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# A TEST OF DIVIDEND IRRELEVANCE USING VOLUME REACTIONS TO A CHANGE IN DIVIDEND POLICY*

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We investigate the implication of clientele theories that changes in dividend policy should result in a marked increase in trading volume as shareholder clienteles change. With 192 firms announcing their first cash dividend we document both an increase in trading volume and firm value around the announcement date. We integrate these results to distinguish between the volume response to good news about the future and clientele adjustments to a change in dividend policy. Our results suggest that volume increases primarily in response to the signal about future earnings contained in the dividend. Clientele adjustments are small.

## 1. Introduction

In this research, we attempt to shed light on the descriptive validity of clientele theories of dividend policy by examining the implication that changes in dividend policy should result in a marked increase in trading volume as the market place experiences a shift in shareholder clienteles. Prior empirical investigations into the relevance of dividend policy have been based on two distinct approaches. One approach is direct inspection of the characteristics of investors holding stocks with different dividend yields. Lewellen et al. (1978) and Pettit (1977) examine the relationship between the marginal tax rates of various clients of a brokerage firm and the dividend yield of the stocks or portfolios purchased through that firm. They find weak evidence of dividend tax clienteles. Pettit finds the strongest evidence but concludes that dividend yield appears important only at the margin.

The second approach is examination of aggregate market statistics. To date, nearly all of the market-based empirical investigations into the relevance of

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dividend policy have focused on the question of price effects. Examples include Elton and Gruber (1970), Black and Scholes (1974), Long (1977), Litzenberger and Ramaswamy (1979,1982), Miller and Scholes (1982), Kalay (1982), and Hess (1983). The exception is Asquith and Krasker (1985) who, concurrent with our research, posit and investigate the volume implications of dividend policy changes. With motivation and basic data similar to ours, they provide an empirical investigation into volume reactions to dividend policy changes. Their methods differ in several respects from ours but their results and conclusions are similar. We discuss some of their insights and results in our conclusions.

For a sample of 192 firms announcing a cash dividend for the first time in the history of the firm, we document both a significant increase in trading volume and an increase in firm value around the announcement date. We integrate these two results to distinguish between the good news – signalling aspect of an increase in dividends and clientele adjustments. Our results suggest that increased trading taking place around the announcement date is largely related to the signal about future earnings contained in the announcement. The evidence of trading for dividend clientele reasons shows this motive to be of less importance although some evidence of clientele trading exists. Essentially, our results extend those of Lewellen et al. (1978) and Pettit (1977) by examining *changes* in dividend policy and the reaction of the entire market rather than the portfolio composition of a sample of investors and the relation between dividend yield and investor demographics.

In section 2 we summarize the current literature on the importance of dividend policy and motivate our interest in trading volume. An outline of our empirical methods is provided in section 3. Section 4 contains our primary results. Conclusions are in section 5.

## 2. Theories and implications of dividend relevance

Miller and Modigliani (1961) hold firms' investment decisions constant in their analysis of dividend policy. This assumption, combined with perfect capital markets, rational investors, perfect information, and no taxes implies that dividend policy is irrelevant to shareholders. Larger current dividends imply offsetting lower future capital gains. If it is assumed that the consumption decision of investors is made at the portfolio level, the relative volume of trading in a given security should not increase when dividend policy changes. Any counterbalancing alterations in the reinvestment of cash dividends or periodic sales of securities would take place in portfolio units.

With personal taxes, Miller and Scholes (1978) extend the results of Miller and Modigliani by appealing to a dividend laundering argument. They argue that dividend receipts can be made tax exempt by laundering them with personal borrowing. Personal loans are taken out with tax deductible interest payments just offsetting the dividend receipts. The proceeds can then be invested in stocks with returns comprised entirely of capital gains or in other tax deferred investments.

In the irrelevance theories of Miller and Modigliani and Miller and Scholes, the changing of dividend policy has no impact on firm value or on shareholder welfare. Further, changing dividend policy has no impact on the relative demand for the shares of the firm by any class of investor.[1] We call this set of implications, strong irrelevance.

Strong irrelevance theories require restrictive assumptions about the market setting. Under weaker assumptions, models can be developed that imply what we call, price irrelevance without preserving the implication that investors are indifferent to dividend yield. Such a theory was suggested by Miller and Modigliani when they introduced transaction costs and taxes into the model. The ideas were extended by Black and Scholes (1974) who combined the existence of investor clienteles with value-maximizing supply side behavior of firms issuing dividends.

Black and Scholes acknowledge that certain investors prefer high dividend yields, ceteris paribus, while others prefer low dividend yields. Taken in aggregate, the relative sizes of these clienteles and their total impact on the market determine the relevance of dividend policy in the pricing of corporate shares. Price irrelevance results if the supply of the firms offering different dividend policies is in proportion to demand. A population of value-maximizing firms will insure price irrelevance by altering their dividend policies so that, at the margin, there are no gains from offering any particular policy over any other.

Within a price irrelevance theory of market equilibrium like that of Black and Scholes, firm value is unaffected by changes in dividend policy but investors must rebalance their portfolios to maximize welfare. For example, a firm that has never paid a dividend is likely to be held by investors who prefer capital gains to dividend income (e.g., investors in higher tax brackets). When the firm issues a dividend for the first time, investors who prefer dividends to capital gains will trade with existing shareholders. Portfolio revisions take place outside of any direct share price reactions. Hence a clientele theory can preserve the implication of price irrelevance but implies that changes in dividend policy should be associated with an increase in trading volume as shareholder clienteles alter their investment positions. Under the strong dividend irrelevance models of Miller and Modigliani and Miller and Scholes, there is no increased volume prediction. In fact, if the consumption decision of

[1] In their proof of dividend irrelevance, Miller and Modigliani assume that an increase in dividend payments is financed by the firm with either an issue of new shares or a reduction in share repurchases. New issues would not be identified as volume in the statistics used below. A reduction in repurchases would, if anything, cause a small reduction in volume subsequent to an increase in dividend payments.

investors is made at the portfolio level, increased relative volume would appear inconsistent with these theories.

