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Trading Behavior and the Unbiasedness of the Market Reaction to Dividend Announcements

MUKESH BAJAJ and ANAND M. VIJH*

ABSTRACT

This article examines the price formation process during dividend announcement day, using daily closing prices and transactions data. We find that the unconditional positive excess returns, first documented by Kalay and Loewenstein (1985), are higher for small-firm and low-priced stocks. Price volatility and trading volume also increase during this period. Examination of trade prices relative to the bid-ask spread and volume of trades at bid and asked prices shows that the excess returns cannot be attributed to measurement errors or to spillover effects of tax-related ex-day trading. Rather, the price behavior is related to the absorption of dividend information.

THIS ARTICLE EXAMINES SEVERAL aspects of the price formation process during dividend announcement day, using daily closing prices as well as transactions data. In a well-functioning market, on average, there should be no surprise in dividend announcements. Absent microstructure effects, market efficiency dictates that the excess returns to all dividend announcements, taken together, be zero. However, Kalay and Loewenstein (1985) find that during a three-day period surrounding dividend announcements, the actual returns, on average, significantly exceed both the returns predicted by the market model and the average daily returns realized over a recent period. They also find that the market's reaction to dividend announcements is sluggish, i.e., the excess returns persist for up to four trading days after the announcement date. In a subsequent study, Eades, Hess, and Kim (1985) find that for the subsample of dividend announcements that are separated sufficiently from ex-dividend dates, there is no evidence of sluggishness. They also confirm that the market's reaction to dividend announcements is biased.

We find that the average excess return to all dividend announcements increases as the firm size and stock price decrease. On the basis of 67,592 dividend announcements (including 336 dividend omission announcements) by New York Stock Exchange (NYSE)-listed firms over the period July 1962

* Bajaj is from the University of Southern California, and Vijh is from the University of Iowa. We appreciate comments of seminar participants at the University of Southern California and the University of Arizona. Warren Bailey, Harry DeAngelo, Bruce Grundy, Larry Harris, David Shimko, Mark Weinstein, and Randolph Westerfield provided specific suggestions to improve the article. We are particularly grateful to David Mayers (the editor) and an anonymous referee for their help in improving the article. All remaining shortcomings are our own responsibility.

to June 1987, we find a 0.21 percent average excess return over the three-day announcement period. For the lowest decile of firm size (stock price), the average excess return is 0.67 (0.61) percent, while the corresponding average for the highest decile of firm size (stock price) is 0.07 (0.05) percent.

Our findings on the firm size and stock price effects suggest that the observed price reactions may be due to microstructure-based reasons. Market microstructure can affect stock prices during dividend-announcement periods for two different reasons: spillover of tax-related trading around ex-dividend days and trading behavior related to the dissemination of dividend information.¹

A. Tax-Related Trading and Market Prices Around Dividend Announcements

Tax arbitrage around ex-dividend dates creates size effects similar to those we document around dividend-announcement dates. Karpoff and Walkling (1988) document these effects for high-yield stocks after 1975 (when transaction costs decreased due to the deregulation of commissions). They explain that tax-arbitrage trading around ex-dividend days should eliminate excess returns within the limits of transaction costs. The evidence that excess returns are higher for small-firm and low-priced stocks (for which transaction costs are greater) suggests that the marginal investors around ex-dividend dates are short-term traders.² More recently, Choe and Masulis (1991) examine transactions data to document direct evidence of short-term trading by domestic corporations and Japanese insurance companies around ex-dividend days. Because corporations must hold stocks for at least 46 days (16 days before 1984) in order to qualify for favorable tax treatment of dividend income, both Karpoff and Walkling (1990) and Choe and Masulis (1991) reason that dividend-capture trading should be limited by the holding period risk. Even though our sample consists of those dividend announcements that are separated from the ex dates by at least seven trading days, dividend-capture trading can explain announcement-period excess returns if corporations wait to initiate arbitrage positions until after the resolution of the dividend risk on the dividend announcement day. An increase in tax-motivated trading upon dividend announcement can create a price pressure and overstate the measured excess returns. The excess returns will eventually revert, but only when the price pressure dissipates after the ex date.

Using transactions data, we examine trade and quote prices to study microstructure effects during dividend announcements. First, we investigate whether the observed returns are biased upward due to the bid-ask spread. Such a bias may arise if the closing price before an announcement is more likely to be a bid price or the closing price after an announcement is more

¹ We are obliged to David Mayers, the editor, for suggesting the microstructure-based reasons that could explain the documented market reaction to dividend announcements.

² In a subsequent article, Karpoff and Walkling (1990) show that ex-dividend day returns are positively related to the bid-ask spreads for National Association of Securities Dealers Automated Quotation systems stocks, particularly for high-yield stocks.

likely to be an ask price. We find no such bias. Second, we look for evidence of price pressure due to a concentration of buy orders after dividend announcements. Even though the total trading volume increases significantly, the relative numbers of buy and sell orders after an announcement are similar to those on an unaffected day.

Our finding that there is increased trading volume but no “buying pressure” during a dividend-announcement period suggests that the increased trading activity may be related to information production rather than tax arbitrage.

B. Information Production and Stock Prices during Dividend Announcements

Kim and Verrecchia (1991a, 1991b, 1992) provide theoretical analysis of private information production and trading behavior around anticipated events. They suggest that anticipation of a public announcement stimulates private information production, even if information production is costly. Traders acquire private information to gain comparative advantage in interpreting the subsequent public information. Upon the release of public information, there is increased trading volume as traders revise their (private) prior beliefs. Kim and Verrecchia’s model predicts an increase in both the trading volume and price volatility during the announcement period. They predict that the expected increases in trading volume and price volatility are increasing functions of the precision of the announced information and decreasing functions of the amount of preannouncement public and private information.³

To examine whether the observed excess returns are related to information production, we first examine the changes in price volatility during the announcement days. We find that, consistent with the findings of Kalay and Loewenstein (1985), on average, the volatility is higher during the announcement days. We also find that the increase in volatility has the same cross-sectional determinants as the average excess return. Next, we find that there is a significant increase in trading volume during the announcement periods. The evidence on excess volume accompanying dividend announcements reinforces the impression of information-related trading. (Trading volume due to liquidity, and tax-arbitrage, reasons should decrease during periods of greater volatility.) We also show that the average excess return is correlated with the average excess trading volume. These findings are consistent with the hypothesis that the observed price reactions are related to information-motivated trading.

An alternative explanation for the findings may be suggested by the work of Grundy and McNichols (1989). They provide a model in which public

³ This reasoning is different from Admati and Pfleiderer’s (1988) model. Admati and Pfleiderer suggest that informed traders are most likely to trade in periods of increased liquidity preferred by uninformed traders (so that they can disguise themselves). But Admati and Pfleiderer do not consider public disclosure, which changes incentives to become informed and trade in announcement versus nonannouncement periods.

disclosure may lead to an increase in trading volume due to portfolio rebalancing reasons. However, we also find that the difference between buyer- and seller-initiated trading volume on the day before the announcement date is positively correlated with the cumulative excess return during the following two days. No such correlation exists for a nonannouncement period.⁴ This evidence further suggests that information-motivated traders are active prior to dividend announcements and the excess volume is not (only) due to portfolio rebalancing reasons.

