Ticks and Tax: The Joint Effects of Discrete (vs. Decimal) Pricing and Taxation on Ex Dividend Day Returns and Trading Volume[†]

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Abstract

We examine ex-dividend day stock price behavior and abnormal trading volume before and after U.S. stock exchanges converted from discrete to decimal pricing systems in early 2001. Prior literature reports a robust empirical result that share prices decrease on the ex-dividend day by less than the amount of the dividend, but there is little agreement regarding the cause of this incomplete price adjustment. One explanation involves the effects of long-term shareholder tax rates that penalize dividend income relative to capital gains. An alternative explanation offered by Bali and Hite (1998) is that discrete pricing precludes share prices from fully adjusting for dividend payments. The change in pricing systems for U.S. equities is a natural experiment that offers a unique opportunity to examine the effects of discrete versus decimal pricing on ex-dividend day stock price behavior while holding tax effects constant. Our results are inconsistent with Bali and Hite's discrete pricing hypothesis and provide new evidence that ex day share price adjustment reflects the tax rates of long-term investors. In addition, we report evidence based on abnormal trading volume that discrete pricing constrained the tax-efficient transfer of small dividend amounts, and that this constraint was eliminated by decimal pricing.

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1. Introduction

The behavior of share prices around ex-dividend dates has been the subject of considerable theoretical and empirical research for nearly 50 years. Prior empirical studies consistently document that, on average, share prices decline on the ex-dividend day by less than the dividend amount, giving rise to positive abnormal returns on the ex-day. However, there is no consensus regarding the explanation for this result. Many studies attribute this ex-day return anomaly to higher shareholder tax rates on dividend income as compared to long-term capital gains (e.g., Elton and Gruber 1970; Michaely and Vila 1995).[1]

However, other studies suggest that positive abnormal returns are due, at least in part, to the pricing of stocks in discrete ticks, which precludes share prices from fully adjusting to dividend payments (e.g., Dubofsky 1992; Bali and Hite 1998).[2] Bali and Hite (1998) (hereafter, BH) argue that, because stocks trade in discrete ticks but dividend amounts are continuous and, on average, fairly small in amount, the price-drop-to-dividend ratio will be less than one even in the absence of differential tax rates. BH hypothesize that, in pricing stocks on the ex-day,

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[1] The differential taxation hypothesis for ex-dividend day price changes has been commonly used and tested by evaluating the behavior of share prices around the ex-dividend period (e.g., Kalay 1982; Lakonishok and Vermaelen 1983; Eades et al. 1984; Michaely 1991) or by testing the relationship between dividend yield and risk-adjusted returns (Brennan 1970; Black and Scholes 1974; Litzenberger and Ramaswamy 1979; Miller and Scholes 1982). Note that the tax hypothesis is consistent with the literature on shareholder tax capitalization, which examines whether share prices are discounted for shareholder-level taxes on future dividend payments (e.g., Auerbach 1979; Poterba and Summers 1985; Ayers, Cloyd and Robinson 2002; Dhaliwal, Li and Trezevant 2002).

[2] Dubofsky (1992) argues that positive ex day returns might be explained by mechanical rules imposed by the NYSE and AMEX for the ex-day adjustment of open limit orders to buy stock. These rules require specialists to reduce open limit orders to buy stock by the dividend amount on the ex-dividend day. If the resulting stock price is not a tick increment, then the limit-buy order price is reduced to the next lower tick increment. Open limit orders to sell *Footnote continued on the next page*.

investors systematically round down a dividend's value to the nearest tick, so that the change in share price is always less than the dividend amount. Contrary to the tax penalty hypothesis, this discrete pricing hypothesis would also seem to explain why share prices change by less than the value of non-taxable distributions (e.g., Eades, Hess and Kim 1984).[3]

We test BH's explanation of ex-day share price behavior using a natural experiment arising from the recent decimalization of share prices on U.S. stock exchanges, which substantially reduced price discreteness. The NYSE, AMEX, and NASDAQ stock exchanges converted from pricing stocks in discrete increments of 1/16ths to decimal pricing beginning in August 2000 and ending in April 2001. Our research design takes advantage of this natural experiment to examine the effect of share price decimalization on ex-dividend day abnormal returns while holding tax rates constant. The discrete pricing hypothesis predicts that the difference between the ex-dividend day price drop and the dividend amount will dissipate when discrete pricing is eliminated such that positive abnormal returns should not be observed post-decimalization. We therefore provide a direct test of the arguments put forth by BH.

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stock are not reduced. Dubofsky concludes that, under certain conditions, these rules can create positive ex-dividend day abnormal returns.

[3] Another non-tax explanation for positive ex day returns is offered by Frank and Jagannathan (1998) who argue that market makers are better equipped than investors to collect and reinvest dividend income, and therefore value dividend income more highly than other market participants (buyers or sellers). Their model predicts that cum-day trades tend to occur at the bid price (due to selling pressure) while ex-day trades tend to occur at the ask price (due to buying pressure), such that ex-day prices decrease by less than the dividend amount for reasons unrelated to differential taxation. They find support for this hypothesis using share price data from Hong Kong, a jurisdiction in which the tax explanation cannot apply because neither dividends nor capital gains are taxed. However, the extent to which Frank and Jagannathan's model is descriptive of U.S. markets is questionable for at least two reasons. First, their model predicts negative abnormal trading volume around the ex-dividend date because of a shortage of buyers in the cum period and a shortage of sellers in the ex period and, by extension, negative (positive) abnormal returns in the days just before (after) the ex day. In sharp contrast, prior studies using U.S. data (e.g., Lakonishok and Vermaelen 1986) report abnormally high trading volume around the ex-date, and positive (negative) abnormal returns immediately before (after) the ex day. Second, an important element of Frank and Jagannathan's model is that the bid-ask spread is smaller than the investor's cost of collecting and reinvesting the dividend, which causes sellers (buyers) to favor trading before (after) the ex date even though they are relatively more likely to incur the cost *Footnote continued on the next page*.

We also test two hypotheses related to the joint effect of taxation and discrete pricing on abnormal trading volume on the last cum-dividend trading day. Specifically, we argue that the tax-efficient transfer of small dividend amounts (generally, those less than or equal to 12.5¢) from relatively high-tax rate long-term sellers to lesser-taxed buyers is constrained by discrete pricing because buyers are unwilling to pay a full tick for the dividend, yet sellers are unwilling to forego the dividend without compensation. Thus, we predict that under discrete pricing, abnormal cum-day trading volume decreases in dividend amounts up to and including 12.5¢. In contrast, because share prices are not constrained to tick intervals after decimalization, we predict post-decimalization abnormal cum-day trading volume increases in dividend amount consistent with incentives created by the tax penalty on dividend income.

We report empirical evidence supporting each of our hypotheses, thereby making two contributions toward understanding the behavior of stocks around ex-dividend days. First, we find that positive ex day abnormal returns persist after decimalization, so their existence prior to decimalization cannot be explained by discrete pricing. In contemporaneous work, Graham, Michaely and Roberts (2002) report similar evidence supporting the tax penalty hypothesis. Second, with regard to cum-day abnormal trading volume, we report evidence that discrete pricing inhibited the tax-efficient transfer of stocks paying dividends less than or equal to 12.5¢ per share, and that decimalization eliminated this constraint. To our knowledge, this is the first study to document a joint effect of share pricing rules and tax incentives on the timing of trades around the ex day. Consistent with prior research, we also find evidence of short-term trading around the ex day both before and after decimalization.

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of the spread. However, a U.S. investor's cost of collecting and reinvesting dividends is often trivial and certainly lower than historical bid-ask spreads (NYSE 2001).

The remainder of this study is organized as follows. The next section describes prior research and develops our hypotheses. Section three describes our sample. Sections four and five present our research method and results for tests related to abnormal returns and abnormal trading volume, respectively. We present concluding remarks in the final section.

2. Prior research and hypothesis development

In a strict theoretical sense, the expected ex-dividend day stock price drop should equal the dividend per share assuming perfect markets, certainty, and no taxes (Miller and Modigliani 1961). Any other ex day share price change provides arbitrage opportunities if transaction costs are low enough. Early empirical work, however, documents that the ex day price drop is less than the dividend per share (Campbell and Beranek 1955; Barker 1959). In explanation of this result, researchers posited that differential taxation of capital gains and dividend income for long-term investors affects the expected price drop and that arbitrage by tax-neutral investors is too costly to eliminate the tax discount.

Elton and Gruber (1970) argue that for prices to be in equilibrium around the ex-day, marginal sellers must be indifferent on an after-tax basis between selling the stock on the ex-day, thereby receiving the dividend, or selling the stock on the last cum day. Such indifference requires the following equality:

$$P_c - t_g\,(P_c - P_0) = E(P_x) - t_g\,[E(P_x) - P_0] + D\,(1 - t_d), \tag{1}$$

where P_c is the share price on the last cum day, $E(P_x)$ is the expected share price on the ex day, P_0 is the shareholder's per share tax basis used in computing capital gain, D is the dividend per share, t_d is the marginal tax rate on ordinary income, and t_g is the marginal tax rate on capital gains. Rearranging equation (1), Elton and Gruber show that the ratio of the share-price drop to dividend per share is the marginal trader's tax preference ratio:

$$\frac{\Delta P}{D} = \frac{(P_c - P_x)}{D} = \frac{(1 - t_d)}{(1 - t_g)} = \tau \quad (2)$$

The tax preference ratio, τ, simply indicates that the marginal trader is indifferent between receiving $1 of dividend income or $(1 - t_d)/(1 - t_g)$ dollars of capital gain. If share prices around the ex day are set by long-term traders who face the same tax rates, t_d and t_g, and share the same expectations about P_x, then the price of the dividend included in P_c should be its face value times τ. Thus, the tax hypothesis is that *ΔP/D* is less than one because, at least for individual taxpayers, Federal income tax rates on dividend income tend to be higher than those applied to long-term capital gains. For example, for individuals subject to the maximum marginal tax rates in 2001, τ = (1 – 0.391)/(1 – 0.20) = 0.76.

However, not all investors have tax preference ratios less than one. In general, corporate investors prefer dividend income to capital gains because they can exclude at least 70 percent of dividends received from other domestic corporations from their taxable income, whereas capital gains are fully taxed. Under current tax laws for corporate investors, τ is approximately 1.38. Brokers, dealers, and tax-exempt investors pay the same tax rate on both types of income such that for these investors τ is 1.0.

