are perfectly correlated with dividend-yield surprises. Dividend-yield surprise is simply the dividend surprise divided by the preannouncement price. Because of the perfect correlation, it is impossible to disentangle the information effect from the yield effect in any announcement. If the marginal investors in different stocks value dividends differently, however, anticipated yield should explain some of the price reactions to announcements of dividend changes.

For an investor with a relatively high aversion to dividends, for example, the positive information in a dividend increase is accompanied by the negative effect of higher-than-anticipated yield. In contrast, the two effects act in the same direction for an investor with a preference for dividends. If investors who value dividends more are the marginal investors in high-yield stocks, then, all else being equal, the price reaction to a dividend change should be larger, the greater the anticipated yield of the stock.

Our reasoning does not particularly depend on taxes being the reason for the different marginal valuations of (unanticipated) dividend changes; a hypothesis for which there is no general consensus among scholars. Moreover, marginal valuations may differ on the announcement day, even if in the long run firms make supply adjustments and individuals rebalance portfolios to take advantage of the differential valuation. This is so because rebalancing in the short run is hindered by tangible and intangible transaction costs and other market frictions such as short-sale restrictions and constraints on personal borrowing.

The rest of the paper proceeds as follows. In section 2, we describe the data and methodology. In section 3, we present the results on the clientele hypothesis; namely, that price reactions to dividend changes are larger, the higher the anticipated yield. In section 4, we examine whether alternative explanations for price reactions to dividend changes can account for the observed results. We find that our main results are robust to alternative explanations, although price reactions to dividend announcements have other important determinants. In particular, we find that the price reactions are higher and the yield effect is stronger for low-priced and small-firm stocks. We conjecture that the yield effect is stronger for lower-priced stocks because of higher transaction costs for such stocks. That the price reaction is greater for small-firm stocks indicates that their dividend announcements convey

[2]See Bajaj (1988) on the difficulty of interpreting stock-price reactions as evidence in favor of the dividend-signaling hypothesis.

more information, perhaps because less information is produced for such firms in other periods. We conclude in section 5.

2. Data and methodology

2.1. The data

We obtain information on dividend declarations and daily returns from the daily master file provided by the Center for Research in Security Prices (CRSP). We used the 1987 version of the CRSP daily master file so that we have data from July 1962 to December 1987, but we exclude data for the latter half of 1987, to avoid the period affected by the market crash in October of that year. We also use the following selection criteria.

(1) We restrict our attention to regular cash dividends payable in U.S. dollars or foreign currency converted to U.S. dollars. Dividend announcements during the first 300 trading days for which data are available on CRSP are not used in analyzing announcement-period returns, because our measure of anticipated yield is based on dividend declarations during the year ending at least one month before the dividend announcement in question.

(2) We include only regular quarterly dividend announcements. (Approximately 3.6% of the regular dividend payments are made with other than quarterly frequency.) Year-end or final, extra or special, interim or nonrecurring dividends are excluded. If any of these dividends is announced with a regular quarterly dividend, the announcement is excluded from the sample used to analyze price reactions to dividend changes (but not from the calculation of historical yield). We calculate anticipated yields using only quarterly regular dividends during the previous year, because we wish to focus on anticipated regular dividend yields and changes in regular dividends. Dividend declarations are identified as belonging to a certain quarter by their ex-dates.[3]

(3) If a distribution other than cash is made during the period from 15 trading days before to 15 trading days after a regular cash dividend, we drop the declaration from the sample for which price reactions are analyzed. This removes any confounding influence of stock dividends, stock splits, and other noncash distributions.

[3]Ex-date is used rather than the announcement date for the following reason: some companies, especially during the beginning of a calendar year, may declare dividends for the following two quarters during the same board meeting. Standard & Poor's Compustat files use the same convention (i.e., the dividend is associated with the quarter during which the ex-date occurs). A dividend declaration is identified as belonging to the previous quarter if its ex-date is between 43 and 84 trading days before the ex-date in question.

(4) We exclude dividend initiations and omissions. CRSP does not provide any dates for dividend omissions, even when the board of directors explicitly announces that dividends will be omitted. We exclude dividend initiations because our procedure for calculating anticipated yield will result in zero anticipated yield for the first quarterly dividend and will categorize all such cases as belonging to the low-yield group. Compared with price reactions to announcements of dividend increases documented by Eades, Hess, and Kim (1985) and Aharony and Swary (1980), Asquith and Mullins (1983) and Healy and Palepu (1988) document much larger price reactions to dividend initiations. We wish to prevent these observations from having a predominant influence on our results for the low-yield stocks.

(5) For the purpose of studying price reactions, we choose only dividend announcements for which the announcement date precedes the ex-date by at least eight trading days. We do so because we do not want to contaminate the comparison of price reactions to dividend changes across different anticipated yield groups with the price reactions around the ex-day. Because the ex-day price effect is correlated with yield, failure to separate this effect may erroneously lead to the conclusion that dividend increases for the high-yield group are accompanied by larger price reactions. The eight-day window is chosen because the ex-day effect is observed up to five days before the ex-day, as documented by Eades, Hess, and Kim (1984). We checked that the eight-day separation is sufficient to keep the ex-day effect from influencing our results.

There are 54,058 dividend announcements that satisfy the above criteria. Of these, 1,188 are dividend decreases, 7,322 are dividend increases, and the rest are unchanged. Most of the reduction in sample (43.5% of the cases) occurs as a result of the criterion that the announcement date and the ex-date be separated by at least eight trading days. The sample is representative of the CRSP population. In particular, there is no significant difference between the in-sample and out-of-sample firms in the concentration of announcements in any calendar year, calendar month, or particular industry group, either for the entire sample or within any dividend-yield and dividend-change group.

2.2. *Methodology*

We divide dividend announcements into three categories based on whether the dividends are higher than, equal to, or lower than dividends in the last quarter. We assign each dividend declaration an index value, i, of -1 for a dividend decrease, 0 for no change, or $+1$ for an increase.

We measure anticipated dividend yield by using the historical dividend yield in a manner similar to Blume (1980). For every dividend-announcement date, we divide the dividends over a 12-month period ending two months preceding the announcement month by the stock price at the beginning of the 12-month period. If a firm started paying dividends during this period, we calculate dividend yield by annualizing the yield averaged over only the nonzero dividend payments during the year. For example, if the firm started paying dividends two quarters before the current quarter, we calculate the annualized dividend payment as twice the total payment over these two quarters. The historical dividend yield is further adjusted for market-wide changes in the level of stock prices; this is done by adjusting the beginning-of-period price by the percentage change in the market average over the period. For example, if the announcement date for a particular company is March 17, 1975, dividends per share from February 1974 to January 1975 are divided by the first recorded stock price before the first dividend announcement in the 12-month period; this price is also multiplied by the market return from the date of the price to March 16, 1975.

An alternative measure of anticipated yield, used by Black and Scholes (1974), can be calculated by using the end-of-the-period price. Blume (1980) found that anticipated yield calculated using the beginning-of-the-period price, adjusted for the market-wide price movement, has lower prediction error. We checked that our results are not sensitive to the choice of yield measure.

To categorize stocks into low-, medium-, or high-anticipated-yield groups, we use ordinal rankings of anticipated yield. Dividend yield at a particular time, however, may be influenced by market-wide yields. Therefore, we rank anticipated yields by calendar quarters, rather than over the aggregate data for 25 years. For each quarter, we divide stocks into 100 categories of equal size. For the purpose of the next section, however, we use a coarser categorization, represented by $j = -1, 0$, and $+1$, corresponding to the low-, medium-, and high-yield groups.

