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Dividend capture and the Tax Reform Act of 1986

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University of Washington, 1991

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Dividend Capture and The Tax Reform Act of 1986

by

Mazhar Ali Siddiqi

A dissertation submitted in partial fulfillment
of the requirements for the degree of

Doctor of Philosophy

University of Washington

1991

Approved by Jonathan M. Kayroll
(Chairperson of Supervisory Committee)

Program Authorized
to Offer Degree BUSINESS ADMINISTRATION

Date AUGUST 5, 1991

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Abstract

Dividend Capture and The Tax Reform Act of 1986

by Mazhar Ali Siddiqi

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This dissertation develops direct tests for the presence of dividend capture trading in NYSE stocks. The empirical method also separates stocks with dividend capture trading from those whose ex-day returns are set by the tax rates of long term investors. Inferences can therefore be made about these tax rates. This dissertation also uses the changes effected by the Tax Reform Act of 1986 to test whether short term investors are in fact setting the ex-dividend day return in some NYSE stocks. It further seeks to test whether long term marginal investors are individuals or corporations, and whether short term traders are corporations or dealers. This dissertation differs from other attempts in its emphasis on stratifying stocks by transaction costs. Without this stratification, any tests on average movements in ex-dividend day returns caused by tax changes will fail to differentiate tax penalty effects from dividend capture effects.

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ACKNOWLEDGMENTS

The author wishes to express sincere appreciation to Professor Jonathan Karpoff for his guidance in the development of this dissertation. The author is also indebted to the other members of the supervisory committee; Professors Peter Frost, Michael Hadjimichalakis, Paul Malatesta, Michael Perlman, Lawrence Schall and Andrew Siegel.

INTRODUCTION

Chapter 1 is a brief review of the literature relating ex-dividend day returns with taxes and short term trading. The important role of transaction costs in short term trading is discussed. The literature contains few, if any, clear tests of short term dividend capture, or the tax effects of long term investors free of the confounding effects of short term trading.

The review includes a discussion of recent papers that use changes in tax laws to test for dividend capture and tax effect implications. None of these papers stratify stocks by transaction costs, using instead, average ex-day returns to derive refutable implications. As the theoretical development in this dissertation will show, tax law changes contained in the Tax Reform Act of 1986 imply movements in opposite directions for different stocks. Averages then fail to generate refutable implications.

Chapter 2 develops the relationship between ex-day returns, taxes and short term trading. The tax penalty hypothesis of Elton and Gruber (1970) explains ex-day returns in terms of the marginal tax rates of long term investors. By the Tax Penalty Hypothesis, ex-day returns are entirely the result of the difference in marginal tax rates on income and capital gains for the long term investor. The short term dividend capture hypothesis states that short term traders can

arbitrage ex-day returns if ex-day returns lie outside the short term traders' zero profit bound.

Observed ex-day returns result from the combined effects of the tax penalty hypothesis and the dividend capture hypothesis. Ex-day returns for a particular stock are shown to depend on both the tax brackets of the long term marginal investor and the cost of transacting in that stock. This is a restatement of the proposition in Karpoff and Walkling (1990). The model developed shows that if ex-day returns are plotted against transaction costs, the data will lie along a two phase system.

This provides a direct test for dividend capture. Fitting a two phase regression, makes it possible to determine the stocks whose ex-day returns are set by short term traders. The sloped segment represents short term dividend capture. I can also infer the tax rate of the marginal long term investor because the horizontal segment represents stocks whose ex-day returns are determined by tax rates alone, without the effects of short term dividend capture. In addition, the position of the horizontal segment also provide a test for the identity of long term marginal investors.

Chapter 3 uses the Tax Reform Act of 1986 to determine shifts in the parameters of the model developed in the previous

section. It is shown that the effect of the Tax Reform Act is to shift the sloped segment up, while shifting the horizontal segment down. The kink in the relationship therefore moves to the left. The Tax Reform Act can therefore be used to test the model.

Previous papers have used movements in average ex-day returns to obtain refutable implications. If the two phase relationship is correct and the shifts as hypothesized, then average ex-day returns cannot provide refutable tests of dividend capture.

In addition, the upward shift in the sloped segment only occurs if the short term traders are corporations. No shift occurs if dealers are short term traders. The Tax Reform Act thus provides a basis for testing for the identity of the short term trader.

Chapter 4 investigates the effect on ex-day returns of dividend yield. Specifically, graphs of ex-day returns against dividend yield are examined for fixed levels of transaction costs.

The effect of dividend yield on the ex-day returns due to short term trading and due to asymmetry of tax rates is discussed. It is found that the tax asymmetry effect on ex-

day returns is unpredictable, and this is the main reason for lack of refutable implications.

This chapter also looks at the theoretical basis for the relationship between spread and volume. Tests for investigating abnormal volume around the ex-dividend day are suggested. The actual empirical tests for dividend yield and volume effects are not conducted as part of the empirical section of this dissertation. They are left as a possible future empirical effort.

Chapter 5 is a discussion of four factors which complicate the tests derived in previous sections. The data must be controlled for dividend yield, otherwise the relationship between ex-day returns and transaction costs varies from stock to stock and refutable implications are not forthcoming.

Different investors have different tax rates on income and capital gains. This means the horizontal segment in the previous diagram is not fixed, but can vary from stock to stock. I will later show that the effect of this on the direct test of dividend capture is to bias against finding a kink in the data.

Portfolio re-balancing as a result of the tax law changes

cause investors to shift clienteles. This again clouds refutable implications, because even in a particular stock, the long term investors are changing as they shift clienteles. However existing empirical evidence suggests the effect is small enough to ignore.

Japanese Life Insurance Companies are also active in dividend capture trading. These companies have regulatory reasons for stripping dividends, and are therefore willing to obtain dividends at some cost. I discuss the effect of dividend capture by Japanese Life Insurance Companies and show that the refutable implications obtained in previous sections should be unaffected if the demand by Japanese Life Insurance Companies for dividend capture is much less than that by domestic short term traders. If the assumption of low demand is invalid, then it is also possible to drop from my sample all stocks which are targets of dividend capture by Japanese Life Insurance Companies. In the empirical section, I use abnormally high trading volume around the ex-dividend day as a criterion for determining which stocks are the targets of dividend capture by Japanese Life Insurance Companies. Test results are reported with and without these stocks.

Chapter 6 is a detailed discussion of empirical method and tests. I discuss the reasons for selecting the particular sub-periods for testing the implications arising out of the Tax

Reform Act of 1986.

The method for obtaining abnormal ex-day returns is outlined. It consists of obtaining ex-day returns for each stock, for each quarter, and applying a one factor market model adjustment to obtain abnormal returns.

The bid-ask spread will proxy for transaction costs. An estimation of the bid-ask spread is obtained from transaction by transaction data recently obtained by the business school. An average bid-ask spread is obtained over the period ex-day - 45 to ex-day -14, so that the proxy is also suitable for corporate dividend capture traders, who are required to hold the stock for 46 days.

Details of the tests outlined in previous sections are given in this section, along with the method of testing for significance. In the case of some tests, standardized distributions do not exist, and simulation experiments are outlined for obtaining finite sample distributions of the test statistics.

CHAPTER 1: LITERATURE REVIEW

Most researchers find an average ex-dividend day price drop significantly different from the full dividend amount, at least for cash dividends. On average, the stock price drops by less than the amount of the dividend. Such a partial price drop is consistent with a tax penalty on dividends. A higher marginal tax rate on dividends than on capital gains causes investors to prefer a dollar of capital gains to a dollar of dividends.

Barclay (1987) tests the tax penalty hypothesis by comparing ex-dividend day behavior before the enactment of income taxes with the ex-dividend day behavior after the enactment of income taxes. He uses firms traded on the NYSE between 1900 and 1910 for the pre income tax sample and firms listed during 1962 to 1985 as the post income tax sample. The pre income tax period shows an ex-dividend day price drop not significantly different from the full dividend amount, while the post income tax period shows only a partial drop. This is consistent with the tax penalty hypothesis.

He also finds evidence of a tax clientele effect in the post income tax period. That is, the relative price drop is positively related to dividend yield, implying low income tax bracket investors prefer high yield stocks, while high income

tax bracket investors prefer low yield stocks. He does not find this effect in the pre income tax period.

If tax penalty effects were the only ones present, the long term investor's marginal tax rates on income and capital gains could be inferred from the ex-dividend day price drop. However, other effects are present.

A drop in the stock price less than the full dividend amount also provides a profit opportunity for short term traders. A short term trader faces the same rate on dividends and capital gains. Such a trader will enter the market if the costs of transacting are less than the difference between the ex-dividend day price drop and the dividend amount.

The ex-dividend day return for any stock may be set by long term investors or by short term traders. It depends on the difference in rates on income and capital gains taxes for the marginal investor in that stock. It also depends on the costs of short term transactions in that stock.

If the long term investor faces similar rates on capital gains and ordinary income, the relative price drop on the ex-dividend day may be large enough and costs of transacting high enough to make short term trading unprofitable.

On the other hand, if the long term trader faces very different rates on income and capital gains, the relative price drop on the ex-dividend day may be small enough and the costs of transacting low enough to make dividend capture profitable. For these stocks, the short term traders determine the ex-dividend day price drop and tax rates of long term investors cannot be inferred.

For corporate short term traders, the effective tax rate on dividends is lower than the effective tax rate on capital gains, due to the deductibility of 70% of dividend income. Corporate short term traders may find it profitable to enter even when the ex-dividend day price drop is close to the amount of the dividend.

Kalay (1982) argues that the tax rate of the marginal investor cannot be inferred from the estimate of the mean ex-dividend day price drop for two reasons. First if the price drops (making up the average) implied by long term trading are less than the 'no profit' bound for short term traders, then the price drops reflect short term trading and marginal rates of long term investors cannot be inferred.

Second, even if the **mean** price drop is greater than the 'no profit' bound for short term traders, it is likely to consist of individual drops both within and outside the transaction

cost limit, so the price drop still reflects some short term trading.

Kalay re-examines the ex-dividend day price behavior for the period April 1966 to March 1967 using his measures of minimum round trip transaction costs obtained from the NYSE Constitution and Rules. The drop is less than the full dividend amount, but the difference is not statistically significant.

Elton, Gruber and Rentzler (1984), in answer to Kalay (1982) suggest Kalay greatly underestimated transaction costs. They argue that transaction costs are large enough to make it unprofitable for short term traders to enter, and thus it is still the tax effects that determine the ex-dividend day price drop. Their estimate of transaction costs is a summation of execution, transfer taxes, bid-ask spreads and clearance costs. Elton, Gruber and Rentzler do not however provide any evidence that transaction costs are indeed too high for dividend capture to be profitable. Nor do they provide any tests for the presence of dividend capture traders.

Kalay (1984) in replying to Elton, Gruber and Rentzler (1984), reiterates that even allowing for transaction costs higher than in his original paper, short term traders still

participate, and marginal tax rates cannot be inferred. He further states that his results and those of Elton, Gruber and Rentzler are consistent with ex-day returns being determined by the activities of both short term traders and long term marginal investors.

Eades, Hess and Kim (1984) find mixed evidence for the tax effect explanation for ex-dividend day price effects. The data consists of all taxable distributions by NYSE common stocks from July 1962 to December 1980. These distributions include cash dividends, preferred dividends, stock splits and tax exempt distributions. Common stock cash dividends do show the predicted partial drop on the ex-dividend day, but Eades, Hess and Kim conclude that the long term investors' marginal tax rates cannot be inferred. For the other distributions, the results conflict with the tax effect hypothesis.

Preferred dividends are priced as if taxed at a rate lower than capital gains tax, non-taxable stock dividends and stock splits behave on ex-dividend day as if fully taxable and non-taxable cash distributions (mostly return of capital) are priced as if they provide a tax subsidy.

The authors also find that the usual result of a partial drop for common stock cash dividends does not hold significantly after the advent of negotiated commissions in 1975. This supports the idea that short term traders became more active

after negotiated commissions reduced costs of transacting.

The evidence on trading volume also indicates short term traders are active around the ex-dividend day. Lakonishok and Vermaelen (1986) test directly for short term traders by observing the net trading volume around the ex-dividend date. The data consists of trading volume for 2300 NYSE and AMEX stocks from 1970 to 1981. They argue that if short term trading is important, there should be a net increase in trading around the ex-dividend day, and that this increase should be related positively to dividend yield and negatively to transaction costs.

Significant volume increases are found in each of the five days leading up to the ex-dividend day, which are not offset by volume changes in the five days following the ex-day. In addition the abnormal volume increase is significantly greater for the post negotiated commissions period, corresponding to lower transaction costs. They do not however test for a cross sectional relation between transaction costs and ex-dividend day volume. The authors do find that abnormal trading volume increases with dividend yield.

The authors also test for abnormal trading volume from ex-dividend day +6 to ex-dividend day +13. They find a significantly larger volume for the data period corresponding

to negotiated commissions. They argue these results are consistent with the hypothesis that corporations that are subject to a sixteen day holding period (before 1984), are major short term players around the ex-dividend day, especially since commissions became negotiable.

The difficulty in measuring transaction costs, limits the power of empirical tests aimed at confirming the dividend capture hypothesis. Karpoff and Walkling (1988), relate the price drop to measures of transactions costs. Using data from the University of Chicago's Center for Research in Security Prices (CRSP), from 1965 to 1984, they find significant evidence that transactions costs are the limiting factor in the price drop for high dividend yields stocks in the period after 1975.

They use four proxies for transaction costs:

1. Inverse of the stock price at the end of the month before the ex-dividend month.
2. Market value of common stock calculated at the end of the month before the ex-dividend month.
3. Number of shares outstanding.

4. Standard deviation of daily stock returns calculated from Ex-Dividend +6 to Ex-dividend +95 days.

Karpoff and Walkling (1990) look at the ex-day behavior of NASDAQ stocks. They use the bid-ask spread as a measure of transaction costs. They find evidence that the ex-day return is positively related to transaction costs, especially in high dividend yield stocks. This supports the hypothesis that dividend capture traders are determining the ex-day return for at least some high dividend yield stocks.

Dividend capture is not a risk-less arbitrage. As Heath and Jarrow (1988) point out continuously changing prices mean some risk remains. They argue that because the ex-dividend day price drop is not always less than the full dividend amount, a risk-less arbitrage opportunity does not exist. And so, the ex-day return reflects a risk premium on top of an equilibrium rate that is the result of tax effects and dividend capture effects.

Brown and Lummer (1984) suggest a hedged dividend capture strategy to reduce the risk exposure of a corporation which must hold the stock for a number of days (16 in 1984) to qualify for the tax deduction on dividend income. The

strategy consists of purchasing the stock and selling an option before the ex-dividend day and unwinding the position after the ex-dividend day. They use portfolios of stocks rather than a single issue to further reduce risk.

Grammatikos (1989) investigates the effect of the Tax Reform Act of 1984 on corporations that took part in dividend capture trading. The Tax Reform Act increased holding costs for these corporations by increasing the holding period from 16 days to 46 days. He finds that the abnormal ex-day return increased after the 1984 Tax Reform Act. This is consistent with increased cost of dividend capture due to the increase in holding period. The increase in ex-day returns is found only in the highest yield stocks, which are more likely to be targets for dividend capture.

If risk exposure is an important factor in dividend capture costs, then the impact of the tax changes should be greater on non-optionable stocks than on optionable stocks.

Grammatikos' results support this.

The additional information being continuously incorporated into the stock price, even on the ex-dividend day, causes the actual ex-day return to differ from the expected ex-day return. The actual ex-day return is what the empirical tests measure. But it is the expected ex-day return that both

marginal investors and short term traders use to make decisions.

Kaplanis (1986) suggests that although under the assumption of rational expectations on the part of investors, actual ex-day falloff is a suitable proxy for expected falloff, another alternative should be tried. He uses the price of an option not exercised on the last cum-dividend date. The option price implies the expected price drop on the ex-dividend date. Using British stock data from 1979 to 1984, he finds the expected falloff to be from 55% to 60% of the dividend and significantly different from it. But he does not find a significant difference between expected and actual falloff.

Lakonishok and Vermaelen (1983) look at the Canadian Tax Reform of 1971, and theorize that the tax penalty hypothesis and the dividend capture hypothesis imply opposite movements in ex-day returns. The 1971 Canadian Tax Reform Act (effective January 1972) brings effective rates on dividends and capital gains closer and raises the rate on dividends. The effect, the authors argue is to reduce the tax penalty of dividends relative to capital gains and to decrease short term profits from dividend capture.

Their data consists of all but the most thinly traded firms on the Toronto stock exchange paying dividends in 1971 and

1972. They find average ex-day returns are higher in 1972 than in 1971, which is not consistent with the tax penalty hypothesis. They find some evidence of dividend capture.

Booth and Johnston (1984) examines the ex-dividend day price behavior of Canadian stocks. They find ex-dividend day returns consistent with a market preference for capital gains over dividend income. But their tests of the effects of the tax reform of 1971-72 do not support the dividend capture hypothesis.

The United States Tax Reform Act of 1986 has changed the difference between capital gains and income taxes for individuals and corporations. This should provide further tests of what determines the ex-dividend day price drop for different stocks. The next section uses the Tax Reform Act of 1986 to develop refutable tests of the dividend capture hypothesis. Some papers have already attempted to use the changes effected by the Tax Reform Act of 1986 to test for dividend capture.

Michaely (1989) looks at firms listed on NYSE that paid dividends during 1986 and 1987. After adjusting abnormal ex-day returns for heteroscedasticity, he does not find a significant positive ex-day return. In fact he finds that average abnormal ex-day returns are negative in 1986 and

1987. He concludes this is evidence of dividend capture by corporations (later in this dissertation I show that negative ex-day returns are also consistent with long term investors determining ex-day returns, if these long term investors are corporations).

Fedenia and Grammatikos (1989) argue that clientele relationships due to tax rates on capital gains and dividends may be distorted during 1987 as investors re-balance their portfolios. However they find empirical evidence of the reappearance of tax-induced clienteles by 1988. Further, they find evidence that ex-dividend day returns still reflect a tax preference for capital gains over dividends, and that the effective tax rates for dividend capture traders increased following the Tax Reform Act.

None of the above papers investigating the effects of the Tax Reform Act, stratify stocks by transaction costs. And since dividend capture may be profitable only below some level of transaction costs, their tests, which use movements in **average** ex-day returns probably lack the power to separate short term trading effects from the effects of the tax penalty of dividends. This point will be discussed in more detail in chapter 2.

CHAPTER 2 UNDERSTANDING EX-DAY RETURNS

2.1 The Tax Penalty Hypothesis

If investors were indifferent between a dollar of dividends and a dollar of capital gains, the price of a stock would drop by exactly the amount of the dividend on the ex-dividend day. Due to the differences in the tax treatment of capital gains and dividends, investors are not indifferent between a dollar of capital gains and a dollar of dividends. Most empirical studies find a preference for capital gains. Due to this preference the price drop on the ex-dividend day is on average less than the full amount of the dividend.

Elton and Gruber (1970) formalized the idea that the marginal tax rates of the long term investor could be inferred from the ex-dividend day price drop. The long term marginal investor is defined as an investor who has decided to sell or buy the stock for reasons other than the dividend. For such an investor transaction costs are irrelevant in the decision to time the transaction before or after the ex-dividend day. The timing then reflects entirely the investor's relative valuation of capital gains and dividends.

The marginal seller is indifferent between selling a stock before or after the ex-day if

$$P_b - (P_b - P_o)t_g = P_a - (P_a - P_o)t_g + d(1 - t_p) \quad (1)$$

where

- t_p is the marginal investor's income tax rate
 t_g is the marginal investor's tax rate on capital gains
 P_o is the original price of the stock.
 p_b is the price of the stock just before going ex dividend
 p_a is the price of the stock just after going ex dividend
 p is the average ex dividend price
 d is the dollar amount of dividend paid

Let R_t equal the ex-day return when no other effects are present. Then

$$R_t = \frac{P_a - P_b + d}{P_b}$$

Substituting into equation (1) gives:

$$R_t = [1 - (1-t_p)/(1-t_g)] d/P_b \quad (2)$$

R_t is a statement of the tax penalty hypothesis, developed by Elton and Gruber (1970). The tax penalty hypothesis holds for both corporate as well as individual long term marginal investors. However the level of R_t may differ between the two groups. Equation (2) is strictly true for individual long term marginal investors.

For corporate long term marginal investors, R_t should be replaced by R_{tcorp} , the equilibrium rate of return with corporations as the long term marginal investors. The derivation for R_{tcorp} , using a 70% corporate deduction on dividends is given below.

The corporate long term investor is indifferent between early or delayed sale, provided:

$$P_b - (P_b - P_o)t_{gc} = P_a - (P_a - P_o)t_{gc} + d(1-.3t_c) \quad (3)$$

Where:

t_{gc} is the effective corporate capital gains tax rate

t_c is the corporate income tax rate

p_b is the price of the stock just before going ex dividend

- p_a is the price of the stock just after going ex dividend
- P_o is the original price of the stock.
- p is the average ex dividend price
- d is the dollar amount of dividend paid

which gives:

$$R_{tcorp} = \frac{(.3t_c - t_{gc})}{(1 - t_{gc})} \cdot \frac{d}{P_b} \quad (4)$$

2.2 Dividend Capture Hypothesis

An ex-dividend day price drop which is less than the amount of the dividend, provides a profit opportunity for dividend capture traders. A quick movement in and out of a position in the stock around the ex-dividend day subjects the trader to the same tax rate on capital gains and income. A short term trader makes excess returns if the cum-dividend price differs from the ex-dividend price by less than the difference between the dividend amount and the cost of transacting the short term trade.

For corporate short term traders a profit opportunity may exist even when the price drop is equal to or greater than the amount of the dividend. This follows from the 70%

dividend deduction allowed to corporations. As a result of this deduction, the effective tax rate on dividends is less than the effective tax rate on capital gains. A corporation can profit from dividend capture if:

$$P_a + d(1-.3t_c) - P_b + (P_b - P_a)t_c > 2x(1-t_c)P + h \quad (5)$$

Where:

- x is the corporation's one way transaction cost expressed as a percentage of the stock price
- h is the corporation's holding cost

Equation (5) puts an upper bound on the ex-day return when corporate dividend capture traders are in the market. Let R_c represent this upper bound. This means the ex-day return, $(P_a - P_b + d) / P_b$, is always less than R_c . This gives:

$$R_c = \frac{2xP}{P_b} + \frac{h - .7dt_c}{P_b(1-t_c)} \quad (6)$$

For dividend capture by dealers, no dividend deduction is provided under the tax laws. A dealer profits from dividend capture if

$$P_a + d(1-t_d) - P_b + (P_b - P_a)t_d > 2x(1-t_d)P \quad (7)$$

where t_d is the dealer's marginal income tax rate.

In this case letting R_d represent the upper bound on the ex-dividend day returns when dealers are short term traders, gives:

$$R_d = \frac{2xP}{P_b} \quad (8)$$

2.3 Observed Ex-Dividend Day Returns

If transaction costs are high enough to make dividend capture unprofitable, short term traders will not enter around the ex-dividend day, and the marginal tax rates of the long term investor set the ex-dividend day price drop. The rates can then be inferred from the price drop on the ex-dividend day. Equilibrium ex-day returns would then lie along R_t or R_{tcorp} .

However if transactions costs are low enough to make at least some short term trading profitable, then the tax rates of the long term investor cannot be inferred. In this case transaction costs are the limiting factor. The difference between the ex-dividend day price drop and the amount of the

dividend will equal the costs of transacting. With short term trading ex-day returns are bounded from above by R_d or R_c .

Combining the tax penalty hypothesis with the dividend capture hypothesis, the equilibrium ex-day rate of return, r , is given by:

$$r = \min (R_{tcorp}, R_t, R_c, R_d) \quad (9)$$

The observed ex-day returns are determined by:

1. The tax bracket of the long term marginal investor in that stock.
2. The transaction costs of trading that stock.

The above equations are a restatement of Karpoff and Walkling (1990), Working Paper 'Dividend Capture in NASDAQ Stocks'.

Figure 2.1 is a graphical representation of equation (9), assuming individuals are the long term marginal investors. The ex-day return for a particular stock is a single point on figure 2.1. The lines in figure 2.1 represent the possible location of the equilibrium ex-day rate of return. If transaction costs are greater than X^* , the ex-day return is

set by the long term individual investors, and dividend capture is too expensive. Ex-day returns then lie along R_t . If transaction costs are less than X^* , the short term traders find it profitable to enter the market and reduce the ex-day return. Ex-day returns then lie along R_c and vary positively with transaction costs. Karpoff and Walkling (1990) find this positive relation in high dividend yield stocks.

Figure 2.2 is a representation of the ex-day return when the long term marginal investors are corporations. In this case, ex-day returns lie along R_{tcorp} when transaction costs are greater than X' . For transaction costs below X' , ex-day returns lie along R_c . Note, a negative ex-day rate of return, in this case, may or may not be due to dividend capture. From equation (4), R_{tcorp} lies in the negative quadrant if $t_{gc} > .3t_c$. For the years 1986, 1987 and 1988 this condition is true and R_{tcorp} lies in the negative quadrant.

As previously stated, figures 2.1 and 2.2 are representative of a single stock. The stock is actually a single point lying anywhere on the relevant lines in those figures. If all investors were in the same tax bracket, R_t would have the same fixed position for each stock, and aggregating many stocks would yield the lines of figures 2.1 and 2.2, i.e. all ex-day

returns would plot along the lines in figures 2.1 and 2.2.

However, this simple picture is complicated by the fact that all investors are not in the same tax brackets, giving different positions for R_t and R_{tcorp} for different stocks. This is discussed in more detail in Chapter 5.

Even with the complicating effects of tax clienteles, aggregation will still yield bands instead of the sharp lines of figures 2.1 and 2.2. The theory can still be developed under the simplifying assumptions that the data will plot along the lines of figures 2.1 and 2.2. The fact that the data actually lies in a broader band will effect the tests of implications arising from that theory.

2.4 Direct Test Of Dividend Capture

The direct test consists of fitting a two phase regression to the data. Abnormal ex-day returns are regressed against the proxy for transaction costs, after sorting the data by the transaction costs proxy.

A test of the hypothesis that the data follow a two phase regression is a test for the presence of dividend capture. As in figures 2.1 and 2.2, the first segment should have a slope of 2. However complications from tax clientele effects,

discussed later, bias the slope downward.

Previous papers have not directly fitted a two-phase regression to the data. In those papers dividend capture is tested in one of the following ways:

1. Investigating volume effects on ex-day returns.
2. Investigating negative correlation between ex-day returns and transaction costs.
3. Using Tax Reform Act changes to test implications for average ex-day returns.

Previous paper which have tried to test implications arising out of Tax Reform Act of 1986 have looked at average returns for all stocks, without ordering by transaction costs. If the shifts caused by the Tax Reform Act in the parameters of figures 2.1 and 2.2 are as outlined in the next section, then such usage of averages would have severely limited power in testing for dividend capture.

2.5 Inferring The Marginal Tax Rates of The Long Term Investor.

The method described above also overcomes the problems with

inferring the marginal tax rates of long term investors implied by the tax penalty hypothesis. It is now possible to infer the tax rates because the effects of short term dividend capture can be separated from the price drop caused by the long term investors alone. The second, horizontal segment in figure 2.1 represents the ex-day return due solely to the long term marginal investors' difference in tax rates, without any short term trading. Equation (2) can therefore be used to infer these rates.

2.6 Direct Test For The Identity Of The Long Term Marginal Investor

From figures 2.1 and 2.2, the position of the intercept of the second segment of the two phase regression provides a test for the identity of the long term marginal investor.

For individual long term investors the intercept is positive. For corporate long term investors the intercept is negative. The slope is theoretically zero, but the clientele effect, discussed later, is expected to bias the slope upwards.