Two questions remain, however. First, why should information-production activity around dividend announcements be greater for small-firm and low-priced stocks? We conjecture that dividends are more informative for small-firm and low-priced stocks, perhaps because there is relatively little information produced for such stocks during nonannouncement periods. This is suggested by the reasoning in Kim and Verrecchia (1992).^{5,6} Second, why should increased information production be accompanied by excess returns? Kalay and Loewenstein (1985) reason that dividends resolve firm-specific risk, which should not be priced according to a portfolio-theory based model of asset pricing. This is true because market prices are set by well-diversified investors, on average. In short-term trading during information events, however, the marginal traders are not necessarily well diversified. Just as market prices around ex-dividend days are influenced by tax-motivated short-term traders, market prices around dividend-announcement days are influenced by information-motivated traders. On average, these short-term traders receive excess return as a compensation for the (unsystematic) risk borne in the information-production process.⁷ Even if this excess return does not conform to a definition of market efficiency in a frictionless environment, it is not necessarily irrational. A broader notion of market efficiency will consider the role of informed traders in setting market prices and transaction costs faced by such traders.

⁴ This argument depends on an assumption that the market makers cannot observe accurately the order-flow imbalance until the end of the trading session, or that they cannot distinguish it from order-flow imbalances caused by liquidity traders. If market makers could observe the trading imbalance continuously and understood its significance, then prices might adjust before the end of trading on the preannouncement day. It is possible, however, that the multiplicity of market makers (e.g., the specialist, the limit order traders, the floor traders, and the upstairs traders) combined with the noise introduced by liquidity trades prevents an immediate price adjustment. (We wish to thank Larry Harris for a discussion on this issue).

⁵ Higher transactions costs for low-priced stocks, would, in general, inhibit information production by traders. (Because higher transactions costs will reduce expected benefits from information production). On the other hand, Kim and Verrecchia (1992) explain that private information production will be more concentrated during announcement periods when potential benefits are larger. This suggests that on a relative basis private information production around public disclosures may be larger for low-priced stocks which have larger transactions costs.

⁶ Bajaj and Vijh (1990) provide evidence that dividend announcements are more informative for small-firm and low-priced stocks. Bamber (1987) shows similar results for earnings announcements.

⁷ Lakonishok and Vermaelen (1990) invoke a similar argument in the context of repurchase tender offers.

The article proceeds as follows. Section I discusses the data and methods. Section II discusses the cross-sectional determinants of expected returns, and Section III investigates the robustness of our results to several possible biases. Section IV examines whether the excess returns are caused by the price pressures resulting from tax-motivated trading, and Section V examines whether the excess returns are related to the information production activity. Section VI concludes.

I. Data and Methods

A. The Data

We obtained information on dividend declarations and returns from the daily master file of the Center for Research in Security Prices (CRSP). We used the 1987 edition, which contains data from July 1962 until December 1987. (Daily trading volume was obtained from the 1991 edition of CRSP.) We exclude data after June 1987 to avoid the effects of the 1987 market crash.⁸ We use returns on an equally weighted portfolio of CRSP stocks as a proxy for market returns.

Other selection criteria and their reasons are:

1. We include all regular cash dividends taxable as ordinary income and payable in U.S. dollars, or in foreign currency converted to U.S. dollars. For some of the tests of spillover of tax-motivated trading, we examine a subsample of high (anticipated)-yield stocks. The first 275 trading days of daily return data for a stock are used to estimate anticipated yield as suggested by Blume (1980). Dividend announcements that occur during this period are not used in the event study of announcement-period returns.
2. For the purpose of studying announcement-period returns, we include only dividend announcements that precede the ex-dividend date by at least seven trading days. We do not want to contaminate the announcement-period returns with price returns induced by tax trading around ex dates. (Eades, Hess, and Kim (1985) show that this window is sufficient.) We also exclude announcement dates that are separated from ex dates by more than 50 trading days.⁹

⁸ We check that our results do not change significantly even if we include the data for the second half of 1987. These observations only increase noise.

⁹ In about 36 percent of the cases the separation between the announcement and the ex-dividend date is less than seven trading days. In about 1 percent of the cases, the separation is more than 50 trading days. Most of the latter cases occur when a company announces dividends for two or more quarters on the same date. These cases are covered only once. (Only the announcement corresponding to the earlier dividend payment is included in such cases.) This selection criterion, of course, is an ex post criterion. However, there is no reason to suspect that the number of days between the announcement and ex-dividend day conveys any information to the market. We also check, as explained below, to see that the sample of declarations excluded by this criterion are not systematically different from the included firms.

3. We restrict the sample to dividend announcements by dividend-paying firms (i.e., we exclude initiations). This is an *ex ante* criterion that is necessary for the following reason. The sample of dividend announcement dates on the CRSP tape excludes dividend omissions, whether or not a company announces the omission. Excluding omissions, however, would introduce a bias by excluding an event with negative information content.¹⁰ Eades, Hess, and Kim (1985) find that when a dividend-paying firm first omits a dividend, there is usually an announcement in the *Wall Street Journal* or the *Standard and Poor's Annual Dividend Records*. By restricting our sample to include only dividend-paying firms, we need to include only the initial omission dates to remove this source of bias.

The above criteria give a sample size of 67,256 dividend announcements. In addition, we identify a total of 623 initial omissions by dividend-paying firms during 1962 to 1987, out of which announcement dates are available in 597 cases. The sample includes the 367 initial omissions identified by Eades, Hess, and Kim (1985).¹¹ To account for the 26 cases in which an announcement date cannot be identified, we multiply every omission return by $623/597 = 1.0436$ whenever appropriate. Because our sample includes only announcement dates that are at least seven trading days before the ex date, but there is no ex date for omissions, we include an omission announcement only if the last dividend announcement precedes the corresponding ex date by at least seven trading days. This criterion is satisfied by 336 of the 623 omissions. Including these 336 initial omissions increases the sample of dividend announcements satisfying all of the required criteria to 67,592. The sample cases are similar to the excluded cases. In particular, there are no significant differences between the two groups in concentration of announcements in any calendar year, calendar month, or industry group.

B. Firm Size and Stock Price Groups

We obtain the most recent stock price available before the dividend announcement period (which begins one trading day before the announcement). We calculate the firm size (market value of equity) by using the number of shares outstanding as of the date of stock price. We obtain ordinal ranking of firm size and stock price within the corresponding calendar year.^{12,13} The ranking is done relative to the universe of all NYSE-listed stocks. Our procedure of ranking firms on firm size and stock price regardless of the dividend policy ensures that our definitions of small size and low price correspond to other studies of size and price effects. Because we only include

¹⁰ See Bajaj (1992).

¹¹ We are thankful to Kenneth Eades for providing these data.

¹² Ranking by the calendar year avoids clustering of observations from a particular time period in a certain size category.

¹³ The preannouncement stock price and market value was assigned to its decile by comparing it to the boundaries of the beginning-of-the-year stock price and market value deciles.

dividend-paying firms in our sample, however, we have an unequal number of observations in various firm-size and stock-price groups. In particular, we have fewer observations in the lowest firm-size and stock-price deciles, because a greater fraction of small firms do not pay dividends.

Table I provides summary statistics on the firm-size and stock-price deciles. Firms in the top (bottom) decile of firm size have an average market value of \$3.23 billion (\$17 million). Firms in the top (bottom) decile of stock price have an average price of \$67.40 (\$8.96).