Table 1 shows the distribution of the anticipated annualized yields for each of the dividend-yield and dividend-change groups. Overall, the sample's mean annual yield is 3.89%, with a standard deviation of 2.04%. The low-yield group has a sample mean of 1.92%, with a standard deviation of 0.82%. The sample means for the medium- and high-yield groups are 3.73 and 5.92%, respectively, with corresponding standard deviations of 0.94 and 1.73%. Similar trends are observed within each dividend-change group.

We measure excess returns during the dividend-announcement period by using the market model. We use the equally weighted return for the portfolio of securities in the CRSP daily master file as a proxy for the market return. If dividend changes do not convey information about a change in the systematic risk (beta) of a firm, the security beta during the announcement period

Table 1

Anticipated dividend yields for stock groups classified by dividend yield and dividend change over the period July 1962 to June 1987.

The sample of 54,058 dividend announcements consists of all NYSE and AMEX stocks from the CRSP daily master file that satisfy the following criteria: 1) Daily return data for the 300 trading days preceding the announcement are available. 2) The dividend announcement does not occur within 15 trading days of any noncash distribution. 3) The announcement does not represent a dividend initiation or omission. 4) The announcement date precedes the ex-dividend date by at least eight trading days. The anticipated dividend yield, *DIVYLD*, is measured by dividing the sum of quarterly regular dividends paid over a 12-month period ending one month before the announcement month by the stock price prevailing at the beginning of the 12-month period. The anticipated dividend yield is further adjusted for market-wide changes in the level of stock prices by multiplying the beginning-of-period price by the same percentage as the market return (measured by the return on the CRSP equally weighted portfolio of NYSE and AMEX stocks) over the period. Finally, dividend announcements within a calendar quarter are ranked by the anticipated yield to categorize stocks as low yield, medium yield, or high yield.

	Dividend news:	Decreases	No change	Increases	Total
Yield category	Variable	Average value (standard deviation)			
Low yield	*DIVYLD*	1.85 (0.76)	1.91 (0.81)	2.02 (0.84)	1.92 (0.82)
	Observations	297	14,578	2,611	17,486
Medium yield	*DIVYLD*	3.71 (0.96)	3.72 (0.94)	3.80 (0.92)	3.73 (0.94)
	Observations	371	15,424	2,522	18,317
High yield	*DIVYLD*	6.32 (2.22)	5.88 (1.71)	6.10 (1.70)	5.92 (1.73)
	Observations	520	15,546	2,189	18,255
Total	*DIVYLD*	4.38 (2.45)	3.88 (2.03)	3.85 (2.03)	3.89 (2.04)
	Observations	1,188	45,548	7,322	54,058

should be the same as its beta over a nearby, unaffected period.[4] Therefore, we estimate the market model over 240 trading days from $AD - 250$ to $AD - 11$ (where AD is a dividend-announcement date taken from the CRSP daily master file) for security k as follows:

$$r_{kt} = \alpha_k + \beta_k r_{mt} + \varepsilon_{kt} \quad \text{where} \quad \mathrm{E}(\varepsilon_{kt} \| r_{mt}) = 0. \tag{1}$$

Here r_{kt} and r_{mt} denote the security return and the CRSP equally weighted market return on day t.

Letting α_k be independently determined for each security can create an *ex post* selection bias if the information used for categorizing stocks is not available *ex ante*. In our case, if dividend increases or decreases follow periods of stock price appreciation or depreciation, the α_k's will be overstated or understated. We found that α_k increases with the historical yield but does not vary significantly across dividend-change groups. We also test

[4]Eades, Hess, and Kim (1985) show that beta *during* the dividend-announcement period does not differ significantly from beta over the recent past. We later show that betas *after* dividend increases are slightly lower and betas after dividend decreases are slightly higher.

for the influence of *ex post* selection biases in estimated α_k's by using market model parameters estimated after the announcement. The results (not reported) are almost identical.

We define the event period affected by the dividend announcement as $AD-1$ to $AD+1$, i.e., the day before to the day after the CRSP announcement date. We include day $AD+1$ because sometimes companies announce dividends after trading hours, making $AD+1$ the effective announcement date for our purpose, and we include day $AD-1$ because a leakage of information can sometimes cause a substantial price reaction on this day. Abnormal returns for each day during the event period are calculated using the estimated market-model parameters as follows:

$$A_{kt} = r_{kt} - \mathrm{E}(r_{kt} \| r_{mt}) = r_{kt} - \hat{\alpha}_k - \hat{\beta}_k r_{mt}, \tag{2}$$

$$\text{where} \quad t \in \{AD-1, AD, AD+1\}.$$

We calculate the cumulative excess return for security k over the three-day event period as follows:

$$CA_k = \sum_{t=AD-1}^{AD+1} A_{kt}. \tag{3}$$

We measure the cumulative average abnormal returns for dividend-change group i and dividend-yield group j by averaging CA_k over all the N_{ij} events belonging to group ij over the entire period from July 1962 to June 1987,

$$\overline{CA}_{ij} = \frac{1}{N_{ij}} \sum_{k=1}^{N_{ij}} CA_k = \frac{1}{N_{ij}} \sum_{k=1}^{N_{ij}} \sum_{t=AD-1}^{AD+1} A_{kt}. \tag{4}$$

The t-statistic for the cumulative average abnormal return is obtained cross-sectionally across the N_{ij} securities as follows:

$$t_{ij} = \overline{CA}_{ij} / \hat{S}_{ij}, \tag{5}$$

where $\hat{S}_{ij}$, the standard error of cumulative average abnormal return, is estimated cross-sectionally as

$$\sqrt{N_{ij}}\, \hat{S}_{ij} = \sqrt{\frac{1}{N_{ij}} \sum_{k=1}^{N_{ij}} \left[CA_k - \overline{CA}_{ij} \right]^2}. \tag{6}$$

Table 2

Abnormal returns within stock groups classified by anticipated dividend yield and dividend change over the period July 1962 to June 1987.

The sample of 54,058 dividend announcements consists of all NYSE and AMEX stocks from the CRSP daily master file that satisfy the following criteria: 1) Daily return data for the 300 trading days preceding the announcement are available. 2) The dividend announcement does not occur within 15 trading days of any noncash distribution. 3) The announcement does not represent a dividend initiation or omission. 4) The announcement date precedes the ex-dividend date by at least eight trading days. Abnormal returns for each day during the announcement period, consisting of the day before, the day of, and the day after the dividend announcement, are calculated by using the market model fitted over the 240 trading days ending 10 days before the announcement date. $\overline{CA}_{ij}$ is the three-day cumulative average abnormal return for all stocks belonging to the dividend-change category i and the dividend-yield category j. All returns are expressed as a percentage of the stock price.

