MARGINAL STOCKHOLDER TAX RATES
AND THE CLIENTELE EFFECT

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The determination of marginal stockholder tax rates is an important and unresolved issue in the economic literature. Marginal stockholder tax brackets play an important role in stock valuation models [1, 6, 14], in normative investment and dividend policy models [11, 16], and in descriptive capital allocation models [7, 8, 10, 12].

The purpose of this paper is to present and test a method of determining marginal stockholder tax brackets and to explore the implications of our findings for corporate investment policy, corporate dividend policy, and the assumption of market rationality.

In the first section of this paper we expand upon the reasons for studying marginal stockholder tax brackets. In the next section we show how marginal stockholder tax brackets can be inferred from the ex-dividend behavior of common stock. In the third and fourth sections we compute marginal stockholder tax brackets and discuss their implications for capital theory.

Reasons for the Study

While stockholder tax brackets are interesting in themselves, they are of primary importance because of the role they play in establishing the firm's cost of capital. In capital theory the cost of retained earnings is defined as that rate which makes a firm's marginal stockholders indifferent between earnings being retained or paid out in the form of dividends. Because dividends are taxed at a different rate than capital gains the cost of retained earnings is a function of the marginal stockholder's tax bracket. This tax rate is therefore necessary in order to accurately determine the firm's optimal investment policy.

Knowledge of marginal stockholder tax brackets will also allow us to draw inferences about the importance of dividend policy. Such inference could be made if we find a strong relationship between corporate dividend policy and investor tax rates. The establishment of this relationship would provide evidence that supports the clientele effect of Miller and Modigliani [13] (each firm is assumed to have a body of stockholders who find its dividend policy optimum). Further, such a finding means that a change in dividend policy might cause a change in clientele and this could be costly. 2

The final reason for studying the ex-dividend behavior of common stock is that it can provide evidence of rationality. Most of the work in investment theory assumes rationality on the part of stockholders (for example, almost all valuation models). This paper provides evidence that a theory based on rational stockholder behavior is really descriptive of their behavior.

Despite the importance of marginal stockholder tax rates to financial theory and practice there have been few attempts to identify stockholder tax brackets. Those attempts which have been made have relied on either a survey of a firm's stockholders or the collection of tax data for all stockholders in the economy. Neither of these methods attempts to identify tax rates for stockholders at the margin. In addition, the latter method implicitly makes the

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1 A distinction has been drawn between investment policy and dividend policy. The same investment policy can be met by using different combinations of retained earnings and external financing. The question remains as to whether dividend policy per se affects firm value. See [13].

2 One type of cost would be the transaction costs incurred by both buyers and sellers as the firm's clientele changes. Furthermore, there should be at least a short-run unfavorable price movement as the change in dividend policy is more apparent to those investors who find it less favorable (present stockholders) than to those who find it more favorable. For an estimate of the effect of a change in clientele on a firm's cost of retained earnings, see Elton and Gruber [5].
assumption that the tax rates of stockholders in all corporations are identical.

The Relationship between Ex-dividend Behavior and Stockholder Tax Rates

The ex-dividend behavior of a corporation's common stock should be related to the tax rates of its marginal stockholders.\(^3\)

A stockholder selling stock before a stock goes ex-dividend loses the right to the already declared dividend. If he sells the stock on the ex-dividend day he retains the dividend but should expect to sell it at a lower price (because of this dividend retention). In a rational market the fall in price on the ex-dividend day should reflect the value of dividends vis-à-vis capital gains to the marginal stockholders. Since dividends and capital gains are taxable at different rates, the relative tax rate on these two types of income affect the decision. If this formulation of the ex-dividend behavior of common stocks is correct, then one can infer marginal stockholder tax brackets from observing the ex-dividend behavior of common stocks. This will now be done more formally.

Starting with the premise that the stockholder wishes to maximize his after-tax wealth we can derive an expression between the ex-dividend behavior of common stock prices and the marginal tax rates of marginal stockholders.

