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Time Variation of Ex-Dividend Day Stock Returns and Corporate Dividend Capture: A Reexamination

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ABSTRACT

This paper documents some empirical facts about ex-day abnormal returns to high dividend yield stocks that are potentially subject to corporate dividend capture. We find that average abnormal ex-dividend day returns are uniformly negative in each year after the introduction of negotiated commission rates and that time variation in ex-day returns during the negotiated commission rates era is consistent with corporate tax-based dividend capture. Ex-day returns are more negative when the tax advantage to corporate dividend capture is greatest and more positive when increases in transaction costs and risk reduce incentives to engage in corporate tax-based dividend capture.

Traditionally, the ex-day return of a stock has been viewed as a means to examine how market participants value lower-taxed capital gains relative to higher-taxed dividends. For example, a 90 cent decline on a stock that pays a one dollar dividend suggests that the market values one dollar of dividends the same as 90 cents of capital gains.[1] This interpretation often implicitly assumes that there is one investor tax clientele that determines the ex-day return. As Michaely and Vila (1995, 1996) and Boyd and Jagannathan (1994) argue, however, the ex-day return may be viewed more properly as being determined by the interaction of investors with different tax-induced valuations on dividends and capital gains.[2] As the ex-dividend day approaches for a stock, investors with a higher relative tax burden on dividend income sell some holdings of dividend paying stocks to investors with a lower relative tax burden on dividend income. For this trade to occur, the ex-day return should have a tax-induced component that reflects the tax profile of various investor tax clienteles. For instance, if one clientele values dividends

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[1] One early study that makes this interpretation is Elton and Gruber (1970).

[2] Further complications in interpreting the meaning of ex-day stock returns arise from market microstructure biases in estimating ex-day returns using data based on discrete price quotations (see Bali and Hite (1998), Frank and Jagannathan (1998), and Dubofsky (1992)).

and capital gains the same and another values one dollar of dividends the same as 80 cents of capital gains, then the share price drop per dollar of dividends should be between 80 cents and a dollar.

The tax heterogeneity argument has interesting implications for high dividend yield stocks. Tax-based trading is more likely the larger the dividend yield, because the tax gains from trading are more likely to cover the costs of trading. This is particularly true for corporations that are taxed more heavily on capital gains than on dividends. With sufficiently low transaction costs, this tax treatment leads corporations to buy high dividend yield stocks before the ex-dividend day and sell them afterward in a practice referred to as dividend capturing. Although corporate tax considerations imply a negative ex-day return if corporations are the only investors in stocks about to go ex-dividend, other investors that are either tax neutral or tax penalized with respect to dividend income also trade in these stocks. To the extent that corporations engaging in corporate dividend capture are less wealth constrained and/or less risk averse than other traders, their trading may lead to negative ex-day returns for high-yield stocks.

Although much of the emphasis of ex-dividend day research has been on how transaction costs or changes in particular tax rules affect the relative pricing of dividends and capital gains on the ex-day, there has been little research on the variation of ex-day stock returns over a prolonged time frame.[3] The notable exception is Eades, Hess, and Kim (1994), who analyze abnormal ex-day returns for the period 1962–1989. They report that prior to 1975 ex-day abnormal returns were predominately positive for high-yield stocks and post-1975 they were predominantly negative. This is consistent with the May 1, 1975 elimination of NYSE minimum brokerage commissions, which reduced trading costs and made corporate dividend capture more viable. Contrary to this interpretation, however, Eades et al. find that post-1975 high-yield ex-day abnormal returns are positive during the period 1982–1985. Eades et al. are unable to explain this aberration in the ex-day return pattern and are also unable to show that any intertemporal variation in high-yield ex-day returns is related to changes in tax laws.

In this paper, we investigate the intertemporal behavior of ex-dividend day stock returns for high-yield stocks. In particular, we reexamine and extend the results of Eades et al. (1994). Like Eades et al., we find that ex-day abnormal returns for high-yield stocks are, on average, positive prior to the 1975 change in brokerage commissions. After 1975, however, ex-day abnormal returns are *consistently* negative. The previously documented 1982–1985 aberration is primarily due to a sampling oversight that excludes some of the top candidates for corporate dividend capture from the Eades et al. sample: high-yield utility stocks. These stocks largely disappear from the

[3] Studies that examine the role of transaction costs include Lakonishok and Vermaelen (1983, 1986), Karpoff and Walkling (1988, 1990), and Michaely and Vila (1995, 1996). Studies that examine the impact of tax rule changes on ex-day return behavior include Grammatikos (1989), Michaely (1991), and Koski (1996).

Eades et al. sample in 1982 and reappear in 1986. When we account for this sampling omission and the inclusion of stocks that are not subject to corporate dividend capture in the Eades et al. sample, we find uniformly negative abnormal ex-day returns for high-yield stocks during the negotiated commissions era.

Given the uniformly negative ex-day abnormal returns for high-yield stocks after the change in commission schedules, we explain variation in high-yield ex-day abnormal returns during this period by focusing on how the costs and benefits of corporate dividend capture change through time. Changes in the corporate tax rate and the intercorporate dividend exclusion cause the tax advantage to corporate dividend capture programs to vary through time. We find that high-yield ex-day returns are lower when the corporate tax advantage to dividend capturing is larger. We also find that ex-day returns are lower when the transaction costs and risk associated with dividend capturing are smaller. Additionally, we find evidence suggesting that investor tax heterogeneity also affects the time variation of ex-day stock returns.

