



ELSEVIER

Journal of Public Economics 76 (2000) 69–85

JOURNAL OF
PUBLIC
ECONOMICS

www.elsevier.nl/locate/econbase

Capitalization of capital gains taxes: evidence from stock price reactions to the 1997 rate reduction

Mark H. Lang, Douglas A. Shackelford*

Kenan-Flagler Business School, University of North Carolina, Campus Box 3490, McColl Building, Chapel Hill, NC 27599-3490, USA

Received 1 December 1998; received in revised form 1 July 1999; accepted 1 July 1999

Abstract

We empirically document that stock prices moved inversely with dividend yields during the May, 1997 week when the White House and Congress agreed on a budget accord that included a reduction in the capital gains tax rate. The findings are consistent with equity prices capitalizing expected capital gains taxes. Two scenarios are possible. First, to the extent returns are expected to be taxed as capital gains, a reduction in the expected capital gains tax rate enhances market value. Second, to the extent individuals hold a stock, a reduction in the expected personal capital gains tax rate increases market value. © 2000 Elsevier Science S.A. All rights reserved.

Keywords: Capital gains taxes; Equity prices; Dividends; Capital markets

JEL classification: H24; G12; G35; G14

1. Introduction

The extent to which shareholder taxes affect stock prices is central to firm valuation and tax policy and has long intrigued scholars in economics, finance, and accounting (e.g., King, 1977; Auerbach, 1979; Gordon and Bradford, 1980;

*Corresponding author. Tel.: +1-919-962-3197; fax: +1-919-962-4727.

E-mail address: doug_shack@unc.edu (D.A. Shackelford)

Bradford, 1981). This study assesses the equity effects of capital gains taxes by evaluating stock price reactions around a likely change in expected capital gains tax rates, namely the May 1997 budget accord that led to a reduction in the long-term capital gains tax rate from 28 to 20%.¹

Shareholder capital gains taxes are triggered by trades in the secondary market, share repurchases, and liquidating distributions. In each case, capital gains taxes are assessed on the difference between the stock's sales price (or liquidation value) and the investor's tax basis. The theoretical literature offers conflicting predictions on how changes in capital gains tax rates affect stock prices. Theories of capital gains tax capitalization (e.g., Collins and Kemsley, 1999) predict that share prices will rise when expected future capital gains taxes are reduced. Others (e.g., Klein, 1999) show that by mitigating the lock-in effect, capital gains tax rate cuts may lower shareholders' reservation prices and decrease stock prices. The tax-irrelevance perspective (e.g., Miller and Scholes, 1978) assumes marginal investors are unaffected by the changes in capital gains tax policy, e.g., tax-exempt investors, and thus predicts no share price reaction. Finally, some dividend tax capitalization models (e.g., Harris and Kemsley, 1999) preclude the possibility that capital gains taxes can affect share prices by assuming all corporate profits are distributed to shareholders as dividends and ignoring the potential valuation implications of capital gains taxes arising in secondary trading.

The few recent empirical studies of the effect of capital gains taxes on stock prices are inconclusive. Amoako-Adu et al. (1992) find that the stock price reaction did not vary across dividend yields when the Canadian government introduced a \$500,000 lifetime capital gains exemption in 1985. However, they find that high-dividend-yield firms experienced a smaller price decrease than low-dividend-yield firms when the exemption was reduced to \$100,000 in 1987. Collins and Kemsley (1999) regress firm-level stock prices on stockholders' equity, earnings, and dividends from 1975 to 1994 and conclude that the multiples vary across tax regimes in a manner consistent with capital gains tax capitalization. Landsman and Shackelford (1995) report that, during the 1989 RJR Nabisco leveraged buyout, shareholders who faced larger capital gains taxes demanded higher prices than shareholders facing smaller capital gains taxes, consistent with the lock-in effect.

This paper extends this literature by adopting a capital markets event study methodology to test the effect of expected changes in the capital gains tax rate on

¹Realizations from capital transactions are subject to differing tax treatments depending on whether they are gains or losses and how long the investor has owned the property. Throughout the paper, references to the capital gains tax rate mean the most favorable long-term capital gains tax rate applied to net long-term capital gains realized by individual investors in the maximum tax bracket.

share prices.² On May 2, 1997, the Clinton Administration and the Republican Congressional leaders announced agreement concerning the general features of the fiscal 1998 federal budget. Among other changes, the accord included an unspecified reduction in the maximum statutory capital gains tax rate for individuals. No adjustment to the ordinary tax rate on dividend income was proposed.

If expected capital gains taxes are capitalized in equity prices and news of the agreement had not leaked to the market, then stock prices should have responded differentially to the announcement depending on the market's assessment of the likelihood that the lower rate would affect shareholder taxes. Consistent with Amoako-Adu et al. (1992) and Collins and Kemsley (1999), this study uses dividend yields to proxy for the value-relevance of the expected capital gains tax. Investors are assumed to place less (more) weight on the expected capital gains tax rate when assessing firms with higher (lower) dividend yields. If equity prices reflect expected capital gains taxes, stock returns around the announcement should be negatively correlated with dividend yields.³

Consistent with investors discounting share prices for expected capital gains taxes, we find returns are decreasing in dividend yields. During the week of the budget accord, the mean return for non-dividend-paying stocks significantly exceeded that for dividend-paying stocks. No similar price movements were detected in the weeks preceding or following the accord. Among dividend-paying firms, stock returns are negatively correlated with dividend yields.

