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The Ex-Dividend Day Behavior of Canadian Stock Prices: Tax Changes and Clientele Effects

L. D. BOOTH and D. J. JOHNSTON*

ABSTRACT

With some simple assumptions the ex-dividend day price drop and the associated dividend can be used to measure the market's marginal tax rate. Previous research has estimated the implied tax rate for the U.S. This paper extends the analysis to Canada, where the tax treatment of dividends and capital gains is completely different from that in the U.S. The paper also presents estimates from 1970–80 to include four distinct periods when the tax treatment was different. Hence, we include an implied test of market efficiency as well as those for the “relevance” of taxes and the existence of tax based dividend clienteles.

THE OBJECTIVE OF THIS PAPER is to see whether we can determine the tax rate of the marginal investor in Canada. Prior work is scant. Morgan [7] has examined dividend policy in Canada and concluded that the “Canadian stock market behaved as though dividends and capital gains were imperfect substitutes in the period 1968–71 and more or less perfect substitutes afterwards.” This indifference would imply an investor in a marginal federal tax bracket of about 37.5%. In parallel work, Lakonishok and Vermaelen [5] have used the Elton and Gruber [2] technique to examine the ex-dividend day behavior of Canadian stock prices between 1971–72. Although, finding the ex-dividend day price ratio to be less than one, i.e., “normally” a preference for capital gains, they ascribed this result to short term trading by professionals and not the tax clientele hypothesis of Elton and Gruber. This result was based on the change in the ex-dividend day price ratio around the 1971–72 tax reform and not the value of the ratio itself.

This paper attempts to determine whether the ex-dividend day price ratio can be used to estimate marginal tax rates in Canada. In extending existing work we (1) examine the price ratio during four distinct tax periods: 1970–71, 1972–76, 1977, and 1978–80, (2) extend the Elton and Gruber analysis to an up-to-date comprehensive Canadian data base, (3) distinguish between tax clientele hypotheses based on realized versus unrealized capital gains, (4) distinguish between institutional and unincorporated professional short term trading, and (5) test for dividend tax and nationality clienteles in Canada.

In empirical tests of this sort it is important to be aware of the institutional setting. Hence, after briefly reviewing the alternative models in Section I, we analyze three aspects of the Canadian setting: the tax structure, the actual tax

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return data, and the structure of trading on the Toronto Stock Exchange (TSE). In Section III we examine the ex-dividend day price ratio to see which of the models has most validity. In Section IV we look at the clientele hypotheses. Our conclusions are in Section V.

I. Models of Ex-Dividend Day Price Behavior

A. Tax Clientele Models

An individual who has already decided to sell a share around its ex-dividend date faces a timing decision of whether to sell on the cum or ex-dividend day. If he sells cum, then he receives the cum dividend price (P_B) and pays tax at the capital gains tax rate (t_g) on the excess of the cum dividend price over the adjusted cost base of the share (P_1). If he sells ex, he receives a dividend and the ex-dividend price (P_A), pays tax on the dividend at the dividend tax rate (t_d), and pays tax on the excess of the ex-dividend price over the adjusted cost base of the share at the capital gains tax rate. For an investor to be indifferent to timing, we must have

$$P_B - t_g(P_B - P_1) = D(1 - t_d) + P_A - t_g(P_A - P_1) \quad (1)$$

which can be rearranged to obtain,

$$\frac{P_B - P_A}{D} = \frac{(1 - t_d)}{(1 - t_g)} \quad (2)$$

Elton and Gruber [2] argue that for the market to be in equilibrium "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 $(P_B - P_A)/D$."

For the buy decision, timing causes a change in the cost of the investment and the present value of the receipts from the stock purchase. For a given holding period buying cum, rather than ex, increases the initial outflow by $P_B - P_A$, increases the after-tax dividend flow by $D(1 - t_d)$, and reduces the future capital gains tax liability by $t_g(P_B - P_A)$. To be indifferent towards the timing of the buy decision requires

$$-(P_B - P_A) + D(1 - t_d) + \frac{t_g}{(1 + k)^n} (P_B - P_A) = 0 \quad (3)$$

which can be rearranged to obtain

$$\frac{P_B - P_A}{D} = \frac{(1 - t_d)}{(1 - t_g/(1 + k)^n)} \quad (4)$$

where n is the individual investor's expected holding period and k is the appropriate risk adjusted discount rate. If the investor has a short holding period then (4) is equivalent to (2).

If the ex-dividend day price ratio is determined by (2) then we have a *realized capital gains tax* version of the tax clientele hypothesis. However, if the investor's holding period is long then the present value of the reduced capital gains tax

liability in (3) is negligible. Moreover, in the selling decision the individual can choose to only realize capital gains when he has already realized offsetting capital losses, in which case the effective capital gains tax rate is again zero. Bailey [1] has argued that the deferral and choice over realization advantages has driven the effective capital gains tax rate on shares to zero. In this case, the ex-dividend day price ratio would be determined as,

$$\frac{P_B - P_A}{D} = (1 - t_d) \quad (5)$$

We shall refer to this as the *unrealized capital gains* tax version of the tax clientele hypothesis.

B. Short Term Trading Models

The tax clientele model relies upon the existence of an equilibrium over a range of investor tax brackets. However, this equilibrium may not be sustainable, since it opens up profitable short term trading strategies for investors in different tax brackets. For example, with unrealized capital gains and a 50% marginal tax bracket investor, the tax clientele model implies an ex-dividend day price ratio of 0.5. However, by buying cum and selling ex, an equally taxed investor could expect to make short term trading profits of $0.5D(1 - t)$. Such short term trading profits would create trading pressure to move the ex-dividend day price ratio closer to one. With complete certainty and no transactions costs, it would equal one.