The paper proceeds as follows. Section I reviews the theoretical issues concerning ex-day stock returns. Section II discusses the intertemporal behavior of high-yield ex-day returns. Section III considers the determinants of high-yield ex-day returns. Section IV summarizes our results and offers some concluding thoughts.

I. Ex-Day Stock Returns, Taxation, and Transaction Costs

Assume for a moment that corporations are the only investors in dividend paying stocks and that there are no transaction costs to trading. In this case, the ex-day expected return on a stock, $E_{-1}(R)$, is defined as

$$E_{-1}(R) = E(R) + [(\tau_d - \tau_g)/(1 - \tau_g)]\,[D/P_{-1}], \tag{1}$$

where

$E(R)$ = the expected pretax return on the stock on a non-ex-day,
P_{-1} = the price of the stock the day prior to the ex-dividend day,
τ_g = the corporate (marginal investor) capital gain tax rate,
D = taxable cash dividend,
τ_d = the corporate (marginal investor) tax rate on dividend income.

Equation (1) shows that the difference between the return on a stock on its ex-day and on other days is a function of the tax rates on dividend and capital gain income facing assumed ex-day investors. In the case of corporations, a unique tax provision affects these tax rates. Corporations can exclude a fraction, θ, of their dividend income from taxation, whereas capital gains or losses are taxed at the marginal corporate tax rate. In the past 30 years, the fraction of dividend income excludable from corporate taxation has ranged from 85 percent to the current level of 70 percent. The exclusion only applies to dividends paid by other taxable corporations.

Given a marginal corporate tax rate of τ_c, the statutory tax rate on dividend income for corporations is $(1 - \theta)\tau_c$ and the statutory capital gain tax rate is τ_c. Substituting these rates into equation (1), we obtain

$$E_{-1}(R) = E(R) - [\theta\tau_c/(1 - \tau_c)]\,[D/P_{-1}]. \tag{2}$$

Equation (2) shows that the ex-day return may be below the non-ex-day return by as much as $[\theta\tau_c / (1 - \tau_c)]\,[D/P_{-1}]$. The potential abnormal ex-day return is more negative, the larger the tax differential, $\theta\tau_c/(1 - \tau_c)$ and the larger the dividend yield on the stock, D/P_{-1}. This analysis, of course, assumes that corporations are the only investors in the stock and that there are no transaction costs.

As suggested by Michaely and Vila (1995, 1996), the presence of other tax clienteles changes equation (2) to

$$E_{-1}(R) = E(R) + \left[\sum_i w_i\,(\tau_{di} - \tau_{gi})/(1 - \tau_{gi})\right][D/P_{-1}], \tag{3}$$

where i indicates the ith investor tax clientele, w_i is the weight given to that clientele's tax preferences, τ_{di} is the dividend tax rate for the ith clientele, and τ_{gi} is the capital gain tax rate for the ith clientele. The weight given to each clientele's tax preferences increases with the number of investors in the clientele, the risk tolerance of the clientele, and the wealth of the clientele. Whereas corporations have $\tau_{di} < \tau_{gi}$, other investor clienteles have $\tau_{di} \geq \tau_{gi}$. Hence, the ex-day returns are higher than suggested by equation (2) even if corporations are active in dividend capture activity.

Transaction costs further diminish the negative impact corporations have on ex-day returns. For instance, if (pretax) per share transaction costs as a percentage of P_{-1} exceed $[\theta\tau_c /(1 - \tau_c)][D/P_{-1}]$, then corporations do not engage in strategic trading around ex-dividend dates unless the expected abnormal ex-day return is positive. In the context of equation (3), the corporate weight in determining ex-day returns is lessened the larger the transaction costs. In contrast, the trading by fully taxable investors that already hold the stock may be largely unaffected by transaction costs, because these investors may have predetermined reasons for trading the stock in the vicinity of the ex-day. If corporate dividend capture leads to negative ex-day returns, then the above arguments imply that, holding all else equal, larger transaction costs lead to higher abnormal ex-day returns for high-yielding stocks. Cross-sectional analysis of ex-day returns by Karpoff and Walkling (1988, 1990) confirms this prediction.

II. Intertemporal Behavior of High-Yield Ex-Day Stock Returns

Section I shows that ex-day stock returns may vary through time as the tax code, trading costs, and dividend yields vary. In this spirit, Eades et al. (1994) examine the time variation of abnormal ex-day returns for high-yield

stocks during the period July 1962–October 1989. In particular, Eades et al. identify all quarterly dividends coded as taxable ordinary income to individuals (1232 and 1238) by the Center for Research in Security Prices (CRSP) databank. These dividend-paying stocks are sorted into five quintiles based on the dividend yield of each stock at the start of each year. For each trading day, all stocks in the highest yield quintile going ex-dividend are formed into a portfolio.[4] Eades et al. then calculate a standardized abnormal ex-day return for each ex-day portfolio, Z_t, as