Opposing the dividend irrelevance models of market equilibrium are several models built on a clientele concept but without the assumption that firms alter supply in response to demand. When the economy-wide mix of firms with different dividend policies no longer matches the mix of personal tax brackets, models like those of Brennan (1970), Litzenberger and Ramaswamy (1979) and Elton and Gruber (1970) imply a revaluation of firms that change dividend policy. In the case of Brennan, no portfolio revisions are predicted because all investors are assumed to be identical. The models of Litzenberger and Ramaswamy and of Elton and Gruber imply both price relevance and shifts in clienteles (clientele relevance).

Models that concentrate on tax differentials imply corner solutions in portfolio composition. In a certainty environment, for example, changes in dividend policy are met with complete share turnover from one clientele to another. Richer settings, however, suggest that dividend yield and relative tax rates are but one facet of investor portfolio choice. Within the models of Long (1977) and Modigliani (1982), investors make their portfolio choices in recognition of tradeoffs along a tax dimension and a risk dimension. Securities do not necessarily have perfect substitutes along the risk dimension, except at the margin, and, hence, Modigliani (1982) concludes that the portfolio composition of investors with high marginal tax rates will differ only modestly from the composition of investors with low marginal tax rates. Similarly, Long (1977) concludes that the efficiency gains from rebalancing to an after-tax efficient portfolio from a before-tax efficient portfolio are likely to be small for most investors.[2]

Within a model that recognizes the increasing cost of foregone portfolio diversification, changes in dividend policy should be accompanied with but modest portfolio rebalancing. Indeed, although investors may care about dividends, the degree of rebalancing could be small. The rebalancing that results from a dividend policy change, however, should be sensitive to measures of the cost and benefits of rebalancing such as the magnitude of the dividend yield and the amount of accrued capital gains tax liability implicit in the tax basis of the security.[3]

[2] Black and Scholes (1974) also suggest this result as an implication of their empirical evidence.

[3] One qualification surrounding a focus on dividend policy changes is that only voluntary changes are observed in practice. Hence, the changes we observe are made in light of the existing shareholders and their preferences. It would generally be suboptimal for a firm to alter dividend policy in pursuit of a small increase in firm value if its existing clientele prefers the original policy and is impeded from shifting to other firms. Where these frictions predominate, an observed sample of dividend policy changes could deviate significantly in behavior from a hypothetical sample of firms that were to alter policy arbitrarily. The latter sample would be expected to contain larger clientele shifts.

One complication with testing the price and volume implications of the theories of dividend relevance and irrelevance is that these implications pertain to pure dividend policy changes, matched by offsetting changes in equity financing. In reality, as noted by Miller and Rock (1985), dividend policy changes are often associated with changes in expected current or future net cash flows. Thus, observed dividend policy changes are typically associated with an information related price effect. Moreover, volume tends to increase around significant information releases about firm value. Volume associated with 'information content' is documented by Beaver (1968), for example, in the case of annual earnings announcements. As a result, tests of dividend relevance along either the price or volume dimension must include controls for the probable information content of the dividend announcement. The controls we consider are discussed in section 4.

## 3. Experimental design

### *3.1. Overview*

We focus on firms as they change from a policy of no cash payments to one of periodic cash dividends. We single out firms that are making their first dividend payment ever, so the event should indicate a significant change in policy from the perspective of the firms' stockholders. We build on the logic of Asquith and Mullins (1983) in this regard. 'Normalized' volume data are examined over the time period from the announcement of the initial dividend until the ex-dividend date. We employ several models to determine whether abnormally high trading (if any) in this period is evidence that a firm's clientele is shifting.

### *3.2. Sample characteristics and selection procedures*

Our sample consists of 192 firms paying a dividend for the first time during the fourteen year period 1969 to 1982, inclusive. The sample was selected from the Annual Compustat Industrial Tape. The initial dividend was typically a quarterly dividend. We calculate the corresponding dividend yield at announcement by dividing the amount declared by the previous day's closing stock price. The dividend yield is not annualized. As indicated in table 1, the average declared dividend yield for the 192 firms was 0.9 percent, with a minimum of 0.04 percent and a maximum of 4.4 percent. Seventy-five percent of the sample continues to pay uninterrupted dividends through 1982, the end of the available data. Firms that classified their dividends as special were excluded from the sample because specials would seem to provide a weaker signal of a change in dividend policy.

Table 2 represents a frequency distribution of dividend initiation dates by quarter and year. There is some evidence of clustering by fiscal year in the

Table 1

Frequency distribution of dividend yields for first-time dividends.[a]

| Cell number | Range | Number |
|---|---|---|
| 1 | > 0.0135 | 37 |
| 2 | 0.0120 – 0.0134 | 8 |
| 3 | 0.0105 – 0.0119 | 14 |
| 4 | 0.0090 – 0.0104 | 19 |
| 5 | 0.0075 – 0.0089 | 13 |
| 6 | 0.0060 – 0.0074 | 23 |
| 7 | 0.0045 – 0.0059 | 24 |
| 8 | 0.0030 – 0.0044 | 19 |
| 9 | 0.0015 – 0.0029 | 29 |
| 10 | 0 – 0.0014 | 6 |
| Total | | 192 |

[a] Yield is defined as the first announced dividend divided by the closing stock price on the day prior to announcement. It is not annualized.

Table 2

Frequency distribution of dividend initiation dates by quarter and year for first-time dividends.

| Year | Quarter 1 | 2 | 3 | 4 | Total |
|---|---|---|---|---|---|
| 1969 | 0 | 0 | 1 | 0 | 1 |
| 1970 | 0 | 0 | 1 | 1 | 2 |
| 1971 | 1 | 1 | 0 | 1 | 3 |
| 1972 | 2 | 1 | 3 | 7 | 13 |
| 1973 | 5 | 4 | 9 | 6 | 24 |
| 1974 | 3 | 5 | 6 | 2 | 16 |
| 1975 | 3 | 5 | 6 | 8 | 22 |
| 1976 | 10 | 11 | 9 | 15 | 45 |
| 1977 | 10 | 9 | 4 | 5 | 28 |
| 1978 | 5 | 5 | 2 | 2 | 14 |
| 1979 | 2 | 3 | 2 | 2 | 9 |
| 1980 | 2 | 2 | 0 | 3 | 7 |
| 1981 | 3 | 0 | 0 | 4 | 7 |
| 1982 | 0 | 1 | 0 | 0 | 1 |
| Total | 46 | 47 | 43 | 56 | 192 |

middle of the study period. Seventy percent, or 135, of the 192 firms made announcements in the five years 1973–1977. There is no significant clustering by quarter although the most frequent quarter is the fourth with 56 firms and the least frequent is the third with 43 firms.

