

Trading Clienteles, Tax Attributes, and Ex-Dividend Returns

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ABSTRACT

I examine whether institutions and individuals react to ex-dividend events and how their reactions impact ex-day excess return. I infer trader identities from trade size, based on the assumption that institutions initiate large trades while individuals initiate small trades. I find that while both increase their trading activities around the ex-days, institutions initiate more trades than individuals. Ex-day institutional and individual trading also impacts ex-day excess return, which decreases when excess trading volume by tax-favored institutions increases and increases when excess trading volume by tax-disfavored individuals increases. This result is consistent with differential taxation of dividends and capital gains influencing the ex-day pricing of dividends.

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Koski and Michaely (2000) argue and show that a trade around the ex-dividend day is least likely to contain information since much of the ex-day trading is tax rather than informationally motivated. Thus, ex-dividend days offer a unique opportunity to study whether differential taxation of dividends and capital gains impacts the pricing of dividends and investor trading behaviors, as well as a host of other issues, such as the effects of transaction costs, arbitrage activities, trading risks, etc. If there are no differential taxation of dividends and capital gains and other market imperfections, then on the ex-days, stock price should drop by the amount of dividends. Most studies find that on average stock price drops by an amount less than that of dividends on the ex-day, which leads to a positive ex-day excess return (Elton and Gruber (1970), Kalay (1982), etc.). Many of these studies assume that there is one investor clientele that determines the ex-day pricing of dividends for all stocks or for a particular type of stocks and thus ignore the roles played by different types of investors. Michaely and Vila (1995 and 1996) argue and provide evidence that tax-induced investor heterogeneity motivates ex-day trading because investors exchange tax burdens with each other. They also demonstrate that the ex-day price-drop-to-dividends ratio or ex-day excess return is a function of the average investor after-tax valuation of dividends. While many studies have examined market-wide excess trading volume around ex-days, they have not isolated the trading activities of different types of investors; neither has the literature provided direct evidence on how the ex-day trading behaviors of different types of investors impact the ex-day excess return.

I examine how two types of investors with differing tax attributes, institutional investors versus individual investors, react to ex-dividend events. Examining this issue is important because it helps to shed light on who trade around ex-dividend days and thus to determine the identities of those investors who influence the pricing of dividends around the ex-days. The tax attributes of institutional and individual investors are different in general. Individual investors tend to be tax-disfavored on dividends versus capital gains whereas institutional investors tend to be relatively tax-favored on dividends versus capital gains. If differential taxation of dividends versus capital gains explains ex-day excess return, then ex-day excess return should be a function of the tax attributes and the ex-day trading behaviors of these investors.

Consistent with prior literature, I use trade size to identify traders. Large trades proxy institutional trades and small trades proxy individual trades (Lee and Radhakrishna (2000), Bhattacharya (2001), etc.). I find that around the ex-days, both institutional and individual investors increase their trading activities. However, institutional investors initiate much more trades than individual investors, suggesting that wealthy and sophisticated institutional investors are more likely to exploit ex-dividend events to relieve their tax burdens than individual investors.

Ex-day institutional and individual excess trading volumes also impact ex-day excess return in the predicted direction. I find that when excess trading volume by tax-favored institutional investors increases, ex-day excess return generally decreases; when excess trading volume by tax-disfavored individual investors increases, ex-day excess return generally increases. If an increase in trading activities by a certain type of investors increases the weight of the influence of their tax attributes on ex-day return, then the

above results suggest that differential taxation of dividends and capital gains should be at least one explanation, among many, for ex-day excess return.

This paper proceeds as follows. The next section reviews the literature and develops hypotheses. Section II explains the research methodology and discusses the empirical results. Section III summarizes and concludes.

I. Theory and Hypotheses

A. Literature and Theory

More than five decades of intensive research have been devoted to examining stock price behavior around the ex-dividend days. In a seminal paper, Elton and Gruber (1970) argue that for the marginal investor to be indifferent between selling or buying a stock cum-dividend or ex-dividend, the following condition has to be satisfied,

$$P_{CUM} - t_g(P_{CUM} - P_{BASIS}) = P_{EX} - t_g(P_{EX} - P_{BASIS}) + D(1 - t_d) \text{ if sell,} \quad (1a)$$

$$(P_{FUTURE} - P_{CUM})(1 - t_g) + D(1 - t_d) = (P_{FUTURE} - P_{EX})(1 - t_g) \text{ if buy,} \quad (1b)$$

where P_{CUM} is the cum-dividend stock price, P_{EX} is the ex-dividend stock price, P_{BASIS} is the tax basis of stock price for the investor who is selling the stock, P_{FUTURE} is the future selling price for the investor who is buying the stock, t_g is the capital gains tax rate and t_d is the dividend tax rate. Equations (1a) and (1b) suggest that for the marginal investor to be indifferent between selling or buying the stock cum-dividend or ex-dividend, his after-tax wealth must be the same before and after the ex-dividend days. Equations (1a) and (1b) both translate into the following,

$$\alpha = \frac{P_{CUM} - P_{EX}}{D} = \frac{1 - t_d}{1 - t_g}, \quad (2)$$

where α is the marginal rate of substitution between dividends and capital gains, or the after-tax marginal valuation of dividends with respect to capital gains. This equation suggests that the ex-day price-drop-to-dividends ratio is a function of the tax rates on dividends and capital gains for a particular investor, if that investor solely determines the ex-day stock price. Equation (2) implies that ex-day excess return, R_{EX} , is equivalent to

$$R_{EX} = \frac{t_d - t_g}{1 - t_g} \frac{D}{P_{CUM}} = \frac{t_d - t_g}{1 - t_g} d, \quad (3)$$

where d is dividend yield. Equation (3) suggests that ex-day excess return is a function of the tax rates on dividends and capital gains, and dividend yield.

Elton and Gruber (1970) find that the price-drop-to-dividends ratio is on average lower than one, leading to a positive ex-day excess return. Since in the US, traditionally, the tax rate on dividends is higher than that on capital gains, differential taxation of dividends and capital gains appears to explain this phenomenon, as Equation (2) suggests. In addition, they show that the price-drop-to-dividends ratio is increasing in dividend yield, a finding widely viewed as being consistent with the existence of dividend tax clienteles. Elton and Gruber suggest that the tax attributes of different clienteles can be inferred from the price-drop-to-dividends ratios.

In contrast, Kalay (1982) argue that the tax attributes of different investors may not be inferred from the price-drop-to-dividends ratio, since the presence of short-term arbitrageurs, who are taxed the same on dividends and capital gains, should drive the ratio to one, through arbitrage activities. Transaction costs, however, can prevent the ratio from converging to one. A price-drop-to-dividends ratio lower than one or a positive excess return on the ex-day can reflect transaction costs rather than differential taxation of dividends and capital gains. Note that theoretically, Kalay's story cannot rule out that

tax is a factor that causes ex-day return to be positive in the first place. He simply argues that investors' tax attributes cannot be inferred from the price-drop-to-dividends ratio on the ex-day due to the presence of arbitrage activities (Kalay (1984)). Broadly speaking, if different investors have different tax attributes, then there is no single price-drop-to-dividends ratio that can satisfy the tax attributes of all investors. At most, it can satisfy the tax attributes of one type of investors. Kalay's empirical evidence is still consistent with a tax effect and a tax-induced clientele effect. On the other hand, Lakonishok and Vermaelen (1983), studying a major Canadian tax reform; and Michaely (1991), studying a major US tax reform; provide evidence that the activities of short-term and corporate traders dominate the price determination on the ex-days.¹

Michaely and Vila (1995 and 1996), in theoretical and empirical analyses of ex-day trading volume and price behavior, argue that differential investor tax attributes motivate investors to trade around ex-days in order to relieve their tax burdens. This causes a surge in ex-day trading volume. The ex-day price-drop-to-dividends ratio and thus the ex-day excess return can be a result of the weighted average after-tax marginal valuation of dividends by investors of differing tax attributes. They show that ex-day excess trading volume increases in dividend yield, supporting their tax-induced investor heterogeneity argument.

Much of the existing literature has examined how the stock market as a whole or how a certain type of investors responds to ex-dividend events and how they impact ex-day

¹ Recently, a few studies resort to price discreteness to explain the ex-dividend day price behavior – see Frank and Jagannathan (1998) and Bali and Hite (1998). However, Graham, Michaely and Roberts (2003), examining the impact of decimalization of major US stock exchanges on ex-day price formation, suggest that the root cause of price behavior around ex-dividend days may still be the differential tax treatment of dividend and capital gains incomes (not discrete prices as suggested in Bali and Hite (1998)), thus again supporting a tax argument. Jakob and Ma (2004) also find evidence against Bali and Hite (1998).

excess return. However, the market is made up of different types of investors who differ in many dimensions, including their tax attributes. Elton and Gruber (1970) show that the ex-day price-drop-to-dividends ratio is a function of dividend yield and conclude that different investors value dividends differently. A recent study by Naranjo, Nimalendran and Ryngaert (2000) show that ex-day return is more negative when corporate dividend capture is the greatest. They argue and show that to the extent that corporations engaging in dividend capturing are less wealth constrained and/or less risk averse than other traders, their trading will likely lead to negative ex-day returns for high-yield stocks.²

Both papers assume the existence of tax-related dividend holding clienteles (Elton and Gruber (1970)) or trading clienteles (Naranjo, Nimalendran and Ryngaert (2000)) and thus acknowledge the roles played by investors with differing tax attributes. However, Elton and Gruber (1970) suggest that the influences of different investor clienteles on ex-day return are compartmentalized, that is, each clientele impacts the ex-day return of one particular type of stocks, depending on certain firm-specific characteristics, such as dividend yield. For example, low tax investors influence the ex-day return of high yield stocks and high tax investors influence the ex-day return of low yield stocks. Naranjo, Nimalendran and Ryngaert (2000) argue that institutional investors play a dominant role in ex-day trading for high dividend yield stocks. Neither paper explicitly allows for the influences of different investor clienteles for a particular stock around its ex-day. In general, a tax clientele based explanation for ex-day return is inconsistent with opportunities for trading profits and thus a high level of excess trading

² Naranjo, Nimalendran and Ryngaert (2000) acknowledge that this happens because trading by corporations may dominate that of tax neutral or tax penalized investors in high yield stocks. Their argument is consistent with the ex-day pricing of dividends being a weighted average of all participating investors' tax attributes.

volume around the ex-days documented in the empirical literature (Lakonishok and Vermaelen (1983), Michaely and Vila (1995 and 1996), Dhaliwal and Li (2005), and many others). Intuitively, with investor tax heterogeneity, the most tax-disadvantaged investors will interact with the most tax-advantaged investors around the ex-days and there are profit opportunities at any level of ex-day excess return, even if it is zero. Michaely and Vila (1995) allow for interactions between different investors by demonstrating that the ex-day pricing of dividends reflects the average investors' tax attributes, not that of a certain clientele. The very evidence found in Naranjo, Nimalendran and Ryngaert (2000) that trading activities by corporate investors cause ex-day returns to be negative should encourage trading participation by individual investors around the ex-days. The issue is which type of investors dominates the ex-day price determination.