In the presence of transactions costs of α on all purchases and sales, we can derive boundary conditions within which the ex-dividend day price ratio must lie in order to make short term trading unprofitable. For example, if the price drop in the ex-dividend day is less than the amount of the dividend, short term trading will be unprofitable as long as

$$-P_B + P_A - D \leq \alpha(P_A + P_B) \quad (6)$$

Letting $\bar{P}$ stand for the average of P_A and P_B , we have

$$1 - 2\alpha \frac{\bar{P}}{D} \leq \frac{P_B - P_A}{D} \quad (7)$$

Similarly, if the drop in price is greater than the amount of the dividend a profit can not be made from trading as long as

$$P_B - P_A - D \leq \alpha(P_A + P_B) \quad (8)$$

or

$$\frac{P_B - P_A}{D} \leq 1 + 2\alpha \frac{\bar{P}}{D} \quad (9)$$

Combining (7) and (9) we have the boundary constraints,

$$1 - 2\alpha \frac{\bar{P}}{D} \leq \frac{P_B - P_A}{D} \leq 1 + 2\alpha \frac{\bar{P}}{D} \quad (10)$$

where short term trading can not set the ex-dividend day price ratio as long as these constraints are not binding.¹

Equation (10) imposes a constraint on the tax clientele models in that the value must lie within these bounds, otherwise short term trading by equally taxed investors would occur. If the constraint is binding, use of Equations (2) or (5) will bias our estimate of the implied marginal tax rate. If the constraints are nonbinding there is no effect. Since equally taxed investors are largely institutions, securities firms, and tax sheltered investment funds, whether or not the constraint is binding will be called the *institutional short term trading hypothesis*. Note that in this model, α must be the transactions costs of the lowest potential short term institutional trader, *not* the lowest possible transactions costs. Some institutions that would like to trade may be prohibited from doing so for legal or “professional” reasons.

For ordinary investors, the costs of transacting will likely exceed any potential profit from short term trading around the ex-dividend day. However, for professional traders and some members of securities firms the costs of transacting are very low. Moreover, the tax loss from buying cum and selling ex would be treated as a *business* and not a *capital* loss. In this case, short term trading may be profitable for professionals in a different marginal tax bracket to the “marginal investor” of the tax clientele hypothesis. The result would be that the ex-dividend day price ratio reflects the marginal tax rate of the floor broker, trading around the ex-dividend day. We call this the *professional short term trading hypothesis*. It is the differential tax treatment of institutions and professionals that differentiates these two short term trading hypotheses.

C. Trading Volume

Each of the four models discussed in Section I *A* and *B* implies that more than average trading should occur around the ex-dividend day. For each dividend yield decile between 1970–80, we calculated the trading volume on the ex-dividend day as a proportion of the average volume of the four days prior to the cum dividend day. The mean relative volume was 2.94 and varied from an annual low of 1.69 to a high of 4.29, with no significant trend over time. Without supporting any particular model, this supports the assertion that investors and/or traders perceive the ex-dividend day as an important input to their trading strategy. However, there was a negative correlation between relative volume and dividend yield with significantly higher relative volume among the low dividend yield stocks. An explanation for this phenomenon in support of any of the models is not immediately apparent. We would expect the reverse result,² if anything, from any of the individual models.

II. Canadian Institutional Detail

A. Canadian Tax Treatment

Canada lies midway between the European example of an integrated tax system for investment income, and the U.S. “classical” system that effectively imposes

¹ This development follows that of Kalay [4].

² Average relative volumes for each of the ten dividend-yield deciles over the 11-year period were 3.97, 3.2, 3.15, 2.69, 4.48, 2.91, 2.57, 2.42, 2.11, and 1.94. The order is of increasing dividend-yields.

double taxation on dividend income. Since 1949 Canada has allowed a tax credit for dividend income. Prior to the tax reforms of 1972, the dividend tax credit was a straight 20% of dividend income. After that date, dividends were grossed-up by $\frac{1}{3}$ to determine taxable income and then a credit of 20% of the grossed-up dividend was allowed. After minor tax revisions took effect in 1978, the gross-up for tax purposes was increased to 50% and the credit increased to 25%. 1977 was an interim year in which the gross-up remained at $\frac{1}{3}$ and the credit was lowered to 18.75%.³ The gross-up and dividend tax credit applies to all unincorporated taxpayers. Intercorporate dividends are tax free, subject to some mild restrictions laid out in Section 112 of the Income Tax Act.

The major tax reform for 1972 also abolished the previous credit for provincial taxes. Instead, the overall level of federal taxes was lowered and provincial taxes became a percentage of federal taxes. This "add-on" in Ontario was originally 30.5%, and in 1977 was raised to 44%. A capital gains tax was also introduced for 1972, where the rate was set at one half the investor's tax rate on ordinary income, but no distinction was made between short term and long term capital gains.⁴ Section 39.5(a) of the Income Tax Act forces a trader or dealer in securities to treat gains and losses as ordinary income, and, for these taxpayers, Section 112(4) requires that any dividend be subtracted from the adjusted cost base of the share for purposes of determining gains and losses.

Offsetting any taxes on capital gains and dividends for individual taxpayers are certain allowances. First, carrying charges are deducted prior to the determination of taxable income. Second, a \$1,000 tax free investment income allowance has been allowed. In 1974 this was allowed on net interest income only, after 1974 the allowance was extended to include grossed-up dividend income, and in 1977 net taxable capital gains. Finally, contributions to registered savings

³ An example of the post-1978 system for an investor in a 40% federal tax bracket living in Ontario where there is a 44% add-on would be,

Dividends received	1,000
Grossed-up dividends	1,500
Federal tax payable (40%)	600
Federal Dividend Tax Credit	375
Net Federal Tax payable	225
Total tax payable	324

⁴ So that the 1971-72 tax changes should not affect the taxation of earnings retained prior to 1972, retained earnings as of December 1972 were divided into undistributed income on hand (UIOH) and capital surplus on hand (CSOH). On payment of 15% tax by the corporation, dividends paid out of UIOH were not taxable in the hands of investors, dividends paid out of CSOH were not taxable at all. For both groups, dividends paid out; while not being taxable, they reduced the investor's adjusted cost base for purposes of taxing eventual capital gains. Dividends paid out of earnings earned after 1972 were subject to the tax system introduced in 1972.

This division of retained earnings remained in force until December 31, 1978 when it was abolished. As a result, corporations issued different classes of shares with rights to dividends out of the different divisions of retained earnings. One implication is that high tax bracket investors could buy shares with dividends paid out of UIOH and only face an effective dividend tax rate of 15%, plus the increased capital gains tax liability.

