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THE EFFECT OF DIVIDEND INCREASES ON INVESTOR BEHAVIOR: THE DIVIDEND CLIENTELE HYPOTHESIS

A Dissertation

by

JIM A. SEIDA

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 1997

Major Subject: Accounting

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May 1997

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ABSTRACT

The Effect of Dividend Increases on Investor Behavior:

The Dividend Clientele Hypothesis. (May 1997)

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M.S., University of Illinois

Chair of Advisory Committee: Dr. Michael R. Kinney

The dividend clientele hypothesis implies that the number of transactions in the stock of a firm that increased its dividend payment should increase after the dividend increase announcement as the firm's shareholder clientele changes. Ten years of daily transaction data from the New York and American Stock Exchange are used to investigate investor trading behavior following a dividend increase announcement. Unlike price or gross trading volume data, transaction data allows examination of the trading behavior of different investor classes. Evidence of clientele-related trading is provided. The results suggest that the number of transactions increases through the ex-dividend date for both individual and institutional investors after an announcement of a large dividend increase. In contrast to prior research, the amount of abnormal trading through the ex-dividend date is positively correlated with the magnitude of the dividend increase even after controlling for the information content of the announcement. This association between the amount of trading activity and dividend increase magnitude is generally stronger for individual investors than for institutional investors.

The analysis is also separately conducted on those trades classified as sells and those as buys. Increased selling (buying) after a dividend increase is generally significant in only

those stocks offering a relatively low (high) dividend yield prior to the dividend increase. The rate of abnormal selling and buying after a dividend increase is also positively correlated with the magnitude of the dividend increase. Weak evidence of greater clientele dividend reactions pre-Tax Reform Act of 1986 is provided.

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I want to thank my dissertation committee: Dr. William Cready, Dr. Robert Stawser, Dr. Atanu Saha, and especially my chairperson Dr. Michael Kinney. I have an extra layer of gratitude to Dr. William Cready who provided additional insights into the use of transaction data. Without his insight my transactions costs from using the *ISSM* transaction data would have been much greater. Any archival-empirical research requires a considerable amount of computer skills, but especially those using ten years of transaction data. Computer programming skills must not be genetically inherited or maybe they tend to skip certain individuals. Both my brothers are "computer" people; while I am not inept at using computers, my programming skills in a main frame environment would not rank in a high enough percentile to be admitted to any honorary "computer" people society. I am indebted to the assistance and guidance I received on computer related issues from Alan Montgomery at Texas A&M University. Thanks is also due to my Ph.D. student colleague David Hurtt for his support, discussions, programming aid, insights, friendship, and lunches. The state of Texas, Texas A&M University, and the Graduate School of Business are also due credit for supplying such a conducive environment to conduct empirical research--I've never seen so much data. Most importantly, I would like to thank my wife for her careful reading of this manuscript and her patient, support, and love.

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CHAPTER I

INTRODUCTION

Corporate profits are generally subject to two layers of tax, corporate level and shareholder level, under the United States income tax system. Investment returns, whether in the form of dividends or price appreciation (capital gains), are subject to income tax but are taxed differently. Cash dividends are taxable as ordinary income in the year received. In contrast, capital gains are recognized in the year the investment is sold or exchanged in a taxable transaction and are generally taxed at a rate equal to or less than that applied to ordinary income. In addition to the variation in tax-rates that apply to ordinary and capital gain income recognized by an investor, the tax-rates that apply to stock returns, whether in the form of dividends or capital gains, vary considerably across investors. This cross-sectional variation is due to the progressive nature of the income tax-rate schedules and the existence of tax-exempt, tax-deferred, and corporate investors. Because dividends and capital gains are subject to differential taxation across investors, different dividend preference classes (dividend clienteles or tax clienteles) consistent with the investor's tax status should exist (Black and Scholes 1974). For example, high tax-rate individual investors should prefer to invest in non-dividend paying stocks that generate returns in the

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The journal used as a style guide for this dissertation is *The Accounting Review*.

form of capital gains, while corporate investors should prefer to invest in high dividend paying stocks since most of the dividend is excluded from taxation due to the dividend received deduction.[1] One implication of the tax-based dividend clientele theory is that the shareholder clientele of a stock should change if the firm alters its established dividend policy.

In an environment without transactions costs the dividend clientele theory implies a complete shift in shareholder clientele upon the initiation of dividend payments by a firm. Previous empirical research has failed to document, or, at best, only provided weak empirical evidence that tax clientele effects are strong enough to influence investors' decisions to transact after a dividend increase (Richardson et al. 1986; Asquith and Krasker 1985; Michaely et al. 1995). These studies examined the gross trading volume of stocks in firms that initiated dividend payments and interpreted an increase in trading volume after dividend initiations as evidence of tax clientele adjustments. The general consensus of this research is that transaction costs of adjusting portfolios (including realizations of capital gains) limit any clientele shifts. These results support the assertion made by Long (1977) that the amount of clientele related trading is likely to be small since the efficiency gains from adjusting to an after-tax efficient portfolio are likely to be small.

This dissertation makes two primary modifications to the research design used in the previous empirical studies of clientele changes that should increase the ability to empirically detect dividend clientele-related trading--if any exists. First, the sample is

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[1] Internal Revenue Code §243.

expanded to include dividend increases as well as dividend initiations.[2] The prior research on shareholder clientele changes examined only dividend initiations. While initiations provide the cleanest opportunity to investigate the dividend clientele hypothesis (since a firm is going from a non-dividend paying status to a dividend paying status), many of these dividend payments are of a relatively small magnitude. If investors consider the tax and non-tax costs associated with adjusting their portfolios after the dividend increase, these relatively small dividend payments may generate portfolio inefficiencies from a tax perspective that are less than other tax and non-tax costs associated with adjusting their portfolios. Therefore, these small dividend payments may result in little clientele-related trading, and create little demand for such shares by dividend preferring investors. By expanding the sample to include all dividend increases, the actual dollar magnitude of the dividend payments represented in the sample should be much greater than that when using only dividend initiations. Also, the increased sample size provides greater statistical power.

The second modification is that transaction data, rather than gross trading volume data, are utilized as the measure of investor activity. The daily transaction data used in this study is accumulated from the *ISSM*[3] data-base. The primary advantage of using transaction data is that trades by different types of investors (individuals or institutions) can be separately examined. If dividend clientele related trading is more concentrated among individual investors than institutional investors, and if individual investors transact in smaller share sizes, then the gross trading volume number used in prior research may be a

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[2] Consistent with Richardson et al. (1986), this study examines only positive dividend changes. Dividend reductions and omissions are not included in the sample. Firms that reduce dividend payments tend to be in poor financial position and isolating the clientele effect may be more difficult. Further, at the time of a dividend omission it is difficult to ascertain whether or not the omission is a temporary event or a sustained change in dividend policy.

poor metric to investigate clientele-related trading.[4] Another benefit of transaction data is that statistical tests are generally more powerful than those using gross trading volume (Cready and Ramanan 1995). A third benefit of transaction data is that the trade direction (buy or sell) can be examined. The dividend clientele theory predicts different trade direction depending on the investor's tax status.

The use of directional trade analysis, especially decisions to sell, should provide additional insight in a real market setting on the impact of potential capital gain taxes on investors' decisions to alter portfolios (lock-in effect - see Meade 1990). The empirical analysis of Richardson et al. did examine the effect of potential capital gain taxes on clientele-related trading after a dividend initiation. However, this transaction cost should only be relevant to shareholders who own the stock of the dividend increasing firm prior to the announcement. The gross trading volume metric used by Richardson et al. does not allow them to examine separately the reaction by existing shareholders (potential sellers) and the reaction by shareholders purchasing the stock after the announcement. Therefore, interpretation of the potential capital gains tax variable in their study is unclear.[5] By partitioning the data into buys and sells, the amount of portfolio adjustments by existing shareholders and the impact of potential capital gains tax recognition on the level portfolio adjustments can be more precisely examined.

This dissertation analyzes the number of abnormal transactions occurring during trading windows after the dividend increase. Because the amount of noise (non-clientele

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[3] Institute for the Study of Security Markets.

[4] Since gross trading volume effectively weighs each transactions by the size of the trade, larger trades tend to dominate the measure. Transaction data weighs each decision to transact equally.

[5] The coefficient estimate on this variable was insignificant in the full models of Richardson et al. (1986).

related trading) captured in the trading measures increases as the trading window lengthens, the trading windows are limited to relatively short periods. Trades by all market participants and trades classified as being made by individual and institutional investors are separately examined. The first three hypotheses are first tested using all trades regardless of trade direction (non-directional analysis) and are then repeated on those trades classified as sells and those classified as buys (directional analysis). The last hypothesis examines only those trades made by individual investors but requires that the individual investor trade class be sub-divided into high and low tax groups.

The evidence presented in the dissertation is consistent with the implications of the dividend clientele theory. A statistically significant increase in transactions after the announcement of a large dividend increase is detected over both an announcement period (generally a five-day period--consisting of the announcement date and the proceeding four trading days) and interval period (starts on the fifth trading day after the announcement and continues through the ex-dividend date), thus indicating the presence of clientele trading. Because the interval period does not contain the trading days immediately after the dividend increase announcement it should not be contaminated as much by any information-related trading. The documented trading increase is generally stronger for those trades made by individuals than those made by institutions. If investors trade-off the tax costs associated with holding sub-optimal after-tax portfolios with tax and non-tax costs associated with rebalancing their portfolios, then, holding the non-tax costs constant, the greater the dividend increase the larger the expected clientele reaction. In the context of an empirical model, a positive correlation between the level of abnormal trading and dividend increase magnitude is interpreted as further evidence of clientele-related trading. Even after controls

for the information content of the dividend increase are incorporated into regression models, the increase in transactions is positively correlated with the dividend increase. This relationship is generally stronger for trades made by individual investors than for those made by institutional investors.

As stated earlier, an additional benefit of transaction data is that it allows investigation of trade direction. The amount of selling during the announcement period after a large dividend increase is significantly greater than the amount of selling that occurs during base-line trading periods; however, during the interval period, this abnormal selling is only detected in those stocks that had relatively low dividend yields prior to the increase and is not statistically significant in the institutional investor class. Statistically significant abnormal buying after a dividend increase is also detected. This abnormal buying is generally stronger in those firms that pay relatively larger dividends. As with the non-directional tests, the amount of abnormal selling and buying is positively correlated with the dividend increase magnitude and the relationship is stronger in the individual investor class than it is in the institutional class. Contrary to expectation, the sign on the coefficient estimate on a variable representing the potential capital gains in regression models examining abnormal selling activity is positive and statistically significant. This coefficient estimate implies that potential capital gain taxes do not prevent investors from re-balancing portfolios after a dividend increase. Consistent with the notion of a stronger clientele effect in the pre-Tax Reform Act of 1986 (TRA 86) period, evidence of greater abnormal selling during pre-TRA periods is also provided.

CHAPTER II

LITERATURE REVIEW

Fundamentals of the Dividend Clientele Theory

Miller and Modigliani [MM] (1961) establish analytically, under strict perfect market assumptions, that firms' stock prices are not affected by the proportion of return realized as dividends versus price appreciation. They hold firm investment constant and assume an environment with no taxes or transaction costs, perfect capital markets, rational investors, and perfect information. The only market imperfection mentioned by MM that could alter their conclusion would be if investors had systematic preferences between a dollar of current dividends and a dollar of capital gains. However, even if such a systematic preference existed, the valuation would still be invariant to dividend policy since each corporation would attract a "clientele" consisting of those preferring its particular payout ratio, and one clientele is as good as another in terms of valuation.

Farrar and Selwyn (1967) examine more closely the propositions made by MM, but their focus is on corporate policy instead of the valuation of shares. Their models focus on the impact of personal taxation, specifically the differential between capital and ordinary income tax rates, on the dividend policy of the corporation rather than on the valuation of shares. They conclude that when the tax rate on capital income is lower than the tax rate on ordinary income, investors' welfare can be improved by shifting returns from dividends to capital gains.

Under the perfect market assumptions, MM's analysis implies that dividend policy is irrelevant to shareholders. The zero taxes assumption is relaxed by Elton and Gruber

(1978). While the emphasis of MM's paper was on the valuation of the firm, Elton and Gruber examine the composition of investors' portfolios under an income tax system. They show that when taxes are introduced into the investment environment, investors no longer hold the market portfolio. The optimal portfolio is a function of an investor's tax-rate, the dividend yield on securities, and the risk of securities. Their results imply that investors with tax-rates above (below) the average tax-rate of the market hold more of their portfolio in low (high) dividend paying stocks relative to the market portfolio.

Miller and Scholes (1978), however, advanced organizational-form arbitrage strategies that reduce or eliminate the tax penalty on dividends relative to capital gains for individual investors. If such strategies are feasible, the importance of the tax clientele theory in explaining corporate dividend policy or an individual's investment choice is diminished. Their primary strategy involves borrowing funds at the risk-free interest rate and investing the borrowed funds in a tax-free life insurance policy that earns the risk-free interest rate. The dividend income from shares of stock is offset by the deduction for investment interest expense. Under such a strategy, individuals are indifferent between investment returns in the form of dividends and capital gains -- dividend irrelevancy. Undertaking such a dividend laundering strategy, however, would seem to involve considerable transaction costs. Further, most individual investors are not able to borrow at the risk-free interest rate and the return on a life insurance policy will generally be less than the risk-free interest rate because of operating costs.[6] Another strategy to reduce the impact of the dividend penalty

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[6] Miller and Scholes examine how taxpayers may be using this strategy in their conclusion. They cite a study by the U.S. Treasury Department ["High Income Tax Returns: 1974 and 1975" (1977)] that indicates the primary reason many high income individuals paid low taxes was due to the interest expense deduction. However, a significant portion of high-income taxpayers have dividend income significantly higher than interest deductions.

on portfolio choice is to hold investments in tax-deferred savings vehicles such as Keogh plans, Individual Retirement Accounts, and/or pension plans. The tax penalty on dividend income is temporarily neutralized when shares are held in these types of accounts since the income is not taxed until the funds are withdrawn.

Another model of corporate investment and dividend policy was put forth by Masulis and Trueman (1988). Their focus is the relation between cash dividends and firm investment given the personal tax disadvantage of dividends and differential personal tax rates. They assume that: all corporations face the same marginal tax rate, personal tax rates on dividend income differ across individuals, capital gain tax rates are effectively zero, corporate repurchases of equity are taxed in the same way as dividends, and eighty percent of all dividends paid from one corporation to another corporation are excluded from taxation. They also assume that there is no debt in a firm's capital structure. The choice faced by the firm is either to invest earnings within the company or distribute a portion to shareholders. Because investment in real assets is subject to diminishing returns to scale, and investment in financial assets is subject to corporate taxation, a firm's ability to defer dividends is not without cost. The optimal dividend payment depends on the firm's investment opportunities and required level of financing, and the shareholders' tax rates. At the firm level, fewer investment opportunities (given the amount of available funds) imply larger optimal dividend levels. With respect to shareholders, the higher the shareholder's marginal tax rate, the greater the benefit from dividend deferral through corporate reinvestment and the lower the optimal dividend level. Their model implies that shareholders with different tax rates will not agree on the firm's internal investment and

dividend policy. High marginal tax rate investors will prefer that the firm reinvest earnings at a higher level and pay smaller dividends than lower-taxed investors.

The above research implies when marginal tax rates differ across investors, and capital gain income is taxed at a lower rate than dividend income, investors may form dividend preference classes (clienteles) consistent with their tax position. Whether or not the dividend policy impacts the valuation of the shares is not addressed in this paper. The focus is whether or not investors adjust their stock portfolios after a dividend increase consistent with the tax-induced dividend clientele theory. In the case of shares of stock, higher-taxed investors should prefer to sell securities that have large dividend increases, while lower-taxed individuals should prefer to purchase these securities. Any dividend clientele effect may, however, be tempered by investors holding shares in tax-deferred savings vehicles (e.g., Individual Retirement Accounts or Keogh plans) or by the dividend laundering strategy proposed by Miller and Scholes (1978).

Empirical Studies of Dividend Clienteles

Although dividend clienteles and dividend policies have been the subject of extensive empirical research, with many different testing environments and methodologies, there is no consensus as to their importance or even existence. One strand of research has examined the ex-dividend day price behavior of a company's stock to determine the mean marginal tax-rate of its shareholders. A second area of research involves survey data from investors and corporate executives. Another area of research has examined the price reaction and/or the trading volume reaction to changes in dividend policy. A final set of

stock returns, investor behavior, and/or corporate dividend policy across different tax regimes.

Ex-Dividend Day Prices

Much of the initial research on dividend clienteles focused on the price drop of a stock after it trades ex-dividend. Elton and Gruber (1970) use the ex-dividend day price drop to measure implied marginal tax-rates of investors. They group securities into portfolios based on dividend yields and find the implied tax-rate decreases as the dividend yield increases--a result consistent with dividend clienteles. However, as suggested by Kalay (1982), it is possible that arbitrage investors trade in the stock around ex-dividend days to capture the difference between the amount of the dividend and the price drop after the stock sells ex-dividend. Such traders may distort the implied tax-rates computed by Elton and Gruber. The occurrence of tax arbitrage trading around the ex-dividend date is empirically examined by Lakonishok and Vermaelen (1986). They find that trading volume increases significantly around ex-dividend dates, and the increase is stronger for higher yield stocks and for stocks with lower transactions cost (actively traded stocks), indicating the presence of arbitrage traders.

Survey Methods

A second stream of dividend clientele research relies on survey methods. Pettit (1977) examines the portfolio positions of individual investment accounts held at a large brokerage firm. In conjunction with this data, Pettit sent a survey to the investors requesting demographic and other investment information. After controlling for time preferences in consumption due to age and income levels, an estimate of the differential tax-rate on dividends relative to capital gains explained a significant portion of the cross-sectional

difference in individual portfolio dividend yields. However, Lewellen et al. (1978), using the same data as Pettit, found a much weaker dividend clientele effect. According to their computations, a ten percent increase in a taxpayer's marginal tax-rate is associated with only a 0.1 percent decrease in portfolio dividend yield. Abrutyn and Turner (1990) surveyed 550 CEOs of the biggest 1,000 corporations in the United States about their dividend payout ratio. They received 163 usable responses. One question on their survey asked respondents to describe the tax status of their shareholders: 58 percent of the responding firms indicated that they do not know their shareholders' tax status. The survey results do not provide strong support for assertions that either the tax status of shareholders or the tax penalty on dividends is a major factor when firms formulate their dividend policies.