C. Excess Returns

We measure the excess return during the dividend-announcement period by using the market model, which only assumes stationarity and joint normality of returns. (Our results are quite similar to the alternative mean-adjusted returns model, which only assumes stationarity.) We estimate the

Table I
Summary Statistics for Deciles Formed by Firm Size and
Stock Price for the Sample of Dividend-paying Stocks from
July 1962 to June 1987

The sample of 67,592 announcements includes 67,256 dividend announcements by all New York Stock Exchange (NYSE)-listed firms on the Center for Research in Securities Prices (CRSP) daily master file between July 1962 and June 1987 that satisfy the following criteria. (1) The dividend declaration was for a regular cash dividend taxable as regular income and payable in U.S. dollars or foreign currency converted to U.S. dollars. In addition, the dividend payment was made after the first 275 trading days since data were available on the daily return file. (2) The dividend announcement day preceded the ex-dividend day by at least 7 trading days and at most 50 trading days. (3) The dividend payment represented a continuation of dividends. In addition, the sample includes 336 announcements of initial omissions satisfying the same criteria. Stocks are assigned to ten deciles based on firm size and stock price. Firm size is proxied by the market value of outstanding equity. The firm size and stock price deciles are formed by ranking within each calendar year, with respect to all NYSE-listed firms regardless of dividend policy, to conform to similar rankings in studies of the size effect. Firm size is expressed in millions of dollars and stock price in dollars and cents.

Decile	Firm Size		Stock Price	
	Sample Size	Mean (Median)	Sample Size	Mean (Median)
1	3440	7 (16)	2098	8.96 (7.75)
2	5354	34 (30)	4993	11.88 (11.12)
3	6366	52 (45)	6335	15.02 (14.62)
4	6522	78 (67)	6745	18.15 (17.87)
5	7438	117 (99)	7329	21.50 (21.25)
6	7345	179 (146)	7661	24.58 (24.75)
7	7956	276 (219)	7715	29.08 (29.00)
8	7814	468 (375)	8190	33.75 (34.00)
9	7916	832 (673)	8249	41.44 (41.37)
10	7441	3233 (1762)	8277	67.40 (59.75)
Total	67,592	588 (163)	67,592	30.21 (25.75)

market model parameters over the 240 days from 250 to 11 trading days before the CRSP announcement date (AD – 250 to AD – 11, where AD represents the announcement date), excluding the day before, the day of, and the day after any previous dividend announcement. These parameters are then used to estimate abnormal returns during the event period, from AD – 1 to AD + 1.¹⁴ Standard errors of excess returns are calculated cross-sectionally, within each firm-size and stock-price group.

II. Determinants of Excess Returns

Table II documents the average excess returns during the three-day event period for stocks arranged in firm-size and stock-price deciles. Excess returns are significantly positive for all stock groups, but are larger for small-firm and low-priced stocks. The average excess returns decline almost monotonically from 0.67 percent for the smallest firm-size decile to 0.07 percent for the largest firm-size decile. Similarly, the average excess returns also decline monotonically from 0.61 percent for the smallest stock-price decile to 0.05 percent for the largest stock-price decile. Averaged across all announcements, the excess return equals 0.21 percent.

We test for the equality of announcement-period returns across market value (and stock price) deciles using the following χ^2 -statistic:

$$Q \equiv \sum_{s=1}^{10} \left(\frac{\overline{CA}_s - \overline{CA}}{S_s} \right)^2 \sim \chi^2(10), \quad (1)$$

where $\overline{CA}_s$ is the excess return for size decile s , $\overline{CA}$ is the excess return for all announcements without regard to market value or stock price, and S_s is the standard error of $\overline{CA}_s$. We reject equality of announcement-period returns across firm-size (stock-price) deciles with a χ^2 -value of 56.67 (50.44). (The $\chi^2(10)$ value corresponding to the 1 percent significance level equals 23.21).¹⁵

The χ^2 test is subject to the limitation that it only tests for the equality of average returns across stock groups and that $\overline{CA}$ is an empirical estimate of the average excess return for all observations (although its precision is very high). We also find, however, that the rank correlation between the average

¹⁴ CRSP records the actual dividend-announcement date. However, if the company announces its dividend after trading hours, the effective announcement date for our purpose will be the following day. Therefore, AD + 1 is included as part of our event period. AD – 1 is included because sometimes there is substantial price reaction on this day, possibly due to private information generation. (See Section V).

¹⁵ Lindley's (1957) paradox states that tests carried out with a very large number of observations (such as 67,592 dividend announcements) overstate the statistical significance of results. This criticism should apply to testing the equality of returns across decile groups by using the χ^2 -statistics, which use standard errors of each $\overline{CA}_s$ estimated from a large number of observations. (Between 2098 and 8277 as reported in Table II). Note, however, that the subsequent tests of rank correlation between average excess returns and decile rankings as well as the regression analysis are not subject to Lindley's paradox. These tests ask whether the correlations between average excess returns and decile rankings are significant and do not use the precision of estimated average excess returns.

Table II
Excess Announcement-period Returns Within Deciles Formed
by Firm Size and Stock Price for the Sample of
Dividend-paying Stocks from July 1962 to June 1987

The sample of 67,592 announcements includes 67,256 dividend announcements by all New York Stock Exchange (NYSE)-listed firms on the Center for Research in Securities Prices (CRSP) daily master file between July 1962 and June 1987 that satisfy the following criteria. (1) The dividend declaration was for a regular cash dividend taxable as regular income and payable in U.S. dollars or foreign currency converted to U.S. dollars. In addition, the dividend payment was made after the first 275 trading days since data were available on the daily return file. (2) The dividend announcement day preceded the ex-dividend day by at least 7 trading days and at most 50 trading days. (3) The dividend payment represented a continuation of dividends. In addition, the sample includes 336 announcements of initial omissions satisfying the same criteria. Stocks are assigned to ten deciles based on firm size and stock price. Excess 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 240 trading days ending 11 days before the announcement date, but excluding all previous announcement periods. Mean excess returns within a stock group are calculated by averaging the three-day excess returns across stocks belonging to that group. The firm size and stock price deciles are formed by ranking within each calendar year, with respect to all NYSE-listed firms regardless of dividend policy, to conform to similar rankings in studies of the size effect. Firm size is expressed in millions of dollars and stock price in dollars and cents. All returns are expressed as a percentage of the stock price.

Decile	Firm Size		Stock Price	
	Sample Size	Excess Return Mean (Std. Error) Median	Sample Size	Excess Return Mean (Std. Error) Median
1	3440	0.6665 (0.0848) 0.2989	2098	0.6099 (0.1192) 0.2344
2	5354	0.3115 (0.0611) 0.0497	4993	0.2363 (0.0698) 0.0982
3	6366	0.3054 (0.0541) 0.1111	6335	0.3480 (0.0525) 0.1544
4	6522	0.2691 (0.0539) 0.0851	6745	0.2371 (0.0490) 0.0896
5	7438	0.1969 (0.0460) 0.0577	7329	0.2618 (0.0458) 0.1796
6	7345	0.1531 (0.0430) 0.0437	7661	0.2107 (0.0419) 0.0287
7	7956	0.1166 (0.0394) 0.0536	7715	0.1570 (0.0412) 0.0337
8	7814	0.1428 (0.0398) 0.0522	8190	0.1863 (0.0377) 0.0807
9	7916	0.1415 (0.0347) 0.0800	8249	0.1154 (0.0363) 0.0000
10	7441	0.0694 (0.0326) 0.0244	8277	0.0535 (0.0328) 0.0094
Total	67,592		0.2061 (0.0146) 0.0706	
χ^2 -statistic	56.67***		50.44***	

*** Denotes significance at the 1 percent level.

excess return within a stock group and its firm-size decile rank equals -0.96 . The corresponding rank correlation for the stock-price decile rank equals -0.90 . Both correlations are significant at the 1 percent level. As a further robustness check, Table II also reports the median excess returns within stock groups. The rank correlations between the median excess returns and the firm-size and stock-price decile ranks equal -0.55 and -0.85 . The medians test shows that our results are not explained by outliers. (The rank correlations corresponding to 5 percent and 1 percent significance levels with 10 observations equal -0.56 and -0.75 .)