Let: \( P_B = \text{Price on the day before the stock goes ex-dividend.} \)

\[ P_A = \text{Price of the stock on the ex-dividend day.} \]
\[ P_C = \text{Price at which the stock was purchased.} \]
\[ t_o = \text{The tax rate on ordinary income.} \]
\[ t_c = \text{The capital gains tax rate.} \]
\[ D = \text{The amount of the dividend.} \]

If a shareholder were to sell his stock in a corporation before it goes ex-dividend his per share wealth would be equal to the price he receives for the stock \( P_B \) minus the tax he must pay on any capital gain incurred by owning the stock \( t_c(P_B - P_C) \).

If he were to sell on the day the stock goes ex-dividend his wealth per share would be equal to the dividend \( D \) times one minus his marginal tax rate on ordinary income \( (1 - t_o) \) plus the after tax return on the sale of the share \( (P_A - t_c(P_A - P_C)) \). For him to be indifferent as to the timing of his sale, the wealth received from either course of action must be the same. That is: \(^4\)

\[
P_B - t_c (P_B - P_C) = P_A - t_c (P_A - P_C) + D (1 - t_o)
\]

Rearranging (1) we get \(^8\)

\[
\frac{P_B - P_A}{D} = \frac{1 - t_c}{1 - t_o}.
\]

The statistic \( (P_B - P_A)/D \) represents the ex-dividend behavior that would cause a stockholder with a particular set of tax rates \( t_o \) and \( t_c \) to be indifferent as to the timing of purchases and sales of common stock. For the market to be in equilibrium the price movement on the ex-dividend day must be such as to leave prospective (marginal) buyers and sellers of the

\(^3\)Discussion of the ex-dividend behavior is not new in the financial literature [see 3, 3, 15]. A large part of the literature states that the price of a share of stock should, and does, fall by the amount of the dividend on the ex-dividend day. The proponents of this approach usually state that the assets per share fall by the amount of the dividend, and thus the price per share should fall by this amount. The wide acceptance of this approach is best illustrated by its being institutionalized in the regulation of the New York Stock Exchange. At the opening of the ex-dividend day all buy and sell orders on the specialists' books are lowered by the amount of the dividend. If our model is correct, this should in general work to the disadvantage of those individuals with orders on the specialists' books. If the seller has an ordinary income tax rate greater than zero the value of his stock should have dropped by less than the amount of the dividend.

Although most theoretical analysis would indicate otherwise, the published empirical work on the ex-dividend behavior of common stock indicates that the price has fallen by less than the amount of the dividend. This tendency while present in all previous tests has not proved to be statistically significant.

\(^4\)Actually, both sides of this equation should be adjusted for the transaction costs incurred in selling stock. The incremental transaction costs are the transaction costs on the decrease in stock price. Elsewhere [4] we have argued that 1 per cent might be a reasonable estimate of transaction costs. Since the reduction in price on the ex-dividend day is our statistic, our statistic could be off by 1 per cent.

\(^8\)A similar conclusion is reached if the decision is analyzed from the buyers side. In this case if the buyer purchases the stock before the ex-dividend day then he receives the stock and the after-tax value of the dividend. If he buys the day the stock goes ex-dividend he receives the stock, pays a reduced price and incurs an increased tax liability. Setting up the above in equation form and rearranging we would again derive (2) with one qualification. Since the payment of the tax liability is delayed, the denominator of (2) is reduced. Given reasonable time horizon this should not significantly affect the magnitude of the implied tax bracket. Evidence that time horizon is generally short is contained in Orner [14].
stock indifferent as to whether they buy before or after the stock goes ex-dividend. If the expected ex-dividend price was either too high or too low marginal buyers and/or sellers would change the timing of their purchases or sales until stock prices were in equilibrium. That is, until their after-tax wealth would be the same whether they sold before or after the stock went ex-dividend. The statistic \((P_B - P_A)/D\) must then reflect the marginal tax rates of the marginal stockholders and one should be able to infer these tax rates by observing \((P_B - P_A)/D\). This is what we shall do in the next section.