$$Z_t = (R_{pt} - R_p)/\sigma_p, \tag{4}$$

where

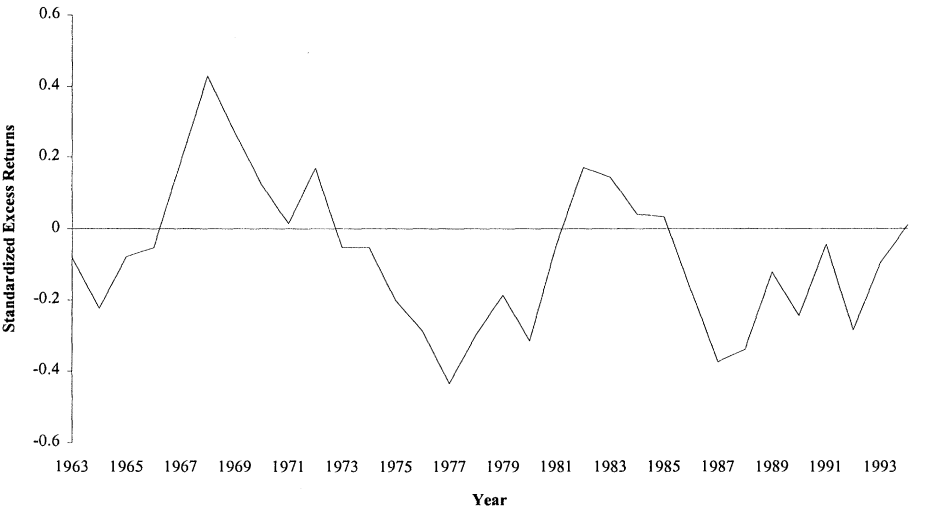
R_{pt} = return to a portfolio of stocks with an ex-day on date t,
R_p = average return to the ex-day portfolio for the 50 trading days starting five days after the ex-day,
σ_p = standard deviation of the portfolio return measured for the 50 trading days starting five days after the ex-date.

We replicate and extend the results of Eades et al. through 1994 using dividends on the 1994 CRSP NYSE monthly file. Although we could not *exactly* replicate their results, our results are very similar. The graphical representation of the annual average Z-statistics for high-yield stocks is displayed in Figure 1A. Consistent with Eades et al., the average Z-statistics for the high-yield quintile are mostly positive in the years prior to 1975. After 1974, the annual average Z-statistics are negative, except for 1982–1985 and 1994 (which is not in the original Eades et al. sample). An explanation for the difference between the pre- and post-1975 results is the introduction of negotiated brokerage commissions in May 1975 on the New York Stock Exchange. Lower trading fees made corporate dividend capture more attractive and result in more negative ex-day returns.

The explanation for positive ex-day returns during 1982–1985 and 1994 lies in the sample composition. The 1981 Tax Act allowed investors in most utility stocks to reinvest dividends through dividend reinvestment plans without paying a tax on the dividend income. The tax on dividend income could be converted to capital gain income when the stock was later sold (IRS 305(e)). The 1981 Tax Act did not, however, change the corporate dividend tax exclusion for utility stocks. So, corporations still had the incentive to engage in dividend capture trading in these stocks. Given the unique tax treatment, CRSP reclassified utility dividends eligible for the tax break as dividend code 1239. Consequently, most utility stocks are no longer in the Eades et al. sample beginning in 1982. The exclusion of high-yield utility stocks elimi-

[4] If the dividend being paid was announced within four days of the ex-dividend day and/or there was another distribution ex-date on or within four days of the ex-day, then the stock was excluded from the portfolio.

Panel A. CRSP Distribution Codes 1232 and 1238; Annual Dividend Yield Sorting (Eades, Hess and Kim (1994) approach)



Panel B. CRSP Distribution Codes 1232 and 1239; CRSP Share Type Codes 10 and 11; $2 Share Price and 12.5 Cent Dividend Screens; Quarterly Dividend Yield Sorting

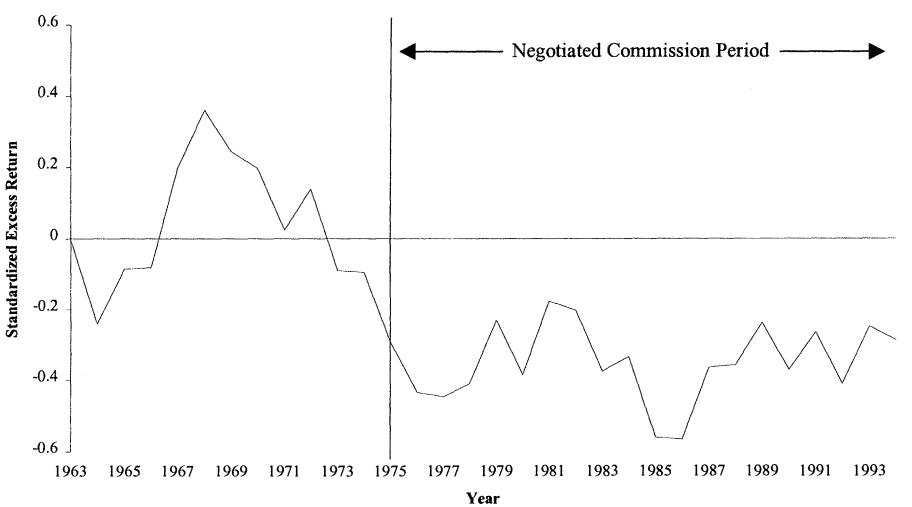


Figure 1. Average daily ex-dividend day pricing for high-yield samples (1963–1994). This figure reports the average standardized excess returns of high-yield ex-dividend day portfolios using various distribution code, share type code, price, and dividend criteria. Portfolio standardized excess returns are calculated using a mean and variance estimated over the 50-day period beginning five days after the ex day. The high-yield sample consists of the highest dividend yield quintile in each year for Figure 1A and in each quarter for Figure 1B. In Figure 1A, the ex-dividend day portfolios are comprised of CRSP distribution codes 1232 and 1238. Figure 1B reports the results for high-yield ex-dividend day portfolios comprised of CRSP distribution codes 1232 and 1239, CRSP share code types 10 and 11, and firms that have share prices that are greater than or equal to $2 and dividends that are greater than or equal to 12.5 cents.

nates stocks that are most likely to be affected by dividend capturing because these stocks have high yields, low volatility, and high liquidity. When the tax break on dividend reinvestment expired in 1986, utility stocks excluded from 1982 to 1985 reappear in the sample. Not surprisingly, the pattern of standardized ex-day abnormal returns in Figure 1A becomes negative again in 1986.

