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Ex–Dividend Day Price and Volume: The Case of 2003 Dividend Tax Cut

Abstract - *We examine the impact of the 2003 dividend tax cut, which removes the differential taxation between dividends and capital gains for individual investors, on the ex–dividend day price and trading volume. We find the ex–dividend day price and volume are affected by taxes, risk, and transaction costs. The ex–dividend day price drop ratio (excess return) increases (decreases) and dividend clienteles weaken after the tax cut. Ex–dividend day abnormal volume among high dividend yield stocks decreases after the tax cut consistent with a diminished motivation for tax–induced trading. Our results suggest that individual investors have a measurable effect on the ex–dividend day price and trading volume.*

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INTRODUCTION

On May 28, 2003, President George W. Bush signed into law the Jobs and Growth Tax Relief Reconciliation Act of 2003 (hereafter 2003 Act). The 2003 Act creates lower dividend and capital gains tax rates for individual investors.[1] Dividends were previously taxed at the ordinary income tax rate applicable to each taxpayer. However, under the 2003 Act, dividends received by an individual shareholder are taxed at the same rates that apply to capital gains. By removing the preferential tax treatment of capital gains over dividends for individuals, the 2003 Act provides a unique and significant event to study the impact of taxes and individual investors on the ex–dividend day stock price and trading behavior.

Research has focused extensively on ex–dividend day stock behavior. However, there is no consensus on the explanation for the widely documented phenomenon that the ex–dividend day price drops by less than the amount of the dividend. The tax–based explanation attributes this phenomenon to the preferential taxation of capital gains

[1] Previously, assets held for more than one year were generally taxed at a maximum net capital gains rate of 20 percent (ten percent for taxpayers in the ten and 15 percent tax bracket). A lower rate of 18 percent (eight percent for taxpayers in the ten and 15 percent tax brackets) applied to capital gains on assets held for more than five years (qualified five–year capital gains). Under the 2003 Act, the maximum net capital gains tax for assets held for more than one year was lowered from 20 to 15 percent (and from ten to five percent for taxpayers in the ten or 15 percent tax bracket). These new rates apply to sales and exchanges and payments received on or after May 6, 2003.

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over dividends. Elton and Gruber (1970) proposed the tax clientele theory that the ex–dividend day price drop ratio (PDR) reflects the relative tax rates between dividends and capital gains. Extending the tax clientele theory, Michaely and Vila (1995) propose the dynamic trading clientele theory which argues that investors with differential tax–induced valuation of dividends and capital gains trade with each other around the ex–dividend day, so as to determine the ex–dividend day price and trading volume. The dynamic trading clientele theory combines tax motivations, transaction costs, and the risk tolerance of investors. Two alternative explanations that challenge the tax–based explanation include the short–term arbitrage theory proposed by Kalay (1982). He argues that arbitrageurs dominate the market and exploit any difference between the ex–dividend day price and the dividend such that any difference remaining is equal to transaction costs. Because arbitrageurs dominate the market in the short–term trading theory, tax changes that impact only individuals would not be predicted to impact the ex–dividend day PDR. Secondly, market microstructure arguments suggest that price discreteness (e.g., Bali and Hite, 1998) or bid–ask bounce (e.g., Frank and Jagannathan, 1998) causes the ex–dividend day price drop to be less than the dividend.

Our paper attempts to determine the role of taxes and individual investors in the determination of stock prices and trading volume around the ex–dividend day. We analyze the ratio of price drop to dividend on the ex–dividend day, the excess return and trading volume around the ex–dividend day before and after the 2003 Act. We examine stocks that pay regular taxable cash dividends, excluding closed–end funds, unit investment trusts, exchange traded funds (ETFs), American depository receipts (ADRs), and real estate investment trusts (REITs), between February 2001 and December 2005. By beginning our analysis in February 2001, we avoid the change in the market microstructure and transaction costs associated with stocks converting to decimal quotations through the end of January 2001. We also attempt to address whether individual investors have a significant effect on ex–dividend price behavior around the 2003 dividend tax cut.

Our results support the tax–based explanation for ex–dividend day price and trading behavior. With the removal of the preferential taxation for capital gains over dividends, the ex–dividend day PDR increases and moves toward one while the excess return decreases and moves toward zero. Our results show the dividend clienteles, either in the form of long–term buy and hold clienteles in the model of Elton and Gruber (1970) or in the form of trading clienteles in the model of Michaely and Vila (1995), weaken after the 2003 Act. Also with the reduction of the tax heterogeneity among investors, ex–dividend day abnormal trading volume among high dividend yield stocks significantly decreases after the 2003 Act consistent with a diminished motivation for tax–induced trading.

We also find significant effects associated with transaction costs on the ex–dividend day PDR, excess return and trading volume and risk on the ex–dividend day PDR, and trading volume. These findings are consistent with predictions of the dynamic tax–motivated trading clientele model of Michaely and Vila (1995). Furthermore, given that the 2003 Act only changes the tax rates for individual investors and not tax–exempt institutional investors or corporate investors, our results suggest that individual investors have a measurable effect on the ex–dividend day stock price and trading behavior.

Our study contributes to the literature in the following ways. First, we are among the few to analyze the recent tax cut and its

associated effects on both the ex–dividend day price formation and tax–motivated trading activities around the ex–dividend day in a comprehensive setting. Although other studies analyze the 2003 dividend tax cut, many focus on the tax cut's impact on corporate dividend payouts or the markets reaction to the dividend tax cut (e.g., Amromin, Harrison, and Sharpe, 2006; Auerbach and Hassett, 2006; Chetty and Saez, 2006; and Howton and Howton, 2006). An exception is Chetty, Rosenberg, and Saez (2007) who analyze the effect of the 2003 dividend tax cut on ex–dividend day price and excess returns, but do not examine trading volume. Cloyd, Li, and Weaver (2006) focus on both the effect of price discreteness and the 2003 tax cut on excess returns and trading volume, but their post–Act time period is very short, ending in December of 2003. If individual investor taxes impact security prices, excess returns, and trading volume, this, in turn, can affect various facets of corporate finance, governmental revenue collection, and financial investments. Second, our study provides additional empirical support for the tax–motivated trading clientele model of Michaely and Villa (1995). Lastly, our study suggests that tax laws that influence the relative taxation of individual investors affect individual investors' trading behavior and the price formation of dividend paying stocks.

This paper is organized as follows. The first section describes the related literature regarding the ex–dividend day PDR, excess return and trading volume, and develops our hypotheses on the effect of the 2003 tax cut on the ex–dividend day market behavior. The second section describes our data and empirical methodology. The third section presents our empirical results and the fourth section concludes the study.

THEORY AND HYPOTHESES

Miller and Modigliani (1961) show that when a stock goes ex–dividend, its price theoretically should drop by the amount of the dividend. However, empirical research has widely documented that the price drop is less than the amount of the dividend.[2] There are many explanations for this phenomenon, including the differential tax treatment of capital gains and dividends.

Miller and Modigliani (1961) first propose the idea of dividend clienteles. They argue that while dividend policy may be irrelevant in determining a corporation's value, in imperfect capital markets in which dividends are taxed more heavily than capital gains, investors could form "clienteles" so that investors in high tax brackets hold low dividend yield stocks, while investors in low tax brackets hold high dividend yield stocks. Elton and Gruber (1970) argue that differential taxation of dividends and capital gains affects the behavior of prices on the day stocks pay dividends. In their model, marginal investors are long–term investors, who should be indifferent to selling on the cum–dividend day or ex–dividend day.[3] In equilibrium, ignoring transaction costs and risk, the PDR reflects the ratio of differential tax rates between dividends and capital gains:

$$[1] \quad \text{PDR} = \frac{P_{cum} - P_{ex}}{D} = \frac{1 - t_d}{1 - t_c}$$

where

[2] See for example, Campbell and Beranek (1955), Elton and Gruber (1970), Kalay (1982), Lakonishok and Vermaelen (1983), Barclay (1987), Karpoff and Walkling (1990).

[3] As described by Elton, Gruber, and Rentzler (1984), at the time of the original Elton and Gruber (1970) analysis, transaction costs were sufficiently high to ensure that short–term traders were not setting equilibrium prices on the ex–dividend day.

P_{cum} is the cum–dividend day price,
P_{ex} is the expected ex–dividend day price,
D is the dividend amount,
t_d is the dividend tax rate and
t_c is the capital gains tax rate.