The existence of different tax clienteles may affect both stock returns and trading volume around ex days for two reasons. First, short-term traders may exploit tax-rate arbitrage opportunities if the tax wedge, or difference between the tax preference ratio priced into the stock and that of the short-term trader, exceeds their round-trip transaction costs. Such dividend capture strategies would tend to bid up prices in the cum period to the point that any discount (or premium) remaining in the cum price would be equal to the short-term trader's round trip costs (Kalay 1982, 1984). Abnormal returns on the ex day should reflect these transaction costs, less the effects of any selling pressure as short-term traders close their positions. Karpoff and Walkling (1988) provide evidence that ex day abnormal returns are positively related to transaction costs, and that short-term trading is most evident in high-yield stocks. Also consistent with short-term trading, Lakonishok and Vermaelen (1986) document positive abnormal trading volume around the ex day.

Second, heterogeneous tax rates create incentives for long-term investors who decide to trade for non-tax reasons to strategically time these trades around the ex day such that the dividend is received by the investor who values it the most on an after-tax basis. Both types of tax-induced trading around the ex day mean that (1) we cannot interpret the observed $\Delta P/D$ as a marginal tax rate (Kalay 1982) and (2) we are likely to observe abnormally high trading volume around the ex day (Lakonishok and Vermaelen 1986; Michaely and Vila 1995, 1996). However, discrete pricing constrains tax-efficient trading of dividends because it forces traders to price dividends in discrete ticks rather than at their after-tax values. In the following section, we model the joint effects of differential taxation and discrete pricing and derive testable hypotheses.

2.1 Joint effects of taxation and discrete pricing

Our model follows the basic assumptions of BH. We assume there are three groups of traders around the ex date—sellers, buyers, and short-term traders—who share common beliefs about a stock's expected ex day price, $E(P_x)$. Like BH, our analysis focuses on the set of cum day prices, P_c, at which these groups are willing to trade, and we refer to the expected ex day price drop, $\Delta P = P_c - E(P_x)$, as the *price of the dividend*. We assume that $E(P_x)$ is an exact tick multiple such that any differences between cum day bid and ask prices arise from (1) different values of τ across traders and (2) discrete pricing of the dividend. Hereafter, our discussion focuses on the bid and ask price for the dividend.

Sellers and buyers are long-term investors who decide to trade for non-tax reasons, but who strategically time their trades around the ex day for tax reasons. Because these long-term investors have already decided to trade, transaction costs are irrelevant to their secondary decisions regarding the timing of the trade. Therefore, like BH, we define the seller's minimum reservation price for giving up the dividend, and the maximum price the buyer is willing to pay for the dividend, in equations (3) and (4), respectively.

$$\Delta P_S^{\min} = \tau_S D < D \tag{3}$$

$$\Delta P_B^{\max} = \tau_B D < D \tag{4}$$

The third trading group is short-term traders, or arbitragers, who exploit any profit opportunities that would exist if the expected ex day price drop, ΔP, is less than the dividend, D, minus the trader's round-trip transaction costs, $2C$. Because such traders face the same tax rates on dividend income and capital gains (i.e., $\tau_A = 1.0$), their trading decisions are not influenced by their own tax rates. The maximum price a short-term trader would pay for the dividend is

$$\Delta P_A^{\max} = D - 2C\,. \tag{5}$$

Because cum day bid and ask prices are confined to discrete ticks, traders must determine their after-tax value of the dividend and then convert this value to a discrete price at which they are willing to trade the dividend. No one is willing to leave money on the table. Therefore, the seller's minimum ask price is ΔP_S^{min} rounded up to the next highest tick, and the buyer's maximum bid price is ΔP_B^{max} rounded down to the next lowest tick. Similarly, an arbitrager will either round up if selling short on the cum day, or round down if buying.

To illustrate these concepts, table 1 depicts the cum-period minimum ask and maximum bid prices for a wide range of dividend amounts for sellers and buyers with particular tax rate characteristics. The tabulated values assume that the seller is a long-term individual investor with a 39.1% tax rate on dividends and a 20% tax rate on capital gains ($\tau = 0.76$), and the buyer is either a long-term individual investor with a 30.5% tax rate on dividends and a 20% tax rate on capital gains ($\tau = 0.87$), or a tax-neutral short-term trader ($\tau = 1.0$) with transaction costs of $0.01 per share.[4] Although somewhat arbitrary, these assumptions are justified by the following considerations. First, if trading around the ex day is tax motivated, then cum period trades must shift dividends from investors with relatively low τ values to investors with higher τ values (i.e., $\tau_S < \tau_B$, or $\tau_S < \tau_A = 1.0$). Second, corporations are unlikely to engage in short-term dividend capture trading in common stocks with relatively low dividend yields because of the risks imposed by the minimum 45 day holding period required to claim the dividends received deduction. Rather, corporate investors are more likely attracted to high-yield utility stocks (Naranjo et al. 2000) or preferred stocks (Erickson and Maydew 1998). Thus, the cum-period marginal seller is likely to be a relatively high-tax rate individual, and the cum-period buyer is likely be either a low-tax rate individual or a tax-neutral short-term trader.[5] Third, we purposely assume a fairly low level of transaction costs for short-term traders because any positive amount of transaction costs enables table 1 to reflect BH's prediction that, for dividends equal to an exact tick multiple, arbitragers will round down bid prices to the next lowest tick.

Unlike BH's model, however, *ΔP/D* ratios are not "increasing toward one over the broad range as dividends approach $1" (BH, page 134). This critical feature of BH's model leads to

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[4] We use these tax rates for illustration because they apply to the post-decimalization time period of our empirical analyses. For calendar year 2001, the marginal Federal income tax rate on dividend income was 39.1% for individuals with taxable income above $297,350. A marginal dividend tax rate of 30.5% applied to single (married filing jointly) taxpayers with taxable income between $65,550 and $136,750 ($109,250 and $166,500).

[5] Bali and Hite (1998, note 3) make similar assumptions about corporate investors.

their conclusion that discrete pricing, rather than dividend tax clienteles, is responsible for the empirical observation that *ΔP/D* tends to increase in dividend yield. The BH model obtains this result by implicitly assuming (1) transaction costs are low enough that the marginal cum-period buyer is a tax-neutral short-term trader and (2) trades always occur at the bid price. We question these assumptions for the following reasons. With regard to assumption (1), Karpoff and Walkling (1988) find no evidence of short-term trading for stocks in the low-yield quintile of their sample. With regard to (2), table 1 reveals that for many dividend amounts at or below $0.25, even a seller for whom dividends are tax disadvantaged should be unwilling to accept the short-term trader's maximum bid price. In addition, for many dividend amounts at or above $0.325, the short-term trader's maximum bid price exceeds the seller's minimum ask price by a full tick. In this situation it is unreasonable to assume that all trades will occur at the bid. Rather, in a cross-section of stocks, we would expect some to trade at the ask and some to trade at the bid, depending on the supply and demand for each stock. Consequently, we assume that *ΔP* will, on average, be the average of the bid and ask prices. It is this critical assumption that causes *ΔP/D* to actually depart from one as dividends approach $1 in table 1. Thus, we question BH's theoretical conclusion that discrete pricing can account for *ΔP/D* "ratios increasing with dividends even without tax-induced dividend clienteles" (BH, page 155).

2.2 Hypotheses

Table 1 reveals three testable hypotheses regarding the joint effects of taxation and discrete pricing on ex day abnormal returns and abnormal trading volume around the ex day. We first consider the implications of the trading model with respect to ex day abnormal returns, providing a direct test of BH's conclusion that "discrete trading prices can account…for observed *ΔP/D* ratios of less than one" (BH, page 155). Rather, we predict that this phenomenon will persist after decimalization because its root cause is differential taxation that causes cum-day sellers with predictable tax characteristics (i.e., relative low values of τ) to sell dividends for less than face value. The magnitude of the dividend tax penalty increases in the dividend amount, so holding share price constant, ex day abnormal returns should increase in dividend yield if the tax hypothesis is correct.

H1: Average abnormal returns on the ex dividend day are significantly positive and increasing in dividend yield under both discrete and decimal pricing.

Beyond the basic change in pricing structures, the decimalization of U.S. equity prices also decreased the average bid-ask spread by more than 50 percent (NYSE 2001) which could make any tax influence on ex-day abnormal returns more or less difficult to detect. If the bid-ask spread is an important element of transaction costs for tax-neutral short-term traders, then decimalization would enable these traders to capture a larger portion of any tax discount on dividends induced by the differential tax rates of long-term investors, thereby driving the price drop closer to the dividend amount. On the other hand, to the extent that noise in ex-day returns increases in the average bid-ask spread (because closing prices randomly occur at either the bid or ask price), lowering the spread could make any remaining tax discount on dividends relatively easier to detect. In either case, the presence of significantly positive ex-day abnormal returns after decimalization would support the tax hypothesis and be inconsistent with the discrete pricing hypothesis.

With respect to trading volume, table 1 demonstrates that, under the discrete pricing constraint, tax motivated cum-day trading is unlikely to occur for stocks paying certain dividend amounts. In general, this constraint is less binding as the dividend amount increases. Therefore, to the extent that dividend amounts and dividend yield are positively correlated, an overall positive relation between dividend amount and abnormal trading volume is consistent with prior studies (e.g., Lakonishok and Vermaelen 1986). However, these studies tend to attribute yield-trading volume relation to the potential for larger arbitrage profits for high-yield stocks rather than the discrete pricing constraint *per se*.

By focusing on small dividend amounts we are able to differentiate the effects of discrete pricing on cum-day trading volume from the yield-trading volume relation described in prior literature. Recall that the tax efficient trading of dividends involves a cum-dividend sale of stock between a seller with a relatively low τ value and a buyer with a higher τ value. The overall tax savings generated by this trade is $(\tau_B - \tau_S)D$, which is obviously increasing in dividend amount (given $\tau_S < \tau_B$). Thus, absent the discrete pricing constraint, tax-motivated abnormal cum-day trading volume should be increasing in dividend amount. However, with a discrete pricing constraint, no buyer would be willing to pay a full tick to receive a dividend that is less than or equal to a tick, but likewise, no seller should be willing to give up the dividend without compensation. In fact, the larger the dividend amount up to and including the tick size constraint, the larger the seller's loss from selling on the last cum-day and, therefore, the lower the likelihood that sale will occur. The analysis in table 1 suggests that with discrete pricing in $1/16^{th}$ increments and the tax rates in effect during our sample period, trading of dividend amounts at or below $0.125 tends to be constrained by price discreteness, whereas trading of dividend amounts above this cutoff tends to be unconstrained. After decimalization, the tax efficient transfer of dividends from sellers to buyers is relatively unconstrained, so for any dividend amount, the likelihood of selling dividends by trading stocks on the cum-day is increasing in the dividend amount. To determine the extent to which tax motivated cum-period trading volume is limited by discrete pricing, we test the following hypotheses.[6]

H2: Under the discrete pricing constraint, the abnormal cum-day trading volume of stocks paying dividends less than or equal to $0.125 is *decreasing* in dividend amount.