Another undesirable feature of the sample used in Figure 1A is the inclusion of certain dividends that are not subject to corporate dividend capture. Dividend distributions coded 1238 by CRSP are dividends paid by REITs and bond funds. This dividend income is not eligible for the intercorporate dividend tax exclusion. Additionally, many dividends classified by CRSP as 1232s (taxable dividends eligible for intercorporate dividend exclusion) are actually dividends paid by REITs, Master Limited Partnerships, and mutual funds with bond income. These dividends are not subject to the intercorporate dividend exclusion.

To illustrate how the results change with respect to the sampling criteria, we alter the sampling criteria of Eades et al. to get a sample of high-yield firms potentially subject to corporate dividend capture. First, we exclude firms that are not domestic corporations (CRSP incorporation code of 10 or 11). This eliminates REITs, limited partnerships, and mutual funds and results in a set of firms that are subject to a uniform set of dividend capture tax rules.[5] Second, we include only the dividend distributions paid by corporations that CRSP classifies as 1232 or 1239. Third, rather than resort firms into quintiles each year, we resort them each quarter based on the last ex-dividend day yield in the prior quarter. By updating our sample sorts more frequently, stocks put into the high-yield quintile are more likely to be high yield at the time they actually have an ex-dividend date.[6] Finally, we eliminate firms that pay a quarterly dividend less than 12.5 cents and/or that have a price level of less than $2. High-yield stocks with dividends less than 12.5 cents are likely to have a very low stock price. This generally means higher trading costs that can make dividend capture trades unprofitable for these stocks.

We identify the high-yield quintile for this restricted set of dividend payers and create yearly average Z-statistics for this quintile. The results presented in Figure 1B are striking. Whereas the average level of pre-1975 ex-day Z-statistics is virtually unchanged, the average level of post-1974

[5] This alleviates another problem with the CRSP databank. Many REIT and bond fund dividend distributions are incorrectly coded as 1232. Many limited partnership dividends are also misclassified in this way. This problem is particularly prevalent in the late 1980s and early 1990s. CRSP also misclassifies some mutual funds, REITs, and limited partnerships as corporations. We reclassify these firms using Barrons, Value Line, Standard and Poor's Stock Guide, Standard and Poor's Corporate Record, and numerous mutual fund directories.

[6] Naranjo, Nimalendran, and Ryngaert (1998) show that frequent updating of dividend yield measures can be quite important when forming portfolios based on dividend yield. Dividend yields can become stale due to changes in price levels and changes in dividend levels through time.

Z-statistics is substantially lowered. In fact, the post-1974 average Z-statistics are negative and significantly different from zero at the 5 percent level for each of the 20 years.[7]

These results highlight two important points. First, once we focus on a group of stocks that are most subject to corporate dividend capture, the ex-day abnormal returns to these stocks are uniformly negative in the post-1974 period. Second, narrowing the focus to the high-yield stocks that are the best candidates for dividend capture does little to decrease ex-day returns in the pre-1975 period but has a large negative impact on ex-day returns in the post-1974 period. This is consistent with dividend capture being more important in the era of negotiated brokerage commissions than in the era of minimum commission schedules.

III. Explaining Intertemporal Variation in High-Yield Ex-Day Stock Returns

The results from Section II suggest that attempts to explain intertemporal variation in ex-day abnormal returns for high-yield stocks must incorporate factors that influence the incentive to engage in corporate dividend capture. It also suggests that regression models should treat the period after May 1, 1975 differently from the period before that date.[8] In this section, we explain the ex-day returns for high dividend yield stocks in the negotiated commission rates era by appealing to differential incentives to engage in dividend capture. We focus on the daily ex-day abnormal returns to the set of firms analyzed in Figure 1B.

A. Ex-Day Abnormal Returns for Regression Analysis

To explain ex-day returns during the negotiated commission rates era, we estimate the daily abnormal return for a portfolio of high-yield stocks going ex-dividend on each day. The abnormal return on day t, $EXRET_t$, is defined as

$$EXRET_t = R_{p,t} - R_{hy,t}, \tag{5}$$

where

$R_{p,t}$ = return to a portfolio of high-yield (top quintile) stocks with an ex-day on day t,

$R_{hy,t}$ = the return to a portfolio of all stocks in the high-yield quintile on day t that do not have an ex-dividend day on or four trading days before or after day t.

[7] If we eliminate the \$2 share price and 12.5 cent dividend screens and use annual dividend yield sorting instead of quarterly sorting, the average level of the pre-1975 ex-day Z-statistics is virtually unchanged and all 20 post-1974 Z-statistics are still negative.