Changes in Dividend Payments

Another methodology used to study dividend clientele effects is to examine the market and/or investor reaction around changes in dividend policy. The price reaction to dividend initiations is found by Asquith and Mullins (1983) to be strong and positive. They examine the price reaction to 168 dividend initiations occurring from 1963 through 1980 and conclude that the abnormal returns are primarily due to the information contained in the dividend initiation. Subsequent dividend increases by the sample firms are shown to generate a wealth effect at least as great as the dividend initiation.

Bajaj and Vijh (1990), find the price reactions to dividend increases (decreases) are significantly more positive (negative) for relatively high dividend yielding stocks.[7] If investors consider their aversion to dividends when forming their portfolios, then those

[7] Bajaj and Vijh (1990) studied all dividend announcements (excluding initiations) with a change in dividend payments from July 1962 through December 1987 (excluding the market crash period).

investors holding higher dividend yielding stocks should value an increase in dividends more than those holding lower dividend yielding stocks. The results are consistent with a tax-driven dividend clientele explanation. In a later study, Denis et al. (1994) attempt to simultaneously examine the cash-flow signaling, over-investment, and dividend clientele hypotheses of dividend changes. They also find that firms with relatively high dividend yields prior to a dividend change have a greater price response to a similar change in dividend payments than do firms with relatively low dividend yields. Their study examined the price reaction to 6,777 large dividend changes (changes in dividend yield equal to or greater than ten percent) from 1962-1988. The preceding results are consistent with the notion implied by the clientele theory that if marginal investors in different stocks value dividends differently, anticipated yields should explain some of the price reaction to the announcement of dividend changes. The price reaction research does not provide conclusive evidence of tax-based dividend clienteles because it is difficult to isolate the signaling component of the dividend and since price is established by the marginal investor.

One implication of the dividend clientele theory is that trading should increase after the announcement of a dividend change as the firm's shareholder clientele adjusts. Richardson et al. (1986) investigated the weekly gross trading volume between initial dividend announcements and ex-dividend dates. Their study examined 192 dividend initiations from 1969 through 1982. For the sample firms, the trading volume during the dividend announcement week was 35 percent greater than that during a non-announcement week. In the period beginning after the dividend announcement week and continuing through the ex-dividend week (the interval period in Richardson et al.) trading volume was

54 percent greater than what would occur normally over a similar interval.[8] Because a portion of this volume reaction could have been due to the information content of the dividend announcement, Richardson et al. attempted to control for any information-related trading. Their model attempts to dichotomize the trading volume reaction into an information-related and a clientele-related portion. They assume that the volume that is related to the abnormal return in the announcement week is information related (i.e., the price reaction proxies for the information content). When the only independent variable in their regression model is a measure of abnormal returns, a significant and positive intercept is interpreted as evidence of clientele trading.[9] When variables representing dividend yield and prior price appreciation are added to the model, a positive (negative) and significant coefficient on the dividend yield (prior price appreciation) variable is interpreted as further evidence in support of clientele trading. Richardson et al. conclude that the increase in trading volume following dividend initiations is due primarily to the signal about future earnings contained in the announcement and not clientele adjustments. Test results during the interval period--best for testing tax clientele effects--are weak.[10] The authors state that the small abnormal trading volume suggests that frictions such as transactions costs and the possible realizations of capital gains for tax purposes slow whatever clientele shift may exist.

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[8] For example, if the interval period was three weeks long the abnormal volume would be eighteen percent per week above normal volume (Richardson et al. p. 321, 1986).

[9] The intercept is this model is positive and significant ($p \leq .01$) over the announcement week but is insignificant over the interval trading period when corrections for heteroskedasticity are made.

[10] The coefficient estimate on the change in dividend yield variable is positive and significant ($p \leq .01$) over the announcement week. The regression model was insignificant over the interval period. The coefficient estimate on the prior price appreciation variable was not significant in any of the full models.

In a similar study, Asquith and Krasker (1985) extend the interval to four weeks beyond the ex-dividend date but find little evidence supporting the dividend clientele theory.

Michaely, et al. (1995) examine the price and volume reactions to dividend initiations and omissions in order to examine the price drift after the dividend change. Michaely et al. define a dividend initiation as the first cash dividend reported on the *CRSP Master File*, and define a dividend omission as the omission of a dividend payment after six consecutive quarterly dividend payments (or three consecutive semi-annual dividend payments, or two consecutive annual dividend payments). The study only includes firms that are traded on the NYSE (New York Stock Exchange) or ASE (American Stock Exchange) for two years prior to the dividend change and eliminates ADRs.[11] They identify 561 dividend initiations (average annual yield of .9%) and 887 dividend omissions (average annual yield prior to omission of 6.7%) using data from 1964 through 1988.[12] The clientele effect of dividend initiations and omissions are investigated by examining the abnormal daily share turnover rate for each stock for a period starting 125 trading days before the dividend change and continuing through 250 trading days after the dividend change.[13] The results for the initiation sample show that the share turnover in the eleven days around the dividend announcement is slightly greater than normal; cumulative turnover during the announcement period is 3.23 percent compared to a normal eleven day turnover of 2.56 percent. They state that there is no appreciable increase in turnover in the subsequent year.

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[11] American Depository Receipts--shares of non-U.S. based companies traded on U.S. stock exchanges.

[12] Michaely et al. do not provide a table showing the distribution of the dividend yields across sample firms. The average dividend yield of 0.9 percent is an annualized dividend yield. Dividend yield is defined as the annualized yield, extrapolated from the current dividend payment, divided by price on the day before the announcement.

Similar results are found for the dividend omission sample. They also investigated the change in institutional holdings of the dividend omission sample and found that the level of institutional ownership remains stable in the pre- and post-omission periods.[14] Given the lack of evidence of any increase in share turnover after the dividend changes, and no change in institutional ownership after a dividend omission, Michaely et al. conclude that the dividend clientele effect is not evident and does not explain the price drift that occurs after the dividend change.

A weakness of this study is many of the dividend initiations were apparently relatively small in size since the mean annualized yield for the entire initiation sample was 0.9 percent. Partitioning the abnormal share turnover measures by the magnitude of the dividend yield change (as done in the price response section of their paper) may have provided a better indicator of clientele trading.

Changes in Tax Regimes

Tax law changes create opportunities to examine dividend clientele predictions. The Tax Reform Act of 1986 (TRA 86) included many significant changes in U.S. tax laws, including equalizing the tax rates on capital gain and dividend income for individual taxpayers.[15] Papaioannou and Savarese (1994), examining a sample of firms from the

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[13] Turnover rate is defined as the number of shares traded in firm *i* on day *t* divided by the number of shares outstanding for firm *i* on day *t*. Normal share turnover is defined as the firm's average share turnover in trading days -125 to -5, where day zero is the dividend change day.

[14] Michaely et al. only investigate the change in institutional holdings for the dividend omission sample since institutional ownership data was not available for many of the dividend initiating firms.

[15] Prior to TRA 86 capital gain income was taxed at a maximum rate of 20 percent while dividend income was taxed at the ordinary income rate of up to 50 percent. TRA 86 created two rate brackets for individuals (15% and 28%) and broadened the tax base. TRA 86 also changed many tax laws affecting corporations, including

Fortune 500 lists of 1985 and 1989, find that low to medium payout ratio (percentage of earnings paid as dividends) firms increased their payout ratios after TRA 86, but firms in the highest payout ratios reduced their payout ratios. Their study provides evidence that firms adjusted dividend policies in response to TRA 86; however, not all firms changed their dividend policies consistent with tax-based predictions. Bolster and Janjigian (1991) find no evidence that firms altered their trend in payout policy after TRA 86. Bolster and Janjigian also examine the price response of stocks to the announcement of the final terms of TRA 86 and find that securities with high dividend yields increased in price relative to low dividend yield stocks. This result is consistent with TRA 86 reducing the relative tax disadvantage of dividends versus capital gains.[16]

Tax reform effects on trading volume have been empirically investigated in numerous studies (Lakonishok and Smidt 1986; Bolster, et al. 1989; Henderson 1990; Seyhun and Skinner 1994; Ricketts and Walter 1992). A consistent result in this empirical literature is that changes in the tax environment (e.g., change in tax rates, or difference between capital gain tax rates and ordinary income tax rates) affect investor behavior. Bolster et al. (1989) find that the tax law changes in 1986 significantly impacted trading volume in December 1986 and January 1987. TRA 86 reduced the tax rates on ordinary income but increased the tax rate on long-term capital gains (equalizing them with the ordinary tax rate). Specifically, the paper finds that the relative trading volume for long-

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lowering the top tax rate faced by corporations from 46 percent to 34 percent, and reducing the dividend received deduction from 85 percent to 70 percent.

[16] Tax-rate increases enacted in 1992 provide an additional opportunity to test the reaction of stock prices to changes in tax law. The changes increased the tax disadvantage of dividend income relative to capital gains for higher income individuals. Tillinger and Loudder (1994) provide evidence that dividend-paying firms experienced a negative price response in comparison to firms paying no dividends during the time period surrounding the tax law change.

term winners was significantly greater in December 1986 than in other periods. Monthly trading volume data from *COMPUSTAT* was used in this study.

Stock Transaction Research

Unlike price or gross trading volume data, stock transaction data allows the behavior of different classes of investors to be separately examined. One of the first studies to use transaction data was Cready's (1988) examination of the reaction to earnings announcements by investors of different sizes (wealth). Cready proxied for investor wealth using the number of shares traded in a transaction. Transactions are classified as made by individuals or institutions based on trade size in number of shares (trade size strata). Within the individual trade size stratum, trades are further classified as made by wealthy or less wealthy individuals based on the trade size; larger trade sizes are associated with wealthier individuals.[17] Lee (1990, 1992) also used transaction data in examining the trading behavior around quarterly earnings announcements by different investor types. Lee classifies trades as made by small (individual) or large (institution) traders based on the dollar size of the trade.[18] Lee's study extended Cready's analysis by examining half-hour time intervals and the direction of the trade (buy or sell) around quarterly earnings announcements.

Three studies have used stock transaction data to examine issues involving dividend payments. Lee (1990) examined the short-term trading response of small and large traders

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[17] Cready (p. 4, 1988) states that the New York Stock Exchange *Shareownership* 1983 survey provides evidence that portfolio value and transaction size are positively correlated. Lee (1990) presents data from the Public Transactions Study that shows that more than seventy percent of trades of 900 shares or less are by individual investors.

[18] Lee determined the largest round-lot (increment of hundred) number of shares that could be purchased with $10,000 based on the year-end stock price. Any transaction with the number of shares less than or equal to

after a dividend increase announcements (117 dividend increases were analyzed by Lee) to gain insight into the speed of investor reaction and general trade direction. Each half-hour interval in trading windows that started on the day before the dividend announcement and continued into the third day after the announcement was investigated. An increase in trading after dividend announcements was detected in both large and small trader classes, however, this increase in the large trader class was not as strong as that to earnings announcements. Notwithstanding, the large trader reaction was speedier than the small trader reaction. Lee classified dividend changes into "good" and "bad" news groups depending on the direction of the price reaction to the announcement (positive price response implies good news) when investigating trade direction. There was no general trends in trade direction (buy or sell) by either the large or small trader class to "good" or "bad" news dividends (small sample size limits statistical power).

Cready (1994) provides evidence that the demand for a firm's common stock by relatively wealthier individuals (proxied by transaction size) is negatively correlated with the firm's dividend yield. This effect was strongest when dividend yield was a significant portion of the stock's return. Daily transaction data from 1981 through 1984 are used in this study; mean transaction size is the dependent variable in the regression model that attempts to explain the cross-sectional variation in transaction sizes. If relatively wealthier individuals face higher marginal tax-rates then the results are consistent with tax-induced dividend clienteles.

(greater than) this round-lot purchase amount was classified as being made by an individual (institutional) investor.

Bajaj and Vijh (1995) use transaction data to determine if excess returns around dividend announcement periods are related to dividend-capture trading (arbitrage trading). Each trade made over a seven-day window surrounding the dividend announcement is classified by trade size in number of shares and further classified as either a buy or sell. They determine if dividend-capture trading is present by examining the number of buyer and seller-initiated trades around the dividend announcement. They do not find excessive amounts of buyer-initiated trades, leading them to conclude that dividend-capture trading is probably not the cause of the excess returns.

CHAPTER III

RESEARCH HYPOTHESES

Previous empirical research has failed to detect any significant clientele-related trading after dividend initiations. Two primary improvements are made in this research design relative to previous studies that have examined clientele reactions to dividend changes. First, the prior studies limit their examination to dividend initiations and many dividend initiations are of a relatively small magnitude [0.9 percent average yield (not annualized) in Richardson et al. (1986); 0.9 percent average annualized yield in Michaely et al. (1995)] and therefore may not generate significant tax clientele trading activity. Furthermore, restricting the sample to initiations results in relatively small samples, which lowers statistical power. This study examines both dividend initiations and dividend increases.[19] The second weakness in the prior studies is that they have analyzed gross trading volume (Richardson et al. 1986; Asquith and Krasker 1985; Michaely et al. 1995), and so have failed to consider the possibility of differential responses across heterogeneous investors. By separately examining different classes of investors, greater insight into investor behavior is possible.

Non-Directional Trade Hypotheses (ND)

Assuming that high (low) tax-rate investors prefer to hold low (high) dividend paying stocks, the dividend clientele theory implies that dividend increases cause changes in

[19] Additionally, dividend initiations may be more informative than other dividend increases, and isolating the clientele-related trading from the information-related trading may be more difficult.

a firm's shareholder clientele. Since small dividend increases may not generate significant clientele-related trading because the transaction costs faced by investors exceed the benefits of portfolio adjustments, the first hypothesis examines only large dividend increases. If investors adjust their portfolios after a large dividend increase, the number of transactions in the dividend-increasing firm's stock should be elevated over some window of time following the dividend increase. The first hypothesis is (all hypotheses stated in alternative form):

$H1_{ND}$ *The number of abnormal transactions during a trading window following a large dividend increase is greater than zero.*

Trading in response to the information content of the dividend announcement (and possible simultaneous earnings announcement) is not explicitly controlled in the above hypothesis. The second hypothesis refines the test to control for trading related to the information content of the dividend increase and other factors expected to impact the number of transactions, and examines the relation between the magnitude of the dividend increase and the number of transactions. If there are transactions costs associated with maintaining optimal (after-tax) portfolios, then the amount of clientele-related trading should be positively related to the dividend magnitude.

$H2_{ND}$ *The amount of abnormal transactions during a trading window following a dividend increase is positively correlated with the magnitude of the dividend increase after controlling for trading due to the information content of the announcement.*

The severity of any clientele adjustment should vary between the periods preceding and following TRA 86. The tax law changes of TRA 86 reduced the differential between ordinary income and capital gain tax-rates and substantially reduced the highest marginal tax-rate on ordinary income. The tax law changes reduced the tax penalty on dividends and therefore reduced the tax costs associated with holding dividend paying stocks by taxable investors. These tax changes are expected to reduce the incentive to alter portfolios for tax reasons after a dividend increase (holding transactions costs constant across the two tax regimes). The third hypothesis is:

$H3_{ND}$ *The amount of clientele-related trading during a trading window following a dividend increase is more strongly correlated with magnitude of the dividend increase in the pre-TRA 86 period relative to the post-TRA 86 period.*

Directional Trade Hypotheses (D)

The above hypotheses examine the number of transactions regardless of trade direction. In this section the hypotheses are refined to consider the direction of trade (sell or buy). The first hypothesis analyzes the abnormal selling and buying activity after a large dividend increase. If dividend increases convey good news and investors buy on good news, the information content explanation should not be a confounding factor when examining the abnormal selling activity. The first directional hypothesis is:

$H1_{D}$ *The number of abnormal sells (buys) during a trading window following a large dividend increase is greater than zero.*

If shareholders who owned the stock in the dividend increasing firm prior to the dividend declaration date (existing shareholders) prefer the firm's previous dividend policy, then the existing shareholders may adjust their portfolios to create after-tax efficient portfolios. The tax costs associated with holding their current portfolios increase with the magnitude of the dividend increase. Therefore, the amount of abnormal selling is expected to be correlated with the dividend increase magnitude as the existing shareholders trade off the tax costs associated with holding the dividend paying stock and the other costs associated with adjusting their portfolios. Additionally, dividend preferring investors will be more inclined to purchase the security after the dividend increase, and their demand for shares should be correlated with the dividend increase. The second directional hypothesis is:

$H2_D$ *The amount of abnormal sells and buys during a trading window following the dividend increase is positively correlated with the magnitude of the dividend increase after controlling for the information content of the announcement.*

TRA 86 is expected to have had its greatest effect on the rate of selling after a dividend increase by taxable individual investors in the pre-TRA 86 periods. Existing shareholders of a stock prior to the dividend increase may have had marginal tax rates on ordinary income as high as 50% while the highest marginal tax-rates on capital gains were 20%. This large differential increases the tax costs of holding the dividend increasing firm's stock relative to non-dividend paying or low dividend paying stocks. In the post-TRA 86 period this rate differential was significantly less and may have been zero for many

taxpayers.[20] Therefore, the rate of abnormal selling is expected to exhibit a stronger correlation with the dividend increase in the pre-TRA period. Since the tax clientele effects should be stronger in the pre-TRA 86 period the rate of abnormal buying is also expected to exhibit a stronger correlation in the pre-TRA 86 period.

