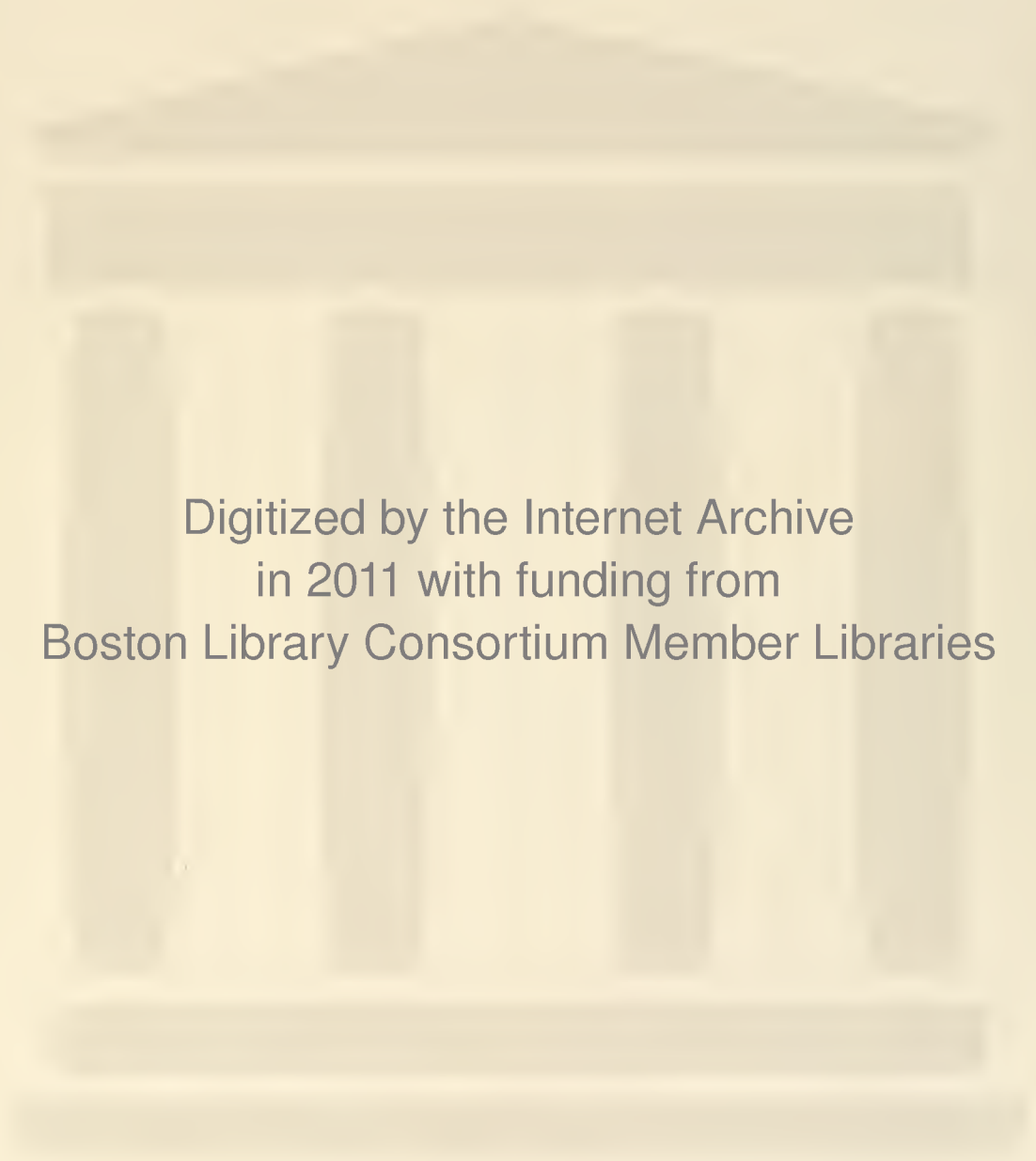

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THE CITIZENS UTILITIES CASE: A FURTHER DIVIDEND PUZZLE

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Abstract

This paper re-examines the case of Citizens Utilities, a firm with two classes of common stock. One class pays stock dividends, which are taxed as capital gains; the other pays taxable cash dividends. The two shares sell for roughly equal dividend multiples. This is consistent with the hypothesis that all investors who are taxed more heavily on dividend income than on capital gains hold stock dividend shares. However, examination of the shares' ex-dividend day price movements contradicts this view. On ex-days, the cash dividend shares decline by less than the value of their dividend, while stock dividend shares fall by nearly their full dividend payment. The difference in dividend valuation is inconsistent with the two stocks' similar dividend multiples. This paper documents the puzzling divergence between share prices and ex-dividend day movements, and uses the CU case to draw conclusions about tax-clientele models and the corporate dividend controversy more generally.

The relationship between dividend policy and share value is one of the fundamental questions in financial economics. In a provocative paper, John Long (1978) provided direct evidence on this issue by comparing the prices of two securities, Citizens Utilities Class A and Class B common stock, which are almost identical except that Class A shares pay stock dividends while Class B shares pay ordinary cash dividends. The significance of the Citizens Utilities case is that it presents a rare example in which investors can choose between dividend streams with different tax and liquidity properties but similar risk characteristics. Class A dividends are taxed as capital gains, which should make them more attractive to many investors than Class B dividends which are taxed as ordinary income. Long's discovery that A and B shares sold at roughly equal dividend multiples, despite their differential tax treatment, suggested that changes in corporate dividend policy might have little effect on share values.