To be included in our sample, each firm met the following criteria:

(i) The dividend change must be recorded as a first-time dividend in *Moody's Dividend Record*. The *Record* was used to determine the announcement and ex-dividend dates.
(ii) The change must be preceded by at least five years of records on the 1983 Annual Compustat Industrial Tape.
(iii) It must be included on the University of Chicago's Center for Research in Security Prices daily returns tape for a one-year period on either side of the announcement date and contain no missing observations over the week of announcement.
(iv) It must have complete volume data available in the *Daily Stock Price Record*, a publication of Standard and Poor's Corp., for a one-year period on either side of the announcement date. Weekly shares traded and total shares outstanding for each firm and the entire NYSE were also obtained from this source.

Shares traded were deflated by total shares outstanding in a manner identical to Beaver (1968). We state the volume measures in percentage terms as follows:

$$v_{it} = \frac{\text{Shares of firm } i \text{ traded in week } t \times 100}{\text{Shares outstanding for firm } i \text{ in week } t} \times \frac{1}{\text{Trading days in week } t},$$

$$v_{mt} = \frac{\text{Shares traded for all NYSE firms in week } t \times 100}{\text{Shares outstanding for all NYSE firms in week } t} \times \frac{1}{\text{Trading days in week } t}.$$

The percentage of shares traded per week is divided by the number of trading days since some weeks have less than five trading days. The above measures therefore represent a weekly average of the daily percentage of shares traded. The data are corrected for issuances, repurchases, splits and stock dividends. Across the sample, the average percentage of shares traded over the 105-week period surrounding a first-time dividend is slightly higher than typical of NYSE firms. The pooled, average $v_{it}$ is 0.11%. Matched pairwise in calendar time, the average $v_{mt}$ is just under 0.10% across the sample.

### 3.3. Preliminary models of volume reactions and abnormal return

#### 3.3.1. The normalization of volume statistics

Volume data are decidedly non-normal. Common practice is to take a natural log transformation of the percentage of shares traded [e.g., Morse (1980) and Pincus (1983)]. A log transformation stands up well to standard normality tests except for the occasional occurrence of zero volume. This problem was handled by the addition of a small positive constant to our entire volume data set.[4] Thus, all of our empirical analysis of volume uses the 'normalized' volume variable

$$V_{it} = \log(v_{it} + c),$$

where

$V_{it}$ = normalized volume for firm $i$ in week $t$,
$v_{it}$ = average percentage of shares traded for firm $i$ in week $t$,
$c$ = 0.001275.

#### 3.3.2. Estimation of the volume reaction

To estimate the volume reaction to the announcement of a dividend policy change and during the subsequent interval to the ex-dividend date we posit a simple model of volume generation of the form

$$V_{it} = \alpha_i + \beta_i V_{mt} + \nu_{iA}\delta_A + \nu_{iI}\delta_I + e_{it}, \tag{1}$$

where

$V_{\cdot t}$ = normalized volume for the firm or market in week $t$,
$\delta_A$ = an announcement variable identifying the announcement week with a value of unity and having zeroes everywhere else,
$\delta_I$ = a variable identifying the interval between the announcement week and the ex-dividend week including the ex-dividend week but excluding announcement. The variable takes on the value $1/T$ during the interval and zero everywhere else where $T$ is the number of weeks in the interval,
$\alpha_i, \beta_i$ = parameters identifying the intercept and sensitivity to market volume,
$\nu_{iA}$ = 'abnormal' volume reaction to the dividend announcement for firm $i$,
$\nu_{iI}$ = 'abnormal' volume reaction during the interval of trading between announcement and the ex-dividend date for firm $i$ ($\nu_{iI}$ is expressed as a total value, cumulated over the interval because of the scaling of $\delta_I$),
$e_{it}$ = normally distributed error term.

[4] The issue of data transformation to approximate normality is discussed in Johnson and Wichern (1982). We investigated a class of power transformations with additive constant terms of the Box-Cox (1964) type and found the log transformation after adding a constant term a reasonable compromise. The constant term was chosen to maximize the 'fit' of the data to a normal distribution. The actual constant used throughout the analysis is 0.001275.

In time series models of volume processes, error terms are autocorrelated [e.g., Pincus (1983)]. The autocorrelation of $e_{it}$ in (1) is assumed to follow a first-order autoregressive process.[5] This assumption allows us to estimate the model conveniently in an estimated generalized least squares (EGLS) framework. The model is transformed for the estimated first-order autocorrelation in $e_{it}$ and the parameters estimated with ordinary least squares (OLS) after transformation [see Judge et al. (1980, 5.2.1)]. One hundred and five weeks of data centered on the week of announcement are used in the estimation.

Summary statistics on the volume coefficients are presented in table 3. Panel A of table 3 presents a frequency distribution for $\nu_{iA}$, the abnormal volume for the announcement week. The mean abnormal volume for this time period is 0.315 with a $t$-ratio of 6.87. When translated back into raw volume, the average announcement week has an increase in volume from 0.10 percent of shares traded per day to 0.135 percent or an increase of about 35 percent over normal volume in non-announcement weeks.[6] Of the 192 observations, 68 percent are positive providing a $z$-statistic for a binomial test of equal probabilities of 4.91.

Panel B of table 3 presents an analogous frequency distribution for $\nu_{iI}$, the abnormal volume effect for the time interval from the dividend announcement to ex date. The mean abnormal volume for this time period is 0.233 with a $t$-ratio of 2.05. Fifty-five percent are positive, generating a $z$-statistic for a binomial test of equal probabilities of 1.44. Translated into raw volume, the average cumulative increase over this interval is 0.054 percent of shares traded or about 54 percent of the normal volume that occurs over the same interval of weeks. For example, if the interval is three weeks, the average interval in our sample, the abnormal volume would be about 18 percent per week above normal volume. Our results are stated in cumulative terms because the motive to trade would seem independent of the interval chosen by the firm.