The tax effect on the ex–dividend day share price can also be expressed in terms of excess return. The ex–dividend day realized return is equal to

$$[2] \quad \frac{P_{ex} + D - P_{cum}}{P_{cum}} = \left(1 - \frac{P_{cum} - P_{ex}}{D}\right) \times \frac{D}{P_{cum}} = \frac{t_d - t_c}{1 - t_c} * \frac{D}{P_{cum}}$$

as implied by the static tax clientele model of Elton and Gruber (1970). The excess return for the ex–dividend day is the realized daily return subtracted from the expected return.

Many studies have used changes in tax laws to test the tax clientele theory (or long–term trading hypothesis) of Elton and Gruber (1970). Evidence supporting the tax effect is provided by several studies, e.g., Barclay (1987), Robin (1991), Lasfer (1995), Koski (1996), Lamdin and Hiemstra (1993), Poterba and Summers (1984), Bell and Jenkinson (2002), and Graham, Michaely, and Roberts (2003). However, Michaely (1991) finds the 1986 Tax Reform has no effect on the ex–dividend day price behavior. Michaely argues that individual investors are less influential while institutional and corporate traders play a more significant role on the ex–dividend day price behavior when transaction costs are lower. If the marginal investor is the corporate investor, who has preferential taxation of dividends over capital gains, then the PDR should be greater than one. Eades, Hess, and Kim (1984) find evidence consistent with the tax clienteles if the marginal investors are corporations. Elton, Gruber, and Blake (2005) revisit the tax clientele theory by studying taxable versus nontaxable closed–end funds. They find the PDR for nontaxable closed–end funds is larger than one, which is consistent with the prediction of the tax theory as dividend tax rates are lower than capital gains tax rates.

Several studies extend the work of Elton and Gruber (1970), to investigate how the interaction of taxes, transaction costs, and risk affects ex–dividend day price and volume. Michaely and Vila (1995) develop a dynamic model where ex–dividend day price and volume is a function of tax heterogeneity among traders, aggregate risk tolerance and risk of the individual stock around the ex–dividend day. Investors with differential tax–induced valuation of dividends and capital gains trade with each other around the ex–dividend day which can generate higher volume, higher excess return and a PDR less than one. In the Michaely and Vila model, the PDR reflects the relative tax rates of all market participants, not just the marginal trader's:

$$[3] \quad E(PDR) = \bar{\alpha} - \frac{X(\sigma_e^2 / K)}{D} = \bar{\alpha} - \frac{v}{D/P}$$

where $\bar{\alpha}$ is the average of investors' relative tax preference of dividend to capital gains weighted by their risk tolerance; X is the aggregate demand for securities on the ex–dividend day; σ_e^2 is the ex–dividend day variance; K is the aggregate risk tolerance and v is the risk premium.

Michaely and Vila (1995) also show that trading volume around the ex–dividend day is positively related to tax heterogeneity and negatively related to transaction costs and risk resulting from the deviation from an otherwise optimal portfolio. Empirical support for the dynamic tax–motivated trading hypothesis is provided by Michaely and Murgia (1995), Michaely and Vila (1996), Wu and Hsu (1996), and Dhaliwal and Li (2006).

Alternatively, the short–term trading theory is based on the premise that market pricing is dominated by short–term

arbitrageurs. Kalay (1982) argues that short–term arbitrageurs would exploit any difference between the ex–dividend day price drop and the dividend until they are approximately equal. If transaction costs are zero, the ex–dividend day PDR should be equal to one since arbitrageurs have the same tax rate on their short–term capital gains as on dividends. If transaction costs are small, by assuming a simple form, the PDR should be bounded around one as

$$[4] \quad 1-\frac{\alpha\overline{P}}{D} \leq PDR \leq 1+\frac{\alpha\overline{P}}{D}$$

where $\alpha\overline{P}$ is the expected transaction cost of "a round trip." Lakonishok and Vermaelen (1983), Karpoff and Walkling (1988), Boyd and Jagannathan (1994), and Wu and Hsu (1996) provide support for this explanation.

An alternative microstructure explanation includes Bali and Hite (1998) who argue that the stock price drops less than the dividend because of price discreteness rather than taxes. Frank and Jagannathan (1998) argue that bid–ask bounce contributes to a price drop that is less than the dividend. However, Graham et al. (2003) and Jakob and Ma (2004) examine the effect of changes in price quotation and find no support for the microstructure explanation. Cloyd et al. (2006) show that both price discreteness and differential taxation affect ex–dividend day price behavior.

The 2003 Act significantly lowers the dividend tax rate and removes the preferential taxation of capital gains over dividends for *individual* investors. Hence the examination of the impact of the 2003 Act on the ex–dividend day share price, excess return, and volume behavior provides an opportunity to further examine the tax–based theories. Before the 2003 dividend tax cut, dividends are taxed more heavily than capital gains for individual investors. Individual investors, therefore, prefer capital gains to dividends while tax–exempt institutional investors are indifferent between dividends and capital gains, and corporate investors prefer dividends to capital gains. The 2003 Act increases the relative tax rates on dividends and capital gains for individual investors while other investors' relative tax rates are unchanged.

Because the PDR reflects the relative tax rate of the marginal investor, if the marginal investor is an individual investor, we expect the ex–dividend day PDR to be less than one before the 2003 Act. After the 2003 Act, tax rates for dividend and capital gains are equal for all individual investors. Hence equation [1] predicts that the PDR should increase to one. However, individual investors may still face a relative tax penalty on dividends as they can defer capital gains causing actual capital gains tax rates to remain lower than dividend tax rates even after the 2003 Act.[4] Thus the PDR may increase but still remain lower than one after the 2003 Act. Equation [4] of the dynamic trading clientele model also suggests that as long as individual investors participate in ex–dividend trading, the PDR should increase after the 2003 Act. The average of all investors' relative tax rates increases since the relative tax rates for individual investors increase and the relative tax rates for other investors such as institutional or corporate investors remain the same after the 2003 Act. Similarly, we expect a positive ex–dividend day excess return before the 2003 Act and a decrease in the excess return after the tax cut once dividends and capital gains taxes are equal for individual investors. This leads to our first hypothesis.

[4] Chay, Choi, and Pontiff (2006) find investors are compensated seven cents in unrealized gains for each dollar of realized capital gains, that is, one dollar of realized capital gains is equivalent to 93 cents of unrealized gains.

Hypothesis 1a: The PDR for dividend paying stocks should increase after the 2003 Act and become closer to one.

Hypothesis 1b: The ex–dividend day excess return for dividend paying stocks should decrease after the 2003 Act and become closer to zero.

The dividend clientele theory states that investors in high (low) tax brackets will prefer low (high) dividend paying stocks when there is preferential taxation of capital gains to dividends. Thus, the implied relative tax rates for marginal investors should decrease with dividend yields. As the PDR reflects the marginal investor's tax rate, it should be an increasing function of dividend yield. When the tax differential for individual investors disappears (or weakens due to the deferability of capital gains) after the 2003 Act, equation [1] predicts that the dividend clientele effect will disappear (or weaken). However, to the extent that transaction costs are important and dividend yield proxies transaction costs, the relation between the PDR and the dividend yield becomes uncertain. As dividend yield increases, more individual investors can participate in the ex–dividend day trading due to the lower transaction costs, which will change the aggregate average relative tax rate.[5] Thus, the relation between the PDR (or excess return) and dividend yield becomes an empirical question. Our second hypothesis follows.

Hypothesis 2a: The PDR should be positively correlated with the dividend yield before the 2003 Act and the correlation should weaken or disappear after the 2003 Act.

Hypothesis 2b: The ex–dividend day excess return should be positively correlated with the dividend yield before the 2003 Act and the correlation should weaken or disappear after the 2003 Act.

The dynamic trading clientele theory predicts a large abnormal volume (AV) around the ex–dividend day. Also tax–induced trading around the ex–dividend day results from the differential valuations of dividends versus capital gains among market participants. Because the 2003 Act not only removes the tax heterogeneity among individual investors, but also aligns the tax differential of individual investors with institutional investors and arbitrageurs, the gains of trading become smaller. With the reduction of tax–induced trading motives, ex–dividend day trading volume should decrease. This leads to our third hypothesis.

Hypothesis 3: The trading volume around the ex–dividend day should decrease after the 2003 Act.

