

Ex-Dividend Day Stock Price Behavior: Evidence from the 2003 Tax Cut

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This paper analyzes the behavior of ex-day prices when one of the imperfections is naturally removed as a result of the 2003 U.S. tax legislation, and attempts to observe if the ex-day price drop is affected by taxes. This equality of tax rates provides for an ideal condition under which the interaction between the ex-day price behavior and taxes can be examined. Consistent with the tax-effect hypothesis, I find that the price change-to-dividend ratio increased significantly after the elimination of preferential tax treatment of capital gains. Moreover, this evidence also contrasts the short-term trading hypothesis, since the new law did not change the tax incentives of short-term traders. The significant change in the ratio shows that the market is not dominated by short-term traders instead the marginal stockholders are long-term individual investors.

INTRODUCTION

Among the most contentious subjects in the corporate finance literature, the one on the behavior of share prices around the ex-dividend days and the factors behind this behavior stands out with its deep implications for corporate dividend policy and remains an unresolved issue. Miller and Modigliani (1961) argue that in perfect capital markets, where the investment policy is fixed, dividend policy does not affect the value of the firm. If dividends are taxed at higher rates than capital gains, then individual investors may require higher pre-tax rates of return from dividend paying stocks in such a manner that after-tax rates of return would be equal for dividend paying and non-paying stocks, subsequently raising the cost of capital for dividend paying firms. Hence, the tax rates of a firm's marginal stockholders should be related to the ex-dividend day price behavior of the common stock. If this is the case, then calculating its marginal stockholders' tax bracket, each firm may obtain its cost of capital.

In a frictionless economy the price of a share should fall by the full amount of the dividend on the ex-dividend day. However, the overwhelming majority of the empirical work shows that stock prices drop by less than the dividend amount on that day. This paper analyzes the behavior of ex-day prices when one of the market imperfections is naturally removed as a result of the U.S. tax legislation and attempts to observe if the ex-day price drop is affected by taxes. Since the signing of the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA from here onwards) into law on May 28, 2003, dividends have been taxed at the same rate as capital gains, which is 15% for most individual taxpayers. This equality of tax rates provides for an ideal condition under which the interaction between the ex-day price behavior and taxes can be examined by comparing the test-statistic developed by Elton and Gruber (1970) from the periods before and after the new tax law was enacted.

Consistent with the tax-effect hypothesis, it is found that the price change (from the day before the ex-day to the ex-day)-to-dividend ratio (PCDR from here onwards) increased significantly after the elimination of preferential tax treatment of capital gains. Moreover, this evidence also contrasts the short-term trading hypothesis, since JGTRRA did not change the tax incentives of short-term traders. The fact that a significant change in the ratio is observed shows that the market is not dominated by short-term traders; instead the marginal stockholders are individual investors.

REVIEW OF THE LITERATURE

Perhaps the earliest empirical test of the ex-day stock price behavior is that of Campbell and Beranek (1955), who first provided evidence to a price drop less than the full dividend amount. Analyzing NYSE data, they found that the drop in ex-day prices averages 90% of the dividend amount. Duran and May (1960) studied the ex-dividend day behavior of AT&T shares and observed a price drop equal to 96% of the dividend amount.

Elton and Gruber (1970) formalized the ex-day price behavior with a tax hypothesis. Assuming market equilibrium, they argued that a shareholder must be indifferent between selling her stock on the ex-day and selling it on the preceding day. So if the shareholder were to sell the stock on the day preceding the ex-dividend day, she receives the price of the stock on the day before ex-day P_w , pays the capital gains tax rate t_c on the excess of the share price over the price at which the stock was purchased P_c . Hence, her resulting wealth is then $P_w - t_c(P_w - P_c)$. On the other hand, if the investor were to wait and sell the stock on the ex-day, she receives the ex-day price P_x , pays the capital gains tax rate t_c on the excess of the share price over the price at which the stock was purchased, and receives the remainder of the dividend D after paying the dividend income tax rate t_d on it. Then, her resulting wealth is $P_x - t_c(P_x - P_c) + D(1 - t_d)$. For the investor to be indifferent between selling on the ex-day and the preceding day, it must be the case that $P_w - t_c(P_w - P_c) = P_x - t_c(P_x - P_c) + D(1 - t_d)$. Rearranging, one gets

$$\frac{P_w - P_x}{D} = \frac{1 - t_d}{1 - t_c}. \quad (1)$$

For convenience, the left-hand-side of this equation will be called PCDR (price change-to-dividend ratio). It is the test statistic this paper employs in order to measure the tax effects on ex-day price behavior. PCDR represents the ex-day behavior that would cause a shareholder with a certain set of taxes t_d and t_c to be indifferent between selling on the ex-day or the day before. Furthermore, Elton and Gruber (1970) argued that PCDR should reflect the marginal shareholder tax brackets and observing this statistic, they calculated the tax rates of marginal investors. Moreover, analyzing the data of all stocks listed on the NYSE, they found that the price drop on the ex-dividend day constitutes 0.7868% of the full dividend amount.