2.7 Dealers, not Corporations, As Short Term Traders

If corporate transaction costs are greater than dealer costs by enough to cover the difference between holding costs and a

factor depending on the dividend deduction, it is possible for R_d to lie below R_c . This can happen when

$$\frac{2x_c P}{P_b} + \frac{h - .7dt_c}{P_b(1-t_c)} > \frac{2x_d P}{P_b}$$

Even when dealer transaction costs are no less than corporate transaction costs, i.e. $x_c = x_d$, R_d can still lie below R_c when,

$$h - .7dt_c > 0$$

or, for a corporate short term trader in 1986 in the 46% tax bracket, with an 85% dividend deduction, R_d becomes relevant in setting ex-day returns (i.e. lies below R_c) if:

$$h > .391d$$

For a corporate short term trader in 1988 in the 34% tax bracket, with an 70% dividend deduction, R_d becomes relevant if:

$$h > .238d$$

Holding costs are primarily connected with the tax law requirement of a 46 day holding period. The corporation must

hold onto the stock for at least 46 days in order to qualify for the dividend received deduction. It therefore represents the costs of hedging a position in the dividend paying stock or the costs of an un-hedged position. Brown and Lummer (1986) and Brown and Lummer (1984) discuss this hedged dividend capture strategy.

To obtain an idea of the order of these holding costs, consider writing an option on a \$100 stock, with a quarterly dividend of \$1, i.e a quarterly dividend yield of 1%. From the above condition, R_d lies below R_c , and is therefore relevant in determining ex-day returns for 1988 as long as

$$h > \$.238$$

Using the round trip transaction cost of writing the option as the holding cost h , consider an in the money option costing about \$20. Then $h > \$.238$ implies a round trip transaction cost, on the option price, greater than 1%, i.e. transaction costs on the option of the order of quarterly dividend yield could make R_d relevant.

And so, the possibility remains that for very low dividend yield stocks, R_d may lie below R_c . In the next section, I will first derive refutable implications without considering R_d . At

the end of that section, however, the results of dividend capture by dealers are considered. It is shown there that the refutable implications obtained using R_d do not differ much from implications obtained ignoring R_d . However I obtain an additional test for the identity of the short term trader.

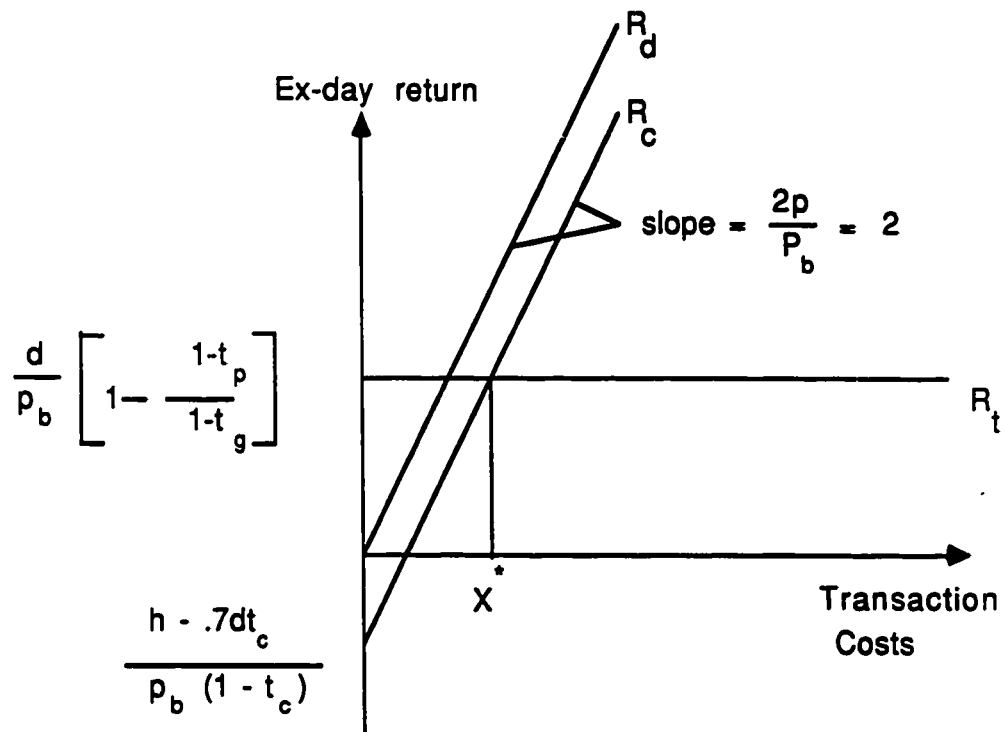


Figure 2.1: Ex-Day Returns With Individual Long Term Investors

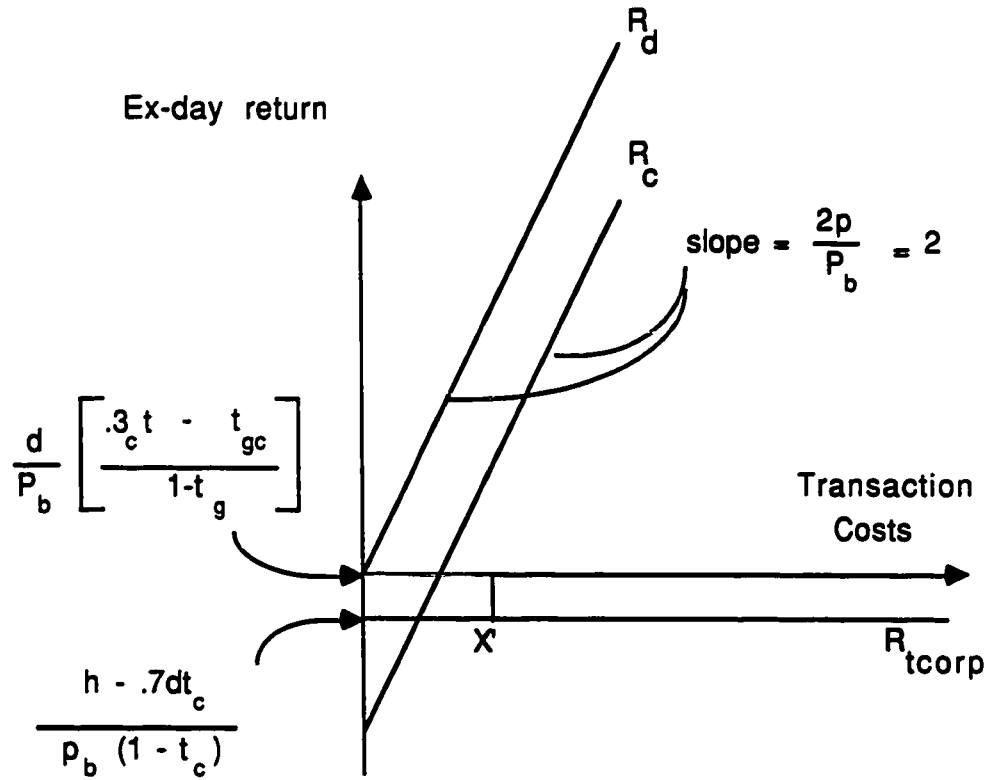


Figure 2.2: Ex-day Returns With Corporate Long Term Investors

CHAPTER 3. USING THE 1986 TAX REFORM ACT TO GENERATE REFUTABLE IMPLICATIONS

3.1 Effects of The 1986 Tax Reform Act

The Tax Reform Act of 1986 (Tax Reform Act) brought about significant changes in several of the parameters of equation (9) from section 2.3. These changes provide an opportunity to test the dividend capture hypothesis. Table 3.1 is a summary of the Tax Reform Act's provisions for individual investors that took effect in 1986 and 1987. Table 3.2 lists the changes for corporations. The effective dates for the changes are discussed below. These and other details are contained in Ernst and Whinney (1986), and in Arthur Andersen and Co. (1986).

3.2 Effective Dates for Tax Reform Act Changes

The effective dates for the individual tax rates in table 3.1 are January 1, 1987 and January 1, 1988 for the rates listed under the 1987 and 1988 columns.

For the corporate rates in table 3.2, the effective date for the dividend deduction is January 1, 1987. The tax rate changes for income and capital gains took effect July 1, 1987. For the income tax rate, the transition was directly

from a maximum of 46% to a maximum of 34%, i.e the 40% rate exists only due to application of the pro-rata provision; 46% for the first half of the year and 34% for the second half of the year.

The pro-rata provision 'blends' the old and new rates. The tax for the year is first calculated using both the old and new rates. The actual tax due is an amount in between these two amounts. The exact amount is found by dividing the difference between the amounts in the ratio of the days under the old tax rate and the days under the new tax rate. For example, if a corporation has a fiscal year starting February 1, The 46% rate applies from February through June and the 34% rate applies from July through January. The pro-rata provision means the tax rate for 1987 is equal to:

$$\frac{150 (46\%)}{365} + \frac{215 (34\%)}{365} = 38.9\%$$

For corporations on a calender year basis (i.e. fiscal year January to December), the pro-rata provision means an effective income tax rate of 40% for 1987. Table 3.2 is, therefore, exactly correct for a corporation on a calender year basis, with January 1 as the effective date for each column. For corporations on a fiscal year basis (i.e. other than from January to December), the pro-rata system implies

an effective income tax rate in 1987 that varies with the closing month of the corporation's fiscal year.

The rules relating equity share to dividend deduction are effective for dividends received or accrued after December 31, 1986 and December 31, 1987. See Commerce Clearing House, 1988, sections 243 (a), (b) and (c) and amendments.

3.3 Shifts in R_c , The Ex-Day Return From Dividend Capture by Corporations

From equation (6), the decrease in corporate tax from 46% to 40% will cause an upward shift in R_c provided

$$\frac{h - .8d(.4)}{P_b(1 - .4)} > \frac{h - .85d(.46)}{P_b(1 - .46)}$$

writing h' for per \$ holding costs, R_c will shift up provided

$$\frac{(h' - .32)}{(.6)} \cdot \frac{d}{P} > \frac{(h' - .391)}{(.54)} \cdot \frac{d}{P}$$

or provided

$$h' < 1.03$$

Assuming holding costs per \$ of dividend held were less than \$1.03, R_c shifts up in 1987.

For the 1987-88 period, the maximum corporate tax rate drops to 34%. Again following the above argument, R_c will again shift up if

$$\frac{h - .7d(.34)}{P_b(1 - .34)} > \frac{h - .8d(.4)}{P_b(1 - .4)}$$

or

$$h' < 1.14$$

And again assuming holding costs are lower than \$1.14 per dollar of dividends, R_c again shifts up in 1988.

I have stated previously, holding costs are related to the costs of hedging or the costs of maintaining an unhedged position in the stock. It is difficult to quantify these costs. This difficulty arises from the fact that the tax law requires investment in the dividend paying stock to be 'at risk', otherwise the corporation does not qualify for the dividend deduction. The interpretation of when the investment ceases to be sufficiently at risk is not exact.

Clearly, writing a call option with a low enough strike price when the dividend paying stock is purchased, and subsequently

buying the option back when the dividend paying stock is sold can eliminate virtually all the risk. On the other hand, writing a call with an exercise price of at least 80% of the stock price is viewed as keeping the dividend capture position sufficiently at risk; See Brown and Lummer (1984).

Zivney and Alderman (1986) describe a hedged dividend capture strategy using index option mutual funds to further reduce the variation in returns.

Still, the costs of the remaining 'at risk' portion of the position are difficult to quantify. For the purposes of determining shifts in R_c , a rigorous quantification is not necessary. The reasons for this are explained next.

As discussed in section 2.7, R_c becomes irrelevant for determining ex-dividend day returns, if

$$h > .391d \quad (\text{for } 1986)$$

or
$$h > .238d \quad (\text{for } 1988)$$

Dealers are now the short term traders and ex-day returns for the dividend capture segment of figure 2.1 lie along R_d and not along R_c . Given this fact, R_c either shifts up as a result

of the Tax Reform Act ($h < .238d$ for 1988) or R_c is irrelevant ($h > .238d$ for 1988). A downward shift in R_c is only possible when R_c is well into the irrelevant range above R_d ($h > 1.03d$ in 1986 and $h > 1.14d$ in 1988). For the moment, then, assuming R_c is the relevant line, the Tax Reform Act causes an upward shift in R_c in both the tax change periods of 1987 and 1988.

3.4 Shifts in R_t , The Ex-Day Rate Implied By Individual Long Term Investors

From equation (2), any reduction in the preferential treatment of capital gains will cause a downward shift in R_t . Such a reduction clearly occurs in 1987, due to elimination of the capital gains deduction. The maximum rate on individual capital gains rises from 20% to 28%, while the maximum rate on income falls from 50% to 38.5%.

The individual tax rate on dividends and capital gains are equal in 1988. However, the tax on capital gains can still be deferred by not realizing the gain. In addition capital losses are fully deductible against capital gains, while only \$3000 of capital losses can be offset against ordinary income. These factors reduce the effective rate on capital gains. These timing and deferral options remain unchanged

even after the Tax Reform Act. For the 1988 period, therefore, there is a further downward shift in R_t , but the rate implied is still above zero.

This downward shift for 1988 may not be significant, as most of the preferential treatment for capital gains had already been eliminated in the 1987 period. This is especially true if the marginal investors in 1987 were not in the highest tax brackets above 28%. If the marginal investors were in an income tax bracket at or below 28%, they faced the same rate on capital gains and dividends from 1987 onwards.

It should also be pointed out, that the loss of income tax shelters during 1986-88, taken by itself, actually implies a relative increase in the preferential treatment for capital gains, and shifts up the R_t curve. The magnitude of this effect is an empirical issue, but there are two factors that reduce its effect.

First, the loss of the passive tax shelter affects both capital gains as well as dividends. That is, before 1986, both dividends and capital gains could be sheltered against passive losses, whereas after 1986, neither dividends nor capital gains can be fully sheltered against passive losses (the phase out rate is also the same for both capital gains

and dividends).

Second, to the extent that tax sheltering is used to convert taxable income into capital gains, the removal of preferential treatment of capital gains reduces the significance of tax shelters for the conversion of income into capital gains. I therefore assume the effect is small enough to ignore.

3.5 Shifts in R_{tcorp} , The Ex-Day Rate Implied by Long Term Corporate Investors

From equation (4) in section 2.1, R_{tcorp} can be shown to shift down for Tax Reform Act changes in 1987, and to shift further down in 1988. This can be seen by inserting the relevant values for the variables in equation (4).

For 1986, Max. $t_c = 46\%$, $t_{gc} = 28\%$, dividend deduction = 85%

$$R_{tcorp} = \frac{d}{P} \cdot \frac{.15(.46) - .28}{1 - .28} = -0.293 \frac{d}{P}$$

For 1987, $t_c = 40\%$, $t_{gc} = 34\%$, dividend deduction = 70%

$$R_{tcorp} = \frac{d}{P} \cdot \frac{.3(.4) - .34}{1 - .34} = -0.333 \frac{d}{P}$$

For 1988, $t_c = 34\%$, $t_{gc} = 34\%$, dividend deduction = 70%

$$R_{tcorp} = \frac{d}{P} \cdot \frac{.3(.34) - .34}{1 - .34} = -0.361 \frac{d}{P}$$

For a given dividend yield, figure 3.1 shows the shifts expected for 1987 and 1988 when individuals are the long term investors. figure 3.2 shows the shifts expected for the 1987 and 1988 changes when corporations are the long term investors. These shifts provide some refutable implications for testing both the existence of dividend capture and whether the long term investors are individuals or corporations.

3.6 Refutable Implications of dividend capture

From both figure 3.1 and figure 3.2, it is clear that the direction of movement of ex-day return depends on the level of transaction costs. If average ex-day returns are computed over the full range of transaction costs, the averages do not provide refutable implications for dividend capture. For a given dividend yield, ex-day returns for low transaction cost stocks are expected to rise, while ex-day returns for high transaction cost stocks are expected to fall. Not much can then be said about averages, unless assumptions are made about which shift dominates and where the kink might be. But

these are empirical issues.

To obtain refutable implications the sample must be stratified by transaction costs, and each transaction cost category examined for changes in ex-day returns around the two tax change periods.

Examination of figures 3.1 and 3.2 for different transaction cost categories, provide the following refutable implications:

1. For positive ex-day returns, a rise in ex-day returns in any period(1986-87 or 1987-88) for any transaction cost category, is consistent with dividend capture in that stock.
2. For positive ex-day returns, a fall in any period, for any transaction cost category, is consistent with the absence of dividend capture in that stock, and ex-day returns being determined by long term **individual** investors.
3. For negative ex-day returns, a fall in any period, for any transaction cost category, is consistent with the absence of dividend capture in that stock, and ex-day returns being determined by long term

corporate investors.

4. For negative ex-day returns, a rise in ex-day returns for any transaction cost category is consistent with dividend capture.

3.7 Test For Dividend Capture

The above implications are summarized in a test for a leftward shift in the break-point X^* (or X') in figure 2.1 (or figure 2.2). A leftward shift in the breakpoint is consistent with dividend capture traders determining the ex-dividend day price drop for at least some stocks. The hypothesis is shown in figure 3.3.

3.8 Test For The Long Term Marginal Investor

To investigate whether long term investors are corporations or individuals, a test for the position of the horizontal segment of the two phase regression is required. If the horizontal segment is in the positive ex-day quadrant, individuals are the long term investors. If it is in the negative ex-day quadrant, then corporations are the long term investors. This does not depend on the effects of the Tax Reform Act but is the same test as described in section 2.6.

3.9 Test For Identity Of Short Term Trader

As discussed earlier, for low dividend yield stocks, dividend capture by dealers may be determining ex-day returns. From equation (8) in section 2.2, it is clear the position of R_d is not effected by the changes in tax rates brought about by the Tax Reform Act. Although the kink in figure 3.3 still moves to the left, I now also have a test for the identity of the short term trader.

If the short term trader is a dealer, then

$$\alpha_{1,1988} = \alpha_{1,1986}$$

If the short term trader is a corporation, then

$$\alpha_{1,1988} > \alpha_{1,1986}$$

Where α_1 is the intercept of the first segment of the two phase regression.

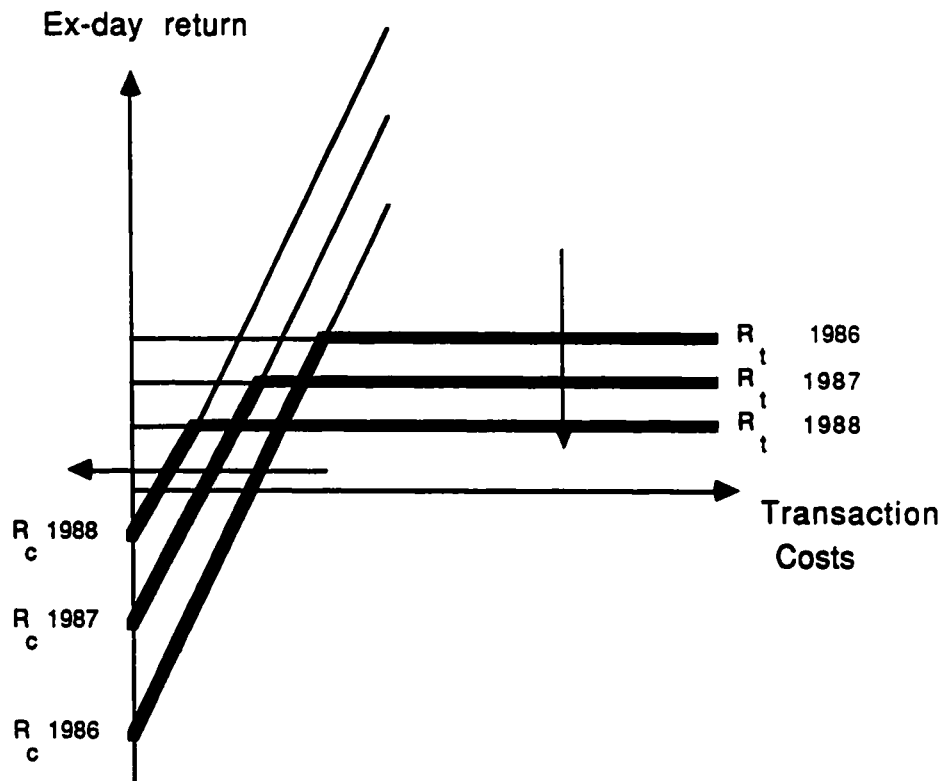


Figure 3.1: Shifts in Ex-Day Returns Caused By The Tax Reform Act When Individuals Are Long Term Investors

Ex-day return

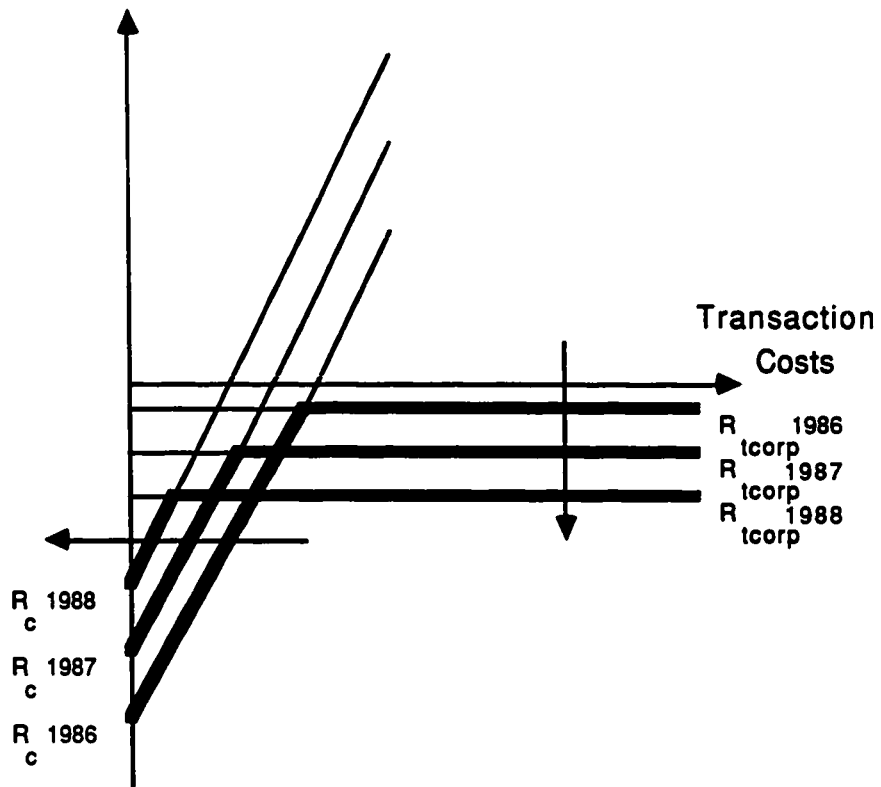
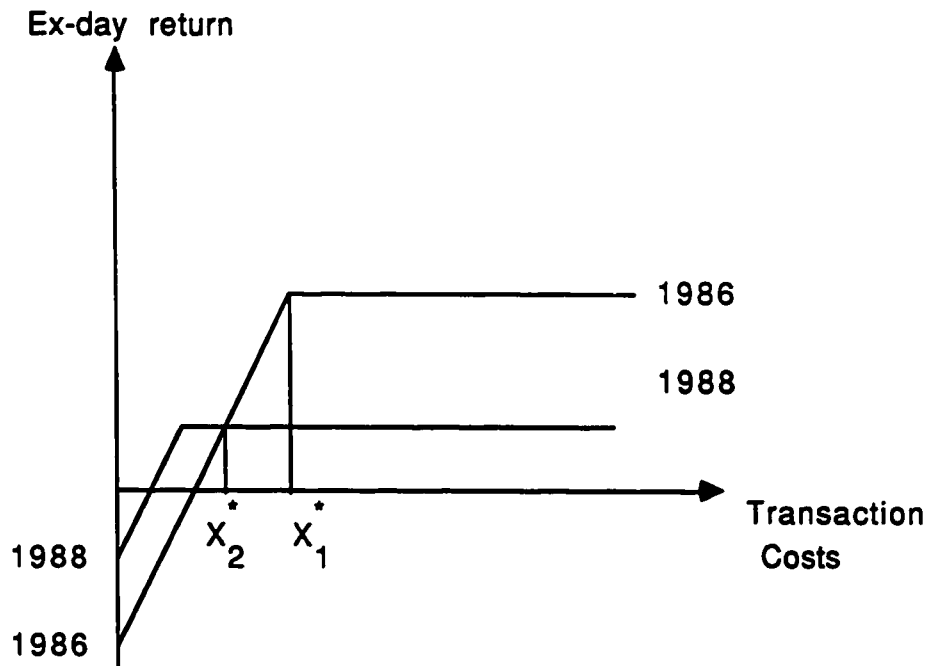


Figure 3.2: Shifts in Ex-Day Returns Caused By The Tax Reform Act When Corporations Are Long Term Investors



$$H_0 : X_1^* < X_2^*$$

$$H_a : X_1^* > X_2^*$$

Figure 3.3: Using The Tax Reform Act To Test For Dividend Capture

Table 3.1: Individual Tax Changes Under The Tax Reform Act

1986	1987	1988
15 income tax brackets 11% to 50 %	5 income tax brackets 11 %, 15%, 28% 35% and 38.5%	3 income tax brackets 15%, 28% and 33%
up to 60% capital gains deduction, i.e. 20% effective maximum capital gains rate	Capital gains rate same as income, except maximum rate is 28%	Capital gains rate same as income.
passive losses deductible against other activity	35% of passive losses disallowed against other activity	By 1991, 100% of passive losses disallowed against other activity; by 1990, 90% disallowed by 1989, 80% disallowed by 1988, 60% disallowed

Table 3.2: Corporate Tax Changes Under The Tax Reform

1986	1987	1988
income tax rates 15% to 46%	income tax rates 15% to 40% (due to pro rata adjustment)	income tax rates 15% to 34%
Capital gains rate equals income tax rate, but never greater than 28%	Capital gains rate equals income tax rate, i.e. maximum capital gains rate is 34%	
dividend income is 85% deductible	dividend income deduction depends on equity in issuer: if equity < 20%, deduction allowed is 80%	if equity < 20%, deduction allowed is 70%
	if 20% < equity < 80%, deduction allowed is 80%	
	if equity > 80%, deduction allowed is 100% (also applies to 1986)	

**CHAPTER 4. INVESTIGATION OF DIVIDEND YIELD AND
VOLUME CONSIDERATIONS**

4.1 The Effect of Dividend Yield On R_t

The effect of dividend yield is investigated by holding transaction costs constant. Equations (2), (4) and (10) are used to plot the relationship between ex-day returns and dividend yield for a fixed level of transaction costs.

From equation (2),

$$R_t = [1 - (1-t_p)/(1-t_g)] d/P_b$$

Differentiating with respect to dividend yield,

$$\frac{\delta R_t}{\delta d/p} = \frac{t_p - t_g + \frac{d}{P} \cdot \frac{\delta t_p}{\delta d/p}}{1 - t_g}$$

The empirical evidence indicates a tax based clientele effect, ie

$$\frac{\delta R_t}{\delta d/p} < 0$$

For low dividend yields, a plot of R_t against dividend yield will have a positive slope, at higher levels of dividend yield, the negative effect gets progressively stronger, reducing the slope and possibly making it negative.

In addition to affecting the slope of the line the clientele effect can change the position of the line itself. This follows from the fact that at higher dividend yields the marginal investors may have lower income tax rates.

The above considerations lead to a relationship as shown in figure 4.1. A single stock will be a point somewhere on these lines. The exact position of the breaks and the extent of the dip caused by the clientele effect is not predictable. In other words it is impossible to predict the exact theoretical relationship between ex-day returns and dividend yield along R_t

For aggregate data however, there should be a smoothing effect on the discontinuities, and means should lie closer together. Aggregate data may be represented better with a smooth, narrow band around the line shown in figure 4.2. Again it must be mentioned, the position and shape of this curve is theoretically unpredictable, but it may be investigated empirically. I will continue to develop the

theory and implications of dividend yield on the other lines R_{tcorp} , R_c and R_d . However due to the unpredictability of the shape of R_t , few refutable implications are forthcoming.

It is possible however to separate the stocks that do not have short term trading from those that do, on the basis of figure 2.1. The shape of R_t in the dividend yield graph can then be examined empirically by plotting the ex-day returns against dividend yield only for those stocks assumed not to have short term trading.