H3: After the decimalization of stock prices, the abnormal cum-day trading volume of stocks paying dividends less than or equal to $0.125 is *increasing* in dividend amount.

3. Sample and descriptive statistics

3.1 Sample derivation

We collect data on all cash dividends from the CRSP files with taxable distribution codes of 1222, 1232, 1242 and 1252 paid during the period January 1, 2000 through December 31, 2001. We include stocks traded on the New York, American and NASDAQ exchanges. Table 2 reports the frequency and size of dividends in our initial sample of 20,001 taxable cash dividend payments. Approximately 95 percent of dividends in our sample are 50¢ or less. This distribution of dividend amounts is consistent with that of previous research. For example, BH report that 92 percent of taxable cash dividends in their sample are 50¢ or less. The sample size for each test reported below varies depending on the availability of data required for measuring the variables included in the analyses.

The NYSE and AMEX exchanges converted from quoting stocks in 1/16ths to decimalization on January 29, 2001, and the NASDAQ converted on April 9, 2001.[7] However,

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[6] An important limitation our model relates to the underlying assumption that all traders share common beliefs about $E(P_x)$, which means that trades will not occur unless sellers value the dividend at less than a given tick multiple while buyers value the dividend at more than the same tick multiple. This leads to the result (shown in table 1) that, for a given set of tax rates, trades will not occur for certain dividend amounts under a discrete pricing constraint. However, if traders have different beliefs about $E(P_x)$, then trades could occur at any dividend amount so long as the tax-induced difference in their dividend valuations, combined with different beliefs about $E(P_x)$, causes the buyer's bid to meet or exceed the seller's ask price.

each exchange selected stocks to pilot test conversion procedures before the bulk of stocks switched over on the dates above. We obtain the exact conversion date for each stock from reports filed by each exchange with the SEC.

3.2 Descriptive statistics for dividend-related variables

Table 3 reports descriptive statistics by pre- and post-decimalization periods for dividend amounts (*DIVAMT*), dividend yield (*YIELD*), closing share prices on the last cum-dividend day (P_C) and first ex-dividend day (P_X), and two measures of ex-dividend day price-drop-to-dividend ratio ($\Delta P/D$ and $\Delta P/D^*$, as defined below), for the full sample (panel A) as well as sample partitions for low-dividend (panel B) and high-dividend (panel C) stocks. Low- (high-) dividend stocks are those paying dividends less than or equal to (greater than) \$0.125 per share.

For the full sample, the mean value of *DIVAMT* is \$0.1709 before decimalization and \$0.1662 after decimalization. *YIELD* is computed as *DIVAMT* divided by the share's closing price on the last cum-dividend day. The mean value of *YIELD* declined significantly between the pre- and post-decimalization periods in both the low- and high-dividend samples (e.g., for the full sample, the mean value of *YIELD* is 0.0097 before decimalization and 0.0087 after decimalization; t = –8.00). It appears that this decline is attributable to an increase in cum-day closing prices between periods rather than a decline in dividend amounts (e.g., for the full sample, the mean value of P_C is \$22.3705 before decimalization and \$23.3924 after decimalization; t = 2.73).

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[7] U.S. exchanges converted from quoting stock prices in 1/8ths of a dollar to 1/16ths in mid-1997. In contemporaneous work, Graham, Michaely and Roberts (2002) compare ex day returns across all three pricing eras (i.e., 1/8ths to 1/16ths to decimal). Following their approach, we are currently extending our tests of our trading volume hypotheses (i.e., H2 and H3) to the 1/8ths pricing era.

The first measure of the ex-dividend day price-drop-to-dividend ratio, *ΔP/D*, is the unadjusted difference between the closing prices on the last cum-dividend day and the first ex-dividend day, divided by the dividend amount [i.e., $(P_c - P_x)/DIVAMT$]. Consistent with BH's discrete pricing hypothesis, the mean value of *ΔP/D* (but not the median value) for the full sample increased between the pre- and post-decimalization periods (0.4863 vs. 0.8111, $t = 1.54$), and is not significantly less than one after decimalization (0.8111, $t = -1.50$). The increase in the post-decimalization mean value of *ΔP/D* is most pronounced for the low-dividend sub-sample (i.e., 1.0022 versus a pre-decimalization mean of 0.4704). However, the median post-decimalization value of *ΔP/D* is only 0.5000 for this sub-sample and over 59 percent of *ΔP/D* observations in this sub-sample are less than one (Z = 12.14, $p < .01$), highlighting the high variance in *ΔP/D* across stocks.

The second measure of the ex-dividend day price-drop-to-dividend ratio, *ΔP/D**, recognizes that the closing price on the ex-day is affected by the stock's normal daily return and attempts to adjust for this price drift. If the drift in daily returns is positive (negative), then *ΔP/D* will be biased downward (upward). Following prior research (Kalay 1982; Michaely 1991; and Naranjo et al. 2000), we address this problem by adjusting the ex day closing price for the normal return [i.e., $P_x^* = P_x /(1 + DRIFT)$], which we define as the value-weighted average return for all dividend paying stocks on the ex day, excluding any stocks that also went ex-dividend that day. Consistent with the tax hypothesis, the mean value of *ΔP/D** for the full sample is significantly less than one after decimalization (0.5030, $t = -4.28$) and is not significantly different from its pre-decimalization mean (0.6426 vs. 0.5030, $t = -0.71$).[8] We hesitate to base any conclusions on

[8] In sensitivity analyses, we also measured *DRIFT* using the equal-weighted return for dividend paying stocks, the value-weighted return and equal-weighted return for all CRSP stocks, and a firm specific beta-excess return. The use *Footnote continued on the next page*.

ΔP/D or *ΔP/D** because both measures are subject to problems created by dividing the price drop by small dividend values (Eades et al. 1984). In the next section we describe our test of H1 based on ex day abnormal returns.

4. Tests of abnormal returns

We calculate daily abnormal returns for each stock as its raw return minus the value-weighted average return of all dividend-paying stocks, excluding any stocks going ex-dividend on that day. The ex day raw return is $(P_x - P_c + DIVAMT)/P_c$ such that, if the price drop equals *DIVAMT*, then the raw return is zero. Table 4 shows the average daily abnormal return for each of the 11 days around the ex-dividend day for dividend observations in the post- and pre-decimalization periods. The ex day is identified as day zero. The largest positive abnormal returns occur on the ex day both before (0.003962, t = 15.44) and after decimalization (0.005035, t = 17.22). Contrary to the discrete pricing hypothesis that decimalization will decrease ex day abnormal returns, the univariate comparison indicates that average ex day abnormal returns are greater after decimalization than before (t = 2.76).

Figure 1 graphically illustrates the cumulative daily abnormal returns (CAR's) over the 11 days surrounding the ex day. The graph depicts CAR's for four groups created by forming separate portfolios of high- and low-dividend stocks during both the pre- and post-decimalization periods.[9] We make three observations concerning figure 1. First, low-dividend stocks during the

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of these alternative measures does not change our inferences. Lower values of *ΔP/D** than *ΔP/D* in the post-decimalization period imply that *DRIFT* is negative, which is consistent with the bear market throughout our sample period. In untabulated analysis we exclude ex-days occurring during the two-week period after September 11, 2001, and post-decimalization mean values of *ΔP/D** and *ΔP/D* are 0.5597 and 0.5329 (based on *N*=7,735 for the full sample).

[9] Prior studies (e.g., Lakonishok and Vermaelen 1986) examine abnormal returns across groups formed on the basis of dividend yield rather than dividend amount. We partition our sample based on dividend amount in figure 1 because dividend amount, relative to the tick size, is the key construct in later tests of abnormal trading volume. The Pearson correlation between *DIVAMT* and *YIELD* is 0.53 indicating that although these measures are highly related, *Footnote continued on the next page*.

discrete pricing period experienced CAR's that were always the smallest of the four groups. In contrast, low-dividend stocks in the post-decimalization period experience positive CAR's similar to those of high-dividend stocks. This dramatic change in the behavior of CAR's for low-dividend stocks is consistent with the idea that discrete pricing inhibited the tax-efficient trading of low-dividend stocks on cum-dividend trading days, and that decimalization removed this constraint. Second, before decimalization, CAR's appear to reach a peak on the ex day and drop off thereafter (Lakonishok and Vermaelen 1986). In contrast, post-decimalization CAR's for both dividend groups do not appear to experience a drop off after the ex day. These patterns suggest that dividend-capture strategies by short-term traders, which would tend to create selling pressure and negative returns after the ex day, may have less influence on stock returns in the post-decimalization period.

Third, figure 1 suggests that both high- and low-dividend groups realized positive abnormal returns on the ex day both before and after decimalization. To examine factors affecting ex day abnormal returns and to test our first hypothesis, we estimate the following regression model:

$$AR_i = \beta_0 + \beta_1 DP + \beta_2 YIELD_i + \beta_3 YIELD_i{*}DP + \beta_4 YIELD_i^2 + \beta_5 YIELD_i^2{*}DP + \beta_6 1/P_{Ci} + \beta_7 1/P_{Ci}{*}DP + \beta_8 IRISK_i + \beta_9 IRISK_i{*}DP + \beta_{10} Log(SIZE)_i + \beta_{11} Log(SIZE)_i{*}DP + u_i \quad (6)$$

where,

AR_i	=	the ex day return for stock *i* minus the value-weighted average return on that day for all dividend paying stocks (excluding those also going ex-dividend the same day),
DP	=	an indicator variable equal to one if the ex-dividend day occurs after the stocks' decimalization conversion date, and zero otherwise,

they reflect different constructs. Nevertheless, a plot of CAR's for sub-samples partitioned on a median split of *YIELD* is very similar to that shown in figure 1.

YIELD$_i$ = the dividend per share for stock *i* divided by stock *i*'s closing price on the last cum dividend day,

1/P$_{C\,i}$ = the inverse of the stock *i*'s closing price on the last cum-dividend day (a proxy for transaction costs),

IRISK$_i$ = the standard deviation of the residuals from a market-model regression of stock *i*'s daily return on the CRSP value-weighted market return computed over the 80-day period from day –45 to day –6 and day 6 to day 45 relative to the ex-dividend day, normalized by the market risk (i.e., $\sigma_{\varepsilon i}/\sigma_M$; a proxy for idiosyncratic risk), and

Log(SIZE)$_i$ = the natural log of the market capitalization of stock *i* as of the last cum-dividend day (a proxy for liquidity).

Prior research reports that ex day abnormal returns increase in *YIELD* (e.g., Michaely and Vila 1995, 1996; Naranjo et al. 2000). This prior result supports the tax hypothesis because, holding share price constant, the tax penalty with respect to a given dividend payment increases in the dividend amount. Thus, if ex day abnormal returns are caused by the shareholder tax penalty, then the abnormal return should be positive and increasing in *YIELD*.