After the publication of this 1970 paper, four different branches of work on this topic have been motivated. The first of these mainly replicate the Elton and Gruber test on non-U.S. markets or on U.S. markets during different time periods. The second branch of work compares the above-defined PCDR measure around changes in tax laws to observe if the ex-day price behavior is related to changes in tax policy. Comparing the ex-day behavior before the enactment of the federal income tax law (sample period from 1900 to 1910) and after the enactment (sample period from 1962 to 1985), Barclay (1987) finds a significant drop in the PCDR after the preferential treatment of capital gains was enforced. This confirms Elton and Gruber's (1970) tax-effect hypothesis. Utilizing a different methodology, Poterba and Summers (1984) also find evidence supportive of the tax-effect hypothesis. On the other hand, Michaely examines the PCDR around the 1986 Tax Reform Act, which eliminated the preferential treatment of capital gains taxes and finds that the direction of the test-statistic is in the opposite direction of predicted by the tax-effect hypothesis.

Kalay (1982) and Miller and Scholes (1982) initiated the third branch of related research (short-term trading hypothesis) and argued that the ex-dividend price drop is not linked to the tax effect but to the activity of short-term traders, whose dividend income and capital gains are taxed at equal rates. Hence, these short-term traders are able to capture the arbitrage profit by buying cum-dividend and selling ex-dividend if the ex-day stock price drop is less than the full amount of the dividend. Lakonishok and Vermaelen (1986), observing high or abnormal trading volumes around the ex-dividend days argued that this must be evidence supporting the short-term trading hypothesis.

Finally, the fourth branch of work capitalizes on the idea of market-microstructure arguments, attributing the price drop discrepancy to such market impediments as mechanical rules for the ex-day adjustment of open limit orders (Dubofsky, 1992), discrete prices (as opposed to continuous prices) (Bali and Hite, 1998), bid/ask price difference (Frank and Jagannathan, 1998) among others. On the contrary, Elton et al. (2005) analyze taxable and non-taxable closed-end funds and find evidence against the market microstructure argument and supportive of the tax-effect hypothesis.

DATA AND METHODOLOGY

For the purpose of this research all the data is obtained from the Center for Research in Security Prices (CRSP) database. The collected data is comprised of the daily price series and the taxable regular cash dividends per share (CRSP distribution codes beginning with 12 and ending with 2) for all common shares (CRSP share codes 10, 11, and 12) of all the firms trading on NYSE, NASDAQ, and NYSE Amex Equities (formerly known as AMEX) (CRSP exchange codes 1, 2, and 3). All the events that did not trade on the ex-day or the day before are discarded. Moreover, any event is cut off if CRSP does not report the actual closing price for either of the days. As noted by Elton and Gruber (1970), it is necessary to discard any such event since the regulation requires the opening price to be adjusted down by the full amount of the dividend. In the absence of any trading, this would mechanically imply a PCDR of one. In the spirit of Elton et al. (2005) an event is also discarded if the price was lower than \$5, since for low priced securities the bid/ask spread is large relative to the dividend and may introduce noise into data. Moreover, all the events with dividend yields of less than 0.01% are also discarded.

The data covers every day from January 1, 1997 till December 31, 2008. To test the mean PCDR before the enactment of JGGTRA, all the events satisfying the above conditions between January 1, 1997 and December 31, 2002 are separated out. To eliminate the effect of the major market disruption caused by 9/11, the timeline from September 10, 2001 through the end of 2001 is also removed. Moreover, events occurring from January 1, 2003 (when the initiation of a tax cut was first made public) until May 28, 2003 (when the act was signed into law) are not used in the analysis either in order to clear data of any potential disturbance caused by prior public anticipation of tax cuts. This produces 41570 events in the pre-act sample.

The mean PCDR after the enactment of the new tax law is analyzed between September 31, 2003 and December 31, 2008. In this case, the timeline from the enactment date of the law until September 31 of that year is discarded in order to allow time for investors to adjust their portfolios. The number of events satisfying all the conditions for the post-reform period adds up to 32899. Moreover, in each of the two samples the data is trimmed at 2.5% and 97.5% to diminish the effect of outliers.

As the opening prices on the ex-day are automatically adjusted down as per regulation, the appropriate prices to employ are closing prices, since the first trade is likely to be a biased estimate of the equilibrium market price. Hence, all the prices are closing prices. However, using closing prices carries another source of bias: the market bias as a result of the general trend of the market throughout the trading day. To adjust for this bias and for the idiosyncratic risk, the ex-day prices are deflated by the expected daily return of the stock. Specifically, the PCDR for firm i is:

$$\widetilde{PCDR}_i = \frac{P_{i,w} - \frac{P_{i,x}}{1 + \hat{\alpha}_i + \hat{\beta}_i * r^m}}{D_i}, \quad (2)$$

where r^m is the value-weighted return on the CRSP NYSE/AMEX/NASDAQ market index, and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated using a firm level regression of the firm return on a constant and market return over the days [-25, -2) and (+2, +25].

