

**ARE DIVIDEND TAXES AND TAX IMPUTATION CREDITS
CAPITALIZED IN SHARE VALUES?**

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ABSTRACT

The relation between personal taxes and firm value has fundamental implications for understanding why firms pay dividends and how taxes influence capital structure choices. Assessing personal tax valuation effects also influences tax policy debates regarding the integration of corporate and personal taxes. Despite its importance, however, several underlying problems have hampered existing research on the valuation consequences of personal taxes, leading to mixed and inconclusive results. Cross-sectional approaches have proven difficult, for example, because variation in investor tax rates across firms is not generally observable. Using time-series variation in dividend tax rates alone to isolate the indirect effects of dividend taxes has been confounded by simultaneous changes in other tax parameters. In addition, a variety of questionable assumptions have confounded interpretation of relevant event studies.

We address these problems by suggesting direct tests of the relationship between dividend taxes and share values. Retained earnings are subject to dividend taxes upon distribution, but paid-in equity can be returned to shareholders as a tax-free return of capital. Therefore we test the prediction that dividend taxes result in a lower value for retained earnings than for paid-in equity (after controlling for the influence of dividend taxes on the cost of using retained earnings capital). This focus on observable ratios of retained earnings to total common equity does not require use of unobservable investor tax rates.

We strengthen this research design by repeating the basic test in several different tax regimes. In the United States, we perform tests for five tax regimes in the 1975-1994 period corresponding to five different levels of dividend taxation. We also conduct tests for the 1984-1994 period for Australia, France, Germany, Japan, and the United Kingdom. The non-U.S. settings allow for comparisons of empirical results across different levels of dividend tax relief provided by tax imputation credits.

Our investigation results in three principal findings. First, firm-level results for the United States indicate that accumulated retained earnings are valued less per unit than contributed capital. This finding is consistent with the capitalization of future dividend taxes in retained earnings, and it is robust to inclusion of a variety of control variables and tests for possible alternative explanations. Second, we find that differences in dividend tax rates across U.S. tax regimes are associated with predictable differences in the implied tax discount for retained earnings. Third, cross-country variation in dividend tax rates is associated with predictable variation in the implied tax discount. Furthermore, the difference in dividend tax rates across two different tax regimes in the United Kingdom is associated with predictable differences in the value discount.

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I. INTRODUCTION

Researchers have long debated the role of taxes in corporate financial policy. Following Miller and Modigliani (1961), numerous studies have considered the relationship between debt and equity financing in the presence of tax-advantaged debt, and other research has focused on the implications of dividend and capital gains taxation for different components of equity financing. Many of the issues addressed in these research programs critically depend on whether shareholder-level taxes on dividends are capitalized in share values. However, prior studies of the share price effects of dividend taxes have primarily relied on indirect tests, resulting in mixed and inconclusive results. In this study, we directly examine the influence of dividend taxes on firm value, and we find evidence that a substantial portion of these shareholder-level taxes are capitalized in share prices.

The firm valuation effects of dividend taxation have several fundamental implications. If, for example, dividend taxes do not influence share prices as suggested by Miller and Scholes (1978), then shareholders should prefer tax-favored capital gains over dividends. However, if share prices absorb the effects of dividend taxation, then corporations could distribute dividends without imposing a tax penalty on shareholders at the margin. That is, dividend policy would be unaffected by dividend taxes.¹ In addition, if dividend tax capitalization reduces the market value of retained-earnings equity, then it would reduce shareholders' required return on this source of financing below the required return on equity raised from external markets (see King, 1977; Auerbach, 1979a,b; Bradford, 1981; and the supporting empirical test in Auerbach, 1984). This

¹ This statement is true for a constant dividend tax; temporary changes in the dividend tax would affect payout decisions.

tax wedge between the costs of using internal versus external equity financing would exist whether or not transaction costs and asymmetric information accentuate the result (see Myers and Majluf, 1984), and it would suggest that a simple dichotomy between “debt” and “equity” financing is incomplete.

Aside from the corporate financial implications, tax policymakers devote substantial attention to the potential share price effects of dividend taxes (see, *e.g.*, U.S. Department of the Treasury, 1992; American Law Institute, 1993; and the reviews in Zodrow, 1991; and in Gentry and Hubbard, 1998). If dividend taxes reduce share prices, then a portion of the economic efficiency benefits of corporate tax integration or other fundamental income and consumption tax reform would be dissipated in windfall gains to current shareholders.