The extent to which clientele effects explain these results is beyond the scope of this paper. Perhaps the marginal investors in non-dividend-paying (and low-dividend) stocks are individuals who enjoy favorable capital gains tax treatment. The marginal investors in other stocks may be pensions, tax-exempt organizations, or foreigners, which are not subject to the capital gains tax rate, or corporations that prefer distributions that qualify for the dividends-received deduction. If so, cuts in the capital gains tax rate should increase the value of non-dividend-paying (and low-dividend) stocks more than other stocks.

²This study potentially provides a more powerful test of the effects of capital gains taxes on share prices than the prior papers. Unlike Amoako-Adu et al. (1992), the capital gains tax reduction in this study affects all individual investors, no matter their amount of capital gains. Its event study approach provides stronger internal validity than the valuation approach in Collins and Kemsley (1999). This study examines prices across many companies, unlike Landsman and Shackelford (1995), which is limited to one transaction for one company.

³The predictions are similar to discussions in the business press around the announcement. An unnamed veteran capital market strategist reportedly stated that the rate reduction "would attract investor attention even more toward stocks with a high probability of capital appreciation and away from dividends." (*Wall Street Journal*, May 5, 1997, page C12).

Our evidence does not support the lock-in effect. On May 7, 1997, Senate Finance Chairman William Roth and House Ways and Means Chairman William Archer jointly announced that the effective date for any capital gains tax cut would be May 7. In August, the Taxpayer Relief Act of 1997 cut capital gains tax rates retroactive to May 7. If the lock-in effect affected share prices, reservation prices should have fallen and share prices should have declined after the effective date of the tax rate change. During the spring and summer of 1997, stock prices soared. If share prices were depressed by a loosening of the lock-in effect, other upward price pressures overwhelmed the lock-in effect. Furthermore, a stock's price decline should have been increasing in its past appreciation. We find no evidence that around the May 2nd accord announcement or following the May 7th effective date announcement, share prices responded differently based on past appreciation.

The remainder of the paper is organized as follows: Section 2 develops models of capital gain tax capitalization and the lock-in effect. Section 3 provides background information concerning the budget agreement and the capital gains tax rate reduction. Section 4 presents the empirical tests and results. Concluding remarks follow.

2. Capital gains taxes

2.1. Capitalization model

The potential for shareholder capital gains arises if firms do not immediately distribute all internally generated cash flows to shareholders. This section develops a model in which the benefits of a reduction in the capital gains tax rate decrease in the dividend payout ratio. Its implications can be summarized as follows. If a firm retains part of its internally generated cash flow, then a decrease in the capital gains tax rate increases its stock prices and the rise in stock price increases with the cash retained. In other words, the benefit of a capital gains tax cut to the investor at liquidation (or share repurchase) increases with the proportion of value realized at liquidation, i.e., decreases with the dividend payout. Secondary trading affects firm value because it accelerates capital gains taxes that could have been deferred until the company liquidated. Thus, even if all profits are ultimately distributed and taxed as dividends (i.e., the liquidating distribution creates zero capital gains), investors who realize their profits in the secondary markets before liquidation will be taxed at the capital gains rate.

More formally, suppose a firm has constant free cash flows of F per period.⁴ If so, firm value at the beginning of the life of the firm can be expressed as the

⁴Similar implications would follow if cash flows were assumed to grow over time. One can view our assumption as normalizing cash flow growth to zero.

present value of future free cash flows. Firm value can also be expressed as the present value of shareholder distributions (D). For simplicity, assume a distribution growth rate, γ , that equates the two expressions for price. This equality can be expressed as:

$$\sum_{n=1}^{\infty} \frac{F}{(1+r)^n} = \sum_{n=1}^{\infty} \frac{D_1(1+\gamma)^{n-1}}{(1+r)^n} \tag{1}$$

The share price at time t (P_t) equals the expected dividends at $t+1$, after shareholder dividend taxes (τ^d), plus the anticipated sales price at $t+1$ (P_{t+1}) less shareholder capital gains taxes (τ^c) on the change in price, discounted at r :

$$P_t = E_t \left[\frac{P_{t+1} + D_{t+1}(1 - \tau_{t+1}^d) - (P_{t+1} - P_t)\tau_{t+1}^c}{1+r} \right] \tag{2}$$

The share price at $t+n$ is a function of the share price at $t+n+1$ for all n . Thus, current prices (P_0) can be expressed as:

$$P_0 = \sum_{n=1}^{\infty} \frac{D_1(1+\gamma)^{n-1}(1-\tau_n^d) \prod_{m=1}^{n-1} (1-\tau_m^c)}{\prod_{m=1}^n (1+r-\tau_m^c)} \tag{3}$$

If $\tau_t^c = \tau^c$ and $\tau_t^d = \tau^d$ for all t , then Eq. (3) simplifies to:

$$P_0 = \frac{D_1(1-\tau^d)}{r \left[\tau^c + \frac{D_1}{F} (1-\tau^c) \right]} \tag{4}$$

$$\frac{\partial P_0}{\partial \tau^c} = -P_0 \left[\frac{F - D_1}{(F - D_1)\tau^c + D_1} \right] \tag{5}$$

If $F > D_1$, the derivative is negative, and a reduction in the capital gains tax rate increases share prices.