Transaction costs play an important role in trading behavior. Trading around the ex–dividend day may be unprofitable when traders face large transaction costs. Since low dividend yield stocks have relatively higher transaction costs than high dividend yield stocks, stocks with a high dividend yield are more likely to show a significant amount of tax–induced trading around the ex–dividend day. Hence, we expect the decrease in the ex–dividend day trading volume to be more significant for high dividend yield stocks. Risk, just like transaction costs, discourages trading around the ex–dividend day. As implied by the dynamic trading model of Michaely and Vila (1995), trading volume is a decreasing function of transaction costs

[5] See Cloyd et al. (2006) for further discussions of how the positive relation between dividend yield and ex–day abnormal returns may be mitigated by heterogeneous tax rates across investors.

and risk. Therefore our last hypothesis is as follows.

> Hypothesis 4: Trading volume is positively related to dividend yield and negatively related to risk and transaction costs.

Given that the 2003 Act only lowers dividend tax rates for individuals, any significant changes on the ex–dividend day price behavior before and after the tax cut would suggest that the ex–dividend day price reflects individual investors' relative tax rates on dividends and capital gains. This would suggest that individual investors' preferences have a measurable impact on ex–dividend day price formation and trading behavior.

DATA AND METHODOLOGY

We collect data from the Center for Research in Security Prices (CRSP). We examine firms that pay taxable regular cash dividends (distribution codes 1222, 1232, 1242, and 1252) to their common stockholders (share codes 10, 11, and 12).[6] We exclude closed–end funds, unit investment trusts, ETFs, ADRs, and REITs because of their different tax treatment and more complex distributions. We eliminate observations where the dividend was less than one cent,[7] where there was no trade on the ex–dividend date, or the price was lower than five dollars.[8] By the end of January 2001, all New York Stock Exchange (NYSE) stocks had converted their price quotations to decimals.[9] Thus, we choose February 2001 as the starting point of our study to avoid the possible effect of the change in the market microstructure. We eliminate year 2003 as the transition year since there may be a lag in investors' restructuring of their portfolios.[10] Therefore we use 2001 (excluding January) and 2002 to represent a distinct pre–Act period and 2004 and 2005 to represent a distinct post–Act period.

To estimate the PDR, we adopt a methodology similar to Michaely (1991). We adjust the ex–dividend day closing price by the expected daily return of the stock.[11] We estimate the expected return using the market model over the window –45 to –2 and +2 to +45, where day zero is the ex–dividend day and the market return is the value–weighted market portfolio (including distributions). Our event window is the same that is used by Michaely and Vila (1995)

$$[5] \quad PDR_i = \frac{P_{i,cum} - \dfrac{P_{i,ex}}{1+E(r_i)}}{D_i}$$

where

$P_{i,cum}$ is the cum–dividend day closing price for stock i,
$P_{i,ex}$ is the ex–dividend day closing price for stock i,
$E(r_i)$ is the expected daily return of stock i, estimated by the market model, and
D_i is the dividend amount for stock i.

[6] The share and distribution codes are the same as those used for the announcement analysis in Chetty et al. (2007).
[7] The minimum tick size is one cent.
[8] Following Elton, Gruber, and Blake (2005) among others, we eliminate observations with prices below five dollars because for low–priced securities, the bid/ask spread is large relative to the dividend and introduces noise into our analysis.
[9] See details in Graham et al. (2003).
[10] Our data show that the PDR is extremely high in the second quarter of 2003 when the Act is enacted and the PDRs of the third and fourth quarter of 2003 are still close to that of 2002, which implies a lag.
[11] The natural ex–dividend price is the opening price. But the opening price is biased because all orders on the books are adjusted by the amount of the dividend. Therefore, we use closing prices and adjust for the daily return on the ex–dividend day (e.g., Elton et al., 2005; Lamdin and Hiemstra, 1993; and Wu and Hsu, 1996).

Due to the large variation in our dividend distribution sample, we winsorize the data at the 2.5 percent level to reduce the effect of outliers.[12] Furthermore, following Michaely (1991), we correct two sources of heteroskedasticity: the security's variance and the dividend yield effect. The stock variance is calculated from the market model and dividend yield is calculated as the amount of the cash dividend divided by the cum–dividend price. As shown in Michaely (1991), the covariance matrix of the disturbances of ex–dividend day PDR is

$$\Omega_{ij} = \begin{cases} \sigma_i^2 / d_i^2 & if \quad i = j \\ 0 & otherwise \end{cases}$$

where σ_i^2 is the variance of stock i, estimated from the market model, and d_i is the dividend yield on stock i.

So the mean PDR is calculated using weighted least squares where:

$$[6] \quad \overline{PDR} = \frac{\sum_{i=1}^{n} (d_i^2 / \sigma_i^2) \times PDR_i}{\sum_{i=1}^{n} (d_i^2 / \sigma_i^2)} .$$

In addition, we use the median of the PDR since the price drop ratio may not be normally distributed. The Wilcoxon sign test is used to test the median difference from one and Wilcoxon–Mann–Whitney test is used to test the difference in the PDR before and after the 2003 Act. The two–sided p–value is reported in the tables.

We also analyze the ex–dividend day excess returns to further examine the ex–dividend day price behavior. We calculated the ex–dividend day excess return on stock i as

$$[7] \quad \frac{P_{i,ex} + D_i - P_{i,cum}}{P_{i,cum}} - E(r_i) .$$

Besides the ex–dividend day, we examine returns of ten days surrounding the ex–dividend day. Our study window is [–5, +5], where day zero is the ex–dividend day. We use [–45, –6] and [6, 45] as our estimation window to calculate the expected return by the market model. We adopt the weighted least squares with the inverse of the standard deviation of the estimation period return as the weight to correct for heteroskedasticity.

Following Michaely and Vila (1995), risk is measured by the variance of the security's return scaled by the variance of the market returns during the estimation period of the market model. Similar to Michaely and Vila (1996), we use market capitalization on the cum–dividend day as a proxy for transaction costs. Our assumption is that large–capitalization stocks are more liquid and have lower transaction costs. To reduce the effect of outliers, we specify the variable as the natural logarithm of market capitalization.

Similar to Michaely and Vila (1995) and Graham et al. (2003), we measure trading volume by stock turnover. Daily turnover is defined as the ratio of daily shares traded to shares outstanding. We compute the average turnover from the average daily turnover for days –45 to –6 and +6 to +45

$$[8] \quad ATO_i = \frac{\sum_{t \in [-45,-6] \cup [+6,+45]} TO_{it}}{T}$$

where TO_{it} is the daily turnover for security i on day t, and T is the number of days with valid volume observations in the estimation period. Then for each day in the

[12] Graham et al. (2003) trim the top and bottom 2.5 percentiles of premium to reduce the effect of outliers in their analysis. As an alternative to winsorizing our data, we trim the top and bottom 2.5 percentiles and the results are qualitatively the same as those reported in the paper.

event window [–5, +5], we calculate the AV as the difference between the stock's actual to average turnover, relative to the average turnover:

$$[9] \quad AV_{it} = \frac{TO_{it} - ATO_i}{ATO_i}$$

The mean daily AV for the sample is computed as

$$[10] \quad AV_t = \frac{\sum_{i=1}^{N} AV_{it}}{N} \qquad t \in [-5, +5]$$

We also compute the cumulative abnormal volume (CAV) of 11 days around the ex–dividend day. The mean of CAV is calculated in the same way as the mean of AV. T–statistics for the volume are calculated using the cross–sectional estimates of the variance of abnormal volume. Given that the daily turnover data is highly skewed, we winsorize the daily AV data at the 2.5 percent level. Data with missing or negative trading volume are deleted from the sample.