I attempt to directly examine how different investors, namely institutional versus individual investors, react to ex-dividend events; and how their trading activities impact the ex-day pricing of dividends. In other words, instead of inferring investor tax clienteles from dividend yield (as in Elton and Gruber (1970) and Naranjo, Nimalendran and Ryngaert (2000)) or from the price-drop-to-dividends ratio (as in Michaely (1991)), I go directly from investor ex-day trading behaviors to ex-day excess return.

For individual investors, dividend tax rate is historically higher than capital gains tax rate whereas institutional investors in general have relatively favorable tax treatment on their dividend income versus capital gains income.³ See Allen, Bernardo and Welch

³ For example, banks and insurance companies are generally corporations that are tax favored on dividends due to the dividends received deduction. Mutual funds are flow through entities for tax purposes. The tax attributes of investors in mutual funds determine the effect of ownership by mutual funds on the dividend tax premium. Brokerage firms pay taxes on both dividends and capital gains at ordinary income tax rates

(2000), Ayers, Cloyd and Robinson (2002), Dhaliwal, Erickson and Trezevant (1999), Dhaliwal, Li and Trezevant (2003), and Dhaliwal and Li (2005). Provided that differential taxation is a reason for ex-day excess return, if the ex-day traders are mostly individuals who are tax-disfavored on dividends, then ex-day excess return should be positive, reflecting more heavily the tax attributes of the individual investors; if the ex-day traders are mostly institutions who are relatively tax-favored on dividends, then ex-day excess return may be relatively low or even negative, reflecting more heavily the tax attributes of the institutional investors. As demonstrated in Michaely and Vila (1995), it is unlikely that the ex-day pricing of dividends is determined solely by one group of investors, or a single marginal investor. All investors trading around the ex-days should play a role in the determination of the ex-day pricing of dividends.

To demonstrate the above issue, I start from Michaely and Vila (1995). They show that the ex-day price drop is a result of the weighted average of all participating investors' tax attributes in the economy,

$$P_{CUM} - P_{EX} = \frac{\sum_{i=1}^N K_i \alpha_i}{\sum_{i=1}^N K_i} D - \tilde{\varepsilon}_e - X(\sigma_e^2 / \sum_{i=1}^N K_i), \quad (4)$$

where X is the aggregate demand for the stock, α_i is the marginal rate of substitution between dividends and capital gains, $(1 - t_{di})/(1 - t_{gi})$, for investor i , K_i is the level of risk tolerance for investor i , $\tilde{\varepsilon}_e$ is a random term for stock price and σ_e^2 is total risk of the stock.

Equation (4) suggests that the ex-day price-drop is determined in part by the average taxation on dividends relative to capital gains in the economy, weighted by investors'

and therefore are tax-neutral on dividends. Endowments and pensions are likely to be tax-favored on dividends.

levels of risk tolerance. Assuming that there are N_{INS} institutional investors and N_{IND} individual investors who trade around the ex-day, Equation (4) becomes

$$P_{CUM} - P_{EX} = \frac{N_{INS}K_{INS}\alpha_{INS} + N_{IND}K_{IND}\alpha_{IND}}{N_{INS}K_{INS} + N_{IND}K_{IND}} D - \tilde{\varepsilon}_e - \frac{X\sigma_e^2}{N_{INS}K_{INS} + N_{IND}K_{IND}}, \quad (5)$$

where K_{INS} and K_{IND} are the levels of risk tolerance for institutional and individual investors, respectively. Here, an implicit assumption is that all institutional investors are identical in terms of their tax attributes and levels of risk tolerance and all individual investors are identical in terms of their tax attributes and levels of risk tolerance. Note that in Equation (5), ex-day price drop is determined in part by institutional and individual investors who participate in ex-day trading and is a function of their weighted average tax attributes, α_{INS} and α_{IND} . When there are more institution-initiated trades than individual-initiated trades, the ex-day pricing of dividends will tend to reflect more of the tax attributes of institutional investors; when there are more individual-initiated trades than institution-initiated trades, the ex-day pricing of dividends will tend to reflect more of the tax attributes of individual investors. To express Equation (5) in excess return form, it becomes

$$\begin{aligned} R_{EX} &= \frac{P_{EX} + D - P_{CUM}}{P_{CUM}} \\ &= \frac{N_{INS}K_{INS}(1 - \alpha_{INS}) + N_{IND}K_{IND}(1 - \alpha_{IND})}{(N_{INS}K_{INS} + N_{IND}K_{IND})} \frac{D}{P_{CUM}} \\ &\quad + \frac{\tilde{\varepsilon}_e}{P_{CUM}} + \frac{X\sigma_e^2}{(N_{INS}K_{INS} + N_{IND}K_{IND})P_{CUM}}. \end{aligned} \quad (6)$$

Note that the first part of Equation (6) represents the portion of ex-day excess return due to differential taxation of dividends and capital gains, and institutional and individual trading. To the extent that $\alpha_{INS} > 1$ and $\alpha_{IND} < 1$, ex-day excess return decreases in

institutional trading and increases in individual trading. If $\alpha_{IND} < \alpha_{INS} < 1$, while ex-day excess return increases in both institutional and individual trading, it increases in individual trading at a greater rate. The second part of Equation (6) represents increased ex-day return due to increased risk exposure because of excess trading around the ex-days.

B. Holding Clienteles Versus Trading Clienteles

One seemingly straightforward way of understanding how institutional and individual investors impact the ex-day pricing of dividends is to examine the effect of the level of institutional (individual) ownership. For example, Sias and Starks (1997) show that the influence of individual (institutional) investors on price-setting is likely to be greater for firms in the low (high) institutional holdings groups. Relying on this concept, three recent studies use the level of institutional ownership to proxy for investor tax status. Ayers, Cloyd and Robinson (2002) find that the higher the firm's dividend yield, the more negative the firm's stock price reaction to the increase in the individual ordinary income tax rate; however, holdings by tax advantaged institutions mitigate this negative reaction. Dhaliwal, Li and Trezevant (2003) provide evidence that a firm's dividend yield has a positive impact on its common stock return that is decreasing in the level of institutional ownership. The results from both studies indicate that differential taxation of dividends and capital gains has an impact on stock prices. Ayers, Lefanowics and Robinson (2003) use the level of target institutional ownership to represent the tax status of target shareholders in a study of acquisition premium. Since the target shareholders have to be compensated for accelerating the realization of capital gains, they argue for and show a

positive association between shareholder capital gains taxes for individual investors and taxable acquisition premiums, which is mitigated by target institutional ownership.

One potential problem with using the level of institutional (individual) ownership in ex-day setting is that it represents only a subset of available investors, namely those investors who actually hold the stock before the ex-days, and thus represents only its holding clienteles. Institutional (individual) investors who hold shares of the stock before the ex-day may not necessarily trade around the ex-dividend days, while those institutional (individual) investors who do not hold shares of the stock before the ex-day may trade around the ex-days. Since trading clienteles represent those investors who actually participate in ex-day trading, it is likely that trading clienteles, not necessarily holding clienteles of the stock, impact the ex-day pricing of dividends. When ex-dividend trading by a certain type of investors increases, ex-day return may more likely reflect the tax attributes of this type of investors. Thus, ex-dividend trading by different types of investors may offer some clue to the average market valuation of dividends around the ex-days.

In this study, I determine whether and how institutional and individual investors react to ex-dividend events and how their trading activities impact the ex-day pricing of dividends. I rely on trade size, from which the identities of the traders, institutions versus individuals, can be inferred.

Cready (1988), Cready and Mynatt (1991), Lee (1992), Lee and Radhakrishna (2000), Bhattacharya (2001), among many others, use trade size to infer trader identities. These studies suggest that large trades are usually initiated by institutional investors and that small trades are usually initiated by individual investors. Their trade size proxies are

based on the premise that individual investors have tighter wealth constraints or are less sophisticated, thus initiating smaller trades (Lee and Radhakrishna (2000)).⁴ A recent study by Dhaliwal and Li (2005) uses a measure of trading clienteles, the ratio of the number of large (institutional) trades to the number of all trades, as a proxy for tax-induced investor heterogeneity, in their examination of ex-day trading volume. Consistent with prior studies, I use trade size to infer whether the ex-day trader is an institution or an individual.

C. Hypotheses

According to Michaely and Vila (1995), investors who are relatively tax-disfavored on dividends will try to sell the stock cum-dividend or buy the stock ex-dividend in order to avoid the dividends whereas those who are relatively tax-favored on dividends will try to buy the stock cum-dividend or sell the stock ex-dividend in order to acquire the dividends. Since individual investors on average are tax-disfavored on dividends and institutional investors are on average relatively tax-favored on dividends, they will trade with each other around the ex-dividend days to alleviate their tax burdens. Thus, my first hypothesis concerning whether institutional and individual investors react to ex-dividend events is:

Hypothesis 1: *Excess trading volumes by institutional and individual investors increase around the ex-dividend days.*

The next issue deals with whether institutional and individual investors react symmetrically or asymmetrically to ex-dividend events. Institutional investors may react more to ex-dividend events, since they are likely to be more sophisticated and wealthier

⁴ Lee (1992) explains that trading only takes place when a market order arrives. The size of a trade reflects the market order, or the active side, of the transaction. If a large market order is filled by several small limit orders, the transaction is recorded as a single transaction at the size of the large market order. This suggests that the size of a trade can contain information on the identity of the investor who initiates the trade.

than individual investors (see Lee (1992), Lee and Radhakrishna (2000), Bhattacharya (2001), etc.). They are likely to be more cognizant of the benefits of trading around ex-dividend days to reduce tax burdens than individual investors. They are also more likely to track firms' ex-dividend days than individual investors. Based on these arguments, institutional investors should be more likely to initiate trades around ex-days and react more to ex-dividend events than individual investors. Thus, the second hypothesis that I test is:

Hypothesis 2: *Ex-day excess trading volume per unit of dividend yield by institutional investors is higher than that by individual investors.*

If both institutional and individual investors react to ex-dividend events, their trading activities should impact the pricing of dividends on the ex-days. When trading volume initiated by institutional investors increases, more valuation weight is placed on the tax attributes of the institutional investors. Since institutional investors are relatively tax-favored on dividends, the increase in trading volume by institutional investors will cause ex-day excess return to decrease. On the other hand, when trading volume initiated by individual investors increases, more valuation weight is placed on the tax attributes of the individual investors. Since individual investors are tax-disfavored on dividends, the increase in trading volume by individual investors will cause ex-day excess return to increase. Thus, the third hypothesis that I test is:

Hypothesis 3: *Ex-day excess return per unit of dividend yield decreases in institution-initiated excess trading volume and increases in individual-initiated excess trading volume.*

Any support for Hypothesis 3 would provide evidence that differential taxation of dividends and capital gains is one factor, among many, that influences the pricing of dividends on the ex-days.