The $t$-ratios represent tests of significance for the cross-sectional means under the assumption that each firm's abnormal volume is an independent drawing from the same normally distributed population. Under these assumptions the $t$-tests reject the hypothesis that the abnormal volume measures are centered on zero at the 0.05 level. The volume reaction is relatively weaker for the time interval subsequent to the announcement week, however.

For the interval period, the failure of the sign test to support our cross-sectional $t$-test suggests a possible violation of the normality assumption under-

[5] This assumption is similar to Pincus (1983) and in our application eliminates substantially all of the autocorrelation present.

[6] Since the volume model is estimated with normalized data it is difficult to translate regression coefficients into raw volume equivalents. To get an approximate magnitude of the shift in volume during the announcement week, the volume model was estimated on the raw data without normalization. The average coefficient in the announcement week was 0.035 and the average intercept, 0.10. The average coefficient over the interval from announcement to the ex-date was 0.054.

Table 3

Frequency distribution of abnormal volume coefficients surrounding first-time dividend announcements.[a]

| Panel A | | | Panel B | | |
|---|---|---|---|---|---|
| Announcement week coefficient $\nu_{iA}$ | | | Interval to ex-date coefficient $\nu_{iI}$ | | |
| Cell number | Range | Number | Cell number | Range | Number |
| 1 | < −1.20 | 0 | 1 | < −4.80 | 1 |
| 2 | −1.20– −0.81 | 5 | 2 | −4.80– −3.61 | 1 |
| 3 | −0.80– −0.41 | 19 | 3 | −3.60– −2.41 | 4 |
| 4 | −0.40– −0.01 | 38 | 4 | −2.40– −1.21 | 19 |
| 5 | 0.00–0.39 | 50 | 5 | −1.20– −0.01 | 61 |
| 6 | 0.40–0.79 | 38 | 6 | 0.00–1.19 | 74 |
| 7 | 0.80–1.19 | 27 | 7 | 1.20–2.39 | 14 |
| 8 | 1.20–1.59 | 11 | 8 | 2.40–3.59 | 8 |
| 9 | 1.60–1.99 | 3 | 9 | 3.60–4.79 | 6 |
| 10 | >2.00 | 1 | 10 | >4.80 | 4 |
| Total | | 192 | | | 192 |
| Mean | 0.315 | | | 0.233 | |
| $T$-ratio | 6.87 | | | 2.05 | |
| % pos. | 68% | | | 55% | |

[a] Coefficients are taken from regression (1) in the text:

$$V_{it} = \alpha_i + \beta_i V_{mt} + \nu_{iA}\delta_A + \nu_{iI}\delta_I + e_{it},$$

$V_{\cdot t}$ = normalized volume for the firm or market in week $t$,

$\delta_A$ = an announcement variable identifying the announcement week with a value of unity and having zeroes everywhere else,

$\delta_I$ = a variable identifying the interval between the announcement week and the ex-dividend week including the ex-divided week but excluding announcement. The variable takes on the value $1/T$ during the interval and zero everywhere else, where $T$ is the number of weeks in the interval,

$\alpha_i, \beta_i$ = parameters identifying the intercept and sensitivity to market volume,

$\nu_{iA}$ = 'abnormal' volume reaction to the dividend announcement for firm $i$,

$\nu_{iI}$ = 'abnormal' volume reaction during the interval of trading between announcement and the ex-dividend date for firm $i$ ($\nu_{iI}$ is expressed as a total value, cumulated over the interval).

lying the $t$-test. A chi-squared goodness-of-fit test rejected cross-sectional normality for $\hat{\nu}_{iI}$ (but not for $\hat{\nu}_{iA}$), thus confirming the violation. We therefore examine the mean effect with a test that incorporates the time-series estimates of the standard error for each firm and exploits the normality assumption, over time for a given firm, of $e_{it}$. Assuming that the $e_{it}$ are independently distributed across firms, the average coefficient has variance equal to the average variance of the coefficients divided by $J$. Under the null hypothesis of a zero mean, the following statistic is distributed as $F$ with 1 and 101 degrees of freedom,

$$F = \left(\sum \hat{\nu}_{iA}\right)^2 \Big/ \left(\sum \hat{\sigma}^2_{\nu_{iA}}\right),$$

where $\hat{\sigma}_{\nu_{iA}}$ is the standard error of $\hat{\nu}_{iA}$ from the time-series regressions. The analogous statistic for the mean of the $\nu_{iI}$ has the same distribution. The corresponding values for a test on the statistics are 44.65 and 3.91, respectively. The marginal significance levels for the statistics are 0.000 and 0.051. Thus the tests corroborate the simple $t$-ratios reported in table 3.

Tests of mean abnormal volume are contaminated, as mentioned in section 2, by possible information trading in response to a reassessment of future earnings characteristics signalled by the dividend announcement. Extensions to control for information about earnings are discussed in section 4. A key control variable is the stock return to the announcement, which is discussed next.

### 3.3.3. *Estimation of the return reaction*

Abnormal returns are measured with daily data using the prediction error from an extended market model. To eliminate possible biases in the intercept resulting from abnormal performance prior to the announcement, market model parameters were estimated over the 240 trading days following the ex-dividend date. No prior data were utilized.[7] The market model prediction equation is

$$R_{it} = \alpha_i + \beta_i^{-1} R_{m_{t-1}} + \beta_i^0 R_{m_t} + \beta_i^{+1} R_{m_{t+1}} + \varepsilon_{it}, \qquad t = +1, +240, \tag{2}$$

where

$R_{\cdot t}$ = return to security $j$ or the equal weighted CRSP index over day $t$,
$\alpha_i, \beta_i$ = regression parameters,
$\varepsilon_{it}$ = an uncorrelated error term.

The prediction equation is intended to capture the lagged dependence between security returns and a market index when there is infrequent trading [see Scholes and Williams (1977) and Dimson (1979)]. Prediction errors from (2) condition on the level of the market return over the day before, day of, and day after the period of interest. The prediction model in (2) differs from the 'Dimson aggregated coefficient method' discussed by Brown and Warner (1985) in that our prediction errors are conditioned on the realized market return in a leading and lagging period. In principle, this allows the prediction

[7] The cumulative daily return from the 240 days prior to the announcement date is in excess of 30 percent per firm. In contrast, trading volume in the prior period is insignificantly different from trading volume in the post-announcement period. Results from the volume model remain essentially unchanged when estimated only on post announcement data.

error to be conditional on more information and hence should lead to a smaller standard error. In reality, any difference in the methods is likely to be small.