In the analysis that follows, we ignore this distinction between class A and B shares for three reasons. First, the available data are inconsistent in the reporting of the class of shares. Second, not all class A and B shares were based on this tax distinction. Third, in most cases the two classes of shares were convertible into each other.

plans can be made prior to the determination of taxable income. The two most prominent savings plans are the Registered Home Ownership Savings Plans (RHOSPs), for which a \$1,000 annual investment is allowed for nonproperty owning investors, and the Registered Retirement Savings Plans (RRSPs) where the eligible annual contribution depends on the individual's company pension plan and taxable income. These latter two innovations have contributed to the development of a substantial pool of nontaxable investments under the control of individual investors.⁵

In terms of the models of Section I, the absence of any tax on capital gains between 1970–71 means that the ex-dividend day price ratio would be identical for the two tax clientele models. This value would reflect the marginal federal tax rate and the 20% dividend tax credit. For 1972 onwards, the capital gains tax rate would be $t_F(1 + t_0)/2$, where t_0 is the add-on for provincial taxes, assumed to be the 44% appropriate for Ontario, and t_F is the marginal federal tax rate. The dividend tax rate would be $(1 + \emptyset)(t_F - \alpha)(1 + t_0)$ where $\emptyset$ is the dividend gross-up and α the dividend tax credit. The ex-dividend day price ratio, for the marginal investor who realizes capital gains, would then be found as

$$\frac{P_B - P_A}{D} = \frac{1 - \{(1 + \emptyset)(t_F - \alpha)(1 + t_0)\}}{1 - (t_F(1 + t_0))/2} \quad (11)$$

If we substitute in the relevant values for $\emptyset$, α , and t_0 for the period 1970–80, we would have the expressions in columns 1 and 2 of Table I for the realized and unrealized capital gains tax versions of the tax clientele hypotheses.

For incorporated traders and dealers, the tax treatment of dividends and capital gains is identical. For investment dealers, both the dividends and capital gains/losses are treated as ordinary income. For these institutions, without transactions costs, short term trading would force the ex-dividend day price ratio to one, similarly for individual investors arbitraging through tax sheltered funds or tax exempt institutions. For ordinary corporations, the dividend is not taxed, but net capital gains and losses are treated as ordinary income.

For unincorporated traders, the tax treatment of dividends is identical to that of other unincorporated investors. However, for capital gains/losses on stock held for under a year, the cost base of the share is reduced by the amount of any dividend received. Hence, the tax on the capital gain from selling ex from (1) would be $t_g(P_A - P_1 + D)$. If we substitute this into Equation (1) and rearrange, we find the ex-dividend day price ratio as

$$\frac{P_B - P_A}{D} = \frac{(1 - t_d - t_g)}{(1 - t_g)} \quad (12)$$

Moreover, the capital gain/loss is regarded as an ordinary gain/loss and taxed at

⁵ There are also additional savings plans, for example, the Registered Education Savings plans. The point of the plans is the spreading, or the deferral, of income. Hence, income earned within the plan is nontaxable and except under penalty can not be withdrawn. The RRSPs have increasingly been used by brokerage firms as a vehicle for private equity investment, through so-called "self-directed" plans. Except for an annual registration fee and some restrictions on eligible investments, these plans represent nontaxable personal equity portfolios.

Table I
Indifference Values for $(P_B - P_A)/D$ for Different Investor Classifications

	Individual Investors			Incorporated Traders & Exempt Corporations
	Realized Capital Gains	Unrealized Capital Gains	Unincorporated** Traders & Dealers	
1970-71	$1.2 - t_F$	$1.2 - t_F$	$\frac{1.2 - t_F}{(1 - t_F)}$	1
1972-76	$\frac{1.348 - 1.74 t_F}{1 - 0.6525 t_F}$	$1.348 - 1.74 t_F$	$\frac{1.35 - 3.045 t_F}{1 - 1.305 t_F}$	1
1977	$\frac{1.36 - 1.92 t_F}{1 - 0.72 t_F}$	$1.36 - 1.92 t_F$	$\frac{1.36 - 3.36 t_F}{1 - 1.44 t_F}$	1
1978-80	$\frac{1.54 - 2.16 t_F}{1 - 0.72 t_F}$	$1.54 - 2.16 t_F$	$\frac{1.54 - 3.6 t_F}{1 - 1.44 t_F}$	1
Receipts cum	$P_A - t_g(P_A - P_1)$	P_A	$P_A - t_F(P_A - P_1)$	P_A^*
Receipts ex	$D(1 - t_d) + P_B - t_g(P_B - P_1)$	$D(1 - t_d) + P_B$	$D(1 - t_d) + P_B - t_F(P_B + D - P_1)$	$D + P_B$

* Investment dealers would be taxed on the capital gain/loss and dividend at their ordinary tax rates.

** Revenue Canada will always tax regular dealing gains and losses as ordinary income. It even attempts to apply this to ordinary investors who follow an "active" investment management policy.

the individual's full marginal tax rate, $t_F(1 + t_0)$. Column 3 of Table I substitutes the relevant values to determine (12) for each tax period 1970-80.

B. Analysis of Tax Return Data

The discussion of Section II A results in three conclusions for the effects of Canadian tax legislation:

- (i) The \$1,000 investment exclusion, together with the allowances for savings plans, creates a large pool of investments in the hands of investors where the income is nontaxable.
- (ii) For investors who pay tax on investment income, the tax on equity income is lower than that on interest income.
- (iii) The tax rate on dividend and capital gains income differs. In 1978 to be indifferent would have required $(1 + \phi)(t_F - \alpha) = t_F/2$, or a marginal federal tax rate of 37.5%. The two income classes above this level had lower tax rates on capital gains income than for dividend income, and the rest the reverse.

In Table II we have the sources of investment income for selected income classes for 1978. We can make several observations from this data. First, bank interest is the predominant form of investment income for lower income investors. Second, the average amount of nonequity investment income is relatively constant until the higher income classes. Third, dividend income is relatively more important than capital gains income right up to the last income class.⁶

⁶ Note that income and capital gains are determined simultaneously; it is not a one-way causal link.