	Dividend news:	Decreases	No change	Increases	Total
Yield category	Variable		Average value (standard error)		
Low yield	$\overline{CA}_{ij}$	−0.53 (0.29)	−0.04 (0.03)	0.63 (0.08)	0.05 (0.03)
	Observations	297	14,578	2,611	17,486
Medium yield	$\overline{CA}_{ij}$	−1.65 (0.26)	0.09 (0.03)	1.02 (0.07)	0.18 (0.03)
	Observations	371	15,424	2,522	18,317
High yield	$\overline{CA}_{ij}$	−2.57 (0.30)	0.12 (0.03)	1.54 (0.08)	0.21 (0.03)
	Observations	520	15,546	2,189	18,255
Total	$\overline{CA}_{i-}$	−1.77 (0.17)	0.06 (0.02)	1.04 (0.04)	0.15 (0.02)
	Observations	1,188	45,548	7,322	54,058
χ^2-statistic[a]		26[b]		65[b]	

[a]The χ^2-statistic tests for the equality of cumulative average abnormal returns across the three dividend-yield categories. Assuming that the expected abnormal returns for the three yield categories are equal for dividend decreases, no change, and increases, separately (i.e., $\overline{CA}_{i1} = \overline{CA}_{i2} = \overline{CA}_{i3} = \overline{CA}_{i-}$, for all $i = -1, 0, +1$),

$$S = \left(\frac{\overline{CA}_{i1} - \overline{CA}_{i-}}{\hat{S}_{i1}}\right)^2 + \left(\frac{\overline{CA}_{i2} - \overline{CA}_{i-}}{\hat{S}_{i2}}\right)^2 + \left(\frac{\overline{CA}_{i3} - \overline{CA}_{i-}}{\hat{S}_{i3}}\right)^2 = \chi^2(3) \quad \text{for all } i.$$

Here, $\hat{S}_{i1}$, $\hat{S}_{i2}$, and $\hat{S}_{i3}$ denote the standard errors for the estimated excess returns for the low-, medium-, and high-yield groups.

[b]Significant at the 1% level.

The t-statistic should be approximately normally distributed, given the large value of N_{ij} (typically at least a few hundred).

3. Anticipated yield and price reactions to dividend announcements

Table 2 presents the main results of the paper. It describes excess returns for each dividend-change and anticipated-yield group. The sample is partitioned according to whether the dividend is decreased, unchanged, or in-

creased, and also according to whether the historical yield is low, medium, or high. $\overline{CA}_{ij}$ gives the excess return during the three-day announcement period consisting of the announcement day, one trading day before, and one trading day after the announcement day.

The average three-day excess returns for the decreased-dividend, no-change, and increased-dividend groups are -1.77, 0.06, and 1.04%, respectively. These returns are highly significant (the standard errors for the three groups are 0.17, 0.02, and 0.04%) and are consistent with previous studies. Within the decreased-dividend group, average excess returns are -0.53, -1.65, and -2.57% for the low-, medium-, and high-yield groups. For the increased-dividend group, the average excess returns are 0.63, 1.02, and 1.54%. All returns are significantly different from zero.

To test the null hypothesis that the cumulative average excess return within a dividend-change group is the same across all yield categories, we compute a χ^2-statistic as follows:

$$S = \left(\frac{\overline{CA}_{i1} - \overline{CA}_{i-}}{\hat{S}_{i1}}\right)^2 + \left(\frac{\overline{CA}_{i2} - \overline{CA}_{i-}}{\hat{S}_{i2}}\right)^2 + \left(\frac{\overline{CA}_{i3} - \overline{CA}_{i-}}{\hat{S}_{i3}}\right)^2$$

$$\equiv \chi^2(3) \qquad \text{for all } i,$$

where $\overline{CA}_{i-}$ is the cumulative average excess return for *all* stocks belonging to dividend-change group i, and $\overline{CA}_{i1}$, $\overline{CA}_{i2}$, and $\overline{CA}_{i3}$ are the cumulative average excess returns for the low-, medium-, and high-yield groups within dividend-change group i. The cumulative average excess returns are estimated with standard errors of $\hat{S}_{i1}$, $\hat{S}_{i2}$, and $\hat{S}_{i3}$. The distribution of the χ^2-statistic has three degrees of freedom. The χ^2-statistics for the decreased-dividend and the increased-dividend groups are 26 and 65. These values are highly significant. We can therefore conclude that the average excess returns within the increased-dividend group are significantly more positive for the high-yield stocks than for the low-yield stocks; within the decreased-dividend group, the excess returns are significantly more negative for the high-yield than for the low-yield stocks.

Although our results in table 2 include all industries, we repeated the analysis after excluding utilities and financial firms. Since accounting practices and the regulatory environment for utilities and financial firms usually differ from those for other firms, dividend changes for such firms may be less significant. Our results (not reported) with the sample that excludes utilities and financial firms are somewhat stronger.

In summary, it appears that the price reaction to dividend changes increases with the anticipated yield. The results are highly significant statistically and economically. As the sample is large and representative of the

CRSP population over the 1962–1987 period, these results strongly support the hypothesis that the anticipated yield affects the price reactions to dividend changes in a manner consistent with the existence of dividend-yield clienteles. Before we can ascribe these results to the clientele effect, however, we must examine some alternative explanations.

4. Alternative explanations for the differential price reactions to dividend changes

If higher-yield stocks are predominantly low-priced (hence, perhaps, small-firm) stocks, our results may be biased or overstated as explained below.[5] If dividend changes are more informative for high-yield than low-yield stocks, information content, rather than a clientele effect, may explain our results. If dividend changes for high-yield stocks are accompanied by a larger change in systematic risk, or a greater reduction in free cash flow, then our findings cannot be unambiguously attributed to clientele effects. Below, we examine these possible biases in and alternative explanations of the observed results.

4.1. The influence of stock price on the market's reactions to dividend changes

Table 3 presents the mean and three quartiles of the distribution of the first available stock price during a five-day window preceding the dividend announcement and the corresponding market values for each anticipated-yield and dividend-change group. The mean (median) stock prices for the low-, medium-, and high-yield groups are \$30.48 (\$24.75), \$26.39 (\$23.25), and \$24.63 (\$21.88). Mean stock prices also decrease with increases in anticipated yield within each dividend-change group. The interquartile range of stock prices for the low-, medium-, and high-yield groups is \$23.12, \$20.25, and \$16.56. The variation in mean stock prices across yield groups is small compared with the variation within the yield groups and may not explain much of the observed yield effect. Still, the evidence in table 3 suggests that we should control for stock price when studying the dividend-yield effect. Below we discuss four ways in which lower prices may affect the market's response to dividend changes and examine whether low-priced stocks affect our results.

First, if a dividend increase is followed by a larger number of trades at the asking price or a dividend decrease by more trades at the bid price, the order-flow imbalance may bias the observed price reactions. To examine this, we could study transactions around dividend-change announcements; but this is beyond the scope of our present study. If, however, the observed price

[5]We wish to thank the referee for pointing out the possibility that stock price affects our results and suggesting ways to investigate the effect.

Table 3

Stock prices and market values within stock groups classified by anticipated dividend yield and dividend change over the period July 1962 to June 1987.

The sample of 54,058 dividend announcements consists of all NYSE and AMEX stocks from the CRSP daily master file that satify the following criteria: 1) Daily return data for the 300 trading days preceding the announcement are available. 2) The dividend announcement does not occur within 15 trading days of any noncash distribution. 3) The announcement does not represent a dividend initiation or omission. 4) The announcement date precedes the ex-dividend date by at least eight trading days. Stock price is measured by the first price available during a five-day window preceding the dividend announcement in question. Market value is measured by the product of the stock price and the number of outstanding shares and is used as a proxy for the size of the firm. *Q1* and *Q3* refer to the first- and third-quartile values of the stock-price or the market-value distribution.