Two explanations could account for Long's finding. One is that there are tax clienteles in the stock market, so that the only investors who hold Class B (taxable) shares are those who face lower tax rates on dividends than on capital gains. An alternative explanation is that cash dividends have some appeal to particular classes of shareholders who choose to receive them in spite of their tax penalty. In this paper, I test the tax clientele hypothesis by studying the movements in Class A and Class B share prices around ex-dividend days. My findings are easily summarized. On ex-days, cash dividend shares decline by substantially less than their dividend payments, a finding which is consistent with the results of many previous ex-dividend studies. The stock dividend shares, however, decline by almost the full value of their dividends. If there were pronounced tax clienteles, the Class B shares, too,

should fall by the full amount of their dividend. My findings therefore cast serious doubt on the tax-clientele explanation of CU share prices. They also raise questions about previous studies of dividends and taxes which have relied upon ex-day price movements to draw conclusions about how dividend policy affects share valuation.

The paper is divided into four sections. The first briefly describes Citizens Utilities' two-class equity capitalization and provides direct evidence on who owns the two classes of stock. This is a weak test of the clientele theory. The second section begins the analysis of ex-dividend evidence by considering whether ex-day movements are likely to convey information about shareholders' tax rates. The third section presents my ex-dividend day findings and some tests for unusual trading or return volatility patterns around ex-days. Finally, the fourth section interprets these results, pinpoints the Citizens Utilities paradox, and suggests several avenues for further study.

1. Class A and Class B: The Citizens Utilities Story[1]

Two classes of Citizens Utilities shares have been traded since 1956, when the firm received a special I.R.S. ruling. Class A shareholders receive semi-annual stock dividends which reduce the shareholder's taxable basis in the stock and are therefore equivalent to capital gains. Class B shareholders receive quarterly cash dividends which are taxed as ordinary income. Since there are currently no other two-class equity firms in the United States,

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[1]My discussion draws heavily on Long (1978) and Harvard Business School cases 9-206-007 and 9-204-059.

Citizen Utilities provides a unique opportunity to study the interactions of taxes, dividend policy, and firm value.

The characteristics of CU's two-class equity capitalization were described in detail by Long (1978). Two essential features for my purposes are:

> (i) The corporate charter requires that "whenever a given cash dividend per share is issued to Series B shares, a stock dividend per share of equal fair value must be paid during the same calendar year to Series A shares." (Long, 1978, p. 237).
>
> (ii) Except during the period between the declaration date of Series B dividends and their ex-date, one share of Series A stock can be converted into one share of Series B stock. Series B shares cannot be converted into Series A shares.

The dividends on the two classes of stock are paid at different times, as well as at different frequencies, and this asynchronous dividend pattern gives rise to movements in the relative price of Citizens Utilities' shares. The Class A shares' relative price is highest just before a stock distribution and lowest just before a Class B cash dividend payment.

Historically, the firm has not distributed strictly equal dividends to Class A and Class B equity holders. Long (1978, p. 240) reported that "in interpreting the 'equal fair value' requirement in the charter amendment, the firm has very consistently declared the semi-annual Series A stock dividends in amounts such that the market value of any given per share stock dividend is about ten percent greater than the cash dividends per share on Series B stock in the corresponding half year." The stock dividend is set to provide Class A shareholders with an amount equal to the cash dividend in the event that all

new shares were sold immediately on the open market.[2] The notorious difficulty in predicting the amount by which share prices will change in response to large trading volume makes challenging the company's interpretation of "equal fair value" a delicate matter.

The real interest in Citizens Utilities derives from the opportunity to compare the prices of two securities with similar risk characteristics but different dividend tax treatments. Long (1978) found that for the 1956-76 period, after the shares' differential dividend policies were taken into account, the market appeared to have valued Class A and Class B equity at roughly equal dividend multiples. If anything, it awarded a slight premium to the cash dividend shares.[3]

One explanation for this finding is that there are tax clienteles. To examine this hypothesis I obtained unpublished data which disaggregate shareholders into several categories. These data are shown in Table 1, and should be interpreted cautiously, since beneficial holders are often unknown. Many "broker's" holdings should ultimately be assigned to individuals or institutions. With this caveat in mind, however, the data suggest that individuals, who are likely to face the highest dividend tax rates, hold a larger fraction of the outstanding Class A than Class B shares. Nominees and institutions hold a smaller fraction of the Class A shares. The individual holdings of Class A shares are also in substantially larger blocks than the Class B shareholdings.

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[2]A further description of the procedure may be found in the Wall Street Journal, 5 January 1956, p. 15.

[3]While this paper was being revised, there were periods when Class A shares were trading at new highs relative to Class B shares. In July 1983, P_A/P_B was about 1.30. The rapid escalation of Class A share prices began immediately following a share split in January, 1983. Of course, the recent price movements do not explain the puzzle of share valuation during the first

Table 1

Clienteles in Citizens Utilities Shares

	Class A Stock Dividend Shares	Class B Cash Dividend Shares
Fraction of Shares held by:		
Individuals	64.6%	54.1%
Fiduciaries	6.5	7.0
Nominees/Institutions	28.9	38.9
Average Holding Size (shares):		
Individuals	963.6	392.5
Fiduciaries	587.0	389.1
Nominees/Institutions	13366.0	5547.1

Source: Unpublished data provided by the Illinois Stock Transfer Company, after permission was granted by Mr. R.L. Rosenthal, Chairman of Citizens Utilities.

These data suggest some divergence between the types of investors in Class A and Class B shares and provide weak support for the clientele hypothesis, but they unfortunately fail to provide direct information on shareholder tax rates. Some individuals may face zero marginal tax rates on dividends [see Miller and Scholes (1978)], although most [see Feenberg (1981)] face higher rates. The shareownership evidence is therefore of limited value.[4]

More evidence on shareholder dividend preference derives from the shareholder survey conducted by CU's Chairman, Richard Rosenthal, in 1955. Shareholders were asked which type of dividend policy they preferred: all stock, all cash, or a mix of the two. Sixty eight percent of the shareholders participated in the survey; of the respondents, 55% voted for all-stock dividends, 38% for a half-stock/half-cash plan, and 7% desired all cash dividends.[5] However, Business Week reported that

> The all-cash minority is a powerful one because its shares are concentrated in large blocks in the hands of a few investment trusts and other institutional investors. Its preference is one reason why stockholders are getting the choice of a cash-paying as well as a stock-paying category. (Business Week, January 14, 1956, p. 107.)