4.2 The Effect of Dividend Yield on R_c

From equation (10),

$$R_c = 2x + \frac{k}{(1 - t_c)} - \frac{(.7t_c)}{(1 - t_c)} \cdot \frac{d}{P} \quad (10)$$

differentiating with respect to dividend yield,

$$\frac{\delta R_c}{\delta d/p} = - \frac{.7dt_c}{1 - t_c}$$

The relationship is plotted in figure 4.3.

4.3 The Effect of Dividend Yield on R_{tcorp}

From equation (4):

$$R_{tcorp} = \frac{(.3t_c - t_{gc})}{(1 - t_{gc})} \cdot \frac{d}{P_b}$$

differentiating with respect to dividend yield,

$$\frac{\delta R_{tcorp}}{\delta d/p} = \frac{.3t_c - t_{gc}}{1 - t_{gc}}$$

The relationship is plotted in figure 4.4.

4.4 Effect Of The Tax Reform Act Of 1986

The Tax Reform Act shifted the lines in figures 4.2, 4.3 and 4.4. Using numbers from the tax rate changes in tables 3.1 and 3.2, these shifts can be drawn.

For R_t , for any tax bracket, as the rate on income tax becomes closer to the rate on capital gains, the slope of R_t becomes flatter. The effect of the Tax Reform Act on R_t is then as shown in figure 4.5.

For R_c , substituting actual rates, the negative slope becomes flatter as the marginal tax rate is reduced, but the same reduction in tax rate causes an increase in the positive intercept. The effects are shown in figure 4.6.

For R_{tcorp} , substituting actual numbers results in a more pronounced negative slope for 1988. The relation is shown in figure 4.7.

The relation between Ex-day returns and dividend yield, assuming individual long term investors is determined by the interaction between R_t and R_c and is shown in figure 4.8. The relation, assuming corporate long term investors is shown in figure 4.9. The effects of the Tax Reform Act are obtained by imposing the shifts of figures 4.5, 4.6 and 4.7 on figures 4.8 and 4.9; the results are shown in figures 4.10 and 4.11.

From figures 4.10 and 4.11, if individuals are the marginal long term investors, ex-day returns for 1988 follow a two phase regression. But if corporations are the long term investors then ex-day returns for 1988 follow a single regression line. This results from the fact that the slopes of R_c and R_{tcorp} are equal, given the tax rates of 1988, and the intercept of R_c is positive while R_{tcorp} passes through the origin.

4.5 Test For The Marginal Long Term Investor

A test for whether individuals or corporations are the marginal long term investors is simply a test for whether the data for 1988 follow a two phase regression or a single phase regression.

The test is similar to the test for a two phase regression used earlier. Here only 1988 data is used and dividend yield is the independent variable, while transaction costs are held constant. As before Quandt's test and Chow's test are used for significance levels. Formally, using y for dividend yield,

$$r_i = \alpha_1 + \beta_1 y_i + u_{1i} \quad \text{for } Y < Y^*$$

$$r_i = \alpha_2 + \beta_2 y_i + u_{2i} \quad \text{for } Y > Y^*$$

From the discussion in the previous paragraphs (figures 4.10 and 4.11), the test hypotheses are:

H_0 : Corporate long term investors

H_a : Individual long term investors

Or,

$$H_0: (\beta_1, \sigma_1^2) = (\beta_2, \sigma_2^2) = (\beta, \sigma^2)$$

$$H_a: (\beta_1, \sigma_1^2) \neq (\beta_2, \sigma_2^2)$$

Where β_1 and σ_1 are the slope coefficient and standard deviation of the first segment of the two-phased regression, while β_2 and σ_2 are the slope coefficient and standard deviation of the second segment. And β and σ are the slope coefficient and standard deviation of the single regression line fitted to the full data set.

4.6 Tests For Dealers As Short Term Traders

The effect of R_d on the 'ex-day returns versus Dividend Yield' graph is more complex. This is because as dividend yield changes from the lowest to the highest, it is possible that the identity of the dividend capture trader changes; dealers may be setting ex-day returns for low dividend yield stocks while corporations may be setting ex-day returns for high dividend yield stocks.

For a given level of transaction costs, figure 4.12 shows the relation between ex-day returns and dividend yield, when dealers are short term traders. From equation (8) the intercept of R_d is approximately $2x$, while the slope is zero. Ex-day returns over the entire range of transaction costs are determined by the interaction of R_c , R_d and R_t .

For relatively low holding costs, h , it is possible R_d remains irrelevant over the entire range of dividend yield. This situation is shown in figure 4.13. Here, for dividend yields below y' , dividend capture is too expensive for anyone, and ex-day returns are determined by individual long term investors (along R_t). For dividend yields greater than y' , corporations are the short term traders and ex-day returns are determined along R_c . The holding costs, h , are low enough over the entire range of dividend yield for R_c and not R_d to be the relevant line.

When holding costs, h , are relatively high, then for at least some range of low dividend yield, R_d and not R_c is relevant. This is depicted in figure 4.14. Here if dividend yield is lower than y' , dividend capture is still too expensive for either dealers or corporations. For dividend yields between y' and y'' , dividend capture is profitable only for dealers and ex-day returns lie along R_d . For dividend yields greater than y'' , the dividend deduction allowed to corporation starts to dominate holding costs, and short term corporate traders enter the market and ex-day returns are determined along R_c .

Figures 4.13 and 4.14 provide a test for the identity of the short term trader. To test for corporate dividend capture traders, fit a two phase regression to data sorted by

dividend yield and controlled for transaction costs. Then test:

$$H_0: \beta_2 = 0$$

$$H_a: \beta_2 < 0$$

If the test supports the presence of corporate dividend capture traders, i.e. if $\beta_2 < 0$, it is still possible that there actually exist three phases, including a middle flat phase as between y' and y'' , in figure 4.14, due to dividend capture by dealers.

To fit a three phase regression, when the switch points are previously unknown, is practically intractable. Some other test for the presence of a flat middle phase can still be conducted. If the data does follow three distinct phases, and I fit only a two phase regression, I will obtain an imaginary switch point which lies between the two real switch points. If I then use this imaginary switch point to divide the data into two groups on either side, I should be able to fit a two phase regression to each of these two groups. This condition is shown in figure 4.15. This forms the basis of a test for the presence of dealer short term dividend capture in some range of dividend yield. Detailed steps of the test are given below.

1. Fit a two phase regression to the whole sub-period to obtain the artificial switch point, Y^* , and biased estimates of the regression parameters.
2. If $\beta_2 = 0$, then dealers are setting ex-day returns for dividend yields above the switch point estimated in 1. In this case, the data does follow only two phases, and the switch point estimated is the real switch point.
3. If $\beta_2 < 0$, then either corporations are setting ex-day returns above the estimated switch point, or there are three distinct phases as in figure 4.15.
 - a. Divide the data into two groups around the switch point estimated in 1.
 - b. Fit a two phase regression to each group, and obtain estimates of the two real switch points y' and y'' .
 - c. Test the hypothesis for the presence of a flat phase, using $k = y'' - y'$,
 $H_0: k = 0$
 $H_a: k > 0$
Significance levels can be obtained using

simulation. Randomize the data in each group around the switch point of 1, and repeat steps b. and c. It is important that the switch point of 1. not be recalculated, and randomizing should be applied only to the data groups separated by the estimated switch point of step 1. It is done in this way because the test is performed to distinguish between two phase data and three phase data. I would not proceed beyond step 1. if the possibility of only a single phase has not already been rejected using Quandt's and Chow's tests in step 1.

4.7 Spread and Volume Considerations

The quoted bid-ask spread is always greater than the realized or effective bid-ask spread. One reason is the market makers' need for maintaining inventory levels. The dealer lowers both bid and ask after a dealer purchase, and raises both the bid and ask after a dealer sale, to induce a transaction in the opposite direction to the previous one. See Stoll (1989).

The quoted bid-ask also contains an adverse selection component to cover the market makers' losses in dealing with traders with inside information. The other component of the

bid-ask spread relates to order initiation. For more information on the components of the bid-ask spread see Glosten and Harris (1988).

We do not observe the actual or realized spread. The quoted spread must be used as a proxy for the realized spread. As a cross-sectional proxy it should be satisfactory, since the purpose is only to stratify stocks by transaction costs. The only problem is the possibility of cross-sectional variation in the adverse selection component.

If there is a large variation in the adverse selection component, then it is possible a situation arises where one stock, say stock A has a higher quoted spread than another, say stock B, but in terms of realized spread stock A has a lower realized spread than stock B. This can happen if the adverse selection component of A's spread is much larger than the adverse selection component of B's spread.

Another problem is the relevance of the adverse selection component of the spread to dividend capture. When a corporate short term trader takes a position in a stock just before the ex-dividend day, the market-maker may not incur any adverse selection costs. In other words, the trade is recognizable for what it is, a dividend capture trade. So, the adverse selection component may not be relevant for the dividend

capture trader.

However, Stoll (1989) shows that for NASDAQ stocks at least, the proportion of the different components of the spread do not vary across stocks. So, in spite of the possible problem noted above, I expect the quoted spread to be a satisfactory proxy for the realized spread, for the purpose of stratifying stocks by transaction costs.

4.8 Testing For a Change in Spread

I suggest a method for investigating changes in spread for a wide period around the ex-dividend day. A wide period (all the days between adjacent ex-dividend days) will include the effects of dividend capture by corporations that are subject to a 46 day holding period. The suggested procedure is as follows.

Average spreads, over all stocks, are to be calculated for each of the days from ex-day -45 to ex-day +45. The value for any day may be compared to the average of all days (which is an average of all the daily averages). A plot of the average spread for each day against the average over the whole period will point out the days when significant changes took place.

Significance levels for deviations, or for cumulative

deviances will be obtained via simulation. The simulation procedure will involve randomizing the days for each stock before the above procedure is estimated.

4.9 Effect of Volume Changes on Spread

As I intend to obtain Bid-ask spreads around the actual ex-dividend days (except for 1986 data), volume differences should not be a complicating factor. The spread obtained at the time of dividend capture should be a suitable proxy for spreads incurred by dividend capture traders.

At this time I do not think including an investigation of volume and spread would be worth the cost of increased computational load. However, as the number of shares traded at each transaction are also available on the data being purchased by the business school, an investigation of volume and spread around the ex-dividend day could be performed if it is later thought worthwhile.

A major reason for not pursuing such an investigation is that no clear theoretical basis exists for expecting a volume effect on spread. The theoretical literature reflects this. A few papers are reviewed below.

Branch and Freed (1977) argue that due to inventory cost

effects, there is a negative relation between volume and spread. According to them, a larger volume implies that buy and sell orders are likely to line up closely, thus reducing inventory levels. However, it seems that order size would be a critical factor. If higher volume results from fewer but larger orders, the effect must be opposite to that stated by Branch and Freed. Although they do find a negative relation between spread and volume, it is done using daily volume and closing daily quoted spreads.

Glosten and Harris (1988) also find a negative relation between spread and average volume per trade. Holthausen, Leftwich and Mayers (1987) find a negative relation between block trade size and spread. However, their results differ somewhat for permanent spread component (which relates to adverse selection) and temporary spread component (which relates to inventory costs). Their results also differentiate between seller initiated and buyer initiated trades.

On the other hand, Stoll (1989) shows that spread may be positively related to volume due to the relation between volume and adverse selection. He argues that without informational trades, volume should be in proportion to shares outstanding, and any higher volume reflects a greater proportion of informational trades, and hence a higher spread due to adverse selection. Stoll finds no relation between

volume and spreads. However, he uses Roll's method on closing quotes for calculating spreads.

One promising possibility for future work lies in relating abnormal ex-day volume around the ex-dividend day to measures of transaction costs, as suggested, but not performed, by Lakonishok and Vermaelen (1986). The relation can be examined separately for stocks that have dividend capture and stocks that are not targets of dividend capture trading. Again the separation is on the basis of the two phase relationship in figure 2.1. Separating the data in this manner would overcome the problem of clustering around the ex-dividend day by long term investors from interfering with volume changes due to short term trading.

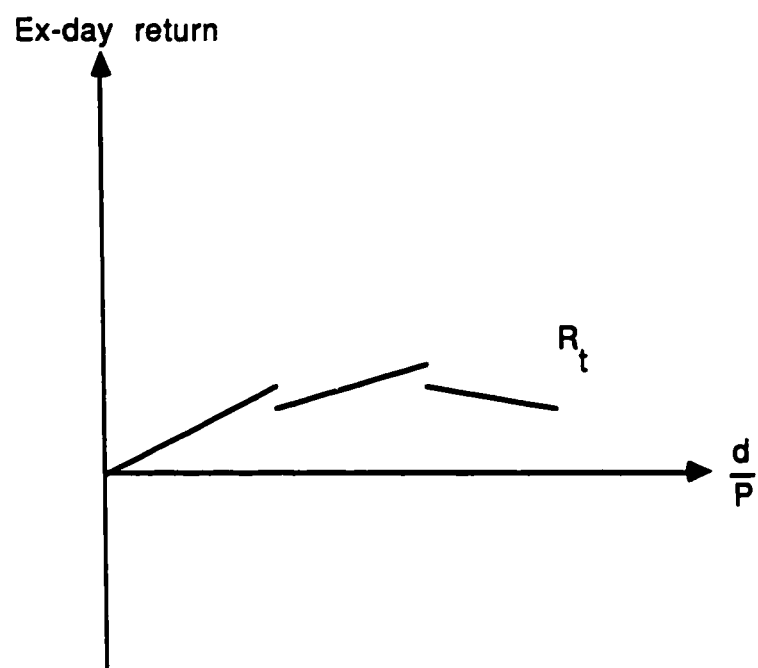


Figure 4.1: Effects of Dividend Yield and Clientelle Shifts
On R_t , Possible Positions for a Single Stock

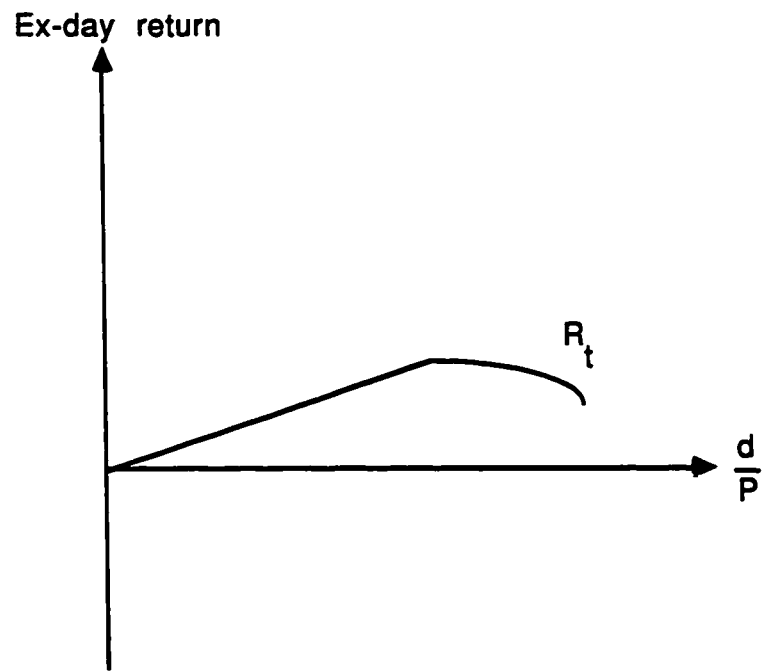


Figure 4.2: Effect of Dividend Yield and Clientell Effects
On R_t , For Aggregate Data

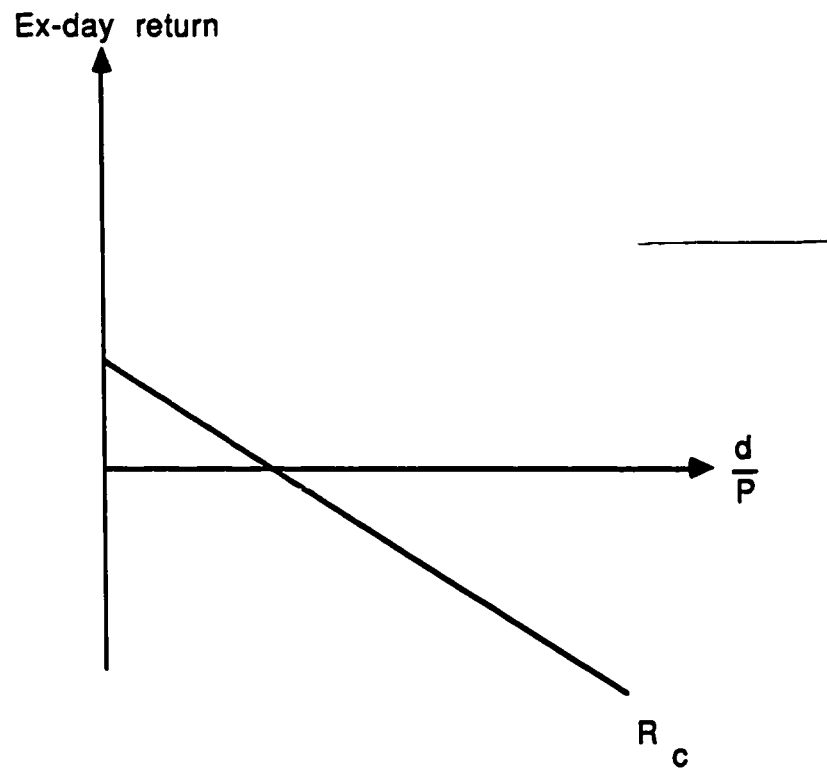


Figure 4.3: Effect of Dividend Yield on Ex-Day Returns
Assuming Individuals As Long Term Investors

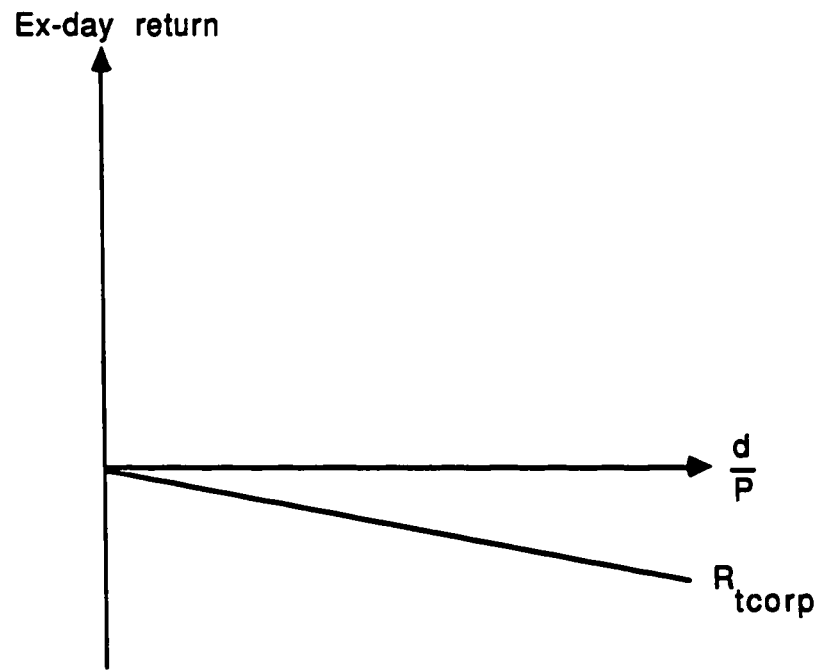


Figure 4.4: Effects of Dividend Yield on Ex-Day Returns, Assuming Corporations As Long Term Investors

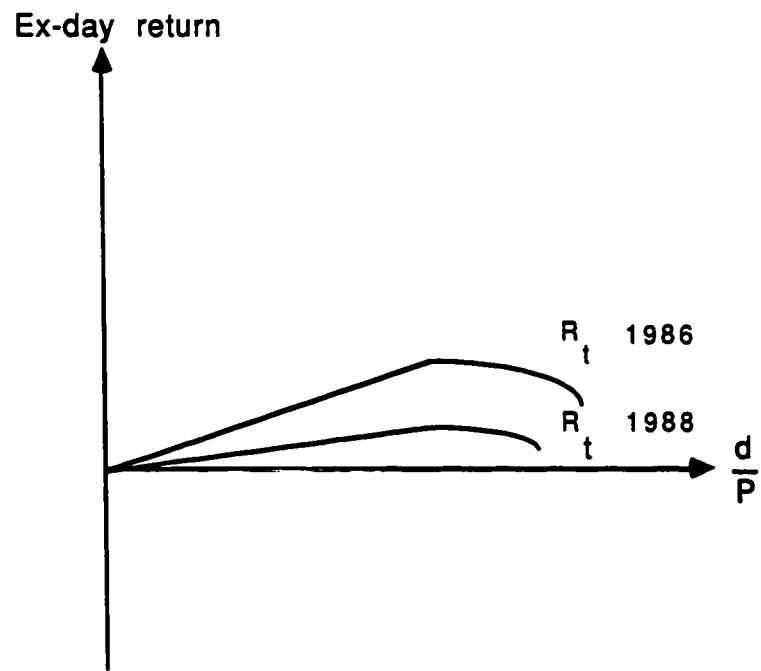


Figure 4.5: Effect of The Tax Reform Act on R_t

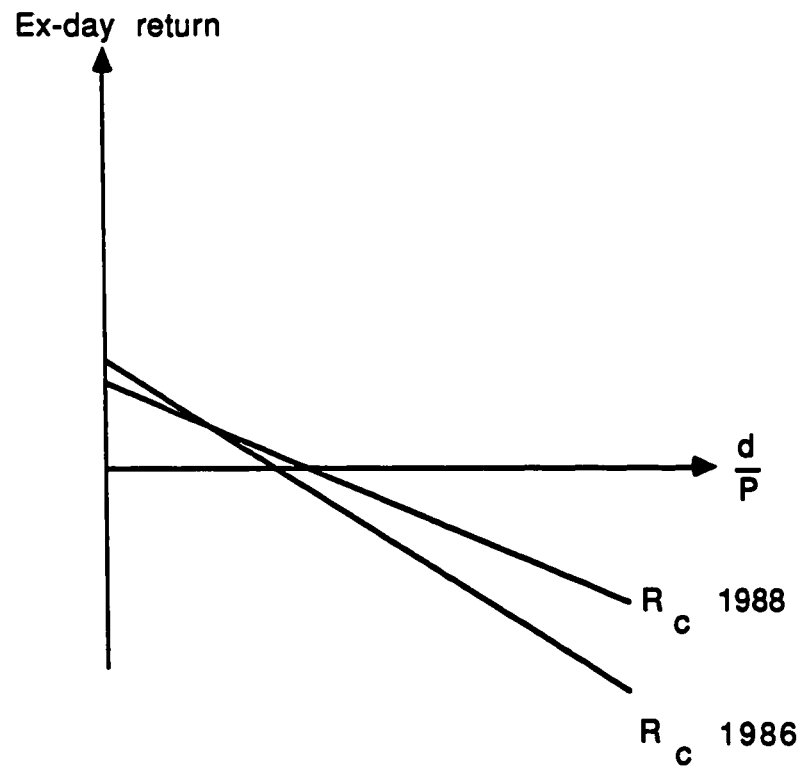


Figure 4.6: Effect of The Tax Reform Act On R_c

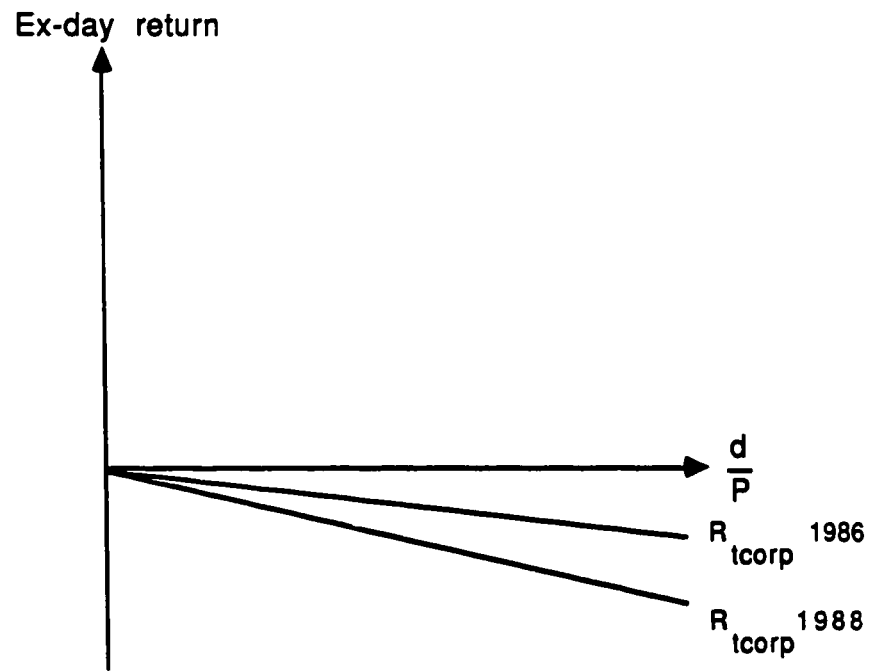


Figure 4.7: Effect of The Tax Reform Act On R_{tcorp}

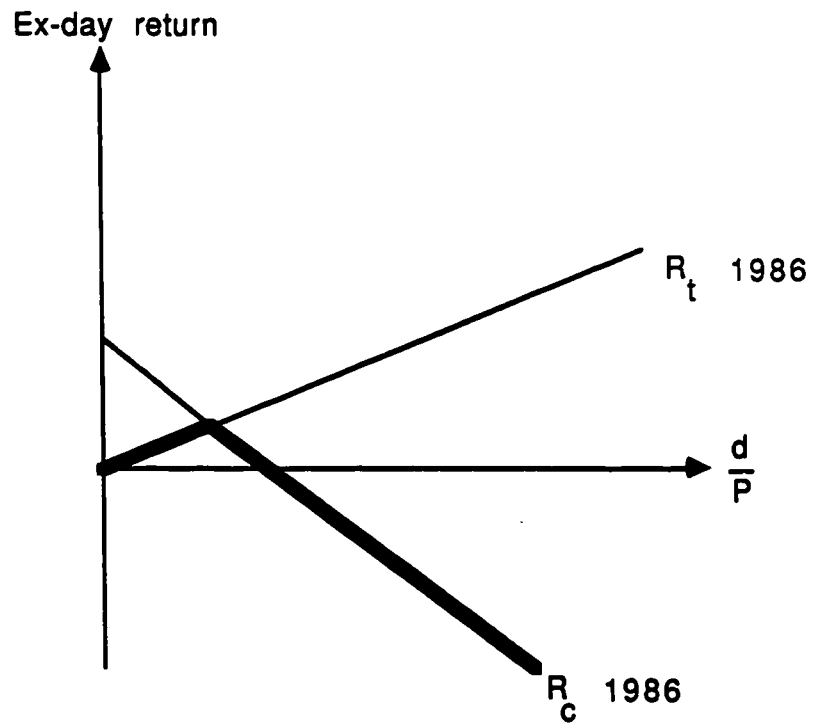


Figure 4.8: The Relation Between Ex-Day Returns and Dividend Yield Assuming Individuals As Long Term Investors