Michaely (1991) finds an increasing and convex relation between dividend yield and *ΔP/D*, which he attributes to potential clientele effects for stocks with high dividend yields, implying an increasing and concave relation between dividend yield and abnormal ex day returns.[10] Similarly, Naranjo et al. (2000) find a negative relation between ex day abnormal returns and dividend yield in their sample of high-dividend-yield stocks, for which they expect a corporate investor clientele. Recall that corporations have τ values greater than one reflecting their tax preference for dividend income. Thus, if the marginal investor in high-dividend-yield stocks is a corporate investor, then we would expect these stocks to experience negative abnormal returns on the ex day. In sum, the existence of tax clienteles with different τ values suggests that the overall relation between dividend yield and ex day abnormal returns is increasing but concave at very high levels of dividend yield. Equation (6) includes $YIELD^2$ to capture this potential non-linearity. We expect a negative coefficient on $YIELD^2$.

The extent to which short-term traders can profit by trading around the ex day is limited by transaction costs. Following prior research (e.g., Karpoff and Walkling 1988; Naranjo et al. 2000), equation (6) includes the inverse of the closing stock price on the last cum-dividend day ($1/P_C$) as a proxy for transaction costs. A positive relation between ex day abnormal returns and transaction costs is typically interpreted as evidence of short-term trading activity around the ex day. Consistent with prior research, we predict a positive relation between excess returns and $1/P_C$ (Lakonishok and Vermaelen 1986; Karpoff and Walkling 1988, 1990; Michaely et al. 1996; Naranjo et al. 2000).

Short-term trading opportunities are also limited by risk. Equation (6) includes *IRISK* as a proxy for idiosyncratic risk.[11] Following Michaely and Vila (1996), we measure *IRISK* as the standard deviation of the residuals from a market-model regression of daily returns for the dividend-paying stock on daily market returns, divided by the standard deviation of daily market returns ($\sigma_{\varepsilon i}/\sigma_M$). Because the ability of short-term traders to capture arbitrage profits decreases in risk, we expect *IRISK* to be positively associated with ex day abnormal returns. Finally, we include *Log(SIZE)*, measured as the natural log of the stock's market capitalization on the last cum dividend day, to control for potential liquidity effects (Naranjo et al. 2000). Because shares of large-capitalization stocks are more liquid, such stocks are better candidates for short-term

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[10] We use the term concave (convex) relation to mean a negative (positive) second derivative.

[11] We do not include a proxy for systematic risk in equation (6) because the dependent variable is an adjusted abnormal return.

trading than small-capitalization stocks. Accordingly, we expect ex day abnormal returns to be negatively related to *Log(SIZE)*.

To allow for the possibility that the effects of these explanatory variables might differ between the pre- and post-decimalization periods, regression equation (6) also includes interaction terms created by multiplying each explanatory variable (*YIELD*, $YIELD^2$, $1/P_C$, *IRISK*, and *Log(SIZE)*) by *DP*.

BH's discrete pricing hypothesis predicts that ex day abnormal returns will decline post-decimalization because price adjustments are no longer constrained to tick increments. This discrete pricing hypothesis would be supported by a negative coefficient on *DP* and/or a negative coefficient on *YIELD**DP*. In contrast, the tax hypothesis (H1) predicts that ex day abnormal returns will not decline post-decimalization because the underlying reason for positive ex day returns is the relative tax penalty on dividend income. The tax hypothesis would be supported by zero or positive coefficients on *DP* and *YIELD**DP*. Table 5 reports the regression results from our analysis of ex day abnormal returns. Consistent with the tax hypothesis, the coefficients on *DP* (0.0133, t = 3.26) and *YIELD* (0.1365, t = 3.10), are both significantly positive, and the coefficient on *YIELD**DP* is not statistically different from zero (-0.0966, t = -0.87). In sum, these results do not support the discrete pricing hypothesis but do support the tax hypothesis, H1.

The estimated coefficient on $YIELD^2$ is significantly negative (-0.8845, t = -2.24), consistent with notion that stocks with very high dividend yields realize negative ex day abnormal returns because their marginal investors are corporations (Naranjo et al. 2000). However, the coefficient on $YIELD^2*DP$ is significantly positive (7.1125, t = 2.61), suggesting that after decimalization, ex day abnormal returns increase across the broad range of dividend yield. In fact, because the sum of the coefficients on $YIELD^2$ and $YIELD^2*DP$ is significantly positive ($F = 8.98$, $p < .01$), the estimated post-decimalization relation between *AR* and dividend yield is actually convex rather than concave. This post-decimalization relation between abnormal returns and yield is contrary to the traditional tax-induced dividend clientele argument (i.e., high (low) dividend-yield stocks are held by low (high) tax rate investors). However, this result is consistent with recent research that finds no empirical support for dividend tax clienteles within the population of dividend-paying firms (Dhaliwal et al. 2002) and that, presumably for non-tax reasons, low-tax rate institutional investors prefer low-dividend stocks to high-dividend stocks (Grinstein and Michaely 2002).

Although the above discussion focuses on the effects of long-term investors' tax preference ratios on ex day abnormal returns, it is likely the case that short-term trading also plays a role in price formation around the ex day for certain stocks. Specifically, the coefficient on *IRISK* is significantly positive (0.0019, $t = 2.98$) suggesting that abnormal returns are increasing in idiosyncratic risk that short-term traders are likely to avoid. Similarly, the coefficient on *Log(SIZE)* is significantly negative (-0.0005, $t = -3.02$), suggesting that short-term trading reduces ex day abnormal returns as the stock's liquidity increases. The coefficient on *Log(SIZE)*DP* is also significantly negative (-0.0008, $t = -3.19$) suggesting that the liquidity effect is stronger after decimalization than before. The coefficients on $1/P_C$, $1/P_C*DP$ and *IRISK*DP* are not statistically significant.

5. *Tests of abnormal trading volume*

Prior research examines tax-induced trading by investigating abnormal daily trading volume around the ex day (Lakonishok and Vermaelen 1986; Michaely and Vila 1995, 1996; Michaely et al. 1996). In this section we examine abnormal trading volume in two ways. First, for comparison to prior research, we examine abnormal trading volume over the 11-day period centered on the ex day. Second, to test our hypotheses about the effects of discrete versus decimal pricing, we examine abnormal trading volume on the last cum-dividend day.

5.1 Abnormal trading volume around the ex day

We define daily abnormal trading volume (*EXVOL*) as the ratio of a stock's trading volume on a particular day to that stock's normal trading volume, minus one. Normal trading volume is estimated as the average daily trading volume over the 80-day period ranging from day –45 to day –6, and day 6 to day 45, relative to the ex day. Table 6 reports the mean value of *EXVOL* on each of the 11 days around the ex day for the post- and pre-decimalization periods. On average, *EXVOL* is significantly positive ($t > 1.96$, $p < .05$) on eight of the 11 days in the post-decimalization period, and six of the 11 days in the pre-decimalization period. Thus, as in prior studies, our sample reflects significant levels of abnormal trading volume around the ex day. Moreover, from day –5 through day 3, *EXVOL* tends to be greater after decimalization, although the difference is statistically significant on day –3 and day 0 only. For example, ex day (day 0) trading volume is 32% higher than normal in the post-decimalization period, compared to 14% higher than normal in the pre-decimalization period ($t = 3.30$).

Figure 2 graphically illustrates the pattern of abnormal trading volume around the ex day for four groups of stock defined by sample period (pre- versus post-decimalization) and dividend amount (high- versus low). High-dividend (low-dividend) stocks are those paying dividends greater than (less than or equal to) $0.125 per share. Figure 2 indicates that *EXVOL* values for low-dividend stocks are relatively small in the pre-decimalization period , but are higher after decimalization. In contrast, the pattern of *EXVOL* values for high-dividend stocks appears to be comparable across the pre- and post-decimalization periods.

We examine the effect of decimalization and other factors on abnormal trading volume by estimating the following regression:

$$AEXVOL_i = \beta_0 + \beta_1 DP + \beta_2 YIELD_i + \beta_3 YIELD_i{*}DP + \beta_4 1/P_{Ci} + \beta_5 1/P_{Ci}{*}DP + \beta_6 BETA_i + \beta_7 BETA_i{*}DP + \beta_8 IRISK_i + \beta_9 IRISK_i{*}DP + \beta_{10} Log(SIZE)_i + \beta_{11} Log(SIZE)_i{*}DP + u_i \quad (7)$$

where,

$AEXVOL_i$ = the average value of $EXVOL_i$ across the 11-day period surrounding the ex day,

$BETA_i$ = regression coefficient obtained from regression of stock *i*'s daily return on the CRSP value-weighted market return over the 80 day period from day –45 to day –6 and day 6 to day 45 relative to the ex-dividend day (a proxy for systematic risk),

and other variables are as previously defined.

Table 7 reports the estimated regression coefficients for equation (7). As expected, the coefficient on *YIELD* is significantly positive (6.3871, t = 5.89) indicating that abnormal trading volume is increasing in dividend yield. Because the tax savings from trading dividends [i.e., $(\tau_B - \tau_S)D$] increases in the dividend amount, this result may be attributable to tax efficient trading among long-term investors with different τ values, and/or dividend capture transactions by short-term traders. The coefficient on *YIELD*DP* is also significantly positive (5.0127, t = 2.20) indicating that the effect of *YIELD* on *AEXVOL* is even greater after decimalization. This result could be attributable to the post-decimalization reduction in bid-ask spreads making short-term trading more profitable, and/or to elimination of the discrete pricing constraints on tax-efficient trading by long-term investors. We attempt to differentiate between these two explanations in the section 5.2.

Table 7 also reports evidence consistent with short-term trading activity around the ex day. Specifically, the coefficients on $1/P_C$ (–0.4997, t = –2.86) and *IRISK* (–0.0304, t = –2.80) are significantly negative, indicating that average abnormal trading volume around the ex day is decreasing in transaction costs and idiosyncratic risk, respectively. The coefficient on *IRISK*DP* is also significantly negative (–0.0452, t = –2.19) indicating that the negative effect of idiosyncratic risk on *AEXVOL* is greater after decimalization than before. Because the share price data used to compute *IRISK* is approximately continuous (discrete) in the post- (pre-) decimalization period, this result may be attributable to less noise in the measurement of *IRISK* for post-decimalization observations.

Finally, the coefficient on *Log*(*SIZE*) is negative (–0.0129, t = –2.35), which is contrary to the expectation that large-capitalization stocks are more liquid and, therefore, would attract more short-term trading activity. A possible explanation for this result is that, because small-capitalization stocks are more thinly traded, our measure of normal trading volume (i.e., the denominator of *EXVOL*) is negatively related to market capitalization, which may cause smaller (larger) capitalization stocks to have relatively higher (lower) values of *AEXVOL*.