Table II
Sources of Investment Income for Selected Income Classes

Income Class \$	Average* Capital Gain	Average Dividend	Average Bond Interest	\$ Average Bank Interest	Average Carrying Charges	Average Exclusion	Investment Income Proportion	Dividend to Capital Gains Declaration
5-6,000	471.4 (0.58)**	532.0 (4.03)	1,019.9 (10.83)	876.0 (37.78)	65.7 (3.86)	568.0 (40.5)	25.7	6.94
10-11,000	505.9 (0.89)	864.4 (5.31)	1,042.4 (12.57)	869.4 (38.12)	114.9 (7.43)	471.4 (42.8)	9.0	5.96
15-16,000	110.1 (1.42)	1,317.4 (7.17)	967.8 (14.13)	821.3 (43.84)	156.5 (10.32)	452.9 (49.3)	5.8	5.04
20-22,000	838.7 (2.72)	1,994.8 (10.17)	1,296.3 (17.51)	934.0 (54.21)	201.2 (16.49)	512.9 (60.5)	6.5	3.73
30-35,000	2,074.7 (7.57)	4,518.3 (26.04)	1,803.6 (27.15)	1,427.8 (73.38)	455.3 (21.29)	634.0 (74.6)	12.0	3.44
50-100,000	8,104.6 (22.89)	16,572.3 (57.17)	3,901.5 (31.90)	4,182.8 (82.79)	2,207.3 (46.16)	828.9 (86.1)	31.0	2.49
>100,000	57,020.0 (38.31)	50,357.0 (74.03)	7,614.2 (34.10)	12,545.2 (89.62)	9,899.8 (56.02)	926.0 (90.4)	54.3	1.93

* Average denotes average over those declaring such income.

** Number in parentheses is the percentage of income class declaring that component of income.

Source: *Taxation Statistics*. Revenue Canada 1978.

Fourth, it is only for the very lowest and very highest income classes that investment income is an important component of total taxable income ($>10\%$).

Given the costs involved in an active investment management strategy, it would seem most likely that the marginal investor is in an income class for which investment income is relatively important. However, since the lowest income classes are predominantly in fixed interest securities, this would imply that the marginal investor is in one of the higher income classes. One indicator of an active investment strategy is the ratio of dividend declaring taxpayers to capital gains declaring taxpayers in Table II. This ratio would be higher for a passive nontrading strategy than for a more active trading strategy. Note that this ratio declines almost continuously through the income classes. This information, combined with the increased use of the \$1,000 exclusion and the increased carrying charges, would suggest that the most active investors are in the highest income classes. As a qualification, we should note that in absolute numbers investors in the highest two income classes realizing capital gains are only about 13% of the total number. However, they would seem to be an obvious candidate for the title "marginal investor," since as well as realizing capital gains, they seem to be more active in managing that realization.

C. Trading on the Toronto Stock Exchange (TSE)

Consistently over the last 15 years the proportion of individual trading by value has been around 50%, with about 5–10% unaccounted for as sales to dealers not registered to trade on the TSE. In contrast, trading by institutions and members of the exchange on the NYSE accounts for 80% of the value of trading. Moreover, our concern is for the prices set in transactions and here the discrepancy is even larger. On the TSE, 81% of all transactions by volume come from individual investors or orders transmitted from nonmember brokers, whereas on the NYSE only 26% of all transactions come from individual investors. Clearly, it is more likely that on the NYSE the ex-dividend day price ratio is determined by institutional investors and floor brokers. Conversely, on the TSE it would seem more likely that it is determined by ordinary investors.⁷

In Table III we have a further breakdown of agency trading on the TSE. Unfortunately, earlier data are not available, but trades by floor brokers for their own account consisted of only 0.04% and 0.02% of the value of trading for 1981 and 1982, respectively. Trades by other personnel in securities firms consisted of 1.16% and 0.8% of the value of trading for 1981 and 1982, respectively. This indicates that there is not much trading by professionals on the TSE, and what there is is miniscule compared to that of the NYSE.

It should be remembered that, unlike the NYSE, the TSE is intent on remaining a pure auction market where trades are effected on an agency basis by brokers. There are no specialists on the TSE and few independent floor brokers. Principal dealing in stocks by member firms is prohibited. The only exception is the Registered Trader (RT) who is assigned responsibility for maintaining an orderly market in a group of stocks. However, unlike the NYSE specialist the

⁷ The source of data is the series of TSE fact books and Williamson [11].

RT's major responsibility is to "trade in a stabilizing manner against the trend" and buy up odd lots. That is, the RT maintains price continuity; he does not provide liquidity or depth comparable to the NYSE specialist. The TSE's policy is best summarized by Williamson [11] who commented on the 1966 regulations that established RT's.

"The previous freedom of all floor brokers to trade for their own accounts was reduced through procedural formalities, including time stamping of orders, that makes short term trading highly inconvenient."

The philosophy of the TSE, the formalities of trading, and the actual breakdown of trading all indicate that professional short term trading is not as important on the TSE as the NYSE.

It is still possible that individuals or institutions could arbitrage away any profit opportunities. However, throughout this period, TSE members charged the fixed transactions costs detailed in Table IV. The lowest commission rate of 0.63% was for a minimum trade of 10,000 shares worth at least \$400,000. This commission rate puts a bound for the ex-dividend day price ratio of $-0.008 \leq x \leq 2.008$ and $0.496 \leq x \leq 1.504$ for the average \$30 stock with a quarterly dividend yield of $1\frac{1}{4}\%$ and $2\frac{1}{2}\%$, respectively. However, it is unlikely that either of the tax clientele hypotheses will imply an ex-dividend day price ratio lying outside

Table III
Agency Trading on the TSE

		Other Securities Firm Personnel	Floor Traders	Public Investors	Total
1981	\$M	603.8	21.7	51,465.6	52,091.1
	%	1.16	0.04	98.80	100
1982	\$M	304.7	7.2	37,560.1	37,872.0
	%	0.80	0.02	99.18	100

Source: Revenue and Market Analysis Study TSE.