Despite the importance of understanding the scope of tax share price effects, existing empirical evidence is inconclusive. Prior studies have sought to isolate tax effects by investigating ex-dividend-day price reactions, dividend yields, or the indirect implications of dividend tax capitalization for dividend payouts, Q , and the user cost of capital. However, several underlying problems hamper the research. Cross-sectional approaches have proven difficult because variation in investor tax rates across firms is not generally observable. Using time-series variation in dividend tax rates alone to isolate the effects of dividend taxes has been confounded by simultaneous changes in other tax parameters. In addition, a variety of questionable assumptions have confounded interpretation of the ex-dividend-day and dividend yield studies.

We address these problems by using a firm valuation approach to study the relationship between dividend taxes and share values. Retained earnings are subject to dividend taxes upon

distribution, but contributed equity can be returned to shareholders as a tax-free return of capital. Therefore we exploit variation in the relative proportions of retained earnings and contributed capital to examine the direct prediction that retained earnings are valued less than dollar-for-dollar in firm value. We also examine the prediction that the relatively low predicted value for retained earnings decreases shareholders' required return on this component of equity, thereby influencing the valuation of reported earnings. This focus on observable ratios of retained earnings to the total book value of equity does not require us to specify unobservable investor tax rates, nor does it require us to rely on the assumptions underlying the ex-dividend-day and dividend-yield studies.

Our approach is related to recent work by Harris and Kemsley (1998), who incorporate dividend taxes into a firm valuation model and find empirical support for the hypothesis that U.S. dividend taxes result in a lower value for retained earnings than for total book value. We extend the tax interpretation of these results by developing a market-to-book specification, by controlling for a wide range of potential non-tax explanations suggested by various models in finance and public economics, and by repeating our basic valuation test in several different tax regimes. In the United States, we conduct tests for five tax regimes in the 1975-1994 period corresponding to five different levels of dividend taxation. We also conduct tests for the 1984-1995 period for Australia, France, Germany, Japan, and two different tax regimes in the United Kingdom. The non-U.S. settings allow for comparisons of empirical results across different levels of dividend tax relief provided by tax imputation credits. In contrast to the problems they create in examinations of dividend payouts across tax regimes, simultaneous changes in dividend taxes and other tax parameters do not generally confound cross-regime predictions regarding the valuation effects of

dividend taxes.

Our investigation results in three principal findings. First, firm-level results for the United States indicate that accumulated retained earnings are valued less per unit than contributed capital. This finding is consistent with the capitalization of future dividend taxes in retained earnings, and it is robust to inclusion of a variety of control variables and tests for possible alternative explanations. Second, we find that differences in dividend tax rates across U.S. tax regimes are associated with predictable differences in the implied tax discount for retained earnings. Third, cross-country variation in dividend tax rates is associated with predictable variation in the implied tax discount. Furthermore, the difference in dividend tax rates across two different tax regimes in the United Kingdom is associated with predictable differences in the value discount.

The remainder of the paper is organized as follows. Section II reviews predictions of competing models of dividend decisions and describes the lack of consensus in existing empirical evidence. Section III describes a simple methodology for estimating the extent to which dividend taxes are capitalized in share values. Section IV reports empirical results for U.S. firms, and section V reports results for non-U.S. firms. In section VI, we place our analysis of dividend tax capitalization in the broader debate over models of corporate financial decisions, arguing that dividend tax capitalization is not necessarily inconsistent with signaling or agency roles for dividends. Section VII provides concluding remarks.

II. INVESTIGATING THE SHARE PRICE EFFECTS OF DIVIDEND TAXES

When dividend taxes are capitalized, share prices absorb the burden of dividend taxation whether or not a firm pays current dividends.² Dividends *per se* do not produce a tax penalty because paying a dollar of dividends reduces firm value by less than a dollar. In particular, firm value only declines by the after-tax value of the dividend to the marginal investor, preserving the dividend displacement property of Miller and Modigliani (1961).³

Using event studies, one research program examines the hypothesis that there is a less than dollar-for-dollar reduction in share prices on ex-dividend days. Empirical evidence supporting the tax hypothesis is provided by Elton and Gruber (1970), Litzenberger and Ramaswamy (1979), Lamdin and Hiemstra (1993), and Lasfer (1995). Poterba and Summers (1984) strengthen the tax interpretation of these results by finding predictable differences in ex-dividend-day share price reactions across three different tax regimes in the United Kingdom. Barclay (1987) further bolsters the results by finding that share values declined by the full value of dividends before adoption of income taxes in 1913, but not after that date. More mixed evidence is offered by Eades, Hess, and Kim (1984), and empirical evidence to the contrary is offered by Gordon and

² This statement assumes that the firm's earnings must ultimately be distributed as dividends; we take up the question of distributions through share repurchases in section IV below.