$H3_D$ *The amount of clientele-related sells (buys) during a trading window following a dividend increase is more strongly correlated with magnitude of the dividend increase in the pre-TRA 86 period relative to the post-TRA 86 period.*

Additional Hypothesis

The final hypothesis uses the non-directional data and only examines trades made by individual investors. If individual investors adjust their portfolios consistent with the dividend clientele theory, then the ownership structure of the dividend-increasing firm should be different after the dividend increase from what it was before. More specifically, if high tax-rate individual investors sell and low tax-rate individual investors purchase the stock of the dividend increasing firm, then the firm should have a higher (lower) incidence of ownership by low (high) tax-rate individual investors after the dividend increase (relative to the ownership structure before the dividend increase). This change in ownership composition should have an effect on the relative number of transactions attributed to high and low tax-rate individual investors after a dividend increase. If the amount of clientele adjustment is related to the magnitude of the dividend increase, then the difference in the relative number of transactions, by high and low tax-rate individual investors, occurring

[20] There was no difference between the highest statutory marginal tax rate on capital gains and ordinary income in the years 1988 and 1989.

over a period of time before the dividend increase--and a similar period of time after the dividend increase--should also be related to the magnitude of the dividend increase. Therefore, a reinforcing test of whether or not investors adjusted their portfolios consistent with the tax prediction involves examining time periods surrounding the dividend increase. The previous hypotheses examine a relatively short adjustment period by investors, this hypothesis has a longer-term focus. It examines the calendar years before and after the calendar year of the dividend increase:

H4 *The difference in the relative number of transactions in the calendar years after and before the calendar year of the dividend increase by low (high) tax-rate individual investors is positively (negatively) correlated with the magnitude of the dividend increase.*

CHAPTER IV

DATA AND RESEARCH SAMPLE

Data

Firms with dividend increases are identified on the *CRSP*[21] *Master File*. Information on the declaration date, ex-date, dollar amount, dividend payment frequency, closing stock prices, shares outstanding, and the exchange the security is listed on are retrieved from *CRSP*. Data on transaction sizes and bid-ask spreads are accumulated from the *ISSM* daily transaction database. Data are available from 1983 through 1992 for New York Stock Exchange (NYSE) and American Stock Exchange (ASE) listed companies.

Sample Selection

Only dividend increases in which the dividend was an ordinary dividend, payable in U.S. dollars, and paid either quarterly, semi-annually, or annually (dividend codes of 1232, 1242, 1252 on *CRSP*) and the stock was traded on the NYSE or ASE at the time of the increase are included in the sample. The sample screening process consists of three phases. Phase one produces a sample of firms that had a dividend increase(s) over the *ISSM* data time period; phase two imposes additional selection criteria on the identified dividend increases; phase three restricts the sample to firms with adequate trading data on *ISSM* (Appendix A discusses the sample selection steps). The final sample consists of 883 dividend increases. Table 1 shows the effects of the sample selection screens on the sample.

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[21] Center for Research in Security Prices.

TABLE 1
Sample Selection Steps

Panel A: Dividend Increase Events from January 1, 1983 through December 31, 1992	
Dividend events on CRSP--1/1/80 - 12/31/92.	66,263
Less: Change in annualized dividend yield at declaration date less than or equal to zero.	(54,122)
	12,141
Less: Dividends paid under a qualified dividend reinvestment plan [IRC §305(e)].	(388)
	11,753
Less: Dividend declaration date before 1/1/83.	(3,659)
Dividend increases--1/1/83 - 12/31/92.	**8,094**

TABLE 1 (Continued)

Panel B: Other Sample Selection Criteria	
Total observations from phase 1.	8,094
Less:	
(1) Reported closing price of the stock on CRSP the trading day before the dividend declaration is zero.	(79)
	8,015
(2) Possible dividend omission in the dividend payment before the identified dividend increase.	(247)
	7,768
(3) Change in exchange code.	(928)
	6,840
(4) SIC code between 6700 and 6799 (inclusive).	(1,190)
	5,650
(5) The next dividend payment is less than current dividend payment.	(839)
	4,811
(6) Dividend is paid on a quarterly basis and the next dividend is greater than the current dividend.	(273)
	4,538
(7) Change in dividend payments prior to the identified dividend increase (two or four payments for quarterly (two if large increase), and one payment for semi-annual and annual dividends).	(3,095)
	1,443
(8) Absolute change in outstanding shares greater than 10%.	(297)
	1,146
(9) Stock price the day before dividend declaration date is less than $8.00.	(42)
	1,104
(10) Stock price the day before dividend declaration date is greater than $40 (indexed 5% a year).	(155)
Sub-total: observations before further date restrictions.	949
Less:	
(11) Declaration date before 7/1/83 and after 6/30/92.	(41)
Total observations after phase two.	**908**
Panel C: ISSM Sample Selection Restrictions	
Total observations from phase two.	908
(1) Observation not matched to *ISSM* data.	(15)
	893
(2) Observation not matched to *ISSM* data in post-dividend increase period.	(6)
	887
(3) Entire ex-dividend date period is missing on *ISSM*.	(4)
Total observations.	**883**

The number of dividend increases, by year, is presented in table 2. Summary statistics pertaining to the dividend increase sample are presented in table 3. The average (median) change in dividend yield for the sample firms is 0.65% (0.47%). The average (median) annualized dividend yield after the increase is 3.93% (3.39%), much greater than the dividend yields investigated in prior research. The dividend increase announcements are not clustered in any calendar quarter and quarterly payments are the most common dividend.[22]

For purposes of testing hypothesis one the sample is partitioned into four groups and restricted to only large dividend increases. A large dividend increase is defined as an increase in dividend payments that causes the annualized dividend yield to increase by at least 0.5 percent.[23] These four sub-samples are collectively referred to as the large dividend increase sub-samples. The first large dividend increase sub-sample consists of all dividend increases identified that have a change in yield greater than 0.5%--*All Increases* sub-sample. The second sample is restricted to include only initial dividends--the *Initiation* sub-sample. The 0.5% change in dividend yield limitation is not applied to the *Initiation* sub-sample due to its small size; therefore, all dividend initiations during the *ISSM* data period are included in this sub-sample. The third and fourth sub-samples are discussed below.

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[22] The cross-sectional tests used in this study assume observational independence. Tables 2 and 3 indicate that the calendar year 1988 generally had more dividend increases than any other calendar year. However, the samples are not heavily concentrated in any calendar year, and within a given year the dividend announcements are not heavily concentrated in any calendar quarter. Some firms are included in the sample more than once (one firm is included six times), but when this occurs there is normally at least one year between the event dates. Dependence due to event date clustering and/or multiple observations from the same firm are not likely to be a problem in this study.

[23] The change in annualized dividend yield is equal to the difference between the annualized dividend payment of the current distribution (amount after the increase) and the annualized dividend payment before the increase divided by the closing stock price on the day before the dividend increase.

TABLE 2
Dividend Increase Sample by Year

Year	*All Increases*
1983	76
1984	125
1985	93
1986	54
1987	92
1988	140
1989	113
1990	93
1991	61
1992	36
Total observations	883
Number of dividend initiations in sample	68

TABLE 3
Summary Statistics - Dividend Increase Sample (*n=883*)

Change in annual dividend yield:	
Average	0.65%
Median	0.47%
Range (max - min)	11.55% - .06%
3rd Quartile - 1st Quartile	.70% - .27%
Annual dividend yield:	
Average	3.93%
Median	3.39%
Range (max - min)	17.09% - .18%
3rd Quartile - 1st Quartile	4.98% - 2.21%
Annual dividend amount:	
Average	$1.04
Median	$0.88
Range (max - min)	$5.00 - $0.04
3rd Quartile - 1st Quartile	$1.44 - $0.48
Dividend increases by calendar quarter:	
1st	237
2nd	216
3rd	185
4th	245
Type of dividend:	
Quarterly	850
Semi-annual	24
Annual	9
Sample by SIC codes:	
0100-0999	6
1000-1999	38
2000-2999	207
3000-3999	264
4000-4999	147
5000-5999	78
6000-6999	85
7000-7999	43
8000-8999	14
9000-9999	1

Note: 253 observations are from a firm that has previously been identified as having a dividend increase during the sample period.

The third sub-sample imposes an additional selection criterion on the *All Increases* sub-sample based on the magnitude of the dividend payment prior to the identified dividend increase.[24] If investors with an aversion to dividends do not own stocks that already pay a significant portion of their return in dividends, and if investors with a preference for dividends already own stocks that pay a significant portion of their return in dividends, then the clientele reaction to a dividend increase may be much smaller for firms already paying large dividends. The additional selection criterion limits this sample to those firms in the *All Increases* sample where the dividend payment prior to the increase had an annualized dividend yield of 2.0 percent or less--the *Low Prior Yield* sub-sample.[25]

The fourth sub-sample imposes an additional selection criterion on the *All Increases* sample based on the magnitude of the dividend payment after the dividend increase. Cready (p. 502, 1994), using transaction data from 1981-1984, finds little evidence of any relation between mean transaction size and dividend yield for relatively low dividend paying stocks (dividend yield less than 4.0%); however, for relatively high dividend paying stocks, a significant negative relation between mean transaction size and dividend yield was found. These results imply that dividend yield affects only the type of investor that trades in the security when it is a significant portion of a stock's return. This sample identifies firms that, after the dividend increase, provide a significant portion of their returns in dividend payments. For purposes of identifying this sample, a firm will be considered as paying a significant portion of its return through dividends if the dividend yield of the stock, after the

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[24] Studies examining the price reactions to dividend changes find the price reaction to a similar dividend change to be greater for firms that already have a relatively high dividend yield (Bajaj and Vijh 1990; Denis et al. 1994).

[25] This annualized yield is based on the stock price the day before the identified dividend increase.

dividend increase, is greater than or equal to the median dividend yield on *Value Line* stocks for that particular year[26]--the *Above Median Yield* sub-sample.

The number of dividend increase events, by year, for each of the large dividend increase sub-samples, is provided in table 4. Summary statistics for the large dividend increase sub-samples are presented in table 5. The change in annualized dividend yield is greatest in the *Initiation* sub-sample with an average (median) change of 2.22 (1.23) percent, much greater than the 0.9 percent average annualized yield for the dividend initiations identified in Michaely et al. (1995). Of the other samples, the change in annualized dividend yield is greatest in the *Low Prior Yield* sample--an average increase of 1.59%. The *All Increases* and *Above Median Yield* samples have an average annualized dividend yield increase of 1.05% and 1.12%. The annualized dividend yield is greatest in the *Above Median Yield* sub-sample [average (median) annualized dividend yield of 5.93% (5.18%)] and is lowest in the *Initiation* sub-sample [average (median) of 2.22% (1.23%)]. Across all samples the most common dividend payment is a quarterly dividend.

[26] The median dividend yield of *Value Line* stocks is computed by taking the mid-point of the 52 week range of the median dividend yields on *Value Line* stocks as published in the market monitor section of *Value Line's Selections and Opinions* report in the last issue for each calendar year.

TABLE 4
Large Dividend Increase Sub-Samples by Year

Year	*All Increases*	*Initiation*	*Low Prior Yield*	*Above Median Yield*
1983	34	3	6	27
1984	76	6	17	44
1985	54	9	15	33
1986	26	7	9	16
1987	38	11	17	23
1988	70	13	22	45
1989	61	11	24	38
1990	39	3	11	26
1991	18	1	3	10
1992	10	4	5	5
Total observations	426	68	129	267
Number of dividend initiations in sample	61	68	61	8

Where:

All Increases sub-sample requires that the identified observation have a dividend increase (large increase - change in yield greater than or equal to 0.5 percent).

Initiation sub-sample contains observations where the dividend increase was the first dividend payment for the firm on the *CRSP* Master File.

Low Prior Yield sub-sample requires that the identified observation have a dividend increase (large increase - change in yield greater than or equal to 0.5 percent) and the yield of the dividend payment before the identified dividend increase be less than or equal to 2.0 percent.

Above Median Yield sub-sample requires that the identified observation have a dividend increase (large increase - change in yield greater than or equal to 0.5 percent) and the dividend yield after the increase greater than or equal to the median dividend yield on *Value Line* stocks for the calendar year of the increase.

TABLE 5
Summary Statistics - Large Dividend Increase Sub-Samples

	All Increases (n=426)	*Initiation (n=68)*	*Low Prior Yield (n=129)*	*Above Median Yield (n=267)*
Change in annual yield:				
Average	1.05%	2.22%	1.59%	1.12%
Median	0.71%	1.23%	0.91%	0.71%
Range (max - min)	11.55% - .50%	11.55% - .18%	11.55% - .50%	11.55% - .50%
3rd Quartile - 1st Quartile	.96% - .58%	2.29% - .75%	1.35% - .65%	.91% - .58%
Annual dividend yield:				
Average	4.51%	2.22%	2.29%	5.93%
Median	3.89%	1.23%	1.92%	5.18%
Range (max - min)	17.09% - .52%	11.55% - .18%	11.55% - .52%	17.09% - 3.02%
3rd Quartile - 1st Quartile	5.80% - 2.62%	2.29% - .75%	2.44% - 1.25%	7.27% - 4.08%
Annual dividend amount:				
Average	$1.14	$0.40	$0.50	$1.51
Median	$1.00	$0.20	$0.40	$1.40
Range (max - min)	$5.00 - $0.07	$2.72 - $0.04	$2.72 - $0.07	$5.00 - $0.30
3rd Quartile - 1st Quartile	$1.60 - $0.50	$0.40 - $0.11	$0.60 - $0.20	$2.00 - $1.00
Increases by calendar quarter:				
1st	138	26	46	86
2nd	102	23	39	53
3rd	69	6	16	47
4th	117	13	28	81
Type of dividend:				
Quarterly	411	55	115	264
Semi-annual	11	8	10	3
Annual	4	5	4	0
Sample by SIC codes:				
0100-0999	4	2	2	3
1000-1999	20	6	7	13
2000-2999	100	14	22	60
3000-3999	110	17	47	53
4000-4999	80	3	4	75
5000-5999	33	10	17	12
6000-6999	48	9	17	34
7000-7999	24	4	10	14
8000-8999	6	3	3	2
9000-9999	1	0	0	1

Note: 91, 7, and 68 observations in the *All Increases*, *Low Prior Yield*, and *Above Median Yield* samples are from firms that had previously been identified as having large dividend increases during the sample period.

CHAPTER V

RESEARCH METHODOLOGY

The dividend clientele theory implies that a change in dividend policy will lead to changes in the firm's shareholder clientele and in investors' portfolio holdings. In addition to examining transactions by all market participants this dissertation separately examines the trades by institutional and individual investors. Since it is not possible on the *ISSM* database to identify exactly whether a trade is made by an institutional or individual trader, trade size classes are used to proxy for investor type. Previous empirical research on trading behavior uses trade sizes (either share number or dollar size) as a proxy for the type of investor trading (Cready 1988; Cready and Mynatt 1991; Lee 1992). This study uses the number of shares traded to proxy for investor type. For testing the first three hypotheses, trades ranging in size from 100 to 200 shares are classified as made by individuals and trades of 1,000 shares or greater are classified as made by institutions.[27] Hypothesis four only examines trades by individual investors and requires classification of individual investors into low and high tax groups. For purposes of hypothesis four, trades of 100-200

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[27] Cready (1988) classified trades ranging in size from 100 to 900 shares as made by individuals and those greater than 1,000 as made by institutions. The results of Lee and Radhakrishna (1996) imply that a better separation between individual and institutional trades is achieved if a range of trade size is eliminated from classification. Using the *TORQ* data they determined that 73 percent of all trades made by individual investors are captured by a 200 share cut-off. When a 200 (900) share cut-off is used to classify individual trades the probability of classifying an institutional trade as an individual trade is 0.15 (0.31). When a 900 share cut-off is used to classify institutional trades, the probability of classifying an individual trade as an institutional trade is 0.07. The *TORQ* data contains trading data from 144 firms selected from a stratified random sample from November 1990 through January 1991. The data indicates the type of trader (institution or individual) and the direction of the trade.

shares are considered made by lower tax individuals and trades of 300-900 shares are considered made by higher tax individual investors.[28]

Because the dividend clientele theory does not predict when an investor will trade following a dividend increase, three alternative trading windows are used in examining the first three hypotheses. The first two trading windows are constructed similarly to those used by Richardson et al: (1) the announcement period - which includes the dividend declaration date through the fourth trading day after the declaration date, and (2) the interval period - which begins on the fifth trading day from dividend declaration date and continues through the ex-dividend date. The third trading period is similar to the interval period except the ending date is not determined by reference to the ex-dividend date, but rather it extends for a fixed length of time. This (3) expanded interval period starts the fifth trading day after the dividend declaration date and continues through the fourteenth trading day after the announcement.[29] If information-related trading occurs fairly rapidly, the abnormal transaction measures over interval periods should not be severely biased.

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[28] Cready (1988) states that the New York Stock Exchange's Shareownership 1983 shareholder survey presents empirical evidence supporting a positive correlation between wealth and transactions size. If wealthier individuals face higher marginal tax rates than less wealthy individuals, then the trade size classifications may noisily partition individual investors into high and low tax-rate groups.

[29] This trading window is included since many of the sample firms are not included in the interval period because the ex-dividend date occurred during the announcement period. The expanded interval period may contain more noise than the interval period since days after the ex-dividend date are captured in the measure. If existing shareholders do not want to receive the dividend, they need to sell the stock prior to the ex-dividend date. Once the ex-dividend date passes there is no incentive to sell the stock to avoid dividend income until the next dividend is declared. Dividend preferring investors need to purchase the stock prior to the ex-dividend date in order to receive the dividend. Results over the expanded interval period will likely not be as strong as the interval period because the incentives to trade (in a timely manner), for dividend reasons, may no longer be present in many stocks since the ex-dividend date has passed.