While this anecdotal evidence suggests that stock market clienteles may exist, the fact that many CU shareholders in 1955 wished to receive both

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27 years of two-class equity trading.

[4]There are also some Canadian firms with two-class equity capitalizations. A small survey by the author suggested the present of similar tax clienteles in these firms.

[5]Shareholding-weighted percentages calculated by Business Week, 14 January 1956, p. 107.

cash and stock dividends is difficult to reconcile with rational behavior in the light of taxes.[6]

2. Testing the Clientele Model: Ex-Day Movements

The low power of shareholding data in resolving disputes about shareholder tax rates led me to search for other sources of evidence. One possibility which I explored was a comparison of share price movements and dividend payments on ex-dividend days. Before considering this evidence, however, we must detour to consider whether ex-day share price movements should bear any relationship to shareholder tax rates. Recent work on the short-term profit elimination argument by Kalay (1982) and others has suggested that they might not.

If investors can borrow and lend freely and there are no transactions costs, short selling restrictions, or risk neutral investors then Brennan's (1970) after-tax capital asset pricing model predicts the following equilibrium relationship among security returns:

$$\bar{g}_{it} + \alpha\bar{d}_{it} - r_{0t} = \beta_i (\bar{g}_{mt} + \alpha\bar{d}_{mt} - \bar{r}_{0t}) \qquad (1)$$

where $\bar{g}_{mt}$ and $\bar{d}_{mt}$ are expected capital gains and expected dividends paid by the market portfolio, r_{0t} is the risk-free interest rate, $\bar{g}_{it}$ and $\bar{d}_{it}$ are the expected capital gain and dividend on the i^{th} security, and β_i = Cov $(\alpha d_{it} + g_{it}, \alpha d_{mt} + g_{mt})$/ Var $(\alpha d_{mt} + g_{mt})$. I neglect taxes on interest payments for convenience. The parameter α is the market's relative valuation of dividends and capital gains. If we let $\theta^h = (1-\tau_D^h)/(1-\tau_c^h)$ where τ_D^h is the

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[6]Some institutions such as pension funds might face zero tax rates on both sources of income. However, their CU shareholdings are below the fraction of investors who voted for a half-and-half policy in 1955. The annual

h^{th} investor's marginal dividend tax rate and τ_c^h his effective capital gains rate, then

$$\alpha = \sum_h s^h \gamma^h / \sum_h s^h \gamma^h \theta^h. \qquad (2)$$

An investor's tax preferences are weighted by γ^h, the reciprocal of his marginal risk aversion, and s^h, his share of total wealth. Hess (1982) has tested and decisively rejected this "no clientele" model in which α is the same for all firms.[7] If a firm pays stock dividends, then

$$\bar{g}_{it} + d_{it} - \bar{r}_{0t} = \beta_i \cdot (\bar{g}_{mt} + \alpha \bar{d}_{mt} - \bar{r}_{0t}) \qquad (3)$$

is the appropriate capital market line. Class A shares should not decline by the full value of their dividends, since when stock dividends are paid, fractional shares are paid to the shareholders in cash and are taxable as ordinary dividend income.

If there are some risk-neutral investors who can engage in trading around ex-days, the equilibrium described by (1) may not exist. A radically different view of ex-day share pricing has been presented by Kalay (1982), Miller and Scholes (1982), and Lakonishok and Vermaelen (1983), who argue that clienteles in each share should be unstable over time and that ex-day trading activity should force $\alpha^i = 1$ for all firms.

Their arguments center on eliminating the short-term profits which

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reports often reveal letters from investors who hold both classes of CU shares ("one for dividends, one for capital appreciation.") This is also difficult to square with strict tax clientele theories.

[7] Auerbach (1983) showed that when some investors are constrained in short selling or borrowing, the dividend preference coefficient facing firm i is

could be earned by ex-day traders if α^i were systematically different from unity. If share prices fell by less than the dividend payment on ex-days, then the after-tax return from a long position in the stock would be

$$(1-\tau_D^h)[d_{it} + g_{it} - \phi_L] = (1-\tau_D^h)[(1-\alpha^i)d_{it} - \phi_L] \qquad (4)$$

where ϕ_L is the marginal round-trip transactions cost as a fraction of share value. Note that since short term capital gains are taxed as ordinary income, just like dividends, this argument can be applied to any investor. If the share price were expected to decline by more than the value of dividends, then the optimal position would be short and the after-tax return would be

$$-(1-\tau_D^h)[d_{it} + g_{it} - \phi_S] = (1-\tau_D^h)[(\alpha^i-1)d_{it} - \phi_S] \qquad (5)$$

where ϕ_S is the fractional transactions cost associated with a round-trip short position. It is likely that $\phi_S > \phi_L$. To rule out short-term profits of the type just described, the relative share price movement must lie within certain bounds:

$$-1 - \frac{\phi_S}{d_{it}} \leq \frac{g_{it}}{d_{it}} \leq -1 + \frac{\phi_L}{d_{it}} . \qquad (6)$$

These bounds restrict the permissible deviation between share price movements and dividend payments, potentially clouding our ability to infer tax rates from

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$$\alpha^i = \sum_h s_i^h \gamma^h / \sum_h s_i^h \gamma^h \theta^h$$

where s_i^h is the h^{th} investor's share of the total wealth held by investors in firm i. This model assumes that the clienteles in each firm remain stable over time.

observed share prices.