The differences in excess returns between stock groups are also economically significant. Stocks belonging to the smallest firm-size (stock-price) decile of all NYSE-listed firms earn an extra 2.67 (2.44) percent per year during the 12 days surrounding the four quarterly dividend announcements. This is 1.85 (1.62) percent more than the average firm, which earns an extra 0.82 percent per year around dividend announcements. In comparison, stocks belonging to the largest firm-size (stock-price) decile earn only 0.28 (0.21) percent, which is 0.54 (0.61) percent less than that of the average firm. The differences between stock groups are too large to be explained by alternate specifications of the asset pricing model generating long-term security returns.¹⁶

Is either determinant of announcement-period returns significant in the presence of the other? Because stock price and firm size are correlated, we examine their bivariate interactions by using regression analysis. We employ a 10×10 bivariate classification based on firm size and stock price. Some of the stock groups contain much fewer observations than others. To address the resulting problem of heteroscedasticity, we also report weighted least squares (WLS) regression results in addition to the ordinary least squares (OLS) results. (The weights chosen for the WLS regressions are square roots of the numbers of observations in the stock groups¹⁷).

Table III shows that the size and price coefficients obtained using OLS and WLS bivariate regressions are quite similar and significant in the same direction as in Table II. The WLS regression shows that there is some collinearity between the two regressors and that each coefficient is moderated by the other, although both remain substantial. The WLS multivariate regression shows that, during the event period, a stock belonging to the

¹⁶ To explain the excess return of 0.67 percent earned by the smallest market-value decile, for example, the market model would have to be misspecified by 0.22 percent per day, or roughly 58 percent per year.

¹⁷ A question arises as to what weights are appropriate for the WLS analysis. At first glance, it appears that weighting mean excess returns by the estimated standard error of the mean in each category would be appropriate. However, as Kalay and Loewenstein (1985) discuss, the excess returns may be a compensation for unsystematic risk during the dividend announcements. (We explore this issue further in Section V). If the excess returns are a compensation for the unsystematic risk, the excess returns are higher when the risk is higher. Weighting the mean excess returns inversely by the standard error will therefore distort the observed relation because of common determinants of the two measures.

Table III
Regression Analysis of Excess Announcement-period Returns
for the Sample of Dividend-paying Stocks Over the Period
July 1962 to June 1987

The sample of 67,592 announcements includes 67,256 dividend announcements by all New York Stock Exchange (NYSE)-listed firms on the Center for Research in Securities Prices (CRSP) daily master file between July 1962 and June 1987 that satisfy the following criteria. (1) The dividend declaration was for a regular cash dividend taxable as regular income and payable in U.S. dollars or foreign currency converted to U.S. dollars. In addition, the dividend payment was made after the first 275 trading days since data were available on the daily return file. (2) The dividend announcement day preceded the ex-dividend day by at least 7 trading days and at most 50 trading days. (3) The dividend payment represented a continuation of dividends. In addition, the sample includes 336 announcements of initial omissions satisfying the same criteria. Stocks are assigned to ten deciles based on firm size and stock price. Thus there are a total of 10 observations for each univariate regression and 100 observations for each bivariate regression. Firm size is proxied by the market value of outstanding equity. The firm size and stock price deciles are formed by ranking within each calendar year, with respect to all NYSE-listed firms regardless of dividend policy. *SIZRNK* and *PRCRNK* refer to the corresponding firm-size and stock-price ranks. The dependent variable in regressions is the mean 3-day excess return surrounding dividend or omission announcements, expressed as a percentage of the stock price. The weighted least squares regression uses the square root of the number of stocks included in a group as its weight.

No.	Estimated Coefficient Value (<i>t</i> -Statistic)			Adjusted- <i>R</i> ²
	<i>INTCPT</i>	<i>SIZRNK</i>	<i>PRCRNK</i>	
Panel A. Ordinary Least Squares Regression Results				
1	0.484 (5.71)***	−0.030 (−2.91)***	−0.017 (−1.66)*	0.093
Panel B. Weighted Least Squares Regression Results				
1	0.440 (10.57)***	−0.038 (−5.78)***		0.254
2	0.404 (8.87)***		−0.031 (−4.38)***	0.160
3	0.493 (10.44)***	−0.030 (−4.14)***	−0.016 (−2.21)**	0.284

* Denotes significance at the 10 percent level.

** Denotes significance at the 5 percent level.

*** Denotes significance at the 1 percent level.

bottom deciles of firm size and stock price earned 0.42 percent more than a stock belonging to the top deciles of firm size and stock price.

III. Confounding Influences

A. *Ex Post* Selection Biases

Tests of unbiasedness should be based on expected returns. But expected returns are unobservable. We use average realized returns as proxies for

expected returns. If stocks are selected by ex post criteria, however, the realized returns may be biased estimates of expected returns. We have already discussed why an ex post sample selection criterion used in sample selection (namely, the effect of requiring at least even trading day separation between the announcement and the ex-dividend date) does not bias our results. Another potential bias can arise if the dividend announcement dates cannot be predicted ex ante with certainty.

Kalay and Loewenstein (1986) have documented that when dividend announcements are later than expected, a reduction in dividend is likely. The market (partially) anticipates the information content of a delayed announcement; that is, such announcements are preceded by a price decrease. Because we measure excess returns over a three-day period centered on the announcement date, we miss this negative preannouncement-date return. Any bias should be quite small, however. Kalay and Loewenstein (1986) report that only about 2.5 percent of announcements are delayed five or more days, and that these announcements are associated with negative excess returns of about 0.034 percent during the preannouncement period from AD - 15 to AD - 2.¹⁸ Failure to include negative preannouncement returns may thus bias the average price reaction to all announcements by only $0.025 \times 0.034 = 0.00085$ percent.

B. Measurement Bias Due to the Bid-Ask Bounce

We examine whether the measured excess returns are overstated by a tendency for closing prices before announcements to lie at the bid prices and/or closing prices after announcements to lie at the ask prices. For example, Lease, Masulis, and Page (1991) show that biases resulting from the bid-ask bounce explain a large part of the excess negative returns earned on seasoned equity offering dates.

We examine transactions data received from the Institute for the Study of Security Markets (ISSM) to explore microstructure around dividend announcement days. The data contain all trades and quotes reported on the NYSE for the calendar year 1986. We note that 1986 is a fairly typical year; the 2605 announcements during this year that satisfy the criteria of Section I earn an average excess return of 0.2594 percent (*t*-statistic 3.51) during the announcement period. ISSM data for 1986 are missing 17 days of return data, so we are left with 2370 announcements for 830 companies for which transactions data are available.