The definition of the specific announcement effect is somewhat arbitrary. Throughout the remaining analysis we define the announcement effect for firm $i$ as the cumulative abnormal return (i.e., prediction error) over the five-day interval starting three days before announcement and concluding one day after announcement. The five-day interval was chosen with the following two conditions in mind:

(1) With infrequent trading and daily data, the price effect of an announcement made on day 0 can spill over into day +1 when there are no trades made after the announcement on day 0.

(2) A tendency for announcements to be made on particular days of the week may induce an apparent announcement effect because of the weekend effect observed in daily data [see, for example, French (1980)]. A five-day interval insures that an entire trading week is represented.[8]

Fig. 1 presents the cumulative average daily prediction errors for the entire sample over the 81-day interval bracketing the announcement (from days −40 to +40). The plot reflects the market reaction to the announcement and has the characteristic 'flat' appearance of a complete adjustment within one or two days of trading.

Table 4 contains information on the cross-sectional distribution of the abnormal return due to the announcement of a first time dividend. The results correspond closely to those of Asquith and Mullins (1983) who examine the stock price reaction to the announcement of a dividend after a hiatus of at least 10 years. Abnormal returns are divided into deciles ranging from −0.10 to 0.35. The mean cumulative return effect for the five-day period is 4.0% with a $t$-ratio of 7.03. The mean compares closely to the 4.3% cumulative excess return reported by Asquith and Mullins. Sixty-seven percent of the 192 residuals are positive generating a $z$-statistic of 4.76. This evidence is consistent with the traditional information content of dividends.

## 4. Controlling for the information content of dividends: Models and results

Since Beaver (1968), the accounting literature has recognized the relationship between trading volume and news about the earnings prospects of firms. Theoretical studies such as Verrecchia (1981) and Hakansson, Kunkel and

[8] We selected the five-day interval before performing any analysis on the results and have resisted the temptation to examine other possible intervals.

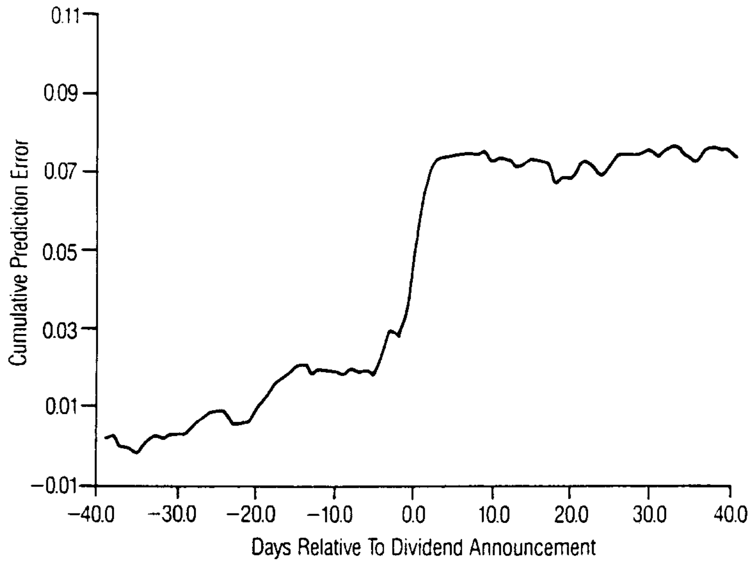


Fig. 1. Cumulative average daily prediction error in stock return over the interval from day −40 to day +40 surrounding the announcement of a first-time dividend. Prediction errors are based on the extended market model (2) in the text using 240 days following the ex-dividend date:

$$R_{it} = \alpha_i + \beta_i^{-1} R_{m_{t-1}} + \beta_i^{0} R_{m_t} + \beta_i^{+1} R_{m_{t+1}} + \varepsilon_{it}, \qquad t = +1, +240,$$

where $R_{.t}$ is the return to security $j$ or the equal weighted CRSP index over day $t$, $\alpha_i, \beta_i$ are regression parameters, and $\varepsilon_{it}$ is an uncorrelated error term.

Ohlson (1982) have attempted to clarify the interpretation of volume reactions to the release of public information. In their pure exchange model, Hakannson, Kunkel and Ohlson demonstrate that volume reactions to a public announcement have two possible components: trading in response to heterogeneity of beliefs, and trading in response to a desire by investors to alter their risk-sharing arrangements (i.e., a shift in risk clienteles). If markets are incomplete or heterogeneity of beliefs exist, their model predicts an increase in trading volume around any announcement that signals a change in investor perceptions of security risk and return. We loosely define the information content of an announcement as the signal contained in the announcement about these variables.

In order to test for tax clientele motivated trading, it is necessary to separate the influence of the information content of a first-time dividend announcement from such trading. The approach we take is to suggest several simple models of abnormal volume reactions. We estimate these for both the announcement week volume reaction, $\nu_{iA}$, and the interval reaction, $\nu_{iI}$. The models separate the volume reaction into several components. The first model dichotomizes the volume reaction into that component associated with the degree of abnormal

Table 4

Frequency distribution of abnormal returns for first-time dividend announcements.[a]

| Cell number | Range | Number |
|---|---|---|
| 1 | $< -0.050$ | 13 |
| 2 | $-0.050$– $-0.001$ | 50 |
| 3 | 0.000– 0.049 | 57 |
| 4 | 0.050– 0.099 | 37 |
| 5 | 0.100– 0.149 | 20 |
| 6 | 0.150– 0.199 | 9 |
| 7 | 0.200– 0.249 | 3 |
| 8 | 0.250– 0.299 | 1 |
| 9 | 0.300– 0.349 | 0 |
| 10 | $>$ 0.350 | 2 |
| | | 192 |
| Mean | 0.040 | |
| $T$-ratio | 7.03 | |
| % pos. | 67% | |