Specifying market equilibrium in the presence of these bounds is difficult. If $-\alpha^i$ for a firm lies within these bounds, then we will observe share price movements of $-\alpha^i \cdot d_{it}$. If $-\alpha^i$ is outside the bounds, however, we should observe the boundary value. Miller and Scholes (1982) argue that for security broker-dealers, $\phi_S \approx \phi_L \approx 0$, effectively requiring the share price drop to equal the dividend payment.

The debate over the relevance of these bounds hinges upon measuring ϕ_S and ϕ_L. Since shares are usually observed to fall by less than their dividends, the upper bound is of greatest interest and ϕ_L will be the focus of this discussion. Kalay (1982) argued that $\phi_L \approx .2\%$. Elton, Gruber, and Rentzler (1983) claimed that this was a substantial underestimate since Kalay's calculation ignored registration costs, trading on opposite sides of the bid-asked spread, and the possible share price movements which might be induced by ex-day trading. For a company like Citizens Utilities on which the semi-annual stock dividend is about 2.5% of share value and cash dividends have a quarterly yield of .0125, the implied bounds for quite conservative values of transactions costs are shown below.

Transaction Cost	Bounds for Class A Shares	Bounds for Class B Shares
$\phi_S = \phi_L = .002$	-.92 to -1.08	-.84 to -1.16
$\phi_S = \phi_L = .005$	-.80 to -1.20	-.60 to -1.40
$\phi_S = \phi_L = .010$	-.60 to -1.40	-.20 to -1.80

Even the larger values of transactions costs are probably too low for a firm like CU. The bid-asked spread for Citizens Utilities varies between 1/4 and

1/2, and is often more than one percent of the share value. This raises the effective transactions cost and thereby widens the bounds around $\alpha^i = 01$. While the profit elimination arguments may have substantial power when applied to widely-held, large firms, their power is much more limited in the case of small, less heavily traded securities. Transactions which are large enough to reduce commission costs to negligible levels may also cause price shifts. Transactions in CU shares which pay a commission rate of only 0.2 percent of the share price would require a trade of about one and one third times CU's average daily volume!

The central empirical findings of previous ex-day studies are (i) that different shares experience price changes equal to different fractions of their dividends, and (ii) that on average price changes are smaller than dividends. While there have been several recent attempts to label these findings as spurious, my interpretation of the available evidence suggests that trading around ex-days is unlikely to erase the dependence of price movements on taxes.[8] While the strict after-tax CAPM of equation (1) is surely incorrect, taxes should have some effect on ex-day share price movements.[9] Studing the ex-day price movements for Citizens Utilities shares should therefore provide some information on tax clienteles.

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[8]One explanation of my findings later in the paper that Class A shares decline by a larger fraction of their dividends is that the profit elimination bounds for two shares with different dividends are different. However, as I point out below, there have been variations in commission costs over time which allow me to test explicitly the profit elimination hypothesis. The movements over time in the ex-day patterns are opposite to the predictions of the theory.

[9]Strong tests to this end may be found in Poterba and Summers (1983).

3. The Ex-Dividend Behavior of CU Share Prices

A. Basic Results

The ex-dividend day price behavior of CU shares was investigated using daily data on the closing bid prices of Series A and Series B shares for the period January 1965 to October 1983. Class A shares declared 39 dividends, while Class B shares experienced 77 ex-days, during this period.[10] Before 1965, there were no ex-dividend days for over-the-counter stocks and individual brokers negotiated share prices with and without dividends. The absence of ex-days prior to 1965 is unfortunate, since one of the most interesting clientele tests in the CU case would have involved a comparison of ex-day price movements for cash dividends on CU shares before 1956, when clientele choice of dividend type was impossible, with the relative price movements for Class B shares after that date.

I follow previous ex-day studies by estimating an equation of the form

$$g_{it} = \beta_0 - \alpha d_{it} + \beta_1 r_{mt} + \varepsilon_{it} \qquad (7)$$

where r_{mt} is measured as the capital gain on the market portfolio.[11] Since there may be a nontrading problem in share prices for a small firm like Citizens Utilities, I have included both the current and the one-period lagged value of

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[10] An earlier version of this study used data on all trading days between January 1972 and October 1982. This sample choice was dictated by availability of data in machine-readable form. The current version extends the sample period by including the ex-days from 1965-71 and 1982-3, but since these data were gathered from the Wall Street Journal, only ex-days were added.

[11] Many studies ignore differences between yield and capital gain in computing the market return, estimating instead $g_{it} = r_{0t} - ad_{it} + \beta_i(r_{mt} - r_{0t}) + \varepsilon_{it}$ where $r_{mt} = g_{mt} + d_{mt}$ instead of $g_{mt} + \alpha d_{mt}$. This is also the procedure which I follow, since in daily data d_{mt} is trivially small.

the market return in may equation.[12]

$$\varepsilon_{it} = \beta_0 - \alpha d_{it} + \beta_1 r_{mt} + \beta_2 r_{mt-1} + \varepsilon_{it} \qquad (8)$$

The one-day market return is measured by the change in the value of the NYSE composite stock price index.

Ex-dividend equations for both classes of CU shares are reported in Table 2. Payment of a one dollar dividend[13] on the stock distribution shares reduces their price by about ninety cents. By comparison, the cash dividend share price seems to decline by only about seventy-five cents when a one dollar dividend is paid. The difference between α^A and α^B in these equations is significant at the 90 percent confidence level. This finding is consistent with the existence of tax effects, since the price change is smaller for the taxable dividend payments than for the tax-free stock dividends.