This model does not distinguish between secondary trading and liquidations or share repurchases.⁵ In reality, secondary trades differ from liquidations and share repurchases in two ways. First, unlike secondary trades, which do not affect the firm’s net assets, liquidations and share repurchases reduce corporate net assets. Second, unlike secondary trades, liquidations eliminate and share repurchases

⁵Liquidations include special elections (Internal Revenue Code section 338 and 338(h)(10)) that convert corporate acquisitions achieved through acquiring stock into corporate acquisitions achieved through purchasing the firms’ assets. These elections assume the target corporation is liquidated for tax purposes, triggering shareholder capital gains taxes, and then reincorporated.

reduce a firm's "earnings and profits" (E&P) and thus its ability to pay taxable dividends in the future.⁶ Thus, ignoring secondary trading, if shareholder taxes are capitalized, share prices should impound dividend taxes to the extent E&P are expected to be reduced through dividend payments and impound capital gains taxes to the extent E&P are expected to be reduced through liquidations and share repurchases.⁷

2.2. Lock-in effect model

Alternatively, if capital gains taxes are viewed as transaction costs for which sellers demand compensation from buyers, stock prices can be shown to be increasing in capital gains tax rates under certain circumstances. A cut in the capital gains tax rate reduces the required compensation, lowering the costs of acquiring shares and thus decreasing stock prices.

For example, suppose a shareholder has a reservation price R , at which he is indifferent between holding and selling the stock and which is unaffected by the change in capital gains tax rates, and a tax basis of C in the property.⁸ To sell, the shareholder will demand a price no less than P , where:

$$P = \frac{R - C\tau^c}{1 - \tau^c} \quad (6)$$

At any price less than P , the shareholder will refuse to sell, hold the stock, avoid the capital gains tax, and collect dividends. Under this model, it is simple to show that stock prices are increasing in capital gains tax rates:

⁶Shareholders pay taxes at the ordinary rate on firm distributions from accumulated or current E&P, which is taxable income adjusted to approximate economic income. Lacking E&P, a firm's distributions are tax-exempt returns of capital or taxable capital gains to shareholders. A share repurchase reduces E&P by the ratable portion of the company redeemed. For example, if a firm's E&P are \$10, redeeming 30% of its stock reduces E&P by \$3. If shares are acquired at a discount to their tax book value (E&P plus contributed and paid-in capital), less E&P are extinguished. For example, assume the company's E&P are \$10 and other capital is \$6. If 30% of the company is redeemed for \$2, E&P are reduced by only \$1.25 [(10/10+6)*2].

⁷The empirical evidence concerning the extent to which firms exercise their option to convert dividend taxation to capital gains taxation through liquidations and share repurchases is mixed. See Auerbach and Reishus (1988), Hayn (1989), Bagwell and Shoven (1989), Schipper and Smith (1991), Auerbach and Hassett (1997), Erickson (1998), among others.

⁸Such a reservation price might exist, for example, because the holders' alternative to selling is to hold the stock and collect dividends in perpetuity at ordinary income rates. To the extent the alternative is to hold the stock for a more limited time and collect dividends, then sell and pay tax at the new capital gains tax rate, the effect would be mitigated.

$$\frac{\partial P}{\partial \tau^c} = \frac{R - C}{(1 - \tau^c)^2} \quad (7)$$

Assuming the reservation price exceeds the share's tax basis ($R > C$), a decrease in the capital gains tax rate will reduce the price that the shareholder will demand to sell his stock, resulting in a price decline.

Klein's (1999) model of the lock-in effect notes a key distinction between lock-in effect models, such as the one developed above, and tax capitalization models, such as the one developed in Section 2.1. Our tax capitalization model assumes no accrued capital gains, i.e., share price equals tax basis in the initial period. Conversely, the lock-in effect model assumes stock appreciation has already occurred ($R > C$). Klein (1999) shows if shareholders have sufficient unrealized capital gains, downward price pressure from the lock-in effect could dominate the upward price pressure from capitalization. Obviously many investors held unrealized capital gains at the time of the budget accord; thus, it is an empirical issue whether tax capitalization or the lock-in effect dominated when capital gains tax rates were reduced in 1997.