EMPIRICAL RESULTS

We begin by providing some overall statistics regarding the dividend behavior of firms (share codes 10–12) tracked by CRSP (distribution codes 1222, 1232, 1242, and 1252) between the period 2001 and 2005 in Table 1.[13] We eliminate firms paying less than a one–cent regular dividend and firms with a stock price lower than five dollars. Based on these restrictions, the number of firms paying regular dividends has increased from 1,751 firms in 2001 to 1,898 firms in 2005. The number of dividend initiations and the number of firms continuing to pay dividends has similarly increased over the period with a corresponding decline in the number of firms discontinuing dividends. Most dramatically, the number of firms initiating dividends more than doubled between 2002 and 2003 (102 to 215) and the number of firms discontinuing dividends went from 310 in 2001 to 119 in 2003.[14] We also document an increasing average annual dividend per share which during the pre–Act period was 0.536 and 0.546

TABLE 1
SUMMARY OF DIVIDEND PAYMENT

	2001	2002	2003	2004	2005
Number of firms paying dividends	1,751	1,661	1,757	1,847	1,898
Number of firms initiating dividends	112	102	215	190	181
Number of firms discontinuing dividends	310	192	119	100	130
Number of firms continuing dividends	1639	1559	1542	1657	1717
Number of firms increasing dividends	707	619	715	844	898
Number of firms with no change in dividends	798	798	684	678	659
Number of firms decreasing dividends	134	142	143	135	160
Average annual dividend amount per share	0.536	0.546	0.547	0.560	0.583
Percentage change in dividend	1.13%	1.87%	0.18%	2.38%	4.11%
Average annual dividend yield	2.57%	2.47%	2.36%	2.11%	2.16%

Note: This table provides summary of firms (share codes 10–12) paying regular dividends (distribution codes 1222, 1232, 1242, and 1252) between 2001 and 2005. Firms paying lower than one–cent dividend or with price lower than five dollars are eliminated. Percentage change in dividend is calculated as (average annualized dividend per share$_t$ – average annualized dividend per share$_{t-1}$)/average annualized dividend per share$_t$.

[13] We eliminate share codes for closed–end funds, unit investment trusts, ETFs, ADRs, REITs, and distribution codes for unknown, unspecified, special, interim, and non–recurring dividends.

[14] Our results appear consistent with Chetty and Saez (2006) who provide detailed analyses of the effect of the dividend tax cut on overall corporate payout policy.

in 2001 and 2002, respectively, while the average annual dividend per share during the post–Act period was 0.560 and 0.583 in 2004 and 2005, respectively.

Table 1 shows that the composition of firms paying dividends across time may be changing substantially. Chetty and Saez (2006) also find that the 2003 Act induced many firms to initiate dividend payments. To avoid introducing a composition bias into the sample, we restrict the remainder of our analysis to firms that pay dividends in all four years of the pre– and post–Act periods that results in a sample of 1,278 firms. Firms may change the amount or frequency of distribution of dividends during the pre– and post–Act periods, however.[15]

PDR AND EXCESS RETURN ANALYSIS

Next we turn our focus to Table 2, Panel A where we present descriptive statistics for the ex–dividend day PDR for each of the four years around the 2003 Act. Unless otherwise noted, all results reported for the PDR are based on the winsorized data to reduce the effect of outliers caused by the large variation in the PDR that arises from a large price change or a tiny dividend. First we note that there are 4,318 and 4,713 dividend distribution events in 2001 and 2002, respectively, while the number of payouts is 4,772 and 4,677 in 2004 and 2005, respectively. Although we restrict the analysis to 1,278 firms that pay

TABLE 2
EX–DIVIDEND DAY PDR

Panel A: PDR for Taxable Quarterly Dividends

Year	2001	2002	2004	2005
Median	0.510***	0.613***	0.763***	0.757***
(Sign test p value)	(0.00)	(0.00)	(0.00)	(0.00)
Mean	0.653***	0.645***	0.857***	0.870***
(t–stat)	(9.68)	(11.14)	(5.92)	(5.65)
Min	–18.81	–16.13	–13.37	–13.90
Max	20.61	18.24	14.63	14.67
S.D	6.68	5.81	4.64	4.62
Sample size	4,318	4,713	4,772	4,677

Panel B: Difference in PDR

	Pre–Act	Post–Act	Post–Pre	Difference (02–01)	Difference (05–04)
Median	0.562***	0.759***	0.197***	0.105***	–0.006
(Wilcoxon p value)	(0.00)	(0.00)	(0.00)	(0.04)	(0.50)
Mean	0.648***	0.864***	0.215***	–0.009	0.012
(t–stat)	(14.74)	(8.17)	(7.40)	(–0.18)	(0.37)
Sample size	9,031	9,449	18,480	9,031	9,449

Notes:
PDR is defined as the cum–dividend day closing price minus the ex–dividend day closing price (adjusted by the expected daily return) divided by the dividend amount. The expected daily return is estimated using the market model with estimation period [–45, –6] and [6, 45]. The market return is defined as the return of the value–weighted market portfolio including distributions. The mean has been corrected for two sources of heteroskedasticity: the security's variance and the dividend yield effect. Data are winsorized at [2.5%, 97.5%]. The sample includes taxable dividend payments (distribution codes 1222, 1232, 1242, and 1252) of common stocks (share codes 10–12) in 2001 (excluding January), 2002, 2004, and 2005. Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005. Wilcoxon sign test p–values are reported for testing the median equal to one and t–statistics are reported for testing the mean equal to one. In Panel B, Wilcoxon–Mann–Whitney test two side p–values are reported for testing the difference in the medians equal to zero and t–statistics are reported for testing the difference in the means equal to zero.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

[15] To determine the sensitivity of our results to requiring firms to pay dividends over all four years of the pre– and post–Act period, we estimate all of our model specifications with the full sample of firms that meet the share and distribution code requirements. Our results are qualitatively the same as those reported unless otherwise noted in the paper.

dividends in all four years, our dividend distribution sample sizes are not equal for several reasons. First, we only capture 11 months of distributions in 2001 due to decimalization. Second, firms may increase or reduce the frequency of payment over the four–year period.

As shown in Panel A of Table 2, the mean PDR is significantly lower than one before the tax cut: 0.653 for 2001 and 0.645 for 2002. After the 2003 Act the mean PDR increases to 0.857 in 2004 and 0.870 in 2005. Analyzing the medians generates similar results. The median PDR increases from 0.510 in 2001 and 0.613 in 2002 to 0.763 in 2004 and 0.757 in 2005.[16] Despite the significant increase in the PDR from 2002 to 2004, the PDR remains significantly less than one. This phenomenon may result from individual investors' ability to defer capital gains which causes capital gains tax rates to remain lower than dividend tax rates for individual investors even after the 2003 Act. Alternatively, a PDR that is less than one is also consistent with the dynamic trading model of Michaely and Vila (1995). Even when the average relative tax rate is one, the risk involved in the ex–dividend day trading results in a PDR that is less than one (see, for example, equation [4]).

We also test the structural change in the PDR by dividing the sample into pre– and post–Act periods, as presented in Panel B of Table 2. The median (mean) PDR increases after the 2003 Act from 0.562 (0.648) to 0.759 (0.864), respectively. The increase in both the median and mean PDR from the pre– to post–Act period is statistically significant at the one percent level. Furthermore there is no significant shift in the mean PDR between 2001 and 2002 or between 2004 and 2005. These results suggest a structural change between the pre– and post–Act periods, thus lending support to our first hypothesis. Absent any shift in the market microstructure such as price discreteness or bid–ask bounce, the structural change in the PDR is associated with the dividend tax cut. Therefore, our data support the tax–based theory on the ex–dividend day price behavior. The relative taxation of dividends and capital gains does affect the ex–dividend day price behavior of stocks.

One potential limitation to our analysis is that we analyze a short–window around the reform. Chetty et al. (2007) perform a similar analysis of the PDR around the 2003 Act and find that although the PDR does rise significantly after the Act, the magnitude of the increase is in large part due to the unusually low value of the PDR during the 2000–2002 period. They argue that there is a time series pattern in the PDR that appears to be unrelated to taxes. To address this concern, we calculate the PDR for 1998 and 1999 since this period captures a similar dividend tax regime as in the 2001 and 2002 period. In results not shown, we calculate the full sample winsorized mean (median) PDR to be 0.754 (0.647) and 0.707 (0.629) for 1998 and 1999, respectively. In 2001 and 2002, we calculate the mean (median) PDR for the full sample to be 0.698 (0.475) and 0.671 (0.558), respectively. We do not restrict the sample to dividend payers for the five–year period between 2001 and 2005 since this would impose an additional survivorship bias on the sample if we extend this requirement back to 1998. Consistent with the findings of Chetty et al. (2007) and Graham et al. (2003), we note that the mean and median PDRs in 1998 and 1999 are higher than the PDRs in 2001 and 2002. However, in our sample of firms, the mean and median PDR after the 2003 Act remains significantly higher than the respective PDRs of 1998 and 1999. Although it appears that the PDR

[16] Our PDR calculations appear reasonable compared to Chetty et al. (2007) who document a median premium of 0.61 in 2002 and 0.74 for 2004.

in 2001 and 2002 is unusually low relative to other time periods, our conclusion that taxes have a significant effect on the PDR appears robust to the choice of alternative pre–Act periods.