RESULTS

Glancing over the right hand side of the tax-hypothesis equation,

$$\frac{P_w - P_x}{D} = \frac{1 - t_d}{1 - t_c}, \quad (3)$$

it is clear that when dividends are taxed more heavily than capital gains, as was the case during the pre-JGTRRA period, the test-statistic (PCDR) should be less than one. If the capital gains and dividend taxes are equal, which is the case during the post-JGTRRA, then one should expect the PCDR to be 1. However, it is noteworthy to underline that this PCDR formulation ignores any transaction costs. In the presence of transaction costs the test statistic will be less than one. Moreover, individual investors may also defer their capital gains, which will, in effect, keep their capital gains tax rates lower than that levied on dividend income. This puts yet another source of downward pressure on the PCDR, possibly lowering it below one even after the enactment of the new tax law in 2003. However, if tax-hypothesis holds, the observed PCDR measure should be significantly higher during the post-JGTRRA period compared to the pre-JGTRRA period.

Table 1 presents the observed outcomes pertaining to the PCDR measure in each period, as well as the difference between the post-JGTRRA and pre-JGTRRA measures. The mean PCDR measures are significantly below one, as expected, both before and after the enactment of the new tax law. However, the mean PCDR measure increases from 0.6779 during the pre-reform period to 0.7521 during the after-reform period, agreeing with the predictions of the tax-hypothesis. Both means are significant at better than 1% levels. Moreover, a two-sample unequal variances t-test for the difference between means across the periods shows that the increase in mean PCDR from pre-to-post JGTRRA is significant at better than 1% level. This implies that as a result of the elimination of preferential taxation of capital gains over dividend income, the PCDR measure increases significantly, hence, implying that the ex-dividend day share price movements are, in fact, related to marginal stockholder tax rates. The fact that the post-JGTRRA PCDR remains significantly lower than one can be explained by the existence of transaction costs and the deferability of capital gains. These results are in agreement with the overwhelming majority of the prior research, including, specifically Poterba and Summers (1984) and Barclay (1987).

TABLE 1
COMPARISON OF THE PRE-JGTRRA AND POST-JGTRRA PCDR'S AND THEIR DIFFERENCE

	Pre-JGTRRA	Post-JGTRRA	Post - Pre
Mean	0.6779***	0.7521***	0.0742***
t-statistic	17.1074	10.7592	2.4934
One-tail p-value	1.09E-65 ^a	2.97E-27 ^a	0.0063 ^b
St. dev.	3.8389	4.1794	
Min	-15.0761	-17.0968	
Max	16.5259	19.9092	
Number of obs.	41570	32899	

a: Based on difference from 1.

b: Based on difference from 0.

This table shows the means, t-statistics, one-tail p-values of the PCDR measures for the pre-JGTRRA, post-JGTRRA periods, and their difference, as well as modes, medians, standard deviations, minimum, maximum of the PCDR measures and the number of observations in pre-JGTRRA and post-JGTRRA periods.

The results stand in contradiction to those of Michaely (1991), who measures the PCDR in one-year intervals in 1986, 1987, 1988, and 1989 and finds that the ratio moves in the opposite direction of expected after the 1986 tax-reform. This tax-reform, similar to that of 2003, substantially decreased (in 1987) and eventually eliminated (in 1988) the preferential taxation of capital gains over dividend income. The answer to this puzzle possibly lies in the results of Chetty et al. (2005), who find that the PCDR is very sensitive to sample period choices. Hence, it is imperative to include a long analysis period for tests of this kind, as is the case of this paper.

These results do not only reinforce the tax-effect hypothesis, but also stand as evidence against the short-term trading hypothesis. According to the latter, the market is dominated by short-term investors who, ultimately, determine the PCDR value with their trading activity. However, JGTRRA did not change the incentives of short-term traders. Hence, the observation that the PCDR did move significantly implies that the marginal stockholders are long-term individual investors.

CONCLUSIONS

Using the price-change-to-dividend ratio developed by Elton and Gruber (1970), this paper examines the ex-day price behavior before and after the 2003 tax reform that equalized the dividend and capital gains taxes in the U.S. Elton and Gruber's (1970) tax-hypothesis (long-term trading hypothesis) posits that this ratio should be below one before the 2003 reform when the dividends had a tax disadvantage, and equal to one after 2003, ignoring transactions costs. The existence of transaction costs, together with the fact that capital gains can be deferred, which in effect, serves to still keep the effective dividend tax rates relatively higher, imply that one should not expect the test statistic to be above one even after the 2003 tax law. However, if the tax-hypothesis holds, the test statistic should increase significantly after the enactment of the law, suggesting a tax effect on dividends.

The evidence suggests that the test statistic (PCDR) was below one during both periods but increased significantly in the period after the enactment of the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) in 2003. This result bolsters the argument for the tax-effect hypothesis and supports a large body of empirical literature on the topic. Moreover, the outcome also weakens the stance of the short-term trading hypothesis. The fact that the PCDR increased significantly indicates that the marginal shareholders are long-term individual investors and not the short-term traders, contrasting the short-term trading argument.

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