[8] Chow tests confirm the structural differences between the two periods at significance levels below 1 percent.

We control for systematic return fluctuations by subtracting out the return on a portfolio of non-ex-day stocks with a similar dividend yield as the ex-day sample.[9] We also estimate the standard deviation of the return to the ex-day portfolio less the return to high-yield non-ex day stocks over the period +5 to +54 after the ex-day. This standard deviation is used later in weighted least squares regression models to explain ex-day abnormal returns.

B. Explanatory Variables

The variables used to explain the abnormal returns are related to corporate incentives to engage in standard dividend capture.[10] Consistent with the theoretical models presented in Section I, higher ex-day dividend yields should result in lower ex-day returns. Hence, we include the ex-day dividend yield of the high-yield stocks, *DYLD*, as an explanatory variable. The expected coefficient on *DYLD* is negative. We also include a variable that captures variations in the tax advantage of corporate dividend capture as determined by tax code parameters. The tax differential, *TAXDIFF*, is defined as $\theta\tau_c/(1 - \tau_c)$, where θ is the amount of dividend income corporations can exclude from taxable income and τ_c is the marginal statutory corporate tax rate. The tax differential varies through time because of variation in the corporate tax rate and variation in the corporate dividend exclusion. Table I shows the various levels of the tax differential through time. During the negotiated commission rates era, the tax differential steadily declines with a small blip up in 1993. We expect the coefficient on *TAXDIFF* entered independently or interactively with dividend yield, *TAXDIFF***DYLD*, to be negative.

To capture the potential incentives for other investors to trade around the ex-day, we also include an indicator variable, *DUM1986*, equal to zero prior to 1986 and one thereafter. The Tax Reform Act of 1986 equilibrated the tax rate for dividends and capital gains for most taxpayers. If the tax status of individual investors changes, then we would expect that changes in their tax-based valuation of dividends versus capital gains would be reflected in ex-day returns as predicted by Michaely and Vila (1996).

Eades et al. also suggest that the level of short-term T-bill yields is positively related to the ex-day return. This is based on the notion that corporate CFOs with excess cash find it more desirable to invest in T-bills than to put money into dividend capture programs. Although they do not deny the possibility that the expected returns from stocks include a risk free return com-

[9] We also obtain very similar results using market-model adjusted returns. Furthermore, we also obtain very similar results using monthly data and firm level data. These results are available on request from the authors.

[10] Another form of dividend capture was the 1980s practice by Japanese life insurance companies of buying stocks cum-dividend and then immediately selling them back ex-dividend for delayed settlement. These nonstandard settlement procedures allowed the insurance companies to capture dividend income. This income was then used to pay required seven to eight percent annual yields to policyholders from current income as required by Japanese regulators. Koski and Michaely (1997) show that these nonstandard settlement traders do not affect ex-day returns.

Table I

Corporate Tax Differential: January 1, 1975–December 31, 1994

The corporate tax differential (*TAXDIFF*) is defined as $\theta\tau_c/(1 - \tau_c)$. θ is the corporate dividend income tax exclusion. The exclusion only applies to dividends paid by other taxable corporations. τ_c is the corporate statutory tax rate. Given the corporate dividend income tax exclusion, the statutory tax rate on dividend income for corporations is $(1 - \theta)\tau_c$, and the statutory capital gain tax rate is τ_c. Both the corporate dividend income tax exclusion and the corporate statutory rate are obtained from the *Tax Foundation*.

Time Period	Corporate Tax Differential, $\theta\tau_c/(1 - \tau_c)$	Dividend Exclusion, θ	Corporate Tax Rate, τ_c
1975–1978	0.7846	0.85	0.48
1979–1986	0.7241	0.85	0.46
1987	0.5333	0.80	0.40
1988–1992	0.3606	0.70	0.34
1993–1994	0.3769	0.70	0.35

ponent, Eades et al. argue that the attractiveness of tax-based dividend capture is less appealing when risk averse CFOs can get high returns on cash equivalent securities.[11] We use the daily level of the three-month T-bill rate, *TBILL*, as a short-term interest rate variable.

Another factor potentially limiting corporate dividend capture is risk exposure. With high risk exposure, risk averse corporate treasurers might be averse to engaging in dividend capture programs. Using pooled cross-section, time-series data, Michaely and Vila (1995, 1996) show that higher levels of firm specific risk reduce abnormal trading volume for a stock around its ex-dividend day. This is particularly true for high-yield stocks. For our time-series sample, it is possible that in certain periods, the level of risk for the stocks in the ex-day portfolio is considerably higher or lower than usual. To capture this effect, we use a risk measure similar to that used by Michaely and Vila (1995). For each ex-day, we measure the variance of each stock in the ex-day portfolio during the period 55 trading days before the ex-day until five trading days before the ex-day. The stock return variance is then divided by the market variance during the same time period. The average of this relative variance measure, *RELVAR*, is used to explain variation in ex-day returns. If higher levels of *RELVAR* lead to less dividend capture, higher levels of *RELVAR* should lead to higher abnormal ex-day returns.

[11] Anecdotal evidence appears to indicate that CFOs do, in fact, consider the return on other short-term securities when deciding whether or not to engage in tax-based dividend capture programs (e.g., *Business Week* (May 19, 1986), "Wringing More Profits from Idle Corporate Cash"). Karpoff and Walkling (1990) also show that variables that are related to holding and hedging costs, such as the T-bill rate, might be relevant in explaining ex-day returns. Michaely and Vila (1996), moreover, argue that the T-bill rate captures changes in business cycles and therefore is likely to proxy for corporate traders' incentives to trade around the ex-day.