Similarly, Table 3 presents the excess returns for ten days surrounding the ex–dividend day for our four year sample period. Consistent with the PDR results, ex–dividend day excess returns are significantly positive. The ex–dividend day excess return is 0.319 percent in 2001 and 0.283 percent in 2002, and it decreases to 0.108 percent in 2004 and 0.119 percent in 2005. Consistent with Eades et al. (1984) and other studies, we find excess returns are not unique for the ex–dividend day. The five trading days before the ex–dividend day generally have positive excess returns while the five trading days after the ex–dividend day generally have negative excess returns or excess returns insignificantly different from zero. But the excess returns of the ex–dividend day are much larger in magnitude compared to other trading days. These patterns can be seen from Figure 1. Figure 1 also illustrates that excess returns for days surrounding the ex–day in the post–Act period are smaller and less volatile than those in the pre–Act period.

To examine the relation between the dividend yield and the PDR, we perform regressions where PDR is our dependent variable, as shown in Table 4, Panel A. Consistent with the predictions of the dividend clientele theory, regression (1) shows that there is a positive and significant relation between dividend yield and PDR in both the pre– and post–Act periods. The coefficient on the dividend yield in the post–Act period is much smaller than that in the pre–Act period, indicating the weakening of the dividend yield effect. Based on the dynamic trading clientele theory, we include a proxy for risk (σ_i^2 / σ_m^2) and transaction costs (log of market capitalization) in regressions (2), (3), and (4). Consistent with the theory, we find a significant negative relation between risk and a significant positive relation between market capitalization and the PDR in all but one specification (Pre–Act) where risk is insignificant.[17] In

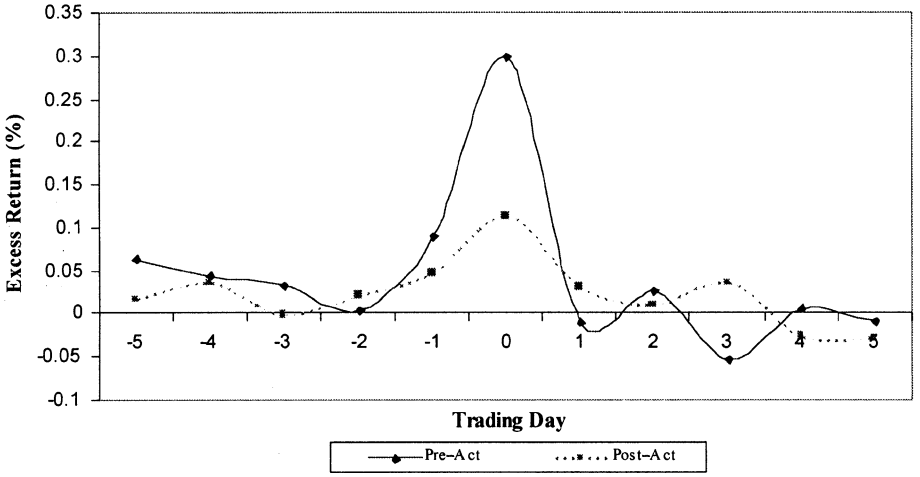
TABLE 3
EXCESS RETURN FOR THE TEN DAYS SURROUNDING THE EX–DIVIDEND DAY

	2001		2002		2004		2005	
Day	ER(%)	t–stat	ER(%)	t–stat	ER(%)	t–stat	ER(%)	t–stat
–5	0.041	1.41	0.080***	3.38	0.014	0.73	0.018	0.88
–4	0.017	0.60	0.067***	2.66	0.045**	2.45	0.044**	2.50
–3	–0.002	–0.09	0.061**	2.52	–0.025	–1.36	0.019	1.10
–2	0.016	0.59	–0.003	–0.14	0.055***	3.12	–0.010	–0.48
–1	0.159***	5.67	0.038***	1.59	0.052***	2.99	0.042**	2.13
0	**0.319*** **	**10.77**	**0.283*** **	**11.33**	**0.108*** **	**6.01**	**0.119*** **	**6.54**
1	0.028	0.97	–0.037	–1.46	0.010	0.56	0.047	2.76
2	0.016	0.58	0.038	1.57	0.002	0.09	0.018	1.04
3	–0.062**	–2.21	–0.046*	–1.85	0.043*	1.77	0.027	1.51
4	–0.026	–0.90	0.031	1.35	–0.039**	–2.20	–0.015	–0.88
5	0.003	0.13	–0.015	–0.63	–0.012**	–0.68	–0.045***	–2.77

Notes:
The excess return is the return above that predicted by the market model. The market return is defined as the return of the value–weighted portfolio including distributions. The estimation period for the market model is [–45, –6] and [6, 45]. Weighted least squares are used to calculate the average excess return with the inverse of the standard deviation of the estimation period return as the weight. Excess returns in the 11–day event window [–5, +5] are presented (ex–dividend day = 0). T–statistics are for testing the null hypothesis that mean excess return is zero. Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

[17] If we estimate Panel A of Table 4 for the full sample of firms without restricting the sample to dividend payers in all four years, the risk measure becomes insignificant in the post–Act period.

Figure 1. Excess Return for the Ten Days Surrounding the Ex–dividend Day



the pre–Act period, the dividend yield effect is very strong, which may dominate the effect of risk. Because stocks with large firm size tend to have lower transaction costs, the positive relation between the PDR and market capitalization indicates a negative association between transaction costs and the PDR. The 2003 Act significantly increases the average PDR even after controlling for dividend yield, risk, and market capitalization, as reflected in the significant positive coefficient on a post–Act dummy variable in regression (3). In column 4, we interact the dividend yield with our post–Act dummy variable to further determine whether dividend clienteles weaken after the reduction in dividend taxes for individuals. The coefficient on the interaction term (–18.121) is negative and significant, suggesting that the dividend clienteles weaken significantly after the 2003 Act.

We similarly analyze the relation between dividend yield and ex–dividend day excess returns with results reported in Panel B of Table 4. Regression (1) shows that the dividend yield effect is significant in the pre–Act period and is insignificant in the post–Act period. Regression (2) shows that market capitalization has a significant effect on excess returns in both pre– and post–Act periods, indicating that transaction costs have a significant positive effect on ex–dividend day excess returns. Risk, however, is insignificant in all model specifications, consistent with the finding of Michaely and Villa (1995). They argue that this result is consistent with the notion that only beta risk is priced, as excess returns are already beta adjusted.

We also test the structural change in ex–dividend day excess returns before and after the 2003 Act. The average excess return declines after the tax cut, as reflected in the significant negative coefficient on a post–Act dummy variable in regression (3). This result lends further support to our first hypothesis that the relative taxation of dividends and capital gains does affect the ex–dividend day excess return behavior of stocks. We further add the interaction term of the dividend yield with the post–Act dummy variable into regression (4). The excess return is positively related to the dividend yield, but the relation weakens in the post–Act period, as indicated by

TABLE 4
TESTS OF THE CHANGE IN DIVIDEND CLIENTELES

	Pre–Act		Post–Act		Full Sample	
	(1)	(2)	(1)	(2)	(3)	(4)
Panel A: PDR						
Intercept	0.377***	–0.511***	0.820***	0.124	–0.166**	–0.352***
	(7.71)	(–3.92)	(37.39)	(1.14)	(–2.10)	(–3.97)
Yield	23.60***	22.312***	3.248***	4.405***	5.868***	22.542***
	(6.38)	(6.04)	(3.06)	(3.98)	(5.57)	(6.08)
Risk		–0.016		–0.014**	–0.015***	–0.013**
		(–0.94)		(–2.39)	(–2.71)	(–2.41)
Market cap		0.066***		0.046***	0.054***	0.054***
		(7.92)		(6.93)	(10.49)	(10.38)
PostDum					0.147***	0.357***
					(4.76)	(6.56)
Interaction term (Yield) × (Dummy)						–18.121***
						(–4.69)
Sample size	9,031	9,031	9,449	9,449	18,480	18,480
R2	0.0045	0.0118	0.001	0.0078	0.0113	0.0125
Panel B: Excess Returns (%)						
Intercept	0.173***	1.106***	0.098***	0.546***	0.746***	0.779***
	(4.74)	(9.61)	(4.12)	(6.36)	(10.90)	(10.63)
Yield	19.279***	10.706**	2.579	1.441	18.036***	13.720***
	(4.01)	(2.18)	(0.78)	(0.43)	(5.13)	(2.81)
Risk		–0.006		–0.002	–0.005	–0.004
		(–0.54)		(–0.60)	(–1.34)	(–1.15)
Market cap		–0.060***		–0.028***	–0.039***	–0.039***
		(–8.80)		(–5.61)	(–9.77)	(–9.69)
PostDum					–19.108***	–0.056
					(–6.01)	(–1.28)
Interaction terms (Yield) × (Dummy)						–12.825**
						(–2.19)
Sample size	9,031	9,031	9,449	9,449	18,480	18,480
R2	0.0018	0.0103	0.0001	0.0034	0.0093	0.0094