The market return is included in ex-dividend day return equations to account for the change in each share's price which is attributable to systematic market forces. A much more accurate indicator of the systematic forces affecting each class of Citizens Utilities shares is readily available, however: it is the return on the <u>other</u> class of CU stock. I therefore

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Similarly, I neglect variation in r_{0t}, the risk-free rate.

[12]Almost all ex-day studies are plagued by non-availability of data on transactions prices. My study is contaminated by the possibility of trading days on which CU does not trade (leading to a measured price change of zero), asd well as deviations between bid prices and market clearing prices. These difficulties lead an errors-in-variables problem which may be treated by using instrumental variables estimators. My regression coefficients were largely unchanged when I used the IV approach, or the average of bid and asked prices, in estimation. The lagged r_{mt} approach was suggested by Scholes and Williams (1977).

[13]The value of Class A dividends was computed following Long (1978), as $[\delta/(1+\delta)]P_{DEC}$, where δ = fractional share distribution per existing share and P_{DEC} is the share price on the declaration date. If an investor owning N

Table 2

Ex-Dividend Day Returns, 1965-1983

Equation	Dividend Type	Constant ($\times 10^{-4}$)	Market Yield	Market Return	Lagged Market Return	CU Return Lagged	CU Return Other	R^2	SEE
1	Cash	3.33 (2.36)	-.763 (.092)	-	-	-	-	.002	.012
2	Cash	2.52 (2.32)	-.758 (.089)	.241 (.027)	.183 (.026)	-	-	.059	.012
3	Cash	.014 (1.76)	-.750 (.069)	.055 (.020)	.036 (.021)	.628 (.014)	.014 (.014)	.448	.009
4	Cash	-.715 (1.96)	-.753 (.076)	-	-	-1.000*	-	-	-
5	Stock	3.559 (2.426)	-.894 (.069)	-	-	-	-	.0008	.013
6	Stock	3.156 (2.350)	-.883 (.066)	.291 (.027)	.225 (.027)	-	-	.079	.0120
7	Stock	.852 (1.803)	-.907 (.051)	.137 (.021)	.097 (.021)	.648 (.151)	.035 (.015)	.459	.009
8	Stock	-.602 (1.958)	-.916 (.056)	-	-	-1.000*	-	-	-

Notes: All equations are estimated using daily returns on Citizens Utilities Class A and Class B shares for the period 1965-1983. All trading days are included for the 1972-82 period; only ex-days from the other years were used. There are a total of 2,797 observations. Standard errors are shown in parentheses. Starred coefficients are constrained values.

modified my specification to use this information:

$$g_{At} = \beta_0 - \alpha d_{At} + \beta_1 r_{Mt} + \beta_2 r_{Mt-1} + \beta_3 r_{Bt} + \beta_4 r_{Bt-1} + \varepsilon_{it} \qquad (9)$$

where subscripts A or B refer to the different share classes and $r_{Bt} = g_{Bt} + d_{Bt}$, the total return on Class B shares.

Results of estimating these specifications are also reported in Table 2. The estimated ex-dividend coefficients move only slightly, but the estimated standard errors decline substantially so that the hypothesis that $\alpha^A = \alpha^B$ can now be rejected at the 95 percent confidence level. There is a puzzle in these findings, however. The sum of the coefficients on the "other CU return" variables, $\beta_3 + \beta_4$ of (9), is substantially less than one for both classes of equity. One explanation for this finding may be that share prices are measured with error,[14] inducing a classical errors-in-variables bias which forces the coefficients closer to zero. Since the expected returns on the two shares should be nearly equal, I imposed this restriction and obtained the estimates which are reported in rows 4 and 8 of Table 2. The findings again point to between a fifteen and twenty percent difference in the effective tax rates on Class A and Class B dividends. While there is clear evidence that dividends paid on Class B shares must be "devalued," so that α^B is less than one, the hypothesis that dividends and capital gains on Class A shares receive

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shares were to sell $[\delta/(1+\delta)]N$ shares before the ex-date he would receive a stock dividend at rate δ on holdings of $[1-\delta/(1+\delta)]N$ shares. His position after the ex-day is therefore $(1+\delta)[(1-\delta/(1+\delta)]N = N$, so he retains the same number of shares as before.

[14]The non-trading problem discussed earlier would induce precisely this type of bias.

equal weight ($\alpha^A = 1$) cannot be rejected in any of the specifications which I estimated. These findings confirm the large body of pre-existing ex-day evidence.[15]

The importance of these ex-day results is that under the tax clientele hypothesis, Citizens Utilities' Class B shares should not behave as most of the cash dividend shares in previous studies did. Investors who are taxed on dividend income have the option of holding another security which promises essentially the same return stream as Class B shares, but does not expose them to an equivalent tax liability. In spite of this opportunity, Class B share prices still behave as though investors faced substantial dividend taxes. This suggests that clientele formation has not elminated the marginal tax burden on Class B cash dividends. The explanation for the market's pricing of Class A and Class B shares must therefore be sought in other factors which make cash dividends attractive.

The emphasis on transactions costs in recent ex-dividend studies led some authors, notably Eades, Hess, and Kim (1982), to consider the effect of the 1975 commission charge reforms on ex-day price movements. The 1975 changes, including the introduction of negotiated commissions, should have substantially reduced the round-trip transactions costs facing many traders. If the short-term profit elimination model is correct, then these changes should have reduced the deviation between share price movements and dividend payments. To test this proposition, I re-estimated my equations for the period 1975-83. The results were qualitatively similar to those reported in Table 2.

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[15]In their analysis of ex-day share price movements, Black and Scholes (1973) found that while there were excess returns to shares on their ex-dividend day, these returns disappeared if the holding period was extended to include several days before and after the ex-date.