3. Development of the budget agreement's capital gains tax rate reduction

President Clinton was reelected in 1996 without endorsing a capital gains tax rate cut, and his 1998 budget, introduced in March 1997, did not propose to reduce the capital gains tax rate. However, commentators speculated that the President might accept a capital gains tax rate reduction in 1997 in exchange for Republican concessions on other issues. In March 1997, Speaker Newt Gingrich and Senate Majority Leader Trent Lott dampened expectations of a capital gains tax rate cut, stating that a balanced budget must take precedent over any tax cuts. Although Gingrich softened his statements following an outcry by conservative Republicans, it remained uncertain whether a balanced budget was feasible, much less a capital gains tax rate reduction. On March 19, House Ways and Means Committee Chair William Archer said that if a tax bill were enacted in 1997, "there is no greater than a 50–50 chance" it would include reductions in the capital gains tax rate (*Tax Notes*, March 24, 1997).

In April 1997, the Administration and the Republican leadership released little public information about their ongoing, private budget negotiations. On April 30 the Congressional Budget Office reduced its estimate of the 1997 deficit by \$45 billion and stated that annual revisions of "similar amounts" were appropriate for years 1998–2002. The CBO's announcement was a major surprise because no revision was scheduled until August and there was no precedence for an early CBO announcement.

The next day the *Wall Street Journal* and the *New York Times* announced that a budget agreement was imminent. Both newspapers speculated that the CBO's new

projections had enabled the President and Congress to balance the budget without forgoing desired expenditure programs and tax cuts.⁹ The following day, May 2, the President and Congressional leaders announced an agreement to balance the budget by 2002 and, among other things, reduce the capital gains tax rate. At the announcement OMB Director Raines admitted that the revision had enabled the negotiators to “make some adjustments.” He stated that the revision had provided additional tax revenue, enabling a balanced budget in 2002. On May 7, Senate Finance Chairman William Roth and House Ways and Means Chairman William Archer jointly announced that the effective date for any capital gains tax cut would be May 7.

The capital gains tax rate was not specified in the agreement, but the business press immediately began to speculate that maximum rates between 15% and 20% were likely, down from the current rate of 28%. After three months of haggling over details, the general features of the May budget agreement were codified in the Taxpayer Relief Act of 1997 (TRA 97) in August.¹⁰ Among other changes, it lowered the individual maximum long-term capital gains tax rate to 20%, effective May 7.

Consistent with the lock-in effect, many articles in the business press around the budget accord asserted that the capital gains tax reduction would lower stock prices in the short run because shareholders would respond to the rate reduction by selling appreciated properties. For example, the *Wall Street Journal* (May 5, 1997, page C1) reported “. . . a burst of selling may hit the markets, strategists say. That could be the reaction, at least temporarily, as investors with big long-term profits rush to lock in their gains.”¹¹

4. Empirical analysis

4.1. Dividend status regressions

The empirical analysis is based on the observation that, if expected capital gains tax rates are capitalized, then stock prices should increase for firms on the

⁹In reviewing the factors that ended “a two-year budget stalemate begun with the House Contract with America,” *Tax Notes* (May 5, 1997, p. 607) concluded, “In the end, negotiations may have been helped most by news from congressional analysts of an unexpected windfall of approximately \$200 billion from a stronger economy over the next five years than earlier predicted.”

¹⁰Confirming general enactment of the budget agreement, *Tax Notes* (July 28, 1997, p. 445) commented in the latter days of negotiation that “They’ll disagree on this and on that, but in the end, they’ll make a deal. And it will basically be the same deal the President and Republican leaders agreed to back in May.”

¹¹Consistent with the lock-in effect, the *Wall Street Journal* (February 19, 1997, page A1) earlier in the year reported that policymakers were advocating a January 1 effective date for any capital gains tax rate reductions “to avoid possible market disruptions that might come from investors delaying transactions in anticipation of a future effective date.”

announcement of the budget agreement, particularly for firms that pay less in dividends. The initial regression applies a market model approach to investigate the stock price change of dividend-paying and non-dividend-paying stocks during the budget accord week, as follows:

$$\text{Return}_{it} = \beta_1 \text{Dividend}_i + \beta_2 \text{Week}_t + \beta_3 \text{Dividend}_i * \text{Week}_t + \sum \beta_{4i} \text{S\&P500}_{it} + \varepsilon_{it} \tag{8}$$

where:

Return = firm *i*'s weekly return for the 129 weeks from January 1995 through the week of the budget accord;

Dividend = a categorical variable that equals one if firm *i* paid a dividend within the prior year;

Week = a categorical variable that equals one if the budget accord occurred in week *t*;

S&P500 = the Standard & Poors 500 index if firm *i* and week *t*; else zero.

This specification permits the joint estimation of the covariability between the firm's return and the market's return, as measured by the S&P 500 index, and allows the dividend variable to affect all returns in all periods. A negative regression coefficient estimate on the interacted term (β_3) will be interpreted as evidence that non-dividend-paying firms outperformed dividend-paying firms during the week of the budget accord.

The analysis is conducted on the 2000 largest U.S. corporations as reported by Datastream for the 129 weeks from January 1995 through the event week (239,296 observations). Of the 1975 sample firms with complete data, 1247 (63%) pay dividends. For those firms, the mean dividend yield is 2.8%. Because dividend initiations and omissions are rare, past dividend status is assumed to predict future status and, hence, the impact of capital gains tax rate changes on investors.