	Dividend news:	Decreases	No change	Increases	Total
Yield category	Variable	Stock price (market value in millions)			
Low yield	Mean	$27.23 ($380)	$30.06 ($484)	$33.21 ($584)	$30.48 ($497)
	Q1	16.62 (047)	14.75 (044)	17.88 (062)	15.13 (046)
	Median	24.50 (127)	24.25 (131)	27.00 (189)	24.75 (139)
	Q3	34.37 (339)	37.88 (434)	40.50 (559)	38.25 (451)
	Observations	297	14,578	2,611	17,486
Medium yield	Mean	22.48 (320)	26.10 (451)	28.72 (563)	26.39 (464)
	Q1	14.50 (039)	14.00 (035)	16.25 (048)	14.25 (037)
	Median	21.13 (120)	23.00 (112)	25.00 (157)	23.25 (117)
	Q3	28.63 (396)	34.38 (396)	36.91 (531)	34.50 (412)
	Observations	371	15,424	2,522	18,317
High yield	Mean	21.74 (334)	24.46 (456)	26.55 (601)	24.63 (470)
	Q1	13.25 (032)	14.75 (033)	16.63 (050)	14.88 (035)
	Median	18.63 (088)	21.75 (106)	23.75 (152)	21.88 (110)
	Q3	26.85 (370)	31.25 (398)	33.75 (505)	31.44 (410)
	Observations	520	15,546	2,189	18,255
Total	Mean	23.34 (341)	26.80 (463)	29.67 (582)	27.12 (477)
	Q1	14.38 (038)	14.50 (037)	17.00 (054)	14.75 (038)
	Median	20.75 (106)	22.88 (116)	25.25 (167)	23.13 (122)
	Q3	29.00 (348)	34.25 (408)	37.00 (532)	34.50 (424)
	Observations	1,188	45,548	7,322	54,058

reactions were due to buying and selling pressures, the price effects would be mean-reverting. Eades, Hess, and Kim (1985) find that if the ex-dividend day is removed from the announcement day by five or more trading days, the market reaction to dividend changes is swift and there is no evidence of persistence or reversal in the excess returns. We examined whether there is evidence of mean-reversion in the prices of lower-priced stocks after the dividend-announcement day and found no such evidence.

Second, even if there is no bias due to order-flow imbalance, the statistical significance of observed returns may be overstated for lower-priced stocks because these stocks have a larger trading-induced volatility due to the minimum-tick rule and higher proportional bid–ask spreads [documented by Branch and Freed (1977) and Glosten and Harris (1988)]. To examine

whether the observed differences in price reactions across yield groups are overstated because of higher trading-induced volatility for high-yield stocks, we divided the observed excess return for each event by the estimated standard deviation of the market-model residuals over the same one-year period over which beta was estimated. The χ^2-statistics for equality of the resulting 'standardized excess returns' across yield groups for dividend decreases and dividend increases were 30 and 124, each larger than the corresponding statistic for equality of the percent abnormal returns as reported in table 2. Thus trading-related biases cannot explain our results.

Third, clientele effects arise because of market frictions such as short-sale and margin restrictions, personal borrowing and lending constraints, and direct and indirect costs of trading. But because the costs of trading are inversely related to the stock price, we would expect the clientele effect to be stronger for low-priced stocks than for high-priced stocks.

Finally, the stock price is correlated with firm size. If less information is produced for small firms during nonannouncement periods, the information content of dividend changes may be higher for small firms and hence, perhaps, for low-priced stocks. Therefore, stock price may also be a proxy for the amount of information conveyed by the dividend announcement. Furthermore, one of the components of transaction costs, the bid–ask spread, is determined in part by the dealer to reflect the potential loss in trading with the informed traders. To explore these stock-price effects, we categorize our sample by stock price and study the price reactions to dividend changes across yield categories for each of four stock-price groups.

The results, reported in table 4, show that the market reaction to dividend changes is larger and the yield effect stronger for lower-priced stocks. Mean abnormal returns associated with dividend decreases are -2.98, -1.73, -1.31, and -0.53% for the lowest to the highest price quartiles, with corresponding standard errors of 0.39, 0.29, 0.30, and 0.35%. The equality of price reactions to dividend decreases across stock-price quartiles, with no regard to dividend yield, is rejected by the following χ^2-statistic:

$$Q_1 = \left(\frac{2.98 - 1.77}{0.39}\right)^2 + \left(\frac{1.73 - 1.77}{0.29}\right)^2 + \left(\frac{1.31 - 1.77}{0.30}\right)^2$$

$$+ \left(\frac{0.53 - 1.77}{0.35}\right)^2 = 25 \equiv \chi^2(4).$$

Similarly, mean abnormal returns associated with dividend increases are 1.95, 1.38, 0.63, and 0.52% for the lowest to the highest price quartiles, with corresponding standard errors of 0.13, 0.09, 0.08, and 0.06%. The equality of

Table 4

Abnormal returns within stock groups classified by anticipated dividend yield and dividend change and across four categories based on stock price over the period July 1962 to June 1987.

The sample of 54,058 dividend announcements consists of all NYSE and AMEX stocks from the CRSP daily master file that satisfy the following criteria: 1) Daily return data for the 300 trading days preceding the announcement are available. 2) The dividend announcement does not occur within 15 trading days of any noncash distribution. 3) The announcement does not represent a dividend initiation or omission. 4) The announcement date precedes the ex-dividend date by at least eight trading days. Stocks are assigned to four quartiles based on price. Abnormal returns for each day during the announcement period, consisting of the day before, the day of, and the day after the dividend announcement, are calculated by using the market model fitted over the 240 trading days ending 10 days before the announcement date. $\overline{CA}_{ij}$ is the three-day cumulative average abnormal return for all stocks belonging to the dividend-change category i and the dividend-yield category j. All returns are expressed as a percentage of the stock price.

	Dividend news:	Decreases	No change	Increases	Total
Yield category	Variable	Average value (standard error)			
	Panel A: Lowest quartile of stock prices, range $1.50 to $14.75				
Low yield	$\overline{CA}_{ij}$	−0.86 (0.84)	0.14 (0.08)	1.65 (0.24)	0.30 (0.08)
	Observations	58	3,677	462	4,197
Medium yield	$\overline{CA}_{ij}$	−2.91 (0.59)	0.33 (0.07)	1.72 (0.18)	0.42 (0.07)
	Observations	93	4,240	539	4,872
High yield	$\overline{CA}_{ij}$	−3.76 (0.58)	0.39 (0.06)	2.62 (0.24)	0.44 (0.07)
	Observations	166	3,955	399	4,520
Total	$\overline{CA}_{i-}$	−2.98 (0.39)	0.31 (0.05)	1.95 (0.13)	0.39 (0.04)
	Observations	317	11,872	1,400	13,589
χ^2-statistic[a]		8.2[c]		11.0[c]	
	Panel B: Second quartile of stock prices, range $14.81 to $23.13				
Low yield	$\overline{CA}_{ij}$	−0.49 (0.52)	−0.01 (0.08)	0.62 (0.17)	0.08 (0.07)
	Observations	77	3,239	569	3,885
Medium yield	$\overline{CA}_{ij}$	−1.04 (0.41)	0.06 (0.06)	1.61 (0.17)	0.25 (0.06)
	Observations	118	3,552	590	4,260
High yield	$\overline{CA}_{ij}$	−2.75 (0.49)	0.12 (0.05)	1.84 (0.14)	0.24 (0.05)
	Observations	175	4,519	652	5,346
Total	$\overline{CA}_{i-}$	−1.73 (0.29)	0.07 (0.03)	1.38 (0.09)	0.19 (0.03)
	Observations	370	11,310	1,811	13,491
χ^2-statistic[a]		12.9[d]		32.6[d]	
	Panel C: Third quartile of stock prices, range $23.19 to $34.44				
Low yield	$\overline{CA}_{ij}$	−0.37 (0.51)	−0.09 (0.07)	0.35 (0.15)	−0.02 (0.06)
	Observations	88	3,226	674	3,988
Medium yield	$\overline{CA}_{ij}$	−1.55 (0.50)	0.06 (0.06)	0.50 (0.12)	0.09 (0.05)
	Observations	111	3,798	658	4,567
High yield	$\overline{CA}_{ij}$	−1.75 (0.55)	0.00 (0.05)	1.08 (0.13)	0.10 (0.05)
	Observations	129	4,079	626	4,834
Total	$\overline{CA}_{i-}$	−1.31 (0.30)	−0.00 (0.03)	0.63 (0.08)	0.05 (0.03)
	Observations	328	11,103	1,958	13,389
χ^2-statistic[a]		4.3		16.6[c]	