¹⁸ In Table 4 of their article, Kalay and Loewenstein (1986) report cumulative mean standardized excess return of -0.525 between AD-15 and AD-2. They calculate the standardized excess return by dividing the percentage excess return (measured by using the comparison-period model) by the standard deviation of portfolio excess returns during the period AD - 60 to AD - 16. In Table 6, they also report the percentage excess return for the same portfolio for days AD - 1 and AD, using the market model. In this table, they calculate the *t*-statistic using the same standard error calculation as in Table 4. If we assume that the percentage excess returns for days AD - 1 and AD used in Tables 4 and 6 are equal, we can infer the percentage excess return during the preannouncement period by combining calculations in Tables 4 and 6.

To test whether closing prices surrounding dividend announcement dates are biased by a systematic tendency for closing trade prices to lie at the bid or ask prices, we use a location statistic, defined by the closing *bid*, *ask*, and (trade) *price*:

$$loc = (price - bid)/(ask - bid). \quad (2)$$

Table IV compares the average values of the location statistic on each day during the announcement period, from $AD - 2$ to $AD + 1$, with a reference day (unaffected by the announcement).¹⁹ The location statistic averages 0.539 on the reference days, consistent with Harris's (1989) finding that closing trades are more likely to occur at the ask price. In comparison, the location statistic ranges between 0.524 and 0.546 during the announcement period and is never significantly different from the reference-day value of 0.539 (standard error 0.010). The closing trade prices during the announcement period are thus no more likely to lie at the bid or the ask prices than on any other day. Table IV also shows that the three-day announcement-period excess returns calculated from quote midpoints average 0.2162 percent for the 2370 observations and are insignificantly different from returns based on closing trade prices which average 0.2353 percent (standard error 0.0717). It does not appear that the bid-ask bounce can explain the observed excess returns.

IV. Tax Trading and the Announcement-Period Returns

Eades, Hess, and Kim (1985) and Lakonishok and Vermaelen (1986) show that stocks earn excess positive returns over several days preceding the ex-dividend date and excess negative returns over several days following the ex date. This finding is consistent with price pressures caused by dividend-capture trading by corporations. Lakonishok and Vermaelen (1986) also document significant increases in trading volume surrounding ex dates. Dividend-capture trading can explain the excess announcement date returns if corporations start taking positions only after the resolution of the announcement-period risk. Such price increases would be temporary, in the nature of price pressure, but would not revert until after the ex date.

If dividend-capture trades predominate during announcement periods, we would expect more buyer-initiated trades than seller-initiated trades. Because the ISSM database does not identify the initiators of trades, we apply an approach based on the location of trade price within the bid-ask spread. If a trade occurs at a price above the quote midpoint, it is presumed to have been initiated by a buyer, and if it occurs at a price lower than the midpoint, it is presumed to have been initiated by a seller. Trades occurring at the quote midpoint are ignored. Such a technique of identifying buyer- versus

¹⁹ The reference day is ten days before the announcement date if data for that day exist on the ISSM tapes. Otherwise, it is ten days after the ex date.

Table IV

Location Statistics of Closing Trade Prices within Bid-Ask Spread for the Sample of Dividend-Paying Stocks in 1986

The sample contains 2370 dividend announcements by 830 New York Stock Exchange (NYSE)-listed firms on both the Center for Research in Securities Prices (CRSP) daily master file and the Institute for the Study of Security Markets (ISSM) transactions data file during 1986 that satisfy the following criteria. (1) The dividend declaration was for a regular cash dividend taxable as regular income and payable in U.S. dollars or foreign currency converted to U.S. dollars. In addition, the dividend payment was made after the first 275 trading days since data were available on the daily return file. (2) The dividend announcement day preceded the ex-dividend day by at least 7 trading days and at most 50 trading days. (3) The dividend payment represented a continuation of dividends. Excess 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 240 trading days ending 11 days before the announcement date, but excluding all previous announcement periods. For the i th announcement, let *bid*, *ask*, and *price* represent the closing bid, ask, and trade prices. Then the location statistic is calculated as

$$loc = (price - bid) / (ask - bid)$$

The close-to-close excess returns are calculated using closing trade prices, just as reported on the CRSP files. Mid-to-mid excess returns are calculated using the midpoint of closing bid-ask prices. All returns are expressed as a percentage of the stock price. The reference day is ten days before the announcement date if data for that day exist on the ISSM file. Otherwise, it is ten days after the ex date.

Date	Location Statistic (Std. Error)	Close-to-Close Excess Returns (Std. Error)	Mid-to-Mid Excess Returns (Std. Error)
Reference day	0.539 (0.010)		
AD - 2	0.524 (0.009)		
AD - 1	0.538 (0.008)	0.0518 (0.0369)	0.0322 (0.0366)
AD	0.538 (0.011)	0.1578 (0.0425)	0.1652 (0.0430)
AD + 1	0.546 (0.009)	0.0257 (0.0417)	0.0188 (0.0420)
AD - 1 to AD + 1		0.2353 (0.0717)	0.2162 (0.0724)

seller-initiated trades is extensively used in the literature (e.g., Glosten and Harris (1988), Hasbrouck (1988), and Vijh (1990)).

Table V shows the total trading volumes as well as the proportions that are buyer- or seller-initiated. (Trading volume is expressed as a percentage of the total outstanding shares.) Notice that the trading volumes are higher during the announcement periods than during the reference periods, but the distributions of buyer- and seller-initiated trades are not any different. Specifically, the trading volume increases by 18 percent on AD and 9 percent on AD + 1 as compared with the reference day, but the differences between buyer- and seller-initiated trading volumes are not indicative of buying pressure. The largest positive difference occurs on AD, when buyer-initiated trades outnumber seller-initiated trades by 3.3 percent with a t -statistic of 1.96 (significant at the 5 percent level). However, the sign of the difference

Table V
Trading Volumes Surrounding Announcement Dates for the
Sample of Dividend-Paying Stocks in 1986

The sample contains 2370 dividend announcements by 830 New York Stock Exchange (NYSE)-listed firms on both the Center for Research in Securities Prices (CRSP) daily master file and the Institute for the Study of Security Markets (ISSM) transactions data file during 1986 that satisfy the following criteria. (1) The dividend declaration was for a regular cash dividend taxable as regular income and payable in U.S. dollars or foreign currency converted to U.S. dollars. In addition, the dividend payment was made after the first 275 trading days since data were available on the daily return file. (2) The dividend announcement day preceded the ex-dividend day by at least 7 trading days and at most 50 trading days. (3) The dividend payment represented a continuation of dividends. The total trading volume cumulates all trades during the day and is expressed as a percentage of the total outstanding equity. If a trade occurs above the quote midpoint, it is presumed to have been initiated by a buyer, and if it occurs at a price lower than the midpoint, it is presumed to have been initiated by a seller. The reference day is ten days before the announcement date if data for that day exist on the ISSM file. Otherwise, it is ten days after the ex date.