Table IV
Commission Rates in Canada January 1, 1976 to
Unfixing

Total Amount of Transaction (\$1,000s)	Rate of Commission (%) on Shares of	
	\$10	\$30
10	2.5	1.64
30	2.25	1.48
50	1.95	1.28
100	1.4	0.92
150	1.18	0.78
200	1.08	0.71
300	0.97	0.63

these bounds. For example, a taxpayer with a 25% federal tax rate pays no tax on dividend income and a 12½% tax on capital gains, if the market were dominated by these individuals the ex-dividend day price ratio would be 1.22. Conversely, for investors in the highest 43% federal tax bracket, the ratio would be 0.885 or 0.611 depending on the effective capital gains tax rate.

It is apparent that even for a firm with a high dividend yield, the lowest official transactions cost puts a bound around the ex-dividend day price ratio that is most unlikely to be binding. Moreover, the TSE is a thin market, and consistent round-trip trading of 10,000 shares may not be possible in many of the companies that are listed. It is still conceivable that the fixed commission rates might not reflect the actual cost of transacting. However, this too is unlikely, given that the *marginal* cost of transacting remains the fixed rate, even though institutions may receive a series of ongoing services at no cost to reduce the *overall* cost of transacting. Hence, it seems that neither short term trading by professionals nor favored institutions is likely to support the short term trading hypotheses.

D. Implications

The motivation for discussing Canadian institutional detail is to remove presumptions that may stem from familiarity with results on the NYSE. The Canadian tax laws are significantly different from those in the U.S. Moreover, the operation of the TSE is significantly different from the NYSE. From the analysis of the tax return data, it seems plausible that it is high tax rate investors who are actively managing their investment portfolios. From the analysis of the structure of the TSE, it seems that these individuals are most important in the trading of common stock, and that institutions or professionals are unable to remove these effects by short term trading.

III. Empirical Analysis of the Ex-Dividend Day Price Ratio

We calculated the ex-dividend day price ratio, defined as the ex-dividend day price change divided by the dividend per share, for our sample of TSE stocks for each year from 1970 to 1980. Price and volume data were obtained from the TSE's daily record; dividend data were obtained from the Financial Post information cards with the ex-dividend dates cross-checked with the TSE's daily record. All dividend paying stocks were included in our sample, except those which paid a dividend per share of less than 12½¢. These were excluded to avoid having the results dominated by the very small dividend paying stocks. Our data consist of the total universe of these observations for TSE stocks between 1970–80. The annual number of observations varies from a low of 242 to a high of 461. In all, 144 firms are included in our sample.

The “best” ex-dividend day price ratio is one which removes intervening price uncertainty, i.e., P_B and P_A are differentiated only by the receipt of the dividend. The shortest period of time in our sample is overnight, represented by the closing price cum dividend and opening price ex-dividend. However, even this statistic does not allow for market movements and the required overnight rate of return.

Hence, we also present the close-open value adjusted for overnight movements in the TSE index.⁸ Elton and Gruber [2] have suggested that the opening price is not a market price, but reflects the specialists' adjusted closing price. Although this is not a factor on the TSE, we also provide the ex-dividend day price ratio using closing prices both on the cum and ex-dividend days, both adjusted and unadjusted for TSE market movements. These four values for the ex-dividend day price ratio are presented in Table V, along with the *t*-statistics for the two hypotheses that their values are really zero and one, respectively.

The hypothesis that the ex-dividend day price ratio is really zero can be rejected at the 1% level for all years except 1979. The hypothesis that the ex-dividend day price ratio is really one can be rejected for all years at the 5% level, and except for 1980 at the 1% level. From this evidence, we can clearly reject the hypotheses that the market fails to acknowledge the value of the immediate dividends, and that round trip trading occurs without transactions costs. The mean value for the ex-dividend day price ratio ranges from 0.403 to 0.491 depending on the estimate. Average annual dividend yields are about 2% for the bottom 20% of dividend yielding stocks, 4% for the overall sample, and 8½% for the top 10% of dividend yielding stocks. These dividend yields imply from Equation (8) transactions costs of 0.149%, 0.298%, and 0.597%, all of which are less than the minimum "official" rates. Hence, particularly for the lower dividend yielding stocks, it becomes difficult to believe that the arbitrage bounds of Equation (8) are binding. Clearly, the observed values for the ex-dividend day price ratio and reasonable assumptions for transactions costs cast doubt on the validity of the institutional short term trading hypothesis.

With a positive expected capital gain, without a market adjustment one would expect the unadjusted price ratio to be *less* than the adjusted price ratio. This is true for 10 out of the 11 years for the close-to-open price variable and 6 out of the 11 years using the close-to-close price variable. With the extra instability of ex-dividend day trading, it is also to be expected that the close-to-close price ratio is more volatile than the close-to-open price ratio. For this reason, the *t*-statistics decline in almost every year going from the close-to-open to the close-to-close variable. For these two reasons, it seems that the adjusted close-to-open price variable is the most accurate estimate of the ex-dividend day price ratio.

In Table VI, we have repeated the adjusted close-to-open ex-dividend day price ratio, calculated the implied tax rate of the marginal investor, and also calculated the ex-dividend day price ratio implied by the investor in the very highest marginal tax bracket.⁹ It is immediately apparent that the mean ex-dividend day price ratio is consistently lower than that implied for an investor in the very highest tax bracket who pays taxes on realized capital gains. In column 2, the implied tax rate exceeds the maximum tax rate in every single year. In column 3, we have the ex-dividend day price ratio implied by the realized capital gains tax model for an investor in the highest marginal tax bracket. This value is statistically different from that actually observed in 6 of the 11 years, using a 5%

⁸ The TSE adjustment uses the TSE's opening and closing values and thus assumes a beta of one for all stocks.

⁹ Implied tax rates are found by manipulating Equation (9).