Table 4 (continued)

Yield category	Dividend news: / Variable	Decreases	No change	Increases	Total
		Average value (standard error)			
	Panel D: Fourth quartile of stock prices, range $34.50 to $586.00				
Low yield	$\overline{CA}_{ij}$	−0.49 (0.53)	−0.18 (0.05)	0.31 (0.10	−0.10 (0.04)
	Observations	74	4,436	906	5,416
Medium yield	$\overline{CA}_{ij}$	−0.96 (0.51)	−0.13 (0.05)	0.51 (0.11)	−0.03 (0.04)
	Observations	49	3,834	735	4,618
High yield	$\overline{CA}_{ij}$	−0.16 (0.78)	−0.08 (0.05)	0.90 (0.13)	0.06 (0.05)
	Observations	50	2,993	512	3,555
Total	$\overline{CA}_{i-}$	−0.53 (0.35)	−0.14 (0.03)	0.52 (0.06)	−0.04 (0.03)
	Observations	173	11,263	2,153	13,589
χ^2-statistic[a]		0.9		13.0[d]	
	Panel E: All stock prices, with no regard to dividend yield, range $1.50 to $586.00				
Total	$\overline{CA}_{i-}$	−1.77 (0.17)	0.06 (0.02)	1.04 (0.04)	0.15 (0.02)
	Observations	1,188	45,548	7,322	54,058
χ^2-statistic[b]		25[d]		165[d]	

[a]The χ^2-statistic tests for the equality of cumulative average abnormal returns across the three dividend-yield categories. Assuming that the expected abnormal returns for the three yield categories are equal for dividend decreases, no change, and increases, separately (i.e., $\overline{CA}_{i1} = \overline{CA}_{i2} = \overline{CA}_{i3} = \overline{CA}_{i-}$, for all $i = -1, 0, +1$),

$$S = \left(\frac{\overline{CA}_{i1} - \overline{CA}_{i-}}{\hat{S}_{i1}}\right)^2 + \left(\frac{\overline{CA}_{i2} - -\overline{CA}_{i-}}{\hat{S}_{i2}}\right)^2 + \left(\frac{\overline{CA}_{i3} - \overline{CA}_{i-}}{\hat{S}_{i3}}\right)^2 \equiv \chi^2(3) \quad \text{for all } i.$$

Here, $\hat{S}_{i1}$, $\hat{S}_{i2}$, and $\hat{S}_{i3}$ denote the standard errors for the estimated excess returns for the low-, medium-, and high-yield groups.

[b]This statistic tests for the equality of price reactions across stock-price quartile, with no regard to dividend yield, and has four degrees of freedom.

[c]Significant at the 5% level.

[d]Significant at the 1% level.

price reactions to dividend increases across stock-price groups, with no regard to dividend yield, is also rejected by a $\chi^2(4)$-statistic of 165. We infer that stock price is a significant determinant of the price reaction to dividend announcements.

Investigation of price reactions within stock-price groups in table 4, however, shows that the stock-price effect does not explain away the dividend-yield effect. The mean abnormal returns increase monotonically with dividend yield in seven out of eight stock groups formed on the basis of stock-price quartiles and whether the dividend was decreased or increased, the only exception being dividend decreases in the highest quartile of stock prices (which includes only 173 observations). The associated χ^2-statistics are significant in six out of eight cases.

The difference in the price reactions to dividend changes across yield categories is also more pronounced for the lower two quartiles for the dividend-decrease as well as dividend-increase group. For dividend decreases, the difference in the cumulative excess return between the high-yield and the low-yield stocks is 2.90, 2.26, 1.38, and −0.33% for the lowest to the highest price groups. The corresponding differences in the cumulative excess returns for dividend increases are 0.97, 1.22, 0.73, and 0.59%.

The evidence thus indicates that stock price is an important determinant of the market's response to dividend changes, but the low-price effects cannot fully explain the dividend-yield effect. Unfortunately we cannot discern whether and how much of the stock-price effect is due to differential information content or due to transaction costs. In fact, the transaction costs may also be related to the information content in dividend announcements because of the adverse-selection component of the bid–ask spread. A careful study of the stock-price and firm-size effects using transactions data and more direct proxies for transaction costs may be a fruitful research endeavor, but is outside the scope of this study. To determine the importance of the yield effect over and above information effects related to price and size, however, we carried out regression analyses. These results are discussed at the end of the next section.

4.2. The information content of dividend changes

If dividend changes are more informative for high-yield stocks than for low-yield stocks, we would erroneously attribute the observed results to the clientele effect. If the high-yield group consists of smaller-capitalization firms, dividend declarations for small firms may convey more information. Dividend changes will be more informative for high-yield stocks than low-yield stocks if it is harder to forecast dividend changes, or dividend changes are more permanent for these stocks. Each of these possibilities is investigated below.

4.2.1. Anticipated dividend yield and firm size

Banz (1981) and Reinganum (1981) found that small firms earn higher risk-adjusted returns, on average, than large firms. Because our results are based on excess returns calculated using the market model estimated over a benchmark period, rather than a particular specification of the CAPM, excess returns earned by smaller firms during the nonannouncement periods will not confound our results. It could be argued, however, that excess returns earned by small firms may not be evenly distributed over time. If information is released for small firms mainly around dividend announcement dates, for example, then small firms may experience relatively greater price changes following dividend announcements than larger firms. It is thus necessary to

examine the correlation between firm size and historical yield within each dividend-change group.

Table 3 shows the differences in firms' market values (calculated using the first available stock price during the five-day window preceding the dividend announcement) across yield categories and dividend-change groups. The average market values for the low-, medium-, and high-yield firms are $497, $464, and $470 million. The median values for these groups are $139, $117, and $110 million. Differences within each dividend-change group are similar. It does not appear likely that our results are being driven by a small-firm effect.

Next, we analyze the effect of yield on the market's response to dividend changes, using four quartiles of market value similar to the stock-price quartiles in table 4. We find that both the price reaction to dividend changes and the yield effect are more pronounced for smaller firms. We do not report these results here, but table 6, discussed below, shows the effect of firm value on the market's response to dividend changes.