5.2 Abnormal trading volume on the last cum-dividend day

We estimate the following regression to test two hypotheses regarding the cum-day trading of stocks paying dividend amounts for which the tick size constraint on share prices likely inhibited tax-efficient trading:

$$CEXVOL_i = \beta_0 + \beta_1 DP_i + \beta_2 LOW_i + \beta_3 YIELD_i + \beta_4 YIELD_i{*}DP_i + \beta_5 DIVAMT_i{*}LOW_i + \beta_6 DIVAMT_i{*}LOW_i{*}DP_i + \beta_7 1/P_{Ci} + \beta_8 1/P_{Ci}{*}DP + \beta_9 BETA_i + \beta_{10} BETA_i{*}DP + \beta_{11} IRISK_i + \beta_{12} IRISK_i{*}DP + \beta_{13} Log(SIZE)_i + \beta_{14} Log(SIZE)_i{*}DP + u_i \quad (8)$$

where,

$CEXVOL_i$ = abnormal trading volume (i.e. $EXVOL_i$) on the last cum-dividend trading day,

LOW_i = one if the dividend amount is less than or equal to \$0.125, and zero otherwise, and other variables are as previously defined.

In review, H2 predicts that when the tick size constraint is binding, abnormal cum-day trading volume is decreasing in the dividend amount because the seller's loss from trading cum-dividend, thereby giving up the dividend, increases in the dividend amount. A significantly negative coefficient on *DIVAMT*LOW* would support H2. The estimated coefficients for equation (8) are shown in table 8. As predicted, the coefficient on *DIVAMT*LOW* is significantly negative (–1.9415, $t = -3.04$). In contrast, H3 predicts that because the tick size constraint is virtually eliminated by decimal pricing, abnormal cum-day trading volume for such stocks will increase in dividend amount consistent with the increasing tax savings to shift dividend income [i.e., $(\tau_B - \tau_S)D$]. H3 would be supported if the sum of the estimated coefficients on *DIVAMT*LOW* and *DIVAMT*LOW*DP* is not significantly negative. As shown in table 8, the estimated coefficient on *DIVAMT*LOW*DP* is positive (1.8308, $t = 2.17$) and of a magnitude that almost completely offsets the negative effect of *DIVAMT*LOW*. The sum of the two coefficients is not statistically different from zero ($F = 0.01$).

To aid in the interpretation of these effects, figure 3 plots predicted values of cum-day abnormal trading volume as a function of dividend amount during both pre- and post-decimalization periods based on the table 8 regression estimates. Under discrete pricing, predicted values of *CEXVOL* actually decrease in dividend amount up to the kink at $0.125. This occurs because the negative effect of the discrete pricing constraint for small dividend amounts, captured by the coefficient on *DIVAMT*LOW*, more than offsets the overall positive effect of *YIELD* identified in prior research and controlled for in this analysis (see below). After decimalization, the tick size constraint on tax-efficient trading of dividends is eliminated such that, consistent with tax incentives to trade, predicted abnormal trading volume is nearly monotonically increasing in dividend amount.

As in the table 7 analysis of abnormal trading volume around the ex day, *CEXVOL* also increases in *YIELD* (17.1009, t = 5.86), and this effect is more pronounced after decimalization [i.e., the coefficient on *YIELD*DP* is also significantly positive (8.7982, t = 1.65)]. Finally, there is evidence that short-term traders are active on the last cum-day. Specifically, abnormal trading volume is decreasing in both systematic risk (*BETA*, coefficient = –0.1077, t = –1.97) and idiosyncratic risk (*IRISK*, coefficient = –0.0450, t = –1.91), and increasing in liquidity (*Log(SIZE)*, coefficient = 0.0372, t = 3.09). None of the other control variables are statistically significant.

6. Conclusions

We examine the effects of discrete versus decimal share pricing on ex-dividend day abnormal returns and abnormal trading volume around the ex day. Our research design takes advantage of a natural experiment that occurred when U.S. stock exchanges implemented decimal pricing in early 2001. Prior research based on discrete pricing data documents an empirical regularity that share prices drop on the ex-dividend day by less than the dividend amount, leading to positive abnormal returns on the ex day. We provide a direct test of BH's discrete pricing hypothesis, which maintains that this phenomenon can be explained by discrete pricing rather than the differential taxation of dividends and capital gains. In contrast, we predict that positive ex day abnormal returns will persist after the decimalization of share prices because the root cause is differential taxation. Consistent with this tax hypothesis, we find that positive abnormal ex day returns persist after decimalization.

This result does not imply that discrete pricing had no effects on share trading behavior around ex dividend days. We derive two testable hypotheses about the joint effects of discrete (versus decimal) pricing and differential taxation on trading volume before the ex day. Specifically, we predict that discrete pricing constrained tax-efficient cum-period trading in low dividend stocks, and that this constraint was eliminated by decimal pricing. Our results support these hypotheses.

This study makes two main contributions to the literature on ex-dividend day share behavior. First, our results contradict BH's discrete pricing hypothesis and provide new evidence that the differential taxation of dividend and capital gain income for long-term investors causes positive ex day abnormal returns. Second, we show that discrete pricing constrained the tax-efficient cum-day trading of stocks paying small dividend amounts, and that decimal pricing substantially eliminated this constraint.

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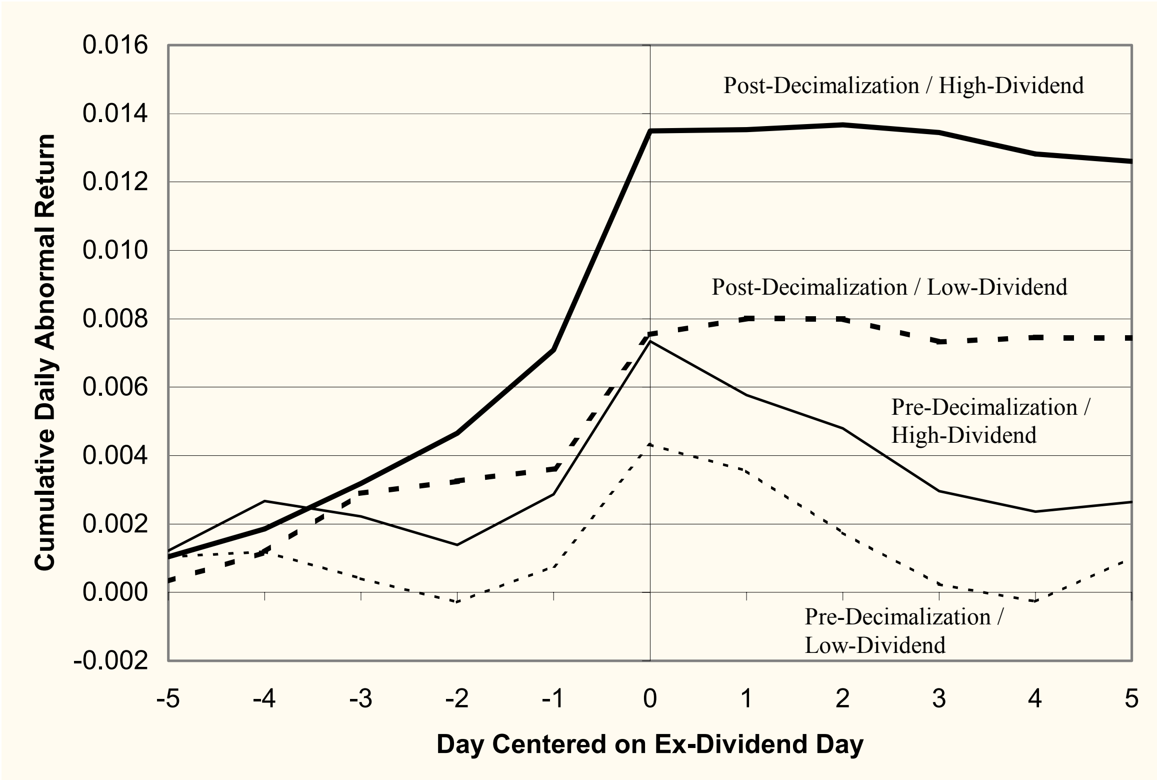

Fig. 1. Cumulative daily abnormal returns for 11 days around the ex-dividend day. This figure reports the cumulative daily abnormal returns for NYSE, AMEX and NASDAQ dividend paying stocks with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 from January 1, 2000 through December 31, 2001. We partition the sample by pre- and post-decimalization period and high- and low-dividend stocks. High-dividend stocks are those paying a dividend greater than $0.125 per share, and low-dividend stocks are those paying a dividend less than or equal to $0.125 per share. Daily abnormal returns (*AR*) are computed as a stock's daily return minus the value weighted return for all dividend-paying stocks not going ex-dividend on that day. Cumulative daily abnormal returns are computed for each group by additively cumulating the mean value of *AR* across days.

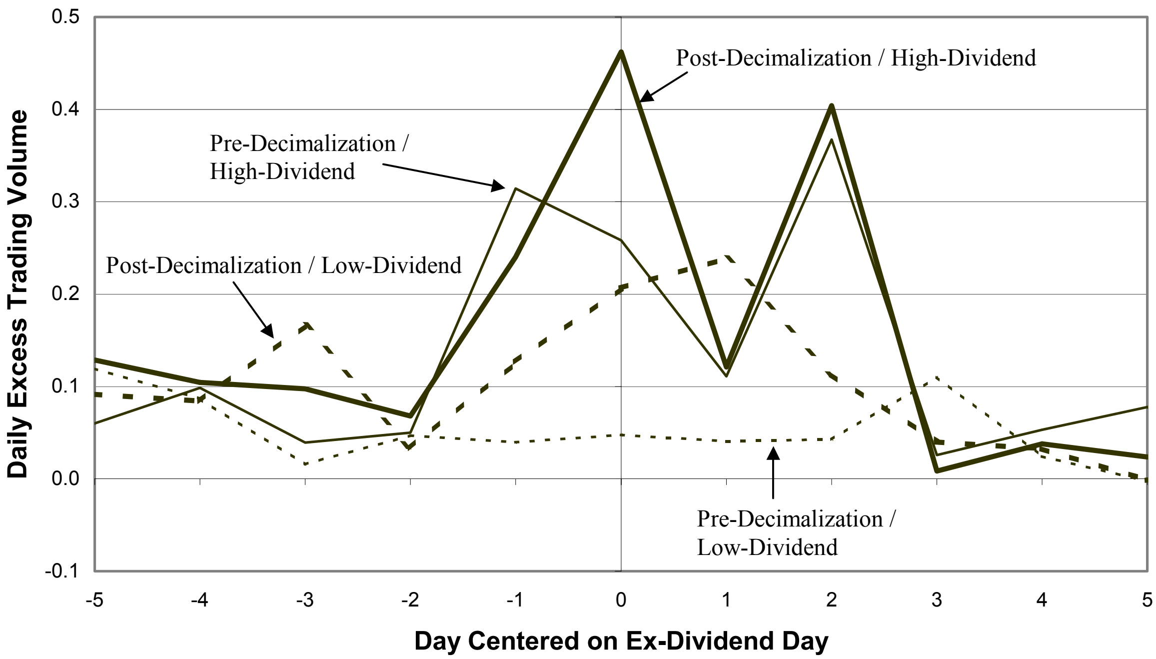

Fig. 2. Daily excess trading volume for 11 days around the ex-dividend day. This figure shows the daily excess trading volume for NYSE, AMEX and NASDAQ dividend paying stocks with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 from January 1, 2000 through December 31, 2001. We partition by pre- and post-decimalization period and high- and low-dividend stocks. High-dividend stocks are those paying a dividend greater than $0.125 per share, and low-dividend stocks are those paying a dividend less than or equal to $0.125 per share. Daily excess trading volume (*EXVOL*) is a normalized measure of share turnover. For each sample stock on each of the 11 days shown in the graph, *EXVOL* is the ratio of trading volume on that day to the stock's normal trading volume, minus 1. Normal trading volume is the average daily trading volume over the 80-day period ranging from day –45 to day –6 and day 6 to day 45, relative to the ex-dividend day.