Non-directional Trade Hypotheses

The *ISSM* data provides information on each transaction occurring in NYSE or ASE listed stocks.[30] For purposes of this study, the *ISSM* data is accumulated on a daily basis. The number of daily transactions are transformed by the natural log consistent with Cready and Ramanan (1995).[31] Variables representing the number of transactions occurring by investor type k in the stock of firm i during day d is computed by:

$$TR_{kid} = ln(1 + \text{number of transactions in trade size stratum } k \text{ in firm } i \text{ during day } d), \quad (1)$$

where:

k	denotes the trade size stratum: *All trades*, *1,000 shares or larger*, and *100-200 shares;*
i	denotes the stock in the firm represented by dividend increase i; and
d	denotes the trading day ($d=0$ is the dividend declaration date).

Since the tests during the trading windows examine the number of abnormal transactions, measures of daily expected transactions during the trading windows are necessary.

A market adjusted expected transactions model is used in the non-directional trade investigation. An estimate of the expected number of transactions during day d of the trading window is derived by using the relationship between the log transformed number of transactions in the stock of dividend increasing firm i and the log transformed number of transactions in all NYSE listed securities over an estimation period. The estimation periods used to generate the expectation models are intentionally constructed to include dividend

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[30] *ISSM* contains data on trades occurring on the NYSE and ASE as well as regional exchanges. This study includes all trades regardless of the exchange on which they were executed.

[31] Cready and Mynatt use a log transformed number of transactions; Lee (1992) utilizes a square root transformation. Cready and Ramanan state that untransformed daily transaction data and abnormal transaction measures are not normally distributed. When the data are transformed by the natural log, the distribution is closer to normal. Cready and Ramanan examine the performance of cross-sectional t-tests of abnormal transactions over single day event windows using both untransformed and log-transformed transactions.

announcement periods and utilize trading data from before and after the identified dividend increase.[32] The relationship is constructed by estimating the following model using ordinary least squares over the estimation period:[33]

$$TR_{kid} = a_{ki} + b_{ki}(ln(1 + MKT\_TR_d)) + e_{kid} . \quad (2)$$

where:

MKT_TR_d	is the total number of transactions occurring in NYSE listed securities on day d;
a_{ki}	is the estimated intercept for dividend increasing firm i's trade stratum k;
b_{ki}	is the estimated slope for dividend increasing firm i's trade stratum k; *and*
e_{kid}	is the error term.

Based on these coefficient estimates the expected number of transactions (*ETR*) within trade stratum k for dividend increasing firm i's stock on day d during the trading window is estimated as:

$$ETR_{kid} = a_{ki} + b_{ki}(ln(1 + MKT\_TR_d)) . \quad (3)$$

Using the above measure of daily expected transactions, an abnormal transactions measure (*ABTR*) for each day during the trading window is computed as:

Rejection percentages were generally the same and over-rejection (type I error) does not appear to be a problem using either metric.

[32] The estimation periods are designed to include 100 days of transaction data, 50 days each from a pre- and post-dividend increase period. For quarterly dividends these time periods generally start on the declaration date of the lag and lead dividend payments and continue for 50 days in each period. However, if the number of trading days between the identified dividend increase and the lead or lag dividend declaration is less than 52, then the starting point for the pre-period (post-period) begins 60 days before (after) the declaration date of the dividend increase. The pre-period starts 60 days before the identified dividend increase for initial, semi-annual, and annual dividends and also for quarterly dividends that have more than 80 days between the declaration date of the identified increase and the prior dividend payment. The post-period begins 70 days from the declaration date of the increase for semi-annual and annual dividends, and quarterly dividends where the number of days between the declaration date of the dividend increase and the lead dividend payment is greater than 80.

[33] Cready and Ramanan (footnote 11, 1995) suggest that the performance of an ordinary least squares market expectation model is similar to a market expectation model that takes into account the autocorrelation in trading over multi-day event windows.

$$ABTR_{kid} = TR_{kid} - ETR_{kid} . \quad (4)$$

Hypothesis One

Hypothesis one examines firms included in the large dividend increase sub-samples. If investors consider the tax and non-tax costs associated with forming after-tax efficient portfolios then small dividend increases may not result in much clientele trading. If shareholder clienteles change after a large dividend increase, an increase in the number of transactions during the trading windows should be evident as investors adjust their portfolios. Hypothesis one examines whether the number of abnormal transactions during the announcement period, the interval period, and the expanded interval period is greater than zero. The standardized mean daily number of abnormal transactions over these periods for each trade stratum in each dividend increasing firm is computed by:

$$MABTR_{ki} = \{ \sum_{d=0.5}^{d+f-1} ABTR_{kid} / f \} / \hat{\sigma}_{ki}, \quad (5)$$

where:

d	is the trading day [$d=0$ *(5)* is the declaration date (start of the interval period)];
f	is the number of trading days during trading period [generally 5 days for the announcement period, number of days between $d=5$ and the ex-dividend date for the interval period, and generally 10 days for the expanded interval period); and
$\hat{\sigma}_{ki}$	is the estimate of the standard deviation of the error term in trade size stratum k for dividend increasing firm i from the estimation period.

Evidence of clientele trading is provided if the cross-sectional mean of *MABTR* is statistically greater than zero over the trading windows.

Hypothesis Two

Hypothesis one does not explicitly control for trading in response to the information content of the dividend announcement (and possible simultaneous earnings announcement). This section discusses refinements to the methodology to control for trading related to the information content of the dividend increase and other factors expected to impact the number of transactions.

Richardson et al. (1986) use the abnormal return at the announcement of the dividend initiation as a proxy for the announcement's information content; this proxy is also used in this study. The abnormal return is measured by accumulating the daily prediction error from a market model over a three-day window ending on the day after the dividend declaration date.[34] As in Richardson et al., market model parameters will be estimated using only days following the dividend declaration. No prior data is utilized in the model estimation period since there is usually considerable price run-up prior to a dividend announcement and using this data may bias the market model parameters. The models are estimated using the technique developed by Scholes and Williams (1977). This technique considers the lagged dependence between security prices and a market index when a security is traded infrequently. The equal-weighted *CRSP* index is used as the market index and the market model is estimated from days 3 through 242 (where day zero is the dividend declaration date).

The cumulative abnormal return over the three-day event window is denoted *CAR* and is computed by:

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[34] Richardson et al. use a five-day interval to accumulate the daily prediction error; their window starts three days before the announcement and ends the day after the announcement.

$$CAR_i = \sum_{d=-1}^{+1} (R_{id} - \hat{R}_{id}), \qquad (6)$$

where:

R_{id} is the return for security i during day d of the event window; and

$\hat{R}_{id}$ is the predicted return for security i during day d of the event window.

The cumulative abnormal return is included as an independent variable in a regression model that attempts to explain the cross-sectional variation in the number of abnormal transactions over the trading windows. Statistics on the cumulative abnormal returns for the dividend increase sample are provided in table 6.[35] Consistent with prior research, the price reaction to the dividend increase announcement is positive and statistically significant. The average cumulative abnormal return over the three day accumulation period is 0.84%.

[35] The cumulative abnormal returns were also separately examined for the four large dividend increase sub-samples. The average cumulative abnormal return for the *Initiation* sample is not statistically different from zero; this value is in sharp contrast to the average cumulative return of four percent reported by Richardson et al. (1986). The expanded *All Increases* (large increases) sample has an average cumulative abnormal return of 1.02 percent; this is closer to, but still less than the 1.25% average cumulative abnormal return reported for the sample of 5,992 large dividend increases studied by Denis et al. (1994). Consistent with prior research on the price reaction to dividend increases, the *Above Median Yield* sample has the largest average cumulative abnormal return. Dividend increases by high dividend paying firms are valued more than dividend increases by low dividend paying firms (Bajaj and Vijh 1990; Denis et al. 1994).

TABLE 6
Three Day Cumulative Abnormal Returns

Average cumulative abnormal return	0.84%
Median cumulative abnormal return	0.61%
t-statistic (mean=0)	7.95*
Positive:Negative	521:362
(percent positive)	(59%)
Sign test (*z*)	7.04*

* significant at less than the .001 level.

The number of abnormal transactions may be tempered by the transaction costs associated with re-balancing portfolios. These transaction costs may include any commissions or fees, the cost to find a new investment, or any capital gain taxes due to a sale. Since it is not possible to determine the investor's holding period for each transaction, different holding periods are used to compute an estimated price appreciation for each security. A variable is constructed that measures this prior price appreciation (denoted PCG) on a percentage basis over one and two year windows (shorter period if price is not available).[36] The stock prices (adjusted for stock splits and dividends) of each security at the dividend declaration date and 250 and 500 trading days before the declaration date are retrieved from *CRSP*. Since capital gain taxes paid affect only the transaction cost of selling, no prediction is made regarding the expected sign of this coefficient in the non-directional investigation.[37]

The annualized dividend yield based on the prior dividend payment (*LDY*) is included in the analysis as a control variable. No prediction is made regarding the sign of any correlation between this variable and the abnormal transaction measures. The closing stock price on the declaration day is also included as a control variable for the other transaction costs. The variables presented above are combined in the following model:

$$MABTR_{ki} = a_0 + a_1 P\_CAR_i + a_2 N\_CAR_i + a_3 CAR^2{}_i + a_4 \Delta DY_i + a_5 LDY_i + a_6 PCG_i + a_7 PRC_i + u_{ki}\,, \qquad (7)$$

where:

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[36] Richardson et al. (1986) report results for an assumed five-year holding period prior to the year of the dividend declaration. They also report in a footnote that they used a six year holding period that consisted of the five years prior to the dividend declaration and the year of the declaration, and a one year holding period that consisted of the year prior to the dividend announcement. The results were essentially the same (327).

[37] Richardson et al. (1986) predict a negative sign on this coefficient. In their empirical analysis the coefficient estimate on this variable is generally not significant.

$MABTR_{ki}$ is the standardized mean daily number of abnormal transactions in trade size stratum k in dividend increasing firm i during: (1) announcement period, (2) interval period, or (3) expanded interval period;
P_CAR_i is the cumulative abnormal return for firm i if the cumulative abnormal return was greater than zero; otherwise, the variable is zero;
N_CAR_i is the absolute value of the cumulative abnormal return for firm i if the cumulative abnormal return was less than zero; otherwise, the variable is zero;
CAR_i is the cumulative abnormal return;
ΔDY_i is the increase in annualized dividend yield;
LDY_i is the annualized dividend yield of the prior dividend payment;
PCG_i is the estimated amount of prior price appreciation over a one year window;
PRC_i is the closing stock price the day of the dividend announcement; and
u_{ki} is the error term.

The above regression model is estimated for each trade stratum over the announcement, interval, and expanded interval periods. Evidence of dividend clientele trading is strengthened if, after controlling for the trading due to the dividend's information content, the coefficient estimate on the change in dividend yield variable is positive and statistically significant.

Hypothesis Three

Hypothesis Three examines TRA 86's (Tax Reform Act of 1986) effect on the magnitude of the clientele adjustments after a dividend increase. TRA 86, when fully phased-in, reduced the top marginal tax-rate from fifty percent to twenty-eight percent and eliminated the sixty percent exclusion for long-term capital gains. The reduction in the differential between ordinary income and capital gain tax-rates reduced the tax penalty on dividends. Therefore, the rate of portfolio adjustment by investors after a dividend increase is predicted to be greater in the pre-TRA 86 period relative to the post-TRA 86 period.

Pre- and post-TRA 86 periods need to be defined to test this hypothesis. Since a considerable amount of selling occurred in the last half of 1986, to take advantage of the lower capital gains tax-rates (Bolster et al. 1989) this period is not considered in the analysis. Additionally, since 1987 was a transitional year with a tax-rate structure between the pre- and post-TRA 86 tax-rates, the year 1987 is not considered part of the post-TRA 86 period. To limit the confounding effects of tax law changes and possibly lower transactions costs, trades occurring after December 31, 1990 are not included in this analysis. Therefore, the pre-TRA 86 period is July 1, 1983 through June 30, 1986 and the post-TRA 86 period is January 1, 1988 through December 31, 1990.

The hypothesis is tested using a regression model similar to that used in equation (7) except for inclusion of two interaction terms. A binary variable (*PRE*) is created that indicates whether the dividend increase occurred in the pre- or post-TRA 86 period (coded 1 if pre-TRA 86 and 0 if post-TRA 86). This binary variable is interacted with the change in dividend yield variable (ΔDY) and the prior price appreciation variable (*PCG*). These interaction variables allow the slope of the line to be different across the two tax regimes. The interaction term with the prior price appreciation is included to control for any differential in capital gain realizations across the two periods.[38] The regression model is (variables are the same as previously defined):

$$MABTR_{ki} = b_0 + b_1 P\_CAR_i + b_2 N\_CAR_i + b_3 CAR^2{}_i + b_4 \Delta DY_i + b_5 LDY_i + b_6 PCG_i + b_7 PRC_i + b_8 (PRE_i * \Delta DY_i) + b_9 (PRE_i * PCG_i) + u_{ki} . \quad (8)$$

Evidence of a greater clientele reaction to dividend increases in the pre-TRA 86 period relative to the post-TRA 86 period is provided if b_8 is positive and statistically significant.

Directional Trade Hypotheses

The *ISSM* data do not indicate whether a trade was a sale or purchase. However, information on the prevailing quote at the time of the trade is available. Lee and Ready (1991) present an algorithm to infer trade direction from intra-day data. The first step in the algorithm classifies a trade as a buy or sell if it occurs at the prevailing ask or bid price (quote). The prevailing quote to classify trades is the most current quote preceding the identified trade which is at least five seconds old. Simply using the most current quote may result in using a quote that was not in place at the time of the trade. Lee and Ready state that quotes are often recorded ahead of the trade that caused the quote revision and the number of quotes recorded ahead of that revision-causing trade is increasing overtime due to the use of "electronic books" by market specialists. They also provide a method to classify trades that occur between the bid and ask prices. In their sample of 150 NYSE firms during 1988, approximately 30% of all trades occurred in between the bid and ask prices.

This study only classifies those trades that occur at the prevailing bid or ask prices. The prevailing quote at the time of the trade is determined consistent with the Lee and Ready trade algorithm. The quote used to classify a trade is the last quote that preceded the identified trade by at least five seconds. All quotes are used regardless of their origin.[39] Trades that occur at prices greater or less than or between the prevailing quote are not included in the analysis. These trades are not included in the analysis for two reasons. First,

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[38] The model does not include an intercept shift since theory does not indicate that the amount of trading holding all variables constant should differ across the two tax regimes.

[39] Lee and Ready (1991) use only BBO (Best Bid & Offer) eligible quotes. When only these quotes were used in this study many trades were not classified. In fact for a number of firms no trades were classified. There appears to be a problem with the quote condition code vector on the *ISSM* database.

approximately 70% of trades occur at the bid or ask price.[40] Since this study is not concerned with intra-day inferences, enough trades at either the bid or ask occur on any given day to provide adequate data for statistical analysis. Second, classifying trades that occur between the bid and ask price is a relatively noisy process. Lee and Radhakrishna (1995) compare the performance of the Lee-Ready trade direction algorithm to the buy-sell classifications coded on the *TORQ* database. When only those trades that are unambiguously classified on the *TORQ* database as a buy or sell are used in the analysis the Lee-Ready algorithm corresponds to the *TORQ* classification 98% of the time for trades occurring at the bid or ask prices. For those trades that occur within the spread, however, the correspondence between the Lee-Ready algorithm and the *TORQ* classification is between 60 and 76% depending on the technique used to classify the trade.[41]

Variables representing the number of transactions for trade stratum k in trade direction q (sell or buy) for the stock of dividend increasing firm i during day d is computed by:

$$DTR_{kqid} = ln(1 + \text{transactions for trade size stratum } k \text{ in trade direction } q \text{ for firm } i \text{ during day } d), \quad (9)$$

where:

k	denotes the trade size stratum: *All trades*, *1,000 shares or larger*, and *100-200 shares;*
q	denotes the trade direction: either sell or buy;
i	denotes the stock in the firm represented by dividend increase i; and
d	denotes the trading day ($d=0$ is the dividend declaration date).

[40] In Lee and Ready (1991) approximately 68.3% of all trades occurred at either the bid or ask price, 0.5% occurred at prices outside of the quote, 7.4% occurred between the bid or ask price but not at the mid-point, and 23.8% occurred in the mid-point of the bid-ask spread. In Lee and Radhakrishna (1995), approximately 75% of the trades occurred at either the bid or ask price.

[41] Approximately 86% of the trades in this analysis occurred at either the bid or ask price. Of the remaining 14%, 2% occurred at a price between the bid and ask prices but not including the midspread value (71% correspondence), 3% occurred at the midspread value and the tick test was used to classify the trade (76% correspondence), and the reaming 9% occurred at the midspread but the zero-tick tests was used to classify the trade (60% correspondence).

A mean-based expected transactions model is used in the directional investigation.[42] An estimate of the expected number of transactions during day *d* of the trading window is based on the mean daily number of sells or buys in the security over the estimation period (denoted *DETR*). The estimation periods used are identical to those used in the non-directional investigation. Using the mean-based expected sells or buys, measures of abnormal selling and buying for each day during the trading window is computed as:

$$DABTR_{kqid} = DTR_{kqid} - DETR_{kqid} , \qquad (10)$$

where:

DTR_{kid} is the actual number of transactions in trade size stratum *k* in trade direction *q* in dividend increasing firm *i* during day *d; and*

$DETR_{kid}$ is the expected number of transactions (estimation period daily mean) in trade size stratum *k* in trade direction *q* for dividend increasing firm *i* during day *d*.

Hypothesis One

The test is constructed identically to that of the directional investigation but transactions classified as sells are analyzed separately from those classified as buys. The standardized mean daily number of abnormal sells and buys over the announcement period, interval period, and expanded interval period for each trade size stratum in each dividend increasing firm is computed by:

$$MDABTR_{kqi} = \{ \sum_{d=0,5}^{d+f-1} DABTR_{kqid} / f \} / \hat{\sigma}_{kqi} , \qquad (11)$$

where:

[42] When the net rate of selling or buying was investigated by Lee (1991), a within-firm-adjusted model of trading activity was utilized. The relative efficiencies of market-adjusted and mean-adjusted sell or buy expected transactions models have not been investigated.