The return for the week of the budget accord is computed over the five-day period, Tuesday, April 29, 1997, through Monday, May 5, 1997, during which most of the uncertainty surrounding the budget agreement appears to have been resolved. The mean (median) return during the accord week was 6.1% (5.6%) for dividend-paying stocks and 12.9% (10.8%) for the non-dividend-paying firms. The return differential is consistent with the capital gains tax reduction being particularly good news for non-dividend-paying stocks. In absolute terms, the return differential exceeds any during the preceding 129 weeks beginning in January 1995, suggesting that whatever occurred during the week was highly unusual.

Table 2, Column A, reports the results from estimating Eq. (8). As predicted, the coefficient on the interaction is negative (−4.25 with a *t*-statistic of −14.5), indicating non-dividend-paying companies outperformed dividend-paying companies during the event week.

The research design assumes that information about future capital gains tax rates was dispersed to market participants in a sufficiently brief period following the

CBO's unexpected revisions that conventional capital market methodologies can detect the effect of capital gains taxes on firm values. An advantage of the budget agreement for this analysis is that few specific provisions in the agreement (other than the capital gains change) clearly benefit one group of firms over another and, therefore, potentially confound the analysis.¹² Nevertheless, a series of control variables is added in the following section to mitigate the possibility that omitted correlated variables spuriously affect the study's inferences.

4.2. Control variables

The choice of control variables is somewhat ad hoc because theory is insufficiently rich to identify other effects of the tax rate change. The controls are:

Size = natural logarithm of market value as of April 28, 1997;

Debt/Assets = total liabilities divided by total assets at year-end 1996;

Return on Assets = 1996 net income divided by year-end total assets.

Size is designed to ensure that the results are not caused by smaller, non-dividend-paying firms outperforming larger, dividend-paying firms. Debt/Assets is included to control for differences in leverage across firms.¹³ Return on assets is designed to capture differences in profitability across firms.¹⁴ All control variables are collected from Compustat.¹⁵ Results are similar if values of Debt/Assets and Return on Assets are trimmed at the 1st and 99th percentiles.

Table 1 presents descriptive statistics for the control variables, split between dividend-paying and non-dividend-paying stocks. Not surprisingly, dividend-paying stocks are larger, more highly levered (median debt/asset ratios of 0.65 vs. 0.18), and more profitable (median ROA of 13.75% vs. 10.74% respectively). *t*-tests of the mean control variables for the two groups are significantly different at conventional levels; however, for each control variable, the two distributions overlap substantially.

Table 2, Column B, shows results including the control variables. Two facts are noteworthy. First, the coefficient estimate on the dividend indicator variable drops from -4.25 to -3.49 , but remains strongly negative suggesting that differences in returns are not driven solely by the control variables. Second, size and leverage are significantly related to returns.

¹²Besides the cut in the capital gains tax rate, the only major tax changes in the accord were a child tax credit, estate tax relief, and education tax incentives. Expanded IRAs were included in the final bill.

¹³Results are consistent if debt is divided by market or book value of equity or if leverage is measured as interest expense divided by market value.

¹⁴Results are qualitatively unaltered if net income is deflated by total assets or book value of equity.

¹⁵The number of observations drops slightly for the regressions including the control variables because Compustat data are not available for every sample firm.

Table 1
Descriptive statistics^a

	Mean	25th Per.	Med.	75th Per.
<i>Non-dividend stocks (n = 728)</i>				
Return (percent)	12.9	4.5	10.8	19.7
Log(MV)	6.72	6.11	6.52	7.21
Debt/assets	0.42	0.06	0.18	0.41
Return on assets	5.61	3.56	10.74	17.34
<i>Dividend stocks (n = 1247)</i>				
Return (percent)	6.1	3.2	5.6	8.3
Log(MV)	7.54	6.59	7.36	8.27
Debt/assets	1.45	0.30	0.65	1.60
Return on assets	14.26	9.88	13.75	18.46
Dividend yield (percent)	2.76	1.18	2.07	3.40

^a Returns are computed over the 5 days, 4/29/97–5/5/97. Log(MV) is the log of market value as of 4/28/97. Debt/assets is total long-term debt divided by total assets. Return on assets is net income divided by total assets. Dividend yield is the most recent quarterly dividend, annualized and divided by market value on 4/28/97.

To our knowledge, the impact of the budget agreement and its capital gains tax rate cut should not have varied substantially across industrial sectors. However, to ensure that the results are not caused by differences across industries, Table 2, Column C reports results using industry indicator variables. Specifically, firms are split into financial, extractive, manufacturing, utilities and services sectors based on their Datastream level 3 industry codes. Again, inferences are unaffected. The indicator variables for the manufacturing, utilities, and service industries are statistically significant.

Finally, unreported regressions show that inferences are unaltered when the explanatory variables include the book-to-market ratio, the percentage change in stock prices over various combinations of the months preceding the event period, finer industry partitions (Datastream level 6), or beta.¹⁶ In addition, excluding firms that went ex-dividend during the examination period does not qualitatively affect the results.