II. Empirical Results

A. Data

This study covers eight years from 1993 to 2000. From CRSP I obtain 90,471 monthly, quarterly, semi-annual and annual taxable cash dividend ex-days that have daily returns from day -45 to day 45 relative to the ex-day and cum-day market capitalization. After excluding stocks that are REITs, ADRs and closed-end funds, I have 69,349 ex-day observations. Then I require each ex-day observation to have daily trade size data between 9:30am and 4:00pm Eastern Standard Time from TAQ from day -45 to day 45 relative to the ex-day, closing bid and ask prices from day -5 to day 5 relative to the ex-day. After applying this criterion, I have a final sample of 24,777 ex-day observations.

B. Variables Definitions and Descriptive Statistics

I use two approaches to define large versus small trades. The first is based on the number of shares traded in each trade and the second is based on the dollar value of each trade. Lee and Radhakrishna (2000) argue that dollar-based cutoffs are conceptually superior to share-based cutoffs because they incorporate differences in stock prices, while share-based cutoffs ignore differences in stock prices. I use both approaches to offer some assurance that my results are not sensitive to how large and small trades are defined.

Specifically, using the first approach, if the number of shares traded in a trade exceeds 600 (900 and 1,200) shares, I define the trade as a large trade; otherwise, it is a small trade. Similarly, using the second approach, if the dollar value of a trade based on

closing price, as in Lee (1992) and Lee and Radhakrishna (2000), exceeds \$5,000 (\$10,000 and \$15,000), I define the trade as a large trade; otherwise, it is a small trade.⁵

Next, I measure ex-day excess trading volume based on trade size. The 80-day period from day -45 to day -6 and from day 6 to day 45 is defined as the non-event control period. The 11-day period from day -5 to day 5 is defined as the ex-dividend period. This approach is used in Michaely and Vila (1995 and 1996). Using the 600-share cutoff as an example, I define the ex-day excess trading volume for large trades, $EXSL600$, as the average daily share turnover by large (institutional) trades during the ex-dividend period scaled by the average daily share turnover by large trades during the control period and then minus one. It is computed as

$$EXSL600_{it} = \frac{\sum_{d \in [-5, 5]} SL600_{it,d} / 11}{\sum_{d \in [-45, -6] \cup [6, 45]} SL600_{it,d} / 80} - 1, \quad (7a)$$

where $SL600_{it,d}$ is the share turnover for large trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff; and share turnover is the number of shares traded in each trade scaled by the number of shares outstanding. Similarly, I define the ex-day excess trading volume for small (individual) trades, $EXSS600$, as the average daily share turnover by small trades during the ex-day period scaled by the average daily share turnover by small trades during the control period and then minus one. It is computed as

$$EXSS600_{it} = \frac{\sum_{d \in [-5, 5]} SS600_{it,d} / 11}{\sum_{d \in [-45, -6] \cup [6, 45]} SS600_{it,d} / 80} - 1, \quad (7b)$$

⁵ Specifically, I first obtain a closing price for the stock for a particular day. Then I compare the closing price to \$5,000 (\$10,000 and \$15,000) and determine the largest number of round lot shares that is less than or equal to \$5,000 (\$10,000 and \$15,000). Trades transacted during the day at this number of shares or less are considered small trades and trades transacted during the day above this number of shares are considered large trades.

where $SS600_{it,d}$ is the share turnover for small trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff; and share turnover is the number of shares traded in each trade scaled by the number of shares outstanding. Ex-day excess trading volumes for large and small trades based on 900 and 1,200 shares cutoffs, $EXSL900$, $EXSS900$, $EXSL1200$ and $EXSS1200$ are defined accordingly.

Note that in $EXSL600$ ($EXSL900$, $EXSL1200$) and $EXSS600$ ($EXSS900$, $EXSS1200$), “ EX ” represents the ex-day excess trading volume, “ SL ” represents share-based large trades, and “ SS ” represents share-based small trades. For dollar-based cutoffs, excess trading volumes for large and small trades, $EXDL5000$ ($EXDL10000$, $EXDL15000$) and $EXDS5000$ ($EXDS10000$, $EXDS15000$) are defined in a similar fashion, where “ DL ” represents dollar-based large trades, and “ DS ” represents dollar-based small trades. Since normal trading volume during the control period is separated from event period volume, the above measures of excess trading volume represent extra trading by institutional or individual investors around the ex-days.

Table I shows the distributional statistics of the six measures of institutional and individual ex-day excess trading volume based on the number of shares traded and the dollar value of each trade. Trading volume by institutional investors increases significantly both economically and statistically around ex-days. It ranges from 0.1041 ($t = 20.54$) for $EXDL600$ to 0.1647 ($t = 19.39$) for $EXSL1200$. Trading volume by individual investors, while in general increases, its magnitude is low and very marginal. It appears that while both types of investors react to ex-dividend events, institutional investors initiate much more trades. The distributional statistics in Table I also suggest that all excess trading volume measures are skewed. Figure 1 depicts excess trading

volume for institutional and individual investors during the 91-day period around the ex-days using share-based cutoffs. Figure 2 depicts excess trading volume for institutional and individual investors during the 91-day period around the ex-days using dollar-based cutoffs. Both figures show that most of the ex-day excess trading volume comes from institution-initiated trades.

Table II shows the correlation coefficients between institutional and individual excess trading volumes. The correlations between measures of large (institutional) trade excess trading volume are mostly close to one and the correlations between measures of small (individual) trade excess trading volume are also mostly close to one. The correlations between large (institutional) trade excess trading volume and small (individual) trade excess trading volume are positive and significant, though in the order of 0.20 to 0.30. The positive correlations between large (institutional) trade excess volume and small (individual) trade excess volume suggest that an increase in one is at least not entirely at the expense of the other.

Ex-day excess return is defined as the ex-day beta-adjusted return, computed as

$$EXRET_{it} = (RET_{it} - RF_t) - \hat{\alpha}_{it} - \hat{\beta}_{it}(MKT_t - RF_t), \quad (8)$$

where RET_{it} is ex-day t return for stock i , MKT_t is the ex-day t market return and RF_t is the ex-day t one-month T-bill return. $\hat{\alpha}$ and $\hat{\beta}$ are estimated from a CAPM-style time-series regression during the 80-day control period,

$$(RET_{it,d} - RF_{t,d}) = \alpha_{it} - \beta_{it}(MKT_{t,d} - RF_{t,d}) + \varepsilon_{it,d}, \quad (9)$$

where d indexes the 80-day control period and $\varepsilon_{it,d}$ is the residual.

Event dividend yield is defined as dividend amount per share divided by the cum-day stock price. It is computed as

$$YIELD_{it} = \frac{DIVAMT_{it}}{P_{CUMit}}, \quad (10)$$

where $DIVAMT$ is dividends per share and P_{CUM} is the cum-day closing price.

To control for idiosyncratic risk, I use the standard error of the CAPM residuals, σ_e , scaled by the standard error of the market returns, σ_M , during the 80-day control period, σ_e/σ_M , as a proxy. This measure is used in Michaely and Vila (1995 and 1996).

To control for transaction costs, I use the average 11-day closing bid-ask spread, computed as

$$SPREAD_{it} = \sum_{d \in [-5,5]} \frac{2(ASK_{it,d} - BID_{it,d})}{(ASK_{it,d} + BID_{it,d})} / 11, \quad (11)$$

where $ASK_{it,d}$ and $BID_{it,d}$ are closing ask and bid prices for stock i on day d relative the ex-day t .

Apart from the above control variables, I am also interested in how firm size impacts the ex-day excess volume and return. I use the cum-day market capitalization of a stock, CAP , as a measure of firm size.

Table III shows the mean and median ex-day excess return, $EXRET$, of 0.0021 and 0.0016, respectively. The mean and median dividend yield, $YIELD$, are 0.0070 and 0.0055, respectively. The market capitalization, CAP , for the sample stocks is skewed, it has a mean of \$3.7563 billions and a median of \$0.8500 billion.

C. Empirical Design and Results

C.1. Size-Based Excess Trading Volume and Dividend Yield

To determine whether institutional investors and individual investors react to ex-dividend events and whether they react symmetrically or asymmetrically, I run the

following regressions for large (institutional) and small (individual) trade excess trading volume based on the 600-share cutoff:

$$EXSL600_{it} = \alpha_0 + \alpha_1 YIELD_{it} + \alpha_2 \beta_{it} + \alpha_3 \sigma_e / \sigma_{Mit} + \alpha_4 SPREAD_{it} + \alpha_5 CAP_{it} + u_{it}, \quad (12a)$$

$$EXSS600_{it} = \alpha_0 + \gamma_1 YIELD_{it} + \gamma_2 \beta_{it} + \gamma_3 \sigma_e / \sigma_{Mit} + \gamma_4 SPREAD_{it} + \gamma_5 CAP_{it} + e_{it}. \quad (12b)$$

For both equations, I expect the coefficients on *YIELD* to be positive for excess trading volume based on large (institutional) and small (individual) trades. This is because, around ex-dividend days, both institutional and individual investors may trade to reduce their tax burdens. However, institutional investors, being possibly wealthier, more sophisticated and more cognizant of ex-day tax reduction opportunities, may be more likely to initiate trades than individual investors. If this is the case, for excess trading volume based on large trades, which represents institutional trading, the coefficient on *YIELD* should be higher than that for excess trading volume based on small (individual) trades.

As for control variables, I expect the coefficients on β and σ_e / σ_M to be negative, since ex-day excess trading causes the traders to assume more risk, which in turn reduces trading incentives (Michaely and Vila (1995)). I expect the effect of *SPREAD* on excess trading volume to be negative, since transaction costs reduce the benefits of ex-day trading (Michaely and Vila (1995)). I include *CAP* to determine if excess trading volume is also a function of firm size.

The first two columns of Panel A, Table IV show the results based on the 600-share cutoff. For excess trading volume based on large trades, the coefficient on *YIELD* is 16.4227 ($t = 21.06$), while for excess trading volume based on small trades, the coefficient on *YIELD* is 2.8480 ($t = 11.38$), considerably lower than that based on large

trades. Results are similar for 900-share and 1,200-share cutoffs. Panel B provides results using the three dollar-based trade size cutoffs and the results are again qualitatively similar. These results in Table IV provide support for Hypotheses 1 and 2. That is, both institutional and individual investors react to ex-dividend events and that institutional investors initiate more trades.

Apart from the coefficients on *YIELD*, Table IV also show that for large trade excess trading volume, the coefficients on β and σ_ϵ/σ_M are negative and significant, suggesting that both systematic and idiosyncratic risks reduce ex-day trading volume, consistent with Michaely and Vila (1995 and 1996). The coefficient on *SPREAD* is negative and significant, suggesting that transaction costs reduce ex-day trading volume, again consistent with Michaely and Vila (1995 and 1996). The effect of *CAP* is negative and significant, suggesting that excess trading volume is relatively large for small capitalization stocks. This result is similar to Dhaliwal and Li (2005).