It is frequently argued that options can be used to hedge dividend capture positions (e.g., Grammatikos (1989), Michaely and Vila (1996)). In fact, Michaely and Vila (1996) find that after stocks have options introduced on them, their ex-day abnormal trading volume increases significantly. Therefore, stocks with options written on them may have more dividend capture and lower ex-day returns. When there are more stocks on an ex-day with options written on them, we expect the ex-day return for a portfolio of those stocks to be more negative. To capture this, we obtain a list of all optionable stocks that were listed on the NYSE over our sample period. Using this list, we calculate the percentage of stocks in each ex-day portfolio that have options written on them, *%OPTION*. If option hedging is important, ex-day returns should be lower at higher levels of *%OPTION*. Similarly, the introduction of market index futures in July 1984 may have enabled traders to hedge the market risk involved in ex-day trading in a less expensive manner. To capture this, we include an indicator variable, *DUM1984*, equal to zero prior to July 1984 and one thereafter. The impact of futures hedging, however, may be obscured by another event in July 1984. The Tax Reform Act of 1984 (July 18, 1984) increased the period corporations were required to hold a stock to qualify for the dividend exclusion from 16 to 45 days. This increased risk exposure for dividend capturing corporations.

A final consideration affecting corporate incentives to engage in dividend capture is the cost of trading. High transaction costs deter corporate dividend capture. Lakonishok and Vermaelen (1986) and Michaely and Vila (1996) find that high-yield stocks with larger market capitalization, and hence greater liquidity, tend to have higher abnormal volume around ex-dividend days, implying dividend capture trading. Liquidity also affects ex-day abnormal returns. Using pooled cross-section and time-series data, Karpoff and Walkling (1988, 1990) find that ex-day returns are higher for high-yield stocks with higher trading costs. As proxies for transaction costs, we use two variables. The first variable is the natural log of the average market value of stocks in the ex-day portfolio, *Log(SIZE)*. The market value is calculated the day before the ex-day and is measured in 1982 dollars. Larger stocks are more liquid and should have lower abnormal returns if they attract more corporate dividend capture activity. We also proxy for transaction costs by measuring the average level of one divided by the price before the ex-day, $1/P_{-1}$, for the ex-day stocks. Higher levels of $1/P_{-1}$ result in higher percentage brokerage costs and bid-ask spreads. Because average price levels on the NYSE vary through time, a liquidity measure like $1/P_{-1}$ will have considerable time variation.[12] We expect higher levels of $1/P_{-1}$ to result in higher abnormal returns.

[12] It is important to note that the firms in the ex-day portfolio vary over time and that this variation also creates a cross-sectional component in the time-series variation of the average transaction cost for the portfolio on one ex-day versus the next ex-day. When we exclude the transaction cost proxies, the remaining results are not affected.

We should also note that $1/P_{-1}$ could proxy for other ex-day return biases documented by Bali and Hite (1998). Bali and Hite argue that because NYSE transaction prices are constrained to discrete one-eighth tick multiples, whereas dividends are continuous, one should not expect ex-day share price changes to equal dividends even if tax neutral investors attempted to arbitrage the ex-day process. In particular, they argue that in a no arbitrage setting, the ex-day expected price drop is less than the dividend being paid but within one tick of the dividend being paid. This suggests a discreteness-induced bias in ex-day returns, *RETBIAS*, equal to

$$RETBIAS = (D - \underline{D})/P_{-1}, \tag{6}$$

where

D = dividend investor receives if the investor holds the stock on the ex-day,
$\underline{D}$ = a hypothetical price drop to the nearest one-eighth tick below D,
P_{-1} = the price of the stock the day prior to the ex-dividend day.

Whereas the evidence in Bali and Hite (1998) suggests that an ex-day bias does exist, it does not appear to be as large as suggested by equation (6). Given the construction of *RETBIAS*, it is likely that it is correlated with $1/P_{-1}$ and *Log(SIZE)*. We expect abnormal returns to increase with *RETBIAS*.

C. Data Analysis

Summary statistics for the dependent and independent variables are presented in Table II. The average dividend yield of 2.032 percent is slightly above eight percent on an annualized basis. This indicates that we are indeed looking at high-yield stocks. The mean daily abnormal return, *EXRET*, is significantly negative at −0.309 percent. The average level of *TAXDIFF* DYLD* is 1.269 percent. This indicates that if there are no transaction costs and corporate trading is taken to the point where it creates zero expected profit, then the average level of *EXRET* should be −1.269 percent. Given the presence of transaction costs and the possibility that other market participants can influence the level of ex-day returns, it is not surprising that the average *EXRET* is only one-quarter of −1.269 percent. It is also worth noting that there is considerable auto-correlation in some of the independent variables. *TAXDIFF*, *DYLD*, *TAXDIFF*DYLD*, and *TBILL* all exhibit auto-correlation coefficients in excess of 0.50.