³ This implies that dividend payouts could in principle be volatile, fluctuating in response to shifts in investment opportunities. Following Lintner's (1956) study, however, researchers have documented the smoothness of dividend payouts. Although smooth dividends are generally considered to be inconsistent with dividend tax capitalization, simple predictions about the comovements of dividends and investment are confounded when firms use both debt and equity financing (see, *e.g.*, Gertler and Hubbard, 1993; and Auerbach and Hassett, 1997).

Bradford (1980) and Miller and Scholes (1982).⁴

Some researchers have questioned the appropriateness of drawing inferences from ex-dividend-day studies, owing to clientele trading behavior surrounding ex-dividend days (see, *e.g.*, Kalay, 1982) or to discounts induced by discreteness of changes in trading prices (Bali and Hite, 1997). Others find evidence that non-tax factors influence ex-day share price movements (see, *e.g.*, Shaw, 1991), creating concerns about the event-study methodology.

In addition, the ex-dividend-day findings have generally been interpreted without considering the implications of dividend tax capitalization. The research program emerged primarily in response to the argument by Miller and Scholes (1978) that the marginal investor is effectively tax-exempt, making dividend taxes irrelevant both for payout decisions and for equity valuation. Ex-dividend-day studies typically assume that, if the marginal investor is taxable, dividend payments are tax-penalized. However, with dividend tax capitalization, firm value only decreases by the after-tax value of a dividend payment, so marginal returns on equity are unaffected by the dividend tax.

Other researchers have studied whether “implicit taxes” (to use the terminology of Scholes

⁴ Analogous to the distinction we make between retained earnings and contributed capital, Eades, Hess, and Kim (1994) separately examine ex-dividend-day pricing behavior for taxable dividends versus non-taxable returns of capital. If taxes on dividends influence ex-dividend-day prices, then share prices are expected to decline by less than the full amount of distributions for taxable dividends, and prices are expected to decline by the full amount of distributions for nontaxable returns of capital. Although they find at least some evidence consistent with the tax hypothesis for taxable dividends, they find that share prices decline by *more* than the full amount of distributions for nontaxable returns of capital. They conclude, therefore, that their findings regarding nontaxable returns of capital are inconsistent with tax effects. It is worth noting, however, that the difference in share pricing behavior around taxable versus non-taxable distributions is qualitatively consistent with dividend tax effects.

and Wolfson, 1992) vary across firms according to dividend yields. It is suggested that dividends are penalized relative to capital gains for tax purposes, so high-dividend-yield stocks should be priced at a discount relative to low-dividend-yield stocks. That is, according to this line of reasoning, high-dividend-yield stocks should provide a greater pre-tax return on investment than low-dividend yield stocks. Empirical evidence has been inconclusive, however. Black and Scholes (1974) find no difference in expected returns for high- versus low-dividend-yield stocks. In contrast, using a two-stage generalized least-squares procedure, Rosenberg and Marathe (1979) find a positive and significant relationship between dividend yields and common stock returns. Litzenberger and Ramaswamy (1982) also find a positive relationship between returns and dividends, even after including controls for the information effects of dividends. However, they conclude that it is still an open question as to whether personal taxes or some omitted variable (other than information effects) account for their results. Consistent with a non-tax interpretation for the dividend-yield effect, Keim (1982) finds that most of the dividend-yield effect occurs in January.

More recently, Chen, Grundy, and Stambaugh (1990) conclude that the positive relation between returns and dividend yields is not robust to the inclusion of various controls for risk. Erickson and Maydew (1997) use an event-study approach surrounding a change in tax regimes and also find no statistically significant difference in pre-tax rates of returns between high-dividend-yield and low-dividend-yield stocks. Using a different approach, Fama and French (1998) examine the relationship between prices and dividends. After controlling for profitability, they hypothesize that the tax penalty on dividends should result in a negative price effect. Instead,

they find a positive relationship between prices and dividends, concluding that the signaling effects of dividends must outweigh the tax effects.