4.3. Dividend yield regressions

Table 3, Column A, shows results for a regression that substitutes dividend yields for the dividend categorical variable in Eq. (8) and examines only dividend-paying stocks. The regression coefficient on the dividend yield is significantly negative, indicating that current dividend yields are correlated with stock price

¹⁶The market model estimation structure in Eq. (8) estimates beta as part of its analysis so including beta as an explanatory variable is redundant. In fact, the results are qualitatively unaltered by simply regressing returns on a dividend indicator variable and beta. The mean (median) beta is 0.72 (0.66) for dividend-paying stocks and 1.22 (1.16) for non-dividend-paying stocks.

Table 2
Regression coefficient estimates (*t*-statistics) for all sample firms with dividend indicator variable^a

	A	B	C
Dividend*week	-4.25 (-14.5)	-3.49 (-9.4)	-3.31 (-8.7)
Log(MV)		-0.93 (-7.1)	-0.94 (-7.1)
Debt/assets		-0.34 (-4.4)	-0.26 (-2.9)
Return on assets		-0.00 (-0.7)	-0.00 (-0.9)
Extractive indicator			-1.40 (-1.9)
Manufacturing indicator			1.05 (2.1)
Utilities indicator			1.70 (2.6)
Services indicator			1.24 (2.4)
Consumer goods indicator			0.69 (1.1)
Number of firms	1975	1466	1466
Number of observations	239,296	179,419	179,419

^a The regression in Column A is: $\text{Return}_{it} = \beta_1 \text{Dividend}_i + \beta_2 \text{Week}_t + \beta_3 \text{Dividend}_i * \text{Week}_t + \sum \beta_4 S\&P500_{it} + \varepsilon_{it}$. Return is firm *i*'s weekly return for the 129 weeks from January 1995 through the week of the budget accord (April 29, 1997, through May 5, 1997). Dividend is a categorical variable that equals one if firm *i* paid a dividend within the prior year. Week is a categorical variable that equals one if the budget accord occurred in week *t*. S&P500 is the Standard & Poors 500 index if firm *i* and week *t*; else zero. The regression in Column B includes control variables, which are defined in Table 1. The regression in Column C adds industry indicator variables, which assume a value of one if the firm is in that Datastream level 3 industry code. The analysis is conducted on the 2000 largest U.S. corporations as reported by Datastream for which complete data are available.

performance during the budget reconciliation week.¹⁷ The coefficient estimate is -0.29, indicating that a one percentage point decrease in the dividend payout ratio results in a 0.29 percentage point larger stock price increase on the announcement of the budget agreement.

Results are robust to including the control variables from Columns B and C of Table 2. Table 3, Column B, shows the coefficient on dividend yield drops to -0.17, but remains statistically negative (*t*-statistic of -2.2). As in Table 2, size and leverage also are statistically significant. Table 3, Column C, reports results

¹⁷ Tests in the preceding section assume current dividend-paying status predicts future dividend-paying status. Likewise, tests in this section assume current dividend yields are correlated with future yields. Payouts are imperfect measures, however, to the extent dividend yields vary with past performance and past market movements. For example, because dividend changes lag returns, low dividend yield firms are more likely to have experienced recent stock appreciation.

Table 3
Regression coefficients (*t*-statistics) for dividend-paying firms including dividend yield^a

	A	B	C
Dividend yield*week	−0.29 (−5.1)	−0.17 (−2.2)	−0.16 (−1.9)
Log(MV)		−0.56 (−5.2)	−0.59 (−5.4)
Debt/assets		−0.21 (−3.5)	−0.11 (−1.5)
ROA		−0.01 (−1.1)	−0.01 (−1.0)
Extractive indicator			−0.66 (1.0)
Manufacturing indicator			0.74 (1.8)
Utilities indicator			1.71 (3.3)
Services indicator			1.67 (3.8)
Consumer goods indicator			0.73 (1.3)
Number of firms	1247	927	927
Number of observations	157,055	117,742	117,742

^a The regression in Column A is: $\text{Return}_{it} = \beta_1 \text{Dividend Yield}_i + \beta_2 \text{Week}_i + \beta_3 \text{Dividend Yield}_i * \text{Week}_i + \sum \beta_{4i} \text{S\&P500}_{it} + \varepsilon_{it}$. The regression includes only dividend-paying stocks from the 2000 largest U.S. corporations as reported by Datastream for which complete data are available. The regression in Column B includes control variables and the regression in Column C adds industry indicator variables. All variables are defined as in Tables 1 and 2.

including industry indicator variables. The coefficient estimate on dividend yield is -0.16 with a *t*-statistic of -1.9 . Only the utilities and service industry indicators are statistically significant.

To investigate further the relation between dividends and the reaction to the budget agreement, dividend-paying stocks are split into quartiles based on dividend yields, where:

DUM1 = 1 if dividend yield is greater than zero but below 1.18%,

DUM2 = 1 if dividend yield is between 1.18% and 2.07%,

DUM3 = 1 if dividend yield is between 2.07% and 3.40%, and

DUM4 = 1 if dividend yield is greater than 3.40%.