Tests of Our Statistic

In order to test our hypothesis, we examined the behavior of all stocks listed on the New York Stock Exchange that paid a dividend during the period April 1, 1966 to March 31, 1967, and were traded on both the ex-dividend day and the prior day. We defined \(P_B\) as the closing price on the day before a stock went ex-dividend. \(P_A\) was measured by the closing price on the ex-dividend day. We used closing rather than opening prices because all orders on the specialists' books are adjusted by the amount of the dividend. Consequently, the first trade is likely to be a biased estimate of the equilibrium market price. Since we had no way of handling this bias, we had to reject opening prices.

Table 1 lists the average value of the statistic \((P_B - P_A)/D\) for our entire sample. The probability that the statistic has a value of one or more (price fell by the amount of the dividend) is less than 0.015. Furthermore, the implied average marginal tax bracket for stockholders on the New York Stock Exchange seems reasonable. Our estimate of 36.4 per cent agrees closely with the results reported by Yolivet [9]. He attempted to determine the marginal tax rates that would be paid by analyzing historic tax returns. He estimated the tax rate to be 36 per cent for the year 1965.

Our use of closing prices on the ex-dividend day might raise questions of bias. A whole trading day has elapsed since the stock went ex-dividend and part of the price movement we attribute to tax effects might actually be due to a systematic shift in market prices. For example, if the market increased in price on the day a stock sold ex-dividend, \(P_A\) would tend to increase, decreasing the value of our statistic, and contributing to the fact that our statistic appears to be significantly different from one.

| Table 1: Data on the Statistic \(
| \frac{P_B - P_A}{D}
| \)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Observations</td>
<td>Mean</td>
<td>Standard Deviation of Mean</td>
<td>Probability That Mean is One or More</td>
<td>Implied Tax Bracket</td>
</tr>
<tr>
<td>Raw Data</td>
<td>4148</td>
<td>.7557</td>
<td>.0996</td>
<td>.013</td>
</tr>
<tr>
<td>Data Adjusted by Index</td>
<td>4148</td>
<td>.7858</td>
<td>.0878</td>
<td>.0075</td>
</tr>
</tbody>
</table>

\(*P_B - P_A = \frac{(1 - t_o)}{1 - t_n}\)

\(t_o\) will be one-half of \(t_n\) or 15 per cent, whichever is lower. For any particular ordinary income tax rate one and only one capital gains tax rate is appropriate. For example, in Table 1, the assumption that the capital gains tax is one-half the income tax rate holds because the implied ordinary tax rate is less than 50 per cent.

The presence of a bias favorable to our hypothesis was checked in two ways. First, the movement of the New York Stock Exchange index during the period we calculated our statistic was examined. As can be seen from

\({}^a\)From the central limit theorem, the mean is normally distributed with a standard deviation equal to the standard deviation of the population divided by the square root of the number of observations. This result is used to test the statistical significance of our statistic.

\({}^b\)Weston and Brigham [17] made an earlier attempt to define stockholder tax brackets using a method analogous to Jolivet. They found a rate of 46 per cent for the year 1965. Neither of these results are fully comparable with ours. Both authors exclude institutional investors from their studies and both look at a weighted (by ownership) average tax rate. Nevertheless, their estimates can be considered as defining a general area in which we would expect to find marginal tax rates.

\({}^c\)The New York Stock Exchange index is not the ideal index for our purposes. We would like to have an index that weights equally a movement in any stock’s price. Unfortunately, the New York Stock Exchange index weights
table 2, the index increased during six months and decreased during six months. Furthermore, its ending level 49.52 is quite close to its opening level of 48.76. These two reasons are in fact why we selected this period of time. However, it is still possible that stocks went ex-dividend primarily on days the market was increasing. To check this we did the following. We counted the number of stocks that went ex-dividend on a particular day and multiplied this number times the change in the New York Stock index. For the sample year this yielded a net positive change of $8.30 in 4,148 observations or about two tenths of a cent per stock. Although this would tend to decrease our statistic this is so small that it should have a minimal influence on our results.