All of these lines of inquiry abstract from a key implication of dividend tax capitalization: If future dividend taxes are capitalized in equity values, then share prices absorb the burden of this tax. This frees dividends from the marginal tax burden, so that dividend yields *per se* should not be useful for isolating tax effects in equity valuation.

In addition to these investigations of the link between dividend taxes and firm value, other research has explored indirect predictions of dividend tax capitalization. Under tax capitalization, permanent changes in the dividend tax rate should not influence dividend payouts. Poterba and Summers (1985) exploit changes in dividend taxation in the United Kingdom from 1950 to 1981 to examine this prediction. They find a significant negative relationship (corroborating earlier time-series findings by Brittain, 1966, and Feldstein, 1970), which they argue supports the argument that dividends are tax penalized. More recently, Poterba (1987) finds a negative relationship between dividend tax rates and dividend payouts within the United States.

Although this evidence is consistent with the presence of a tax penalty for dividends, confounding factors exist. It is difficult to identify permanent dividend tax rate changes, for example, and temporary rate changes are expected to affect payouts whether or not tax capitalization occurs. It also is difficult to isolate the effects of changing dividend tax rates from simultaneous changes in other tax parameters. If, for example, the tax rate on interest income declines along with the tax rate on dividends, then the after-tax return on bond investments would rise. This would increase the required return by equity investors, leading to lower corporate

investment and higher dividend payouts under tax capitalization (at least until a new equilibrium is reached), just as would be expected in the absence of tax capitalization.

Using an alternative approach, Poterba and Summers (1985) analyze the impact of dividend taxes on the level of business fixed investment. Essentially, they estimate a variant of the Q model in the presence of adjustment costs (see Hayashi, 1982; and Summers, 1981).⁵ In the absence of tax capitalization, the equilibrium value of Q equal is one, and tax capitalization suggests an equilibrium value of Q equal to $(1 - t_d)/(1 - t_g)$, where t_d is the individual tax rate on dividends and t_g is the accrual-equivalent tax rate on capital gains. Using British firm-level data over the period from 1950 to 1981, they find that specifying Q as unity explains the investment data better than specifying Q as $(1 - t_d)/(1 - t_g)$.

While such tests are suggestive, many researchers have questioned the simple Q model on measurement error grounds (see, *e.g.*, the reviews of studies in Hubbard, 1998). In addition, the tax burden on undistributed earnings in the United Kingdom may actually have exceeded the tax on dividends for at least a portion of the time period studied by Poterba and Summers. In this case, predictions under the two views are similar (see, *e.g.*, Sinn, 1985).

To summarize, a variety of dividend tax predictions have been subjected to significant empirical scrutiny without conclusive results. However, little attention has been paid to the principal prediction that dividend taxes on accumulated equity are capitalized in share values. It is to this prediction that we now turn.

⁵ Marginal Q is the shadow value of an additional unit of capital. Average Q , which is generally used in empirical tests, is the ratio of the market value of the firm to the replacement cost of the stockholders' equity.

III. TESTING TAX CAPITALIZATION: METHODOLOGY

Following Harris and Kemsley (1997), we exploit variation in firm-level ratios of retained earnings to total book value to examine the direct prediction that the burden of dividend taxation results in a value discount for retained earnings.⁶ This variation is not generally considered in economic valuation models, which adjust for future growth in equity but do not emphasize the distinction between contributed capital and retained earnings in current equity (book value).

If investors discount the value of retained earnings for future dividend taxes, then this discount should decrease the cost of using retained earnings equity (*i.e.*, internally generated cash flow) below the cost of using external equity. As we discuss more fully below, the low cost of using retained earnings capital increases firm value. Indeed this positive cost-of-capital effect for retained earnings at least partially offsets the negative valuation effects of dividend taxes on equity. Therefore we develop empirical tests to separately capture these two offsetting effects.