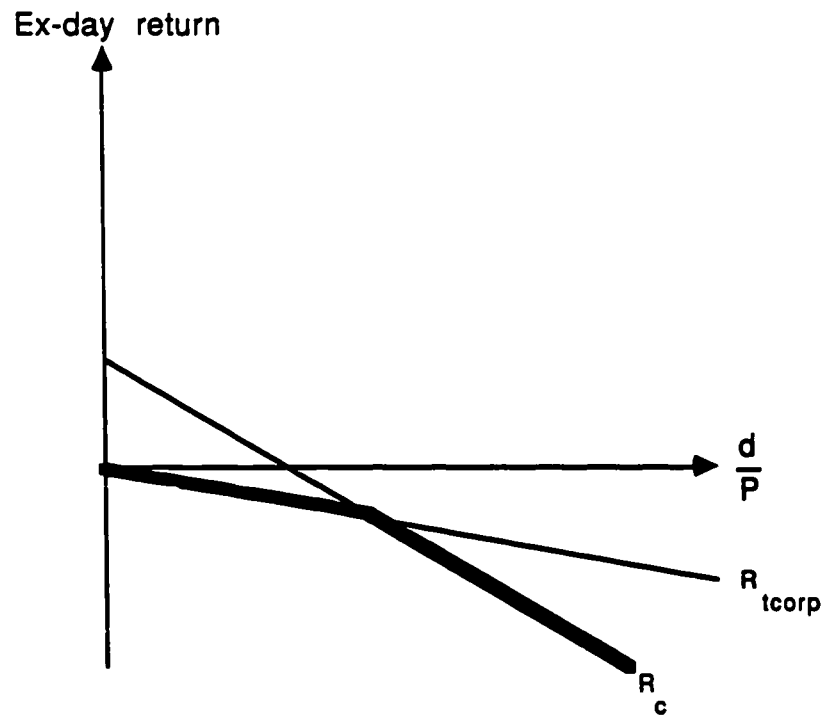


Figure 4.9: The Relation Between Ex-Day Returns and Dividend Yield Assuming Corporations As Long Term Investors

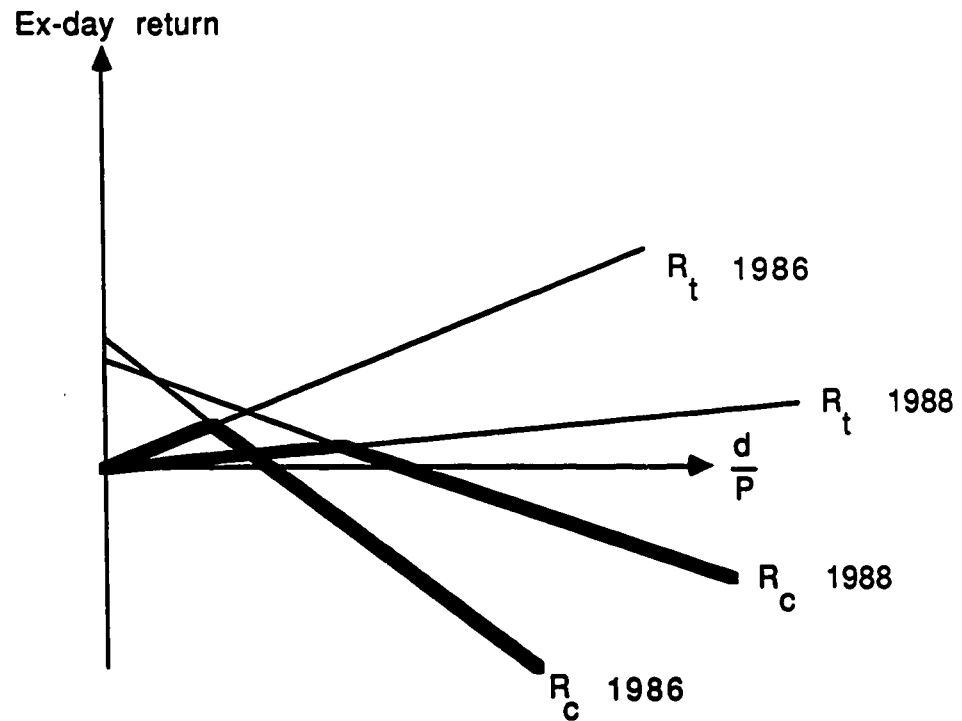


Figure 4.10: Shifts In The Relation Between Ex-Day Returns and Dividend Yield Caused By The Tax Reform Act Assuming Individuals As Long Term Investors

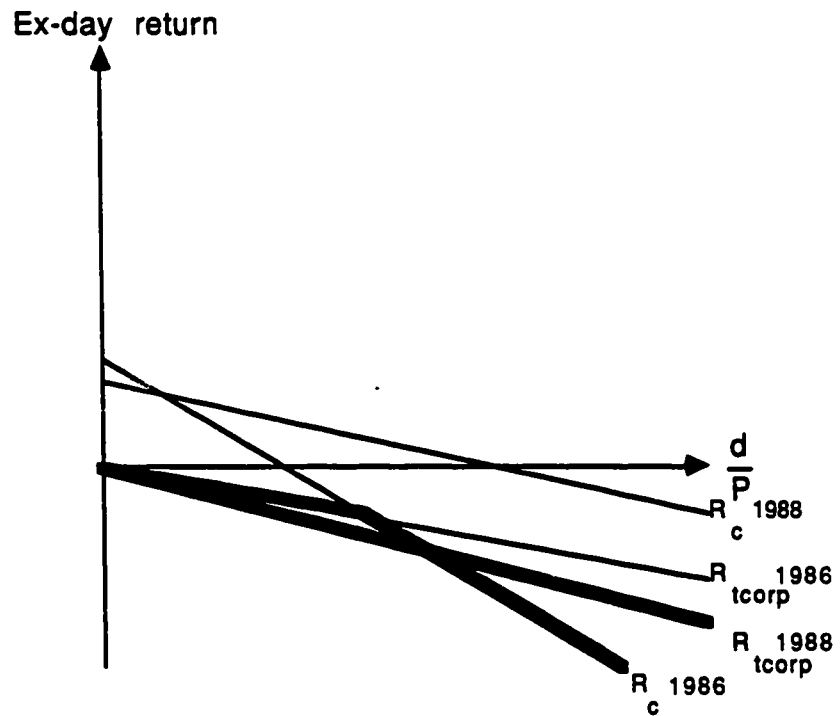


Figure 4.11: Shifts In The Relation Between Ex-Day Returns and Dividend Yield Caused By The Tax Reform Act Assuming Corporate Long Term Investors

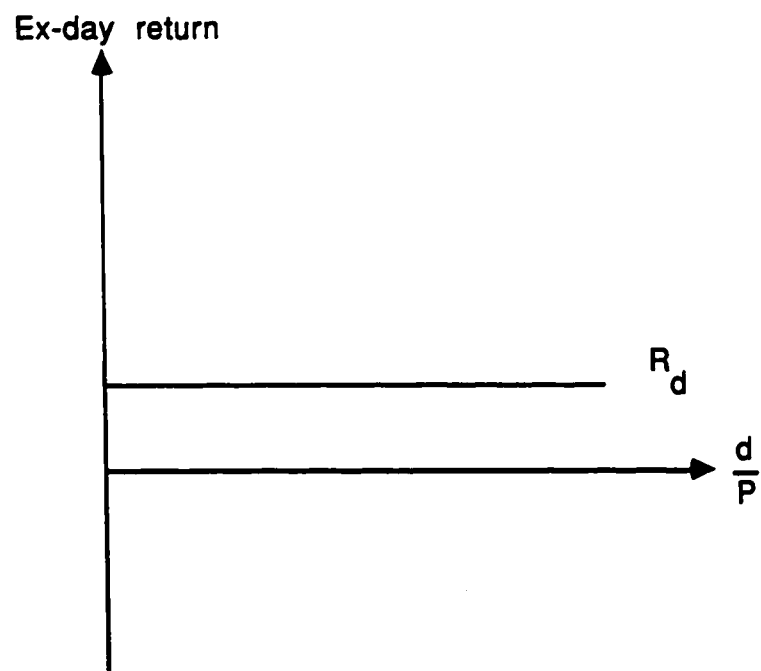


Figure 4.12: The Relation Between Ex-Day Returns And Dividend Yield Assuming Dealers As Short Term Traders

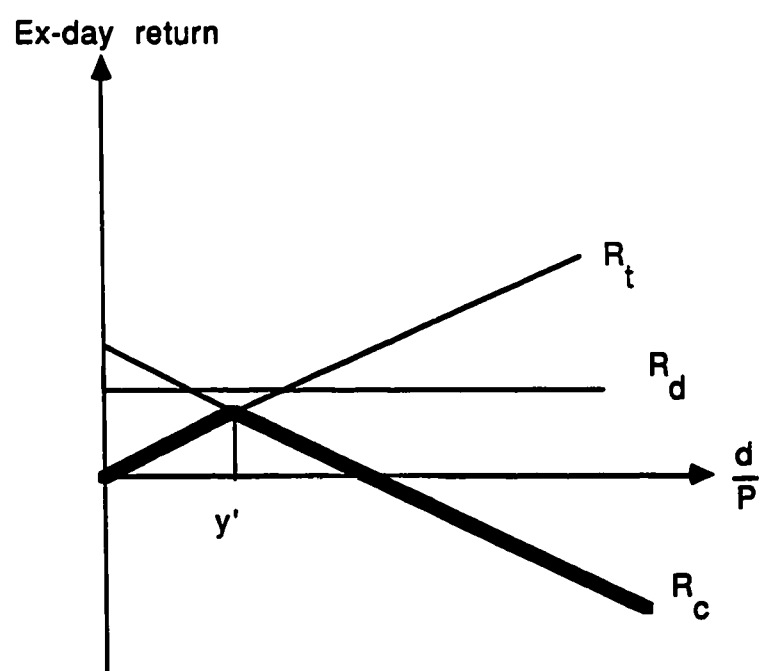


Figure 4.13: Possible Relation Between Ex-Day Returns And Dividend Yield Assuming Dealers Are Not Active

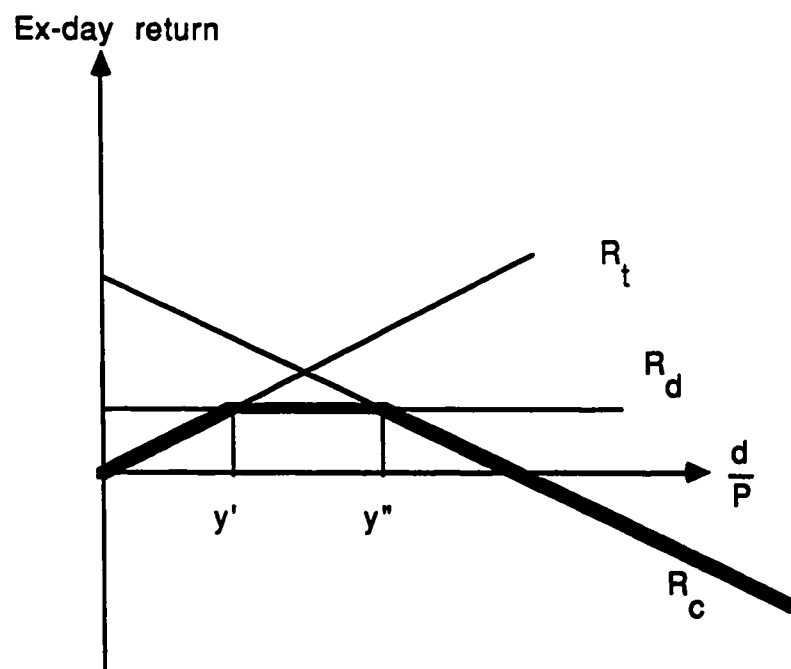


Figure 4.14: Possible Relation Between Ex-Day Returns And Dividend Yield Assuming Dealers Are Active In Some Range of Dividend Yield

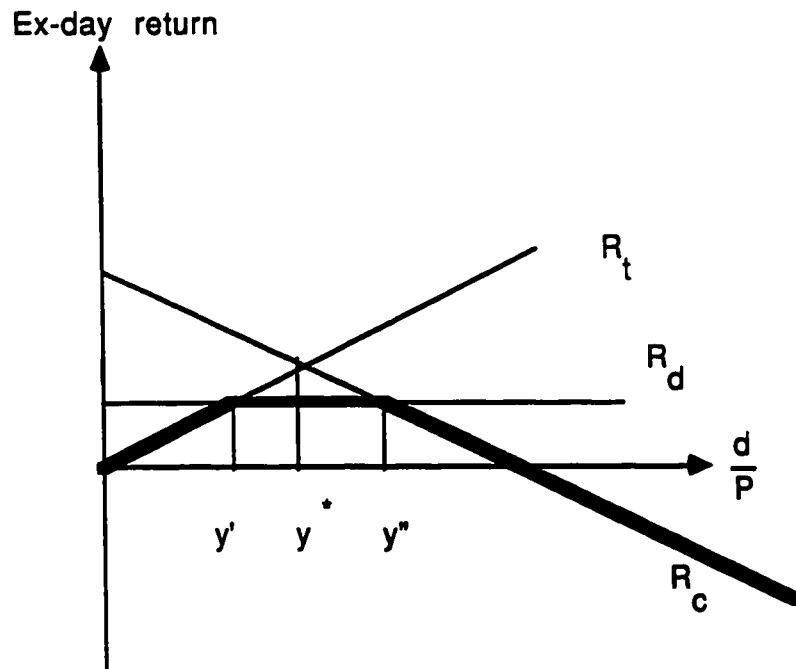


Figure 4.15: Basis Of Test For Presence Of Flat Phase (Dealer Activity)

CHAPTER 5. COMPLICATING FACTORS

5.1 The Effect of Dividend Yield

The data must be controlled for dividend yield because changes in dividend yield cause shifts in R_c , R_t and R_{tcorp} . From equation (2), R_t is seen to shift up with an increase in dividend yield. From equation (4), R_{tcorp} is seen to shift down with an increase in dividend yield.

The effect on R_c is a little more complicated. From equation (6), R_c can be written as:

$$R_c = 2x + \frac{(h/d - .7t_c)}{(1 - t_c)} \cdot \frac{d}{P}$$

i.e. the position of the curve appears to depend not only on the dividend yield but also on the level of dividends.

However, assuming holding costs vary directly with the price of the stock, h can be written as kP , where P is the price of the stock and k is a constant of proportionality, assumed constant across stocks. Under these assumptions:

$$R_c = 2x + \frac{k}{(1 - t_c)} - \frac{(.7t_c)}{(1 - t_c)} \cdot \frac{d}{P} \quad (10)$$

i.e. controlling for dividend yield alone is enough to fix the position of R_c .

Even if k is not strictly constant across stocks, and even if holding costs are not strictly directly proportional to stock price, the effect of variations in d on the position of R_c will be small as long as dividend yield does not change.

I will control the effect of dividend yield by dividing the sample into dividend yield deciles, and conducting the tests outlined in the theory and empirical sections on each dividend yield decile.

5.2 Tax Clientele Effects

As discussed earlier, figure 2.1 is representative for a single stock. In some ways the lines are misleading, as the data for the stock consists of a single point. It is that point which must lie somewhere along the lines in figure 2.1. Exactly where it lies depends on the tax brackets of the marginal investors and the level of transaction costs for that stock.

It is individual tax rates that vary the most. Corporate tax rates have fewer brackets, and most large corporations are in the top bracket. When considering a group of stocks, then the line for R_t in figure 2.1 may exhibit wide variation, while the line for R_c will show little variation. In fact if a large number of corporations are in the top marginal tax bracket, R_c will not vary. This means that for a group of several stocks, the data points for each stock may be distributed as in figure 5.1. Here R_u and R_l are the upper and lower bounds for possible values for R_t for different marginal long term investors.

The actual variation in ex-day returns will be less than the possible variation in individual tax rates. There are two reasons for this.

First, the variation in ex-day returns is caused if the marginal investors in different stocks are also in different tax brackets. For example, there would be no variation in the position of R_t if the marginal investors in every stock were in the same tax bracket.

Second, as mentioned before, the data will be controlled by dividend yield. Due to tax clientele effects, controlling by dividend yield reduces the possible number of tax brackets

that the marginal investor may inhabit. It is of course an empirical issue as to how broad the band in figure 5.1 is. The empirical method in chapter 6 is best suited to a narrow band. The effect of fitting two regression lines to data that consists of one line and one band, is to bias against finding a kink. The broader the band the greater the bias.

This is because, in figure 5.1., points on R_u to the left of X_u are pushed down onto R_c , while those on R_l continue to lie on R_l to the left of X_u , in fact up till X_l . Fitting a single line to data in the band will result in an estimated line with a positive slope, i.e. a bias against finding a kink.

The above discussion for figure 2.1 applies also to figure 2.2. But in figure 2.2 the long term investors are corporations and R_{tcorp} is expected to remain fixed if a large number of corporations are in the top tax bracket. figure 2.2 therefore will be as drawn.

5.3 Portfolio Rebalancing Could Cloud The Refutable Implications

Investors shift clienteles in response to changes in the tax rates for dividends and capital gains. Modigliani (1982) and Long (1977) argue that these changes are not significant.

Richardson, et al, (1986), look at volume effects of dividend policy changes. They find most of the volume effect is around the announcement date and not around the ex-dividend date. They also find the effect is mostly due to information contained in the dividend announcement; the clientele effect is small.

5.4 Dividend Capture By Japanese Life Insurance Companies

Regulations governing Japanese Life Insurance Companies require that policy holders be paid out of the company's dividend income. Japanese Life Insurance Companies therefore have a requirement for dividends that may force them into dividend capture even beyond a zero-profit bound. They may be willing to obtain dividends at some cost.

In this case the zero profit bound on ex-day returns due to dealers or domestic corporations may not be setting ex-day returns. Returns would fall further as Japanese Life Insurance Companies may be willing to incur a cost in dividend capture, this cost can be looked at as a loss on the dividend capture position. I assume here that trading by Japanese Life Insurance Companies is only a fraction of total dividend capture in NYSE stocks. If it appears to be an invalid assumption then it may be necessary to find the

stocks in which Japanese Life Insurance Companies are active and eliminate them from the sample.

In my empirical tests, I do in fact separate stocks which appear to be targets of Japanese life insurance companies. The effect on my results of removing them, however, is insignificant.

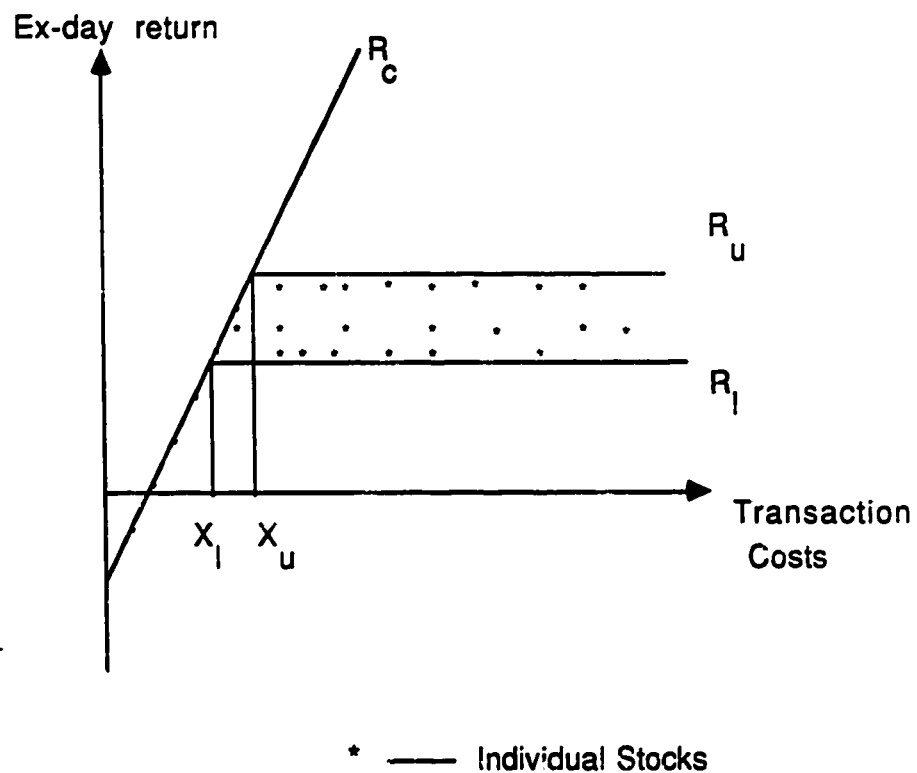


Figure 5.1: Ex-Day Returns For Aggregate Data
When Tax Rates Vary Between Long
Term Investors In Various Stocks

CHAPTER 6: EMPIRICAL METHOD

6.1 Sample Selection

There are three reasons why 1987 data is expected to be noisier than the data for 1988. First, as explained in chapter 2.2, for all corporations on a fiscal year basis, the effective dates for the corporate tax changes listed in table 3.2 vary with the closing date of the corporations' tax period. For these corporations, tests for changes due to the Tax Reform Act can be based on the same two subperiods only if the two subperiods straddle 1987.

Second, the portfolio re-balancing effects discussed in section 5.3, cause tax clientele changes and hence shifts in R_t . Although it is not possible to predict the length of the portfolio adjustment period, all of 1987 could arbitrarily be taken as an adjustment period.

Third, the stock market Crash of October 19, 1987, is likely to have had an abnormal effect on bid ask spreads. This would interfere with the transaction cost estimation around those dates.

Most of the Tax Reform Act changes took place in two phases; around January 1987 and January 1988. Any period prior to

January 1, 1987 represents the situation before the enactment of the 1986 Tax Reform Act. Any period later than January 1, 1988, represents the situation when most of the provisions of the Tax Reform Act were in effect. Choosing the lengths of the pre Tax Reform Act and post Tax Reform Act subperiods requires balancing the tradeoff between obtaining multiple ex-day returns for each stock and computational load. Also the new transaction cost data purchased by the school comprises only 1987 and 1988.

For all the above reasons, the sample of NYSE stocks is divided into the following three sub-periods:

1. July 1, 1986 to December 31, 1986
2. January 1, 1987 to December 31, 1987
3. January 1, 1988 to December 31, 1988

6.2 Estimating Abnormal Ex-Day Returns

For each stock, average abnormal ex-day returns are obtained for each sub-period as follows. The subperiod is divided into quarters, so that each stock appears only once a quarter. Each ex-dividend day is treated as an independent event. First each stock's market risk is calculated using daily

returns from ex-day -150 to ex-day -10. A one-factor market model is used.

$$r_{jt} = \gamma_{0jq} + \gamma_{1jq}r_{mt} + v_{jt}, \quad t = -210, \dots, -14$$

The error terms are assumed to be independently and jointly distributed as multivariate normal.

Next, the abnormal return on the ex-day is calculated using the parameters estimated in the above step.

$$\epsilon_{jq} = r_{j0} - \hat{\gamma}_{0jq} - \hat{\gamma}_{1jq}r_{m0}$$

where r_{j0} is stock j 's rate of return on its ex-dividend day, and r_{m0} is the market return on the same day. An average abnormal ex-day return for each stock is obtained by aggregating all the returns for a particular stock.

Such a procedure runs the risk of violating the independence requirements. Pooling time series and cross-sectional data means the abnormal ex-day returns calculated are not independent of each other. Serial correlation exists between time series data corresponding to the same stock.

An alternative would be to run the procedure as well as subsequent tests of hypotheses on quarterly data (i.e. one quarter pre Tax Reform Act and one quarter post Tax Reform Act). I actually use both the above approaches.

The data is on the CRSP tapes. Returns are taken off the daily returns file. The returns on this file are calculated using dividends, whenever paid. The ex-dividend date itself will be picked off the monthly master file.

6.3 Estimating Bid-Ask Spreads

The Bid-Ask spread is used to represent transaction costs for each stock. I use the tapes purchased from the Institute for the Study of Security Markets. Data for 1987 and 1988 are available. These tapes contain each transaction and each quote for all NYSE and AMEX stocks. The database is immense. I, therefore sample every twentieth quote, and calculate an average bid-ask spread from ex-day - 45 to ex-day -14, for each stock.

Estimates of transaction costs for 1988 can be obtained from this data. However for the 1986 subperiod, each stock's transaction cost will be calculated using data from early 1987. The assumption is cross-sectional transaction costs have not changed much from 1986 to early 1987.

Also since 1987 spreads are being used to proxy for transaction costs in 1986, stocks which showed a very large price change over this period will be dropped from the sample. This seems the only way to handle the effect of large price changes on spread.

6.4 Testing The Two-Phase Regression In Each of The Sub-Periods

First of all, each sub-period is tested for the presence of the relationship shown in figure 2.1. The break point X^* is also found. The Maximum Likelihood technique as applied by Quandt (1958) is used. This Technique is explained next. The data is sorted by transaction costs, X . For each assumed X^* , two regression lines are fitted.

$$r_i = \alpha_1 + \beta_1 x_i + u_{1i} \quad \text{for } X < X^*$$

$$r_i = \alpha_2 + \beta_2 x_i + u_{2i} \quad \text{for } X > X^*$$

The Log Likelihood function is calculated, assuming most generally, the variance of the error terms given by the two equations are not the same.

$$\ln L = - \frac{n}{2} \ln 2\pi - \frac{n}{2} - \frac{X^*}{2} \ln \hat{\sigma}_1^2 - \frac{n - X^*}{2} \ln \hat{\sigma}_2^2$$

Where:

σ_1^2 is the estimated variance of the error terms in
segment 1

σ_2^2 is the estimated variance of the error terms in
segment 2

I then choose the pair of regression lines that maximizes the above Log likelihood function. This provides the point X^* , as well as the estimates of the regression parameters.

I then test the hypothesis that a change occurred at X^* :

$$H_0: (\beta_1, \sigma_1^2) = (\beta_2, \sigma_2^2) = (\beta, \sigma^2)$$

$$H_a: (\beta_1, \sigma_1^2) \neq (\beta_2, \sigma_2^2)$$

Where β_1 and σ_1 are the slope coefficient and standard deviation (of error terms) of the first segment of the two-phase regression, while β_2 and σ_2 are the slope coefficient and standard deviation (of error terms) of the second segment. And β and σ are the slope coefficient and standard deviation (of the error terms) of the single regression line

forced onto the full subperiod. Two tests are available for the hypothesis that a kink exists in the data.

- a. Quandt's test (1960) for the likelihood ratio statistic:

$$\lambda = \frac{L(H_a)}{L(H_0)} = \frac{\frac{(\hat{\sigma}_1^2)^{\frac{X^*}{2}} (\hat{\sigma}_2^2)^{\frac{n-X^*}{2}}}{n}}{(\hat{\sigma}^2)^{\frac{n}{2}}}$$

Here $\hat{\sigma}^2$ is estimated by fitting a single regression to the entire sub-period. The test statistic, $-2\ln\hat{\lambda}$, will only approximate a Chi square distribution. However, a plot of $-2\ln\hat{\lambda}$ can be useful in determining the switch point X^* , as in Brown, Durbin and Evans (1975).

- b. Chow's (1960) test for the equality of the sets of coefficients in two regressions obtains the sum of the squares of residuals under the null and the sum of the squares of residuals under the alternate hypothesis, and uses the following test statistic:

$$\frac{SSR(H_0) - SSR(H_a)}{SSR(H_a)} \cdot \frac{df(H_a)}{df(H_0) - df(H_a)} \sim F_{df(H_0) - df(H_a), df(H_0)}$$

i.e.

$$\left[\frac{(n - k) \hat{\sigma}^2}{(X^* - k) \hat{\sigma}_1^2 + (n - X^* - k) \hat{\sigma}_2^2} - 1 \right] \cdot \frac{n - 2k}{k} \sim F_{k, n-2k}$$

Where:

k is the number of right hand side explanatory variables

n is the sample size of the particular sub-period

$\hat{\sigma}^2$ is, again, estimated by fitting a single

regression To the entire sub-period.

6.5 Test For Refutable Implications of The Dividend Capture Hypothesis Arising Out of The Tax Reform Act of 1986

Figure 3.3 in section 2.7 forms the basis of this test. The first step consists of fitting a two-phase regression to 1987 data, obtaining X_1^* , then fitting a two-phase regression to 1988 data, and obtaining X_2^* . The regressions are fitted using the Maximum Likelihood method, as used by Quandt (1958). The second step tests the significance level of the shift $X_2^* - X_1^*$.

No standardized tests seem to suit the above problem. D. V. Hinckly (1969) does provide a test for the position of the break point being different from some arbitrary position. However that is not exactly the situation being tested here. Also Hinckly's tests suffer from small sample problems. Due to the absence of a standardized test, I intend to rely on a simulation experiment to obtain significance levels for the test of the hypothesis in figure 3.3.

I will simply use the difference between the two break-points as the test statistic.