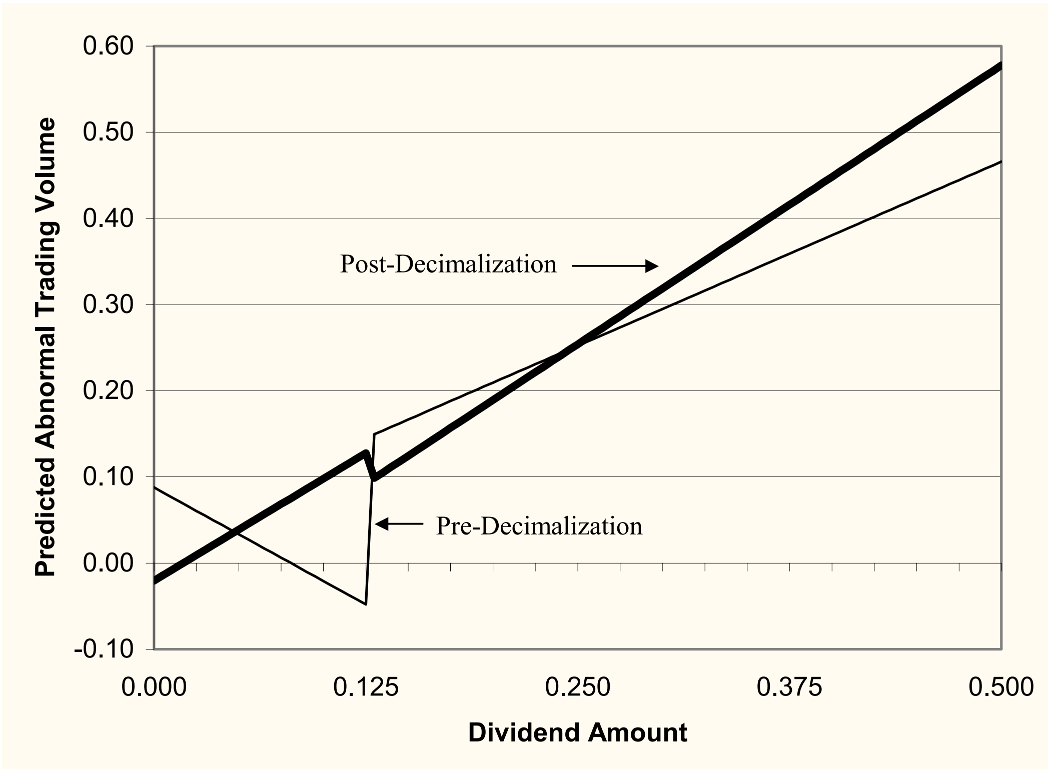

Fig. 3. Predicted values of cum-dividend day (day -1) excess trading volume by dividend amount pre- and post-decimalization The graph shows predicted values of abnormal trading volume on the last cum-dividend day based on the regression estimates in Table 8 for a $20 stock as a function of dividend amount under discrete pricing (lighter line) and decimal pricing (darker line).

Table 1
The predicted joint effects of differential taxation and discrete (vs. decimal) pricing

This table reports predicted cum-period ask and bid prices, and average ΔP/D for selected dividend amounts between $0.025 and $1.00 for both discrete (1/16th s) and decimal pricing regimes. We assume that cum-period sellers are long-term individual investors with tax rates of 39.1% and 20% on dividend income and capital gain income, respectively. Buyers are either long-term individual investors with a somewhat lower (i.e., 30.5%) tax rate on dividend income, or short-term traders who face identical tax rates on dividend income and capital gains. A seller's (long-term buyer's) minimum ask (maximum bid) price is her after-tax value of the dividend rounded up (down) to the nearest tick (cent) under the discrete (decimal) pricing constraint. A short-term trader's maximum bid price is the sum of her after-tax value of the dividend minus $0.01 per share transaction costs, rounded down to the nearest tick (cent) under the discrete (decimal) pricing constraint. No cum-period trade occurs, as indicated by *NCT*, when the minimum ask price exceeds the maximum bid price. Where trades do occur, the average ΔP/D is equal to the average of the minimum ask and maximum bid prices, divided by the dividend amount.

		After-Tax & Transaction Costs Value of Dividend to:			Discrete Pricing Constraint (1/16th)					Decimal Pricing Constraint				
						Maximum Bid		Average ΔP/D			Maximum Bid		Average ΔP/D	
Ticks in 16th s	Dividend Amount	Seller $\tau = .761$	LT Buyer $\tau = .869$	ST Trader $\tau = 1.0$	Minimum Ask	LT Buyer	ST Trader	LT Buyer	ST Trader	Minimum Ask	LT Buyer	ST Trader	LT Buyer	ST Trader
	0.0250	0.019	0.022	0.015	0.0625	0.0000	0.0000	*NCT*	*NCT*	0.02	0.02	0.01	0.800	*NCT*
	0.0500	0.038	0.043	0.040	0.0625	0.0000	0.0000	*NCT*	*NCT*	0.04	0.04	0.04	0.800	0.800
1	**0.0625**	**0.048**	**0.054**	**0.053**	**0.0625**	**0.0000**	**0.0000**	***NCT***	***NCT***	**0.05**	**0.05**	**0.05**	**0.800**	**0.800**
	0.0750	0.057	0.065	0.065	0.0625	0.0625	0.0625	0.833	0.833	0.06	0.06	0.06	0.800	0.800
	0.1000	0.076	0.087	0.090	0.1250	0.0625	0.0625	*NCT*	*NCT*	0.08	0.08	0.09	0.800	0.850
2	**0.1250**	**0.095**	**0.109**	**0.115**	**0.1250**	**0.0625**	**0.0625**	***NCT***	***NCT***	**0.10**	**0.10**	**0.11**	**0.800**	**0.840**
	0.1500	0.114	0.130	0.140	0.1250	0.1250	0.1250	0.833	0.833	0.12	0.13	0.14	0.833	0.867
	0.1750	0.133	0.152	0.165	0.1875	0.1250	0.1250	*NCT*	*NCT*	0.14	0.15	0.16	0.829	0.857
3	**0.1875**	**0.143**	**0.163**	**0.178**	**0.1875**	**0.1250**	**0.1250**	***NCT***	***NCT***	**0.15**	**0.16**	**0.17**	**0.827**	**0.853**
	0.2000	0.152	0.174	0.190	0.1875	0.1250	0.1875	*NCT*	0.938	0.16	0.17	0.19	0.825	0.875
	0.2250	0.171	0.195	0.215	0.1875	0.1875	0.1875	0.833	0.833	0.18	0.19	0.21	0.822	0.867
4	**0.2500**	**0.190**	**0.217**	**0.240**	**0.2500**	**0.1875**	**0.1875**	***NCT***	***NCT***	**0.20**	**0.21**	**0.24**	**0.820**	**0.880**
	0.2750	0.209	0.239	0.265	0.2500	0.1875	0.2500	*NCT*	0.909	0.21	0.23	0.26	0.800	0.855
	0.3000	0.228	0.261	0.290	0.2500	0.2500	0.2500	0.833	0.833	0.23	0.26	0.29	0.817	0.867
5	**0.3125**	**0.238**	**0.271**	**0.303**	**0.2500**	**0.2500**	**0.2500**	**0.800**	**0.800**	**0.24**	**0.27**	**0.30**	**0.816**	**0.864**
	0.3250	0.247	0.282	0.315	0.2500	0.2500	0.3125	0.769	0.865	0.25	0.28	0.31	0.815	0.862
	0.3500	0.266	0.304	0.340	0.3125	0.2500	0.3125	*NCT*	0.893	0.27	0.30	0.34	0.814	0.871
6	**0.3750**	**0.285**	**0.326**	**0.365**	**0.3125**	**0.3125**	**0.3125**	**0.833**	**0.833**	**0.29**	**0.32**	**0.36**	**0.813**	**0.867**
	0.4000	0.305	0.348	0.390	0.3125	0.3125	0.3750	0.781	0.859	0.31	0.34	0.39	0.813	0.875
	0.4250	0.324	0.369	0.415	0.3750	0.3125	0.3750	*NCT*	0.882	0.33	0.36	0.41	0.812	0.871

Table 1 (Continued)