The weighted least squares regression results for various specifications are presented in Table III. The first four regressions examine the ex-day returns from the point of view that corporate dividend capture is the primary driver in explaining ex-day returns for high-yield stocks. The signs of most of the coefficients are as predicted. For instance, regressions 1 and 3 indicate that the coefficients on *TAXDIFF* and *DYLD* are negative and significantly different from zero. Similarly, regressions 2 and 4 indicate that the variable *TAXDIFF*DYLD* has a negative coefficient that is significantly

Table II

Summary Statistics for the Determinants of Ex-Day Stock Returns: May 1, 1975–October 13, 1994 (3,407 ex-dividend days)

EXRET is the daily average ex-day abnormal percentage return for the highest dividend yield quintile. The abnormal return is measured as the return to a portfolio of high-yield stocks with an ex-day on a particular date minus the return on a portfolio of non-ex-day high-yield stocks on that same date. *TAXDIFF* is the corporate tax differential and is defined as $\theta\tau_c/(1 - \tau_c)$, where θ is the corporate dividend income tax exclusion and τ_c is the corporate statutory tax rate. *TAXDIFF*DYLD* is defined as *TAXDIFF* interacted with the daily average ex-day portfolio percentage dividend yield, *DYLD*. *TBILL* is the daily three-month Treasury bill rate in percentage per annum obtained from the H.15 statistical release from the Board of Governors of the Federal Reserve System. $1/P_{-1}$ is defined as the daily average level of one divided by the price before the ex-day for the stocks in the ex-day portfolio. *RETBIAS* is defined as the percentage daily average of $(D - \underline{D})/P_{-1}$, where D is the dividend on the ex-day and $\underline{D}$ is a hypothetical price drop to the nearest one-eighth tick below D. *RELVAR* is defined as the daily average of the variance of the stocks in the ex-day portfolio relative to the daily variance of the CRSP value-weighted market portfolio. *%OPTION* is the daily average of the proportion of stocks in the ex-day portfolio that are optionable. *Log(SIZE)* is defined as the natural logarithm of the daily average stock market capitalization before the ex-day for the stocks in the ex-day portfolio deflated by the consumer price index.

Variables	Mean	Std. Dev.	Auto-Corr.	Min	Max
EXRET	−0.309	1.077	0.037	−7.394	7.389
TAXDIFF	0.610	0.178	1.000	0.361	0.785
*TAXDIFF*DYLD*	1.269	0.503	0.868	0.328	2.999
DYLD	2.032	0.411	0.534	0.909	5.263
TBILL	7.372	2.993	0.999	2.640	17.000
$1/P_{-1}$	0.049	0.019	0.263	0.014	0.211
RETBIAS	0.333	0.194	0.095	0.011	2.632
RELVAR	4.064	3.486	0.248	0.291	50.959
%OPTION	14.378	27.680	0.097	0.000	36.017
Log(SIZE)	8.791	1.211	0.130	4.726	12.910

different from zero. The regressions indicate that the larger the tax advantage to dividend capture, the more negative the ex-day returns. In particular, statutory changes in tax rates that effect the tax advantage associated with corporate dividend capture have a significant impact on returns.

Market microstructure and liquidity variables also seem to have explanatory power. For all specifications, *RETBIAS* is positive and significantly different from zero, and *Log(SIZE)* is negative and significantly different from zero. The coefficients on $1/P_{-1}$ are negative but rarely significant. Given the high correlation of $1/P_{-1}$ with *Log(SIZE)* and *RETBIAS*, we do not view this as evidence negating the importance of transaction costs. In fact, when *RETBIAS* and *Log(SIZE)* are omitted from the regression, the coefficient on $1/P_{-1}$ is positive and highly significant. The coefficients on *Log(SIZE)* and *RETBIAS* are consistent with higher transaction costs limiting corporate arbitrage and are also consistent with microstructure effects that cause an upward bias in ex-day returns.

Table III

Weighted Least Squares Estimates of the Determinants of Ex-Day Excess Returns: May 1, 1975–October 13, 1994 (3,407 ex-dividend days)

We use weighted least squares estimation procedures. For the *WLS* weights, we use the square root of the variance estimate of the ex-day return net of the non-ex-day high dividend yield portfolio return for date j estimated over the period +5 to +54 after the ex-day. The dependent variable in the regressions, *EXRET*, is the daily average ex-day abnormal percentage return for the highest dividend yield quintile. The abnormal return is measured as the return to a portfolio of high-yield stocks with an ex-day on a particular date minus the return on a portfolio of non-ex-day high-yield stocks on that same date. *TAXDIFF* is the corporate tax differential and is defined as $\theta\tau_c/(1 - \tau_c)$, where θ is the corporate dividend income tax exclusion and τ_c is the corporate statutory tax rate. *TAXDIFF*DYLD* is defined as *TAXDIFF* interacted with the daily average ex-day portfolio percentage dividend yield, *DYLD*. *TBILL* is the daily three-month Treasury bill rate in percentages per annum obtained from the H.15 statistical release from the Board of Governors of the Federal Reserve System. $1/P_{-1}$ is defined as the daily average level of one divided by the price before the ex-day for the stocks in the ex-day portfolio. *RETBIAS* is defined as the percentage daily average of $(D - \underline{D})/P_{-1}$, where D is the dividend on the ex-day and $\underline{D}$ is a hypothetical price drop to the nearest one-eighth tick below D. *RELVAR* is defined as the daily average of the variance of the stocks in the ex-day portfolio relative to the daily variance of the CRSP value-weighted market portfolio. *%OPTION* is the daily average of the proportion of stocks in the ex-day portfolio that are optionable. *Log(SIZE)* is defined as the natural logarithm of the daily average stock market capitalization before the ex-day for the stocks in the ex-day portfolio deflated by the consumer price index. *DUM1984* is an indicator variable equal to zero prior to July 1984 and one thereafter, whereas *DUM1986* is an indicator variable equal to zero prior to 1986 and one thereafter. t-statistics from heteroskedastic-consistent (Robust-White) standard errors are in parentheses.