Therefore:, using $d = X_1^* - X_2^*$

$$H_0 : d < 0$$

$$H_a : d > 0$$

The simulation procedure will involve randomizing the data into two arbitrary subperiods and fitting a separate two-phase regression to each of the subperiods, thereby obtaining X_1^* , X_2^* and, hence, d . Again, the regressions will be fitted using the Maximum Likelihood technique explained previously.

The randomizing followed by regression fitting will be repeated 1000 times to obtain a finite sample distribution of

the test statistic, d . The distribution thus obtained is used to test the hypothesis about the actual d obtained from the original subperiods that correspond to actual 1987 and 1988 data.

6.6 Test For Corporations As Short Term Traders

As discussed in section 2.7, dealers and not corporations may be the short term traders engaged in dividend capture of some low dividend yield stocks. In this case effects of the Tax Reform Act on the 'ex-dividend day returns versus transaction costs' graph are as shown in figure 6.1. R_d is unchanged as a result of the Tax Reform Act; see equation (8), section 1.2. From figure 6.1, it is clear I can still test for a leftward shift in the kink as a result of the Tax Reform Act of 1986.

Further, I can test for the identity of the short term trader. After fitting a two-phase regression to each subperiod, a test for a shift in the intercept α , of the first segment (corresponding to R_c or R_d) can be conducted. Specifically, to test for corporate dividend capture traders, a one-tailed test exists:

$$H_0: \alpha_{1988} = \alpha_{1986}$$

$$H_a: \alpha_{1988} > \alpha_{1986}$$

6.7 Test For Individuals As Long Term Investors

The identity of the long term marginal investor, corporate or individual, can be determined from the intercept of the second (horizontal) segment of the two phase regression fitted to each subperiod.

From figure 3.1, if individuals are the long term investors, then

$$\alpha_2 > 0$$

From figure 3.2, if corporations are the long term investors, then

$$\alpha_2 < 0$$

So, to test for individuals as long term marginal investors, the hypotheses are:

$$H_0 : \alpha_2 < 0$$

$$H_a : \alpha_2 > 0$$

Significance levels can be obtained by a simple t-test using the data to the right of the break point X^* .

6.8 Use of Recursive Residuals to Reduce Computational Load

The maximum likelihood technique for fitting a two-phase

regression to each subperiod involves running $n-2k$ separate pairs of regressions in each subperiod, where k equals the number of explanatory variables.

In addition, the simulation experiment will multiply this load 1000 times. Such a heavy computational load makes it worthwhile to program and use a Recursive Residuals approach to the problem of regression fitting.

Riddell (1980) shows how recursive residuals can be used to reduce the computational load in a switching regression model. All the information required to find X^* is obtained by only two runs of the Recursive Residuals program.

The theoretical treatment can be found in Riddell (1975), while its application to problems is given in Riddell (1980). The essentials, also outlined in Johnston (1984) are as follows:

1. Given the linear model,

$$Y = Xb + u$$

$$u \sim N(0, \sigma^2 I)$$

where X is a non-stochastic matrix of order $n \times k$ (k

explanatory variables)

2. Define the recursive residual w_{k+1} , as

$$w_{k+1} = \frac{y_{k+1} - \mathbf{x}'_{k+1}\mathbf{b}_k}{[1 + \mathbf{x}'_{k+1}(\mathbf{X}'_k\mathbf{X}_k)^{-1}\mathbf{x}_{k+1}]^{1/2}}$$

3. Obtain a vector of *forward* recursive residuals, \mathbf{w} , by following the procedure:

- a. Start with the first k observations, compute w_{k+1}
(after obtaining \mathbf{b}_k)
- b. Update with the next observation, compute \mathbf{b}_{k+1} and w_{k+1} , where $\mathbf{b}_{k+1} = (\mathbf{X}'_{k+1}\mathbf{X}_{k+1})^{-1}\mathbf{X}'_{k+1}\mathbf{Y}_{k+1}$
- c. Repeat step b., adding one observation at a time.

If the above procedure is run in reverse, i.e. starting with the last k observations first, it provides a vector of *backward* recursive residuals.

4. It can be shown, for any break-point, X^* ,

$$\sigma_1^2(X^*) = \sum_{x=k}^{X^*} w_x^2$$

$$\text{and } \sigma_2^2(X^*) = \sum_{x=n-k-1}^{X^*+1} w'_x{}^2$$

where w_x is an element of the vector of forward recursive residuals, and w' is an element from the vector of backward recursive residuals.

These two vectors of forward and backward recursive residuals, obtained from just two runs (in opposite directions) of the recursive residuals program, provide all the information needed to find the X^* that maximizes the log likelihood function:

$$\ln L = - \frac{n}{2} \ln 2\pi - \frac{n}{2} - \frac{X^*}{2} \ln \hat{\sigma}_1^2 - \frac{n - X^*}{2} \ln \hat{\sigma}_2^2$$

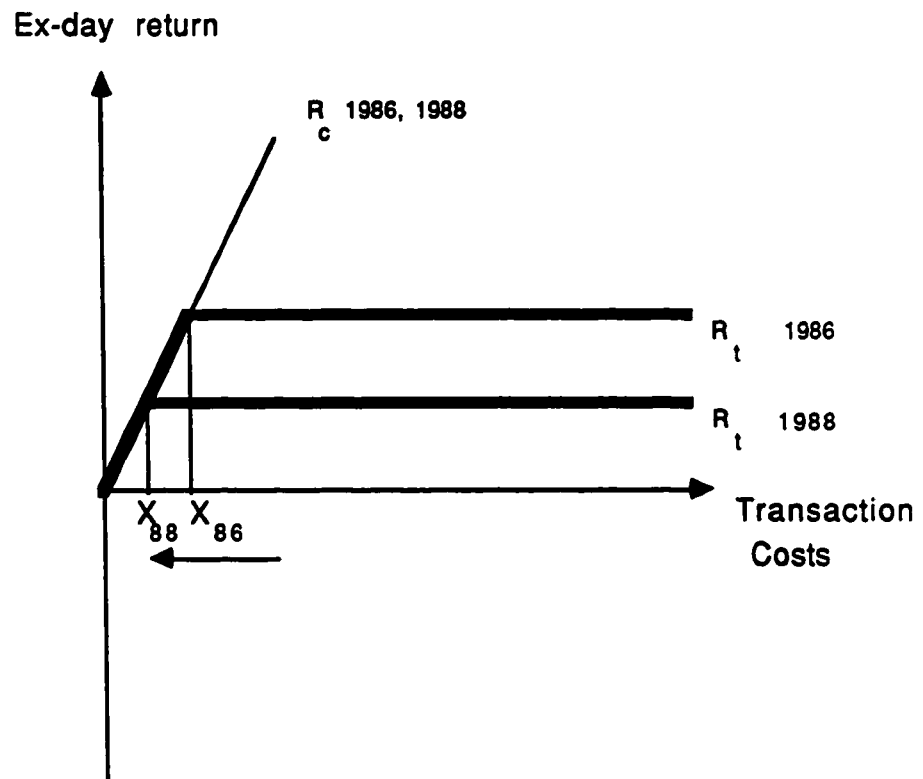


Figure 6.1: Shifts In Ex-Day Returns Caused By The Tax Reform Act When Dealers Are Short Term Traders And Individuals Are Long Term Investors

CHAPTER 7: EMPIRICAL FINDINGS

7.1 Direct Test of Dividend Capture

Tables 7.1 through 7.10 contain results of the direct test of dividend capture. Each table reports the results for a particular quarter. Columns two, three and four (α , β and mean ex-day return) relate to the fitting of a single regression line. The dependant variable for this regression is abnormal ex-day return and the independent variable is percentage bid-ask spread. A star following α or β indicates the parameter is significantly different from zero at the 10% level.

Columns four through nine relate to the estimation of a two-phase regression. The dependant and independent variables are as for the single regression above, and the data are sorted by percentage bid-ask spreads. α_1 and β_1 are the estimated intercept and slope of the first regression and α_2 and β_2 are the intercept and slope of the second regression. The Chow value relates to the test for significance of the alternate hypothesis that a two phase relationship exists compared to the null hypothesis of only a single phase relationship. The star following a Chow value indicates the null can be rejected at the 10% level. This significance is determined

using 50 simulations of randomly ordered data, as opposed to the original transaction cost order used in fitting a two phased regression. The last column contains the total number of observations and the switch point for the two phase regression. For example, 44/49 means there were 49 observations, and a switch point in the two phase regression was calculated as the 44th data point.

There were two reasons for performing only 50 simulations. First, since no evidence at all was found of the type of kink suggested by the theory, there was little expected benefit to running a large number of simulations. Second, even 50 simulations resulted in a large computational load due to the Maximum Likelihood Estimation procedure. In a dividend yield decile with n data points, each simulation involves estimating $n-5$ pairs of regressions.

In all of the tables 7.1 through 7.10, I report few significant Chow statistics. Where the Chow values are significant, they are mostly associated with slope coefficients that are not consistent with the model of dividend capture developed in this dissertation. This is a major outcome of the empirical tests. The data do not show a significant two phase relationship when sorted by transaction costs.

As detailed in Chow (1960), due to the discreet nature of the data, the Chow test statistic does not follow a Chi-squared distribution. An F-table therefore does not yield true significance levels for the test of the hypothesis that the data follow two distinct phases. A more reliable estimate of true significance is gained through simulations.

For both quarters of 1986, tables 7.1 and 7.2, there is only one decile that shows a significant Chow value (decile 1 in table 7.1), and in this decile the slope of the first segment is close to zero, which is not consistent with the model. Further there is only one decile (decile 10 in table 7.1) that shows a significant positive slope for the single regression of ex-day returns against transaction costs. Though such a positive slope is consistent with dividend capture trading, it occurs in only one decile for the two quarters of 1986. In 1986, therefore, I find almost no evidence, direct or indirect, that ex-day returns are set by short term traders. I should point out here that bid-asks used in 1986 tests are obtained from 1987 data. If bid-asks are only a proxy for actual total transaction costs, then using 1987 bid-asks to proxy for 1986 bid-asks may be going too far into the inaccurate.

Tables 7.3 through 7.6 report the results for 1987, quarters 1 through 4. For quarter 1 there are significant positive

slopes for the single regression in deciles 1, 6 and 9. Quarters 2 and 3 show no significant positive slopes. Quarter 4 shows significant positive slopes for deciles 4, 5, 7, 8 and 9.

Again, there are few Chow statistics significant at the 10% level. There are two in 1987 quarter 1, deciles 5 and 9. The two segments in decile 5 have slopes of 5.67 and .81. The two segments in decile 9 have slopes of 25.5 and 1.42. Neither of these deciles have slopes consistent with my model which suggests slopes of one and zero for the two segments. There are no significant Chow values for 1987 quarter 2. The two significant Chow values for 1987 quarter 3 also do not have the predicted slopes. Similarly for 1987, quarter 4 significant Chow values are associated with incorrect slopes for the two segments.

Tables 7.7 through 7.10 report the results for 1988. There is some evidence of dividend capture traders setting ex-day returns, at least in terms of positive slopes for the single regression line. Such positive slopes are found in quarter 1, deciles 1, 7, and 9, quarter 2, deciles 5 and 10, quarter 3, deciles 2 and 4 and quarter 4, deciles 2,4,5,6,8 and 9.

For 1988, as for 1987, the Chow values do not support the presence of a kink as hypothesized in the model. No

significant Chow values are found for quarter 1 at all. For quarter 2, decile 2 has a significant Chow statistic, and the slopes also appear close to what the model predicts. However on closer inspection, a large discontinuity exists at the switch point. Again this is inconsistent with the model.

There are four significant Chow statistics for 1988 quarter 3, all of which except the one for decile 10 are associated with incorrect slopes. In decile 10, β_1 and β_2 are somewhat consistent with my model but the overall slope β is significantly negative, which is clearly not consistent with dividend capture. In 1988 quarter 4 also the three significant Chow values are all associated with incorrect slopes.

Summarizing the results of these initial tests on quarterly data, I find no evidence of a two phase relationship as predicted by my model. The direct test of dividend capture clearly fails. There is however some indirect evidence of dividend capture in the shape of positive slopes for the regression of ex-day returns against percentage bid-ask spreads. The positive slopes are almost entirely associated with negative intercepts, which supports dividend capture by corporations, not dealers.

Further, the weak positive slopes along with the absence of a kink implies that dividend capture may be taking place in a subset of stocks over the full range of percentage bid-ask spreads. This would be consistent with the proposition that although percentage bid-asks represent relevant costs in the decision to capture dividends, they do not represent the full costs of capturing dividends. If so, stratifying stocks by percentage bid-asks may not necessarily order these stocks perfectly in terms of the total costs of dividend capture.

7.2 Excluding Japanese Life insurance companies

As discussed in section 5.4, Japanese life insurance companies were also active in the market around the ex-dividend day. Huge volumes around the ex-day are attributed to dividend capture by these companies. Koski (1991) has looked at these volumes in detail. She finds volume increase of a hundred fold in some cases for stocks that are the target of dividend capture by Japanese life insurance companies.

She also suggests this trading may be spread across several days around the ex-dividend day, and is not just concentrated on the ex-day itself. This follows from a special settlement provision the Japanese life insurance companies appear to be using. As Koski points out, usually settlement takes five

days, and that is why the official ex-day precedes the record day by five days. In this way the investor who will receive the dividend is the official owner by the record date. However, due to alternate settlement methods such as cash settlement, the stock may be traded cum-dividend at any time up to the record date. Under these provisions then cum-dividend and ex-dividend trades may take place up to 5 trading days apart. The effect of using this provision is to allow moving the 'effective' ex-day up to five days away from the 'nominal' ex-day.

For the reasons given in section 5.4, trading by Japanese life insurance companies are expected to confuse the tests of dividend capture. I must therefore separate from the sample those stocks that are the targets of dividend capture by Japanese life insurance companies. I use high volume trades to identify these stocks.

The data were examined for large volume trades in the interval ex-day -5 to ex-day +5. A large volume trade is defined here as greater than half a million shares. Stocks with two or more large volume trades in this eleven day interval were dropped under the assumption that these trades were on behalf of Japanese life insurance companies. The eleven day interval is chosen due to the five day special settlement provision.

Although an eleven day interval was used, the vast majority of these high volume trades occurred between ex-day - 1 and ex-day + 1. Table 7.11 lists the number of stocks dropped in each quarter along with mean ex-day returns, mean percentage spreads, mean prices and mean dividend yields.

The previous tests for dividend capture were repeated on the sample from which Japanese life insurance companies' target stocks had been separated. Since no volume data are available for 1986, the tests were performed only for 1987 and 1988. Tables 7.12 through 7.19 report the results of the tests of dividend capture on data for 1987 quarter 1 through 1988 quarter 4. These tables record the results of the single regression and two phased regressions on the data without stocks which appear to be the targets of dividend capture trading by Japanese life insurance companies.

Comparing tables 7.12 through 7.19 with tables 7.3 through 7.10 shows that removing Japanese life insurance companies' target stocks from the data has very little effect. The dropped data occurs mostly in deciles 7, 8, 9 and 10. As stated the effect is small and none of the estimated parameters are significantly changed. In addition the Chow statistic shows little change. The effect of removing these stocks is negligible both on the single regression line estimates as well as on the estimation of a kink in the data.

This lack of any effect of removing these stocks from my sample implies that trading by Japanese life insurance companies cannot be blamed for the weakness of evidence in support of dividend capture. Further, by eliminating high volume stocks, I may also be throwing out stocks which are the targets of dividend capture by domestic corporations. In other words, those stocks which may be erroneously excluded as Japanese life insurance companies' targets are more likely to belong to the dividend capture segment of the model than to the long term investor segment. This would make it more difficult to detect improvements in dividend capture results from excluding stocks thought to be the targets of Japanese life insurance companies.

In addition, there is the following measurement problem. It is possible that Japanese life insurance companies can capture dividends off the exchange floor, in repurchase agreements with large corporate holders using special settlement procedures. Due to these special settlement procedures the effective date on which the dividend has been stripped can be different from the official ex-dividend day. My measurement of abnormal ex-day return calculated on the official ex-dividend day, then may not reflect the full effect of this activity.

The trading by the Japanese life insurance companies should

still be excluded from the sample as their effects on the results are not subject to the theoretical relationships outlined in the previous sections. In measuring the implications of that theory, the trading by Japanese life insurance companies introduces noise.

7.3 Pooling Cross-sectional and Time Series Data

The cross-sectional data are expected to suffer from hetroskedasticity. The main source of hetroskedasticity is expected to be the difference in the number of observations used for computing the percentage bid-ask spread. For some slow moving stocks, less than 10 observations are used to calculate percentage bid-ask spreads, while for the most actively traded stocks more than 300 observations are available for estimating the percentage bid-ask spread.

The time series data are expected to suffer from serial correlation. This serial correlation arises from unique factors effecting the returns of individual stocks over more than one ex-dividend day period.

The paucity of significant results reduces concerns for fine tuning of the empirical method. For this reason I overlook the effects of dissimilar characteristics of the error term and pool crossectional and time series data to obtain

aggregate results for each year.

I also make two other changes. Previously the slowest moving stocks were dropped under the assumption that the bid-ask may not be representative of transaction costs faced by short term traders, as the average is calculated over only a few observations. However as these stocks are more likely to be stocks for which long term investors are setting ex-day returns, their removal may bias against finding a kink. In the following tables stocks are no longer excluded on the basis of few bid-ask observations.

The other change relates to outlying values of ex-day returns. Ex-day returns greater than 10% or less than -10% are now dropped as they are clearly outliers and including them would swamp any other effects on the data. Only a very few stocks are excluded under this criterion.

Table 7.20 reports the results on all 1986 data. There are no deciles with positive slopes. Table 7.21 reports the results on pooled 1987 data. Significant positive slopes are found for deciles 4, 5, 7, 8 and 9. For 1988 data, significant positive slopes are found in deciles 4 and 9.

The pooled data shows results that support, at least indirectly, both dividend capture as well as the effects of the Tax Reform Act, in the following two ways. First, the

large number (5) of deciles showing significant positive slopes in 1987 shows that dividend capture traders are setting some ex-day returns. Second the much fewer significant positive slopes in 1988 are consistent with the effect of a reduced differential between the tax rates on income and capital gains. Such a reduction in the tax differential is expected to reduce the opportunities for profitable dividend capture.

Again, I believe 1986 results are unreliable because ex-day returns are obtained from 1986, while bid-ask spreads are obtained from the first quarter of 1987, since bid-ask spreads for 1986 are not available in the data base purchased by the University of Washington Business School.

In both 1987 and 1988, decile 9 shows strong evidence of dividend capture. The positive slopes and negative intercepts are significant at the 1% level. Further, the upward movement in the negative intercept from 1987 to 1988 along with the reduced positive slope during the same period are both consistent with the effects of the Tax Reform Act of 1986. As the horizontal segment moves down and the sloped segment moves up as a result of the Tax Reform Act, a single regression line will show a flatter slope than when the two segments are further apart. This evidence suggests the majority of dividend capture stocks are found in decile 9.

The predicted effect of the Tax Reform Act is further supported by two additional facts. First, in all but one decile (decile 4), the slopes for the single regression line are lower in 1988 than in 1987. Second, the intercept of the single regression line moves up in 1988, from its position in 1987 for all but two deciles (deciles 3 and 4). Both these changes are consistent with the effects of the Tax Reform Act as drawn in figures 3.2 and 3.3.

Pooling time series and cross-sectional data do not however improve the estimation of a kink in the data. The data still show no evidence of a kink in the relation between ex-dividend day returns and percentage bid-ask spreads.

An interesting result is the larger number of significant Chow values for 1988 data, even in the absence of a large number of significant positive slopes. This too is consistent with the model of dividend capture. From figures 3.2 and 3.3, the Tax Reform Act causes dividend capture to be attractive in a smaller group of lower transaction cost stocks in 1988. This could explain both the fewer significant positive slopes, as well as the larger number of significant Chow statistics for 1988. This is because as the kink moves leftward, fewer stocks lie along the sloped segment while more stocks lie along the flat segment. This has two effects. First it reduces the slope and significance of the single

regression line . Second, it can result in a more significant Chow value if the flat segment now contains enough stocks to cause detection of a regime separate from the sloped segment.

An unexpected result is the significant **negative** slope of the single regression line for decile 10 in both 1987 and 1988. In the next chapter I look at the underlying effects of dividend yield, within each decile, to see if some of the unusual results in tables 7.21 and 7.22 can be better understood.

7.4 Testable Implications of the Tax Reform Act

The previous results show a two phased regression cannot be fitted to the data as predicted by the theory. This preempts using the Tax Reform Act to test for a leftward kink in the data, as detailed in Chapter 6. The fact that a two phased regression cannot be fitted to the data does not necessarily mean that ex-day returns are not set in accordance with the theory. The problem may be one of measurement. The relationship may be too weak or the effects of varying dividend yield, tax clienteles and holding costs could be causing the two segments of the model to be such broad bands that fitting a two phase regression does not yield any fruitful results.

If the above is true, and the model does still underlie observed ex-day returns, I can still test for the effects of the Tax Reform Act by looking at mean ex-day returns in the lowest and highest transaction cost quintiles. This can yield significant results even when the two phase estimation failed. This is due to two reasons. First, any effects of a stratification by transaction costs are likely to be strongest at the two extremes of the transaction cost spectrum, i.e. the difference between the lowest and highest transaction cost categories would be more pronounced than between adjacent groups. Second, the Tax Reform Act implies **movements** in ex-day returns from 1987 to 1988. This bypasses the confounding effects of multiple dividend yield, tax clientele and holding costs. Even if more than one set of lines underlies ex-day returns, each set moves in the direction predicted by the model. And while in the middle range of transaction costs, stocks do not clearly belong to either the short term traders segment or the long term marginal investor segment of figure 2.1, at the lowest and highest transaction cost quintiles the separation would be more complete. In other words, the lowest transaction cost quintile should include a large proportion of dividend capture stocks while the highest transaction cost quintile should represent stocks whose ex-day returns are set by long term marginal investors. And even if more than one dividend yield, tax clientele or holding cost group occurs in the

pictures shown in figures 2.1 and 2.2, the ex-day returns for quintile 1 should all shift down in 1988 as a result of the Tax Reform Act. Similarly ex-day returns for quintile 5 should all shift down in 1988 as a result of the Tax Reform Act.

The theory thus suggests that mean ex-day returns for the lowest quintile should move upwards as a result of the Tax Reform Act and mean ex-day returns for the highest quintile should shift down as a result of the Tax Reform Act.

Table 7.23 reports the result of the test for an upward shift in mean ex-day returns for transaction cost quintile 1 as predicted by the model. In all but one decile (decile 4) the movement is in the predicted direction. However, only three t-statistics are significant. Higher t-statistics are found in the higher dividend yield deciles.

Table 7.24 reports the result of the test for a downward shift in mean ex-day returns for transaction cost quintile 5. Here the results are not supportive of the model. In six deciles (1,2,3,4,7, and 10) the movement is actually upwards, however it is not statistically significant.

The results of separate t-tests on mean ex-day returns in transaction cost quintiles 1 and 5 are therefore mixed. Mean

ex-day returns in the lowest transaction cost quintiles do shift up as a result of the Tax Reform Act as predicted by the model, but mean ex-day returns for the highest transaction cost quintile do not move significantly in either direction.

The above are results of separate t-tests on mean ex-day returns in transaction cost quintiles 1 and 5. I next test for the joint upward and downward movement in mean ex-day returns for stocks in transaction cost quintiles 1 and 5. To test this joint movement, I calculate a new statistic for each dividend yield decile. This statistic, d is given by:

$$d = \Delta_{q1} - \Delta_{q5}$$

where:

$$\Delta_{q1} = \mu_{88q1} - \mu_{87q1}$$

$$\Delta_{q5} = \mu_{88q5} - \mu_{87q5}$$

and:

μ_{87q1} = mean ex-day return in 1987 for quintile 1

μ_{87q5} = mean ex-day return in 1987 for quintile 5

μ_{88q1} = mean ex-day return in 1988 for quintile 1

μ_{88q5} = mean ex-day return in 1988 for quintile 5

The statistic d increases as mean ex-day returns for quintile 1 shift up in 1988 compared to mean ex-day returns for the same quintile in 1987. The statistic d also increases as mean ex-day returns for quintile 5 shift down in 1988. A positive d is thus in accordance with the effect of the Tax Reform Act if returns are set as suggested by the model in this dissertation. Specifically, the testable hypotheses are:

$$H_0: d < 0$$

$$H_a: d > 0$$

The test for significance of the above hypotheses requires the use of a randomizing procedure. The randomizing involves allocating the data arbitrarily between 1987 and 1988. This allows testing whether the measured effect is indeed due to the effect of the time element, and hence due to the effect of the Tax Reform Act. For example, the data set for dividend yield decile 9 contains 165 observations. Out of these 60 belong to 1987 and 95 to 1988. The value of d is calculated first using these 'true' yearly classifications.

To obtain a distribution of the d statistic, a random number is assigned to each record in the above set. After sorting by this random number, the first 65 observations are tagged as belonging to 1987 and the last and remaining 95 observations

are tagged as belonging to 1988. The test statistic is now recalculated as before but with the new randomly assigned yearly classifications. This procedure is repeated 1000 times to obtain a distribution for the statistic d . These d values are sorted and the significance of the original 'true' d is simply read off from the sorted list of d values obtained via randomization.

The significance levels for the separate tests cannot be compared to the significance levels for the joint test. This is because the separate tests are conducting using a t -statistic and assuming the ex-day returns in 1987 and 1988 are independent. If the ex-day returns in the two years are positively related, then the t -values would be biased upwards. The joint test makes no such assumptions, it uses a randomization experiment to determine significance levels.

Table 7.25 contains the results for the above test. The table lists decile #, μ_{88q1} , μ_{87q1} , μ_{87q5} , μ_{88q5} , Δ_{q1} , Δ_{q5} , d and the significance level of d for rejecting the null hypothesis. In four out of the top five dividend yield deciles, the movements in mean ex-day returns are in accordance with the effects of the Tax Reform Act if observed ex-day returns are determined by the model laid out in this dissertation. In these deciles (deciles 6, 8, 9, and 10) the d -statistic is

significant at at least the 10% level.

These results are consistent with the original premise of this dissertation with respect to testing the effects of the Tax Reform Act. That original premise stated that without stratifying stocks by transaction costs, any tests that use movements in mean ex-day returns would lack power in differentiating between the effects of dividend capture and tax penalties.

To make this point clearer, I combined transaction cost quintiles 1 and 5 and tested for a downward shift for these stocks in mean ex-day returns from 1987 to 1988. A downward shift is consistent with the Tax Penalty model of ex-dividend day returns. For this test I calculate a g-statistic as follows:

$$g = \mu_{87} - \mu_{88}$$

where:

μ_{87} = mean ex-day return in 1987 for quintile 1 and 5

μ_{88} = mean ex-day return in 1988 for quintile 1 and 5

According to the Tax Penalty hypothesis the testable hypotheses are:

$H_0: g < 0$

$H_a: g > 0$

A simple t-test could be used to test for significance. However, to be able to compare this test with the test of the dividend capture model of table 7.25, the same randomizing procedure is used to test for significance. The results for this test are shown in table 7.26. None of the deciles show a movement in mean ex-day returns that would cause rejection of the null hypothesis that ex-day returns do not decrease as a result of the Tax Reform Act. This test provides additional support for the proposition that observed ex-dividend day returns are set in accordance with the model laid out in this dissertation.

There is another interesting result in table 7.26. Not only is the g-statistic not significant in a one tailed test for a downward movement in ex-day returns, it is in fact not significantly different from zero in any of the ten deciles. This means that when we combine transaction cost quintiles 1 and 5, average ex-day returns show no significant effect of the Tax Reform Act of 1986.

It should be pointed out that significant results for the test of the model of dividend capture in table 7.25 do not

depend on opposing movement in mean ex-day returns for quintiles 1 and 5. Even if only one of the quintiles moves significantly in one direction, the results could be as obtained. However the means in table 7.25 show that in four deciles (decile 5,6,8 and 9) the d-statistic is the result of opposing movements in the mean ex-day returns for quintiles 1 and 5. These movements are in the directions predicted by the dividend capture model. This is especially true for dividend yield decile 9, where the d-statistic has large contributions from both the upward movement in quintile 1 as well as the downward movement in quintile 5. Given these opposing movements a joint test for the upward movement in quintile 1 and the downward movement in quintile 5 is more powerful than two separate t-tests on quintiles 1 and 5.