[a]Abnormal return is defined as the five-day cumulative prediction error over the interval three days prior through one day following the announcement day. Prediction errors are based on the extended market model (2) in the text using 240 days following the ex-divided date:

$$R_{it} = \alpha_i + \beta_i^{-1} R_{m_{t-1}} + \beta^0 R_{m_t} + \beta_i^{+1} R_{m_{t+1}} + \varepsilon_{it}, \qquad t = +1, +240,$$

$R_{\cdot t}$ = return to security $j$ or the equal weighted CRSP index over day $t$,
$\alpha_i, \beta_i$ = regression parameters,
$\varepsilon_{it}$ = an uncorrelated error term.

return resulting from the announcement and that component which is unrelated to the degree of abnormal return. We hypothesize that the first component represents the abnormal volume resulting from the information content of the announcement and the second component, the abnormal volume resulting from a shift in dividend clientele. While the dichotomy is crude, our intention is to isolate a component of abnormal volume that is not directly associated with the price effect of the dividend announcement. The price effect serves as a proxy for information content. We examine both a linear and a non-linear form of the model.

A second model augments the first by including a control for the magnitude of the announced dividend yield. If there are transactions costs related to rebalancing optimal portfolios, tax clientele trading should be positively related to dividend magnitude, with less clientele trading for dividends of a trivial magnitude. After controlling for information related effects in the manner described above, we interpret a positive association between dividend yield and abnormal volume to be tax clientele related.

Finally, the model is augmented further by including the magnitude of the accrued capital gain experienced by investors over an assumed prior holding period. Investors may choose to postpone or forgo portfolio revisions if they are 'locked-in' by prior capital gains.[9] We therefore hypothesize a negative association between prior capital gains and abnormal trading volume to be tax clientele related. We measure prior capital appreciation over the five-year period prior to the year of declaration.[10] For this period, the average price appreciation for the 192 firms was 52 percent, a figure suggesting that the potential realized capital gains are not trivial. In the one-year period prior to the year of declaration, the average capital appreciation was 49 percent, indicating that much of the five-year appreciation occurred in this period.

Table 5 presents the results from alternative specifications of the cross-sectional relationship between abnormal volume reaction and the variables just described. The specification are of the form

$$\hat{\nu}_{i.} = \gamma_0 + \gamma_1 AR_i + \gamma_2 AR_i^2 + \gamma_3(DY_i) + \gamma_4(PCG_i) + u_i, \quad i = 1,192, \tag{3}$$

where

$\hat{\nu}_{i.}$ = estimated abnormal volume reaction for the announcement week ($\hat{\nu}_{iA}$) or the interval period ($\hat{\nu}_{iI}$),

$\gamma_0$ = component of abnormal volume unrelated to predictor variables,

$AR_i$ = abnormal return for firm $i$ in the week of announcement,

$DY_i$ = dividend yield for firm $i$ based on the announced dividend and previous day's closing stock price,

$PCG_i$ = prior capital gain experienced over the five-year period prior to the year of announcement,

$\gamma_1, \gamma_2$ = linear and non-linear contribution of abnormal return to abnormal volume,

[9] The deferment of unrealized capital gains points to the turn-of-the-year subsequent to the announcement as an interesting time period to examine volume [see Lakonishok and Smidt (1984)]. Investors may choose to postpone portfolio revisions until the new year if they have capital gains in the security. We investigated the volume surrounding the turn-of-the-year by comparing the pattern of volume residuals from eq. (1) over the turn-of-the-year both prior and subsequent to the dividend announcement. The pattern for the three weeks starting one week before year end, including the year end and continuing into the first week of January is virtually identical for the two years. Both prior and subsequent to the announcement there is a significant positive average volume residual across our sample in the last week of December based on a cross-sectional measure of standard deviation. The other two weeks have no significant residual volume on average in either year, nor are these averages significantly different from each other. Thus it does not appear that the dividend policy change was followed by an unusual increase in volume around the subsequent turn-of-the-year.

[10] We repeated (but do not report) our cross-sectional tests measuring prior capital gains over two alternative choices of holding periods: a six-year period, consisting of five years prior and the year of declaration, chosen in order to capture any capital gains in the year of dividend announcement; and the one-year period prior to the year of announcement. The results for the six-year and the one-year holding periods are essentially the same as those reported in the paper.

Table 5

Fitted models of the abnormal volume relationship for first-time dividends (uncorrected for heteroscedasticity).[a]

| | $\hat{\gamma}_0$ | $t(\hat{\gamma}_0)$ | $\hat{\gamma}_1$ | $t(\hat{\gamma}_1)$ | $\hat{\gamma}_2$ | $t(\hat{\gamma}_2)$ | $\hat{\gamma}_3$ | $t(\hat{\gamma}_3)$ | $\hat{\gamma}_4$ | $t(\hat{\gamma}_4)$ | Model $F$ statistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Panel A | 0.315 | 6.87[b] | – | – | – | – | – | – | – | – | – |
| Regression | 0.202 | 4.18[b] | 2.86 | 5.16[b] | – | – | – | – | – | – | 26.65[b] |
| results for | 0.229 | 4.72[b] | – | – | 11.37 | 4.24[b] | – | – | – | – | 17.99[b] |
| announcement | 0.012 | 0.18 | – | – | – | – | 32.95 | 6.01[b] | – | – | 36.10[b] |
| coefficient | 0.380 | 6.71[b] | – | – | – | – | – | – | −0.04 | −1.93[c] | 3.72 |
| $\hat{\nu}_{iA}$ | 0.050 | 0.66 | 1.86 | 2.46[b] | 0.09 | 0.02 | 24.44 | 6.04[b] | −0.02 | −1.10 | 12.37[b] |
| Panel B | 0.233 | 2.05[b] | – | – | – | – | – | – | – | – | – |
| Regression | 0.219 | 1.71[c] | 0.37 | 0.25 | – | – | – | – | – | – | 0.06 |
| results for | 0.207 | 1.64 | – | – | 3.52 | 0.51 | – | – | – | – | 0.26 |
| interval | −0.09 | −0.54 | – | – | – | – | 35.66 | 2.44[b] | – | – | 5.93[c] |
| coefficient | 0.234 | 1.65 | – | – | – | – | – | – | −0.0003 | −0.006 | 0.00 |
| $\hat{\nu}_{iI}$ | −0.138 | −0.66 | −1.14 | −0.55 | −0.50 | −0.05 | 41.74 | 2.52[b] | 0.02 | 0.42 | 1.66 |