$\hat{\sigma}_{kqi}$ is the standard deviation of the mean in trade size stratum k and trade direction q for dividend increasing firm i from the estimation period.

Evidence of clientele trading is provided if the cross-sectional mean of *MDABTR* is statistically greater than zero over the trading windows.

Hypothesis Two

The directional tests uses the same model as that used in the non-directional analysis (equation 7) except the dependent variable incorporates trade direction. The model is:

$$MDABTR_{kqi} = a_0 + a_1 P\_CAR_i + a_2 N\_CAR_i + a_3 CAR^2{}_i + a_4 \Delta DY_i + a_5 LDY_i + a_6 PCG_i + a_7 PRC_i + u_{kqi}\ , \quad (12)$$

where:

$MDABTR_{kqi}$ is the standardized mean daily number of abnormal transactions in trade size stratum k in trade direction q in dividend increasing firm i during: (1) announcement period, (2) interval period, or (3) expanded interval period.

Evidence of dividend clientele trading is strengthened if, after controlling for the trading due to the dividend's information content, the coefficient estimate on the change in dividend yield variable is positive and significant. The sign on the *PCG* variable is expected to be negative in the model investigating the abnormal sells.

Hypothesis Three

The regression model used in the directional test of hypothesis three is identical to that used in the non-directional test except for the dependent variable reflects the direction of trade. The model is:

$$MDABTR_{kqi} = b_0 + b_1 P\_CAR_i + b_2 N\_CAR_i + b_3 CAR^2{}_i + b_4 \Delta DY_i + b_5 LDY_i + b_6 PCG_i + b_7 PRC_i + b_8 (PRE_i * \Delta DY_i) + b_9 (PRE_i * PCG_i) + u_{kqi} . \quad (13)$$

Evidence of a greater clientele reaction to dividend increases in the pre-TRA 86 period relative to the post-TRA 86 period is provided if b_8 is positive and significant. This stronger clientele reaction is expected to be more evident when abnormal sells are investigated.

Additional Hypothesis

The last hypothesis tests the dividend clientele theory through use of data from time periods outside the trading windows investigated in the first three hypotheses. This hypothesis examines the differences in the relative number of transactions by high and low tax-rate individual investors in a time period before and a similar time period after the identified dividend increase, to see if these differences are correlated with the magnitude of the dividend increase. If relative investor demand for shares is altered by a dividend increase, then the change should occur in a predictable direction depending on the investor's tax status.

The periods analyzed in this hypothesis are the calendar years before and after the calendar year of the identified dividend increase. The number of transactions is not transformed by the natural log function for this test since the test investigates proportions. The mean number of transactions by individual investors in trade stratum *k* during the calendar years surrounding the dividend increase is computed as:

$$MN\_UTR1_{ki} = \sum_{d=a}^{a+g-1} UTR_{kid} \Big/ g , \quad (14)$$

$$MN\_UTR2_{ki} = \sum_{d=b}^{b+g-1} UTR_{kid} \Big/ g \ , \tag{15}$$

where:

UTR_{kid}	is the number of transactions in trade size stratum k (*100-200 shares, and 100-900 shares*) in the stock of dividend increasing firm i during trading day d;
a	is the first trading day of the calendar year prior to the identified dividend increase in firm i;
b	is the first trading day of the calendar year after the identified dividend increase in firm i; and
g	is the number of trading days in firm i during the calendar year.

A variable is required that measures the differences in the relative number of transactions between the two calendar years. The variable *DIF_UTR* represents the change in the relative number of transactions in firm i by low-tax rate individual investors to all transactions by individual investors during the same time periods.[43] This variable is computed as:

$$DIF\_UTR_i = \left(\frac{MN\_UTR2_{100\text{-}200,i}}{MN\_UTR2_{100\text{-}900,i}} - \frac{MN\_UTR1_{100\text{-}200,i}}{MN\_UTR1_{100\text{-}900,i}} \right) * 100 \ . \tag{16}$$

The test requires estimating the following regression model:

$$DIF\_UTR_i = f_o + f_1 \Delta DY_i + f_2 LDY_i + f_3 PRC_i + u_{ki} \ . \tag{17}$$

A positive sign on f_1 means that the differences in the relative number of transactions by small individual investors in the periods before and after the dividend increase are positively correlated with the dividend yield change. This implies that the small individual investors' relative demand for a firm's stock is correlated with the magnitude of the dividend increase in the direction predicted by the tax clientele theory. The variable *LDY* is

[43] A variable is not constructed for the large individual investor class since this variable is a linear function of the small individual investor variable.

intended to capture any differences that are due to the overall dividend level. A variable representing the closing stock price on the dividend increase date is included to control for differences in transactions sizes due to the stock's price.

Modifications due to Incomplete ISSM Data and Treatment of Thinly-Traded Stocks

The *ISSM* data is missing for 133 trading days over the ten years of data (2,529 total days). The estimation periods and event windows are adjusted for the missing days. The estimation periods used to compute the measures of expected daily number of transactions are adjusted for missing *ISSM* days such that fifty trading days before and after the dividend increase are still used. This was achieved by anchoring the ending (beginning) dates of the pre-dividend increase period (post-dividend increase period) and extending the window back (forward) until fifty *ISSM* days are available. Missing *ISSM* days are also excluded from the number of days used in computing the mean daily number of abnormal transactions during the trading windows (see equation 5). If the dividend declaration date is a missing *ISSM* date, the event period starts at the nearest available *ISSM* date after the dividend declaration. When a stock is identified in the *ISSM* data as having no trades during a day in any estimation period, event window, or other test period, the gross trading volume number from *CRSP* is retrieved. If that gross trading volume number is also zero, then the trading date is included in the analysis.[44] If the gross trading volume number is positive (or

[44] The above procedure may result in zero trading days due to trading halts being included in the estimation or event windows. To eliminate the effects of trading halts on the estimation periods, zero trading days (for firm *i*) were eliminated if the prior day had ten trades or more. This resulted in the deletion of 33 of the 88,300 firm-days used for the estimation periods. Zero trading days were eliminated during the event window if the mean number of transactions during the estimation period is ten trades or more. This eliminated no more than 12 of the 12,583 firm-days during the period between the dividend announcement date and ex-dividend date.

missing), it is assumed that the *ISSM* data have a firm-specific error and the trading date is then removed from the analysis.[45]

This study does not eliminate any trades from the analysis. Other studies that have used transaction data eliminated the first trade prior to a BBO eligible quote (Lee 1992), or trades occurring in the first minutes of the day (Cready 1988) to avoid misclassifying smaller trades accumulated overnight and executed as a single large transaction. Such occurrences are not a major concern in this study since the primary emphasis is on individual investors.[46] Lee (1992) further restricted his sample to firms that average ten trades per day. He investigated half-hour trading intervals, and states that thinly traded stocks present a problem when making intra-day inferences. Since this paper is not analyzing intra-day trading behavior, the research design does not place any restrictions based on the number of trades.

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[45] This procedure affects very few trading days. For example, 38,268 firm-trading days are initially identified over a 45 trading window that starts from the beginning of the interval period (d=5) and continues through the forty-ninth (d=49) trading day from the declaration date. Of these 38,268 firm-trading days, 918 firm-days have no trading on ISSM, and only 59 of these firm-days have positive trading volume on *CRSP*.

[46] Lee and Radhakrishna (1996) state that 24% of total market orders are batched in execution. But batching of orders is more prevalent in larger trades. Only six percent of market orders are split-up in execution.

CHAPTER VI

EMPIRICAL RESULTS

Non-Directional Trade Hypotheses

Hypothesis One

Cross-sectional *t*-tests are used to test if the mean daily abnormal transactions during the trading windows are greater than zero. These tests are conducted on the large dividend increase sub-samples. As expected, the distributions of the abnormal transaction measures are slightly skewed.[47] The *t*-test is generally robust to violations of normality, and when sample sizes are large do not require observational normality (Cready and Ramanan 1995).

Panel A of Table 7 shows the results of the *t*-tests on the cross-sectional standardized mean daily abnormal transactions over the announcement period; the mean and related *t*-statistic are presented. The mean daily abnormal transactions during the announcement period are significantly different from zero at less than the one-percent significance level across each trade stratum and sub-sample. This result is consistent with either an information or clientele hypothesis.

The results over the interval period are presented in Panel B. The magnitude of the cross-sectional mean daily abnormal transactions over the interval period is much less than that during the announcement period.[48] The *All Increases* and *Above Median Yield* sub-

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[47] The skewness over the announcement period is very slight (normality test cannot reject normality at less than the 1% level). The skewness over the interval and expanded interval periods is more evident, but not severe. Normality is rejected in slightly more than half of the tests. The skewness value is generally between 0.5 and 0.9, the largest value is 1.95--*Initiation* sample over the expanded interval period).

[48] The sample sizes during the interval periods are less than those during the announcement periods because some ex-dividend dates occur prior to the fifth day after the announcement and these observations are not included in the interval period analysis.

samples have the most statistically significant increase in trading across each trade stratum. The results over the interval period are consistent with the dividend clientele theory's implication that investors adjust their portfolios after a dividend change, and by excluding the first five days of the announcement period, these tests limit the amount of information-related trading captured in the abnormal transactions measures.

Panel C investigates the expanded interval period. The cross-sectional mean abnormal transactions measures are not significant for any of the trade strata in either the *Initiation* or *Low Prior Yield* sub-samples. A statistically significant increase in the All trades and 100-200 shares trade strata is detected in the *All Increases* and *Above Median Yield* sub-samples. Across all four sub-samples no significant increase in trading is detected in the 1,000 share or larger trade stratum.

The results of the cross-sectional *t*-tests imply that there is a significant increase in trading during the announcement period following a large dividend increase. This trading is evident in both the individual and institutional trade strata. Abnormal trading is still evident during the interval period, but it appears stronger in the individual investor trade stratum than in the institutional trade stratum. The above results do not imply that institutions are not responsive or less responsive than individuals to dividend policy but may provide evidence that institutional investors adjust more rapidly than other investors.[49]

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[49] The tests were also conducted using a mean-adjusted model of abnormal transactions. Expected transactions were defined as the mean of the log-transformed transactions in each trade strata during the estimation period. The results using the mean adjusted models are similar to those presented. Additionally, the tests were replicated imposing a trade limit on the sample. The sample was limited to those observations having an average of ten transactions or more per day. The results using this more heavily traded subset of firms are generally identical to those for the full sample. The t-tests were also calculated on raw transaction data (not transformed by the natural log). These results are very similar to those presented. The distribution of the raw transaction data is highly nonnormal with a fat-tail on the right side of the distribution.

TABLE 7
Standardized Mean Daily Abnormal Transactions for Large Dividend Increase Sub-Samples
Market Adjusted
(t-statistic in parentheses)

Panel A: Announcement Period (days 0-4)

Size of Trade:	*All Increases (n=423)*	*Initiation (n=68)*	*Low Prior Yield (n=128)*	*Above Median Yield (n=265)*
All trades	.37 (9.73)[a]	.42 (4.73)[a]	.28 (3.96)[a]	.43 (8.83)[a]
1,000 shares or larger	.29 (8.39)[a]	.31 (3.71)[a]	.29 (4.36)[a]	.29 (7.05)[a]
100-200 shares	.30 (8.08)[a]	.35 (4.07)[a]	.15 (2.41)[a]	.36 (7.80)[a]

Panel B: Interval Period (days 5 - ex-dividend date)

Size of Trade:	*All Increases (n=343)*	*Initiation (n=50)*	*Low Prior Yield (n=98)*	*Above Median Yield (n=218)*
All trades	.15 (3.60)[a]	.26 (2.25)[b]	.16 (1.82)[b]	.16 (3.05)[a]
1,000 shares or larger	.08 (2.31)[b]	.11 (1.21)	.12 (1.61)[c]	.09 (1.98)[b]
100-200 shares	.13 (3.23)[a]	.22 (2.06)[b]	.08 (0.98)	.14 (2.83)[a]

Panel C: Expanded Interval Period (days 5 - 14)

Size of Trade:	*All Increases (n=423)*	*Initiation (n=68)*	*Low Prior Yield (n=128)*	*Above Median Yield (n=265)*
All trades	.09 (2.55)[a]	.11 (1.20)	.01 (0.14)	.12 (2.76)[a]
1,000 shares or larger	.04 (1.36)[c]	.07 (0.90)	.03 (0.49)	.05 (1.32)[a]
100-200 shares	.08 (2.37)[a]	.08 (0.92)	-.04 (0.71)	.12 (3.08)[a]

[a] indicates significance at less than the .01 level (one tailed test).
[b] indicates significance at less than the .05 level (one tailed test).
[c] indicates significance at less than the .10 level (one tailed test).

Hypothesis Two

Hypothesis one provides evidence consistent with the dividend clientele theory, but the tests do not explicitly control for trading related to the information content of the announcement. A multivariate regression model is used to examine the determinants of the cross-sectional variation in the mean daily abnormal transactions measure. The model is estimated using ordinary least squares.[50]

The regression results for the announcement period are presented in table 8 panel A. The variables representing the information content of the announcement all have coefficient estimates that are statistically significant across each trade stratum. A quadratic relationship between the price and transaction reaction is indicated by the negative coefficient estimate on CAR^2. The coefficient on ΔDY variable is positive and statistically significant in the all trades and 100-200 shares trade strata but is not significant in the 1,000 shares or larger stratum.

[50] White's (1980) heteroskedasticity tests cannot reject the null hypothesis of constant error variance in any trade stratum across the three trading windows. The Breusch-Pagen test (Breusch and Pagan 1979) does indicate heteroskedasticity for the announcement period models. The models were also estimated using an unstandarized dependent variable (see equation 5 -- not standardized by the standard deviation of the error term during the estimation period). The results using the unstandardized dependent variable were generally similar to those presented, but heteroskedasticity is detected more frequently when the unstandardized dependent variable is used.

TABLE 8

Non-Directional Regression Analysis of Mean Daily Abnormal Transactions

$$MABTR_{ki} = a_0 + a_1 P\_CAR_i + a_2 N\_CAR_i + a_3 CAR^2{}_i + a_4 \Delta DY_i + a_5 LDY_i + a_6 PCG_i + a_7 PRC_i$$

Trade size stratum	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	F value	Adj R^2
Panel A: Announcement Period (n=874)										
All trades	-.2873	.1811	.0889	-.0064	.0676	.0338	.0019	.0033	18.75	12.46%
	(2.86)[a]	(6.94)[a]	(3.31)[a]	(2.85)[a]	(2.57)[a]	(2.95)[a]	(2.52)[b]	(1.28)		
1,000 shares or larger	-.1832	.1403	.0687	-.0062	.0372	.0129	.0015	.0036	11.00	7.43%
	(2.05)[b]	(6.04)[a]	(2.88)[a]	(3.12)[a]	(1.59)	(1.26)	(2.16)[b]	(1.55)		
100-200 shares	-.2204	.1191	.0533	-.0035	.0605	.0390	.0023	.0011	12.67	8.56%
	(2.33)[b]	(4.86)[a]	(2.11)[a]	(1.69)[b]	(2.45)[a]	(3.61)[a]	(3.18)[a]	(0.47)		
Panel B: Interval Period (n=719)										
All trades	-.2761	.0479	.0268	-.0018	.0891	.0260	.0009	.0054	3.31	2.20%
	(2.86)[a]	(1.75)[b]	(0.96)	(0.74)	(2.98)[a]	(2.22)[b]	(1.16)	(2.00)[b]		
1,000 shares or larger	-.2471	.0250	.0234	-.0005	.0348	.0242	.0001	.0052	1.98	0.94%
	(2.65)[a]	(1.03)	(0.95)	(0.24)	(1.31)	(2.33)[b]	(0.19)	(2.19)[b]		
100-200 shares	-.2486	.0630	.0431	-.0032	.0768	.0222	.0005	.0042	3.10	2.01%
	(2.52)[b]	(2.46)[a]	(1.65)[b]	(1.44)	(2.74)[a]	(2.02)[b]	(0.63)	(1.67)		
Panel C: Expanded Interval Period (n=875)										
All trades	-.2184	.0550	.0334	-.0027	.0316	.0096	.0016	.0044	2.74	1.37%
	(2.46)[b]	(2.38)[a]	(1.41)	(1.38)	(1.36)	(0.95)	(2.36)[b]	(1.93)		
1,000 shares or larger	-.1847	.0289	.0220	-.0011	.0014	.0116	.0006	.0045	1.67	0.53%
	(2.41)[b]	(1.45)	(1.07)	(0.66)	(0.07)	(1.32)	(0.93)	(2.29)[b]		
100-200 shares	-.2068	.0514	.0405	-.0028	.0369	.0078	.0013	.0039	2.450	1.15%
	(2.54)[b]	(2.43)[a]	(1.86)[b]	(1.53)	(1.72)[b]	(0.84)	(1.97)[b]	(1.87)		

[a] indicates significance at less than the .01 level; [b] indicates significance at less than the .05 level. One-tailed tests on a_1, a_2, a_3, and a_4.

Table 8 panel B presents the regression results when the dependent variable is the mean abnormal trading during the interval period. The explanatory power of these models is significantly less than for the models using the announcement period. The coefficient estimates on the proxy variables for information content are not as significant as during the announcement period. Of the information content variables, only the coefficient on *P_CAR* is significant in the all-trades stratum; none are significant in the 1,000 shares or larger stratum, and *P_CAR* and *N_CAR* are both significant in the 100-200 shares stratum. As with the announcement period, the coefficient estimate on ΔDY is positive and significant in the all-trades and 100-200 shares trade strata. The results over the expanded interval period (panel C) are similar to those over the interval period except the coefficient estimate on the ΔDY variable is statistically significant only in the 100-200 shares trade stratum.[51]

[51] A reduced form of equation 7 was also estimated. This model did not contain the *P_CAR*, *N_CAR*, and *LDY* variables. The results with respect to the coefficient estimate on the ΔDY variable are similar to those presented.