Before introducing taxes, we begin with a simple financial valuation model stating that the price per share (P) equals the present value of taxable dividends (D) plus the present value of returns of capital (NC). That is, letting ρ equal the firm's discount factor (*i.e.*, one plus the appropriate discount rate) and i and t denote the firm and time period, respectively:

$$P_{it} = \sum_{s=1}^{\infty} \rho_i^{-s} D_{i,t+s} + \sum_{s=1}^{\infty} \rho_i^{-s} NC_{i,t+s}. \quad (1)$$

As the next step, we use an accounting identity to express current book value (BV_{it}) as the

⁶ Another source of cross-sectional variation in effective tax rates is offered by firm-specific tax rates, as in the case of an undistributed profits tax (see the evidence for U.S. firms during the 1930s in Calomiris and Hubbard, 1995) or the case of variation in surplus advance corporation tax in the United Kingdom (see the study of U.K. firms over the 1970-90 period in Bond, Chennells, and Devereux, 1996).

sum of contributed capital (C_{it}) and accumulated retained earnings (RE_{it}). Using additional accounting identities, C_{it} is expressed as $C_{i,t-1} - NC_{it}$, and RE_{it} is expressed as $RE_{i,t-1} + NI_{it} - D_{it}$, where NI equals net income, so:

$$BV_{it} = C_{it} + RE_{it} = C_{i,t-1} + RE_{i,t-1} + NI_{it} - D_{it} - NC_{it} . \quad (2)$$

We can use this expression to solve for dividends:

$$D_{it} = C_{i,t-1} - C_{it} + NI_{it} + RE_{i,t-1} - RE_{it} - NC_{it} . \quad (3)$$

Using equation (3) to substitute for dividends in equation (1) yields:

$$P_{it} = \sum_{s=1}^{\infty} \rho_i^{-s} (BV_{i,t+s-1} - BV_{it+s}) + \sum_{s=1}^{\infty} \rho_i^{-s} NI_{i,t+s} . \quad (4)$$

At this juncture, it is useful to separate net income into normal and supranormal returns on invested equity. The normal profit equals $r_i BV_{i,t-1}$, and the supranormal or “economic” profit (π) equals $NI_{it} - r_i BV_{i,t-1}$, where r_i is the firm’s required rate of return on external equity (*i.e.*, $\rho_i - 1$).

Making this substitution into equation (4) yields:

$$P_{it} = \sum_{s=1}^{\infty} \rho_i^{-s} (\rho_i BV_{i,t+s-1} - BV_{it+s}) + E_t \sum_{s=1}^{\infty} \rho_i^{-s} \pi_{i,t+s} ,$$

or

$$P_{it} = BV_{it} + \Pi_{it} = C_{it} + RE_{it} + \Pi_{it} , \quad (5)$$

where Π_{it} is the expected present value of firm i ’s economic profit, or

$$\Pi_{it} = E_t \sum \rho_i^{-s} \pi_{i,t+s} .$$

Equation (5), which follows directly from the familiar dividend discount model in equation (1), simply states that the value of the firm equals the present value of normal profits (equal to the current book value, BV) plus the present value of economic profits. Note that the time path of the distributions of contributed capital or retained earnings is irrelevant. The presence of the book value term in the basic valuation expression simply measures the present value of normal returns on invested equity (plus the eventual return of the equity).

With these concepts in mind, it is straightforward to introduce shareholder taxes on dividends (at rate t_d). Distributions from contributed capital are not subject to the dividend tax. Hence abstracting from capital gains taxation for the moment, the present value of normal returns on contributed capital simply equals C_{it} . In contrast, distributions from retained earnings are subject to dividend taxation, so that the after-tax value of the distribution of retained earnings at time t equals $(1 - t_d)RE_{it}$. Shareholders, therefore, do not have a full dollar of after-tax investment at stake for each dollar of reported retained earnings. Hence the present value of normal returns on retained earnings only equals its after-tax value at time t of $(1 - t_d)RE_{it}$, so we can express the price per share as:

$$P_{it} = C_{it} + (1 - t_d)RE_{it} + \Pi_{it}. \quad (6)$$

We next define the economic profit term more precisely by adding the dividend tax as follows:

$$\Pi_{it} = \sum_{s=t}^{\infty} \rho_i^{-s} [(1-t_d)NI_{is} - r_i(C_{is} + (1-t_d)RE_{is})]. \quad (7)$$

The tax discount on retained earnings reflects a lower cost of capital for retained earnings than for contributed capital, or more intuitively, the idea that from the shareholders' perspective reported book value is overstated by the capitalized dividend tax. The equation implies that the economic profit portion of a fixed amount of net income rises in the proportion of retained earnings to total book value, suggesting that firms maximize economic profits by using low-cost retained earnings before issuing costly external equity. This is consistent with the financing pecking order suggested by Myers and Majluf (1984), except that tax factors are sufficient to create a preference for using retained earnings, even in the absence of costs relating to asymmetric information.