7.5 Identity of Short Term Traders

In the empirical section it was suggested that the intercept of the first segment of the two phase regression could provide a test for the identity of short term traders. If the intercept moved up as a result of the Tax Reform Act then it could be concluded that corporations were short term traders. If the intercept stayed unchanged then it would imply that dealers were short term traders.

Even in the absence of a kinked regression, the test may

still be attempted by looking at the mean ex-day returns for the first quintile by percentage bid-ask spreads. As stated previously, the lowest transaction cost quintile contains stocks that are among the most likely to attract short term traders. If the mean ex-day returns for this quintile shift upwards it may be concluded that corporate short term traders affect a significant number of these stocks' ex-day returns. The test then for corporate short term traders is:

$$H_0: \mu_{88q1} < \mu_{87q1}$$

$$H_a: \mu_{88q1} > \mu_{87q1}$$

where:

$$\mu_{87q1} = \text{mean ex-day return in 1987 for quintile 1}$$

$$\mu_{88q1} = \text{mean ex-day return in 1988 for quintile 1}$$

Table 7.23 already contains the results for this test. In all but one decile (decile 4), the mean ex-day return moves up as a result of the Tax Reform Act, which is consistent with short term corporate traders. However, for only three of the deciles the movement is significant at at least the 10% level. The above results provide some, but not overwhelming support for the proposition that, when short term trading occurs, the marginal short term traders are corporations and

not dealers.

7.6 Identity of Long Term Marginal Investors

In the section 6.7 it was also suggested that the intercept of the second segment of the two phase regression could provide a test for the identity of long term marginal investors. A significant positive intercept would indicate individuals as long term marginal investors while a significant negative intercept would indicate that corporations were the long term marginal investors.

Despite the absence of a kinked regression, I can nevertheless still examine this issue by looking at the mean ex-dividend day return for the highest transaction cost quintile. This quintile is expected to contain most of the stocks for which long term marginal investors are setting ex-day returns. Thus if the mean ex-day return is significantly positive it suggests that individuals are long term investors. On the other hand if mean ex-day returns are significantly negative, it suggests corporations are the marginal long term investors in those stocks.

The results of this test on 1987 data are shown in table 7.27, and the results for 1988 data are shown in table 7.28. For 1987, deciles 6 and 9 show a significantly positive mean

ex-day return. For 1988 deciles 4, 6 and 7 show a significantly positive mean ex-day return. In both years decile 10 has significantly negative ex-day returns. In all other deciles the mean ex-day returns are not significantly different from zero. For these deciles the means, though not significantly different from zero, are almost always positive.

The evidence suggests strongly that in the highest dividend yield decile (decile 10) corporations are the long term marginal investors. The evidence also suggests, though less strongly, that in other deciles long term marginal investors are individuals.

7.7 Summary and discussion of findings

The results from the initial tests show little evidence of the kind of kink hypothesized in the theory section. Some evidence of dividend capture in the shape of a positive slope of the single regression line of ex-day returns against percentage bid-ask spreads is found for 1987 and 1988. Such indirect evidence is stronger in 1987 than in 1988, which is consistent with the hypothesis that the Tax Reform Act of 1986 decreased incentives for dividend capture trading.

Further, the tests that show that the lowest and highest

transaction cost quintiles have opposite movements in mean ex-day returns as a result of the Tax Reform Act provide additional indirect evidence supporting not only the presence of dividend capture but also the model of observed ex-day returns developed in this dissertation.

The support for the model is, however, not strong enough to allow separating all the stocks into two groups, one group containing stocks which are the targets of dividend capture, and the other group containing those stocks whose ex-day returns are set by long term marginal investors. The essence of the results seems to be that the model of dividend capture is supported indirectly, but that the data are too noisy for the application of a kinked regression line as suggested in the original empirical tests.

One possible explanation relates to the fact that bid-ask spreads do not represent the full costs of transacting. However since bid-ask spreads are a major component of full transaction costs, stratifying stocks by percentage bid-ask spreads approximates but does not achieve true ordering of the stocks by full transaction costs. This approximate ordering may be good enough to obtain positive slopes when ex-day returns are regressed against percentage bid-ask spreads, but the ordering is not true enough to yield the two phase relationship.

Another possible explanation is that ex-post ex-day returns are too poor a proxy for ex-ante expected ex-day returns, and it is ex-ante expected ex-day returns which form the basis of the short term traders decision to enter the market. In this regard, Grammatikos (1984) looks at unexercised options on the ex-dividend day to gauge expected ex-day returns. His results show this proxy is no better than using actual ex-post ex-day returns.

Focusing on the lowest and highest transaction cost quintiles also provides tests for the identity of both short term traders and long term marginal investors. The evidence supports the idea that dividend capture is done by corporations, i.e. corporations are the short term traders. Note, these results are for data from which I have excluded targets of Japanese life insurance companies. The evidence further suggests that in all but the highest dividend yield stocks, the long term marginal investors are individuals. In the highest dividend yield decile the evidence strongly suggests that corporations are the long term marginal investors.

TABLE 7.1: Direct Test of Dividend Capture; data from 1986, quarter 3

divyld decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	-.005 (-.66)	.81 (1.34)	.0045	.0033	.351	-.08	-15.7	17.6 *	41/44
2	.006 (.93)	-.54 (-1.13)	-.0006	-.208	-.0037	46.3	-.41	8.6	4/55
3	-.004 (-.63)	.72 (1.24)	.0036	.0048	.062	-.302	-1.73	4.55	45/49
4	.002 (.29)	-.01 (-.01)	.0019	-.021	-.027	3.70	1.43	8.5	84/89
5	-.001 (-.23)	.19 (.59)	.0011	.007	.023	-.90	-.53	5.4	42/50
6	-.003 (-.23)	.54 (.65)	.0042	-.0039	-.074	1.03	3.70	6.2	27/37
7	-.002 (-.39)	.17 (.36)	-.0004	.015	.009	-4.69	-.461	6.83	7/34
8	-.0096 (-1.78)	.53 (1.0)	-.005	.030	-.008	-6.1	.44	8.42	18/58
9	.0121 (1.18)	-1.78 (-1.90)	-.0068	.024	.078	-3.16	-6.09	4.14	39/49
10	-.036 (-2.4)	2.59 (2.44)	-.001	-.001	.045	-1.13	-1.54	10.1	11/18

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies a data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.2: Direct Test of Dividend Capture; data from 1986, quarter 4

divy/d decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.005 (.93)	-.064 (-15)	.0038	-.001	0.030	.71	1.83	3.88	38/52
2	.009 (1.95)	-.56 (-1.46)	.0029	.018	.077	-1.63	-3.13	12.6	55/61
3	.019 (2.62)	-1.30 (-2.1)	.0051	-.052	.0204	9.54	-1.44	6.1	18/57
4	-.005 (-.8)	.58 (1.09)	.0013	.003	.292	-.40	-12.6	8.5	42/47
5	.007 (1.58)	-.29 (.92)	.0033	.013	.033	-1.23	-1.23	6.8	46/60
6	.0038 (.71)	.09 (.22)	.0049	.0018	.585	.290	-2.47	5.9	53/57
7	.0029 (.83)	-.04 (-1.13)	.0024	.005	.080	-.24	-3.17	5.03	37/43
8	-.0089 (-1.55)	.56 (1.01)	-.0034	-.006	-.034	.73	2.42	7.5	27/64
9	-.013 (-2.42)	.32 (.70)	-.0093	-.139	-.022	18.1	.98	12.2	10/63
10	.027 (4.28)	-2.7 (-7.06)	-.0124	.002	.029	-.63	-2.87	3.81	21/24

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies b data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.3: Direct Test of Dividend Capture; data from 1987, quarter 1

divyld decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.011 (-1.39)	1.32 (1.98)	.0034	.008	.005	-1.01	.89	7.0	36/46
2	0 (.01)	.22 (.39)	.0026	-.008	-.083	1.14	3.48	4.5	48/56
3	-.003 (-.63)	.103 (.26)	-.0021	-.006	-.153	.393	5.50	4.8	53/56
4	.002 (.25)	.28 (.56)	.0048	.033	.012	-6.3	-.32	9.0	9/44
5	.002 (.31)	.60 (1.27)	.0080	-.036	-.011	5.69	.81	14.8 *	36/45
6	-.009 (-1.66)	.74 (1.89)	.0003	0	.049	-.13	-1.12	5.0	44/48
7	.0195 (1.76)	-1.74 (-2.06)	.0010	.006	-.39	-.24	14.9	5.03	19/22
8	-.005 (-.8)	.24 (.4)	-.0026	-.032	-.022	3.97	1.30	5.9	26/44
9	-.013 (-1.88)	.98 (1.9)	-.0011	-.193	-.022	25.5	1.42	27.0 *	8/30
10	-.013 (-1.20)	.39 (.67)	-.0064	.237	-.005	-27.8	.13	8.77	4/17

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies a data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.4: Direct Test of Dividend Capture; data from 1987, quarter 2

divy/d decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.004 (-.86)	.131 (.35)	-.0027	-.007	-.035	.805	1.68	7.9	62/108
2	-.002 (-.56)	.125 (.38)	-.0008	-.029	-.0015	4.73	.042	6.33	32/108
3	-.003 (-.76)	.367 (1.16)	.0013	-.001	.075	.105	-1.86	5.7	94/97
4	.003 (.74)	-.213 (-.55)	.0012	-.109	.007	20.8	-.43	5.4	8/93
5	.0004 (.12)	.118 (.42)	.0015	.013	.007	-1.84	-.222	6.5	50/84
6	.002 (.42)	-.205 (-.53)	-.0003	-.003	-.199	.391	7.2	6.9	62/70
7	-.002 (-.58)	.263 (.77)	.0005	-.0003	.436	.023	-18.5	9.9	60/64
8	.002 (.25)	.034 (.04)	.0023	-.014	-.018	2.60	1.35	3.99	31/53
9	-.011 (-1.85)	.337 (.69)	-.0072	-.008	-.058	.233	3.2	11.8	54/87
10	-.004 (-.49)	.072 (.16)	-.0024	-.02	.016	.886	-.89	9.7	15/51

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies b data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.5: Direct Test of Dividend Capture; data from 1987, quarter 3

divyld decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.002 (.25)	.107 (.22)	.0028	-.013	-.049	1.78	1.91	9.1	* 93/109
2	.001 (.11)	-.051 (-.13)	0	-.002	-.063	.264	3.22	5.6	77/93
3	.007 (1.36)	-.72 (-1.75)	-.0012	.009	-.067	-.85	2.41	7.8	68/79
4	-.007 (-1.64)	.539 (1.53)	-.0010	.009	.013	-1.52	-.282	10.3	76/99
5	-.002 (-.41)	.335 (.94)	.0018	-.005	-.086	.74	3.45	5.8	67/71
6	-.005 (-1.79)	.722 (1.47)	.0031	-.045	-.009	8.31	.938	5.43	15/51
7	.0002 (.03)	.090 (.17)	.0011	-.062	-.008	13.6	.63	14.9	13/56
8	-.0002 (-.05)	-.035 (-1.0)	-.0006	.006	.032	-.881	-1.43	5.9	37/45
9	.003 (.51)	-.71 (-1.42)	-.0054	-.009	-.073	.504	3.2	8.7	50/60
10	.0002 (.03)	-.26 (-.64)	-.0034	-.014	.10	.78	-4.43	35.3	* 39/43

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies a data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.6: Direct Test of Dividend Capture; data from 1987, quarter 4

divyld decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	-.001 (-.05)	.128 (.22)	.0016	-.026	-.031	4.45	1.18	6.8	34/87
2	-.008 (-1.23)	.28 (.75)	-.0039	.084	-.001	-16.7	-.11	9.9	12/82
3	.002 (.18)	-.38 (-.76)	-.0047	-.039	-.020	4.11	.24	6.7	35/65
4	-.007 (-1.15)	.573 (1.84)	.0027	.518	-.003	-.93	.41	18.4 *	5/79
5	-.005 (-.85)	.539 (1.57)	.0033	-.006	-.019	.59	-1.9	3.74	74/83
6	.006 (.63)	-.254 (-.57)	.0011	-.007	1.22	.62	-.29	33.6 *	86/89
7	-.014 (-2.23)	.88 (2.74)	.0009	-.002	-.122	.104	3.4	8.3	77/81
8	-.006 (-1.17)	.495 (1.78)	.0016	-.012	.077	.86	-1.55	11.6 *	68/79
9	-.015 (-1.62)	1.04 (1.88)	.0012	-.060	-.021	6.12	1.3	3.6	25/79
10	-.01 (-1.47)	.08 (.24)	-.0084	.069	-.001	-6.61	-.19	8.0	34/94

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies b data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.7: Direct Test of Dividend Capture; data from 1988, quarter 1

divyld decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.007 (-1.17)	.618 (1.84)	.0031	-.048	-.011	7.69	.825	7.4	7/55
2	.011 (1.59)	-.633 (-1.62)	.0014	-.002	-.035	.623	.426	5.8	43/51
3	.006 (1.24)	-.286 (-1.04)	.0015	-.0015	-.0195	.545	.488	7.7	40/56
4	.0014 (.21)	.318 (.70)	.0058	-.0071	-.104	1.12	3.65	7.34	60/66
5	-.004 (-.78)	.394 (1.41)	.0023	-.015	-.022	1.38	.672	7.3	57/65
6	.0022 (.53)	.077 (.31)	.0034	.0047	.054	-.171	-1.49	4.5	68/78
7	-.002 (-.42)	.678 (2.46)	.0083	-.0034	.097	.736	-2.58	9.4	87/104
8	.007 (1.71)	-.551 (-2.05)	-.0004	-.0041	.0438	.350	-1.82	12.1	57/69
9	-.015 (-3.82)	.829 (3.53)	-.0026	-.0071	.1501	.178	-3.38	20.8	69/74
10	-.0032 (-.63)	-.148 (-.58)	-.0060	-.0023	.107	-.259	-2.35	11.8	65/69

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies b data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.8: Direct Test of Dividend Capture; data from 1988, quarter 2

divy/d decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.003 (.68)	-.447 (-1.43)	-.0030	.0037	-.252	-.480	10.1	8.1	72/76
2	.0007 (.16)	-.029 (-.10)	.0003	-.015	-.010	1.60	.1	10.4	63/74
3	.0062 (1.42)	-.232 (-.91)	.0028	.019	.021	-1.58	-.592	5.2	55/73
4	-.0004 (-.12)	.062 (.29)	.0004	.003	.011	-.467	-.366	5.9	51/78
5	-.0007 (-.25)	.288 (1.79)	.0034	-.005	-.033	.687	.981	4.6	76/83
6	.0113 (2.24)	-.290 (-.84)	.0074	-.285	.008	62.6	-.130	9.5	3/99
7	.0061 (2.33)	-.322 (-2.02)	.0015	.009	.028	-.668	-.975	7.5	82/102
8	.0038 (1.30)	-.254 (-1.33)	.0004	.006	.074	-.441	-2.21	4.1	67/73
9	-.0043 (-1.80)	.171 (1.02)	-.0021	.001	.006	-.376	-.132	5.8	69/83
10	.0020 (.61)	-.389 (-2.12)	-.0044	-.006	.165	.106	-4.47	18.7 *	100/103

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies b data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.9: Direct Test of Dividend Capture; data from 1988, quarter 3

divyld decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	-.007 (-.66)	.820 (1.08)	.0039	.008	.066	-.708	-2.02	6.3	55/68
2	-.008 (-2.34)	.736 (2.85)	.0007	-.010	-.126	1.01	4.45	23.3 *	62/67
3	.002 (.50)	-.077 (-.23)	.0013	.014	.006	-1.33	-.090	3.3	61/78
4	-.012 (-3.39)	.998 (4.36)	.0016	.005	-.024	-.780	1.63	12.6 *	50/74
5	.006 (1.81)	-.370 (-1.51)	.0016	-.005	-.010	.99	.214	10.4	53/75
6	.002 (.80)	-.108 (-.60)	.0009	.013	.007	-1.90	-.257	4.3	39/93
7	.002 (.91)	-.052 (-.30)	.0018	.004	.029	-.291	-.80	6.7	89/104
8	.003 (.92)	-.134 (-.70)	.0010	-.002	-.150	.342	3.47	10.0	81/86
9	-.0004 (-.12)	-.139 (-.52)	-.0019	.0001	.049	-.245	-2.94	11.2 *	62/77
10	.006 (1.45)	-.776 (-3.55)	-.0068	-.012	-.004	.595	-.74	12.3 *	83/94

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies a data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.10: Direct Test of Dividend Capture; data from 1988, quarter 4

divyld decile	α (t-stat)	β (t-stat)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.0005 (.12)	-.141 (-.54)	-.0015	.002	-.028	-.11	1.0	5.9	50/72
2	-.008 (-1.77)	.623 (1.93)	-.0003	-.004	.308	.176	-9.8	36.8 *	55/59
3	-.002 (-.37)	.147 (.38)	0	-.0002	.128	-.074	-6.67	13.1 *	61/73
4	-.007 (-2.13)	.80 (3.43)	.0029	-.009	-.043	1.20	2.16	13.9	52/72
5	.014 (2.39)	-.812 (-2.12)	.0036	-.011	.001	1.75	-.790	11.6	71/83
6	-.004 (-1.62)	.417 (2.55)	.0014	-.007	-.027	.934	1.18	16.0 *	69/95
7	.005 (1.63)	-.261 (-1.12)	.0019	.004	.076	-.195	-2.97	14.2	94/104
8	-.002 (-.99)	.383 (2.56)	.0026	-.004	-.070	.577	1.81	13.4	94/99
9	-.008 (-2.92)	.525 (2.49)	-.0019	-.011	-.047	.838	1.68	8.9	77/83
10	-.004 (-1.14)	.063 (.31)	-.0029	-.008	-.106	.364	2.94	10.4	84/90

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies b data points in the decile and the ath data point represents the estimated break between the two regression lines.

TABLE 7.11: Summary of Stocks Dropped Due to Assumed Trading By Japanese Life Insurance Companies

trading quarter	number of stocks dropped	mean ex-day return	mean percentage average spread	mean price	mean dividend yield
1987 Q1	6	-.0031	.849	31.2	.0160
1987 Q2	11	.0011	1.06	31.0	.0148
1987 Q3	19	-.0041	.984	29.4	.0198
1987 Q4	39	-.0076	1.18	32.2	.0199
1988 Q1	39	-.0020	1.12	29.2	.0211
1988 Q2	49	-.0049	1.14	25.8	.0218
1988 Q3	40	-.0026	1.05	28.2	.0215
1988 Q4	22	-.0028	.910	32.3	.0182

**TABLE 7.12: Direct Test of Dividend Capture; data from 1987, quarter 1
Excluding Stocks Assumed to be Targets of Japanese Life
Insurance Companies**

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.011 (-1.39)	1.32 (1.98)	.0034	.008	.005	-1.01	.89	7.0	36/46
2	0 (0)	.22 (.39)	.0026	-.008	-.083	1.14	3.48	4.5	48/56
3	-.003 (-.63)	.103 (.26)	-.0021	-.006	-.153	.393	5.50	4.8	53/56
4	.002 (.25)	.28 (.56)	.0048	.033	.012	-6.3	-.32	9.0	9/44
5	.001 (.17)	.61 (1.33)	.0076	-.037	-.011	5.77	.81	15.1 *	35/44
6	-.009 (-1.66)	.74 (1.89)	.0003	0	.049	-.13	-1.12	5.0	44/48
7	.0195 (1.76)	-1.74 (-2.06)	-.0010	.006	-.39	-.24	14.9	5.03	19/22
8	-.004 (-.63)	.157 (.27)	-.0024	-.028	-.022	3.57	1.30	5.2	24/42
9	-.012 (-1.68)	.952 (1.75)	-.0007	-.190	-.023	25.1	1.46	25.6 *	7/28
10	-.011 (-1.06)	.37 (.61)	-.0057	.237	-.002	-27.8	.06	9.17	4/16

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies a data points in the decile and the ath data point represents the estimated break between the two regression lines.

**TABLE 7.13: Direct Test of Dividend Capture; data from 1987, quarter 2
Excluding Stocks Assumed to be Targets of Japanese Life
Insurance Companies**

ivylid decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	-.005 (-1.0)	.161 (.44)	-.0030	-.007	-.035	.733	1.68	7.5	61/107
2	-.002 (-.61)	.14 (.41)	-.0009	-.029	-.0015	4.73	.042	5.9	31/107
3	-.003 (-.76)	.367 (1.16)	.0013	-.001	.075	.105	-1.86	5.7	94/97
4	.003 (.74)	-.213 (-.55)	.0012	-.109	.007	20.8	-.43	5.4	8/93
5	.0004 (.12)	.118 (.42)	.0015	.013	.007	-1.84	-.222	6.5	50/84
6	.003 (.49)	-.210 (-.54)	0	-.003	-.199	.411	7.2	7.2	61/69
7	-.002 (-.58)	.263 (.77)	.0005	-.0003	.436	.023	-18.5	9.9	60/64
8	.001 (.10)	.106 (.13)	.0019	-.015	-.018	2.60	1.35	3.5	29/51
9	-.011 (-1.68)	.258 (.51)	-.0074	-.007	-.060	.125	3.3	13.1	52/83
10	-.003 (-.38)	.045 (.10)	-.0020	-.02	.020	.886	-1.03	11.9	15/51

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies a data points in the decile and the ath data point represents the estimated break between the two regression lines.

**TABLE 7.14: Direct Test of Dividend Capture; data from 1987, quarter 3
Excluding Stocks Assumed to be Targets of Japanese Life
Insurance Companies**

divy/d decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.002 (.25)	.107 (.22)	.0028	-.013	-.049	1.78	1.91	9.1	* 93/109
2	.001 (.11)	-.051 (-.13)	0	-.002	-.063	.264	3.22	5.6	77/93
3	.007 (1.36)	-.72 (-1.75)	-.0012	.009	-.067	-.85	2.41	7.8	68/79
4	-.007 (-1.64)	.539 (1.53)	-.0010	.009	.013	-1.52	-.282	10.3	76/99
5	-.002 (-.41)	.335 (.94)	.0018	-.005	-.086	.74	3.45	5.8	67/71
6	-.005 (-.90)	.760 (1.53)	.0029	-.045	-.009	8.50	.938	4.6	14/50
7	0 (.01)	.100 (.18)	.0010	-.062	-.009	13.6	.69	14.9	13/55
8	-.0003 (.08)	-.08 (-.23)	-.0005	.007	.032	-1.04	-1.43	6.7	33/41
9	.004 (.63)	-.78 (-1.48)	-.0053	-.008	-.073	.422	3.2	8.0	46/56
10	.004 (.63)	-.46 (-.99)	-.0022	-.012	.10	.70	-4.43	30.2	* 30/34

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies a data points in the decile, and the ath data point represents the estimated break between the two regression lines.

**TABLE 7.15: Direct Test of Dividend Capture; data from 1987, quarter 4
Excluding Stocks Assumed to be Targets of Japanese Life
Insurance Companies**

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.001 (-.05)	.128 (.22)	.0016	-.026	-.031	4.45	1.18	6.8	34/87
2	-.008 (-1.23)	.28 (.75)	-.0039	.084	-.001	-16.7	-.11	9.9	12/82
3	.002 (.18)	-.38 (-.76)	-.0047	-.039	-.020	4.11	.24	6.7	35/65
4	-.007 (-1.15)	.573 (1.84)	.0027	.518	-.003	-.93	.41	18.4 *	5/79
5	-.004 (-.73)	.510 (1.48)	.0036	-.005	-.078	.54	-1.9	3.70	73/82
6	.006 (.63)	-.254 (-.57)	.0011	-.007	1.22	.62	-.29	33.6 *	86/89
7	-.013 (-2.08)	.86 (2.65)	.0013	-.006	-.030	.097	1.51	8.7	22/79
8	-.005 (-.96)	.474 (1.64)	.0023	-.012	.077	.86	-1.55	11.0 *	61/72
9	-.015 (-1.35)	1.03 (1.62)	.0019	-.140	-.023	13.7	1.36	7.2	16/68
10	-.009 (-1.14)	.063 (.17)	-.0081	.144	.0002	-12.2	-.21	6.8	22/76

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies b data points in the decile, and the ath data point represents the estimated break between the two regression lines.

TABLE 7.16: Direct Test of Dividend Capture; data from 1988, quarter 1 Excluding Stocks Assumed to be Targets of Japanese Life Insurance Companies

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.007 (-1.17)	.618 (1.84)	.0031	-.048	-.011	7.69	.825	7.4	7/55
2	.011 (1.59)	-.633 (-1.62)	.0014	-.002	-.035	.623	.426	5.8	43/51
3	.006 (1.24)	-.286 (-1.04)	.0015	-.0015	-.0195	.545	.488	7.7	40/56
4	.0014 (.21)	.318 (.70)	.0058	-.0071	-.104	1.12	3.65	7.34	60/66
5	-.004 (-.78)	.394 (1.41)	.0023	-.015	-.022	1.38	.672	7.3	57/65
6	.0022 (.53)	.077 (.31)	.0034	.0047	.054	-.171	-1.49	4.5	68/78
7	-.002 (-.43)	.681 (2.45)	.0083	-.0036	.097	.746	-2.58	9.4	86/103
8	.007 (1.72)	-.561 (-2.05)	-.0004	-.0041	.0438	.350	-1.82	11.8	56/68
9	-.018 (-3.67)	.960 (3.48)	-.0027	-.0096	.1501	2.73	-3.38	17.9	50/55
10	-.004 (-.64)	-.133 (-.44)	-.0066	-.003	.107	-.345	-2.35	10.3	49/53

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies a data points in the decile, and the ath data point represents the estimated break between the two regression lines.

TABLE 7.17: Direct Test of Dividend Capture; data from 1988, quarter 2
Excluding Stocks Assumed to be Targets of Japanese Life
Insurance Companies

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	.003 (.68)	-.447 (-1.43)	-.0030	.0037	-.252	-.480	10.1	8.1	72/76
2	.0007 (.16)	-.029 (-.10)	.0003	-.015	-.010	1.60	.1	10.4 *	63/74
3	.0062 (1.42)	-.232 (-.91)	.0028	.019	.021	-1.58	-.592	5.2	55/73
4	-.0004 (-.12)	.062 (.29)	.0004	.003	.011	-.467	-.366	5.9	51/78
5	-.0007 (-.25)	.288 (1.79)	.0034	-.005	-.033	.687	.981	4.6	76/83
6	.0113 (2.24)	-.290 (-.84)	.0074	-.285	.008	62.6	-.130	9.5	3/99
7	.0061 (2.30)	-.322 (-2.0)	.0015	.009	.028	-.668	-.975	7.5	82/101
8	.0038 (1.33)	-.254 (-1.28)	.0004	.006	.074	-.441	-2.21	4.1	67/71
9	-.002 (-.73)	.073 (.40)	-.001	.006	.006	-.78	-1.32	7.4	50/64
10	.003 (.80)	-.430 (-2.05)	-.0044	-.007	.165	.215	-4.47	19.6 *	73/76

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies b data points in the decile, and the ath data point represents the estimated break between the two regression lines.