Notes:
We test the change in dividend clienteles. The dependent variable of regressions in Panel A is the PDR. Weighted least squares are utilized to correct for heteroskedasticity with the ratio of squared dividend yield to the stock's variance as the weight. The dependent variable of regressions in Panel B is the ex–dividend day excess returns. Weighted least squares are used to calculate the average excess return with the inverse of the standard deviation of the estimation period return as the weight. Data are winsorized at [2.5%, 97.5%]. T–statistics are in parentheses under the parameter estimates. Dividend yield is calculated by dividing the dividend amount by the cum–dividend day closing price. Risk is measured by the variance of the security's return scaled by the variance of the market returns during the estimation period [–25, –6] and [6, 25]. Market cap is the natural logarithm of the market capitalization on the cum–dividend day (i.e., cum–dividend day price multiplied by the outstanding shares). Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005. PostDum = 0 for pre–Act period, and 1 otherwise.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

the statistically significant negative coefficient of the interaction term: –12.825 percent. The results in Table 4 Panels A and B provide support for our second hypothesis that predicts a weakening of the dividend clienteles.

To gain further insight into dividend tax clienteles, we separate our sample into four dividend yield groups based on Graham et al. (2003) as follows (right–endpoint inclusive):[18] annualized dividend yield less than or equal to two percent, between two and four percent, between four and six percent, and greater than six percent. Table 5 presents the mean and median PDR of each dividend yield group. In the pre–Act period, the mean (median) PDR is significantly lower than one for each dividend yield group except the highest group which has a PDR that is insignificantly different from one. The mean (median) PDR is higher in the post–Act period than in the pre–Act period for each dividend yield group. The highest dividend yield group has a PDR higher than one in the post–Act period, consistent with the notion that the marginal investor for the highest dividend yield stocks are corporate investors. We also note that the standard deviation decreases in the post–Act period relative to the pre–Act period. We graph the mean PDR of each dividend yield group in Figure 2.[19] We illustrate that the mean PDR of each dividend yield group after the tax change is larger than before the tax change. The entire PDR curve shifts up and is less varied in the post–Act period compared to the pre–Act period.

Contrary to the prediction of the dividend tax clientele theory that a positive relation exists between the PDR and the dividend yield, we find a U–shaped relation in the pre–Act period. As the dividend clientele theory predicts, investors in the high tax brackets tend to hold

TABLE 5
PDR GROUPED BY DIVIDEND YIELD

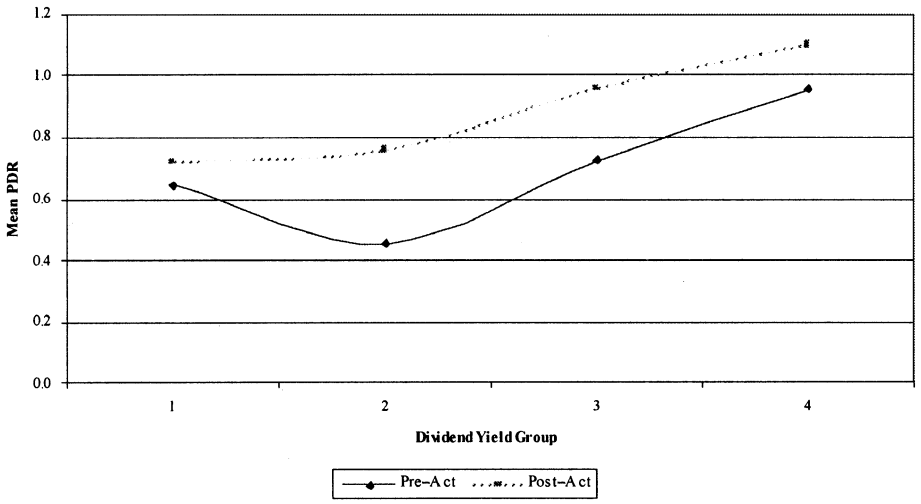
Group	Dividend Yield (y)	N	Median	S.D.	Mean	SE
			Pre–Act			
1	y<=2%	4,094	0.547***	8.653[a]	0.648***	0.077[b]
2	2%<y<=4%	3,673	0.451***	3.274[c]	0.456***	0.039[c]
3	4%<y<=6%	1,052	0.751***	1.826[c]	0.731***	0.044[c]
4	y>6%	212	0.998	1.466	0.958	0.065
			Post–Act			
1	y<=2%	4,749	0.712***	6.144	0.719***	0.049
2	2%<y<=4%	3,839	0.686***	2.396[c]	0.760***	0.026[c]
3	4%<y<=6%	721	0.932**	1.196[c]	0.958	0.031[b]
4	y>6%	140	1.157**	1.454	1.100**	0.049

Notes:
We separate the sample into groups based on annualized dividend yields. Data are winsorized at [2.5%, 97.5%]. The mean PDR is adjusted for heteroskedasticity. Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005. Statistical significance for testing mean or median PDR different from one is indicated in the table. We also test for the difference between the PDR of the dividend yield group and the next higher dividend yield group (e.g., group 1 to group 2).
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.
[a], [b], and [c] indicates statistically significant (10%, 5%, and 1% levels) difference from the next dividend yield group.

[18] Graham et al. (2003) divide observations based on quarterly dividend yields into five groups: less than 0.5 percent, between 0.5 and one percent, between one and 1.5 percent, between 1.5 and 2.0 percent, and greater than 2.0 percent. Because we have a very small number of observations with an annual dividend yield greater than eight percent (2% × 4), we combine these observations into the fourth group.

[19] The graph of the median PDR shows a similar pattern.

Figure 2. PDR by Dividend Yield Group



low dividend paying stocks, which should lead to a low PDR. But in our sample, the PDR of the lowest dividend yield group (group 1—with an annual dividend yield less than or equal to two percent) is significantly higher than that of the next higher dividend yield group. We are not the first to document such a pattern, as similar results appear in Elton and Gruber (1970), and Michaely (1991) among others. Elton and Gruber (1970), however, attribute the high PDR for the low dividend yield stocks to the bias of the data as small dividends drive the PDR misleadingly high or to the large standard deviation of their results. In our study, we winsorize the data to reduce the impact of outliers and correct for heteroskedasticity of the dividend yield effect by assigning lower weights to low dividend yield stocks. Cloyd et al. (2006) discuss several factors which may distort the positive relation between the dividend yield and the ex–dividend day PDR (or excess return). In the post–Act period, the PDR and the dividend yield generally exhibit a positive relation.

We find similar results, as outlined in Table 6, when analyzing the ex–dividend day excess return behavior across the same dividend yield groups. We find that ex–dividend day excess returns for all the dividend yield groups are significantly positive before the 2003 Act. After the 2003 Act, excess returns decline significantly relative to pre–Act returns for each dividend yield group, and the two highest dividend yield groups have insignificant excess returns. Figure 3 illustrates the arch shape of the excess returns across dividend yield groups, which corresponds with the U–shape of the PDR depicted in Figure 2. Low (high) dividend yield stocks exhibit a positive (negative) relation between the excess return and the dividend yield. Our high dividend yield result is consistent with the findings of Naranjo, Nimalendran, and Ryngaert (2000) who suggest that the clientele for high dividend yield stocks are corporate investors.