Table 4 shows a monotonic relation between dividend yields and the weekly stock return. Column A indicates that, relative to the quartile with the lowest dividend yield, the 2nd, 3rd and 4th quartiles have returns that were lower by 1.44,

Table 4
Regression coefficients (*t*-statistics) by dividend-paying firms, including dividend yield quartile^a

	A	B	C
2nd quartile*week	-1.44 (-4.5)	-1.14 (-3.1)	-1.02 (-2.8)
3rd quartile*week	-1.58 (-4.9)	-1.00 (-2.6)	-0.73 (-1.9)
4th quartile*week	-1.93 (-5.2)	-1.11 (-2.5)	-0.93 (-1.9)
Log(MV)		-0.54 (-5.0)	-0.57 (-5.1)
Debt/assets		-0.20 (-3.4)	-0.09 (-1.3)
ROA		-0.01 (-1.0)	-0.00 (-0.9)
Extractive indicator			0.70 (1.1)
Manufacturing indicator			0.88 (2.1)
Utilities indicator			1.51 (2.9)
Services indicator			1.74 (4.0)
Consumer goods indicator			0.86 (1.6)
Number of firms	1247	927	927
Number of observations	157,055	117,742	117,742

^a The regression in Column A is: $\text{Return}_{it} = \sum \beta_{1j} \text{Dividend Yield Quartile}_{ij} + \beta_2 \text{Week}_i + \sum \beta_{3j} \text{Dividend Quartile}_{ij} * \text{Week}_i + \sum \beta_{4i} \text{S\&P500}_{it} + \varepsilon_{it}$. The regression in Column B includes control variables and the regression in Column C adds industry indicator variables. All variables are defined as in Tables 1 and 2 except the dividend yield quartiles, which are one if the dividend yield over the prior year is in quartile *j*. The sample is the same as in Table 3.

1.58 and 1.93 percentage points, respectively. With inclusion of control variables (Column B) and industry indicator variables (Column C), results are no longer monotonic but the general pattern is maintained. In summary, Table 4 results indicate that among dividend-paying firms, the quartile with the lowest yield is significantly different from the other stocks.

4.4. Lock-in effect

The positive market return for both dividend-paying firms and non-dividend-paying firms during the budget accord week is consistent with the budget

agreement being good news for the market as a whole.¹⁸ During the week, the Dow Jones Industrial Average rose 6% and the Nasdaq Composite rose 10%.¹⁹ The week in question accounted for 58% of the Dow's increase and 67% of the rise in the Nasdaq Composite in April and May. In addition, the Dow Jones Industrial Average and the Nasdaq Composite were largely unchanged in the week preceding and the week following the agreement. The DJIA rose 2% (1%) in the week preceding (following) the accord week. The Nasdaq rose 1% (0%) in the week preceding (following) the accord week. Moreover, a casual review of the business press during that week reveals no particularly newsworthy events, other than the accord. Thus, the evidence suggests that investors viewed the budget agreement as favorable regardless of dividend status.

Recall that, consistent with the lock-in effect, the business press widely reported that the capital gains tax rate cut would unleash selling pressure that would drive down the prices of stocks that had already appreciated. The results indicate that any downward price movement caused by reduced transaction costs was more than offset by upward price pressures. The DJIA increased on May 7, the effective date for the lower rates, and during the week beginning with May 7. By the end of the month, the DJIA (Nasdaq) had risen 1.6% (4.8%) since May 6. By enactment of the tax bill in August, the Dow Jones Industrial Average had climbed nearly 30% since shortly before the accord. The bull market appears to have overwhelmed any downward price pressure created by a lessening of the lock-in effect. As further evidence of an inability to detect a lock-in effect, stock returns during this period did not vary with the percentage change in stock prices during the months preceding the event period.

Ruling out the possibility that the lock-in effect affected prices is difficult.

¹⁸Consistent with a favorable response to the balanced budget agreement, Lehman Brothers' long-term treasury bond yield slipped from 7.21% to 6.91% on April 30, the day that CBO adjusted its revenue forecasts. The yield rebounded the following day to 7.04%. Yields were steady for the month preceding the CBO announcement (7.21% on April 1) and the month following the accord (7.05% on June 1). Empirical tests, detailed above, using firm-specific controls for leverage, growth and industry, among other factors, allay concerns that the results were attributable solely to interest rate responses. However, the fact that interest rates moved in opposite directions on successive days during the event week while stock prices for non-dividend paying companies consistently outperformed dividend-paying firms throughout the event week provides further evidence that the equity price changes were not attributable to interest rate changes alone.

¹⁹In the spirit of this paper, the *Wall Street Journal* (April 25, 1997) reported that Brian Wesbury, chief economist at the Chicago bond firm of Griffin, Kubik, Stephens & Thompson, characterized the Nasdaq Composite as an indicator of the market's expectations of the future capital gains tax rate, "a little cap-gains futures contract." Wesbury related movements in the Nasdaq since November 1996 to changes in the probability of a capital gains tax rate reduction. The DJIA was termed less sensitive to capital gains tax changes because its stocks "throw off a relatively heavy share of their profits in dividends."