The models are also estimated using robust regression methods. The abnormal transaction measures are slightly skewed; so are the residuals from the OLS regressions. While not a basic assumption of ordinary least squares, hypothesis testing generally requires normality or in large samples reliance on the central limit theorem to justify use of statistics based on normality. The two robust regression methods used are the five quantile and least absolute error methods.[52] The coefficient estimates and *t*-statistic on the ΔDY variable using OLS and the two robust regression methods are presented in table 9. The results using the robust methods are similar to those using OLS. The coefficient estimate in the 1,000 shares or larger trade stratum is significant during the announcement and interval period when the five quantile method is used. However, as with the other regression methods, the coefficient's magnitude and significance level in the 1,000 shares or larger stratum is much less than the all-trades and 100-200 shares strata.

The regression results over the interval period imply that the trading reaction to a dividend increase is positively related to the magnitude of the dividend increase. However, the reaction of institutional traders is not as strongly related to the dividend increase as the reaction by individual investors. Since institutions are the primary driver of trading volume, this result may partially explain why Richardson et al. failed to detect a positive association between the change in dividend yield and abnormal volume during the interval trading period.

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[52] The five quantile method and least absolute error method of robust regressions are explained in Judge et al. (1986).

TABLE 9
OLS and Robust Regression Coefficient Estimates on ΔDY

	Regression Method		
	OLS	*Five Quantile*	*Least Absolute Error*
Panel A: Announcement Period			
All trades	.0676 (2.57)[a]	.0634 (10.84)[a]	.0589 (1.97)[b]
1,000 shares or larger	.0372 (1.59)	.0395 (8.26)[a]	.0334 (1.13)
100-200 shares	.0605 (2.45)[a]	.0548 (10.55)[a]	.0555 (2.01)[b]
Panel B: Interval Period			
All trades	.0891 (2.98)[a]	.0903 (11.86)[a]	.1074 (3.34)[a]
1,000 shares or larger	.0348 (1.31)	.0247 (3.73)[a]	.0392 (1.39)
100-200 shares	.0768 (2.74)[a]	.0768 (12.13)[a]	.1014 (3.35)[a]
Panel C: Expanded Interval Period			
All trades	.0316 (1.36)	.0320 (5.79)[a]	.0332 (1.32)
1,000 shares or larger	.0014 (0.07)	-.0020 (0.46)	.0071 (0.32)
100-200 shares	.0369 (1.72)[b]	.0321 (7.47)[a]	.0255 (1.06)

[a] indicates significance at less than the .01 level (one tailed test).
[b] indicates significance at less than the .05 level (one tailed test).

Hypothesis Three

TRA 86 reduced the tax penalty on dividends by raising the maximum tax-rate on capital gains and lowering the ordinary income tax-rates. Results using OLS regression over the announcement period, interval period, and expanded interval period are presented in table 10. Because observations occurring between July 1, 1986 and December 31, 1987, and after December 31, 1990 are excluded from this test, the sample size is reduced relative to that used in testing hypothesis two. The primary interest of this hypothesis is the coefficient estimate (b_8) on the change in dividend yield and pre-TRA 86 interaction ($\Delta DY*PRE$) variable. The coefficient estimate on this interaction term is not statistically significant across any trade strata during the announcement, interval, or expanded interval periods.[53]

The coefficient estimates on the ΔDY and $\Delta DY*PRE$ variables from the OLS regression are compared to those from the two robust regression methods in table 11. The coefficient estimate b_8 is positive and statistically significant in the 100-200 shares stratum over both the announcement and interval period and in the 1,000 shares or larger stratum over the interval period only when the five quantile method of estimation is used. The results using the least absolute error regression method are similar to the OLS results. Only weak empirical evidence of greater clientele-related trading during the period prior to TRA 86 is provided using the non-directional trade data.

[53] Results are similar when the dependent variable in the model is the unstandardized measure of abnormal transactions. When a reduced form of the model is used (exclude *P_CAR*, *N_CAR*, and *LDY*) the results are similar.

TABLE 10
Effect of TRA 86 on Mean Daily Abnormal Transactions

$$MABTR_{ki} = b_0 + b_1 P\_CAR_i + b_2 N\_CAR_i + b_3 CAR^2_i + b_4 \Delta DY_i + b_5 LDY_i + b_6 PCG_i + b_7 PRC_i + b_8(\Delta DY_i * PRE_i) + b_9(PCG_i * PRE_i)$$

Trade size stratum.	B_0	b_1	b_2	b_3	b_4	b_5	b_6	b_7	b_8	b_9	F value	Adj. R^2
Panel A: Announcement Period (n=666)												
All trades	-.2552	.1682	.2502	.0033	.0827	.0295	.0023	.0021	-.0344	-.0004	13.24	14.21%
	(2.31)[a]	(5.45)[a]	(4.29)[a]	(1.19)	(2.56)[a]	(2.37)[b]	(1.67)	(0.71)	(0.60)	(0.25)		
1,000 shares or larger	-.1826	.1323	.2038	-.0040	.0572	.0084	.0027	.0034	-.0203	-.0019	7.50	8.08%
	(1.81)	(4.70)[a]	(3.83)[a]	(1.58)	(1.97)[b]	(0.74)	(2.11)[b]	(1.26)	(0.39)	(1.21)		
100-200 shares	-.1825	.1049	.1408	.0010	.0576	.0352	.0022	-.0002	.0027	.0003	9.16	9.95%
	(1.79)	(3.68)[a]	(2.61)[a]	(0.40)	(1.96)[b]	(3.06)[a]	(1.72)	(0.07)	(0.05)	(0.18)		
Panel B: Interval Period (n=549)												
All trades	-.2657	.0811	.1257	-.0026	.1143	.0184	.0026	.0024	-.0193	-.0023	3.66	4.18%
	(2.33)[b]	(2.42)[a]	(1.98)[b]	(0.80)	(3.39)[a]	(1.47)	(1.77)	(0.78)	(0.33)	(1.28)		
1,000 shares or larger	-.2779	.0516	.0899	-.0009	.0384	.0168	.0018	.0043	.0553	-.0025	2.18	1.89%
	(2.67)[a]	(1.69)[b]	(1.56)	(0.31)	(1.25)	(1.47)	(1.33)	(1.52)	(1.04)	(1.53)		
100-200 shares	-.2564	.0960	.1632	-.0042	.1063	.0184	.0021	.0014	-.0115	-.0028	3.84	4.45%
	(2.38)[b]	(3.04)[a]	(2.73)[a]	(1.42)	(3.35)[a]	(1.56)	(1.54)	(0.48)	(0.21)	(1.61)		
Panel C: Expanded Interval Period (n=668)												
All trades	-.1821	.0768	.1088	-.0026	.0553	.0059	.0022	.0011	-.0115	-.0009	3.16	2.83%
	(1.85)	(2.79)[a]	(2.09)[b]	(1.07)	(1.94)[b]	(0.53)	(0.39)	(0.45)	(0.23)	(0.58)		
1,000 shares or larger	-.1739	.0557	.0895	-.0023	.0197	.0083	.0015	.0020	-.0110	-.0011	1.55	0.74%
	(2.01)[b]	(2.31)[b]	(1.96)[b]	(1.05)	(0.79)	(0.85)	(1.34)	(0.87)	(0.25)	(0.83)		
100-200 shares	-.1918	.0658	.1054	-.0022	.0629	.0064	.0021	.0011	-.0046	-.0016	3.04	2.67%
	(2.16)[b]	(2.64)[a]	(2.24)[b]	(0.99)	(2.45)[a]	(0.64)	(1.86)	(0.45)	(0.10)	(1.12)		

[a] indicates significance at less than the .01 level; [b] indicates significance at less than the .05 level. One-tailed tests on b_1, b_2, b_3, b_4, b_8.

TABLE 11
OLS and Robust Regression Coefficient Estimates on ΔDY and Pre-TRA 86 (*PRE*) Interaction Variables

	Regression Method					
	OLS		*Five Quantile*		*Least Absolute Error*	
Trade size stratum:	b_4	b_8	b_4	b_8	b_4	b_8
Panel A: Announcement Period						
All trades	.0827	-.0344	.0785	-.0081	.0693	-.0096
	(2.56)[a]	(0.60)	(11.96)[a]	(0.69)	(2.00)[b]	(0.15)
1,000 shares or larger	.0572	-.0203	.0473	.0048	.0427	-.0178
	(1.97)[a]	(0.39)	(8.66)[a]	(0.49)	(1.20)	(0.28)
100-200 shares	.0576	.0027	.0400	.0235	.0637	-.0069
	(1.96)[a]	(0.05)	(6.31)[a]	(2.06)[b]	(1.92)[b]	(0.12)
Panel B: Interval Period						
All trades	.1143	-.0193	.1137	.0035	.1114	.0235
	(3.39)[a]	(0.33)	(15.08)[a]	(0.28)	(2.92)[a]	(0.36)
1,000 shares or larger	.0384	.0553	.0335	.0397	.0438	.0251
	(1.25)	(1.04)	(4.92)[a]	(3.37)[a]	(1.49)	(0.49)
100-200 shares	.1063	-.0115	.1000	.0192	.1041	.0019
	(3.35)[a]	(0.21)	(16.46)[a]	(1.82)[b]	(2.96)[a]	(0.33)
Panel C: Expanded Interval Period						
All trades	.0553	-.0115	.0547	.0222	.0693	-.0096
	(1.95)[b]	(0.23)	(8.62)[a]	(1.95)[b]	(2.00)[b]	(0.15)
1,000 shares or larger	.0197	-.0110	.0196	-.0332	.0427	-.0178
	(0.79)	(0.25)	(3.86)[a]	(3.26)	(1.20)	(0.28)
100-200 shares	.0629	-.0046	.0631	.0054	.0637	-.0069
	(2.45)[a]	(0.10)	(13.12)[a]	(0.63)	(1.92)[b]	(0.12)

[a] indicates significance at less than the .01 level in the hypothesized direction (one tailed test).
[b] indicates significance at less than the .05 level in the hypothesized direction (one tailed test).

Directional Trade Hypotheses

The method used to classify trades as buys or sells classified greater than 66 percent of the trades used in the directional analysis. This percentage corresponds closely to the 68 percent of trades that occurred at the bid or ask prices in Lee and Ready (1991).

Hypothesis One

The results of the *t*-tests on the cross-sectional standardized mean daily abnormal sells over the announcement period are shown in table 12. In the all trades stratum the mean daily abnormal sells during the announcement period are significantly different from zero at less than the one-percent significance level in each large dividend increase sub-sample, except in the *Above Median Yield* sub-sample where it is significant at less than the ten percent level. The direction of trade is opposite that expected under the information-content perspective if dividends convey good news, thus the abnormal selling results provide more reliable evidence of tax clientele effects.

Over the interval period the abnormal selling measure is only significant in the *Initiation* and *Low Prior Yield* sub-samples and only in the all-trades and 100-200 shares trade strata (table 12 panel B). The results in the individual investor stratum are consistent with high tax-rate investors holding low dividend paying securities and having greater propensity to sell these securities after a dividend increase. The results over the expanded interval period (panel C) are generally statistically insignificant.

TABLE 12
Standardized Mean Daily Abnormal Sells for Large Dividend Increase Sub-Samples
Mean Adjusted
(t-statistic in parentheses)

Panel A: Announcement Period (days 0-4)

Size of Trade:	*Initiation (n=68)*	*All Increases (n=423)*	*Low Prior Yield (n=128)*	*Above Median Yield (n=265)*
All trades	.20 (2.61)[a]	.09 (2.86)[a]	.16 (2.91)[a]	.06 (1.53)[c]
1,000 shares or larger	.07 (0.98)	.10 (3.45)[a]	.14 (2.61)[a]	.08 (2.30)[b]
100-200 shares	.20 (2.43)[a]	.04 (1.16)	.10 (1.81)[a]	.01 (0.16)

Panel B: Interval Period (days 5 - ex-dividend date)

Size of Trade:	*Initiation (n=50)*	*All Increases (n=343)*	*Low Prior Yield (n=98)*	*Above Median Yield (n=218)*
All trades	.21 (2.10)[b]	.02 (0.47)	.13 (1.89)[b]	.00 (0.09)
1,000 shares or larger	.06 (0.64)	-.01 (0.37)	.07 (1.14)	-.01 (0.36)
100-200 shares	.26 (2.31)[b]	.03 (0.91)	.12 (1.68)[b]	.01 (0.28)

Panel C: Expanded Interval Period (days 5 - 14)

Size of Trade:	*Initiation (n=68)*	*All Increases (n=423)*	*Low Prior Yield (n=128)*	*Above Median Yield (n=265)*
All trades	.10 (1.29)[c]	-.01 (0.49)	-.01 (0.14)	-.01 (0.38)
1,000 shares or larger	.04 (0.53)	.00 (0.14)	.00 (0.49)	.00 (0.07)
100-200 shares	.10 (1.59)[c]	-.02 (0.82)	-.05 (0.71)	-.02 (0.51)

[a] indicates significance at less than the .01 level (one tailed test).
[b] indicates significance at less than the .05 level (one tailed test).
[c] indicates significance at less than the .10 level (one tailed test).

The tests results for the mean daily abnormal buys are presented in table 13. Consistent with both the information content and the dividend clientele hypotheses, significant abnormal buying is detected during the announcement period. The *t*-statistic is significant at less than the .01 level in each trade stratum across all four large dividend increase sub-samples (table 13 panel A). When all trades are considered, a statistically significant increase in buying is detected during the interval period across all four sub-samples (table 13 panel B). When the trades are split into the individual and institutional investor classes, a statistically significant increase for both strata is detected only in the *All Increases* and *Above Median Yield* sub-samples. The abnormal buying in the all trades stratum over the expanded interval period in the *Initiation* and *Low Prior Yield* sub-samples is only significant at less than the .10 level (table 13 panel C). In general, the results over the expanded interval period are similar to those in the interval period.

The results across the sub-samples during the interval periods are consistent with the notion that dividend preferring investors prefer stocks with relatively higher dividend yields. In comparing abnormal selling and buying activity in the individual investor stratum it should be noted that significant abnormal selling is detected only in the lower-dividend paying sub-samples (*Initiation* and *Low Prior Yield*) and abnormal buying is detected only in the high dividend-paying sub-samples (*All Increases* and *Above Median Yield*).

TABLE 13
Standardized Mean Daily Abnormal Buys for Large Dividend Increase Sub-Samples
Mean Adjusted
(t-statistic in parentheses)

Panel A: Announcement Period (days 0-4)

Size of Trade:	*Initiation (n=68)*	*All Increases (n=423)*	*Low Prior Yield (n=128)*	*Above Median Yield (n=265)*
All trades	.41 (4.60)[a]	.40 (11.07)[a]	.33 (4.62)[a]	.44 (10.23)[a]
1,000 shares or larger	.33 (3.39)[a]	.30 (8.71)[a]	.29 (4.37)[a]	.32 (7.73)[a]
100-200 shares	.34 (3.57)[a]	.35 (9.84)[a]	.24 (3.58)[a]	.41 (9.47)[a]

Panel B: Interval Period (days 5 - ex-dividend date)

Size of Trade:	*Initiation (n=50)*	*All Increases (n=343)*	*Low Prior Yield (n=98)*	*Above Median Yield (n=218)*
All trades	.23 (1.87)[b]	.14 (3.67)[a]	.17 (2.11)[b]	.16 (3.21)[a]
1,000 shares or larger	.09 (0.95)	.07 (2.03)[b]	.07 (1.03)	.09 (2.00)[b]
100-200 shares	.12 (1.13)	.15 (3.97)[a]	.08 (1.11)	.18 (3.97)[a]

Panel C: Expanded Interval Period (days 5 - 14)

Size of Trade:	*Initiation (n=68)*	*All Increases (n=423)*	*Low Prior Yield (n=128)*	*Above Median Yield (n=265)*
All trades	.15 (1.53)[c]	.10 (3.34)[a]	.01 (1.43)[c]	.11 (3.15)[a]
1,000 shares or larger	.12 (1.48)[c]	.05 (2.09)[b]	.03 (1.22)	.05 (1.63)[c]
100-200 shares	.09 (1.00)	.10 (3.33)[a]	.07 (1.05)	.11 (3.34)[a]

[a] indicates significance at less than the .01 level (one tailed test).
[b] indicates significance at less than the .05 level (one tailed test).
[c] indicates significance at less than the .10 level (one tailed test).

Hypothesis Two

The results of hypothesis two with respect to the level of selling after a dividend increase are presented in table 14. The coefficient estimates on *P_CAR* and *N_CAR* are positive and statistically significant over the announcement period in each trade stratum (table 14 panel A), thus indicating that the level of abnormal selling is positively correlated with the magnitude of the abnormal return. A positive and statistically significant coefficient on the change in dividend yield (*ΔDY*) variable for both the all-trades and 100-200 shares trade strata provides evidence consistent with the dividend clientele theory. Contrary to expectation, the coefficient estimate on the prior capital gains (*PCG*) (when measured over a one-year period) variable is positive and statistically significant.[54]

The explanatory power of the models over the interval period is much less than that over the announcement period; the F-statistic of these models is not significant at conventional levels (table 14 panel B).[55] The only coefficient estimate that is statistically significant over the interval period is that on the *ΔDY* variable in the all-trades and 100-200 shares trade strata. The results over the interval period provide only weak support of hypothesis two. The coefficient estimate on *ΔDY* is positive but not statistically significant in the all-trades and 100-200 shares trade strata and is nearly zero in the 1,000 shares or larger trade stratum over the expanded interval period (table 14 panel C). The coefficient estimate on *PCG* is not statistically significant over the interval period but is positive and statistically significant over the expanded interval period..

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[54] The sign of this variable remains positive when a two-year capital gain accumulation period is used. The significance level of the variable is similar to the results presented for the one-year accumulation period.

[55] When a reduced form model is estimated (model does not include *P_CAR*, *N_CAR*, and *LDY*) the results with respect to the *ΔDY* are the same as those presented but the F-statistic is more significant.