4.2.2. Is it harder to forecast dividend changes for high-yield firms?

Price reactions to dividend changes may be larger for high-yield stocks if dividend changes for these stocks are more surprising. Table 2 shows that the percentage of dividend announcements giving a change in dividends was lowest for the high-yield group (14.83%, versus 15.79 and 16.63% for the medium- and low-yield groups). The statistical significance and direction of these results suggest that dividend changes are more informative for high-yield stocks. In our judgment, the differences are small, however, compared with differences in average price reactions.

We next examine whether dividend changes are more permanent for the high-yield stocks. We calculate the probability that, given the last change in dividend, the next change will be of the opposite sign. For high-yield stocks, the dividend change following a decreased dividend is an increase 59.4% of the time; the corresponding percentage for low-yield stocks is 74.7. It appears that dividend decreases are more permanent for the high-yield group. But the corresponding probabilities of a decrease following an increase are 7.6% for the high-yield group and 5.9% for the low-yield group. Dividend increases are more permanent for the low-yield group. These conflicting results cannot account for the larger price reactions for high-yield stocks.

We also examine whether, given a change in dividend, the change is more of a surprise for the high-yield than the low-yield group. Unfortunately, there is no clear measure of the surprise component of a dividend change. Aharony and Swary (1980) have argued that dividend changes are relatively infrequent, so the total change in dividend may be viewed as a surprise. But it is

not clear whether a dividend change should be measured as the percentage change or as the dollar change in the dividend, normalized by the share price. The answer depends on which measure better captures the information content of the change. We examine both of these measures, defined as:

$$DRAT = \frac{100 \times (D_t - D_{t-1})}{D_{t-1}} \tag{7}$$

and

$$DOLCHG = \frac{100 \times (D_t - D_{t-1})}{P_t}, \tag{8}$$

where *DRAT* is the percentage change, *DOLCHG* the dollar change, D_t the dividend paid for the tth quarter, and P_t the stock price before the dividend announcement.

Table 5 gives some summary statistics for the distribution of the two measures of dividend change by yield group. The *DRAT* values for dividend decreases are similar across yield groups, but the *DRAT* values for dividend increases decline substantially with yield. It is thus unlikely that the magnitude of dividend surprise, as measured by *DRAT*, explains the substantially higher price reactions for high-yield firms.

DOLCHG increases with yield for both dividend decreases and increases; it may explain our results. To find out, we regress *CA*, the cumulative excess return from day $AD - 1$ to $AD + 1$, on *DRAT*, *DOLCHG*, *YLDRNK* (percentile rank of dividend yield by calendar quarter), *VALRNK* (percentile rank of market value), and *PRCRNK* (percentile rank of stock price). If our hypothesis that price reactions depend on dividend-yield clienteles is correct, then *YLDRNK* should continue to be significant even after we account for *DRAT*, *DOLCHG*, and other independent variables.

Panel A of table 6 reports the results for stocks that experience a dividend decrease. The coefficient of *YLDRNK* is very significant and negative despite inclusion of the proxies for dividend surprise and other independent variables to account for the low-price and the small-firm effects. The multivariate regression shows that a stock that ranks in the 75th percentile according to yield declines in price by 1.45% more than a stock that ranks in the 25th percentile of yield after the announcement of a dividend decrease. In comparison, if dividends are cut, a stock that ranks in the 75th percentile according to *DRAT* (a cut of 50%) declines in price by 1.37% more than a stock that ranks in the 25th percentile (a cut of 29%). Similarly, a firm that ranks in the 25th percentile according to market value declines in price by 1.72% more than a firm that ranks in the 75th percentile. Although *DOLCHG* and *PRCRNK* are significant in univariate regressions, they become insignif-

Table 5

Magnitude of dividend change within stock groups classified by anticipated dividend yield and dividend change over the period July 1962 to June 1987.

The sample of 8,510 announcements of an increase or a decrease in the quarterly regular dividend consists of all NYSE and AMEX stocks from the CRSP daily master file that satisfy the following criteria: 1) Daily return data for the 300 trading days preceding the announcement are available. 2) The dividend announcement does not occur within 15 trading days of any noncash distribution. 3) The announcement does not represent a dividend initiation or omission. 4) The announcement date precedes the ex-dividend date by at least eight trading days. Two measures of dividend surprise are used. *DRAT* measures the percentage increase in dividend since the last quarter, i.e.,

$$DRAT = [100 \times (D_t - D_{t-1})]/D_{t-1},$$

where D_t is the regular dividend paid during quarter t. *DOLCHG* measures the increase in dividend since the last quarter as a percentage of the stock price, i.e.,

$$DOLCHG = [100 \times (D_t - D_{t-1})]/P_{t-1}.$$

Q1 and *Q3* represent the first- and third-quartile values of the *DRAT* or the *DOLCHG* distribution.

	Dividend news:	Decreases	Increases
Yield category	Variable	*DRAT* (*DOLCHG*)	
Low yield	Mean	−35 (−0.23)	28 (0.12)
	Q1	−50 (−0.31)	11 (0.05)
	Median	−33 (−0.17)	19 (0.08)
	Q3	−22 (−0.09)	27 (0.14)
	Observations	297	2,611
Medium yield	Mean	−40 (−0.51)	17 (0.15)
	Q1	−50 (−0.67)	8 (0.07)
	Median	−43 (−0.46)	12 (0.12)
	Q3	−33 (−0.27)	20 (0.18)
	Observations	371	2,522
High yield	Mean	−41 (−0.84)	13 (0.17)
	Q1	−50 (−1.12)	6 (0.09)
	Median	−43 (−0.72)	10 (0.13)
	Q3	−29 (−0.45)	15 (0.20)
	Observations	520	2,189
Total	Mean	−39 (−0.58)	20 (0.12)
	Q1	−50 (−0.79)	8 (0.05)
	Median	−40 (−0.48)	12 (0.08)
	Q3	−29 (−0.22)	20 (0.14)
	Observations	1,188	7,322

icant in the multivariate regression, perhaps because of their correlations with *DOLCHG* and *VALRNK*.

Thus our analysis reveals three significant determinants of the price reaction to dividend decreases. The price reaction increases with anticipated yield, which is consistent with higher marginal valuation of dividends by the holders of high-yield stocks, and with the percentage change in regular

Table 6

Regression analysis of factors that may explain the magnitude of price reactions to dividend decreases and increases over the period July 1962 to June 1987.

The sample of 8,510 announcements of an increase or a decrease in the quarterly regular dividend consists of all NYSE and AMEX stocks from the CRSP daily master file that satisfy the following criteria: 1) Daily return data for the 300 trading days preceding the announcement are available. 2) The dividend announcement does not occur within 15 trading days of any noncash distribution. 3) The announcement does not represent a dividend initiation or omission. 4) The announcement date precedes the ex-dividend date by at least eight trading days. The dependent variable in the following regressions is the three-day abnormal return (calculated using the market model and expressed in basis points) from the day before a dividend announcement to the day after the announcement. *INTCTP* is the intercept; *DRAT* is the change in dividend since the last quarter divided by the last quarter's dividend; *DOLCHG* is the change in dividend divided by the stock price prevailing before the announcement; and *PRCRNK*, *VALRNK*, and *YLDRNK* are the percentile rankings of stock based on stock price, market value, and anticipated dividend yield (*t*-statistics in parentheses).