For small trade excess trading volume, while the coefficients on β and σ_ϵ/σ_M are negative and significant, they are of much smaller magnitudes than those for large trades. An ex post explanation for this difference may be that while both institutional and individual investors are subject to ex-day trading risks, individual investors may be less sensitive to the risks involved in ex-day trading due to their being less sophisticated investors. They may not fully appreciate the risks involved in ex-day trading and thus do not pay enough attention to them. They may also take relatively small ex-day positions during the event period and thus are subject to lower levels of risks. The coefficients on *SPREAD* are insignificant for small trades (except for \$5,000 cutoff, where it is positive and marginally significant), either due to less sophisticated individual investors being less

sensitive to transaction costs or due to their relatively small ex-day positions. The coefficients on *CAP* are all negative and are significant for \$5,000 and \$10,000 cutoffs.

In sum, results in Table IV provide evidence largely consistent with investors with different tax attributes increasing their trading activities around the ex-days to reduce tax burdens. They also suggest that institutional and individual investors react differently to ex-dividend events. Institutional investors appear to initiate more trades than individual investors around the ex-days.

C.2. Size-Based Excess Trading Volume and Ex-Day Excess Return

As argued earlier, if an increase in ex-day excess trading volume is primarily due to excess trading initiated by a certain type of investors, e.g., institutional versus individual investors, then the market places a heavier weight on the tax attributes of this type of investors in determining the ex-day pricing of dividends. Since ex-day excess return reflects investors' weighted average tax attributes (Michaely and Vila (1995)), it is possible to observe that the ex-day excess return changes as a function of excess trading volumes by large (institutional) and small (individual) traders. More specifically, when excess trading volume increases mainly due to trading initiated by institutional investors, a heavier weight is placed on the tax attributes of the institutional investors in determining the ex-day pricing of dividends. Since institutional investors in general have relatively favorable tax treatment on dividends versus capital gains, an increase in excess trading volume by large (institutional) trades should decrease the ex-day excess return. On the other hand, when excess trading volume increases mainly due to trading initiated by individual investors, a heavier weight is placed on the tax attributes of the individual investors in determining the ex-day pricing of dividends. Since individual investors

generally are tax-disfavored on dividends versus capital gains, an increase in excess trading volume by small (individual) trades should increase the ex-day excess return.

To test for the above arguments, I run the following regressions for various share-based cutoffs for large and small trades:

$$EXRET_{it} = \alpha_0 + \alpha_1 YIELD_{it} + \alpha_2 EXSL900_{it} + \alpha_3 YIELD_{it} \cdot EXSL900_{it} + \alpha_4 EXSS600_{it} + \alpha_5 YIELD_{it} \cdot EXSS600_{it} + \alpha_6 \sigma_E / \sigma_{Mit} + \alpha_7 SPREAD_{it} + \alpha_8 CAP_{it} + u_{it}, \quad (13a)$$

$$EXRET_{it} = \alpha_0 + \alpha_1 YIELD_{it} + \alpha_2 EXSL1200_{it} + \alpha_3 YIELD_{it} \cdot EXSL1200_{it} + \alpha_4 EXSS900_{it} + \alpha_5 YIELD_{it} \cdot EXSS900_{it} + \alpha_6 \sigma_E / \sigma_{Mit} + \alpha_7 SPREAD_{it} + \alpha_8 CAP_{it} + u_{it}, \quad (13b)$$

$$EXRET_{it} = \alpha_0 + \alpha_1 YIELD_{it} + \alpha_2 EXSL1200_{it} + \alpha_3 YIELD_{it} \cdot EXSL1200_{it} + \alpha_4 EXSS600_{it} + \alpha_5 YIELD_{it} \cdot EXSS600_{it} + \alpha_6 \sigma_E / \sigma_{Mit} + \alpha_7 SPREAD_{it} + \alpha_8 CAP_{it} + u_{it}. \quad (13c)$$

Note that in the above equations, volumes related to medium-sized trades are omitted.

Lee and Radhakrishna (2000) show that misclassifications of institutional and individual trades can be reduced by a buffer zone of medium-sized trades. Bhattacharya (2001), in a study of trade size and trading responses around earnings announcements, also omits medium-sized trades to distinguish more clearly the trading activities of wealthier, better informed (institutional) traders from those of less wealthy, less informed (individual) traders. Based on these studies, I omit volumes related to medium-sized trades, namely, between 600 shares and 900 shares for Equation (13a); between 900 shares and 1,200 shares for Equation (13b) and between 600 shares and 1,200 shares for Equation (13c), to increase the chance that institutional investors are responsible for large trades and individual investors are responsible for small trades.

For the above three equations, the coefficient on *YIELD* should be positive, which represents the average market valuation of dividends on the ex-days for all stocks. The coefficients on *YIELD·EXSL900* and *YIELD·EXSL1200* should be negative, since an increase in institution-initiated trading around the ex-days should reduce ex-day excess

return. I expect the coefficient on $YIELD \cdot EXSS600$ and $YIELD \cdot EXSS900$ to be positive, since an increase in individual-initiated trading around ex-days should increase the ex-day excess return. The coefficient on σ_e/σ_M should be positive, since a trader has to be compensated for taking extra risk on the ex-day (Michaely and Vila (1995)). The coefficient on $SPREAD$ should also be positive, since transaction costs prevent ex-day excess return to be arbitrated away (Kalay (1982)).

Before presenting the regression results, I depict ex-day excess return in dividend yield and share-based large trade ($EXSL1200$) and small trade ($EXSS600$) excess volume quartiles in Figure 3. Part A shows that ex-day excess return generally decreases in institutional excess trading volume in the highest dividend yield quartile while generally increases in individual excess trading volume in all dividend yield quartiles. Figure 4 shows a similar pattern for dollar-based large trade ($EXDL15000$) and small trade ($EXDS5000$) excess volumes. These preliminary results support Hypothesis 3. From a different angle, Figures 3 and 4 also show that in the highest institutional excess trading volume quartile, ex-day excess return first increases in dividend yield and then decreases in dividend yield. This result suggests that the effect of institutional trading on ex-day excess return is most pronounced when dividend yield is high, consistent with Naranjo, Nimalendran and Ryngaert (2000).

The share-based regression results are reported in Panel A, Table V. For the 600 shares versus 900 shares model, the coefficient on $YIELD$ is positive and significant ($\alpha_1 = 0.1196$, $t = 5.15$). This is the average market valuation of dividends on the ex-days for all stocks. The coefficient on $YIELD \cdot EXSL900$ is negative and significant ($\alpha_3 = -0.0527$, $t = -2.34$) and the coefficient on $YIELD \cdot EXSS600$ is positive and significant ($\alpha_5 = 0.1687$, $t =$

4.11). These results are consistent with an increase in institution-initiated trading reducing the ex-day excess return while an increase in individual-initiated trading increasing the ex-day excess return. For the 900 shares versus 1,200 shares model, the coefficients on *YIELD·EXSL1200* and *YIELD·EXSS900* are not significant. For the 600 shares versus 1,200 shares model, again, the coefficient on *YIELD·EXSL1200* is negative and significant ($\alpha_3 = -0.0368$, $t = -1.91$) and the coefficient on *YIELD·EXSS600* is positive and significant ($\alpha_5 = 0.1586$, $t = 3.96$).

Panel B, Table V reports results using dollar-based cutoffs. For the \$5,000 versus \$10,000 model, the coefficient on *YIELD* is positive and significant ($\alpha_1 = 0.0993$, $t = 4.29$). The coefficient on *YIELD·EXDL10000* is insignificant while the coefficient on *YIELD·EXDS5000* is positive and significant ($\alpha_5 = 0.0643$, $t = 1.67$). For the \$10,000 versus \$15,000 model, the coefficient on *YIELD·EXDL15000* is negative and significant ($\alpha_3 = -0.0403$, $t = -2.94$) and the coefficient on *YIELD·EXDS10000* is positive and significant ($\alpha_5 = 0.1272$, $t = 3.74$). For the \$5,000 versus \$15,000 model, the coefficient on *YIELD·EXDL15000* is negative and significant ($\alpha_3 = -0.0330$, $t = -2.66$) and the coefficient on *YIELD·EXDS5000* is positive and significant ($\alpha_5 = 0.1182$, $t = 3.69$).

In sum, the above results provide evidence that when excess trading volume initiated by institutional investors increases, ex-day excess return decreases; when excess trading volume initiated by individual investors increases, ex-day excess return increases. These results support Hypothesis 3 and suggest that trading clienteles and their tax attributes impact the ex-day pricing of dividends. An important implication of the above results is that differential taxation appears to be one factor that affects ex-day excess return.

Apart from the results on the effect of excess trading volume, Table V also shows that the effects of idiosyncratic risk and bid-ask spread on ex-day excess return are both positive and significant. They suggest that high levels of ex-day trading risks and transaction costs prevent short-term traders from arbitraging away the ex-day excess return and a full ex-day adjustment of stock price to the amount of dividends, consistent with Kalay (1982) and Michaely and Vila (1995).

III. Summary and Conclusion

In this paper, I show that institutional and individual investors, who are taxed differently on dividends and capital gains, both react to ex-dividend events. I use trade size to infer trader identities. Large trades are assumed to be initiated by institutional investors while small trades are assumed to be initiated by individual investors. I find that ex-day excess trading volume increases for both institution-initiated and individual-initiated trades. This result suggests that both types of investors trade around ex-days to relieve their tax burdens. However, wealthier and more sophisticated institutional investors appear to initiate much more trades than individual investors.

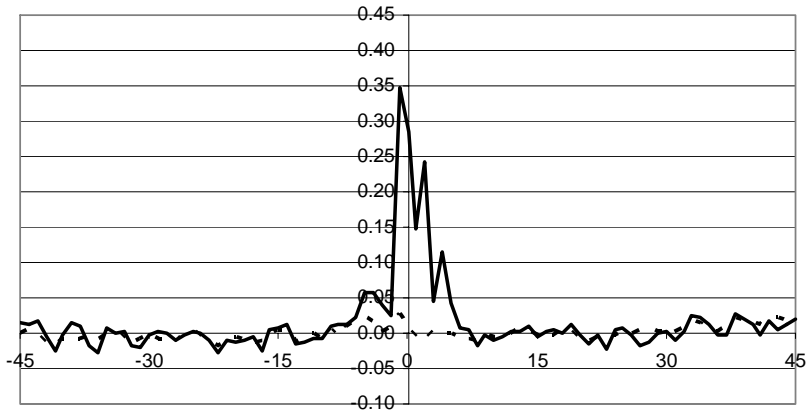
Excess trading by institutional and individual investors also impacts the ex-day pricing of dividends. Since individual investors are usually tax-disfavored on dividends, trading by these investors should increase ex-day excess return. On the other hand, institutional investors are relatively tax-favored on dividends versus capital gains, trading by these investors should decrease ex-day excess return. I obtain evidence supporting this prediction.