TABLE 14

Directional Regression Analysis of Mean Daily Abnormal Sells

$$MABTR_{ki} = a_0 + a_1 P\_CAR_i + a_2 N\_CAR_i + a_3 CAR^2{}_i + a_4 \Delta DY_i + a_5 LDY_i + a_6 PCG_i + a_7 PRC_i$$

Trade size stratum	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	F value	Adj R^2
Panel A: Announcement Period (n=874)										
All trades	-.2453	.0872	.0823	-.0027	.0401	-.0135	.0026	.0040	9.04	6.05%
	(2.83)[a]	(3.87)[a]	(3.55)[a]	(1.39)	(1.76)[b]	(1.37)	(3.98)[a]	(1.81)		
1,000 shares or larger	-.1451	.0541	.0598	-.0011	-.0029	-.0092	.0020	.0042	5.96	3.83%
	(1.82)	(2.61)[a]	(2.80)[a]	(0.62)	(0.14)	(1.01)	(3.34)[a]	(2.06)[b]		
100-200 shares	-.2032	.0601	.0446	-.0021	.0514	-.0095	.0028	.0029	6.61	4.30%
	(2.47)[b]	(2.81)[a]	(2.03)[a]	(1.15)	(2.39)[a]	(1.01)	(4.49)[a]	(1.35)		
Panel B: Interval Period (n=719)										
All trades	-.1290	.0156	.0064	.0002	.0469	-.0021	.0012	.0026	1.36	0.35%
	(1.41)	(0.66)	(0.26)	(0.08)	(1.81)[b]	(0.21)	(1.69)	(1.091)		
1,000 shares or larger	-.1453	.0187	.0245	-.0000	-.0099	.0046	.0007	.0021	0.82	0.00%
	(1.64)	(0.82)	(1.04)	(0.01)	(0.40)	(0.47)	(0.99)	(0.92)		
100-200 shares	-.1106	.0226	.0035	-.0004	.0488	-.0043	.0009	.0027	1.44	0.43%
	(1.22)	(0.96)	(0.14)	(0.18)	(1.90)[b]	(0.43)	(1.28)	(1.16)		
Panel C: Expanded Interval Period (n=875)										
All trades	-.1810	.0122	.0062	-.0002	.0145	-.0024	.0022	.0041	3.22	1.75%
	(2.53)[b]	(0.65)	(0.32)	(0.14)	(0.77)	(0.30)	(3.88)[a]	(2.24)[b]		
1,000 shares or larger	-.1126	.0039	.0117	.0003	-.0093	.0049	.0012	.0027	1.54	0.43%
	(1.77)	(0.24)	(0.69)	(0.19)	(0.55)	(0.67)	(2.30)[b]	(1.66)		
100-200 shares	-.1116	.0035	-.0026	.0008	.0165	-.0073	.0017	.0032	3.03	1.60%
	(1.74)	(0.21)	(0.15)	(0.56)	(0.98)	(1.00)	(3.47)[a]	(1.97)[b]		

[a] indicates significance at less than the .01 level; [b] indicates significance at less than the .05 level. One-tailed tests on a_1, a_2, a_3, and a_4.

The results when the abnormal buying is the dependent variable in the regression model are presented in table 15. The explanatory power of these models is much greater than for those with abnormal selling as the dependent variable. The results over the announcement period are consistent with the dividend clientele theory; coefficient estimates on ΔDY are statistically significant in the hypothesized direction after controlling for the information content of the announcement (table 15 panel A). The coefficient estimates on the proxies for the information content of the announcement are also generally statistically significant and in the predicted direction.

The coefficient estimate on ΔDY is positive and significant at less than the .01 level in the all-trades and 100-200 shares trade strata over the interval period (table 15 panel B). As with the non-directional data, the coefficient estimate on ΔDY is not significant in the 1,000 shares or larger trade stratum. Consist with the results of hypothesis one, the coefficient estimate on LDY is positive and statistically significant, implying a greater level of buying in higher dividend paying stocks. The coefficient estimate on ΔDY is positive but not statistically significant in any of the trade strata over the expanded interval period (table 15 panel C).

TABLE 15

Directional Regression Analysis of Mean Daily Abnormal Buys

$$MABTR_{ki} = a_0 + a_1 P\_CAR_i + a_2 N\_CAR_i + a_3 CAR^2_i + a_4 \Delta DY_i + a_5 LDY_i + a_6 PCG_i + a_7 PRC_i$$

Trade size stratum	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	F value	Adj R^2
Panel A: Announcement Period (n=874)										
All trades	-.1778	.1508	.0759	-.0055	.0691	.0417	.0017	-.0001	16.89	11.30%
	(1.95)	(6.37)[a]	(3.12)[a]	(2.73)[a]	(2.90)[a]	(4.01)[a]	(2.53)[b]	(0.06)		
1,000 shares or larger	-.1488	.1166	.0467	-.0039	.0566	.0230	.0014	.0014	11.63	7.88%
	(1.73)	(5.14)[a]	(2.00)[b]	(1.99)[b]	(2.48)[a]	(2.30)[b]	(2.03)[b]	(0.62)		
100-200 shares	-.1201	.0961	.0617	-.0025	.0518	.0438	.0016	-.0010	10.33	6.96%
	(1.33)	(4.10)[a]	(2.56)[b]	(1.25)	(2.20)[b]	(4.26)[a]	(2.28)[b]	(0.42)		
Panel B: Interval Period (n=719)										
All trades	-.2603	.0294	.0284	-.0007	.0986	.0321	.0012	.0030	3.61	2.48%
	(2.65)[b]	(1.15)	(1.09)	(0.32)	(3.53)[a]	(2.93)[a]	(1.56)	(1.20)		
1,000 shares or larger	-.1274	.0007	.0087	.0001	.0033	.0259	.0011	.0021	1.37	0.36%
	(1.41)	(0.03)	(0.36)	(0.06)	(0.13)	(2.56)[b]	(1.66)	(0.91)		
100-200 shares	-.2700	.0319	.0396	-.0014	.0867	.0421	.0006	-.0028	4.06	2.90%
	(2.88)[a]	(1.31)	(1.59)	(0.66)	(3.25)[a]	(4.02)[a]	(0.84)	(1.16)		
Panel C: Expanded Interval Period (n=875)										
All Trades	-.1749	.0570	.0485	-.0029	.0238	.0162	.0019	.0009	3.21	1.74%
	(2.18)[b]	(2.73)[a]	(2.26)[b]	(1.63)	(1.13)	(1.76)	(2.99)[a]	(0.45)		
1,000 shares or larger	-.1311	.0172	.0138	-.0005	.0115	.0116	.0012	.0024	1.56	0.45%
	(1.89)	(0.96)	(0.75)	(0.32)	(0.64)	(1.46)	(2.30)[b]	(1.37)		
100-200 shares	-.1478	.0461	.0462	-.0024	.0283	.0187	.0015	.0004	2.75	1.38%
	(1.94)	(2.32)[b]	(2.26)[b]	(1.41)	(1.41)	(2.14)[b]	(2.58)[a]	(0.22)		

[a] indicates significance at less than the .01 level; [b] indicates significance at less than the .05 level. One-tailed tests on a_1, a_2, a_3, and a_4.

The distribution of the error term in the models examining the abnormal selling activity does not exhibit the skewness that was evident in the non-directional data. In fact, normality tests generally cannot reject the null hypothesis of a normally distributed error term. The error-term in the abnormal buying models does, however, exhibit a distribution skewed to the right due to outlying observations. This skewness is more pronounced in the interval and expanded interval periods. The robust regression procedures used in the non-directional analysis are also used on the directional tests.

The coefficient estimate on the ΔDY variable using OLS regression and the five quantile and least absolute error robust regression methods are presented in table 16. The coefficient estimates from the abnormal sell models are presented in part I of the table. The coefficient estimates from the robust regression method are nearly identical to those for the OLS regression model. The coefficient estimate is significant in the all-trades stratum and it appears this result is driven by individual investors. The coefficient estimate on the ΔDY variable in the abnormal buying models is significant in each trade stratum regardless of the method of estimation used (part II of table 16). As with the OLS results, the coefficient estimate on ΔDY variable is close to zero in the institutional investor trade group during the interval period.

TABLE 16
OLS and Robust Regression Coefficient Estimates on ΔDY - Directional Analysis

	Regression Method		
	OLS	*Five Quantile*	*Least Absolute Error*
Part I: Abnormal Sells			
Panel A: Announcement Period			
All trades	.0401 (1.76)[b]	.0432 (9.66)[a]	.0224 (0.82)
1,000 shares or larger	-.0029 (0.14)	.0029 (0.69)	.0121 (0.45)
100-200 shares	.0514 (2.39)[a]	.0426 (9.62)[a]	.0461 (1.71)[b]
Panel B: Interval Period			
All trades	.0469 (1.81)[b]	.0524 (9.31)[a]	.0745 (2.49)[a]
1,000 shares or larger	-.0099 (0.40)	.0082 (1.49)	.0260 (1.07)
100-200 shares	.0488 (1.90)[b]	.0349 (6.19)[a]	.0534 (1.94)[b]
Panel C: Expanded Interval Period			
All trades	.0145 (0.77)	.0153 (4.11)[a]	.0186 (0.81)
1,000 shares or larger	-.0093 (0.55)	-.0179 (4.74)	-.0280 (1.42)
100-200 shares	.0173 (0.98)	.0187 (5.06)[a]	.0300 (1.39)
Part II: Abnormal Buys			
Panel A: Announcement Period			
All trades	.0691 (2.90)[a]	.0751 (14.78)[a]	.0743 (2.79)[a]
1,000 shares or larger	.0566 (2.48)[a]	.0697 (14.56)[a]	.0714 (2.56)[a]
100-200 shares	.0518 (2.20)[b]	.0507 (9.88)[a]	.0650 (2.45)[a]
Panel B: Interval Period			
All trades	.0986 (3.53)[a]	.1077 (15.17)[a]	.1208 (3.74)[a]
1,000 shares or larger	.0033 (0.13)	.0176 (3.12)[a]	.0111 (0.40)
100-200 shares	.0867 (3.25)[a]	.0870 (14.22)[a]	.0717 (2.38)[a]
Panel C: Expanded Interval Period			
All trades	.0238 (1.13)	.0265 (5.99)[a]	.0286 (1.13)
1,000 shares or larger	.0115 (0.63)	.0104 (2.73)[a]	.0113 (0.58)
100-200 shares	.0283 (1.41)	.0328 (7.59)[a]	.0279 (1.13)

[a] indicates significance at less than the .01 level in the hypothesized direction (one tailed test).
[b] indicates significance at less than the .05 level in the hypothesized direction (one tailed test).

Hypothesis Three

The effect of TRA 86 on dividend clientele related trading should be most evident when examining the number of abnormal sells. The coefficient estimates and related *t*-statistics when the dependent variable in the model used to test hypothesis three is the number of abnormal sells are shown in table 17. The coefficient estimate on the *ΔDY*PRE* variable is positive during the announcement period in each trade stratum, but only significant in the 100-200 shares trade stratum (table 17 panel A). The coefficient estimate over the interval period is positive in the all-trades (not statistically significant) and 100-200 shares (significant at less than the .05 level) trade strata, but is negative and statistically insignificant in the 1,000 shares or larger trade stratum (table 17 panel B). The signs during the expanded interval period follow the same pattern as the interval period but none of the coefficient estimates on ΔDY variable are statistically significant (table 17 panel C). The abnormal sell results are consistent with the notion that the tax clientele effects are stronger in pre-TRA 86 years since the tax penalty on dividends was greater.

Table 18 presents the results when abnormal buys are the dependent variable. The coefficient estimates on the *ΔDY*PRE* variable during the announcement period are positive but not statistically significant in each trade stratum (panel A). The coefficient estimate during the interval period is negative and insignificant in the all-trades and 100-200 shares trade strata but is positive and significant in the 1,000 shares or larger trade stratum (table 18 panel B). Over the expanded interval period the coefficient estimates on *ΔDY*PRE* are all positive and insignificant (table 18 panel C).

TABLE 17
Effect of TRA 86 on Mean Daily Abnormal Sells

$$MABTR_{ki} = b_0 + b_1 P\_CAR_i + b_2 N\_CAR_i + b_3 CAR^2{}_i + b_4 \Delta DY_i + b_5 LDY_i + b_6 PCG_i + b_7 PRC_i + b_8(\Delta DY_i * PRE_i) + b_9(PCG_i * PRE_i)$$

Trade size stratum.	B_0	b_1	b_2	b_3	b_4	b_5	b_6	b_7	b_8	b_9	F value	Adj. R^2
Panel A: Announcement Period (n=666)												
All trades	-.1346	.0257	.0489	.0024	.0247	-.0174	.0044	.0025	.0590	-.0027	4.69	4.75
	(1.37)	(0.93)	(0.94)	(0.98)	(0.87)	(1.57)	(3.56)	(0.93)	(1.16)	(1.73)		
1,000 shares or larger	-.1017	.0247	.0567	.0012	.0030	-.0139	.0039	.0042	.0052	-.0036	3.14	2.82
	(1.11)	(0.96)	(1.17)	(0.52)	(0.11)	(1.34)	(3.36)	(1.69)	(0.11)	(2.48)		
100-200 shares	-.0679	-.0012	-.0185	.0025	.0137	-.0120	.0039	.0009	.0789	-.0015	3.37	3.10
	(0.73)	(0.05)	(0.38)	(1.06)	(0.51)	(1.15)	(3.31)	(0.36)	(1.64)[b]	(1.04)		
Panel B: Interval Period (n=549)												
All trades	-.0788	-.0035	-.0270	.0024	.0382	-.0080	.0026	.0009	.0680	-.0027	1.57	0.93%
	(0.78)	(0.12)	(0.48)	(0.84)	(1.29)	(0.72)	(2.00)	(0.35)	(1.33)	(1.71)		
1,000 shares or larger	-.1357	.0300	.0542	.0000	.0316	-.0052	.0025	.0009	-.0353	-.0028	1.25	0.40%
	(1.39)	(1.04)	(1.00)	(0.01)	(1.10)	(0.48)	(1.99)	(0.34)	(0.71)	(1.77)		
100-200 shares	-.0627	.0053	-.0089	.0012	.0398	-.0065	.0017	.0005	.1050	-.0027	1.81	1.31%
	(0.64)	(0.18)	(0.16)	(0.44)	(1.38)	(0.61)	(1.33)	(0.19)	(2.11)[a]	(1.74)		
Panel C: Expanded Interval Period (n=668)												
All trades	-.1109	.0034	-.0203	.0011	.0087	-.0081	.0032	.0024	.0381	-.0021	2.34	1.32%
	(1.42)	(0.16)	(0.49)	(0.56)	(0.38)	(0.92)	(3.20)	(1.14)	(0.94)	(1.68)		
1,000 shares or larger	-0633	.0116	.0142	-.0005	.0096	.0008	.0019	.0008	-.0392	-.0015	0.76	-0.33%
	(0.87)	(0.57)	(0.37)	(0.29)	(0.46)	(0.09)	(2.09)	(0.41)	(1.04)	(1.34)		
100-200 shares	-.0795	.0001	-.0220	.0011	.0159	-.0091	.0025	.0019	.0321	-.0021	1.75	1.01%
	(1.09)	(0.01)	(0.57)	(0.59)	(0.75)	(1.11)	(2.66)	(0.95)	(0.85)	(1.82)		

[a] indicates significance at less than the .01 level; [b] indicates significance at less than the .05 level. One-tailed tests on b_1, b_2, b_3, b_4, b_6. b_8.

TABLE 18
Effect of TRA 86 on Mean Daily Abnormal Buys

$$MABTR_{ki} = b_0 + b_1 P\_CAR_i + b_2 N\_CAR_i + b_3 CAR^2_i + b_4 \Delta DY_i + b_5 LDY_i + b_6 PCG_i + b_7 PRC_i + b_8(\Delta DY_i * PRE_i) + b_9(PCG_i * PRE_i)$$

Trade size stratum.	B_0	b_1	b_2	b_3	b_4	b_5	b_6	b_7	b_8	b_9	F value	Adj. R^2
Panel A: Announcement Period (n=666)												
All trades	-.1239	.1312	.1808	-.0019	.0608	.0358	.0022	-.0014	.0381	-.0010	11.81	12.76
	(1.21)	(4.58)[a]	(3.34)[a]	(0.76)	(2.06)[b]	(3.10)[a]	(1.67)	(0.51)	(0.72)	(0.58)		
1,000 shares or larger	-.1153	.1042	.1368	-.0015	.0624	.0209	.0026	-.0003	.0319	-.0016	8.18	8.89
	(1.15)	(3.72)[a]	(2.59)[a]	(0.59)	(2.17)[b]	(1.85)	(2.06)[b]	(0.11)	(0.61)	(0.99)		
100-200 shares	-.0868	.0796	.1090	.0007	.0273	.0395	.0023	-.0014	.0620	-.0015	8.47	9.18
	(0.89)	(2.91)[a]	(2.11)[b]	(0.30)	(0.97)	(3.58)[a]	(1.84)	(0.53)	(1.22)	(0.97)		
Panel B: Interval Period (n=549):												
All trades	-.2044	.0374	.0552	.0006	.1235	.0261	.0021	.0000	-.0187	-.0014	3.64	4.16%
	(1.88)	(1.17)	(0.92)	(0.19)	(3.85)[a]	(2.19)[b]	(1.52)	(0.02)	(0.34)	(0.81)		
1,000 shares or larger	-.1307	.0014	-.0002	.0007	-.0224	.0213	.0020	.0014	.1322	-.0011	1.52	0.85%
	(1.28)	(0.04)	(0.00)	(0.26)	(0.74)	(1.89)	(1.50)	(0.50)	(2.52)[a]	(0.67)		
100-200 shares	-.2411	.0460	.0819	-.0012	.1084	.0393	.0023	.0006	-.0192	-.0025	3.66	4.18%
	(2.30)[b]	(1.49)	(1.40)	(0.41)	(3.50)[a]	(3.40)[a]	(1.70)	(0.20)	(0.36)	(1.52)		
Panel C: Expanded Interval Period (n=668)												
All trades	-.1226	.0689	.1003	-.0028	.0332	.0088	.0030	-.0014	.0182	-.0014	3.16	2.83%
	(1.34)	(2.69)[a]	(2.08)[b]	(1.24)	(1.26)	(0.85)	(2.61)[a]	(0.58)	(0.38)	(0.99)		
1,000 shares or larger	-.1199	.0269	.0370	-.0007	.0027	.0083	.0027	.0010	.0417	-.0018	1.72	0.96%
	(1.54)	(1.24)	(0.90)	(0.38)	(0.12)	(0.95)	(2.75)[a]	(0.47)	(1.03)	(1.44)		
100-200 shares	-.1070	.0519	.0777	-.0019	.0420	.0133	.0028	-.0013	.0053	-.0018	2.56	2.06%
	(1.24)	(2.14)[b]	(1.70)	(0.88)	(1.68)[b]	(1.35)	(2.53)[b]	(0.56)	(0.12)	(1.34)		

[a] indicates significance at less than the .01 level; [b] indicates significance at less than the .05 level. One-tailed tests on b_1, b_2, b_3, b_4, b_6. b_8.