To further control against any problem of bias we adjusted our data by the market index. That is, we took the price on the ex-dividend day and multiplied it by the ratio of the index on the day before the stock goes ex-dividend to the index on the ex-dividend day. We then recomputed the results. As can be seen from table 1, our results remain essentially the same. The test statistic is significantly less than one at the 0.01 level and the inferred marginal tax bracket becomes 35.1 per cent.\footnote{price movements by the total market value of the firm's stock. Although this means the index is not ideal, it is closer to what we used than any daily index we know of.}

\footnote{One could argue that since the ex-dividend day affects the index, the index understates the "true" movement of the market. Fortunately, the number of stocks going ex-dividend on a particular day are just not that large. For example, in the last quarter the largest day had 63 stocks meeting our criteria; 7 days had more than 40 stocks and the majority had 20 or less.}

\footnote{For firms paying very small dividends \( (P_s - P_a) / D \) is occasionally very large. We eliminated various groups of low dividend paying stocks and examined the effect on our results. The only effect was to reduce the variance.}

### Clientele Effect

Having inferred the average marginal tax rate for New York Stock Exchange firms let us see if we can disaggregate the results and find the marginal stockholder tax rates for firms with different characteristics. In particular, let us see if the dividend policy of a firm affects the tax rate of its marginal stockholders. This would be useful information for it would aid in predicting the tax rate of any firm's marginal stockholders, and at the same time it would provide strong evidence as to the existence of the Miller and Modigliani clientele effect.

In order to test the presence of the clientele effect, two variables were hypothesized which should affect stockholder's desire to invest in a company. The first was the firm's dividend yield. The lower a firm's dividend yield the smaller the percentage of his total return that a stockholder expects to receive in the form of dividends and the larger the percentage he expects to receive in the form of capital gains. Therefore, investors who hold stocks which have high dividend yields should be in low tax brackets relative to stockholders who hold stocks with low dividend yields.

The second variable that we hypothesized might affect the ex-dividend behavior of common stocks was the payout ratio. Firms that paid out a high percentage of their earnings as dividends would, all other things being equal, grow (both in terms of market price and earnings) at a slower rate than firms which retained a larger percentage of earnings. Thus, the high payout firm should attract stockholders in relatively lower tax brackets than the low payout firms.

Tables 3 and 4 present the tests of these two hypotheses. In each table all observations were divided into deciles according to the variable which was supposed to account for the ex-dividend behavior of the stock (dividend yield in table 3 and payout in table 4). For each decile the mean of both the variable hypothesized as accounting for ex-dividend behavior and the statistic used to measure ex-dividend behavior were computed. Spearman's rank correlation coefficient was then used to judge the extent of the relationship between these two variables. If the relationship is statistically significant we
can conclude that there is a clientele effect present in the market. The relationship between implied tax brackets and dividend yields can be seen by examining the third and last column of table 3. The tax bracket in general decreases as the dividend yield at which the stock sells increases. The fact that the first is out of line may simply be a result of chance alone given the magnitude of its standard error.