The implied tax rates on Class B shares are actually larger during the recent subsample than during the full period: the estimated value of α^B for the post-1975 period is approximately .70. This tendency toward a larger divergence between share price movements and dividends after 1975 is precisely opposite the prediction of models which emphasize commission costs, and constitutes some evidence against the short-term profits argument when applied to CU.

B. Extensions

All of the preceding equations have been estimated under the standard statistical assumptions of the general linear model. However, the stochastic process generating share price movements may not satisfy these assumptions. If returns are more volatile around event days than on non-event days, the standard errors reported by least squares will be inappropriate for making inferences about the ex-day model. These standard errors are computed using the average residual variance over the entire data sample, and they will not reflect the greater return uncertainty around ex-dates. If all of the events whose effects we wish to measure occur during periods of abnormal volatility, regression standard errors will understate the actual variability of the estimated coefficients.

To explore the importance of volatility changes, I regressed the squared residuals from the equations in Table 2 on a dummy variable corresponding to the ex-dividend day.[16] The results are shown below:

My results also displayed some instability as the holding period around the ex-day was varied.

[16]The results in this section are based on data for the period 1972-1982. This was the time for which continual daily data was available, making analysis of residual serial correlation properties possible.

Class A shares: $\hat{e}_t^2 = \underset{(.047)}{.822} + \underset{(.535)}{.980}$ EXDAYA

Class B shares: $\hat{e}_t^2 = \underset{(.053)}{.827} + \underset{(.429)}{.440}$ EXDAYB.

The return variance on Class A ex-days is twice as large as on other days. Class B returns display a somewhat less pronounced volatility increase, about fifty percent, on ex-days. Since these volatility changes are a form of heteroscedasticity, I calculated White's (1980) heteroscedasticity-consistent standard errors for my regression model. These are shown below along with least-squares coefficients:

$$\varepsilon_{At} = \underset{(1.81)}{1.11} - \underset{(.058)}{.946}\, d_{At} + \underset{(.015)}{.652}\, r_{Bt} + \underset{(.015)}{.035}\, r_{Bt-1} + \underset{(.021)}{.131}\, r_{mt} + \underset{(.021)}{.095}\, r_{mt-1}$$

White SE (1.80) (.083) (.036) (.028) (.027) (.025)

$$\varepsilon_{Bt} = \underset{(1.78)}{.46} - \underset{(.078)}{.753}\, d_{Bt} + \underset{(.015)}{.627}\, r_{At} + \underset{(.014)}{.012}\, r_{At-1} + \underset{(.020)}{.065}\, r_{mt} + \underset{(.021)}{.036}\, r_{mt-1}$$

White SE (1.80) (.088) (.030) (.020) (.026) (.024)

While all but one of the estimated standard errors increase, the effects on the precision of the d_{it} coefficients (α^A and α^B) are particularly pronounced. The standard error in the Class A equation increases by nearly fifty percent; that in the model for Class B returns rises by a smaller amount.[17]

The implications of excess volatility around event days extend far beyond the present study. If this proves to be a general tendency in security

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[17]The difference between α^A and α^B is still significant at the 90% confidence level.

returns data, then many conclusions based on previous studies may require re-examination. The danger is particularly pronounced in research employing daily data, where the frequency of event days is low relative to that of non-event days.

I also discovered persistent excess volatility in the residuals from my return model. Days on which returns were unusually noisy were, on average, followed by days with highly variable price movements. This can be seen from the following regressions using squared residuals.[18]

$$\text{Class A:}\quad \hat{e}_t^2 = \underset{(.051)}{.529} + \underset{(.512)}{.750}\ \text{EXDAYA} + \underset{(.019)}{.205}\hat{e}_{t-1}^2 + \underset{(.020)}{.081}\hat{e}_{t-2}^2 + \underset{(.020)}{.099}\hat{e}_{t-3}^2$$

$$\text{Class B:}\quad \hat{e}_t^2 = \underset{(.583)}{.497} + \underset{(.423)}{.488}\ \text{EXDAYB} + \underset{(.019)}{.108}\hat{e}_{t-1}^2 + \underset{(.019)}{.077}\hat{e}_{t-2}^2 + \underset{(.119)}{.089}\hat{e}_{t-3}^2$$

Serial correlation in the residual variances can make ordinary least squares estimation highly inefficient.[19] Perhaps more importantly, however, intermittent but persistent shocks to security return variances may require modifications in standard option pricing and other security valuation rules.

Some information on ex-day phenomena can also be obtained by looking for unusual trading patterns around the ex-day which might suggest that some

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[18]Most values of $\hat{e}_t^2$ lagged more than three periods proved insignificant in these equations.

[19]Engle (1982) discusses these problems, which he refers to as "Autoregressive Conditional Heteroscedasticity," and demonstrates in some cases OLS becomes infinitely inefficient relative to maximim likelihood. While procedures for estimating models with ARCH exist, I have not yet explored them, see Morgan and Morgan (1983) for an appli-

form of short-term profit elimination was taking place. Green (1980) constructed a model of the shareholder population in which the presence of an ex-day might result in unusual volume patterns. He studied thirty Dow Jones firms and found some evidence of excessive trading activity before ex-dates.

To examine CU volume fluctuations, I estimated two regression models. The first considered only trading activity within one week of the ex-date, using dummy variables for the ex-day and days around it as explanatory variables. The results of estimating this model for the period 1972-1982 are shown in Table 3. Both classes of CU shares were unusually active on their ex-days. Class A shares' experienced volume eighteen percent above average on their own ex-dates, and Class B shares' volume rose by about 22 percent on their ex-date. These effects are substantial, but should be viewed with caution since the hypothesis that the volume was equal on ex-days and other days could not be rejected. I also explored the effect of one share's ex-date on the other share's volume. While Class B share volume appeared to rise on Class A ex-days, Class A volume declined on Class B ex-days. There was no pronounced volume pattern before or after the ex-dates.