	Estimated coefficient value						
No.	*INTCTP*	*DRAT*	*DOLCHG*	*PRCRNK*	*VALRNK*	*YLDRNK*	R^2
	Panel A: Dividend decreases, 1,188 observations						
1.	11 (0.27)	4.80 (4.92)					0.0200
2.	−85 (−3.29)		159 (4.76)				0.0188
3.	−306 (−9.18)			2.92 (4.49)			0.0167
4.	−345 (−10.29)				3.52 (5.79)		0.0274
5.	−10 (−0.29)					−2.95 (−5.12)	0.0216
6.	−0.69 (−0.01)	6.54 (4.78)	−78 (−1.40)	0.77 (0.96)	3.44 (4.75)	−2.89 (−4.04)	0.0704
	Panel B: Dividend increases, 7,322 observations						
1.	89 (17.5)	0.77 (6.00)					0.0049
2.	32 (5.4)		501 (18.0)				0.0422
3.	216 (22.7)			−2.07 (−13.3)			0.0235
4.	196 (20.4)				−1.69 (−10.8)		0.0157
5.	36 (4.2)					1.44 (9.3)	0.0118
6.	85 (6.0)	−0.93 (−5.0)	567 (13.4)	−0.91 (−4.3)	−0.51 (−2.5)	0.70 (4.3)	0.0626

dividend, which is a proxy for the dividend surprise. The price reaction is greater the smaller the firm, which shows that dividend announcements for smaller firms are more informative. As measured by the incremental price reactions of firms in the 75th percentile compared with firms in the 25th percentile, these three factors seem to be about equally important.

Panel B of table 6 reports the somewhat different results for dividend increases. First, with inclusion of both *DRAT* and *DOLCHG*, *DRAT* becomes significant in the *unanticipated* direction, whereas *DOLCHG* remains significant in the anticipated direction. The coefficient of *YLDRNK* remains significant. The price reactions are stronger for low-price and small-firm stocks, but together do not explain the yield effect.

We estimate the relative importance of regressors by the incremental price reactions associated with firms in the 75th percentile as compared with firms in the 25th percentile when ranked by the variable in question, keeping all other variables constant (i.e., based on the multivariate regression). The incremental price reaction is −0.11 and 0.51% for *DRAT* and *DOLCHG*, the two measures of dividend surprise. The corresponding difference in the price reactions based on *PRCRNK* is −0.45%, indicating a larger price reaction to dividend increases for lower-priced stocks. The difference is −0.26 and 0.35% for *VALRNK* and *YLDRNK*, indicating that the price reactions are larger for smaller-firm and higher-yield stocks.

Thus, in addition to anticipated yield, dividend surprise (as measured by *DOLCHG*), and firm size, stock price is also a significant determinant of the price reaction to dividend increases. As explained before, stock price in a univariate regression may be significant because it serves as a proxy for firm size and transaction costs. We have no satisfactory explanation for the significance of stock price in a multivariate regression that includes the firm size, except that the dividend-yield effect is greater for low-priced stocks because of higher transaction costs.

4.3. *Changes in security beta*

Beaver, Kettler, and Scholes (1970) have documented a negative correlation between dividend yield and security beta. Because dividend increases are associated with increases in dividend yield, i.e., the percentage change in the stock's price is typically much smaller than the percentage change in the dividend, one would expect a decrease in security beta after a dividend increase and an increase in security beta after a dividend decrease. If the beta increase or decrease is larger for high-yield stocks, our results may simply reflect changes in the security betas.

If beta changes associated with dividend changes vary across yield groups, our results will be affected in two ways. First, calculation of excess returns during the announcement period will be affected. As we discussed in section

3, however, this effect is very small. Second, changes in beta may *result* in price reactions via changes in the discount rate. This effect could be quite large even for a small change in beta. To get a feel for the magnitude of this effect, let $P(\cdot)$ denote security price, β the security beta, r_{ft} and r_{pt} the riskless return and the market risk premium t periods hence, and $c(t)$ the corresponding cash flow. Assume that $c(t)$ is an even stream of cash inflows and r_{ft} and r_{pt} are constant over time. Then,

$$P(c,\beta) = \frac{c}{r_f + \beta r_p}. \tag{9}$$

Taking the first differences, ignoring higher-order terms, and representing before and after parameters by subscripts b and a, we have

$$\frac{P(c_a,\beta_a) - P(c_b,\beta_b)}{P(c_b,\beta_b)} = \frac{c_a - c_b}{c_b} - \frac{(\beta_a - \beta_b) r_p}{r_f + \beta_b r_p}. \tag{10}$$

The first term on the right-hand side of (10) represents the effect of information about future cash flows conveyed by dividend announcements and the second term represents the effect of information about future betas. The second term may be substantial. Assuming that $r_f = r_p = 8\%$ per annum, a permanent decrease in β from 1.00 to 0.99 will lead to a price increase of 0.5%.

We examine the changes in security betas following dividend announcements. As expected, dividend decreases are accompanied by a significant increase in beta of 0.077 and dividend increases by a significant decrease in beta of 0.014. (The corresponding standard errors are 0.0119 and 0.0045, respectively.) The null hypothesis of the equality of beta changes across dividend-yield categories for dividend decreases cannot be rejected, however. Given the much larger number of dividend increases, the equality of beta changes across yield categories can be rejected, but the trend is exactly the opposite of what would explain away the dividend-yield effect. We thus conclude that a positive correlation between the price reaction to a dividend change and historical yield cannot be explained by the accompanying changes in security betas.

4.4. The agency costs of free cash flow

Finally, anticipated yield could be correlated with a company's free cash flow. There is good reason to suspect that high-yield firms are mature firms that have 'cash-cow' businesses generating a large free cash flow. As Jensen (1986) and Easterbrook (1984) have argued, managers may not use such

internally generated funds as efficiently as they do externally raised funds, whose use is subject to a fair degree of scrutiny. Therefore, the positive average price reactions to dividend changes may be explained by a decrease in free cash flow and negative price reactions by an increase in free cash flow.

Lang and Litzenberger (1989) have shown that the price reactions to dividend changes are larger for firms with a Tobin's q ratio of less than one.[6] This suggests the existence of agency problems arising from inefficient use of free cash flow. If yield is correlated with Tobin's q, our hypothesis that price reactions to dividend announcements depend on dividend clienteles may not be accurate.

One direct approach to test for this possibility would be to include the q ratio as another regressor to explain excess returns and to see whether *YLDRNK* remains significant. But data on q ratios are not easily obtained and are subject to the problems discussed in Lang and Litzenberger (1989). We can, however, check whether dividend increases are accompanied by a greater reduction (smaller increase) in retained earnings for the high-yield than for the low-yield stocks.

We obtain quarterly earnings announcement data from the Standard & Poor's Compustat quarterly file and match these with a dividend announcement if the earnings were earned over the fiscal quarter preceding the fiscal quarter of the dividend and announced during the concurrent quarter. For each announcement, we compute the change in earnings per share from the same quarter of the previous fiscal year and the change in dividend per share, on an annualized basis, from the last fiscal quarter. This measure of the change in earnings is equivalent to measuring the change in the running total of the last four quarters' earnings. Dividends are annualized by Compustat to take into account any seasonalities in dividends, such as special dividends every fourth quarter. We call these variables *E-DIFF* and *D-DIFF*. We also compute *ED-DIFF*, which is the differential change in earnings over the change in dividends. The variable *ED-DIFF* represents the change in retained earnings, which is taken to be a proxy for the free cash flow available to managers. We ignore those cases where a stock distribution is announced during 15 trading days before or after the dividend announcement. The data cover 17,830 dividend and earnings announcements.