Ticks in 16^{th}s	Dividend Amount	After-Tax & Transaction Costs Value of Dividend to: Seller $\tau = .761$	LT Buyer $\tau = .869$	ST Trader $\tau = 1.0$	Discrete Pricing Constraint ($1/16^{th}$): Minimum Ask	Maximum Bid: LT Buyer	Maximum Bid: ST Trader	Average ΔP/D: LT Buyer	Average ΔP/D: ST Trader	Decimal Pricing Constraint: Minimum Ask	Maximum Bid: LT Buyer	Maximum Bid: ST Trader	Average ΔP/D: LT Buyer	Average ΔP/D: ST Trader
7	**0.4375**	**0.333**	**0.380**	**0.428**	**0.3750**	**0.3750**	**0.3750**	**0.857**	**0.857**	**0.34**	**0.38**	**0.42**	**0.823**	**0.869**
	0.4500	0.343	0.391	0.440	0.3750	0.3750	0.4375	0.833	0.903	0.35	0.39	0.44	0.822	0.878
	0.4750	0.362	0.413	0.465	0.3750	0.3750	0.4375	0.789	0.855	0.37	0.41	0.46	0.821	0.874
8	**0.5000**	**0.381**	**0.434**	**0.490**	**0.4375**	**0.3750**	**0.4375**	***NCT***	**0.875**	**0.39**	**0.43**	**0.49**	**0.820**	**0.880**
	0.5250	0.400	0.456	0.515	0.4375	0.4375	0.5000	0.833	0.893	0.40	0.45	0.51	0.810	0.867
	0.5500	0.419	0.478	0.540	0.4375	0.4375	0.5000	0.795	0.852	0.42	0.47	0.54	0.809	0.873
9	**0.5625**	**0.428**	**0.489**	**0.553**	**0.4375**	**0.4375**	**0.5000**	**0.778**	**0.833**	**0.43**	**0.48**	**0.55**	**0.809**	**0.871**
	0.5750	0.438	0.500	0.565	0.5000	0.4375	0.5625	*NCT*	0.924	0.44	0.49	0.56	0.809	0.870
	0.6000	0.457	0.521	0.590	0.5000	0.5000	0.5625	0.833	0.885	0.46	0.52	0.59	0.817	0.875
10	**0.6250**	**0.476**	**0.543**	**0.615**	**0.5000**	**0.5000**	**0.5625**	**0.800**	**0.850**	**0.48**	**0.54**	**0.61**	**0.816**	**0.872**
	0.6500	0.495	0.565	0.640	0.5000	0.5625	0.6250	0.817	0.865	0.50	0.56	0.64	0.815	0.877
	0.6750	0.514	0.586	0.665	0.5625	0.5625	0.6250	0.833	0.880	0.52	0.58	0.66	0.815	0.874
11	**0.6875**	**0.523**	**0.597**	**0.678**	**0.5625**	**0.5625**	**0.6250**	**0.818**	**0.864**	**0.53**	**0.59**	**0.67**	**0.815**	**0.873**
	0.7000	0.533	0.608	0.690	0.5625	0.5625	0.6875	0.804	0.893	0.54	0.60	0.69	0.814	0.879
	0.7250	0.552	0.630	0.715	0.5625	0.6250	0.6875	0.819	0.862	0.56	0.62	0.71	0.814	0.876
12	**0.7500**	**0.571**	**0.652**	**0.740**	**0.6250**	**0.6250**	**0.6875**	**0.833**	**0.875**	**0.58**	**0.65**	**0.74**	**0.820**	**0.880**
	0.7750	0.590	0.673	0.765	0.6250	0.6250	0.7500	0.806	0.887	0.59	0.67	0.76	0.813	0.871
	0.8000	0.609	0.695	0.790	0.6250	0.6875	0.7500	0.820	0.859	0.61	0.69	0.79	0.813	0.875
13	**0.8125**	**0.619**	**0.706**	**0.803**	**0.6250**	**0.6875**	**0.7500**	**0.808**	**0.846**	**0.62**	**0.70**	**0.80**	**0.812**	**0.874**
	0.8250	0.628	0.717	0.815	0.6875	0.6875	0.8125	0.833	0.909	0.63	0.71	0.81	0.812	0.873
	0.8500	0.647	0.738	0.840	0.6875	0.6875	0.8125	0.809	0.882	0.65	0.73	0.84	0.812	0.876
14	**0.8750**	**0.666**	**0.760**	**0.865**	**0.6875**	**0.7500**	**0.8125**	**0.821**	**0.857**	**0.67**	**0.76**	**0.86**	**0.817**	**0.874**
	0.9000	0.685	0.782	0.890	0.6875	0.7500	0.8750	0.799	0.868	0.69	0.78	0.89	0.817	0.878
	0.9250	0.704	0.804	0.915	0.7500	0.7500	0.8750	0.811	0.878	0.71	0.80	0.91	0.816	0.876
15	**0.9375**	**0.714**	**0.814**	**0.928**	**0.7500**	**0.8125**	**0.8750**	**0.833**	**0.867**	**0.72**	**0.81**	**0.92**	**0.816**	**0.875**
	0.9500	0.723	0.825	0.940	0.7500	0.8125	0.9375	0.822	0.888	0.73	0.82	0.94	0.816	0.879
	0.9750	0.742	0.847	0.965	0.7500	0.8125	0.9375	0.801	0.865	0.75	0.84	0.96	0.815	0.877
16	**1.0000**	**0.761**	**0.869**	**0.990**	**0.8125**	**0.8125**	**0.9375**	**0.813**	**0.875**	**0.77**	**0.86**	**0.99**	**0.815**	**0.880**

Table 2
Frequency and size of taxable cash dividends

The sample includes 20,001 observations with ex-dividend dates reported by CRSP between January 1, 2000 and December 31, 2001 for firms listed on NYSE, AMEX and NASDAQ. Only cash dividends with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 are included.

Dividend per share range	**N**	**Cumulative N**	**Cumulative %**	**Mean**	**Median**
(0.00, 0.01]	202	202	1.01%	0.0083	0.0100
(0.01, 0.05]	2,757	2,959	14.79%	0.0329	0.0350
(0.05, 0.10]	5,590	8,549	42.74%	0.0688	0.0700
(0.10, 0.15]	3,632	12,181	60.90%	0.1181	0.1200
(0.15, 0.20]	2,193	14,374	71.87%	0.1662	0.1625
(0.20, 0.25]	1,976	16,350	81.75%	0.2232	0.2200
(0.25, 0.30]	732	17,082	85.41%	0.2728	0.2700
(0.30, 0.35]	826	17,908	89.54%	0.3224	0.3200
(0.35, 0.40]	341	18,249	91.24%	0.3730	0.3700
(0.40, 0.45]	490	18,739	93.69%	0.4267	0.4265
(0.45, 0.50]	322	19,061	95.30%	0.4809	0.4800
(0.50, 0.55]	235	19,296	96.48%	0.5245	0.5250
(0.55, 0.60]	217	19,513	97.56%	0.5663	0.5675
(0.60, 0.65]	192	19,705	98.52%	0.6177	0.6110
(0.65, 0.70]	57	19,762	98.81%	0.6824	0.6900
(0.70, 0.75]	55	19,817	99.08%	0.7273	0.7200
(0.75, 0.80]	43	19,860	99.30%	0.7738	0.7750
(0.80, 0.85]	17	19,877	99.38%	0.8073	0.8000
(0.85, 0.90]	23	19,900	99.50%	0.8689	0.8750
(0.90, 0.95]	15	19,915	99.57%	0.9348	0.9375
(0.95, +]	86	20,001	100.00%	1.6166	1.1965
Overall	20,001			0.1666	0.1100

Table 3
Post- and pre-decimalization descriptive statistics for dividend, stock price and related variables

The sample consists of 19,169 ex dividend day observations during the period January 1, 2000-December 31, 2001 for firms listed on NYSE, AMEX and NASDAQ. Only cash dividends with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 are included. We include all observations that have cum- and ex-dividend day price data and dividends greater than or equal to 1¢, which mitigates problems created by small denominators in tests involving the *ΔP/D* and *ΔP/D** ratios. Each panel contains means, medians, standard deviations, and *t*-tests of differences in means for each variable, partitioned by post- and pre-decimalization period. Panel A contains statistics for the full sample. Panels B and C report the statistics partitioned on low vs. high dividend stocks. A stock belongs to the low dividend sample if its dividend amount is less than or equal to $0.125 per share, and it belongs to the high dividend sample if its dividend amount is more than $0.125 per share. *DIVAMT* is dividend per share on the ex-dividend day. *YIELD* is $DIVAMT/P_C$, where P_C is the cum-dividend day closing price. $\Delta P/D = (P_C - P_X) / DIVAMT$, where P_X is the ex-dividend day closing price. $\Delta P/D^* = [P_C - P_X / (1 + DRIFT)] / DIVAMT$, where *DRIFT* is the value-weighted average return of all dividend paying stocks on the ex-day, excluding those stocks also going ex-dividend on the same day.

Panel A: Full Sample

	Post-Decimalization (n = 8,113)			**Pre-Decimalization** (n = 11,056)			**Difference**	
Variable	Mean	Median	Std Dev	Mean	Median	Std Dev	Post-Pre	t-value
DIVAMT	0.1662	0.1188	0.1592	0.1709	0.1100	0.2464	-0.0047	-1.60
YIELD	0.0087	0.0070	0.0076	0.0097	0.0078	0.0091	-0.0010	-8.00
Pc	23.3924	18.0000	25.6902	22.3705	15.5625	25.5149	1.0218	2.73
Px	23.2763	17.8800	25.6436	22.2784	15.5000	25.5040	0.9980	2.67
ΔP/D	0.8111	0.5714	11.3237	0.4863	0.6002	17.7508	0.3248	1.54
*ΔP/D**	0.5030	0.5173	10.4523	0.6426	0.6154	16.6920	-0.1396	-0.71

Panel B: Low-Dividend Sample

	Post-Decimalization (n = 4,419)			**Pre-Decimalization** (n = 6,101)			**Difference**	
Variable	Mean	Median	Std Dev	Mean	Median	Std Dev	Post-Pre	t-value
DIVAMT	0.0700	0.0700	0.0304	0.0695	0.0688	0.0292	0.0005	0.91
YIELD	0.0059	0.0056	0.0047	0.0064	0.0060	0.0040	-0.0005	-5.24
Pc	16.8743	13.0000	12.9718	16.2645	11.3750	14.9024	0.6098	2.19
Px	16.8203	12.9500	12.9577	16.2420	11.3750	14.9488	0.5783	2.23
ΔP/D	1.0022	0.5000	14.8801	0.4704	0.5208	23.6553	0.5318	1.41
*ΔP/D**	0.6246	0.3833	13.7009	0.6821	0.5431	22.2209	-0.0576	-0.16

Panel C: High-Dividend Sample

	Post-Decimalization (n = 3,694)			**Pre-Decimalization** (n = 4,955)			**Difference**	
Variable	Mean	Median	Std Dev	Mean	Median	Std Dev	Post-Pre	t-value
DIVAMT	0.2813	0.2250	0.1740	0.2958	0.2350	0.3258	-0.0145	-2.67
YIELD	0.0120	0.0095	0.0089	0.0137	0.0107	0.0116	-0.0017	-7.63
Pc	31.1897	25.0000	33.7160	29.8888	22.5000	32.8153	1.3009	1.80
Px	30.9995	24.8062	33.6758	29.7108	22.2500	32.8059	1.2887	1.78
ΔP/D	0.5824	0.6250	4.0840	0.5059	0.6250	3.7568	0.0765	0.89
*ΔP/D**	0.3576	0.5706	3.9209	0.5939	0.6702	3.7098	-0.2363	-2.84

Table 4
Post- and pre-decimalization average abnormal returns for the 11 days around the ex-dividend day

Average abnormal returns for ex dividend day (day zero) reflect 8,307 post-decimalization dividend observations and 11,295 pre-decimalization dividend observations during the period January 1, 2000-December 31, 2001 for firms listed on NYSE, AMEX and NASDAQ. Only cash dividends with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 are included. We include all observations with available stock return data. Days other than day 0 may have fewer observations because of missing return data. The abnormal return for each day is that day's raw return for the dividend paying stock minus the value-weighted average return of all dividend paying stocks on that day, excluding those stocks that went ex-dividend on that day. Days are identified relative to the ex dividend day.