Table V
Ex-Dividend Day Price Ratios 1970–80

Year	Unadjusted		Adjusted		Number of Observations
	Close-Open	Close-Close	Close-Open	Close-Close	
1970	0.173 (1.201) (-5.743)	0.132 (0.772) (-5.076)	0.196 (1.286) (-5.275)	0.258 (1.433) (-4.213)	242
1971	0.264 (3.083) (-8.595)	0.293 (2.491) (-6.011)	0.343 (1.853) (-3.549)	0.320 (2.503) (-5.019)	326
1972	0.499 (4.676) (-4.695)	0.386 (2.878) (-4.578)	0.590 (5.309) (-3.689)	0.244 (0.823) (-2.550)	333
1973	0.260 (1.894) (-5.391)	0.386 (2.189) (-3.482)	0.360 (2.224) (-3.954)	0.183 (1.051) (-4.692)	361
1974	0.455 (4.732) (-5.668)	0.475 (4.237) (-4.682)	0.402 (3.607) (-5.366)	0.255 (2.214) (-6.468)	403
1975	0.427 (6.024) (-8.084)	0.477 (5.754) (-6.309)	0.520 (4.258) (-3.931)	0.417 (4.896) (-6.845)	435
1976	0.451 (7.539) (-9.169)	0.529 (6.775) (-6.032)	0.489 (4.084) (-4.268)	0.488 (3.734) (-3.918)	438
1977	0.422 (7.630) (-0.451)	0.399 (6.150) (-9.264)	0.512 (4.316) (-4.114)	0.498 (3.762) (-3.792)	437
1978	0.528 (6.895) (-6.164)	0.576 (5.306) (-3.906)	0.572 (6.877) (-5.146)	0.700 (6.292) (-2.697)	456
1979	0.426 (6.488) (-8.742)	0.406 (4.045) (-5.918)	0.648 (4.463) (-2.424)	0.692 (6.290) (-2.799)	460
1980	0.439 (4.438) (-5.671)	0.371 (2.438) (-4.133)	0.640 (3.219) (-1.811)	0.593 (2.814) (-1.931)	461
Total Sample	0.403 (14.904) (-22.079)	0.406 (11.372) (-16.638)	0.491 (11.549) (-11.972)	0.463 (9.882) (-11.461)	4352

Note: First value is the mean value, second and third values are the *t*-statistics for the two hypotheses for which the ex-dividend rate is 0 and 1, respectively.

significance level. Moreover, the *t*-statistics themselves should be mean zero random variables if this model does hold. However, in every year they are negative. Hence, we can reject the realized capital gains tax version of the tax clientele hypothesis.

In column 4, we have the tax rate implied by the tax clientele model with a zero effective tax rate on capital gains. In column 5, we have the ex-dividend day price ratio implied by the unrealized capital gains tax model and an investor in the highest tax bracket. The implied tax rate exceeds the statutory maximum in

Table VI
Implied Tax Rates

Year	Ex-Dividend Day Ratio	Realized Capital Gains		Unrealized Capital Gains		Professional Trader	
		Implied t_F	Max t_F Rate Ratio	Implied t_F	Max t_F Rate Ratio	Implied t_F	Implied** Ratio
1970	0.196	100*	0.4 (-1.34)	100*	0.4 (-1.34)	124*	1.57 (-9.01)
1971	0.343	85.7*	0.4 (-0.31)	85.7*	0.4 (-0.31)	130*	1.57 (-6.64)
1972	0.590	55.9*	0.76 (-1.52)	43.6	0.53 (0.54)	33.4	0.475 (1.04)
1973	0.360	65.6*	0.76 (-2.47)	56.8*	0.53 (-1.05)	38.4	0.475 (-0.71)
1974	0.402	64.0*	0.76 (-3.21)	54.4*	0.53 (-1.15)	37.6	0.475 (-0.655)
1975	0.520	59.1*	0.76 (-1.97)	47.6*	0.53 (-0.08)	35.1	0.475 (0.369)
1976	0.489	60.5*	0.76 (-2.26)	49.4*	0.53 (-0.34)	35.8	0.475 (0.117)
1977	0.512	54.7*	0.77 (-2.18)	44.2*	0.53 (-0.15)	32.3	0.53 (-0.152)
1978	0.572	55.3*	0.89 (-3.82)	44.8*	0.61 (-0.05)	34.9	0.719 (-0.765)
1979	0.648	52.6*	0.89 (-1.66)	41.3	0.61 (0.26)	33.4	0.719 (-0.487)
1980	0.640	53.0*	0.89 (-1.26)	41.7	0.61 (0.15)	33.6	0.719 (-0.398)

* Indicates that it exceeds maximum federal tax rate.

** Assumes fourth highest marginal tax bracket.

8 out of the 11 years. However, in no years is the discrepancy statistically significant at the 5% level. Hence, we can not reject the unrealized capital gains tax model and the hypothesis that the marginal investor is in the very highest tax bracket.

In column 6, we have the tax rate implied by the professional short term trading hypothesis and in column 7 the ex-dividend day price ratio implied by a trader in about the fourth highest marginal tax bracket (in 1980 a 32% marginal federal tax rate). In all years, except 1970-71, the model fits the observed data very well. In 1970-71 the model performs very badly, since the implied ex-dividend day price ratio exceeds one and the actual mean value is significantly different from one. The only way that the professional short term trading strategy could explain the ex-dividend day price ratio in 1970-71 would be for Revenue Canada to have disallowed the price drop as a business loss. This in turn would have required that Revenue Canada not tax short term trading income as ordinary income. This is highly implausible, since Revenue Canada even tries to tax the gains from an "active" investment strategy as ordinary income.

The data thus suggest that the institutional trading hypothesis and the realized capital gains tax version of the tax clientele hypothesis can be rejected outright.

Moreover, the short term trading hypothesis by professionals is implausible, both because of its inability to explain the 1970–71 period and the institutional structure of the TSE. It seems that the only model not rejected by the data is the tax clientele model where investors do not pay significant taxes on capital gains. This model would then imply a “marginal” investor in the very highest tax bracket. If this result seems implausible, it should be borne in mind that the professional short term trading hypothesis, which fits the data so well from 1972–80, would imply a floor broker in only a 32% marginal federal tax bracket. Alternatively, this would imply an income class of about \$30,000 or U.S. \$24,000!¹⁰

Our results conflict with those of Lakonishok and Vermaelen [5] for several reasons. First, they incorrectly deducted provincial taxes from the overall federal tax rate for 1970–71, without recognizing that this represented a revenue sharing agreement between the provinces and the Government of Canada that left the total tax due unchanged.