The coefficient estimates on the ΔDY and the $\Delta DY*PRE$ variables from the OLS estimated models and the robust regression methods for the abnormal sell and buy models are shown in tables 19 and 20. The results from the robust regression models over the announcement period are generally similar to the OLS results (table 19 panel A). The coefficient estimate on the $\Delta DY*PRE$ variable is positive and statistically significant in the 100-200 shares stratum regardless of the regression method used. Over the interval period, the coefficient estimates using the robust methods have the same sign as the OLS coefficients (panel B). The coefficient estimate in the 100-200 shares trade stratum is positive across all three estimation methods and is statistically significant in the OLS and five quantile method. The robust regression results over the expanded interval period are also similar to the OLS results. The abnormal sell results by individual investors provide evidence consistent with the tax clientele effect being stronger in the pre-TRA 86 period.

TABLE 19
OLS and Robust Regression Coefficient Estimates on ΔDY and Pre-TRA 86 (*PRE*) Interaction Variables - Abnormal Sells

	Regression Method					
	OLS		*Five Quantile*		*Least Absolute Error*	
Trade size stratum:	b_4	b_8	b_4	b_8	b_4	b_8
Panel A: Announcement Period						
All trades	.0247	.0590	.0088	.0832	.0165	.0797
	(0.87)	(1.16)	(1.81)[b]	(9.55)[a]	(0.49)	(1.31)
1,000 shares or larger	.0030	.0052	.0102	-.0017	.0186	-.0116
	(0.11)	(0.11)	(2.04)[b]	(0.19)	(0.54)	(0.19)
100-200 shares	.0137	.0789	.0107	.0920	-.0109	.1494
	(0.51)	(1.64)[b]	(2.01)[b]	(9.58)[a]	(0.35)	(2.70)[a]
Panel B: Interval Period						
All trades	.0382	.0680	.0422	.0461	.0646	.0522
	(1.29)	(1.33)	(6.11)[a]	(3.86)[a]	(1.77)[b]	(0.83)
1,000 shares or larger	.0316	-.0353	.0353	-.0899	.0280	-.0774
	(1.10)	(0.71)	(6.16)[a]	(9.05)[a]	(0.89)	(1.43)
100-200 shares	.0398	.1050	.0516	.0768	.0503	.0628
	(1.38)	(2.11)[b]	(9.67)[a]	(8.32)[a]	(1.59)	(1.15)
Panel C: Expanded Interval Period						
All trades	.0086	.0381	.0066	.0242	.0161	.0324
	(0.38)	(0.94)	(1.38)	(2.82)[a]	(0.58)	(0.65)
1,000 shares or larger	.0096	-.0392	.0156	-.0563	.0186	-.0540
	(0.46)	(1.04)	(3.34)[a]	(6.66)[a]	(0.85)	(1.37)
100-200 shares	.0159	.0321	.0115	.0358	.0237	.0234
	(0.75)	(0.85)	(3.01)[a]	(5.22)[a]	(0.87)	(0.48)

[a] indicates significance at less than the .01 level (one tailed test).
[b] indicates significance at less than the .05 level (one tailed test).

TABLE 20
OLS and Robust Regression Coefficient Estimates on ΔDY and Pre-TRA 86 (*PRE*) Interaction Variables - Abnormal Buys

	Regression Method					
	OLS		*Five Quantile*		*Least Absolute Error*	
Trade size stratum:	b_4	b_8	b_4	b_8	b_4	b_8
Panel A: Announcement Period						
All trades	.0608	.0381	.0619	.0225	.0165	.0494
	(2.06)[b]	(0.72)	(10.77)[a]	(2.18)[b]	(1.08)	(0.81)
1,000 shares or larger	.0624	.0319	.0850	-.0006	.1285	-.0165
	(2.17)[b]	(0.61)	(14.78)[a]	(0.06)	(3.95)	(0.28)
100-200 shares	.0273	.0620	.0125	.0996	.0241	.0410
	(0.97)	(1.22)	(2.22)[b]	(9.89)[a]	(0.72)	(0.68)
Panel B: Interval Period						
All trades	.1235	-.0187	.1273	-.0499	.1266	-.0562
	(3.85)[a]	(0.34)	(18.93)[a]	(4.29)[a]	(3.53)[b]	(0.91)
1,000 shares or larger	-.0224	.1322	-.0194	.1199	-.0036	.1293
	(0.74)	(2.52)	(3.26)	(11.65)[a]	(0.11)	(2.26)[b]
100-200 shares	.1084	-.0192	.1294	-.0711	.1390	-.0848
	(3.50)	(0.36)	(19.84)[a]	(6.30)[a]	(4.40)	(1.55)
Panel C: Expanded Interval Period						
All trades	.0332	.0182	.0304	-.0061	.0303	-.0044
	(1.26)	(0.38)	(5.91)[a]	(0.66)	(1.02)	(0.08)
1,000 shares or larger	.0027	.0417	-.0020	.0537	-.0010	.0501
	(0.12)	(1.03)	(0.41)	(6.01)[a]	(0.04)	(1.20)
100-200 shares	.0420	.0053	.0398	.0003	.0367	.0020
	(1.68)[b]	(0.12)	(8.14)[a]	(0.04)	(1.25)	(0.04)

[a] indicates significance at less than the .01 level (one tailed test).
[b] indicates significance at less than the .05 level (one tailed test).

Additional Hypothesis

Hypothesis four examines the change in the relative number of transactions in the calendar years after and before the calendar year of the dividend increase. The results of this test are presented in table 21. The coefficient estimate on the change in dividend yield variable is positive and statistically significant ($p \leq .01$). Thus, implying that the greater the dividend increase, the greater the upward shift in relative demand for shares by lower tax-rate individuals--consistent with predictions from the tax clientele theory.[56]

[56] The results are similar when the analysis is limited to those firms with a mean of at least ten trades per day in the pre- and post-dividend increase calendar years. The adjusted R-squared of this model is 3.26% and the coefficient estimate for f_i is .42 ($p \leq 0.025$).

Table 21

Relationship Between Relative Number of Transactions by Small Individual Investors in the Calendar Years Before and After Dividend Increase and Change in Dividend Yield (n=724)

$$AB\_SMI_i = f_0 + f_1\Delta DY_i + f_2 LDY_i + f_3 PRC_i$$

	f_0	f_1	f_2	f_3	*F-statistic*	*Adj.* R^2
Coefficient estimates	-3.06	0.50	0.06	0.08	6.91	2.39%
(*t*-statistics)	(-4.70)*	(2.81)*	(0.88)	(4.03)*		

* Significant at less than the .01 level (two tailed test). Standard errors are computed using White's (1980) heteroskedasticity consistent covariance matrix.

Where:

AB_SMI_i	is the difference in the relative number of transactions by small individual investors between the calendar years after and before the calendar year of the dividend increase;
ΔDY_i	is the increase in annualized dividend yield;
LDY_i	is the annualized dividend yield of the prior dividend payment;
PRC_i	is the closing stock price on the day of the dividend announcement.

CHAPTER VII

SUMMARY

This research empirically examines investors' trading responses to dividend increases. The tax clientele theory implies that shareholder clienteles may shift in response to changes in dividend policy. However, prior research that has examined gross trading volume response to the initiation of dividend payments has failed to document any clientele adjustments. The research design used in this study differs from that used in the prior research on two dimensions. First, the sample is expanded to include all dividend increases, not just dividend initiations, that pass the selection criteria. The two primary benefits of this modification are greater sample size and more variation in overall magnitude of dividend payments. Second, this study utilizes daily stock transaction data, as opposed to gross trading volume data, to examine the theory's implications. Transaction data provides insights beyond that available from gross trading volume data since trades by individual and institutional investors can be separately examined, as well as the direction of trade (buy or sell). Additionally, transaction data generally has a greater probability of detecting a given trading increase than gross trading volume does (Cready and Ramanan 1995). Unlike prior empirical research, evidence consistent with the implications of the dividend clientele hypothesis is presented in this study.

The results of the first part of the study are based on non-directional trade data and are consistent with the implications of the dividend clientele hypothesis. Increased trading following a large dividend increase is detected over both an announcement period and an interval period. This increased trading is generally stronger for those trades made by

individuals than those made by institutional investors. In multivariate regression models that have abnormal transactions as the dependent variable and controls for information-related trading, the coefficient estimate on the magnitude of the dividend increase variable is positive and statistically significant over both the announcement and interval periods. When trades are partitioned into individual and institutional classes, the correlation is generally only statistically significant in the individual investor trade class. Since greater cross-sectional variation in tax rates and greater differential between ordinary income and long-term capital gains tax rates existed prior to TRA 86, the clientele reaction is expected to be greater in the pre-TRA 86 period. However, the empirical evidence of greater clientele reactions in the pre-TRA 86 period, using the non-directional data, is weak.

Trade direction is also examined by classifying trades as either sells or buys. Increased selling after a dividend increase is documented over the announcement period after a large dividend increase. This increased selling is evident in both the individual and institutional investor classes. Abnormal selling is also detected over the interval period in stocks paying a relatively low dividend prior to the dividend increases. Unlike the announcement period, this selling appears to be most concentrated in the individual investor class. In regression models with abnormal selling as the dependent variable, the coefficient estimate on a variable representing the change in dividend yield is positive and statistically significant during both the announcement and interval periods (the F-statistic of these interval period models are not statistically significant). When the trades are separated into individual and institutional classes, the coefficient estimate on the change in dividend variable is only significant in the individual investor group. The analysis of selling activity

suggests that portfolio re-balancing by individual investors was slightly stronger prior to TRA 86.

A group of investors appears to be attracted to stock in firms that increased their dividends. A statistically significant increase in buying after a large dividend increase is detected over the announcement and interval periods. This increase in buying is evident in both the individual and institutional trade classes. The amount of buying appears to be greater in firms that pay a relatively high dividend yield. A multivariate regression model indicates that the amount of abnormal buying is positively correlated with the magnitude of the dividend increase, even after controlling for the information content of the announcement. This correlation is not significant for the institutional class over the interval period. In contrast to the abnormal selling analysis, concluding that the increased buying after a dividend increase is due to tax clientele reasons, as opposed to other plausible causes, such as a desire for current income, is more problematic.

Overall, the results provide evidence consistent with the dividend clientele theory. A statistically significant increase in trading activity across both individual and institutional investors is detected after a large dividend increase. This evidence is stronger when the time period examined is limited to the time from the dividend announcement through the ex-dividend date. In contrast to the results of Richardson et al.(1986), the amount of abnormal trading after a dividend increase is found to be significantly correlated with the magnitude of the dividend increase after controlling for the information content of the dividend announcement. This correlation is weak for the institutional investor class. Since transaction data places equal weight on investors' decisions to transact while gross trading volume is driven primarily by larger trades, the results in the institutional class may partially explain

why Richardson et al. (1986) failed to document a significant correlation using gross trading volume.

If investors do alter their portfolios after a change in dividend payments, which the empirical evidence in this study suggests, this implies that signaling via dividend changes is costly. Additionally, if dividend changes alter the composition of the firm's owners, firms may want to consider which type of shareholder they prefer. There may be differences in the behavior or investment horizon of different shareholder groups. Since it appears investors (especially individual investors) are sensitive to the tax penalty on dividends, any future tax reform that increases the tax-rate differential between capital gains and ordinary income may cause more drastic portfolio adjustments after dividend changes, therefore increasing the cost to signal via dividend changes.

Another way to test for dividend clienteles among individual investors would be to examine the trading behavior of utility stocks during the period when dividends paid under a qualifying dividend reinvestment plan (IRC section 305(e)) were tax deferred. This provision was in place from 1982 through 1985; it allowed a single (married) taxpayer to defer tax on $750 ($1,500) of qualifying dividends. The issue is whether this temporary provision affected the type of investor that purchased utility stocks.

This paper primarily focuses on individual investors since it is easier to proxy for their marginal tax-rates. However, since institutions account for a significant portion of today's trading volume, it would be interesting to analyze institutional behavior after a substantial dividend increase. Michaely et al. (1995) examine the level of institutional ownership before and after a dividend omission and find no change. However, the omission may be just a temporary event. More interesting than investigating the level of institutional

ownership after a dividend increase would be to examine the types of institutions that hold stock before and after a firm has a substantial change in dividend policy. The dividend clientele theory predicts that taxable (tax-free or tax-deferred) institutions should sell (buy) stock in companies that increase dividends. However, it is difficult to determine which institutions own a company and to determine the tax status of institutions.

Another area for future market-based tax research is the examination of the lock-in effect on individual investors' decisions to sell stock. The results from regressions examining abnormal selling activity in this study imply that the recognition of capital gain taxes do not mitigate the incidence of selling by individual investors.

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APPENDIX A

SAMPLE SELECTION STEPS

Phase one begins with identification of all ordinary dividend events recorded on *CRSP* from January 1, 1980 through December 31, 1992[1]; 66,263 dividend events are identified. Since the study only examines dividend increases, those dividend events with a change in the annualized dividend payment of less than or equal to zero are eliminated. Remaining observations with a dividend code on *CRSP* having a last digit of nine are removed from the sample.[2] Finally, those observations with a dividend declaration date before January 1, 1983 are eliminated since the available *ISSM* data starts in 1983.[3] Phase one produces 8,094 dividend increase events from January 1, 1983 through December 31, 1992 (see table 1-panel A).

In the second phase of the sample selection process, screens are used to ensure that adequate data is available to conduct the analysis and to limit the sample to observations that meet specified criteria. Details on sample screens employed and their effect on the final samples are shown in panel B of table 1. A description of some of the sample selection screens used in phase two follows.

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[1] An ordinary dividend event is a dividend payment coded on *CRSP* as 1232, 1242, 1252, 1239, 1249, or 1259. The last digit of '9' indicates a dividend payment that qualifies under the dividend reinvestment plans for utility companies under former IRC §305(e). A more detailed description of the dividend codes and the algorithm used to generate the samples is provided in Appendix I of the dissertation. This appendix is not included with this document. It is available from the author upon request.

[2] If an individual elected to reinvest dividends paid by utility companies in a qualified dividend reinvestment plan [IRC §305(e)], the income from the dividend would be deferred until the stock was sold. The amount of dividend income allowed to be deferred was $750 for a single taxpayer and $1,500 for married taxpayers. These observations are removed from the sample since any tax clientele reaction to the dividend increase may be mitigated because of the tax deferral.

[3] Dividend events are originally identified starting with 1980 since transaction data from 1981-1984 for NYSE companies are available at Texas A&M University from an alternative data source.

Since the identified dividend increase may be due to a catch-up payment for an omitted dividend, the second screen eliminates observations in which the dividend increase followed a potential dividend omission. Firms with Standard Industrial Classification (SIC) codes between 6700 and 6799 (investment funds, trusts, royalty traders, and real estate trusts) are eliminated in the fourth screen. These firms are eliminated since they have considerable variation in their dividend payment from period to period.

The fifth screen eliminates the observation if the dividend payment established by the increase is not sustained one dividend payment into the future. This screen provides some confidence that the announced dividend increase was intended to be a permanent change in dividend policy. A further restriction is placed on quarterly dividends (screen six): if the annualized dividend payment one period in the future is greater than the current payment the observation is removed. This screen is necessary to eliminate the impact of future dividend increases on the measures of expected transactions. Since the identified dividend increase is desired to be a change following a relatively stable pattern of dividend payments, the seventh screen eliminates observations when changes in dividend payments occurred during the prior dividend payment(s): two prior payments for quarterly dividends and the dividend increase is a large increase, otherwise four prior payments for a quarterly dividend; and one prior payment for semi-annual and annual dividends. The stock price range restrictions of $8-$40 (upper bound indexed 5% per year) invoked by the ninth screen ensure some degree of homogeneity on dollar value of transactions.[4] The last screen eliminates dividend increases

[4] The upper-bound for stock price limit is set at $40 for calendar year 1982. The price is the closing price the day prior to the dividend announcement. The amount is indexed at five percent each year (the year 1992 has an upper-bound of $65). Cready (1988) and Cready and Mynatt (1991) used a $40 ceiling on stock prices for transaction data spanning 1981-1984; the stock price used in these studies is the mean closing price over

occurring before July 1, 1983 and after June 30, 1992. Adequate transaction data are not available to construct the measures of expected transactions for increases occurring beyond these dates. The selection steps invoked in phase two result in 908 dividend increase events.

The third phase of the sample screening process restricts the sample to those firms with adequate transaction data. A total of twenty-one observations were not matched to the *ISSM* data. Additionally, four observations that were missing data for the entire period from dividend declaration through the ex-dividend date were eliminated. The final sample consists of 883 dividend increase events.

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the 201 days centered on the announcement date. The lower bound in this study is set at a share price of $8, a price between Cready's (1988) $10 and Lee's (1992) $5 lower bounds.

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