**TABLE 7.18: Direct Test of Dividend Capture; data from 1988, quarter 3
Excluding Stocks Assumed to be Targets of Japanese Life
Insurance Companies**

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	-0.07 (-0.66)	.820 (1.08)	.0039	.008	.066	-.708	-2.02	6.3	55/68
2	-0.08 (-2.34)	.736 (2.85)	.0007	-.010	-.126	1.01	4.45	23.3 *	62/67
3	.002 (.50)	-.077 (-2.23)	.0013	.014	.006	-1.33	-.090	3.3	61/78
4	-.012 (-3.39)	.998 (4.36)	.0016	.005	-.024	-.780	1.63	12.6 *	50/74
5	.006 (1.81)	-.370 (-1.51)	.0016	-.005	-.010	.99	.214	10.4	53/75
6	.002 (.80)	-.108 (-0.60)	.0009	.013	.007	-1.90	-.257	4.3	39/93
7	.002 (.91)	-.052 (-0.30)	.0018	.004	.029	-.291	-.80	6.7	89/104
8	.003 (.85)	-.134 (-0.65)	.0010	-.002	-.150	.342	3.47	10.0	81/84
9	.0004 (.11)	-.191 (-0.59)	-.0018	-.002	.047	-.040	-.2.88	8.5	45/58
10	.006 (1.32)	-.81 (-3.23)	-.0068	-.015	-.004	.768	-.74	10.5	64/75

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies b data points in the decile, and the ath data point represents the estimated break between the two regression lines.

TABLE 7.19: Direct Test of Dividend Capture; data from 1988, quarter 4 Excluding Stocks Assumed to be Targets of Japanese Life Insurance Companies

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.0005 (.12)	-.141 (-.54)	-.0015	.002	-.028	-.11	1.0	5.9	50/72
2	-.008 (-1.77)	.623 (1.93)	-.0003	-.004	.308	.176	-9.8	36.8 *	55/59
3	-.002 (-.37)	.147 (.38)	0	-.0002	.128	-.074	-6.67	13.1 *	61/73
4	-.007 (-2.13)	.80 (3.42)	.0029	-.009	-.043	1.20	2.16	13.9	52/71
5	.014 (2.39)	-.812 (-2.12)	.0036	-.011	.001	1.75	-.790	11.6	71/83
6	-.004 (-1.48)	.417 (2.50)	.0014	-.007	-.027	.934	1.18	16.0 *	69/93
7	.005 (1.65)	-.261 (-1.14)	.0019	.004	.076	-.195	-2.97	14.2	94/103
8	-.002 (-.62)	.383 (2.28)	.0026	-.004	-.070	.577	1.81	13.4	94/95
9	-.009 (-3.44)	.590 (2.87)	-.0024	-.014	-.047	1.06	1.68	10.2	72/78
10	-.004 (-1.07)	.077 (.35)	-.0028	-.009	-.106	.455	2.94	10.3	75/81

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X* in the form a/b signifies b data points in the decile, and the ath data point represents the estimated break between the two regression lines.

TABLE 7.20: Direct Test of Dividend Capture; Combined 1986 data. Excluding Stocks Assumed to be Targets of Japanese Life Insurance. But Including Low Volume Stocks.

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	0	.294 (.91)	.0034	.004	.121	-.141	-.046	15.8	97/103
2	.008 (2.49)	-.576 (-2.65)	.0007	-.120	.006	27.2	-.504	9.0	11/123
3	.010 (1.95)	-.472 (-1.98)	.0043	-.052	.010	11.6	-.476	4.2	11/118
4	-.002 (-.42)	.310 (.89)	.0017	-.014	-.025	2.36	1.56	10.6	54/102
5	.003 (1.01)	-.079 (-3.7)	.0020	.008	.023	-.781	.762	8.8	100/125
6	.002 (.30)	.232 (.58)	.0044	.003	-.221	.085	8.56	9.9	93/97
7	.002 (.61)	-.073 (-3.2)	.0010	-.017	-.004	2.43	.174	8.6	50/89
8	-.008 (-2.31)	.329 (1.12)	-.0042	-.009	-.458	.446	16.9	11.3	136/139
9	-.004 (-.89)	-.345 (-8.0)	-.0083	.014	0	-2.36	-.378	9.6	90/121
10	-.008 (-1.22)	.317 (.73)	-.0036	-.025	-.016	1.72	.340	4.8	45/53

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies b data points in the decile, and the ath data point represents the estimated break between the two regression lines.

TABLE 7.21: Direct Test of Dividend Capture; Combined 1987 data. Excluding Stocks Assumed to be Targets of Japanese Life Insurance. But Including Low Volume stocks.

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	-.002 (-.79)	.152 (.87)	0	.001	-.073	-.093	2.42	16.1 *	353/382
2	-.003 (-1.3)	.116 (.77)	-.0014	-.001	.337	-.092	-6.0	18.3	379/383
3	.004 (1.71)	-.261 (-1.88)	.0001	.001	-.084	-.034	1.30	11.0	345/351
4	-.002 (-1.13)	.284 (2.05)	.0013	-.008	-.009	.984	.456	6.62	281/356
5	0 (0)	.221 (1.40)	.0028	-.006	-.018	.884	.781	9.0	263/317
6	-.004 (-1.22)	.371 (2.02)	.0017	.001	.261	.012	-5.97	11.5	287/296
7	-.004 (-1.39)	.389 (2.26)	.0015	0	-.136	.090	3.60	20.7 *	245/252
8	-.003 (-1.24)	.240 (1.57)	.0003	.010	-.001	-2.0	.153	4.3	68/255
9	-.016 (-5.74)	.915 (4.81)	-.0034	-.001	-.025	-.427	1.47	16.4 *	224/269
10	0 (-.05)	-.194 (-1.17)	-.0036	-.007	-.040	.257	.559	7.4	239/253

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies b data points in the decile, and the a-th data point represents the estimated break between the two regression lines.

TABLE 7.22: Direct Test of Dividend Capture; Combined 1988 data. Excluding Stocks Assumed to be Targets of Japanese Life Insurance. But Including Low Volume Stocks.

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	0	-0.17 (-12)	-.0005	.003	.024	-.318	-.626	7.2	280/304
2	.001 (.41)	-.040 (-.29)	.0003	-.010	-.005	1.01	-.049	20.8 *	252/292
3	.003 (1.28)	-.041 (-.32)	.0021	.005	.044	-.270	-1.14	13.1	297/329
4	-.003 (-1.32)	.374 (3.16)	.0027	-.003	.202	.387	-3.66	11.8	332/337
5	.005 (3.60)	-.194 (-2.24)	.0026	.004	.121	-.056	-2.11	27.4 *	346/353
6	.003 (1.71)	.044 (.54)	.0031	-.009	.001	2.64	.101	5.9	53/399
7	.003 (2.24)	-.030 (-.33)	.0029	.006	.024	-.329	-.693	19.3 *	357/454
8	.002 (1.27)	-.069 (-.72)	.0010	.001	-.099	-.020	1.96	6.3	375/382
9	-.006 (-3.96)	.324 (3.35)	-.0014	-.002	.069	.025	-1.34	26.22 *	320/332
10	.001 (.51)	-.301 (-2.98)	-.0043	0	-.376	-.246	5.49	29.9	378/382

α and β represent the intercept and slope of an OLS regression of ex-day returns against percentage bid-ask spreads, t-statistics in parentheses.

The last six columns relate to the fitting of a two phased regression between ex-day returns and percentage bid-ask spreads, sorting by the latter. α_1 and β_1 are the intercept and slope of the first segment while α_2 and β_2 are the intercept and slope of the second segment.

The Chow statistic tests the alternate hypothesis that the data follow two distinct regression lines, compared to the null of a single regression line; * indicates the null is rejected at the 10% level.

X^* in the form a/b signifies a data points in the decile, and the ath data point represents the estimated break between the two regression lines.

**TABLE 7.23: Test of The Model Using The Tax Reform Act:
 Mean Ex-Day Returns in Quintile One by
 Percentage Bid-Ask Spreads.**

divyld decile	μ_{87q1}	μ_{88q1}	change $\mu_{88q1} - \mu_{87q1}$	t-stat. for $\mu_{88q1} > \mu_{87q1}$
1	.000624	.003587	.002963	.96
2	-.003570	-.002352	.001218	.50
3	-.000406	.001415	.001821	.73
4	-.000524	-.000732	-.000208	-.10
5	-.000268	.000758	.001026	.60
6	-.000795	.003750	.004545	1.63
7	.000721	.003184	.002463	1.05
8	-.002072	.00214	.004212	2.24
9	-.005262	-.002369	.002893	1.17
10	-.007616	.008232	.015848	1.87
all deciles	-.0010306	.0012028	.0022334	2.77

**TABLE 7.24: Test of The Model Using The Tax Reform Act:
 Mean Ex-Day Returns in Quintile Five by
 Percentage Bid-Ask Spreads.**

divy/d decile	μ_{87q5}	μ_{88q5}	$\mu_{87q5} - \mu_{88q5}$	significance for $\mu_{88q5} < \mu_{87q5}$
1	.000094	.000791	-.000697	-.19
2	-.001236	.000558	-.001794	-.36
3	-.003309	.001928	-.005237	-1.42
4	.003260	.008175	-.004915	-1.35
5	.001838	.000165	.001673	.45
6	.008246	.003913	.004333	.97
7	.004784	.005079	-.000295	-.07
8	.003869	.001326	.002543	.60
9	.008375	.001425	.00695	1.54
10	-.006356	-.005479	-.000877	-.26
all deciles	.0012151	.0012404	.0000253	.02

**TABLE 7.25: Test of The Model Using The Tax Reform Act:
Mean Ex-Day Returns in Quintiles One and Five by
Percentage Bid-Ask Spreads.**

divid decile	μ_{87q1}	μ_{87q5}	μ_{88q1}	μ_{88q5}	$\Delta_{q1} =$ $\mu_{88q1} - \mu_{87q1}$	$\Delta_{q5} =$ $\mu_{88q5} - \mu_{87q5}$	d-statistic= $\Delta_{q1} - \Delta_{q5}$	significance level of d-stat.
1	.000624	.000094	.003587	.000791	.002963	.000697	.0022656	not significant
2	-.003570	-.001236	-.002352	.000558	.001218	.001794	-.0005752	not significant
3	-.000406	-.003309	.001415	.001928	.001821	.005237	-.003415	not significant
4	-.000524	.003260	-.000732	.008175	-.000208	.004915	-.0051	not significant
5	-.000268	.001838	.000758	.000165	.001026	-.001673	.0026985	not significant
6	-.000795	.008246	.003750	.003913	.004545	-.00433	.008878	3%
7	.000721	.004784	.003184	.005079	.002463	.000295	.0021672	not significant
8	-.002072	.003869	.002140	.001326	.004212	-.002543	.006756	6%
9	-.005262	.008375	-.002369	.001425	.002893	-.00695	.0098427	4%
10	-.007616	-.006356	.008232	-.005479	.015848	.000877	.014971	10%
all deciles	-.0010301	.001215	.001203	.001240	.002233	.000025	.002208	not significant

Significance level of d-statistic is calculated using 1000 randomizations. The actual d-statistic in the table is compared to values obtained when data are randomly assigned to 1987 and 1988.

TABLE 7.26: Test of The Tax Penalty Model Using The Tax Reform Act: Mean Ex-Day Returns of Combined Quintiles One and Five by Percentage Bid-Ask Spreads.

div/d decile	μ_{87}	μ_{88}	g-statistic= $\mu_{88} - \mu_{87}$	significance of g-statistic
1	.0004174	.0017805	.0013631	not significant
2	-.0027171	-.0011699	.0015472	not significant
3	-.0018989	.0015492	.0034481	not significant
4	.0009473	.0035122	.0025649	not significant
5	.0004823	.0004652	-.0000171	not significant
6	.0038005	.0038321	.0000316	not significant
7	.0024872	.0040805	.0015933	not significant
8	.000156	.0017514	.0015954	not significant
9	.0026931	-.0005319	-.003225	not significant
10	-.0064743	-.005057	.001417	not significant
all deciles	-.0000122	.0012232	.0012354	not significant

Significance level of d-statistic is calculated using 1000 randomizations. The actual d-statistic in the table is compared to values obtained when data are randomly assigned to 1987 and 1988.

**TABLE 7.27: Test For The Identity of Long Term Marginal Investors
1987 Mean Ex-Day Returns of Highest Quintile by Percentage
Bid-Ask Spreads.**

	divyld	μ_{87q5}	t-stat for $\mu_{87q5} = 0$
	decile		
1		.000094	.03
2		-.001236	-.40
3		-.003309	-1.29
4		.003260	1.26
5		.001838	.66
6		.008246	2.05
7		.004784	1.16
8		.003869	1.14
9		.008375	2.48
10		-.006356	-2.29
	all deciles	.0012028	1.18

**TABLE 7.28: Test For The Identity of Long Term Marginal Investors
1988 Mean Ex-Day Returns of Highest Quintile by Percentage
Bid-Ask Spreads.**

	divyld	μ_{88q5}	t-stat for $\mu_{88q5} = 0$
	decile		
1		.000791	.02
2		.000508	.13
3		.001928	.73
4		.008175	3.22
5		.000165	.07
6		.003913	2.02
7		.005079	2.50
8		.001326	.52
9		.001425	.47
10		-.005479	-2.93
	all deciles	.0012404	.37

CHAPTER 8. EXTENSIONS

8.1 Dividend Yield Clienteles

In spite of controlling for the effects of dividend yield, clientele shifts can still interfere with the results. If clientele shifts do occur, i.e. if at some level of dividend yield the marginal investors changes from one tax bracket to another, the results may be effected because such a shift can occur within the dividend yield deciles' boundaries. In other words, unless dividend clientele shifts are perfectly aligned with the dividend yield decile boundaries, such clientele shifts mean that in at least some of the deciles, there are two (or possibly more) sets of marginal investors, each with a different value of R_t .

To be able to test the model accurately, I must ensure that tax clientele shifts do not occur within my dividend yield deciles. I therefore realign some dividend yield group boundaries to correspond to tax clientele shifts. I cannot any longer call these groups deciles, because now the boundaries have been moved to correspond to clientele change levels, with unequal number of observations in each group. This should not pose any problems for the direct test of dividend capture within each year, but it makes it difficult to test tax reform implications between years, as dividend

yield groups now correspond to different dividend yield ranges. However, when comparing results for 1987 and 1988, I can take sections of the dividend yield groups such that each section contains the same range of dividend yield for each year.

To investigate if such clientele shifts do indeed occur, I intend to use a variation of the program which fits a two phase regression to each dividend yield decile. In that program the data are sorted by transaction costs and for each data point a switch in the regression relationship is assumed, and the fit for two regressions is compared with the fit with a single regression. The point with the best improvement over the single line is taken as the point where a change in regression relationship occurs. Since the program always yields a switch point, a Chow test is performed to gauge how significant the change in relationship is.

To test for tax clientele shifts, the above procedure is applied to data sorted by dividend yield. From the theory section, dividend capture effects may be present, and would interfere with the detection of clientele shifts. However the two effects differ somewhat. Dividend capture effects are almost always continuous, and even when at some level of dividend yield ex-day returns change from being set by long term investors to being set by short term traders, the two

segments are joined at the split point. In the case of a tax clientele shift, on the other hand, the two segments are discontinuous at the switch point, with the segment corresponding to the higher dividend yield values lying below the segment corresponding to the lower dividend yield values. This follows from our expectation of the tax clientele effect that higher tax bracket investors are likely to prefer lower yield stocks and lower tax bracket investors are likely to prefer higher dividend yield stocks. For this reason instead of controlling the data for transaction cost deciles and using the whole range of dividend yields, I will still control by dividend yield deciles, and simply sort the data by dividend yield. The result is that a significant two phase relation will only show up when there is a clientele shift, and the dividend capture effects of varying dividend yield will not interfere with the measurement of tax clientele shifts. If significant clientele shifts are found, then the boundaries of the dividend yield groups in which they occur must be altered so that the clientele shift corresponds with the new boundary of the dividend yield group.

Results of this test for 1987 are shown in table 8.2 and for 1988 in table 8.3. The first noteworthy point is the significant negative slope for the tenth decile in both years. The single line regressing ex-day returns against dividend yield (not against percentage bid ask spreads as

before) yields a significant negative slope for the data in decile 10 during 1987 and 1988. Due to the positive correlation between dividend yield and percentage bid-ask spread (price is the denominator for both) such a significant negative slope interferes with the measurement of my model for the tenth decile. The reason why the slope is significant in decile 10 and not in other deciles is due to the large range of dividend yield, in decile 10. This decile lumps together dividend yields between .020949 and .1. Compare this large range to the range for the adjacent decile 9, which is from .015647 to .020948. There is no way around this problem, except ignoring the findings for decile 10. The important point is that the results for decile 10 in table 7.21 and table 7.22 do not refute the model of dividend capture. This is because the significant negative relation in tables 8.2 and 8.3, between dividend yield and ex-day returns, underlies the unexpected negative slopes in tables 7.21 and 7.22, between ex-day returns and percentage bid-ask spreads.

The other result in these tables is the presence of some significant Chow statistics. As stated previously a significant change in regression regimes when the data are sorted by dividend yield may be indirect evidence of tax clientele shifts. In any case, whatever the reason for these regime changes, they could interfere with the estimation of my model. The boundaries of the dividend yield groups (which

cannot now be called deciles) should be altered to correspond to the regime changes in tables 8.2 and 8.3.

In table 8.2 a significant Chow is observed in decile 5, and a high Chow, though not significant at the 10% level, is observed in decile 2. I use the last column in this table, which gives the dividend yield value corresponding to the change in regime, to redraw dividend groups 1,2,5 and 6 along the following dividend yield boundaries:

Group 1.	dividend yield 0	to	.00295
Group 2.	dividend yield .00296	to	.00515
Group 5.	dividend yield .00647	to	.00759
Group 6.	dividend yield .00760	to	.00762

Similarly in table 8.3 a significant Chow statistic is observed in decile 6, and another high Chow value, though not significant at the 10% level is observed in decile 8. Consequently groups 6,7 and 8 are reconfigured with the following dividend yield boundaries:

Group 6.	dividend yield .00748	to	.01077
Group 7.	dividend yield .01078	to	.01186
Group 8.	dividend yield .01187	to	.01733

With these new boundaries the original two phase regression

(with percentage bid ask sequence) was rerun for 1987 and 1988. The results are contained in tables 8.4 and 8.5. The old results are largely unaffected by the re-drawing of boundaries. In both tables 8.4 and 8.5 there is not a single dividend yield group where a previously insignificant parameter becomes significant or vice versa. Further the estimates of the parameters are little affected.

Summarizing the results of this section, I find that only in deciles 7 and 10 in 1987, and decile 10 in 1988 does dividend yield have an effect significant enough to interfere with the estimation of dividend capture effects. In these deciles the tests of dividend capture cannot be applied, and the results of dividend capture in these deciles should be ignored. In all the other deciles, however, dividend yield effects, due to tax clientele changes or otherwise do not interfere with the tests of dividend capture.

8.2 Residual Variance and Total Variance

It was stated in a previous section that holding costs include the costs of maintaining an undiversified position in dividend capture stocks. Below, I seek to explain why these costs are related directly to the residual variance of the stock obtained from fitting a single factor market model to stock returns.

If the short term trader is fully diversified, any risk from price changes is compensated for in the expected return of the stock. To understand the effects of an undiversified position I need to look separately at the two components of price risk; systematic risk and unsystematic risk. The systematic risk represents price changes due to market factors and is directly related to stock beta; a measure of how the stock price varies with respect to the market. On the other hand the unsystematic risk represents the part of price variation that is unique to the stock and is not related to market wide factors. The variance of the error term from the single factor market model (residual variance) is thus a measure of the unsystematic risk.

Whether diversified or not, traders are always compensated for the systematic component of price variation. This is the risk that is priced in the market. On the other hand the unsystematic risk reduces to zero in a fully diversified position, and that is why it is not priced in the market. The trader is therefore not compensated for any portion of unsystematic risk. By holding an undiversified position the trader bears extra costs due to non-zero unsystematic risk.

Putting it another way, if the holder is fully diversified, there are no holding costs, from either systematic or non-systematic risk. However if the holder is not fully

diversified, it is the unsystematic component of risk that is not being rewarded, resulting in holding costs. The costs could be from the use of hedging strategies, or they could arise from maintaining an unhedged position. The costs of using a hedging strategy may be increased due to the regulatory requirement for the position in the dividend paying stock to be 'at risk' to qualify for the 70% tax deduction.

Since residual variance is a measure of unsystematic risk, holding costs can therefore be expected to increase with residual variance. With respect to figure 2.1, it means the sloped segment shifts up with increasing residual variance. This would confuse my tests of the model, because as with dividend yield, I have more than one set of lines underlying the data sample.

To attempt to fix the position of the sloped segment, I must control for residual variance in much the same way as the data were split into dividend yield deciles to control for the effect of varying dividend yield. For residual variance however, splitting the data into residual variance deciles, within the existing dividend yield deciles leaves too few data points in each category. To maintain both a large enough sample and to control for residual variance effects, the data were split into residual variance **quartiles**.

Tables 8.7 through 8.10 contain the results for 1987 data. The results appear to be no better than the results without dividing the data into residual variance quartiles, as in table 7.21. Tables 8.11 through 8.14 contain the results for 1988 data. Again the results are no improvement over table 7.22, which contains 1988 data without dividing into residual variance quartiles.

One way to interpret these results is that residual variance does not significantly effect holding costs. This would imply dividend capture traders maintain diversified portfolios of dividend paying stocks.

There is additional recent evidence on the effect of holding costs on ex-dividend day returns. Eades, Hess and Kim in a 1991 Working Paper show that the opportunity cost of the funds invested in a dividend capture position are a part of holding costs. The authors show a time series relation exists between ex-day returns and the T-Bill rate. In effect, as the interest rate rises, increased holding costs shift the sloped segment in the model upwards, thereby raising ex-day returns.

8.3 Comparing Tax Regimes: Looking at 1983 Data

The absence of strong support for dividend capture during 1986, 1987 and 1988 may be the result of changes in the tax

laws not only during 1986-87 but also during 1984. It was the Tax Reform Act of 1984 that increased the minimum holding period from 16 to 46 days. For this reason, I compared results during 1987 and 1988 with results for 1983. The problem is that bid ask spreads for those earlier years are not present at the University of Washington. I obtained some closing bid-asks for NYSE stocks from Fitch Data Group, 130 Ceder Street, New York, NY 10006.

The data obtained from Fitch are not in machine readable format and need to be punched in. For this reason, only three dates during the first quarter of 1983 were purchased. The data for each date are in the form of sheets with closing bid-asks on that date for all NYSE stocks. Data for January 14, February 15 and March 15, 1983 were purchased. These data were used to obtain an average price and an average percentage bid-ask for each stock during the first quarter of 1983. Ex-day returns were calculated as for 1987 and 1988. The data set for the first quarter of 1983 contains 895 ex-dividend day returns.

Table 8.15 contains results for the two phased regression performed on the 1983 data. There is no significant support for dividend capture. The single regression coefficients are not significantly positive, and no significant kink of the form hypothesized by my model exists. The three significant

Chow statistics are associated with changes in relationships different from those hypothesized by the model.

The absence of better support for dividend capture in 1983 implies that the increased holding period after 1984 is not responsible for the lack of support for dividend capture in the data for the years 1987 and 1988. The above statement should be qualified slightly. The sample size for 1983 is much smaller than the aggregate set for 1987 or 1988. Each of the those sets, which show significant positive slopes are about four times as large as the data set for 1983. This smaller data size may be the reason for lack of significant positive slopes in 1983. This lack of results in 1983 also conflicts with the findings of Karpoff and Walkling (1990), where a positive slope is found for data containing ex-dividend dates between 1974 and 1985. In any case the important point is that the data for 1983, quarter 1 are not significantly better in terms of support for dividend capture than any quarter in 1987 or 1988.

8.4 Separating Public Utilities From The Sample

Reports in the financial press and anecdotal evidence suggest dividend capture occurs more in the stocks of public electric utilities than in other stocks. The reasons generally stated are high dividend yield, stable dividend policy and low price

variation.

Higher dividend yield means a higher expected abnormal ex-dividend day return before short term traders enter the market, implying higher profits to such short term trading. A low price variation implies low holding costs if the dividend capture position is unhedged. In terms of the model in this dissertation both these factors imply higher profitability for short term traders, and thus a higher incidence of dividend capture trading. A stable dividend policy on the other hand does not relate to any of the parameters of the model and the model makes no theoretical prediction about the effects of a stable dividend policy.

I used the Standard Industrial Classification codes (SIC codes) to pick out the electrical utilities, SIC code 4911. These include stocks which at some time were classified in this category, but later may have been reclassified into some other combined utility category, e.g. combined Electrical and Gas Utility. This category yielded a total of 72 stocks on the NYSE.

For 1987, the electrical utility category yielded 170 ex-day returns. Table 8.16 shows the results for this set. Most of these ex-day returns (161 out of 170) are in deciles 8, 9 and 10, and so only these deciles are reported. The only

difference is a slight increase in significance in the positive slopes, and negative intercepts in deciles 8 and 9. There is still no evidence of a kink in the data. Also as before, decile 10 does not show a positive relationship between ex-dividend day returns and percentage bid-ask spreads. This result does support the idea that dividend capture is no more prevalent in electrical utilities than in other stocks with the same level of dividend yield.

For 1988, the electrical utilities category provides 172 ex-dividend day observations. For 1988 there are no significant positive slope coefficients. These results are even weaker than the results of 1987 data for all stocks.

The results for electrical utilities further supports the conclusions arrived at the end of section 7. There is some evidence for dividend capture in 1987 in the form of a positive relationship between ex-day returns and percentage bid ask spreads. However, this relation is no more stronger for electrical utilities than for stocks in general. The evidence of short term dividend capture is weaker in 1988. This is consistent with the effects of the Tax Reform Act of 1986.

The above tests were repeated for all utilities, which include SIC codes from 4911 to 4971. This group contains 195

stocks on the NYSE. For 1987 this group had 403 ex-day returns. The results are shown in table 8.18, and are very similar to those for electrical utilities. The whole category of utilities shows evidence of dividend capture in 1987 similar to other stocks in general.

For 1988, this category had 395 ex-day returns. The results are shown in table 8.19. These are similar to table 8.17 for electrical utilities, and there is no significant positive slope. The results show that for 1988 the utilities group shows less evidence of dividend capture than other stocks in general. This is unexpected. I conclude that contrary to popular belief utilities are no more likely to be the targets of dividend capture than non-utility stocks with similar dividend yields.

In terms of the model's predictions this is not such an unexpected result. As stated utility stocks differ in that they are high dividend yield stocks with low price volatility and a stable dividend policy. The model does not predict any effect from a stable dividend policy; dividends are captured as and when available. As for high dividend yields, the tests are performed on dividend yield deciles. The effect of dividend yield within each decile is the same whether the stock is from the utility group or not. Although price volatility could conceivably effect ex-day returns through

the holding cost parameter in the model, the results of section 8.2 show such no evidence of such effects.

8.5 Anecdotal Evidence

The unexpected lack of support for dividend capture in the data prompted a desire to investigate anecdotal evidence from potential short term traders.

The most effective way of obtaining this was thought to be a questionnaire addressed to corporate treasurers. This questionnaire is attached as appendix A. It attempts to gauge the extent of short term dividend capture performed by corporations.

The questionnaire was addressed to 205 of the Fortune 500 companies. The largest 240 companies were looked at from the compact disclosure disk in the University of Washington business library. Out of these 240, full mailing addresses and names of officers were found on only 205.

Responses were obtained from 108 firms. all but two reported that they had not participated in dividend capture trading over the last twelve months. This is consistent with the idea that the removal of asymmetric taxation on income and capital gains has greatly reduced or even eliminated dividend capture

trading by corporations.

It should be pointed out that since provisions of the tax laws are specifically aimed at eliminating or greatly limiting short term dividend capture by corporations, there may be a strong unwillingness to admit to short term dividend capture on the part of corporate treasurers. The survey thus has rather limited value in gauging the extent of short term capture undertaken by corporations.