Since there are sound reasons for trading activity to increase far in advance of the ex-date, for example, corporations buying equities 15 days before it, I tried an alternative specification with dummy variables for the weeks around the ex-day. The results again were rather inconclusive. Volume in each share appeared to increase slightly on its ex-day, but these effects

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cation in financial economics.

Table 3

Volume Around Ex-Dates

Equation	Type of Share	Constant	Number of Days Until Ex-Date: Series A Shares (-2)	(-1)	0	(+1)	(+2)	Number of Days Until Ex-Date: Series B Shares (-2)	(-1)	0	(+1)	(+2)	NYSE Vol	R^2
1.	Cash Distribution	11.66 (.25)	-	-	-	-	-	-	-	2.54 (2.03)	-	-	-.121 (.597)	.0006
2.	Cash Distribution	11.66 (.25)	-	-	1.72 (2.86)	-	-	-	-	2.56 (2.03)			-.121 (.598)	.0007
3.	Cash Distribution	11.63 (.27)	-.63 (2.8)	-1.06 (2.8)	1.74 (2.8)	-1.16 (2.8)	-1.01 (2.8)	-.05 (2.04)	1.17 (2.04)	2.57 (2.04)	-.40 (2.04)	2.00 (2.04)	-.118 (.605)	.0014
4.	Stock Distribution	33.59 (.48)	-	-	6.06 (5.50)	-	-	-	-	-	-	-	-.374 (1.147)	.0005
5.	Stock Distribution	33.65 (.48)	-	-	5.99 (5.50)	-	-	-	-	-4.00 (3.91)	-	-	-.376 (1.147)	.0009
6.	Stock Distribution	33.57 (.51)	-.43 (5.50)	8.08 (5.50)	6.07 (5.50)	1.56 (5.50)	1.12 (5.50)	6.32 (3.95)	-1.44 (3.91)	-3.92 (3.91)	-3.17 (3.17)	-3.03 (3.17)	-.662 (1.161)	.0032

Notes: The dependent variable is the daily trading volume in hundreds of shares. The explanatory variables are indicator variables for ex-dividend dates and the volume on the NYSE. Equations are estimated using data from 1972-82, a total of 2,672 observations. Standard errors are shown in parentheses.

were not statistically significant. There were again no pronounced volume effects in weeks prior to, or after, the ex-day.

One explanation for the absence of trading activity is CU's size. Although there are market makers for CU in most financial centers, these markets may be thin and any attempts to take advantage of ex-day profits might result in substantial, and adverse, share price changes. An alternative explanation, however, is that the inherent riskiness of ex-day trading deters short-term profit-takers. The earlier results suggest that there is more variance in CU returns on ex-days then on other days. This hypothesis of excess event day volatility, which could also deter trading, merits further study.

4. Interpreting the Results

The findings on the ex-dividend day price movements in Citizens Utilities shares raise several challenges to current thinking about both corporate dividend policy and capital market equilibrium. Before discussing these issues, however, I should introduce several possible resolutions of the CU puzzle. None of these solutions appears satisfactory.

One explanation of the paradoxical relationship between prices and ex-day movements involves the eventual expiration of Series A shares' dividend tax exemption. While the difference between Class A and Class B ex-day price movements should reflect the difference between the current tax rates on dividends and capital gains, the share price levels should depend on the discounted value of the tax savings. For example, if the two shares were identically taxed on all dividend payments except one, then their prices would be almost the same but they might experience substantially different ex-dividend price

changes on that particular dividend day.

There is a substantial probability that the special treatment of Class A shares will expire in 1990. The relative price of the two shares should approach unity as the date of expiration nears, so we would predict that the prices of Class A and Class B shares should have narrowed in recent years. However, the prices have in fact diverged. This is evidence against the proposition that the expiration of tax exempt status drives the price movements.

Another explanation is that Class A shareholders are exposed to extra uncertainty because the factor of proportionality between Class A and Class B dividends may change. This uncertainty has a pronounced effect on the value of their option to convert their shares into Class B common stock. This hypothesis is weakened by the stable pattern of dividend ratios during the 27 years since 1956. Similarly, the hypothesis that shareholders fail to recognize that taxes affect the two shares differently is undercut by the lengthy discussions of dividend tax treatment in each year's annual report.

None of the simple explanations seem to resolve the CU puzzle. We should therefore consider some of its implications. First, the results raise doubts about current models of ex-ante security returns. On ex-days, cash dividend shares earn excess pre-tax returns roughly equal to twenty percent of their dividend. Stock dividend shares yield a much smaller excess return, if any. However, averaged over the year, the prices of the two classes of CU shares are roughly equal. On the days between dividends, therefore, stock dividend shares must appreciate <u>more rapidly</u> than cash dividend shares. This higher return on non-ex-days lets the Class A shares "catch up" with their Class B counterparts. When Long (1978) calculated the pretax returns on A and B shares

for the 1956-1976 period, he found a .5 percent per year excess return on Class A equity. The excess return from holding Class A, instead of Class B, shares on all the non-ex-days in a year is about twenty percent of the dividend yield, today close to one percent. While some studies of security returns (e.g., Rosenberg and Marathe (1979), Elton, et.al. (1983b), and Poterba and Summers (1983)) have found that the ex-ante return in non-dividend months depends upon the security's average dividend yield, the results are still controversial and require further study.

The second important implication of these results is that while taxes can explain some of the variation in shareholder clienteles, they predict more complete clientele formation than we actually observe. Many of the Class B shareholders are probably taxed on their dividend income. Nonetheless, they hold cash dividend shares in preference to comparably-risky stock-dividend securities. One explanation is that for sizable classes of stockholders, the transactions costs associated with selling shares to finance consumption or to rebalance their portfolios exceeds the tax penalty on dividends. This reasoning leads to a model of security market equilibrium in which many investors pursue buy and hold strategies in some securities to obtain dividend income. The evidence from the CU case suggests that models with these features (for example, Mayshar (1979)) must be given serious consideration.