Day	Total Trading Volume	Percentage of Trading Volume that is		
		Buyer-Initiated	Seller-Initiated	Difference (<i>t</i> -Statistic)
Reference day	0.288 (100) ^a	40.9	39.8	1.1 (0.64)
AD - 3	0.268 (93)	39.5	39.9	-0.4 (-0.27)
AD - 2	0.277 (96)	40.7	39.1	1.6 (0.84)
AD - 1	0.284 (99)	38.8	41.0	-2.2 (-1.04)
AD	0.322 (118)	41.4	38.1	3.3 (1.96)
AD + 1	0.315 (109)	40.1	40.6	-0.5 (-0.21)
AD + 2	0.289 (100)	40.0	40.6	-0.6 (-0.31)
AD + 3	0.288 (100)	39.7	40.0	-0.3 (-0.21)

^a The number in parentheses with the total trading volume represents the total trading volume as a percentage of the reference-day trading volume.

reverses on AD - 1 and AD + 1, and the magnitude of the difference on AD - 1 is two-thirds of the difference on AD. Summed over AD - 1, AD and AD + 1, the buyer- and seller-initiated trades are quite well matched. Furthermore, in economic terms, the differential trading volume is 3.3 percent of the total trading volume and amounts to about 0.01 percent of the company's outstanding equity. (Table V shows that, on average, the total trading volume on day AD equals 0.322 percent of outstanding shares.) In light of the price elasticities documented in the received literature, it is unlikely that excess buyer-initiated trading volume amounting to 0.01 percent of the company's equity can explain 0.1578 percent excess return on AD (Table IV). (For example, Bagwell (1992), in the context of Dutch auction share repurchases, documents that the average firm in her sample offers a 9.1 percent premium to repurchase 15 percent of the outstanding stock.)

If the buyer-initiated trading volume is concentrated in block trades while the seller-initiated trading volume is fragmented, however, the differential trading volume on day AD may cause substantial price pressures. Many

studies of block trades (e.g., Dann, Mayers, and Raab (1977) and Holthausen, Leftwich, and Mayers (1987)) show that block trades cause both temporary and permanent price effects. Table VI shows the size distribution of buyer- and seller-initiated trades. We cumulate the reported trades for all announcements corresponding to an event date and calculate the percentage trading volume accounted for by four trade-size categories. These categories are, from 1 to 999 shares, 1000 to 9999 shares, 10,000 to 99,999 shares, and over 100,000 shares. Table VI shows that buyer-initiated volume exceeds seller-initiated volume on AD in the trade size categories of 1000 to 9999 and 10,000 to 99,999 shares. These differences are relatively small, however, and seller-initiated volume is larger in the trade-size category of 100,000 shares or more. Moreover, when we compare the relative volumes of buyer- and seller-initiated trades on the reference (unaffected) day, we see the same pattern. The greater percentage of seller-initiated block trades, on average, is consistent with the popular notion that large blocks are sold more often than purchased (Kraus and Stoll (1972)). Finally, Holthausen, Leftwich, and May-

Table VI
Trade Sizes and Block Trading Activity Surrounding
Announcement Dates for the Sample of Dividend-Paying
Stocks in 1986

The sample contains 2370 dividend announcements by 830 New York Stock Exchange (NYSE)-listed firms on both the Center for Research in Securities Prices (CRSP) daily master file and the Institute for the Study of Security Markets (ISSM) transactions data file during 1986 that satisfy the following criteria. (1) The dividend declaration was for a regular cash dividend taxable as regular income and payable in U.S. dollars or foreign currency converted to U.S. dollars. In addition, the dividend payment was made after the first 275 trading days since data were available on the daily return file. (2) The dividend announcement day preceded the ex-dividend day by at least 7 trading days and at most 50 trading days. (3) The dividend payment represented a continuation of dividends. We cumulate reported trades for all announcements corresponding to any particular event date and calculate the percentage trading volume accounted for by the various trade-size categories.

Day	Percentage of Buyer-Initiated Trading Volume Accounted for by Trade Sizes in the Range of				Percentage of Seller-Initiated Trading Volume Accounted for by Trade Sizes in the Range of			
	1 to 999	1000 to 9999	10,000 to 99,999	100,000 and above	1 to 999	1000 to 9999	10,000 to 99,999	100,000 and above
Reference day	13.7	42.4	35.4	8.6	14.7	40.3	34.4	10.6
AD - 3	13.3	41.3	34.9	10.5	13.7	38.3	35.5	12.5
AD - 2	13.0	40.8	36.8	9.4	13.1	38.2	35.3	13.4
AD - 1	13.6	41.9	35.2	9.3	13.3	38.4	34.0	14.3
AD	13.3	43.3	34.8	8.6	13.8	39.8	33.5	12.9
AD + 1	14.2	43.0	34.2	8.6	13.1	37.9	33.6	15.4
AD + 2	14.4	41.5	34.8	9.3	13.6	37.6	35.1	13.7
AD + 3	13.9	42.1	35.4	8.6	13.2	37.0	33.0	16.8

ers (1990) show that the liquidity-related and temporary price effects of buyer-initiated block trades revert by the next trade. Thus block trades can only explain the excess announcement-date returns if the day-end trades are block trades. We find, however, that less than 4 percent of day-end trades are in the trade size category of 10,000 shares or more.

Karpoff and Walking (1990) show that the tax-capture trading effects around dividend ex dates are more pronounced for high-yield stocks. Therefore, we also repeated our tests with the quintile of highest (anticipated) dividend-yield stocks. (The dividend yield ranking procedure for this purpose is described in Bajaj and Vijh (1990).) Our results were essentially unchanged. We conclude that the announcement-period returns are not caused by tax-capture trading.

V. Information Production and the Market Prices around Dividend Announcements

Kim and Verrecchia (1991a, 1991b, 1992) suggest that anticipation of a public announcement stimulates private information gathering, even if it is costly. Traders acquire private information of differing precision before the public announcement. Upon announcement, they form posterior beliefs and trade on their private information and market prices. They predict an increase in volume as well as in the variance of the price process during the announcement period. The expected abnormal volume and the variance of return are increasing functions of the precision of the announced information and decreasing functions of the preannouncement information. Our finding that there is increased trading volume during the dividend-announcement period but no buying pressure suggests that the increased activity may be caused by information-motivated traders rather than liquidity/tax traders.

To explore the implications of increased information trading activity for announcement-period risk, an intuitive measure is the average value of the squared difference between actual and expected returns. Because we want to compute announcement-period volatility across many stocks, this measure is also adjusted for the benchmark-period variance of each security. Specifically, we compute average risk for firms belonging to size decile s as follows:

$$\Omega_s = \frac{1}{K_s} \sum_{k=1}^{K_s} \left[(CA_k - \overline{CA_s})^2 - 3\sigma_k^2 \right], \quad (3)$$

where CA_k is the excess return for security k and $\overline{CA_s}$ is the average excess return for all securities belonging to decile s , K_s is the number of securities in decile s , and σ_k is the standard deviation of residuals from the market model applied to daily returns for security k .

In the incremental risk measure described above, we have adjusted for the benchmark-period risk by subtracting the average risk for firms belonging to size decile s . This is appropriate if dividend announcements lead to a similar absolute increase in announcement-period risk for all firms included in a

decile. If the stocks within a size decile have different return volatilities and similar percentage increases in volatility during the announcement period, an alternate measure of incremental risk based on the ratio of announcement-period risk to benchmark-period risk, as given below, will be more appropriate.²⁰

$$\Omega_s = \frac{1}{K_s} \sum_{k=1}^{K_s} \left[(CA_k - \overline{CA_s})^2 / (3\sigma_k^2) \right] \quad (4)$$

We carried out all the tests reported in the article using both measures of incremental risk. For the sake of brevity, we only report the results of tests based on the first of the two measures described above. The results with the other measure are similar and are available upon request from the authors.