This paper contributes to the ex-dividend literature by providing evidence on ex-day excess trading by different types of investors. It also provides evidence that ex-day trading clienteles and their tax attributes impact ex-day excess return in a predicted way. This result adds support to differential taxation of dividends and capital gains being one factor, among many, that impacts the ex-day pricing of dividends.

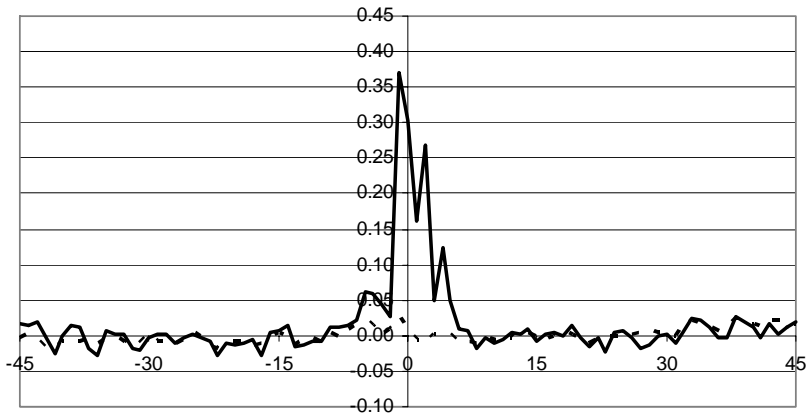
REFERENCES

- Allen, Franklin, Antonio E. Bernardo, and Ivo Welch, 2000. A theory of dividends based on tax-clienteles, *Journal of Finance* 55, 2499-2536.
- Ayers, Benjamin C., C. Bryan Cloyd, and John R. Robinson, 2002. The effect of shareholder-level dividend taxes on stock prices: Evidence from the Revenue Reconciliation Act of 1993. *The Accounting Review* 77, 933-947.
- Ayers, Benjamin C., Craig E. Lefanowicz and John R. Robinson, 2003. Shareholder taxes in acquisition premiums: The effect of capital gains taxation. *Journal of Finance* 58, 2783-2801.
- Bali, Rakesh, and Gailen L. Hite, 1998, Ex-dividend day stock price behavior: discreteness or tax-induced clientele? *Journal of Financial Economics* 47, 127-159.
- Bhattacharya, Nilabhra, 2001. Investors' trade size and trading responses around earnings announcements: An empirical investigation. *The Accounting Review* 76, 221-244.
- Cready, W. M., 1988, Information value and investor wealth: The case of earnings announcements, *Journal of Accounting Research* 26, 1-27.
- Cready, W. M., and D. N. Hurtt, 2002, Assessing investor response to information events using return and volume metrics, *The Accounting Review* 77, 891-909.
- Cready, W. M., and P. G. Mynatt, 1991, The information content of annual reports: A price and trading response analysis, *The Accounting Review* 66, 291-312.
- Dhaliwal, Dan S., Merle Erickson, Robert Trezevant, 1999, A test of the theory of tax clientele for dividend policies, *National Tax Journal* 52, 179-194.
- Dhaliwal, Dan S., Oliver Zhen Li, and Robert Trezevant, 2003, Is a dividend tax penalty incorporated into common stock return?, *Journal of Accounting and Economics* 35, 155-178.
- Dhaliwal, Dan S., and Oliver Zhen Li, 2005, Investor Tax Heterogeneity and Ex-Dividend Day Trading Volume, *Journal of Finance*, Forthcoming.
- Elton, E. J., and M. Gruber, 1970, Marginal stockholder tax rates and the clientele effect, *Review of Economics and Statistics* 52, 68-74.
- Graham, J.R., R. Michaely, and M.R. Roberts. 2003. Do price discreteness and transactions costs affect stock returns? Comparing ex-dividend pricing before and after decimalization. *Journal of Finance* 58, 2611-2635.

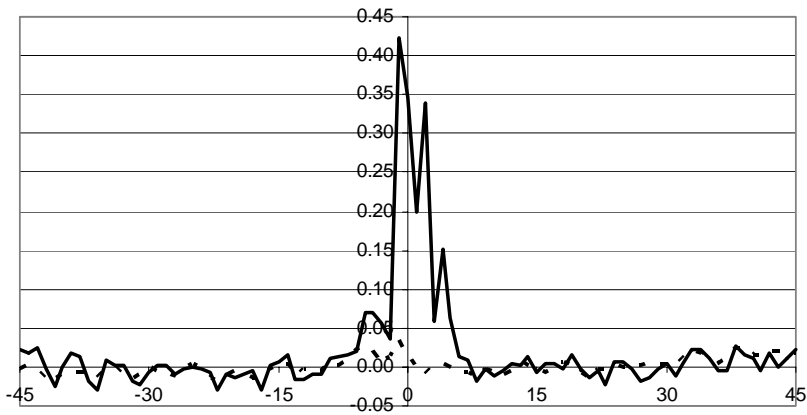
- Jakob, Keith, and Tongshu Ma, 2004, Tick size, NYSE rule 118, and ex-dividend day stock price behavior, *Journal of Financial Economics* 72, 605-625.
- Kalay, A., 1982, The ex-dividend day behavior of stock prices: A re-examination of the clientele effect, *Journal of Finance* 37, 1059-1070.
- Kalay, A., 1984, The ex-dividend day behavior of stock prices; a re-examination of the clientele effect: A reply, *Journal of Finance* 39, 557-561.
- Koski, Jennifer Lynch, and Roni Michaely, 2000. Prices, liquidity, and the information content of trades, *Review of Financial Studies* 13, 659-696.
- Lakonishok, J., and T. Vermaelen, 1983, Tax reform and ex-dividend day behavior, *Journal of Finance* 38, 1157-1179.
- Lee, C. M. C., 1992, Earnings news and small traders, *Journal of Accounting and Economics* 15, 265-302.
- Lee, C. M. C., and B. Radhakrishna, 2000, Inferring investor behavior: Evidence from TORQ data, *Journal of Financial Markets* 3, 83-111.
- Michaely, R., and J. Vila, 1995, Investors' heterogeneity, prices, and volume around the ex-dividend day, *Journal of Financial and Quantitative Analysis* 30, 171-198.
- Michaely, R., and J. Vila, 1996, Trading volume with private valuation: Evidence from the ex-dividend day, *Review of Financial Studies* 9, 471-509.
- Naranjo, A., M. Nimalendran, and M. Ryngaert, 2000. Time variation of ex-dividend day stock returns and corporate dividend capture: A reexamination. *Journal of Finance* 55, 2357-2372.
- Sias, R. W., and L. T. Starks, 1997. Return autocorrelation and institutional investors. *Journal of Financial Economics* 46, 103-131.
- Walther, B. R., 1997. Investor sophistication and market earnings expectation. *Journal of Accounting Research* 35, 157-179.



A: 600-share cutoff

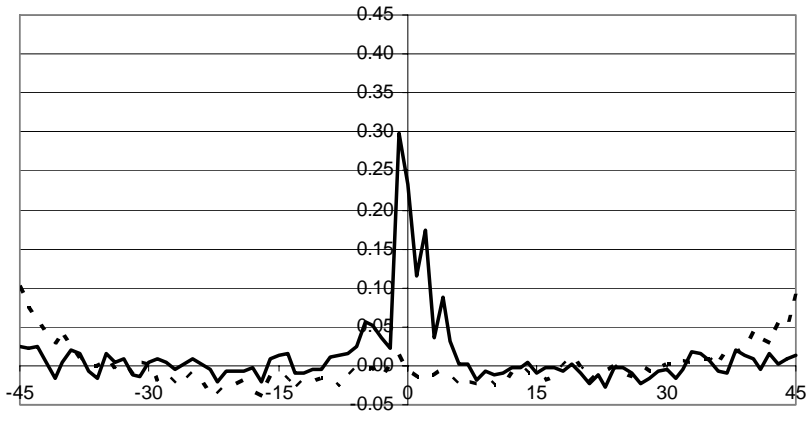


B: 900-share cutoff

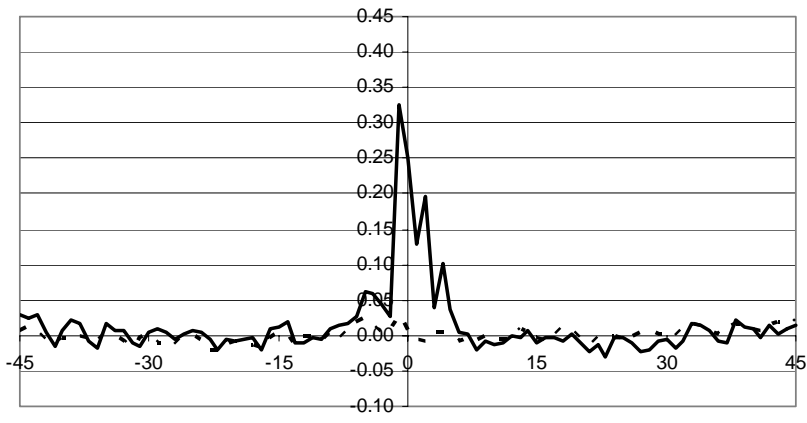


C: 1,200-share cutoff

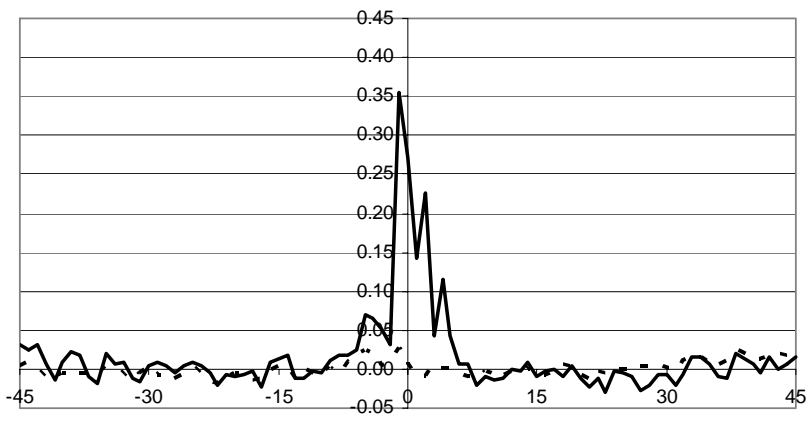
Figure 1
 Share-based excess trading volume 91 days around the ex-dividend day
 The solid lines represent excess volume for trades above the cutoffs and the dotted lines represent excess volume for trades below the cutoffs.