Variable	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Intercept	0.786**	0.362*	1.051**	0.604**	0.818**
	(4.144)	(2.022)	(4.899)	(3.058)	(4.004)
TAXDIFF	−0.357**	—	−0.524**	—	—
	(−3.989)		(−4.271)		
*TAXDIFF*DYLD*	—	−0.269**	—	−0.361**	−0.586**
		(−7.174)		(−7.232)	(−5.928)
DYLD	−0.366**	—	−0.365**	—	−0.001
	(−5.821)		(−5.804)		(−0.006)
TBILL	0.045**	0.033**	0.042**	0.033**	0.038**
	(6.448)	(5.352)	(6.106)	(5.427)	(5.400)
$1/P_{-1}$	−0.930	−2.419	−1.594	−2.900	−1.152
	(−0.579)	(−1.551)	(−0.977)	(−1.854)	(−0.706)
RETBIAS	0.450**	0.446**	0.432**	0.423**	0.442**
	(3.653)	(3.616)	(3.508)	(3.431)	(3.592)
Log(SIZE)	−0.069**	−0.075**	−0.077**	−0.080**	−0.073**
	(−4.322)	(−4.766)	(−4.274)	(−4.414)	(−4.076)
RELVAR	0.014*	0.021**	0.014*	0.019**	0.010
	(2.408)	(3.709)	(2.358)	(3.362)	(1.586)
%OPTION	—	—	0.098	0.087	0.102
			(1.439)	(1.272)	(1.495)
DUM1984	—	—	−0.103*	−0.136**	0.0004
			(−2.163)	(−3.003)	(0.001)
*DUM1986*DYLD*	—	—	—	—	−0.193**
					(−4.573)
Adj. R^2	0.031	0.027	0.032	0.029	0.037
DW	2.034	2.039	2.039	2.042	2.047

**, * denote significance levels at 1 percent and 5 percent, respectively.

Consistent with the results of Eades et al., the coefficient on *TBILL* has substantial explanatory power. Higher levels of *TBILL* result in higher ex-day returns. This is consistent with some substitution out of dividend capture when yields on risk free treasury securities are high.

The results pertaining to risk exposure variables are mixed. The coefficient on the risk measure, *RELVAR*, has the correct sign and is marginally significant at the 5 percent level in a few specifications. This suggests that the volatility of ex-day stocks impacts the intertemporal variation of high-yield ex-day returns.[13] The potential for hedging stock risk via options as captured by *%OPTION* does not seem to impact intertemporal ex-day returns. The coefficient on the variable has the wrong sign and is statistically insignificant.[14] This result is not entirely surprising given the high transaction costs associated with using options as a hedging vehicle and the fact that the IRS requires corporations to bear the security at risk (IRS 246(c)) to receive the dividend exclusion. However, consistent with increased hedging possibilities from the introduction of stock index futures, *DUM1984* is negative and significantly different from zero in two of the regression models (regressions 3 and 4).

The final regression reported in the last column of Table III includes a dummy variable for the post-1986 tax environment. So, besides *TAXDIFF* DYLD* and *DYLD*, in regression 5 we include an interaction variable, *DUM1986*DYLD*, that equals the dividend yield times a dummy variable that equals one after 1986. We expect a negative coefficient on *TAXDIFF* DYLD* reflecting corporate dividend capture and a negative coefficient on *DUM1986*DYLD* as the tax preference of individual investors is altered with the change in the tax laws in 1986. We find negative and significant coefficients on both variables. Interestingly, the negative coefficient on *DUM1984* disappears in this specification. This suggests that changes in personal tax laws may have some effect on the ex-day return for high-yield stocks in a manner consistent with Michaely and Vila's (1996) tax heterogeneity hypothesis.

IV. Conclusion

This paper documents the time variation of ex-day abnormal returns to high dividend yield stocks that are subject to corporate dividend capture. When care is taken to identify a sample of firms that are subject to corpo-

[13] As a robustness check, we also use two additional risk exposure measures similar to those used by Michaely and Vila (1996). The first measure is the idiosyncratic variance from a market model divided by the market variance. This variable is highly correlated with our *RELVAR* measure (correlation = 0.79). The results from using this variable are very similar to those using *RELVAR*. For the second measure, we use both the market beta (at both the portfolio and firm levels) and market variance to capture the potential effects of market risk. Neither of these variables is significantly different from zero.

[14] The *%OPTION* variable is also insignificantly different from zero when it is interacted with the risk exposure variables.

rate dividend capture, we find that whereas ex-day returns are predominantly positive prior to 1975, annual averages of abnormal high yield ex-day returns are uniformly negative in the years after the introduction of negotiated commission rates. An analysis of ex-day returns in the negotiated commission rates era further indicates that time variation in ex-day returns is consistent with corporate dividend capture programs playing a key role in determining ex-day returns. Returns are more negative when the tax advantage to corporate dividend capture is the greatest and more positive for smaller and presumably less liquid stocks that are less susceptible to corporate dividend capture. The bottom line is that high-yield ex-day returns are highly influenced by corporate dividend capture during the negotiated commission rate years.

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