Second, they arbitrarily adjusted their estimates in two ways. First, to account for discrete price movements, they rounded all dividends per share to the nearest 12½¢. For 1972 our sample has 333 observations and theirs originally had 671 rounded down to 563. By implication, 338 of their observations have dividends of less than 12½¢, of these 108 were rounded down and excluded and 230 were rounded up and included. Hence, about 41% of their 1972 sample had rounded-up dividends. This would bias their estimate down. For 1971 about 32% of the sample had rounded-up dividends. Hence, the increased proportion of “rounded-up” dividends may also have contributed to their result of a decline in the ex-dividend day price ratio. Second, they emphasized a “portfolio measure” of the ex-dividend day price ratio, justified by an arbitrary portfolio strategy and an *assumed* price generating function that produces heteroscedasticity in the classic Elton and Gruber model. In contrast, we only include stocks that paid dividends in excess of 12½¢ and report only the Elton and Gruber ex-dividend day price ratio.

Third, we emphasize the close-open price ratio adjusted for market movements. There is no justification for using close-to-close price ratios in Canada since there is no specialist’s book to bias the opening prices. The only result of using the close-to-close price ratio is to introduce more uncertainty, witnessed by the increased variance in Lakonishok and Vermaelen’s estimates and decreased *t*-statistics in our own estimates. Moreover, with the adjusted close-to-close price ratio we get in our data the same decline between 1971–72 as analyzed by Lakonishok and Vermaelen (see Table V). However, rather than ascribing this to reduced incentives for short term professional trading, we would explain it by the volatility in the estimate. The close-to-close price ratio decreases by the same amount in 1972–73 and then increases by the same, if not larger, amounts in 1973–74, 1974–75, and 1975–76!

To remove more of the random fluctuation in the estimates, we consolidated the results of Table VI into the four tax periods for the close-open and close-close price ratios adjusted for market movements. In Table VII we also show the

¹⁰ As the professional’s marginal tax rate increases above 36%, the implied ex-dividend day price ratio rapidly falls to become negative for the highest marginal tax bracket.

Table VII
"Tax Period" Estimates

Years	Adjusted Ex-Dividend Price Ratios*		Tax Clientele Capital Gains**		Short Term Trading	
	Close-Open	Close-Close	Realized	Unrealized	Institutional	Professional
1970-71	0.270 (0.1118)	0.289 (0.0995)	0.4 (-1.162)	0.4 (-1.162)	1 (-6.53)	1.57 (-11.63)
1972-76	0.472 (0.0565)	0.317 (0.0726)	0.76 (-5.697)	0.53 (-1.027)	1 (-9.345)	0.475 (-0.053)
1977	0.512 (0.1186)	0.498 (0.1324)	0.77 (-2.175)	0.53 (-0.152)	1 (-4.115)	0.53 (-0.152)
1978-80	0.620 (0.0868)	0.662 (0.0867)	0.89 (-3.111)	0.61 (0.115)	1 (-4.378)	0.72 (-1.152)

* Second values are standard errors.

** Second values are *t*-statistics using close-open adjusted.

implied values for our four models. It is clear that the decline in the ex-dividend day price ratio, emphasized by Lakonishok and Vermaelen, is not apparent once the data are consolidated, even for the close-to-close price ratio. What is apparent is the increase in value between each tax period. This is a prediction of the tax clientele model, not made by the short term trading hypothesis, unless you impose tax assumptions on professionals that make them almost indistinguishable from ordinary investors.

IV. Clientele Hypotheses

There are two clientele hypotheses advanced to explain Canadian shareholdings. The first is the dividend tax clientele hypothesis that, given a set of dividend policies, investors will hold portfolios chosen on the basis of their after-tax rates of return. Thus, *ceteris paribus*, low tax investors will hold shares of high dividend yield stocks and high tax investors low dividend yield stocks. The second is the nationality clientele hypothesis. The larger Canadian companies have their shares traded in the United States. Geographic arbitrage will insure that the TSE and American prices are identical, but it may well be that it is American investors that determine prices and their tax brackets are determined by American and not Canadian tax regulations.

The dividend tax clientele hypothesis was examined by partitioning our annual data for the adjusted close-to-open ex-dividend day price ratio into ten dividend yield deciles. The dividend yields were determined by the prior year's dividend per share and the end-of-year price. Hence, there is no sample selection bias. The number of observations per dividend decile year varies from 12 to 57. Hence, the values reported in Table VIII exhibit considerable variability; many have standard errors larger than their associated mean values.

The dividend tax clientele model implies that the ex-dividend day price ratio should increase with the firm's dividend yield. It should start out less than one and increase to exceed one if, in fact, low tax investors are marginal for the high dividend yield stocks. The data in Table VIII provide little support for this

Table VIII
Dividend Clientele Hypothesis

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Mean of Means
LOW												
1	0.27	-0.78	1.30	1.06	0.08	0.35	0.17	-0.20	0.95	-0.08	1.16	0.39
2	0.74	1.81	0.35	0.22	0.82	0.54	0.05	0.41	0.90	0.48	0.36	0.61
3	-0.22	-0.24	0.76	0.80	-0.11	0.43	0.24	0.36	0.28	0.59	1.87	0.43
4	0.22	-0.03	0.07	0.56	0.53	1.29	0.48	0.35	0.40	0.32	0.44	0.30
5	0.20	0.21	0.40	-0.03	0.23	0.22	0.44	0.73	0.37	1.57	1.00	0.49
6	-0.06	0.27	0.51	-0.27	0.20	0.79	0.34	0.37	0.45	0.80	-0.02	0.31
7	0.06	0.57	0.30	0.38	0.61	0.33	0.50	0.40	0.48	0.35	0.34	0.40
8	0.50	0.41	0.01	0.00	0.36	0.23	1.27	0.33	0.55	0.55	0.49	0.43
9	0.37	0.39	0.81	0.74	0.68	0.41	0.48	0.63	0.84	0.61	0.62	0.59
10	0.33	0.29	0.83	0.47	0.47	0.64	1.60	1.27	0.59	0.83	0.28	0.69
HIGH												
ρ^*	0.08	0.44	-0.04	-0.27	0.31	-0.07	0.81	0.37	-0.01	0.54	-0.45	0.36