ABNORMAL TRADING VOLUME ANALYSIS

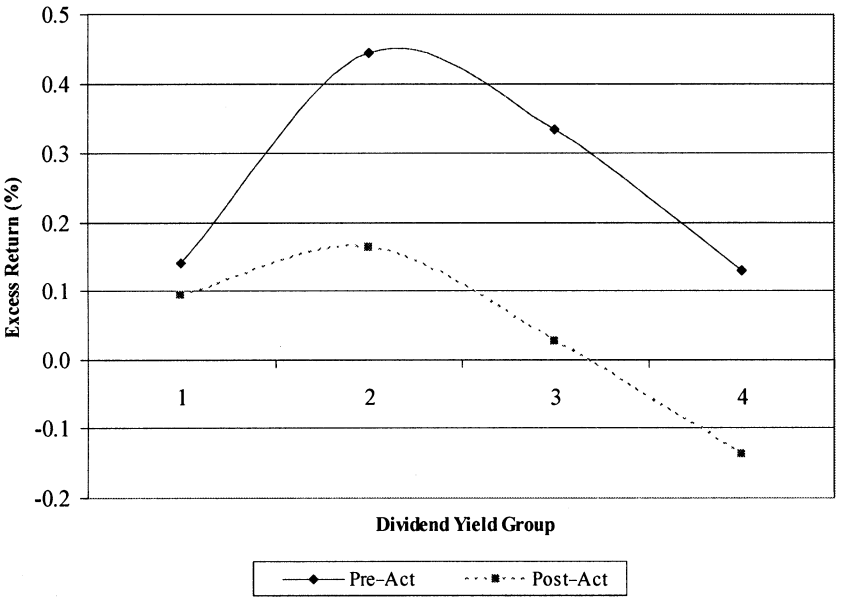
As previously hypothesized, we expect that the trading volume around the ex–dividend day will decrease significantly after the 2003 Act (Hypothesis 3) and that the

TABLE 6
EXCESS RETURN GROUPED BY DIVIDEND YIELD

		Pre–Act			Post–Act		
Group	Dividend Yield (y)	N	ER (%)	SE (%)	N	ER (%)	SE (%)
1	y<=2%	4,094	0.142***	0.030[c]	4,749	0.094***	0.019[b]
2	2%<y<=4%	3,673	0.443***	0.029[a]	3,839	0.163***	0.020[c]
3	4%<y<=6%	1,052	0.333***	0.052	721	0.027	0.036[b]
4	y>6%	212	0.130	0.122	140	–0.137	0.111

Notes:
We separate the sample into groups based on annualized dividend yields. The mean excess return is adjusted for heteroskedasticity. Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005. Standard errors for the mean excess return are reported. Statistical significance for testing mean excess return different from zero is indicated in the table. We also test for the difference in the excess return between the dividend yield group and the next higher dividend yield group (e.g., group 1 to group 2).
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.
[a], [b], and [c] indicates statistically significant (10%, 5%, and 1% levels) difference from the next dividend yield group.

Figure 3. Ex–dividend Day Excess Return by Dividend Yield Group



trading volume will be positively related to dividend yield and negatively related to risk and transaction costs (Hypothesis 4). Thus, to analyze tax–induced trading around the ex–dividend day, we estimate abnormal trading volume for ten days surrounding the ex–dividend day for the pre– and post–Act period. We also analyze abnormal trading volume for high dividend yield stocks that we define as an annualized dividend yield greater than four percent. We use four percent since Graham et al. (2003) find that most AV activity occurs in stocks with quarterly dividend yields above one percent and argue that the result is consistent with greater dividend capture activity where the payoff to such activity is highest.

Analyzing the full sample results in Table 7, Panel A, we find significant positive AV for most of the 11 days around the ex–dividend day and AV is much higher

TABLE 7
THE AV FOR THE TEN DAYS SURROUNDING THE EX–DIVIDEND DAY

	Panel A: Full Sample				Panel B: High Dividend Yield			
	Pre–Act		Post–Act		Pre–Act		Post–Act	
Day	AV (%)	t–stat	AV (%)	t–stat	AV (%)	t–stat	AV (%)	t–stat
–5	2.83***	2.42	7.75***	5.55	2.10	0.89	3.44	1.81
–4	4.96***	3.10	6.81***	5.00	3.12	1.30	0.48	0.25
–3	2.31	1.75	5.51***	3.75	–0.09	–0.04	4.24*	2.10
–2	0.78***	0.56	4.91***	3.43	0.60	0.25	9.90***	4.76
–1	12.48***	6.98	11.90***	6.01	35.86***	9.79	18.02***	8.25
0	18.44***	7.08	7.72***	7.32	28.62***	8.43	19.83***	8.36
1	6.05***	2.53	2.60**	2.07	3.38	1.38	0.95	0.49
2	13.07***	2.53	3.40***	2.84	2.82	1.05	–0.64	–0.32
3	0.16	0.12	3.08***	2.80	–1.95	–0.84	2.72	1.38
4	–0.42	–0.20	1.30	1.18	–4.19	–1.75	–0.63	–0.34
5	0.11	0.07	2.44***	2.28	–1.53	–0.66	–2.64	–1.13

Notes:
AV is defined as the difference between a stock's actual to average turnover, relative to the average turnover. Daily turnover is defined as the ratio of daily shares traded to shares outstanding. We compute the average turnover by using the estimation period [–45, –6] and [6, 45]. Data are winsorized at [2.5%, 97.5%]. T–statistics for testing whether AV is equal to zero are computed using the cross–sectional estimates of the variance of AV. Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005. The high dividend yield sample is those stocks with an annualized dividend yield greater than 4%. The CAV in Figures 4 and 5 is the sum of the AV up to and including that day.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

on the cum–dividend day (day –1) and ex–dividend day (day 0) than the other days. Panel B of Table 7 shows even higher AV for high dividend yield stocks, which is consistent with the tax–induced trading theory. When the dividend yield is high, the tax benefit of exchanging dividends and capital gains is greater, thus providing greater motivation for investors to trade. In the pre–Act period, the high dividend yield stocks have an average AV of 35.86 percent on the cum–dividend day and 28.62 percent on the ex–dividend day. In the post–Act period, the AV decreases to only 18.02 percent on the cum–dividend day and 19.83 percent on the ex–dividend day. Figure 4 depicts the CAV from days –5 to +5 for the pre– and post–Act period. The CAV for the pre– and post–Act period does not exhibit a pronounced difference for the full sample of dividend paying firms. Figure 5 depicts the CAV only for the high dividend yield stocks. For the high dividend yield sample, the post–Act period CAV is lower than that in the pre–Act period particularly after the cum–dividend day.

We also calculate the CAV as the sum of the AV during the 11–day event window encompassing the ex–dividend day. We further separate the sample into low–, medium– and high–yield dividend paying groups (annual dividend yields less than or equal to two percent, two to four percent, and greater than four percent, respectively). We present the average CAV for the 11–day event window in Table 8. For the full sample, the CAV is 27.29 percent before the 2003 Act and 31.53 percent after the 2003 Act. The difference is not significant at conventional levels. However, when we separate the sample into low–, medium– and high–yield groups, the strong positive relation between dividend yield and trading volume becomes obvious. The magnitude of the CAV for the low–yield group (3.22 percent) and the medium–yield group (0.49 percent) before the 2003 Act is insignificant from zero and much lower than that of the high–yield group (183.14 percent). In the post–act period, the CAV of the low– and medium–yield groups increases to 16.44 percent and 34.58 percent, respectively. But only the change in the medium–yield