The above measures of incremental announcement-period risk differ from the risk measures investigated by Kalay and Loewenstein (1985) and Eades, Hess, and Kim (1985). Both articles investigate the changes in stock betas. Eades, Hess, and Kim (1985) report that the announcement-period betas are insignificantly different from the nonannouncement period betas, whereas Kalay and Loewenstein (1985) report that the announcement period betas are higher, on average, by 0.09. They conclude that the observed increase in beta is too small to explain the average excess return. Kalay and Loewenstein (1985) also investigate the changes in total risk by calculating the ratio of the announcement period variance and the nonannouncement period variance. (The resulting *F*-statistic rejects the equality of two measured variances.) For our purpose, however, we seek to relate excess risk to excess return within various size categories. Therefore, we calculate the numerator in the two expressions above by computing squared deviations from the (estimated) expected return for a stock price and firm size category.

Table VII shows that, for the entire sample, the announcement-period excess risk, as defined by Ω_s , averages 3.55. (This measure squares returns expressed in percent.) The excess risk is positive in 69 percent of the cases. Our results are similar to Kalay and Loewenstein (1985) who find equally significant increases in the total announcement-period risk. Table VII also shows that the increase in risk during dividend announcement periods is greater for small-firm and low-priced stocks. The rank correlations between announcement-period risk and firm-size and stock-price deciles equal -0.93 and -0.88 (both significant at the 1 percent level).

Dividend announcements may be more informative for small stocks because there is less information produced for such stocks during nonannouncement periods. Regarding stock price, the inverse relation between stock price and brokerage commission rates as well as bid-ask spreads is well documented.²¹ Higher transactions costs for low-priced stocks, would, in general,

²⁰ We wish to thank the referee for pointing out this argument to us.

²¹ A partial list includes Demsetz (1968), Tinic and West (1972), Bensten and Hagerman (1974), and Copeland (1979).

Table VII
Incremental Risk during Dividend Announcement Period
within Groups Formed by Firm Size and Stock Price for the
Sample of Dividend-Paying Stocks Over the Period July 1962
to June 1987

The sample of 67,592 announcements includes 67,256 dividend announcements by all New York Stock Exchange (NYSE)-listed firms on the Center for Research in Securities Prices (CRSP) daily master file between July 1962 and June 1987 that satisfy the following criteria. (1) The dividend declaration was for a regular cash dividend taxable as regular income and payable in U.S. dollars or foreign currency converted to U.S. dollars. In addition, the dividend payment was made after the first 275 trading days since data were available on the daily return file. (2) The dividend announcement day preceded the ex-dividend day by at least 7 trading days and at most 50 trading days. (3) The dividend payment represented a continuation of dividends. In addition, the sample includes 336 announcements of initial omissions satisfying the same criteria. Stocks are assigned to ten deciles based on firm size and stock price. Firm size is proxied by the market value of outstanding equity. The firm size and stock price deciles are formed by ranking within each calendar year, with respect to all NYSE-listed firms regardless of dividend policy, to conform to similar rankings in studies of the size effect. Firm size is expressed in millions of dollars and stock price in dollars and cents. Incremental announcement-period risk for any stock group s is computed by averaging across all securities k belonging to that group, as follows:

$$\Omega_s = \frac{1}{K_s} \sum_{k=1}^{K_s} \left[(CA_k - \overline{CA_s})^2 - 3\sigma_k^2 \right],$$

where CA_k is the excess return for security k , $\overline{CA_s}$ is the average excess return for decile s , K_s is the number of securities in decile s , and σ_k is the standard deviation of residuals for the market model fitted for security k . All returns are expressed as a percentage of the stock price.

Decile	Firm Size		Stock Price	
	Sample Size	Incremental Announcement Period Risk Ω_s	Sample Size	Incremental Announcement Period Risk Ω_p
1	3440	7.40	2098	8.35
2	5354	5.06	4993	7.51
3	6366	4.80	6335	3.26
4	6522	5.96	6745	3.76
5	7438	3.74	7329	4.25
6	7345	2.74	7661	2.98
7	7956	2.18	7715	3.58
8	7814	3.40	8190	2.49
9	7916	1.81	8249	2.53
10	7441	1.40	8277	1.80
Total	67,592			3.55

inhibit information production by traders who wish to trade on their information (because higher transactions costs will reduce expected benefits from information production). On the other hand, Kim and Verrecchia (1992) explain that private information production will be more concentrated during announcement periods when potential benefits are larger. This suggests that, on a relative basis, private information around public disclosures may be larger for low-priced stocks. Also, Brennan and Hughes (1991) argue that

higher commission rates encourage analysts to make recommendations to trade because their compensation is related to commission revenues generated by their recommendations.

The following WLS regression of average incremental risk for each of the 10×10 stock groups based on firm size and stock price shows that the relationship between risk and firm size and stock price remains significant in a bivariate analysis (*SIZRNK* denotes the firm size decile, and *PRCRNK* denotes the stock price decile.):

$$\Omega_s = 7.88 - 0.24 \text{ SIZRNK} - 0.46 \text{ PRCRNK}. \quad (5)$$

The weights chosen for the regression are square roots of the numbers of observations in the stock groups. The regression has an adjusted- R^2 of 0.263, and the t -statistics of *SIZRNK* and *PRCRNK* equal -2.11 and -4.12 (significant at the 5 percent and 1 percent levels, respectively). The higher incremental announcement period risk for small-firm and low-priced stocks suggests that the excess return may be a compensation for the incremental risk.

To directly examine whether the excess returns around dividend announcements are explained by incremental risk during the period, we regress the average excess return for the 10×10 stock groups on the corresponding measure of excess risk. As before, we represent the three-day excess return within a stock group by $\overline{CA}$ and the excess risk by Ω . The WLS regression shows that the slope coefficient is significant at the 1 percent level and suggests that the observed announcement-period excess returns are explained by the increase in risk. Such a regression, however, is subject to an ex post selection bias pointed out by Miller and Scholes (1972). They reason that, in a regression of expected return on risk, even if the true coefficient of risk is zero, the measured coefficient will equal $\mu_3/(\mu_4 - \mu_2^2)$, where μ_2 , μ_3 , and μ_4 are the second, third, and fourth moments of the return distribution. Because security returns are skewed to the right (i.e., $\mu_3 > 0$), the measured coefficient will be positive.²² The problem is of special concern to us because we find that not only are return distributions for all stock groups skewed to the right, but skewness decreases with both firm size and stock price.

Kim and Verrecchia (1991b) suggest that the excess trading volume on account of information-motivated trading should also be related to the announcement-period risk.²³ If the announcement-period excess return is a

²² Miller and Scholes (1972) explain this by noting that, ex post, large positive returns will occur for those securities that also, by implication, realized large volatilities. If the return distribution were symmetric, then large-negative-return cases would cancel the large-positive-return cases among large-volatility securities. However, return distributions are skewed to the right and, therefore, researchers often find positive and significant but spurious coefficients of unsystematic variance in tests of asset pricing models.