Table 7 gives the mean value of the differential change in earnings over the change in dividends (*ED-DIFF*) for each of the yield and dividend change groups. For the sample of firms that cut dividends, the average dividend decrease is 10.7 cents per share. For these firms, on average, earnings decrease by 69.9 cents a share. The average value of the difference of earnings change and the dividend change is therefore -59.2 cents per share.

[6]Tobin's q is defined as the market value of a firm divided by the replacement cost of its assets. If this ratio is less than one, it indicates inefficient use of funds by the firm.

Table 7

Changes in retained earnings surrounding dividend announcements within stock groups classified by anticipated dividend yield and dividend change over the period 1978–1987.

The sample of 17,830 dividend announcements consists of all NYSE and AMEX stocks from the CRSP daily master file that satisfy the following criteria: 1) Daily return data for the 300 trading days preceding the announcement are available. 2) The dividend announcement does not occur within 15 trading days of any noncash distribution. 3) The announcement does not represent a dividend initiation or omission. 4) The announcement date precedes the ex-dividend date by at least eight trading days. 5) Earnings data for the quarter corresponding to the dividend announcement are available from the Standard & Poor's Compustat quarterly files beginning in fiscal year 1978 and ending in fiscal year 1987. Because of the additional earnings data criterion, the subsample used in this table is smaller than in tables 1–6. *D-DIFF* refers to the difference between this quarter's and the last quarter's dividend per share; *E-DIFF* refers to the difference in earnings per share between this quarter and the same quarter last year; *ED-DIFF* equals the difference between *E-DIFF* and *D-DIFF* and represents the net increase in retained earnings. All quantities are expressed in dollars per share (standard errors in parentheses).

Yield category	Dividend news: Variable	Decreases	No change	Increases	Total
		Average value			
Low yield	*D-DIFF*	−0.045 (0.005)	0.000 (0.000)	0.014 (0.001)	0.002 (0.001
	E-DIFF	−0.394 (0.111)	−0.045 (0.009)	0.049 (0.009)	−0.034 (0.008)
	ED-DIFF	−0.350 (0.110)	−0.045 (0.009)	0.035 (0.009)	−0.036 (0.008)
	Freq (−, 0, +)[a]	68.6, 0.0, 31.4	42.2, 3.0, 54.8	29.4, 1.6, 69.0	40.6, 2.8, 56.6
	Observations	35	4,675	748	5,458
Medium yield	*D-DIFF*	−0.103 (0.010)	0.000 (0.000)	0.020 (0.001)	0.002 (0.001)
	E-DIFF	−1.084 (0.446)	−0.047 (0.011)	0.106 (0.026)	−0.036 (0.011)
	ED-DIFF	−0.982 (0.446)	−0.047 (0.011)	0.086 (0.026)	−0.038 (0.011)
	Freq (−, 0, +)	70.4, 0.0, 29.6	42.1, 3.0, 54.9	28.6, 1.9, 69.5	40.9, 2.0, 57.1
	Observations	61	5,189	849	6,099
High yield	*D-DIFF*	−0.127 (0.008)	0.000 (0.000)	0.025 (0.006)	0.001 (0.001)
	E-DIFF	−0.595 (0.218)	−0.032 (0.010)	0.064 (0.009)	−0.029 (0.009)
	Freq (−, 0, +)	70.4, 0.0, 29.6	42.1, 3.0, 54.9	28.6, 1.9, 69.5	42.2, 2.0, 55.8
	Observations	124	5,237	912	6,273
Total	*D-DIFF*	−0.107 (0.006)	0.000 (0.000)	0.020 (0.001)	0.001 (0.001)
	E-DIFF	−0.699 (0.175)	−0.041 (0.006)	0.074 (0.010)	−0.033 (0.006)
	ED-DIFF	−0.592 (0.174)	−0.041 (0.006)	0.054 (0.010)	−0.035 (0.006)
	Freq (−, 0, +)	71.3, 0.5, 28.2	42.3, 2.4, 55.3	32.3, 1.5, 66.2	41.3, 2.3, 56.4
	Observations	220	15,101	2,509	17,830
χ^2-statistic	*ED-DIFF*	5.89		8.74	

[a]The three figures under Freq (+, 0, −) represent the frequency of positive, zero, and negative *ED − DIFF*.

The corresponding average values for the low-, medium-, and high-yield groups are −35.0 cents, −98.2 cents, and −46.8 cents. The differential change in earnings over dividends is not monotonic in the anticipated yield. Although all these values are statistically significant, the χ^2-statistic for the differences across yield groups is not significant. We cannot conclude that the relative magnitude of negative average price reactions for the high-yield

group can be explained by the agency problems associated with free cash flow.

The increased-dividend group as a whole has an average dividend change and earnings change of 2.0 cents per share and 7.4 cents per share. The average incremental change in earnings over dividends is 5.4 cents per share. The corresponding values for the low-, medium-, and high-yield groups are 3.5 cents, 8.6 cents, and 3.9 cents per share. Again, the magnitude is not monotonic in the anticipated yield. Although each of these values is significant, the difference among them is not significant according to the χ^2-statistic. We therefore conclude that the agency problems of free cash flow do not explain our results.

Table 7 also presents statistics on the proportion of firms for which the change in earnings minus the change in dividends is positive within each dividend-change and yield group. The nonparametric results also show that the free cash flow hypothesis does not account for our results.

5. Conclusions

We provide evidence that anticipated yield affects the price reactions to dividend announcements in a manner consistent with dividend clienteles. This effect is very significant statistically and economically. For our sample, the average price reaction to dividend decreases is only -0.53% for the low-yield group, but -2.57% for the high-yield group. For the increased-dividend group, the corresponding averages are 0.63 and 1.54%. Our results are robust to various confounding influences.

The price reactions to dividend changes are larger and the clientele effect is stronger for low-priced and small-firm stocks. Using univariate as well as multivariate analysis, we find that the three effects – dividend yield, firm size, and stock price – are about equally important.

We suggest two possible explanations for the size effects. First, if relatively little information about small firms is released during periods other than those surrounding dividend and earnings announcements, we would expect dividend-change announcements to be more informative for small firms. Many small firms also have low stock prices, which may partially explain why stock price is a significant explanatory variable for price reactions to dividend changes. Second, the major contribution of Kalay (1982) has been to point out that different marginal valuations of dividends cannot be sustained in equilibrium unless there are significant transaction costs. Since transaction costs are higher for lower-priced and smaller-firm stocks, we can perhaps attribute some of the size effects to transaction costs.

We believe this evidence is important to understanding the yield and information effects of dividends. There has been much debate about whether dividend-yield-based clienteles have any effect on required rates of return

because investors in high-yield and low-yield stocks value dividends differently. Our evidence indicates that the marginal valuation of unanticipated yield, at least, differs across stocks in a manner consistent with the existence of dividend clienteles.

Finally, we reason that not only does the information content of dividend announcements make it difficult to measure the effect of yield on rates of return, but that yield also affects the measurement of the information content of dividends. Unfortunately, it is impossible to separate market price reactions into a component attributable to yield surprise and a component attributable to the information about future earnings conveyed by a dividend announcement.

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