[a] Results are for the regression (3) in the text:

$$\hat{\nu}_{i} = \gamma_0 + \gamma_1(AR_i) + \gamma_2(AR_i)^2 + \gamma_3(DY_i) + \gamma_4(PCG_i) - u_i, \qquad i = 1,192.$$

$\hat{\nu}_i$ = estimated abnormal volume reaction for the announcement week ($\hat{\nu}_{iA}$) or the interval period ($\hat{\nu}_{iI}$).
$\gamma_0$ = component of abnormal volume unrelated to predictor variables.
$AR_i$ = abnormal return for firm $i$ in the week of announcement.
$DY_i$ = dividend yield for firm $i$ based on the announced dividend and previous day's closing stock price.
$PCG_i$ = prior capital gain experienced over the five-year period prior to the year of announcement.
$\gamma_1, \gamma_2$ = linear and non-linear contribution of abnormal return to abnormal volume.
$\gamma_3$ = contribution of dividend yield to abnormal volume.
$\gamma_4$ = contribution of prior capital gain to abnormal volume.
$\epsilon_i$ = model of error term, assumed to be independent across firms and normal.

[b] Significant at the $\alpha = 0.01$ level of significance, for a one-tailed test.

[c] Significant at the $a = 0.05$ level of significance, for a one-tailed test.

$\gamma_3$ = contribution of dividend yield to abnormal volume,
$\gamma_4$ = contribution of prior capital gain to abnormal volume,
$u_i$ = model error term, assumed to be independent across firms and normal volume.

Subject to the limitation of using estimated explanatory variables in the regression, our crude dichotomy suggests that the portion of abnormal trading volume unrelated to abnormal return should be tax clientele related. A significant intercept ($\hat{\gamma}_0$) after controlling for abnormal return ($\hat{\gamma}_1, \hat{\gamma}_2$) therefore provides evidence in favor of clientele relevance. If $\hat{\gamma}_3$ and $\hat{\gamma}_4$ are of the expected sign and significant, after controlling for abnormal return, the case for rejecting the null is furthered.

The strongest case for rejection of the null of dividend irrelevance involves abnormal trading in the interval period. Prior evidence on abnormal volume surrounding earnings announcements has found that the bulk of increased trading volume occurs simultaneously with the announcements [e.g., Beaver (1968), Morse (1980)], although Morse (1980) documents significant abnormal trading volume for up to four days after the announcement of earnings. A significant interval period intercept ($\hat{\gamma}_0$), after controlling for abnormal return, would constitute evidence that is less contaminated by an incorrect modelling of information effects.

The standard OLS assumption of homoscedasticity of model error terms is employed in the regression results reported in table 5. In table 6, this assumption is relaxed and the regressions repeated after correcting for heteroscedasticity in a weighted least squares fashion.

Panel A of table 5 contains the results for the announcement week abnormal trading volume. The second and third models give the impression of the dichotomy we seek. In each model, there is both a significant component of abnormal volume unrelated to abnormal return ($\hat{\gamma}_0$) and a significant component related to the abnormal return. Since $\hat{\gamma}_2$ is not significant in the final model of panel A, we conclude that the relationship between the abnormal volume and abnormal return is approximately linear for our sample. As predicted, the final model in panel A indicates that $\hat{\gamma}_3$ is positive and significant, after controlling for abnormal return. Finally, the coefficient on prior capital gain, $\hat{\gamma}_4$, has the predicted negative sign, consistent with a 'lock-in' effect. However, $\hat{\gamma}_4$ is not significant after controlling for other predictor variables. The residuals appear consistent with the normality assumption as judged by a chi-squared goodness-of-fit test (not reported).

Panel B of table 5 presents results for the same models with the dependent variable changed to the abnormal trading volume in the interval from announcement to 'ex'. Once again, the results give an impression favorable to a degree of clientele-motivated trading. The intercept, $\hat{\gamma}_0$, is significant or marginally significant after controlling for abnormal returns, as indicated by the second and third models of panel B. The final model of panel B indicates that $\hat{\gamma}_3$ is positive and significant, after controlling for abnormal return. The coefficient on prior capital gain, $\hat{\gamma}_4$, is not significant. The tests of significance in panel B of table 5 should be treated with caution, however, as a chi-squared test rejects normality of residuals.

Table 6 contains the results of similar tests after correcting for heteroscedasticity. The cross-sectional regression was transformed for heteroscedasticity by scaling both the dependent and independent variables by the inverse of the standard error of the estimate of the abnormal volume coefficient computed from the individual time-series regressions.[11]

[11] Chi-squared tests for the equality (in cross-section) of standard errors across the abnormal volume measures showed gross violations of homoscedasticity for both the announcement week and the interval to the ex-date.

Table 6

Fitted models of the abnormal volume relationship for first-time dividends (corrected for heteroscedasticity).[a]

| | $\hat{\gamma}_0$ | $t(\hat{\gamma}_0)$ | $\hat{\gamma}_1$ | $t(\hat{\gamma}_1)$ | $\hat{\gamma}_2$ | $t(\hat{\gamma}_2)$ | $\hat{\gamma}_3$ | $t(\hat{\gamma}_3)$ | $\hat{\gamma}_4$ | $t(\hat{\gamma}_4)$ | Model $F$ statistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Panel A | 0.479 | 6.51[b] | – | – | – | – | – | – | – | – | – |
| Regression | 0.337 | 4.24[b] | 2.32 | 3.93[b] | – | – | – | – | – | – | 15.47[b] |
| results for | 0.347 | 4.65[b] | – | – | 5.73 | 2.94[b] | – | – | – | – | 8.63[b] |
| announcement | 0.033 | 0.29 | – | – | – | – | 30.81 | 5.16[b] | – | – | 26.58[b] |
| coefficient | 0.580 | 6.59[b] | – | – | – | – | – | – | −0.04 | −2.05[c] | 4.22[c] |
| $\hat{\nu}_{iA}$ | 0.107 | 0.85 | 1.66 | 2.12 | −1.18 | −0.46 | 24.72 | 3.79 | −0.03 | −1.41 | 8.75[b] |
| Panel B | 0.118 | 1.60 | – | – | – | – | – | – | – | – | – |
| Regression | 0.046 | 0.58 | 1.89 | 2.29[c] | – | – | – | – | – | – | 5.25[c] |
| results for | 0.063 | 0.81 | – | – | 5.96 | 2.23[c] | – | – | – | – | 4.97[c] |
| interval | −0.040 | −0.40 | – | – | – | – | 18.97 | 2.30[c] | – | – | 5.29[c] |
| coefficient | 0.086 | 0.94 | – | – | – | – | – | – | 0.023 | 0.61 | 0.37 |
| $\hat{\nu}_{iI}$ | −0.048 | −0.43 | 0.85 | 0.74 | 2.25 | 0.60 | 10.52 | 1.04 | 0.018 | 0.47 | 1.86 |