A: \$5,000 cutoff

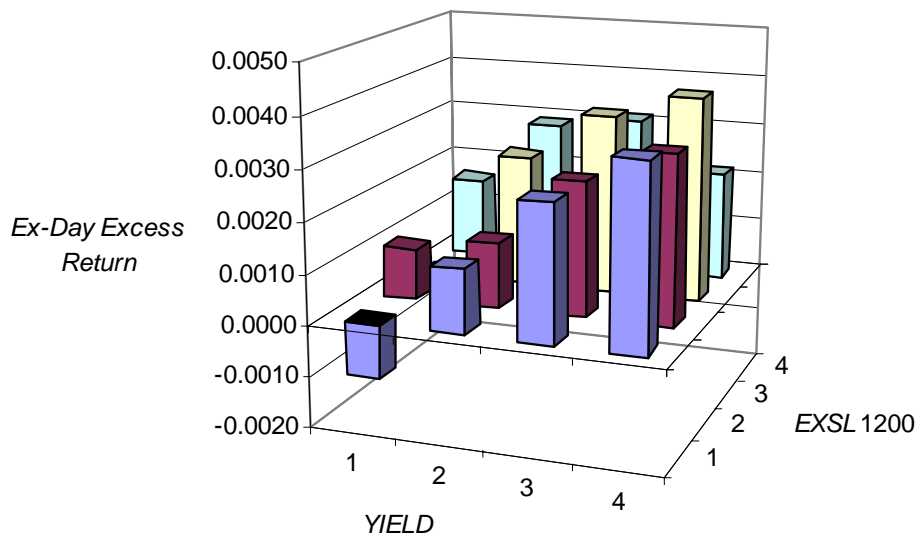


B: \$10,000 cutoff

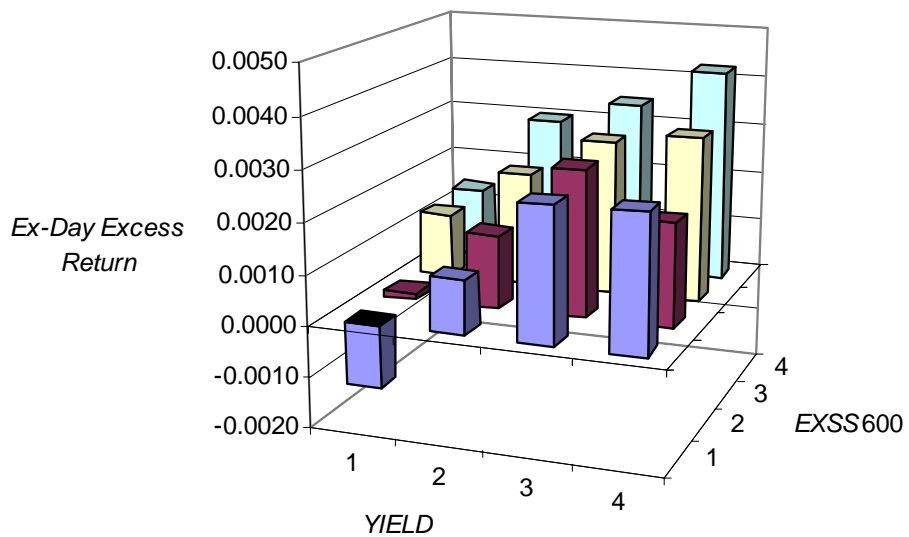


C: \$15,000 cutoff

Figure 2
 Dollar-based excess trading volume 91 days around the ex-dividend day
 The solid lines represent excess volume for trades above the cutoffs and the dotted lines represent excess volume for trades below the cutoffs.

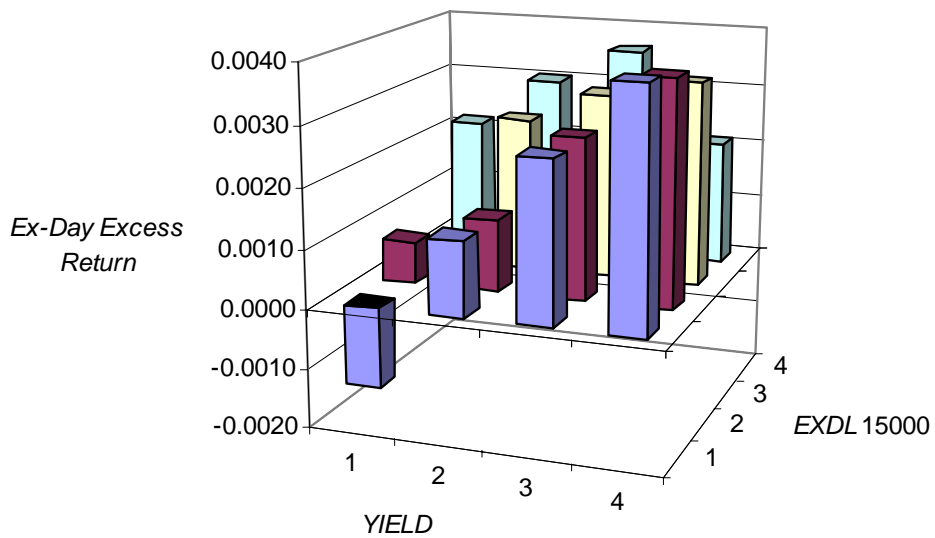


A: Ex-day excess return and excess trading volume above 1,200 shares per trade

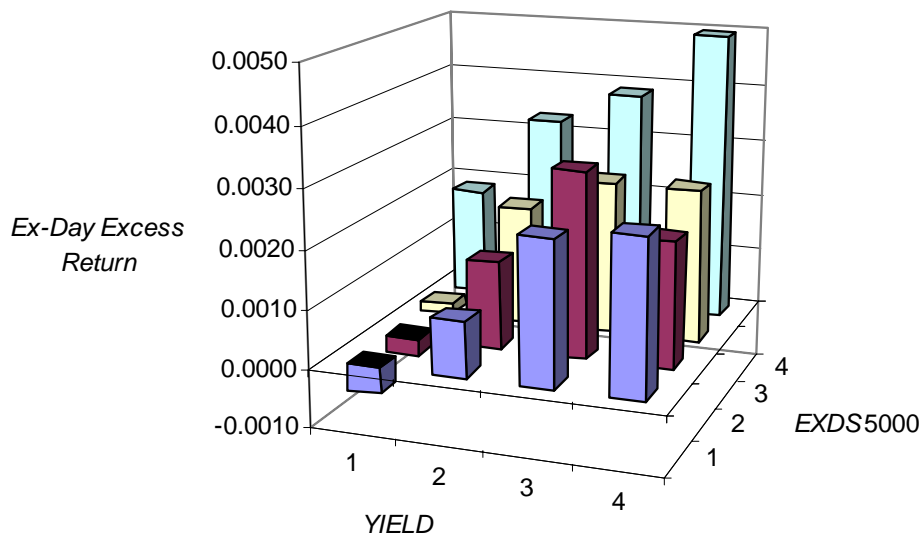


B: Ex-day excess return and excess trading volume below 600 shares per trade

Figure 3
Ex-day excess return in dividend yield and share-based trade size quartiles



A: Ex-day excess return and excess trading volume above \$15,000 per trade



B: Ex-day excess return and excess trading volume below \$5,000 per trade

Figure 4
Ex-day excess return in dividend yield and dollar-based trade size quartiles

Table I
Size-Based Excess Trading Volume

Using the share-based approach, if the number of shares traded in a trade exceeds 600 (900 and 1,200) shares, I define the trade as a large trade, otherwise, it is a small trade. Similarly, using the dollar-based approach, if the dollar value of a trade based on closing price exceeds \$5,000 (\$10,000 and \$15,000), I define the trade as a large trade, otherwise, it is a small trade. Next, I measure ex-day excess trading volume based on trade size. The 80-day period from day -45 to day -6 and from day 6 to day 45 is defined as the non-event control period. The 11-day period from day -5 to day 5 is defined as the ex-dividend period. Using the 600-share cutoff as an example, the ex-day excess trading volume for large trades, $EXSL600$, is defined as the average daily share turnover by large (institutional) trades during the ex-dividend period scaled by the average daily share turnover by large trades during the control period and then minus 1. It is computed as

$$EXSL600_{it} = \frac{\sum_{d \in [-5,5]} SL600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SL600_{it,d} / 80} - 1,$$

where $SL600_{it,d}$ is the share turnover for large trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff; and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Similarly, the ex-day excess trading volume for small (individual) trades, $EXSS600$, is defined as the average daily share turnover by small trades during the ex-day period scaled by the average daily share turnover by small trades during the control period and then minus 1. It is computed as

$$EXSS600_{it} = \frac{\sum_{d \in [-5,5]} SS600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SS600_{it,d} / 80} - 1,$$

where $SS600_{it,d}$ is the share turnover for small trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff, and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Ex-day excess trading volume for large and small trades based on 900 and 1,200 shares cutoffs, $EXSL900$, $EXSS900$, $EXSL1200$ and $EXSS1200$ are defined accordingly. Note that in $EXSL600$ ($EXSL900$, $EXSL1200$) and $EXSS600$ ($EXSS900$, $EXSS1200$), “EX” represents the ex-day excess trading volume, “SL” represents share-based large trades and “SS” represents share-based small trades. For dollar-based cutoffs, excess trading volume for large and small trades, $EXDL5000$ ($EXDL10000$, $EXDL15000$) and $EXDS5000$ ($EXDS10000$, $EXDS15000$) are defined in a similar fashion, where “DL” represents dollar-based large trades and “DS” represents dollar-based small trades.