**Table 3. — Data Arranged by Decile According to the Value of D/P**

<table>
<thead>
<tr>
<th>Decile</th>
<th>( \frac{D/P}{D/P\text{ Mean}} )</th>
<th>( \frac{P_R - P_a}{P_a} )</th>
<th>Standard Deviation</th>
<th>( Z ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.0124</td>
<td>.690</td>
<td>.0054</td>
<td>.411</td>
</tr>
<tr>
<td>2</td>
<td>.0215</td>
<td>.4873</td>
<td>.2080</td>
<td>2.465</td>
</tr>
<tr>
<td>3</td>
<td>.0276</td>
<td>.5447</td>
<td>.1550</td>
<td>2.937</td>
</tr>
<tr>
<td>4</td>
<td>.0338</td>
<td>.6246</td>
<td>.1216</td>
<td>3.087</td>
</tr>
<tr>
<td>5</td>
<td>.0376</td>
<td>.7553</td>
<td>.1064</td>
<td>1.924</td>
</tr>
<tr>
<td>6</td>
<td>.0416</td>
<td>.8579</td>
<td>.0712</td>
<td>1.855</td>
</tr>
<tr>
<td>7</td>
<td>.0452</td>
<td>.9203</td>
<td>.0762</td>
<td>2.210</td>
</tr>
<tr>
<td>8</td>
<td>.0495</td>
<td>.9504</td>
<td>.0691</td>
<td>1.369</td>
</tr>
<tr>
<td>9</td>
<td>.0532</td>
<td>1.0723</td>
<td>.0538</td>
<td>.229</td>
</tr>
<tr>
<td>10</td>
<td>.0708</td>
<td>1.1755</td>
<td>.0555</td>
<td>3.162</td>
</tr>
</tbody>
</table>

* Spearman’s rank correlation coefficient between \( D/P \) and \( \frac{P_R - P_a}{P_a} \) is .952 which is significant at the 1 percent level.

\(^{15}\)The standard deviation of the mean of the ex-dividend statistic for the first decile is so high (relative to the standard deviation of the mean within other deciles) that we can place little confidence in the ranking of this mean relative to other means. The extremely high value of the standard deviation for the first decile is explained by the presence of several low dividend stocks in this decile. The first decile contained some stocks with quarterly dividends of a few pennies which experienced ex-dividend price movements of several times the amount of the dividend.

\(^{16}\)In order to imply a marginal tax rate we would need a structural relationship between the capital gains tax rate and the ordinary income tax rate for individuals or institutions who prefer dividends to capital gains.
as pension funds or educational institutions) corporations actually prefer dividends. For example, corporations are taxed at a rate of 25 per cent on their capital gains but they only pay a tax on 15 per cent of the income they receive as dividends from another corporation. Thus, a corporation would pay a lower tax on dividends (7.8 per cent) than it did on capital gains (25 per cent). While corporations might account for some of the dividend preference exhibited by the last two deciles, the authors do not believe that this phenomena is widespread enough to account for the extent of dividend preference. Part of the preference for dividends might result from behavioral patterns which, while not wholly rational, have become widely recognized over time. One behavioral pattern that could account for part of the preference for dividends is the propensity for the beneficiary of trust accounts to be restricted or to restrict himself to dividend income from the account. Since capital gains cannot be used as income, the trust manager would prefer to retain the right to the dividend. This type of behavior along with the tax advantage of dividends for a few types of institutional investors could account for the dividend preference exhibited by the last two deciles.

Table 4 contains the same type of data that is contained in Table 3 except that the analysis has been performed in terms of the firm’s payout ratio. The relationship between our test statistic and the firm’s payout ratio is significant at the 1 per cent level, adding support to the findings discussed earlier. Furthermore, as expected, the implied tax bracket declined with an increase in the firm’s payout ratio.

The close relationship between both measures of a firm’s dividend policy and the implied stockholder tax bracket suggest that Miller and Modigliani were right in hypothesizing a “clientele effect.” As our results show, firms not only seem to attract a clientele but they attract a rational clientele—one which should prefer their dividend policy.

**Summary**

In this paper, we have derived marginal stockholder tax brackets by studying the ex-dividend behavior of common stocks and have shown that these tax brackets are related to a firm’s dividend policy. These findings...

1. Provide data that is necessary in order to calculate a firm’s cost of retained earnings and to test investment models.

2. Provide evidence in support of Modigliani’s and Miller’s clientele effect, suggesting that a change in dividend policy could cause a costly change in shareholder wealth.

3. Illustrate one form of market rationality in that stockholders in higher tax brackets show a preference for capital gains over dividend income relative to those in lower tax brackets.
REFERENCES