[a]See footnotes a–c of table 5.

As panel A of table 6 indicates, the announcement week results after correcting for heteroscedasticity are very similar to the standard OLS results reported in panel A of table 5. In contrast, the results reported in panel B of table 6 are quite different from the corresponding results in table 5, implying that the interval tests are sensitive to corrections for heteroscedasticity. The positive and significant coefficients for $\hat{\gamma}_1$ and $\hat{\gamma}_2$ in models two and three of panel B, combined with loss of significance of the intercept, imply a failure to reject the hypothesis that abnormal trading in the interval period is information-related rather than clientele-related. A chi-squared test failed to reject normality of residuals for both the announcement and interval models.

To summarize, the evidence supporting the existence of clientele trading is somewhat weak. While the announcement week results give the impression of a volume component related to information and a volume component related to clientele trading, the interval results are less likely to be contaminated by information effects. There, the results (after correcting for heteroscedasticity) suggest that abnormal trading is primarily information related.[12]

[12]Another source of tax trading in response to dividend payments is discussed by Lakonishok and Vermaelen (1986). They document an increase in average trading around ex-dividend dates for a broad sample of dividend-paying firms. Lakonishok and Vermaelen link the increase to short-term trading activity associated with tax arbitrage. They find the extent of this trading to be highly correlated with dividend yield. For small dividend yields, the abnormal trading is minimal, even negative relative to average volume preceding a window surrounding the ex-date. Most of our sample would fall in the bottom two quintiles (by dividend yield) of the sample examined by Lakonishok and Vermaelen. For these two quintiles positive abnormal short-term trading activity was not detected. We would conclude that short-term trading of the type discussed by Lakonishok and Vermaelen probably does not contribute significantly to our findings.

## 5. Conclusions

Our examination of abnormal trading volume surrounding the announcement of a first-time dividend reveals four essential stylized facts about our sample:

(1) In the week of announcement of the first dividend in the company's history there is a highly significant increase in trading volume on average.

(2) There is a marginally significant increase in trading volume on average, during the period subsequent to the announcement week, up to and including the ex-dividend week.

(3) Abnormal trading volume in the announcement week is related to the information content in the announcement as measured by the abnormal return, but a significant portion of abnormal volume is unrelated to the information content. Abnormal volume is positively related to the size of dividend and negatively related to the degree of prior price appreciation.

(4) Abnormal trading volume in the interval from announcement to 'ex' is largely explained by proxies for the information content in the announcement, as measured by the abnormal return. The portion unrelated to the information content appears insignificant.

In another study on the volume reactions to dividend announcements, Asquith and Krasker (1985) make several insightful points about their evidence and its interpretation. Their experiment differs slightly from ours but they arrive at similar conclusions.

There are four major differences in the experiments:

(1) Asquith and Krasker use a slightly smaller sample of firms that includes firms which resume dividend payments after a hiatus of at least ten years. Our sample consists entirely of first-time dividend announcements.

(2) To examine abnormal volume in a period separate from the announcement period, Asquith and Krasker look at two periods: the week directly following the announcement week and the period following announcement but extending four weeks past the 'ex' week. We examine the period subsequent to the announcement but only up to and including the 'ex' week.

(3) We find marginally significant abnormal volume subsequent to the announcement, while Asquith and Krasker find essentially no increase in volume subsequent to the announcement. That we are able to document this increase probably stems from our more specialized sample of firms

and our more concentrated definition of the subsequent trading interval. Both experiments find significant abnormal volume in the announcement week on average.

(4) Asquith and Krasker use dividend yield as a proxy for information content and show a significant correlation between the announcement week abnormal volume and dividend yield, as in our fourth row of table 5. We include abnormal stock return as a control for information content and interpret the *partial correlation* between abnormal volume and dividend yield as tax clientele related.

Based on their results, Asquith and Krasker conclude that there is only the weakest evidence in favor of a clientele theory. They are hesitant to draw strong conclusions based on the announcement period because the duration of activity is so short. Further they point out that the actual volume of shares traded is still only a small fraction of the firm even though it is, technically, abnormally large. While our evidence also provides weak support for clientele adjustments, we agree with Asquith and Krasker that the evidence, in total, is not overwhelming. The small absolute magnitude of abnormal trading volume suggests that trading frictions such as transaction costs and the possible realization of capital gains for tax purposes slows whatever clientele shifts exist.

The sum total of the evidence on clientele shifts surrounding dividend policy changes,[13] when combined with the results of Lewellen et al. (1978) and Pettit (1977), bear the closest correspondence with the predictions of Modigliani (1982) that clientele effects will be modest in view of the probable diversification tradeoff. Finally, our conclusion that clientele movements are small reflects favorably on Long's (1977) conclusion that holding well diversified but suboptimal after-tax portfolios creates relatively small inefficiencies in theory.

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[13]Another interesting change in dividend policy is the stoppage of dividend payments after a reasonable period of continuous dividend payments. We identified 50 firms from the 1982 Compustat tape that ceased paying dividends (and never restarted) after a period of at least five years of continuous dividends. An analysis of the annual volume available from Compustat failed to detect a significant increase in volume during the last year of dividend payments or the year after. The test is extremely crude, however, because there is no logical window of trading activity as in an interval from announcement to ex-dividend and no readily available announcement date.

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