Figure 4. Cumulative Abnormal Volume

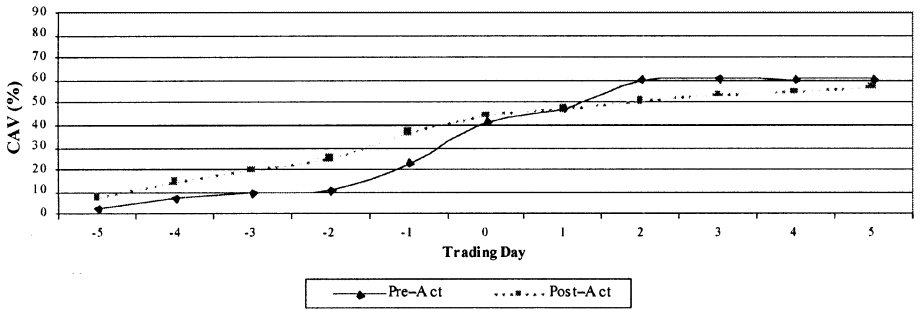
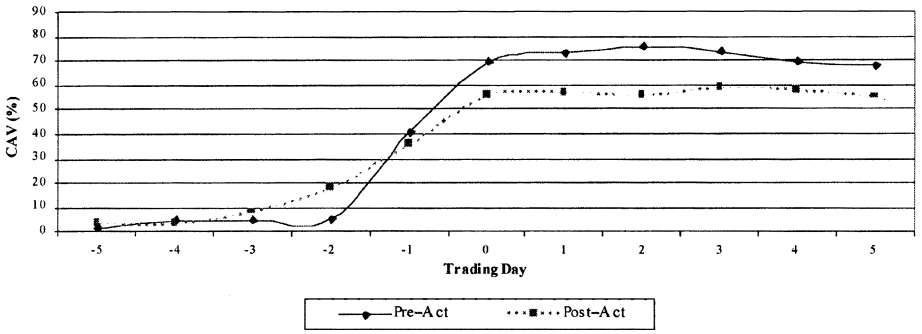


Figure 5. CAV of High Dividend Yield Group



group is statistically significant. Alternatively, the CAV of the high–yield group declines significantly after the 2003 Act to 101.12 percent. These results are generally consistent with our fourth hypothesis. With the reduction of the tax heterogeneity in the market, ex–dividend day trading volume decreases for high dividend yield stocks as the tax–induced motives to trade decrease. However, the overall trading volume is not significantly different between pre– and post–Act since most of our sample is low– and medium–dividend yield stocks.[20] For low– and medium–yield dividend paying stocks, most trading may be for non–tax reasons since a small dividend is not attractive in terms of tax considerations, however, investors may time their trading around the ex–dividend day to capture abnormal returns. Thus, the effect of the reduction in tax heterogeneity on tax–motivated trading does not show up in the full sample results.

We also analyze the effect of risk and transaction costs on the ex–dividend day

[20] If we estimate the full sample without winsorizing the data, we find that the overall CAV significantly decreases in the post–Act period. We also estimate AV utilizing the log of turnover as described by Chae (2005), but find that our results are highly sensitive to this adjustment. We note that much of the abnormal trading volume activity occurs for high dividend yield stocks. Thus, mitigating the effect of the high dividend yield stocks on abnormal trading volume makes it difficult to draw inferences regarding dividend clienteles. Therefore, we caution the reader that our results are sensitive to the choice of proxy for abnormal trading volume and the trimming of volume data.

TABLE 8
CUMULATIVE ABNORMAL VOLUME

	Pre–Act		Post–Act		Post–Pre
	N	CAV (%)	N	CAV (%)	CAV (%)
Full sample	9,031	27.29***	9,449	31.53***	4.24
		(4.99)		(7.28)	(0.61)
Low–yield group	4,094	3.22	4,749	16.44***	13.22
		(0.44)		(2. 78)	(1.41)
Medium–yield group	3,673	0.49	3,839	34.58***	34.09***
		(0.06)		(4.90)	(3.03)
High–yield group	1,264	183.14***	861	101.12***	–82.03***
		(10.48)		(7.22)	(–3.66)

Notes:
The CAV is the sum of the AV during the 11–day event window encompassing the ex–dividend day. Data are winsorized at [2.5%, 97.5%]. Low dividend yield group has an annualized dividend yield less than or equal to 2%. High dividend yield group has an annualized dividend yield greater than 4%. The remainder of the sample is the medium–yield group. Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 9
TESTS OF THE CHANGE IN THE CAV

	Full Sample	High–Yield Group	Medium–Yield Group	Low–Yield Group
Intercept	–3.165***	–3.652***	–2.848***	–1.758***
	(–15.14)	(–5.73)	(–6.69)	(–5.15)
PostDum	0.176**	–0.820***	0.334***	0.295***
	(2.34)	(–3.21)	(2.74)	(2.92)
Yield	28.419***	28.021***	–1.609	0.092
	(13.18)	(5.41)	(–0.16)	(0.01)
Risk	–0.018**	–0.091**	0.011	–0.032***
	(–2.49)	(–3.15)	(0.91)	(–3.44)
Beta	–0.421***	–0.890***	–0.417***	–0.316***
	(–6.03)	(–3.37)	(–3.77)	(–3.38)
Market cap	0.213***	0.338***	0.228***	0.139***
	(15.69)	(7.54)	(10.58)	(6.95)
Sample size	18,480	2,125	7,512	8,843
R2	0.0226	0.0610	0.0165	0.0092

Notes:
We test the structural changes in CAV ten days surrounding the ex–dividend day. The dependent variable of the Ordinary Least Squares model is the CAV. Data are winsorized at [2.5%, 97.5%]. Pre–Act period is from February 1, 2001 to December 31, 2002; Post–Act period is from January 1, 2004 to December 31, 2005. PostDum = 0 for Pre–Act period and 1 otherwise. Low–yield group has an annualized dividend yield less than or equal to 2%. High–yield group has an annualized dividend yield greater than 4%. The remainder of the sample is the medium–yield group. Dividend yield is calculated by dividing the dividend amount by the cum–dividend day closing price. Risk is measured by the variance of a security's return scaled by the variance of the market return during the estimation period [–25, –6] and [6, 25]. Beta is obtained from the OLS market model. Market cap is the natural logarithm of the market capitalization on the cum–dividend day (i.e., cum–dividend day price multiplied by the outstanding shares). T–statistics for testing the difference from zero are in parentheses.
*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

trading volume. Following Michaely and Vila (1996), we regress CAV on dividend yield, idiosyncratic risk, beta, market capitalization, and a post–Act dummy variable for the full sample and each of the three dividend yield groups. Results are shown in Table 9. We find a significant negative relation between idiosyncratic risk and trading volume for high– and low–yield stocks, but an insignificant relation between idiosyncratic risk and trading volume for medium–

yield stocks.[21] The coefficients of beta are significantly negative for all groups, consistent with the finding of Michaely and Vila (1996). Also the coefficient on market capitalization is positive and significant in all specifications that is consistent with the prediction that transaction costs decrease trading volume. In addition, we find the dividend yield effect is only significant for the high–yield sample and the full sample. The cumulative trading volume for high dividend yield stocks significantly declines after the 2003 Act even after controlling for risk, transaction costs, and market risk, indicated by the significant negative coefficient on the post–Act dummy variable: –0.820. In general, our results support a positive relation between trading volume and dividend yield, a negative relation between trading volume and risk, and a negative relation between trading volume and transaction costs as predicted by the fourth hypothesis, but our results appear to be driven by high dividend paying stocks.

CONCLUSION

The paper examines the effect of the 2003 Act on investor behavior. The net effect of the 2003 Act was to align the tax rates on capital gains and dividends for individual investors, whereas previously individual investors paid a higher rate on dividend income relative to capital gains. We find that more corporations tend to pay dividends in the post–Act period. We also find that dividend paying firms increased the amount of dividends per share, but the dividend yield tends to decrease in the post–Act period. Analyzing tax relevance versus tax irrelevance on ex–dividend day market behavior, our findings support the tax–based view that the relative taxation of dividends versus capital gains does affect ex–dividend day price and trading behavior. We find that the ex–dividend day PDR increases and the excess return decreases in the post–Act period.

We also find evidence that overall dividend clienteles weaken after the 2003 Act as evidenced by a decrease in the relation between the dividend yield and the ex–dividend day PDR (or excess return). Consistent with the trading clientele theory, we find a significant effect of transaction costs on the ex–dividend day PDR and excess returns, and a significant effect of risk on the PDR. As the tax heterogeneity among investors is reduced after the Act, tax–motivated trading around the ex–dividend day declines significantly for high dividend yield stocks. We also find that trading volume is negatively related to risk and transaction costs and positively related to dividend yield although the result appears to be driven by high dividend yield stocks. We interpret our results to be generally consistent with the dynamic trading clientele model of Michaely and Vila (1995). The ex–dividend day stock price and trading behavior is jointly affected by relative taxation of dividend versus capital gains, risk, and transaction costs. Given that the 2003 Act only affects the relative tax rates for individual investors, our results suggest that individual investors play an important role in ex–dividend day price formation and trading activities.

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[21] If we estimate Table 9 for the full sample of firms without restricting the sample to dividend payers in all four years, we find a negative and significant relation between idiosyncratic risk and trading volume in all four specifications.

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