TABLE 8.1: Test for Tax Clientele Shifts, Combined 1986 Data Sorted by Dividend Yield

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*	yld*
1	.006	-1.22	.0034	.008	.099	-3.43	-34.0	4.3	81/103	.00252
2	-.006	1.70	.0007	.057	.055	19.2	-13.6	8.7	34/123	.00333
3	-.073 *	16.0 *	.0043	15.2	-.095	-3547	20.5	19.6 *	3/118	.00429
4	.053	-8.68	.0017	.019	-.161	-2.36	25.6	5.3	59/102	.00596
5	-.033	5.0	.0020	-1.09	-.063	16.7	9.08	6.3	14/125	.00661
6	.04	-4.32	.0044	-3.97	-.014	522	2.02	17.6 *	10/97	.00774
7	.001	-.016	.0010	5.94	.011	-661	-.978	11.6 *	3/89	.00901
8	.007	-.827	-.0042	181.6	.009	-16062	.953	11.1	3/139	.01131
9	-.013	.289	-.0083	0	.122	.566	-6.51	6.3	84/121	.01840
10	-.003	-.046	-.0036	-.097	-.028	4.16	.623	4.3	40/53	.02526

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.2: Test for Tax Clientele Shifts, Combined 1987 Data Sorted by Dividend Yield

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*	yld*
1	0	.403	0	-.044	-.002	268	.732	7.5	5/382	.000398
2	.004	-1.61	-.0014	-8.52	-.003	2899	.225	11.44	9/383	.002951
3	-.011	2.26	0	.0003	.431	-.168	-81.2	4.3	295/351	.005161
4	-.012	2.26	.0013	-.008	-53.9	1.50	8341	8.2	353/356	.006464
5	.005	-.311	.0028	.006	-91.8	-.485	12066	15.8 *	313/317	.007591
6	-.024	3.097	.0017	23.2	-.021	-3044	2.75	7.9	6/296	.007638
7	-.052 *	5.37 *	.0015	.620	-.042	-69.1	-4.45	3.8	39/252	.009205
8	.010	-.692	.0003	1.51	.014	-134	-.971	3.2	17/255	.011335
9	.013	-.925	-.0034	-7.28	.009	464	-.720	6.82	9/269	.015740
10	.006	-.330 *	-.0036	-.030	-.003	1.23	-.167	6.7	165/253	.027384

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.3: Test for Tax Clientele Shifts, Combined 1988 Data Sorted by Dividend Yield

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*	Yld*
1	-.001	.427	-.0005	0	.168	-.422	-59.9	8.4	242/304	.002603
2	.007	-1.91	.0003	.003	-.498	-.671	119	5.7	250/292	.004066
3	-.003	1.18	.0021	.938	.003	-.218	-.101	9.8	32/329	.004398
4	.010	-1.19	.0027	.013	2.26	-1.84	-352	6.8	315/338	.006380
5	.013	-1.52	.0026	.013	1.03	-1.52	-136.5	4.8	305/353	.007475
6	-.015	2.22	.0031	.003	4.61	-.043	-516	13.4 *	383/401	.008888
7	.003	-.034	.0029	.014	.320	-1.21	-28.7	5.0	385/455	.010773
8	.0004	.034	.0010	.294	.007	-25.6	-.433	13.9	97/386	.011867
9	.005	-.323	-.0014	-.086	-.014	5.27	.640	7.9	93/337	.017349
10	.008 *	-.432 *	-.0043	.001	-.037	-.161	.076	8.8	384/391	.050299

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.4: Direct Tests of Dividend Capture on Combined 1986 Data With Dividend Yield Groups Redrawn to Avoid Tax Clientele Shifts

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
2	.007 *	-.468 *	.0012	-.120	.005	27.2	-.394	7.8	11/127
3	.013 *	-.774 *	.0037	-.052	.013	11.6	-.828	4.9	11/114
5	.004	-.096	.0029	.003	.063	-.021	-1.72	5.5	129/134
6	-.001	.332	.0029	-.004	-.053	.936	2.82	12.1	63/91
7	.003	-.097	.0014	.002	.009	-1.37	-.471	11.5	16/86

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.5: Direct Tests of Dividend Capture on Combined 1987 Data With Dividend Yield Groups Redrawn to Avoid Tax Clientele Shifts

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.002	.161	-.0002	.001	-.068	-.080	2.27	14.4	360/390
2	-.003	.105	-.0017	-.001	.337	-.117	-6.0	18.7	371/375
5	.001	.183	.0028	-.004	-.018	.716	.781	7.4	259/313
6	-.004	.399 *	.0017	0	.261	.058	-5.97	10.6	291/300

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.6: Direct Tests of Dividend Capture on Combined 1988 Data With Dividend Yield Groups Redrawn to Avoid Tax Clientele Shifts

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
6	.002	.028	.0026	.004	.028	-.128	-.193	6.5	374/381
7	.004 *	-.103	.0027	.004	.092	-.001	-.024	21.5 *	546/567
8	0	.089	.0014	-.002	-.078	.278	1.85	16.3	274/287

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

**TABLE 8.7: Direct Test of Dividend Capture; Combined 1987 Data
Quartile 1 by Residual Variance**

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.004	-.252	.0024	.284	.002	-74.6	-.092	9.3	5/35
2	-.003	-.127	-.0044	.010	.020	-2.53	-.862	6.5	41/47
3	-.015 *	2.41 *	.0034	-.010	.246	1.61	-16.6	6.3	40/43
4	.002	-.226	.0004	.178	.001	-43.8	-.141	5.6	4/64
5	-.007	1.06	.0007	-.010	-.340	1.47	26.3	5.9	61/66
6	.001	-.310	-.0015	-.009	-.062	1.01	2.68	10.0	51/56
7	-.003	.554	.0019	-.075	-.008	15.8	.925	19.0 *	21/73
8	.003	-.430	-.0012	.012	.014	-2.11	-1.22	3.5	52/105
9	-.001	-.393	-.0058	-.001	-.062	-.369	3.38	12.5	122/160
10	-.005	-.049	-.0054	-.031	-.018	2.69	.640	7.9	45/115

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

**TABLE 8.8: Direct Test of Dividend Capture; Combined 1987 Data
Quartile 2 by Residual Variance**

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.012 *	.736	-.0051	-.009	.423	.396	-20.3	2.7	73/76
2	.003	-.354	-.0008	-.010	-.003	1.24	-.291	4.6	99/122
3	.001	-.295	-.0019	-.046	-.003	7.6	.019	3.5	13/94
4	-.007	.691	.0001	-.006	.077	.524	-4.65	10.8	96/116
5	.004	.038	.0040	-.017	-.019	2.64	1.04	12.8	90/114
6	-.010 *	1.02 *	.0015	-.025	-.021	3.49	1.79	4.3	31/89
7	.003	-.269	.0003	.003	-.186	-.154	9.05	15.6	57/64
8	-.003	.263	.0004	-.041	-.002	5.29	.18	5.9	24/83
9	-.016 *	.846 *	-.0028	-.042	-.029	3.15	1.4	5.0	32/68
10	-.003	.112	-.0009	-.760	.003	69.0	-.153	10.6	5/69

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10 level

**TABLE 8.9: Direct Test of Dividend Capture; Combined 1987 Data
Quartile 3 by Residual Variance**

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.005	-.261	.0016	-.044	0	10.0	.036	9.1	15/139
2	-.002	.018	-.0014	.046	.006	-8.93	-.425	9.7	15/128
3	.010	-.627	.0010	.014	.452	-1.01	-18.03	7.5	114/117
4	-.007	.628	.0020	-.027	-.033	2.57	1.67	8.7	83/111
5	.003	-.198	.0007	.014	.028	-1.65	-1.49	4.8	38/81
6	0	.102	.0014	.003	-.024	1.93	1.17	5.4	41/95
7	.003	.141	.0046	-.194	.001	22.8	.191	7.2	15/64
8	-.007	.449	.0004	-.014	-.422	.993	16.0	7.33	37/41
9	-.018	1.32 *	.0034	.040	-.005	-3.20	.806	4.6	14/27
10	-.001	.084	.0007	-.048	-.048	3.47	1.84	5.0	25/41

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

**TABLE 8.10: Direct Test of Dividend Capture; Combined 1987 Data
Quartile 4 by Residual Variance**

divyld decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.003	.227	.0005	.010	-.078	-.653	2.51	12.7	109/132
2	-.005	.227	-.0006	.002	.337	-.209	-6.0	12.7	82/86
3	.006	-.337	-.0005	-.001	-.084	.109	1.3	10.3	91/97
4	.001	.104	.0034	-.180	-.003	24.3	.244	11.8	6/65
5	-.001	.317	.0060	.101	.007	-16.1	.041	6.5	6/65
6	-.003	.406	.0056	-.008	-.036	2.01	1.46	5.6	15/56
7	-.028 *	1.24 *	-.0015	-.010	-.095	.246	2.92	6.8	48/51
8	.001	.18	.0057	.087	.021	-8.77	-.346	5.9	6/26
9	-.037 *	1.95 *	.0080	-.074	-.061	4.34	2.54	3.7	8/14
10	.003	-.377	-.0090	-.017	-.059	.80	.925	5.2	15/28

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

**TABLE 8.11: Direct Test of Dividend Capture; Combined 1988 Data
Quartile 1 by Residual Variance**

divy/d decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.006	-.714 *	.0001	-.003	-.002	.998	-.275	4.7	21/32
2	-.008 *	.696	-.0024	-.006	-.033	.592	2.84	8.2	24/40
3	-.001	.269	.0015	-.009	-.005	1.49	.458	2.6	25/44
4	-.005	.822 *	.0028	.009	-.082	1.41	4.14	7.9	58/63
5	-.002	.576	.0033	.007	.003	-2.07	.201	3.8	9/47
6	-.002	.421	.0017	-.010	-.009	2.11	.968	4.7	30/83
7	.005	-.355	.0018	.003	-.322	-.121	16.2	21.0	107/110
8	.002	.099	.0025	.003	.023	-.054	-.715	3.0	119/127
9	-.005 *	.242	-.0019	-.007	-.10	.494	4.68	8.0	185/194
10	-.004	.069	-.0031	0	.014	-.30	1.43	5.1	121/169

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

**TABLE 8.12: Direct Test of Dividend Capture; Combined 1988 Data
Quartile 2 by Residual Variance**

divy/d decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.006	.262	-.0031	.009	-.114	-1.11	4.43	24.6	44/48
2	-.013 *	1.37 *	.0011	-.008	.60	.802	-29.8	12.7	65/68
3	-.010 *	1.16 *	.0027	.003	-.047	-.155	3.1	12.5	48/67
4	-.004	.5	.0020	.002	.047	-.183	-1.68	7.1	56/66
5	.004	.027	.0042	-.003	-.418	.782	19.5	17.1	80/85
6	.004	-.020	.0034	-.224	0	51.8	.212	20.9	3/88
7	.007 *	-.219	.0037	-.004	.003	.945	-.156	6.6	65/101
8	.006	-.657 *	-.0014	-.001	-.223	.027	7.11	18.1	93/96
9	0	-.304	-.0039	-.007	-.097	.283	3.0	9.7	56/59
10	0	-.151	-.0028	-.003	-.064	.044	1.79	7.4	88/97

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

**TABLE 8.13: Direct Test of Dividend Capture; Combined 1988 Data
Quartile 3 by Residual Variance**

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	.010 *	-.614	.0014	-.021	.008	4.24	-.465	2.3	9/81
2	-.001	.225	.0020	.005	-.124	-2.36	4.79	21.4	64/73
3	.003	-.195	.0005	.050	.010	-5.90	-5.49	12.0	26/94
4	-.002	.138	.0001	.043	.002	-7.69	-.029	7.8	14/84
5	.007 *	-.367 *	.0015	.001	-.017	.243	.470	7.8	80/99
6	.005	-.231	.0022	.021	.009	-2.35	-.398	4.6	45/105
7	.004	-.184	.0020	.007	.060	-4.73	-2.28	7.5	90/104
8	-.002	.210	.0012	.006	.030	-.473	-.640	6.7	74/83
9	-.007	.386	-.0007	.005	.028	-.524	-.180	11.8	40/43
10	-.006	.034	-.0052	-.008	.209	.156	-5.31	6.1	56/59

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

**TABLE 8.14: Direct Test of Dividend Capture; Combined 1988 Data
Quartile 4 by Residual Variance**

divy/d decile (signif.)	α (signif.)	β (signif.)	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
1	-.003	.120	-.0008	.034	-.001	-5.80	.063	7.7	11/143
2	.005	-.334	-.0003	-.017	-.001	1.52	-.301	12.7	82/111
3	.006	-.226	.0032	-.020	.047	-1.24	-1.20	8.6	100/124
4	-.003	.428 *	.0048	-.001	.190	.294	-3.38	5.3	120/124
5	.006 *	-.217	.0021	-.003	-.016	3.22	-.386	21.2 *	119/122
6	.004	.022	.0046	.009	.028	-.281	-.193	4.2	116/123
7	.004	-.028	.0037	.003	.025	-.156	-.698	9.5	72/139
8	.004	-.130	.0013	-.003	-.046	.341	.897	5.2	63/76
9	-.004	.362	.0041	.002	.083	-.168	-1.74	11.0	25/36
10	.001	-.399	-.0096	-.016	-.187	.486	2.64	24.6 *	50/57

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.15: Direct Test of Dividend Capture; Data For 1983, Quarter 1

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X^*
1	.005	-.054	.0048	-.018	0	9.30	.332	5.9	5/86
2	-.007	.980 *	.0032	-.010	-.068	1.49	4.38	4.6	56/73
3	.004	.039	.0049	.043	.009	-7.26	-.162	9.7	26/86
4	.006	.330	.0095	-.008	-.254	1.95	10.2	15.4	57/63
5	.001	.100	.0024	.003	-.017	.372	1.06	5.1	30/74
6	.006	-.289	.0033	.005	.054	-.414	-3.25	11.5	51/88
7	-.003	.896 *	.0064	-.019	-.013	3.47	1.40	9.2	69/135
8	.004	.185	.0062	.002	.123	.404	-4.97	9.2	172/180
9	-.002	.344	.0017	.017	-.001	-2.38	.430	10.0	49/82
10	.008	-.251	.0048	.004	-.148	.206	6.72	14.9	25/28

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.16: Direct Test of Dividend Capture On Electric Utilities' Stocks; Combined Data for 1987

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
8	-.017 ***	1.29 ***	-.0020	-.015	.038	1.01	-1.19	6.8	22/26
9	-.015 ***	.702 **	-.0060	-.014	-.425	.652	20.1	5.8	105/108
10	.001	-.475	-.0048	-.007	.042	-.023	-2.78	13.5	14/27

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

** Parameter significantly different from zero at the 5% level

*** Parameter significantly different from zero at the 1% level

TABLE 8.17: Direct Test of Dividend Capture On Electric Utilities' Stocks; Combined Data for 1988

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
8	.007	-.353	.0020	.025	-.115	-1.79	6.27	3.6	11/14
9	-.003	-.100	-.0044	-.008	-.017	.353	.200	6.5	102/108
10	-.009	.213	-.0061	.039	-.016	-4.55	.824	12.7	25/45

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

TABLE 8.18: Direct Test of Dividend Capture On All Utilities' Stocks; Combined Data for 1987

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
8	-.011 **	.723 **	-.0018	-.056	-.017	7.02	1.11	5.5	25/88
9	-.012 ***	.553 **	-.0047	-.001	-.018	-.432	.984	8.2	171/202
10	-.008	.066	-.0072	.014	.020	-2.66	-1.58	8.62	20/48

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

** Parameter significantly different from zero at the 5% level

*** Parameter significantly different from zero at the 1% level

TABLE 8.19: Direct Test of Dividend Capture On All Utilities' Stocks; Combined Data for 1988

divyld decile	α	β	mean ex-day return	α_1	α_2	β_1	β_2	Chow	X*
8	.006	-.358	.0008	.040	.011	-4.23	-.619	5.6	20/69
9	-.005 **	.166	-.0029	-.004	.996	.051	-34.7	21.0	212/215
10	-.004	-.094	-.0055	.029	.003	-3.39	-.413	9.3	33/74

* Parameter significantly different from zero at the 10% level, or Chow value significant at the 10% level

** Parameter significantly different from zero at the 5% level

*** Parameter significantly different from zero at the 1% level

CHAPTER 9. CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The model of observed ex-dividend day returns provides two distinct tests of dividend capture. First the model suggests that ex-day returns should lie in two distinct regimes when the data are sorted by percentage bid-ask spreads. The first regime contains stocks that are the targets of short term trading, and for which ex-day returns vary directly with percentage bid-ask spreads. The second regime contains stocks for which ex-day returns are set by marginal long term investors. Ex-day returns for the second regime do not vary with percentage bid ask spread. Percentage bid-ask spreads are the separating variable, with lower percentage bid-ask stocks lying along the short term trader segment and higher percentage bid-ask stocks lying along the long term marginal investor segment.

Second, the model predicts that the Tax Reform Act of 1986 causes opposing movements in mean ex-day returns for the two segments. Changes in corporate tax rates cause an upward movement in ex-day returns when corporate short term traders are setting ex-day returns. Changes in individual tax rates cause a downward movement in ex-day returns when ex-day returns are set by long term marginal investors.

The first test thus consists of estimating a switching regression for the data, after sorting by the independent variable; percentage bid-ask spreads. The dependant variable is abnormal ex-day returns. However, little evidence is found of a two phased relationship as predicted by the model.

However, weak evidence of dividend capture is still found. The evidence consists of positive slopes for the single regression between ex-day returns and percentage bid-ask spreads. This is similar to the results in Karpoff and Walkling (1990).

The second test consists of estimating the significance of both an upward movement in mean ex-day returns for low transaction cost stocks and a the significance of a downward movement in mean ex-day returns for high transaction cost stocks. The lowest transaction cost (percentage bid ask-spread) quintile is assumed to contain mostly stocks for which short term traders are setting ex-day returns, while the highest transaction cost quintile is assumed to contain mostly stocks for which long term marginal investors are setting ex-day returns. The empirical results support an upward movement in mean ex-day returns for the stocks in transaction cost quintile 1, as predicted by the model. However, mean ex-day returns for the stocks in transaction cost quintile 5 do not move down significantly; in fact

these returns do not show a significant movement in any direction.

Weak evidence for dividend capture trading therefore exists in two forms. First, the positive slopes in the higher dividend yield deciles for 1987 and 1988 are consistent with dividend capture. Second, the behavior of the mean ex-day returns for the lowest and highest transaction cost quintiles is in accordance with the predictions of the Tax Reform Act only if at least some stocks' ex-day returns are being set by dividend capture traders.

The evidence for dividend capture is strongest in dividend yield decile 9. Dividend capture may also be significant in decile 10. One reason the decile 10 data do not support dividend capture may be that the great range for dividend yield in decile 10 means that dividend yield is not fixed, and the model is miss-specified.

I also find that Electric Utilities' stocks show strong evidence of dividend capture. However these stocks are mostly concentrated in decile 9, and are no more apt to be the targets of dividend capture than other stocks with similar dividend yields.

The model also suggests tests for both the identity of short

term traders and the identity of long term marginal investors. If corporations are short term traders, then the model predicts mean ex-day returns for stocks in the lowest transaction cost quintile will rise as a result of the Tax Reform Act. As shown in table 7.23, this is the case. This supports the proposition that short term traders are corporations and not dealers.

The level of mean ex-day returns for stock in transaction cost quintile 5 can be used to test for the identity of long term marginal investors. By the Tax Penalty Hypothesis, if individuals are long term marginal investors, then mean ex-day returns in transaction cost quintile 5 should be positive. On the other hand if long term marginal investors are corporations, then mean ex-day returns in transaction cost quintile 5 should be negative. The empirical tests on 1987 and 1988 data find mostly positive ex-day returns in dividend yield deciles 1 through 9, but strongly significant negative ex-day returns in dividend yield decile 10. The evidence supports the notion that in the highest dividend yield stocks corporations are long term marginal investors, while in all other deciles individuals are long term marginal investors.

The fact that a two phase regression does not explain ex-day returns even though indirect evidence of dividend capture is

obtained suggests three possible measurement problems. First is the problem of estimating a kink for aggregate data even if each stock follows the constraints of the model. This problem is the result of the confounding effects of dividend yield, tax or other clienteles. The positions of the lines in figures 2.1 and 2.2 change with changes in dividend yield, tax brackets and holding costs.

The second problem relates to the choice of proxies. Percentage bid-ask spreads are used to proxy for actual full transaction costs, although these costs are only one component of the full costs of transacting. Also, actual ex-post ex-day returns are used to proxy for ex-ante expected ex-day returns.

The third problem relates to the effect of information on stock prices even on the ex-dividend day. These effects cause errors in measuring the real ex-dividend effect which result solely from the stock trading without the dividend. This problem becomes less significant as the sample size increases. In a large enough sample the effects of information unique to particular stocks should cancel out and only the ex-dividend effect is left.

Useful future research may focus on reducing the effects of the above three problems. Although I attempted to fix the

level of holding costs by controlling for residual variance, the substantially fewer data points remaining in each decile may hide the significance of this factor. Including execution and other fixed transaction costs may provide a more accurate proxy for total transaction costs.

The highest transaction cost quintile which represents stocks for which long term investors are setting ex-day returns could provide future tests for tax clientele effects. An empirical investigation of tax clienteles that focuses on stocks in this highest transaction cost category would be largely free of the confounding effects of dividend capture by short term traders.

REFERENCES

- Arthur Andersen and Co., 1986, Tax Reform 1986: Analysis and Planning.
- Barclay, M., 1897, Dividends, Taxes and Common Stock Prices: The Ex-Dividend Day Behavior of Common Stock Prices Before The Income Tax, *Journal of Financial Economics*, 19, 31-44.
- Booth, L. D., and D. J. Johnston, 1984, The Ex-Dividend Day Behavior of Canadian Stock Prices: Tax Changes and Clientele Effects, *Journal of Finance*, 39, 457-476.
- Branch, B. and W. Freed, 1977, Bid-Asked spreads on the Amex and The Big Board, *Journal of Finance*, 32, 159-163.
- Brown, R. L., J. Durbin and J. M. Evans, 1975, Techniques for Testing the Constancy of Regression Relationships over time, *Journal of The Royal Statistical Society, Series B*, 37, 149-192.
- Brown, K. C. and S. L. Lummer, 1986, A Re-examination of The Covered Call Option Strategy For Corporate Cash Management, *Financial Management*, Summer 1986, 13-17.
- _____, 1984, The Cash Management Implications of a Hedged Dividend Capture Strategy, *Financial Management*, Winter 1984, 7-17.
- Chow, G. C., 1960, Tests of Equality Between Sets of Coefficients in Two Linear Regressions, *Econometrica*, 28, 3, 591-605.
- Commerce Clearing House, 1988, Internal Revenue Code: Income, Employment, Estate and Gift Tax Provisions As of May 1, 1989.
- Eades, K. M., P. Hess and E. H. Kim, 1984, On Interpreting Security Returns During The Ex-Dividend Period, *Journal of Financial Economics*, 13, 3-34.
- Eades, K. M., P. Hess and E. H. Kim, 1991, Time Series Variation in Dividend Pricing: What The Dividend Anomalies Are About, Working Paper.
- Earnst and Whinney, 1986, Tax Reform - 1986: An Analysis of The Internal Revenue Code of 1986.
- Elton, E. J., and M. J. Gruber, 1970, Marginal Stockholder Tax Rates and The Clientele Effect, *Review of Economics and Statistics*, 68-74.
- Elton, E. J., M. J. Gruber and J. Rentzler, 1984, The Ex-Dividend Day Behavior of Stock Prices; A Re-Examination of The Clientele Effect: A Comment, *Journal of Finance*, 39, 551-

- Elton, E. J., M. J. Gruber and J. Rentzler, 1984, The Ex-Dividend Day Behavior of Stock Prices; A Re-Examination of The Clientele Effect: A Comment, *Journal of Finance*, 39, 551-561.
- Fedenia and Grammatikos, 1989, Portfolio Rebalancing and The Effective Taxation of Dividends and Capital Gains Following The Tax Reform of 1986, Working Paper.
- Gallant and Fuller, 1973, *Journal of The American Statistical Association* 68, 144-147.
- Glosten, L. R. and L. E. Harris, 1988, Estimating The Components of The Bid-Ask Spread, *Journal of Financial Economics*, 21, 123-142.
- Grammatikos, T., 1989, Dividend Stripping, Risk Exposure and The Effect of The 1984 Tax Reform Act on The Ex-Dividend Day Behavior, *Journal of Business*, 62, 157-173.
- Heath, D. C. and R. A. Jarrow, 1988, Ex-Dividend Stock Price Behavior and Arbitrage Opportunities, *Journal of Business*, vol. 61, no.1, 95-108.
- Hinckly, D. V., 1969, Inference About The Intersection in Two Phase Regression, *Biometrika*, 56, 3, 495-504.
- Holthausen, R., R. Leftwich and D. Mayers, 1987, The Effect of Large Block Transactions On Security Prices: A Cross-Sectional Analysis, *Journal of Financial Economics*, 19, 237-267.
- Hudson, 1966, *Journal of The American Statistical Association* 61, 1097-1129
- Johnston, J, 1984, *Econometric Methods*, McGraw Hill Book Company.
- Kalay, A., 1982, The Ex-Dividend Day Behavior of Stock Prices: A Re-Examination of The Clientele Effect, *Journal of Finance*, 37, 1059-1069.
- Kaplanis, C. P., 1986, Options, Taxes and Ex-Dividend Day Behavior, *Journal of Finance*, 41, 411-424.
- Karpoff, J. M. and R. A. Walkling, 1988, Short-Term Trading Around Ex-dividend Dates, *Journal of Financial Economics*, 21, 1-8.
- Karpoff, J. M. and R. A. Walkling, 1990, Dividend Capture in NASDAQ Stocks, Working Paper.

- Koski, J. L., 1991, Market Segmentation and the Identification of Marginal Traders on Ex-Dividend Days: A Microstructure Analysis, Working Paper, Stanford University, Graduate School of Business.
- Lakonishok, J. and T. Vermaelen, 1983, Tax Reform and Ex-Dividend Day Behavior, *Journal of Finance*, 38, 1157-1179.
- Lakonishok, J. and T. Vermaelen, 1986, Tax Induced Trading Around Ex-Dividend Days, *Journal of Financial Economics*, 16, 287-319.
- Long, J. B. Jr, 1977, Efficient Portfolio Choice With Differential Taxation of Dividends and Capital Gains, *Journal of Financial Economics*, 5, 25-53.
- Michaely, R., 1989, Ex-Dividend Price Behavior: The Case of The 1986 Tax Reform Act, Working Paper, New York University.
- Modigliani, F., 1982, Debt, Dividend Policy, Taxes, Inflation and Market Valuation, *Journal of Finance*, 37, 255-273.
- Quandt, 1958, The Estimation of The Parameters of a Linear Regression System Obeying Two Separate Regimes, *Journal of The American Statistical Association*, 53, 873-880.
- Quandt, 1960, Tests of The Hypothesis That a Linear Regression System Obeys Two Separate Regimes, *Journal of The American Statistical Association*, 55, 324-330.
- Research Institute of America ,1986, Complete Analysis of The 1986 Tax Reform Act.
- Richardson, G., S. E. Sefcik and R. Thompson 1986, A Test of Dividend Irrelevance Using Volume Reaction To A Change In Dividend Policy, *Journal of Financial Economics*, 17, 313-333.
- Riddell, W. G., 1975, Recursive Estimation Algorithms For Economic Research, *Annals of Economic and Social Measurement*, 4, 397-406.
- Riddel, W. G., 1980, *Journal of Statistical and Computational Simulation*, 10, 95-101.
- Roll, R., 1984, A Simple Implicit Measure of The Bid-Ask Spread In An Efficient Market, *Journal of Finance*, 39, 1127-1139.
- Stoll, H. R., Inferring The Components of the Bid-Ask Spread: Theory and Empirical Tests, *Journal of Finance*, 44, 115-134.

Zivney, T., and M. Alderman, 1986, Hedged Dividend Capture With Stock Index Options, *Financial Management*, Summer 1986, 5-12.

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Ph. D. Business Administration	Univ. of Washington	1991
MBA Finance	Brigham Young University	1987
B.Sc Electrical Engineering	Loughborough University, U.K.	1978

AREAS OF INTEREST

Corporate and International Finance

DISSERTATION TOPIC

Dividend Capture And The Tax Reform Act of 1986