²³ Specifically, Lemma 1 in their article states: "The volume reaction to the arrival of a public announcement is the absolute value of the price change multiplied by a measure of information asymmetry among investors." In their model, the investors' information asymmetry derives from averaging across all investors the absolute deviation of the precision of each investor's private information from the average precision, weighted by the investor's coefficient of risk tolerance.

compensation for the excess risk, then the excess trading volume should also be related to the excess return. We can investigate the relationship between return, risk, and trading volume for the entire 25-year period because of the recent availability of daily trading volume data in the 1991 edition of the CRSP daily master file. To calculate excess announcement-period volume, we subtract from the (three-day) announcement-period trading volume an amount equal to three times the average trading volume over the benchmark period (from $AD - 250$ to $AD - 11$), but excluding any previous announcement periods. During the announcement period the trading volume increases by 0.084 percent of the outstanding shares (t -statistic: 31.06) for the 65,093 cases (of 67,592) for which both the benchmark-period and announcement-period volume data are available. This figure compares favorably with the corresponding 1986 figure of 0.057 percent from Table V (obtained as: $0.284 + 0.322 + 0.315 - 3 \times 0.288$). Across the 10×10 stock groups formed by firm size and stock price, the correlation between excess volume and excess risk equals 0.594 (significant at the 1 percent level). Because an increase in risk as measured by the volatility implies a reduction in market liquidity, the evidence of positive correlation between excess risk and volume reinforces the impression of information-motivated trading around dividend announcement dates. (Since liquidity and tax-motivated traders are not informed investors, they should prefer to trade during periods of high liquidity, as explained by Admati and Pfleiderer (1988). Therefore, trading volume due to liquidity/tax reasons should be negatively and not positively related to an increase in volatility.)

A WLS regression of the average excess returns within the 10×10 stock groups on the average excess trading volumes also shows a significant slope coefficient. However, even though the (excess) trading volume is not directly derived from the return distribution, the distribution of trading volumes is also skewed to the right. Therefore, the regression of excess return on excess volume is also subject to the Miller and Scholes (1972) criticism.

To examine the role of information traders more directly, we conduct the following experiment. For every announcement during 1986 for which we have the microstructure data, we compute the difference between buyer-initiated and seller-initiated trading volumes on $AD - 1$. If this difference is caused by liquidity/tax traders, it should have no predictive ability concerning the information content of a subsequent announcement. If, however, the difference between trading volumes reflects the positions taken by informed traders acting on their private information, then it may be positively correlated with the market's reaction to dividend announcement. (On average, the informed traders should be buying stock before the arrival of positive news, and selling stock before the arrival of negative news.²⁴) Let $CA_{0,1}$ represent the two-day excess return on AD and $AD + 1$, and let $VOLDIF_{-1}$ represent the difference between the buyer-initiated and seller-initiated trading vol-

²⁴ See footnote 4 above.

umes on $AD - 1$. The following regression shows that $VOLDIF_{-1}$ has some predictive ability concerning the market's reaction to a subsequent announcement as measured by $CA_{0,1}$:

$$CA_{0,1} = 0.1774 + 1.043 VOLDIF_{-1}, \quad R^2 = 0.0050. \quad (6)$$

The t -statistics of the intercept term and the coefficient on $VOLDIF_{-1}$ equal 2.74 and 2.86 (both significant at 1 percent level), respectively. In comparison, a similar regression carried out on unaffected reference days produces an insignificant intercept and coefficient on $VOLDIF_{-1}$.

Table V shows that the average value of $VOLDIF_{-1}$ is close to zero. The intercept term in this regression should therefore equal the two-day return on AD and $AD + 1$. The difference between the intercept value of 0.1774 percent and the excess return value of 0.1835 percent is explained by small differences in the samples. (The samples differ slightly because, unlike daily returns in Table IV, the regression above requires data on all three days, $AD - 1$, AD , and $AD + 1$). The measured coefficient on $VOLDIF_{-1}$ suggests that the volume asymmetry of 0.05 percent of outstanding equity (11,000 shares for the median firm in the sample) on $AD - 1$ is associated with an extra return of $1.043 \times 0.05 = 0.052$ percent on AD and $AD + 1$. Because $VOLDIF_{-1}$ is a noisy measure of the informed trading volume (confounded by both liquidity/tax trading and noise trading), this coefficient reflects only a part of the returns earned by informed traders. If, for example, 2 percent of the cross-sectional variance of $VOLDIF_{-1}$ were due to the cross-sectional variance of informed trading, the errors-in-variables results suggest that when informed traders buy or sell 0.05 percent of equity on $AD - 1$, they would, on average, get an excess return of $0.1774 + 1.043 \times 0.05/0.02 = 2.78$ percent on AD and $AD + 1$.

Notice also that this regression cannot be explained by tax-motivated trading. Tax-motivated purchases (sales), if they result in significant price pressure, would lead to positive (negative) contemporaneous returns. Information-motivated traders, on the other hand, are trading on the basis of anticipated price movements and will, on average, be on the buy side if the subsequent price is likely to increase, and vice versa. This result is similar to that of Seppi (1992) who finds increased block purchases (sales) before earnings announcements if the subsequent announcement conveys positive (negative) surprise.

Why would increased information production be accompanied by excess returns? Kalay and Loewenstein (1985) reason that firm-specific information events resolve firm-specific risk, which should not be priced according to a portfolio-theory based model of asset pricing. This is true because market prices are set by well-diversified investors, on average. In short-term trading during information events, however, the marginal traders are not necessarily well diversified. Just as market prices around ex-dividend days are influenced by tax-motivated, short-term traders, market prices around dividend

announcement days are influenced by information-motivated, short-term traders. These short-term traders receive excess returns which compensate them for the (unsystematic) risk they bear in the information production process. Lakonishok and Vermaelen (1990) document evidence from the popular press as well as stock prices that arbitrageurs/information traders require a compensation for information production activity in the context of repurchase tender offers. This is not necessarily irrational, even if it does not conform to a definition of market efficiency for long-term returns.

VI. Conclusions

This article examines the market returns and the trading behavior during dividend announcement periods by using both the daily closing prices and transaction prices. Similar to results documented by Kalay and Loewenstein (1985) and Eades, Hess, and Kim (1985), we find that all dividend announcements, without any *ex post* selection criteria, are accompanied by a positive average excess return. In addition, we find that the average excess return increases as firm size and stock price decrease. This suggests that the excess return may be due to microstructure-based reasons. However, the excess return does not represent microstructure biases. Examination of transaction prices shows that the bid-ask bounce does not create an upward bias in measured returns. There is no evidence of price pressures resulting from order imbalance either. Even though the announcement-period price effect is similar to the documented *ex-date* price effect, it is not explained by a spillover of tax-related trading around *ex dates*.

Further investigation shows that the announcement-period return is related to the absorption of dividend information. As suggested by Kim and Verrecchia (1991a, 1991b, 1992), we find evidence of increased information production around dividend announcement days, resulting in greater trading volume and increased price volatility. The excess return, price volatility, and trading volume are all positively correlated. Furthermore, the order imbalance on the day before the dividend announcement anticipates the excess return upon the announcement. This evidence suggests that the marginal investors who set prices around dividend announcements are information-motivated traders, and that the announcement-period excess return is a likely compensation for the risk borne during the information production.

Finally, our study is related to the literature on information content of dividends. The received literature in this area, except for an article by Venkatesh and Chiang (1986), has mostly focussed on testing a specific hypothesis formulated by Miller and Modigliani (1961), *i.e.*, dividend increases (decreases) represent a permanent increase (decrease) in future earnings. Venkatesh and Chiang (1986) examine the bid-ask spreads during the dividend announcement period to find evidence of greater information asymmetry during the dividend announcement period. Perhaps due to the coarseness of bid-ask prices, however, they find that the spreads are not

significantly increased, except in a subset of cases. Like Venkatesh and Chiang (1986), the notion of information production we examine in this article is more general and could pertain to information about near-term earnings, risk in future cash flows, or any other factor relevant to the stock price.

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