Panel A: Share-based Trade Size				
Variable	Mean	t-value	Skewness	Kurtosis
$EXSL600$	0.1274	20.53	15.7752	666.7480
$EXSS600$	0.0069	3.51	2.6593	20.5943
$EXSL900$	0.1380	20.30	17.7746	802.5127
$EXSS900$	0.0070	3.62	2.6035	19.1201
$EXSL1200$	0.1647	19.39	21.3419	953.1051
$EXSS1200$	0.0100	4.88	2.7932	21.7813
Panel B: Dollar-based Trade Size				
Variable	Mean	t-value	Skewness	Kurtosis
$EXDL5000$	0.1041	20.54	12.6648	501.3921
$EXDS5000$	-0.0067	-1.75	11.5863	357.6866
$EXDL10000$	0.1153	20.54	14.3501	619.3804
$EXDS10000$	0.0072	3.42	2.2699	14.5847
$EXDL15000$	0.1284	20.45	15.5899	672.3520
$EXDS15000$	0.0078	3.79	2.4702	16.3992

Table II
Correlations of Different Measures of Size-Based Excess Trading Volume

Using the share-based approach, if the number of shares traded in a trade exceeds 600 (900 and 1,200) shares, I define the trade as a large trade, otherwise, it is a small trade. Similarly, using the dollar-based approach, if the dollar value of a trade based on closing price exceeds \$5,000 (\$10,000 and \$15,000), I define the trade as a large trade, otherwise, it is a small trade. Next, I measure ex-day excess trading volume based on trade size. The 80-day period from day -45 to day -6 and from day 6 to day 45 is defined as the non-event control period. The 11-day period from day -5 to day 5 is defined as the ex-dividend period. Using the 600-share cutoff as an example, the ex-day excess trading volume for large trades, $EXSL600$, is defined as the average daily share turnover by large (institutional) trades during the ex-dividend period scaled by the average daily share turnover by large trades during the control period and then minus 1. It is computed as

$$EXSL600_{it} = \frac{\sum_{d \in [-5,5]} SL600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SL600_{it,d} / 80} - 1,$$

where $SL600_{it,d}$ is the share turnover for large trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff; and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Similarly, the ex-day excess trading volume for small (individual) trades, $EXSS600$, is defined as the average daily share turnover by small trades during the ex-day period scaled by the average daily share turnover by small trades during the control period and then minus 1. It is computed as

$$EXSS600_{it} = \frac{\sum_{d \in [-5,5]} SS600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SS600_{it,d} / 80} - 1,$$

where $SS600_{it,d}$ is the share turnover for small trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff, and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Ex-day excess trading volume for large and small trades based on 900 and 1,200 shares cutoffs, $EXSL900$, $EXSS900$, $EXSL1200$ and $EXSS1200$ are defined accordingly. Note that in $EXSL600$ ($EXSL900$, $EXSL1200$) and $EXSS600$ ($EXSS900$, $EXSS1200$), “ EX ” represents the ex-day excess trading volume, “ SL ” represents share-based large trades and “ SS ” represents share-based small trades. For dollar-based cutoffs, excess trading volume for large and small trades, $EXDL5000$ ($EXDL10000$, $EXDL15000$) and $EXDS5000$ ($EXDS10000$, $EXDS15000$) are defined in a similar fashion, where “ DL ” represents dollar-based large trades and “ DS ” represents dollar-based small trades.

Table II, continued

	<i>EXSL600</i>	<i>EXSS600</i>	<i>EXSL900</i>	<i>EXSS900</i>	<i>EXSL1200</i>	<i>EXSS1200</i>	<i>EXDL5000</i>	<i>EXDS5000</i>	<i>EXDL10000</i>	<i>EXDS10000</i>	<i>EXDL15000</i>	<i>EXDS15000</i>
<i>EXSL600</i>	1.0000											
<i>EXSS600</i>	0.3127 [0.0001]	1.0000										
<i>EXSL900</i>	0.9977 [0.0001]	0.2894 [0.0001]	1.0000									
<i>EXSS900</i>	0.3218 [0.0001]	0.9811 [0.0001]	0.2955 [0.0001]	1.0000								
<i>EXSL1200</i>	0.9680 [0.0001]	0.2365 [0.0001]	0.9802 [0.0001]	0.2414 [0.0001]	1.0000							
<i>EXSS1200</i>	0.3646 [0.0001]	0.9432 [0.0001]	0.3377 [0.0001]	0.9601 [0.0001]	0.2734 [0.0001]	1.0000						
<i>EXDL5000</i>	0.9759 [0.0001]	0.3935 [0.0001]	0.9653 [0.0001]	0.4017 [0.0001]	0.9170 [0.0001]	0.4422 [0.0001]	1.0000					
<i>EXDS5000</i>	0.1519 [0.0001]	0.4465 [0.0001]	0.1410 [0.0001]	0.4384 [0.0001]	0.1161 [0.0001]	0.4243 [0.0001]	0.1617 [0.0001]	1.0000				
<i>EXDL10000</i>	0.9766 [0.0001]	0.3593 [0.0001]	0.9691 [0.0001]	0.3675 [0.0001]	0.9277 [0.0001]	0.4083 [0.0001]	0.9954 [0.0001]	0.1484 [0.0001]	1.0000			
<i>EXDS10000</i>	0.2845 [0.0001]	0.8800 [0.0001]	0.2628 [0.0001]	0.8704 [0.0001]	0.2140 [0.0001]	0.8464 [0.0001]	0.3507 [0.0001]	0.5651 [0.0001]	0.3166 [0.0001]	1.0000		
<i>EXDL15000</i>	0.9701 [0.0001]	0.3232 [0.0001]	0.9660 [0.0001]	0.3307 [0.0001]	0.9327 [0.0001]	0.3708 [0.0001]	0.9812 [0.0001]	0.1351 [0.0001]	0.9926 [0.0001]	0.2888 [0.0001]	1.0000	
<i>EXDS15000</i>	0.3124 [0.0001]	0.9246 [0.0001]	0.2889 [0.0001]	0.9223 [0.0001]	0.2357 [0.0001]	0.9089 [0.0001]	0.3920 [0.0001]	0.4696 [0.0001]	0.3610 [0.0001]	0.8889 [0.0001]	0.3207 [0.0001]	1.0000

Table III
Descriptive Statistics

Ex-day excess return is defined as the ex-day beta-adjusted return, computed as

$$EXRET_{it} = (RET_{it} - RF_t) - \hat{\alpha}_{it} - \hat{\beta}_{it}(MKT_t - RF_t),$$

where RET_{it} is ex-day t return for stock i , MKT_t is the ex-day t market return and RF_t is the ex-day t one-month T-bill return. $\hat{\alpha}$ and $\hat{\beta}$ are estimated from a CAPM-style time-series regression during the 80-day control period,

$$(RET_{it,d} - RF_{t,d}) = \alpha_{it} - \beta_{it}(MKT_{t,d} - RF_{t,d}) + \varepsilon_{it,d},$$

where d indexes the 80-day control period and $\varepsilon_{it,d}$ is the residual. Event dividend yield is defined as dividend amount per share divided by the cum-day stock price. It is

$$YIELD_{it} = \frac{DIVAMT_{it}}{P_{CUMit}},$$

where $DIVAMT$ is dividend amount per share and P_{CUM} is the cum-day closing price. To control for idiosyncratic risk, I use the standard error of the CAPM residuals, σ_ε , scaled by the standard error of the market returns, σ_M , during the 80-day control period, as a proxy. To control for transaction costs, I use the average 11-day closing bid-ask spread, computed as

$$SPREAD_{it} = \sum_{d \in [-5,5]} \frac{2(ASK_{it,d} - BID_{it,d})}{(ASK_{it,d} + BID_{it,d})} / 11,$$

where $ASK_{it,d}$ and $BID_{it,d}$ are closing ask and bid prices for stock i on day d relative the ex-day t . I use the cum-day stock market capitalization, CAP , as a measure of firm size.

Variable	Mean	Std Dev	5th Pctl	25th Pctl	50th Pctl	75th Pctl	95th Pctl
<i>EXRET</i>	0.0021	0.0231	-0.0309	-0.0094	0.0016	0.0122	0.0371
<i>YIELD</i>	0.0070	0.0080	0.0011	0.0032	0.0055	0.0089	0.0171
β	0.5837	0.5127	-0.1259	0.2479	0.5363	0.8727	1.4699
$\sigma_\varepsilon/\sigma_M$	2.5364	1.4369	1.0665	1.6210	2.1804	3.0266	5.1979
<i>SPREAD</i>	0.0201	0.0467	0.0041	0.0072	0.0116	0.0189	0.0477
<i>CAP</i>	3.7563	13.3823	0.0484	0.2692	0.8500	2.7060	13.7182

Table IV
Size-Based Excess Trading Volume and Dividend Yield

Using the share-based approach, if the number of shares traded in a trade exceeds 600 (900 and 1,200) shares, I define the trade as a large trade, otherwise, it is a small trade. Similarly, using the dollar-based approach, if the dollar value of a trade based on closing price exceeds \$5,000 (\$10,000 and \$15,000), I define the trade as a large trade, otherwise, it is a small trade. Next, I measure ex-day excess trading volume based on trade size. The 80-day period from day -45 to day -6 and from day 6 to day 45 is defined as the non-event control period. The 11-day period from day -5 to day 5 is defined as the ex-dividend period. Using the 600-share cutoff as an example, the ex-day excess trading volume for large trades, $EXSL600$, is defined as the average daily share turnover by large (institutional) trades during the ex-dividend period scaled by the average daily share turnover by large trades during the control period and then minus 1. It is computed as

$$EXSL600_{it} = \frac{\sum_{d \in [-5,5]} SL600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SL600_{it,d} / 80} - 1,$$

where $SL600_{it,d}$ is the share turnover for large trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff; and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Similarly, the ex-day excess trading volume for small (individual) trades, $EXSS600$, is defined as the average daily share turnover by small trades during the ex-day period scaled by the average daily share turnover by small trades during the control period and then minus 1. It is computed as

$$EXSS600_{it} = \frac{\sum_{d \in [-5,5]} SS600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SS600_{it,d} / 80} - 1,$$

where $SS600_{it,d}$ is the share turnover for small trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff, and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Ex-day excess trading volume for large and small trades based on 900 and 1,200 shares cutoffs, $EXSL900$, $EXSS900$, $EXSL1200$ and $EXSS1200$ are defined accordingly. Note that in $EXSL600$ ($EXSL900$, $EXSL1200$) and $EXSS600$ ($EXSS900$, $EXSS1200$), “EX” represents the ex-day excess trading volume, “SL” represents share-based large trades and “SS” represents share-based small trades. For dollar-based cutoffs, excess trading volume for large and small trades, $EXDL5000$ ($EXDL10000$, $EXDL15000$) and $EXDS5000$ ($EXDS10000$, $EXDS15000$) are defined in a similar fashion, where “DL” represents dollar-based large trades and “DS” represents dollar-based small trades.

Event dividend yield is defined as dividend amount per share divided by the cum-day stock price. It is

$$YIELD_{it} = \frac{DIVAMT_{it}}{P_{CUM_{it}}},$$

where $DIVAMT$ is dividend amount per share and P_{CUM} is the cum-day closing price. To control for idiosyncratic risk, I use the standard error of the CAPM residuals, σ_{e_i} , scaled by the standard error of the market returns, σ_M , during the 80-day control period, as a proxy. To control for transaction costs, I use the average 11-day closing bid-ask spread, computed as

$$SPREAD_{it} = \sum_{d \in [-5,5]} \frac{2(ASK_{it,d} - BID_{it,d})}{(ASK_{it,d} + BID_{it,d})} / 11,$$

where $ASK_{it,d}$ and $BID_{it,d}$ are closing ask and bid prices for stock i on day d relative the ex-day t . I use the cum-day stock market capitalization, CAP , as a measure of firm size.