There is still a puzzle, however. If cash dividends are valuable because they reduce investors' need to undertake costly transactions, then the difference in share prices before and after the ex-day should reflect both the after-tax income associated with the dividend and its shadow value in reducing the need for transactions. The ex-day price movements found in this study

therefore seem inconsistent with this explanation. Perhaps further work directed at modelling a liquidity-based demand for dividends will resolve this puzzle. The problem which remains to be explained is why shareholders would value shares which paid regular cash dividends even though each dividend is disliked because of its tax treatment.

The findings also have implications ex-dividend studies more generally. Although a burgeoning literature has focused on the accurate measurement of ex-day share price movements, there have been few attempts to assess the value of these investigations. The Citizens Utilities results raise doubts concerning the overall usefulness of ex-dividend day share price studies. While the stock market's valuation of the dividends paid on each of the two classes of CU shares is quite different, its valuation of the two shares is almost identical. This suggests that ex-day studies may not provide a complete answer to questions about how alternative dividend policies affect share values.

The Citizens Utilities case may also help to rule out some of the competing explanations of corporate dividend behavior. The intrinsic value of the cash dividends paid to Class B shareholders cannot derive from, for example, the signalling content of these payments. Class A shareholders can observe the same signal, and there should be no differential in these shares' value because of information effects. Theories which rely upon the shareholders' need to restrict managerial discretion are also indicted by these results, since the Class A shareholders are free riders on whatever benefits obtain by paying dividends on Class B shares. These results support the conclusion of Stiglitz (1980) and others, that signalling-type models are unlikely to

account for the persistence of dividend payout.

Finally, one might ask if the results are simply unrepresentative of the market as a whole, since Citizens Utilities is only one, small firm. This question is difficult to answer. While CU is small, it is the only American firm which provides a direct testing ground for the clientele hypothesis. Some encouragement may be drawn from the stability of estimated ex-day coefficients for the two shares during different sample periods. Until better evidence or more data becomes available,[20] the best approach is to determine what hypotheses are suggested by the CU case and then to attempt to test them in future work. It seems unwise to completely discount the insights which this unique "experiment" can provide for out understanding of dividend policy, taxes, and share valuation.

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[20]There are several large Canadian firms with both cash-dividend and stock-dividend shares, and they probably deserve future investigation. Unfortunately, their share price data cannot be used, since in all cases the two classes of equity are mutually interconvertible and therefore sell for the same price. Clienteles in these shares, however, could be studied.

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References

Auerbach, A.J., 1983, Stockhlder tax rates and firm attributes, Journal of Public Economics 21, 107-127.

Citizens Utilities Company, 1981 Annual Report. Stamford, Conn.

Citizens Utilities Company, 1956 Annual Report. Stamford, Conn.

Eades, K.M., Hess and Kim, 1982, On interpreting security returns during the ex-dividend period, unpublished manuscript, University of Michigan.

Elton, E.J., M. Gruber, and J. Rentzler, 1983a, A simple examination of the empirical relationship between dividend yields and deviations from the CAPM, Journal of Banking and Finance 7, 135-46.

Elton, E.J., M. Gruber, and J. Rentzler, 1983b, The ex-dividend day behavior of stock prices; A Re-examination of the clientele effect: A comment, unpublished, NYU Graduate School of Business.

Engle, R.F., 1982, Autogressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflations, Econometrica 50, 987-1009.

Feenberg, D., 1981, Does the investment interest limitation explain the existence of dividends, Journal of Financial Economics 9, 265-269.

Green, J., 1980, Taxation and the ex-dividend day behavior of common stock prices, NBER Working Paper No. 496, Cambridge, Mass.

Harvard Business School, 1959, Citizens Utilities (A), Case #9-204-059, Cambridge, Mass.

_____, 1960, Citizens Utilities (B), Case #9-206-007, Cambridge, Mass.

Hess, P., 1982, The ex-dividend day behavior of stock returns: further evidence on tax effects, Journal of Finance 37, 445-56.

Kalay, A., 1982, The ex-dividend day behavior of stock prices: A re-examination of the clientele effect, Journal of Finance 37, 1059-70.

Kalay, A., 1983, The ex-dividend day behavior of stock prices: A re-examination of the clientele effect: A reply, unpublished manuscript, NYU Graduate School of Business.

Lakonishok, J., and T. Vermaelen, 1983, Tax reform and ex-dividend day behavior, Journal of Finance XXXVIII, pp. 1157-79.

Long, J.B., Jr., 1978, The market valuation of cash dividends: A case to consider, Journal of Financial Economics 6, 235-64.

Mayshar, J., 1979, Transactions costs in a model of capital market equilibrium, Journal of Political Economy, 87, 673-700.

Miller, M.H., and M. Scholes, 1978, Dividends and taxes, Journal of Financial Economics 6, 333-64.

Miller, M.H., and M. Scholes, 1982, Dividends and taxes: Some empirical evidence, Journal of Political Economy 90, 1182-42.

Morgan, I.G., and K. Morgan, 1983, Further evidence on small firm effects, mimeo, Queens University.

Poterba, J.M. and L.H. Summers, 1983, New evidence that taxes affect the valuation of dividends, mimeo, MIT.

Rosenberg, B. and V. Marathe, 1979, Tests of capital asset pricing hypotheses, Research in Finance 1, 115-223.

Scholes, M., and J. Williams, 1977, Estimating betas from non-synchronous data, Journal of Financial Economics 5, 309-27.

White, H., 1980, A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity, Econometrica 48, 817-838.