* Spearman rank correlation coefficient.

hypothesis. First, very few of the values exceed one, and those that do seem to be randomly scattered throughout the dividend decile years. Hence, the data imply a preference for capital gains over dividends, regardless of the firm's dividend yield. Second, there is very little evidence that the ex-dividend day price ratio is dependent on the dividend decile. For half the sample years the simple rank correlation coefficient is negative, and for the other half it is positive. For the whole sample, the simple mean value for the ex-dividend day price ratio is positively correlated with the dividend yield. Similar to Lakonishok and Vermaelen, we find that there is a monotonically increasing relationship for the five highest dividend-yield deciles.¹¹

One explanation for these results is that the data in Table VIII are derived from trading and do not measure predominant shareholdings. That is, it may well be that high dividend yield stocks are predominantly owned by low tax rate investors. However, we know from our trading proxy, developed in Section II B, that low tax rate investors do not trade frequently. Hence, the data in Table VIII for high dividend yield stocks could reflect the trading around the ex-dividend day by the minority of shareholders in high tax brackets.¹²

The nationality clientele hypothesis was examined by separating our sample into interlisted and solely Canadian listed TSE stocks.¹³ The hypothesis is that the interlisted stocks have their prices determined by American investors. Hence, the ex-dividend day price ratio should be invariant to the successive changes in Canadian tax treatment of dividends and capital gains. The solely Canadian listed stocks should, by contrast, then exhibit a much more marked tax effect as a result of these changes. The partitioned sample is shown in Table IX, where the data have been aggregated into the four distinct tax periods.

The "interlisted" stocks are listed on the AMEX and NYSE or traded over the counter via NASDAQ. Hence, they would be regarded as more speculative than the sample of stocks analyzed by Elton and Gruber. Consistent with their results, we would expect a lower ex-dividend day price ratio, than their estimate of 0.789, to reflect a higher tax bracket and more speculative clientele. Two points are relevant. First, there does not appear to be any time trend. Second, the mean of means of 0.56 appears reasonable, since it would reflect a 44% marginal tax bracket U.S. investor who does not immediately realize capital gains. By contrast, the solely Canadian listed stocks exhibit a marked trend over time and, except for the year 1977 where few observations are available for the interlisted stocks, have ratios consistently lower than those for the listed stocks.

Both the level and trend in the ex-dividend day price ratio supports the assertion that the prices of listed and interlisted stocks are determined by

¹¹ Two attempts were made to look further into the clientele effect. First, the data were grouped into quintiles, and then by tax period. Second, simple regressions were run over the whole period and for relevant subperiods. In both cases, there was no evidence in support of the dividend tax clientele hypothesis.

¹² Another plausible explanation for the lack of a dividend clientele in Canada is the distinction between class A and B shares noted in footnote 4. By issuing both A and B shares, the firm will attract both high and low tax bracket investors, thus the marginal investor may be identical across all firms.

¹³ Of course, American interest is not solely confined to the interlisted stocks. However, similar partitions based, for example on relative volume, were not useful.

Table IX
Interlisted and TSE Listed Stocks

Years	Elton & Gruber U.S. Estimate	Interlisted*	No. of Observations	Pre- dicted**	Solely TSE Listed*	No. of Observations	Interlisted- Listed Difference***
1970-71	0.789	0.6042 0.1378	148	0.40	0.1724 0.1379	570	0.4318 (2.215)
1972-76	0.789	0.4997 0.1115	439	0.53	0.4634 0.0653	1531	0.0363 (0.281)
1977	0.789	0.3959 0.1442	90	0.53	0.5419 0.1445	347	-0.1460 (-0.715)
1978-80	0.789	0.7361 0.1909	292	0.61	0.5890 0.0975	1085	0.1471 (0.686)

* The first value is the adjusted close to open ex-dividend day price ratio, the second value the associated standard error.

** Based on highest tax bracket investor.

*** Second value is the *t*-statistic.

different clienteles. For 1970-71, when the U.S.-Canadian tax treatment produced the largest difference in the implied ex-dividend day price ratios, the two samples have statistically significantly different mean values at the 1% level. In subsequent years, as the changed Canadian tax treatment brought the implied ex-dividend day price ratios more in line with those for high tax bracket stocks in the U.S., the difference is less significant. Overall, the evidence is suggestive that the interlisted stocks have their prices determined by American and not Canadian investors, a result with profound implications for corporate financial policy for these companies.

V. Conclusions

We offer the following conclusions.

(I) The ex-dividend day price ratio is significantly different from zero or one. This is consistent with a market preference for capital gains income over dividend income.

(II) The response of the ex-dividend day price ratio to tax changes is consistent with a marginal investor who is an individual with a very low effective tax rate on capital gains.¹⁴

(III) The professional short term trading hypothesis fails to explain the behavior of the ex-dividend day price ratio around the major tax reforms of 1971-72, unless (1) it is assumed that Revenue Canada does not tax short term trading profits, in which case the hypothesis is indistinguishable from the tax clientele hypothesis, or (2) we use a close-close ex-dividend day price ratio that has equally as large fluctuations during periods of no-tax changes.

(IV) The data reject the realized capital gains tax version of the tax clientele hypothesis and the institutional short term trading hypothesis under reasonable transactions costs.

¹⁴ Protapapadakis [8] has recently estimated the effective marginal tax rate on capital gains in the U.S. at between 3.4% and 6.6% between 1960 and 1978.

(V) The ex-dividend day price ratios do not provide much evidence in support of dividend tax clienteles. This may support the notion that ex-dividend day trading is primarily by wealthy, sophisticated investors.

(VI) There is evidence that listed and interlisted stocks are different. One explanation is the nationality hypothesis, that the interlisted stocks have their prices determined by American investors and the solely TSE listed stocks by Canadians.

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