Table IV, continued

Panel A: Share-based Trade Size						
	600 Shares Cutoff		900 Shares Cutoff		1,200 Shares Cutoff	
	Above	Below	Above	Below	Above	Below
Intercept	0.1578 (10.00)***	-0.0003 (-0.05)	0.1737 (10.05)***	-0.0022 (-0.45)	0.2098 (9.70)***	0.0004 (0.08)
YIELD	16.4227 (21.06)***	2.8480 (11.38)***	17.4804 (20.46)***	3.0242 (12.32)***	20.4840 (19.16)***	3.6818 (14.16)***
β	-0.0268 (-2.17)**	-0.0095 (-2.39)**	-0.0312 (-2.30)**	-0.0085 (-2.19)**	-0.0416 (-2.45)**	-0.0110 (-2.66)***
σ_e/σ_M	-0.0466 (-10.78)***	-0.0026 (-1.84)*	-0.0503 (-10.62)***	-0.0024 (-1.79)*	-0.0589 (-9.95)***	-0.0035 (-2.41)**
SPREAD	-0.3338 (-2.53)**	-0.0037 (-0.09)	-0.3555 (-2.46)**	-0.0018 (-0.04)	-0.4135 (-2.29)**	-0.0053 (-0.12)
CAP	-0.0014 (-2.95)***	-0.0002 (-1.26)	-0.0015 (-2.93)***	-0.0002 (-1.45)	-0.0018 (-2.85)***	-0.0003 (-1.63)
Adj. R ²	0.0252	0.0062	0.0241	0.0071	0.0214	0.0096
Panel B: Dollar-based Trade Size						
	\$5,000 Cutoff		\$10,000 Cutoff		\$15,000 Cutoff	
	Above	Below	Above	Below	Above	Below
Intercept	0.1074 (8.36)***	-0.0167 (-1.68)*	0.1145 (8.04)***	-0.0091 (-1.68)*	0.1327 (8.32)***	-0.0120 (-2.27)**
YIELD	14.9801 (23.58)***	3.8677 (7.92)***	16.5729 (23.55)***	3.7681 (14.13)***	17.6812 (22.43)***	3.9684 (15.24)***
β	-0.0180 (-1.79)*	-0.0305 (-3.93)***	-0.0205 (-1.83)*	-0.0099 (-2.35)**	-0.0258 (-2.06)**	-0.0074 (-1.80)*
σ_e/σ_M	-0.0348 (-9.89)***	0.0011 (0.41)	-0.0369 (-9.46)***	-0.0015 (-0.99)	-0.0403 (-9.23)***	-0.0014 (-0.98)
SPREAD	-0.3134 (-2.92)***	0.1588 (1.92)*	-0.3047 (-2.56)***	0.0317 (0.70)	-0.3313 (-2.49)**	0.0326 (0.74)
CAP	-0.0009 (-2.42)**	-0.0015 (-4.99)***	-0.0011 (-2.48)**	-0.0004 (-2.20)**	-0.0012 (-2.56)***	-0.0002 (-1.42)
Adj. R ²	0.0287	0.0053	0.0283	0.0094	0.0261	0.0103

*** represents significance level at 1%, ** represents significance level at 5% and * represents significance level at 10%.

Table V
Ex-Day Excess Return and Size-Based Excess Trading Volume

Using the share-based approach, if the number of shares traded in a trade exceeds 600 (900 and 1,200) shares, I define the trade as a large trade, otherwise, it is a small trade. Similarly, using the dollar-based approach, if the dollar value of a trade based on closing price exceeds \$5,000 (\$10,000 and \$15,000), I define the trade as a large trade, otherwise, it is a small trade. Next, I measure ex-day excess trading volume based on trade size. The 80-day period from day -45 to day -6 and from day 6 to day 45 is defined as the non-event control period. The 11-day period from day -5 to day 5 is defined as the ex-dividend period. Using the 600-share cutoff as an example, the ex-day excess trading volume for large trades, $EXSL600$, is defined as the average daily share turnover by large (institutional) trades during the ex-dividend period scaled by the average daily share turnover by large trades during the control period and then minus 1. It is computed as

$$EXSL600_{it} = \frac{\sum_{d \in [-5,5]} SL600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SL600_{it,d} / 80} - 1,$$

where $SL600_{it,d}$ is the share turnover for large trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff; and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Similarly, the ex-day excess trading volume for small (individual) trades, $EXSS600$, is defined as the average daily share turnover by small trades during the ex-day period scaled by the average daily share turnover by small trades during the control period and then minus 1. It is computed as

$$EXSS600_{it} = \frac{\sum_{d \in [-5,5]} SS600_{it,d} / 11}{\sum_{d \in [-45,-6] \cup [6,45]} SS600_{it,d} / 80} - 1,$$

where $SS600_{it,d}$ is the share turnover for small trades on day d relative to the ex-day t for stock i , based on the 600-share cutoff, and share turnover is number of shares traded in each trade scaled by the number of shares outstanding. Ex-day excess trading volume for large and small trades based on 900 and 1,200 shares cutoffs, $EXSL900$, $EXSS900$, $EXSL1200$ and $EXSS1200$ are defined accordingly. Note that in $EXSL600$ ($EXSL900$, $EXSL1200$) and $EXSS600$ ($EXSS900$, $EXSS1200$), “EX” represents the ex-day excess trading volume, “SL” represents share-based large trades and “SS” represents share-based small trades. For dollar-based cutoffs, excess trading volume for large and small trades, $EXDL5000$ ($EXDL10000$, $EXDL15000$) and $EXDS5000$ ($EXDS10000$, $EXDS15000$) are defined in a similar fashion, where “DL” represents dollar-based large trades and “DS” represents dollar-based small trades.

Ex-day excess return is defined as the ex-day beta-adjusted return, computed as

$$EXRET_{it} = (RET_{it} - RF_t) - \hat{\alpha}_{it} - \hat{\beta}_{it}(MKT_t - RF_t),$$

where RET_{it} is ex-day t return for stock i , MKT_t is the ex-day t market return and RF_t is the ex-day t one-month T-bill return. $\hat{\alpha}$ and $\hat{\beta}$ are estimated from a CAPM-style time-series regression during the 80-day control period,

$$(RET_{it,d} - RF_{t,d}) = \alpha_{it} - \beta_{it}(MKT_{t,d} - RF_{t,d}) + \varepsilon_{it,d},$$

where d indexes the 80-day control period and $\varepsilon_{it,d}$ is the residual. Event dividend yield is defined as dividend amount per share divided by the cum-day stock price. It is

$$YIELD_{it} = \frac{DIVAMT_{it}}{P_{CUM_{it}}},$$

where $DIVAMT$ is dividend amount per share and P_{CUM} is the cum-day closing price. To control for idiosyncratic risk, I use the standard error of the CAPM residuals, σ_{ε} , scaled by the standard error of the market returns, σ_M , during the 80-day control period, as a proxy. To control for transaction costs, I use the average 11-day closing bid-ask spread, computed as

$$SPREAD_{it} = \sum_{d \in [-5,5]} \frac{2(ASK_{it,d} - BID_{it,d})}{(ASK_{it,d} + BID_{it,d})} / 11,$$

where $ASK_{it,d}$ and $BID_{it,d}$ are closing ask and bid prices for stock i on day d relative the ex-day t . I use the cum-day stock market capitalization, CAP , as a measure of firm size.

Table V, continued

600 Shares versus 900 Shares		Panel A: Share-based Trade Size		600 Shares versus 1,200 Shares	
		900 Shares versus 1,200 Shares			
Intercept	-0.0007 (-1.91)*	Intercept	-0.0008 (-2.33)**	Intercept	-0.0007 (-1.83)*
<i>YIELD</i>	0.1196 (5.15)***	<i>YIELD</i>	0.1382 (5.99)***	<i>YIELD</i>	0.1148 (5.00)***
<i>EXSL900</i>	0.0016 (0.66)	<i>EXSL1200</i>	-0.0002 (-0.65)	<i>EXSL1200</i>	0.0008 (1.12)
<i>YIELD·EXSL900</i>	-0.0527 (-2.34)**	<i>YIELD·EXSL1200</i>	0.0039 (0.23)	<i>YIELD·EXSL1200</i>	-0.0368 (-1.91)*
<i>EXSS600</i>	-0.0011 (-0.42)	<i>EXSS900</i>	0.0032 (5.04)***	<i>EXSS600</i>	-0.0004 (-0.58)
<i>YIELD·EXSS600</i>	0.1687 (4.11)***	<i>YIELD·EXSS900</i>	-0.0085 (-0.19)	<i>YIELD·EXSS600</i>	0.1586 (3.96)***
$\sigma_{\varepsilon}/\sigma_M$	0.0007 (6.82)***	$\sigma_{\varepsilon}/\sigma_M$	0.0007 (6.95)***	$\sigma_{\varepsilon}/\sigma_M$	0.0007 (6.82)***
<i>SPREAD</i>	0.0087 (2.76)***	<i>SPREAD</i>	0.0086 (2.74)***	<i>SPREAD</i>	0.0087 (2.77)***
<i>CAP</i>	0.0000 (-1.06)	<i>CAP</i>	0.0000 (-0.97)	<i>CAP</i>	0.0000 (-1.07)
Adj. R ²	0.0053	Adj. R ²	0.0061	Adj. R ²	0.0052
\$5,000 versus \$10,000		Panel B: Dollar-based Trade Size		\$5,000 versus \$15,000	
		\$10,000 versus \$15,000			
Intercept	-0.0006 (-1.55)	Intercept	-0.0006 (-1.56)	Intercept	-0.0006 (-1.66)*
<i>YIELD</i>	0.0993 (4.29)***	<i>YIELD</i>	0.1056 (4.58)***	<i>YIELD</i>	0.1091 (4.73)***
<i>EXDL10000</i>	0.0001 (0.29)	<i>EXDL15000</i>	0.0005 (2.05)**	<i>EXDL15000</i>	0.0005 (2.35)**
<i>YIELD·EXDL10000</i>	0.0083 (0.48)	<i>YIELD·EXDL15000</i>	-0.0403 (-2.94)***	<i>YIELD·EXDL15000</i>	-0.0330 (-2.66)***
<i>EXDS5000</i>	0.0008 (2.38)**	<i>EXDS10000</i>	0.0014 (2.52)**	<i>EXDS5000</i>	0.0005 (1.49)
<i>YIELD·EXDS5000</i>	0.0643 (1.67)*	<i>YIELD·EXDS10000</i>	0.1272 (3.74)***	<i>YIELD·EXDS5000</i>	0.1182 (3.69)***
$\sigma_{\varepsilon}/\sigma_M$	0.0007 (6.81)***	$\sigma_{\varepsilon}/\sigma_M$	0.0007 (6.72)***	$\sigma_{\varepsilon}/\sigma_M$	0.0007 (6.77)***
<i>SPREAD</i>	0.0085 (2.72)***	<i>SPREAD</i>	0.0084 (2.66)***	<i>SPREAD</i>	0.0084 (2.66)***
<i>CAP</i>	0.0000 (-0.95)	<i>CAP</i>	0.0000 (-1.05)	<i>CAP</i>	0.0000 (-0.96)
Adj. R ²	0.0059	Adj. R ²	0.0063	Adj. R ²	0.0062

*** represents significance level at 1%, ** represents significance level at 5% and * represents significance level at 10%.