Because the capital gains tax rate was reduced indefinitely (i.e., the reduced rate is not subject to any sunset provision), investors were not required to unload appreciated stock immediately following the rate reduction to garner the reduced rate. Perhaps the reduced capital gains tax rate did lower transactions costs and reduce share prices, but the selling occurred over a long period, and the event study methodology employed in this paper is insufficiently powerful to detect a slow trickle of downward price pressure.

5. Conclusions

Prior studies generally have ignored the effect of anticipated shareholder taxes on firm values or limited the focus to dividend taxes. This paper presents evidence consistent with capital gains taxes significantly affecting share prices during a week when expected capital gains tax rates likely were revised downward. In contrast to some studies of the stock market response to tax legislation (e.g., Cutler, 1988), the paper provides evidence of market efficiency.

Regression summary statistics show that stock prices moved inversely with dividend yields when the 1997 budget reconciliation was reached. The share prices of firms not currently paying dividends increased more over a five-day window than the share prices of other firms. Among firms paying dividends, the change in share prices was decreasing in dividend yields. Results are robust to a battery of sensitivity checks, mitigating concerns that inferences are affected by omitted factors correlated with dividend yields.

The results are consistent with at least two related explanations. First, to the extent a stock's returns are expected to be taxed as capital gains, a reduction in the expected capital gains tax rate enhances the attractiveness of the investment to investors. Second, to the extent a firm's stock is held by individual shareholders subject to the favorable personal capital gains tax, a reduction in the expected capital gains tax rate increases its market value. The results suggest capitalization of shareholder taxes extends beyond dividend taxes to include capital gains taxes. Because dividend yields are zero for many companies and approach zero for others, tax capitalization of expected capital gains taxes may be an important, previously overlooked, component of equity pricing. The findings are not consistent with a sell-off of appreciated securities following the rate cut caused by a reduction in the compensation for capital gains taxes that selling shareholders demand from buyers.

Acknowledgements

This paper has benefited from comments by Julie Collins, Iliia Dichev, Merle Erickson, Bill Gentry, Glenn Hubbard, Deen Kemsley, Wayne Landsman, Ed

Maydew, Lillian Mills, Mary Margaret Myers, James Poterba (editor), Andrew Samwick, Joel Slemrod, Steve Slezak, Peter Wysocki, two anonymous referees, and workshop participants at the American Accounting Association/Taiwan Accounting Association's First Globalization Conference, University of Arizona, National Bureau of Economic Research, University of Michigan, Ohio State University, and University of Pennsylvania and from research assistance by Judy Land.

References

- Amoako-Adu, B., Rashid, M., Stebbins, M., 1992. Capital gains tax and equity values: empirical test of stock price reaction to the introduction and reduction of capital gains tax exemption. *Journal of Banking and Finance* 16, 275–287.
- Auerbach, A., 1979. Wealth maximization and the cost of capital. *Quarterly Journal of Economics* 93, 433–446.
- Auerbach, A., Hassett, K., 1997. On the marginal source of investment funds. University of California, Berkeley, working paper.
- Auerbach, A., Reishus, D., 1988. The impact of taxation on mergers and acquisitions. In: Auerbach, A. (Ed.), *Mergers and Acquisitions*, University of Chicago Press, Chicago, pp. 157–183.
- Bagwell, L., Shoven, J., 1989. Cash distributions to shareholders: alternatives to dividends. *Journal of Economic Perspectives* 3, 129–140.
- Bradford, D., 1981. The incidence and allocation effects of a tax on corporate distributions. *Journal of Public Economics* 15, 1–22.
- Collins, J., Kemsley D., 1999. Capital gains and dividend taxes in firm valuation and corporate financial policy. University of North Carolina and Columbia University working paper.
- Cutler, D., 1988. Tax reform and the stock market: an asset price approach. *American Economic Review* 78, 1107–1117.
- Erickson, M., 1998. The effect of taxes on the structure of corporate acquisitions. *Journal of Accounting Research* 36, 279–298.
- Gordon, R., Bradford, D., 1980. Taxation and the stock market valuation of capital gains and dividends: theory and empirical results. *Journal of Public Economics* 14, 109–136.
- Harris, T., Kemsley, D., 1999. Dividend taxation in firm valuation: new evidence. *Journal of Accounting Research* 37, 275–292.
- Hayn, C., 1989. Tax attributes as determinants of shareholder gains in corporate acquisitions. *Journal of Financial Economics* 23, 121–153.
- King, M., 1977. *Public Policy and the Corporation*, Chapman and Hall, London.
- Klein, P., 1999. The capital gain lock-in effect and equilibrium returns. *Journal of Public Economics* 71, 355–378.
- Landsman, W., Shackelford, D., 1995. The lock-in effect of capital gains taxes: evidence from the RJR Nabisco leveraged buyout. *National Tax Journal* 48, 245–259.
- Miller, M., Scholes, M., 1978. Dividends and taxes. *Journal of Financial Economics* 6, 333–364.
- Schipper, K., Smith, A., 1991. Effects of management buyouts on corporate interest and depreciation tax deductions. *Journal of Law and Economics* 34, 295–341.