	Post-Decimalization		**Pre-Decimalization**		**Post v. Pre**	
Day	***Abnormal Return***	***t*-value**	***Abnormal Return***	***t*-value**	**Difference**	***t*-value**
-5	0.000651	2.39	0.001120	4.33	-0.000469	-1.25
-4	0.000824	2.96	0.000728	2.89	0.000096	0.26
-3	0.001541	6.00	-0.000637	-2.53	0.002178	6.05
-2	0.000841	3.29	-0.000759	-2.84	0.001600	4.32
-1	0.001304	4.74	0.001242	4.89	0.000062	0.16
0	**0.005035**	**17.22**	**0.003962**	**15.44**	**0.001073**	**2.76**
1	0.000280	1.03	-0.001125	-4.21	0.001405	3.69
2	0.000058	0.21	-0.001440	-5.52	0.001498	3.95
3	-0.000472	-1.40	-0.001651	-6.32	0.001179	2.77
4	-0.000209	-0.76	-0.000545	-2.08	0.000336	0.89
5	-0.000106	-0.38	0.000836	3.22	-0.000942	-2.47

Table 5
Regression analysis of ex-dividend day abnormal returns

This regression analysis is based on 17,060 ex-dividend day observations during January 1, 2000-December 31, 2001 for firms listed on NYSE, AMEX and NASDAQ. Only cash dividends with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 are included. To be included in this analysis, we require each observation to have return data on the ex dividend day as well as return data during an 80-day non-event period to compute the regression variables. The dependent variable, *AR*, is the abnormal return on the ex-dividend day, computed as the dividend paying stock's raw return on the ex-dividend day minus the value-weighted average return for that day for all dividend paying stocks, excluding those also going ex-dividend on the same day. *DP* equals to 1 if the ex-dividend day occurs after the stock's decimalization conversion date, and zero if it occurs during the discrete pricing period. *YIELD* is the per share dividend amount divided by the closing share price on the last cum-dividend day. $1/P_C$ is the inverse of the closing share price on the last cum-dividend day. *IRISK* is idiosyncratic risk, measured as the standard deviation of the residuals from a market-model regression of stock *i*'s daily returns on the CRSP value-weighted market return, divided by the standard deviation of the daily market returns (i.e., $\sigma_{\varepsilon i}/\sigma_M$). The market model is estimated over an 80-day non-event period from day –45 to day –6 and day 6 to day 45 relative to the ex-dividend day. *Log*(*SIZE*) is the market capitalization of the dividend paying stock as of the last cum-dividend day. *YIELD*DP*, $YIELD^2*DP$, $1/P_C*DP$, *IRISK*DP*, and *Log*(*SIZE*)**DP* are interaction terms formed by multiplying *YIELD*, $YIELD^2$, $1/P_C$, *IRISK*, and *Log*(*SIZE*), respectively, by *DP*. In parentheses are t-statistics calculated with White's (1980) heteroskedaticity-consistent variance estimators.

Explanatory Variables	**Parameter Estimate**
Intercept	0.0064
	(2.39)**
DP	0.0133
	(3.26)***
YIELD	0.1365
	(3.10)***
YIELD×DP	-0.0966
	(-0.87)
$YIELD^2$	-0.8845
	(-2.24)**
$YIELD^2$×DP	7.1125
	(2.61)***
$1/P_C$	0.0019
	(0.27)
$1/P_C$×DP	-0.0063
	(-0.65)
IRISK	0.0019
	(2.98)***
IRISK×DP	-0.0007
	(-0.67)
Log(SIZE)	-0.0005
	(-3.02)***
Log(SIZE)×DP	-0.0008
	(-3.19)***
Adj. R^2	0.0104

*** Significant at 1%, ** significant at 5%, * significant at 10% using two-tailed tests.

Table 6
Post- and pre-decimalization daily excess trading volume for the 11 days around the ex-dividend day

Excess trading volume for ex dividend day (day zero) reflect 6,129 post-decimalization dividend observations and 11,091 pre-decimalization dividend observations during the period January 1, 2000-December 31, 2001 for firms listed on NYSE, AMEX and NASDAQ. Only cash dividends with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 are included. We exclude observations with missing volume data either during the 11-day event period or during the 80-day non-event period used to compute the normal trading volume. Daily excess trading volume (*EXVOL*) is a normalized measure of share turnover. For each sample stock on each of the 11 days shown in the table, *EXVOL* is the ratio of trading volume on that day to the stock's normal trading volume, minus 1. Normal trading volume is the average daily trading volume over the 80-day period ranging from day –45 to day –6 and day 6 to day 45, relative to the ex-dividend day.

	Post Decimalization (n = 6,129)		**Pre Decimalization** (n = 11,091)		**Difference**	
Day	***EXVOL***	***t-value***	***EXVOL***	***t-value***	**Post - Pre**	***t-value***
-5	0.1081	1.9658	0.0930	1.9047	0.0151	0.4880
-4	0.0932	1.6256	0.0920	2.2202	0.0012	0.0395
-3	0.1356	2.3541	0.0260	1.5728	0.1096	3.2650
-2	0.0486	2.0147	0.0483	2.0864	0.0004	0.0112
-1	0.1772	2.5024	0.1616	1.7846	0.0156	0.4304
0	**0.3207**	**3.6568**	**0.1410**	**2.9327**	**0.1797**	**3.3048**
1	0.1863	5.4532	0.0719	1.9334	0.1144	1.5882
2	0.2431	3.0828	0.1868	2.9371	0.0563	1.1672
3	0.0259	2.3940	0.0729	3.4278	-0.0470	-1.0526
4	0.0349	1.6074	0.0372	1.5913	-0.0023	-0.0911
5	0.0096	1.5677	0.0331	2.0303	-0.0235	-0.8440

Table 7
Regression analysis of mean daily excess trading volume for the 11 days around the ex-dividend day

This regression analysis is based on 17,217 observations during January 1, 2000-December 31, 2001 for firms listed on NYSE, AMEX and NASDAQ. Only cash dividends with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 are included. To be included in this analysis, we require each observation to have trading volume data during the 11-day event period and the 80-day non-event period used to compute the normal trading volume. We further require non-missing return data during the 80-day non-event period to compute the regression variables. The dependent measure, *AEXVOL*, is the daily average of *EXVOL* over the 11-day period surrounding the ex-dividend day. *EXVOL* is a normalized measure of share turnover. For each sample stock for each day in the 11-day period, *EXVOL* is the ratio of trading volume on that day to the stock's normal trading volume, minus 1. Normal trading volume is the average daily trading volume over the 80-day period ranging from day –45 to day –6 and day 6 to day 45, relative to the ex-dividend day. *BETA* (β_i) represents systematic risk as measured by the regression coefficient in a market-model regression of stock *i*'s daily returns on the CRSP value-weighted market return over an 80-day non-event period from day –45 to day –6 and day 6 to day 45, relative to the ex-dividend day. *BETA*DP* is an interaction term formed by multiplying *BETA* by *DP*. All other variables are defined in table 5. In parentheses are t-statistics calculated with White's (1980) heteroskedaticity-consistent variance estimators.

Explanatory Variables	**Parameter Estimate**
Intercept	0.2706
	(3.13)***
DP	0.1504
	(0.82)
YIELD	6.3871
	(5.89)***
YIELD×DP	5.0127
	(2.20)**
$1/P_C$	-0.4997
	(-2.86)***
$1/P_C$×DP	0.2422
	(0.87)
BETA	0.0164
	(0.80)
BETA×DP	0.0015
	(0.05)
IRISK	-0.0304
	(-2.80)***
IRISK×DP	-0.0452
	(-2.19)**
Log(SIZE)	-0.0129
	(-2.35)**
Log(SIZE)×DP	-0.0082
	(-0.72)
Adj. R^2	0.0090

*** Significant at 1%, ** significant at 5%, * significant at 10% using two-tailed tests.

Table 8
Regression analysis of cum-dividend day excess trading volume (day –1)

This regression analysis is based on 17,217 observations during January 1, 2000-December 31, 2001 for firms listed on NYSE, AMEX and NASDAQ. Only cash dividends with CRSP taxable distribution codes of 1222, 1232, 1242 and 1252 are included. We require each observation to have trading volume data during the 11-day event period and the 80-day non-event period used to compute the normal trading volume. We further require non-missing return data during the 80-day non-event period to compute the regression variables. The dependent variable, *CEXVOL*, is the ratio of trading volume on the last cum-dividend day to the stock's normal trading volume, minus 1. Normal trading volume is the average trading volume over the 80-day period ranging from day –45 to day –6 and day 6 to day 45, relative to the ex-dividend day. *LOW* is an indicator variable equal to one if the dividend amount is less than or equal to $0.125 per share (one tick before decimalization), and zero otherwise. *DIVAMT*LOW* (*DIVAMT*LOW*DP*) is an interaction term formed by multiplying *DIVAMT* by *LOW* (*LOW* and *DP*). All other variables are defined in tables 5 and 7. In parentheses are t-statistics calculated with White's (1980) heteroskedaticity-consistent variance estimators.

Explanatory Variables	**Parameter Estimate**
Intercept	-0.3208
	(-1.78)*
DP	0.7003
	(1.25)
LOW	0.0494
	(0.76)
YIELD	17.1009
	(5.86)***
YIELD×DP	8.7982
	(1.65)*
DIVAMT×LOW	-1.9415
	(-3.04)***
DIVAMT×LOW×DP	1.8308
	(2.17)**
$1/P_C$	-0.1576
	(-0.38)
$1/P_C$×DP	0.1418
	(0.25)
BETA	-0.1077
	(-1.97)**
BETA×DP	0.1147
	(1.45)
IRISK	-0.0450
	(-1.91)*
IRISK×DP	-0.0704
	(-1.33)
Log(SIZE)	0.0372
	(3.09)***
Log(SIZE)×DP	-0.0588
	(-1.63)
Adj. R^2	0.0088

*** Significant at 1%, ** significant at 5%, * significant at 10% using two-tailed tests.