We now add capital gains taxation to the analysis by letting t_g equal the accrual-equivalent tax rate on gains. If all retained and future earnings are eventually paid out as dividends, then the capital gains tax only applies to distributions of contributed capital, after subtracting out tax basis. Therefore the present value of all future distributions equals the after-tax returns of capital, or $(1-t_g)C_{it}$, plus the after-tax present value of distributions from current and future retained earnings, or $(1-t_d)RE_{it} + (1-t_d)\Pi_{it}$. The after-capital-gains-tax price per share is:

$$(1-t_g)P_{it} = (1-t_g)C_{it} + (1-t_d)RE_{it} + \Pi_{it},$$

or

$$P_{it} = C_{it} + \left(\frac{1 - t_d}{1 - t_g} \right) RE_{it} + \left(\frac{1}{1 - t_g} \right) \Pi_{it}. \quad (8)$$

This equation abstracts from cross-sectional variation in tax basis among current shareholders by focusing on tax basis among all potential buyers, which is assumed to equal the current purchase price of the stock. The $(1-t_g)$ multiplier in front of P_{it} accounts for this tax basis.

If we abstract for the moment from contributed capital and assume that all distributions are paid out of current and expected future retained earnings, then equation (8) simplifies to:

$$P_{it} = \left(\frac{1 - t_d}{1 - t_g} \right) \sum_{s=1}^{\infty} \rho_i^{-s} D_{i,t+s} \quad (8')$$

which is a common expression used by public finance economists. That is, paying a dividend leads to an immediate dividend tax liability, but the reduced value of the firm reduces future capital gains tax liabilities; the net tax effect of a dividend payment is the dividend tax offset by the reduction in future capital gains taxes. Assuming that $t_d > t_g$, a dollar of dividends paid out of retained earnings is valued at less than one dollar because $(1-t_d)/(1-t_g) < 1$.

In contrast to numerous studies following Miller (1977) that assume the tax burden on equity is relatively light, equations (8) and (8') suggest that shareholders cannot use tax-favored capital transactions to avoid the dividend tax. Instead, selling stock only passes the accumulated dividend tax on to a buyer. If tax capitalization occurs, the buyer “charges” the seller for this tax

burden by offering a lower price for the stock. In this case, shareholders face the burden of dividend taxation whether or not they receive current dividends, so that the marginal investor effectively faces a zero tax rate on dividend payments from the discounted retained earnings.⁷

Returning to equation (8) and noting that book value equals the sum of contributed capital and retained earnings, we can express the value of the firm as a function of book value, expected economic profit, and the dividend tax discount:

$$P_{it} = BV_{it} - \left(\frac{t_d - t_g}{1 - t_g} \right) RE_{it} + \left(\frac{1}{1 - t_g} \right) \Pi_{it},$$

or

$$\frac{P_{it}}{BV_{it}} = 1 - \left(\frac{t_d - t_g}{1 - t_g} \right) \frac{RE_{it}}{BV_{it}} + \left(\frac{1}{1 - t_g} \right) \frac{\Pi_{it}}{BV_{it}}. \quad (9)$$

The left-hand side of equation (9) is the familiar market-to-book ratio, which is akin to Tobin's Q . Leaving aside the third term on the right-hand side of (9), the equation implies that if $t_d > t_g$, there should be a negative relation between the market to book ratio and the ratio of retained earnings to total book value.⁸ This is the variation we exploit. Unlike the ex-dividend-day studies, our approach does not rely on the observation of a dividend payment, assumptions

⁷ In the presence of dividend tax capitalization, therefore, the overall tax burden on corporate equity is relatively high because it reflects the full dividend tax on all earnings plus any capital gains taxes that are incurred.

⁸ Indeed, abstracting from economic profits and contributed capital, equation (9) implies that " Q_{it} " = $P_{it}/BV_{it} = (1-t_d)/(1-t_g)$ for a dividend-paying firm, as in the Auerbach-Bradford-King characterization of tax capitalization. We return to this point later.

about clientele-based trading patterns, or the identification of a dividend as coming from accumulated retained earnings or contributed capital.

If we could observe directly the stock of economic profits, we could use equation (9) to estimate the dividend tax discount on retained earnings. Moving from equation (9) to an estimation equation, however, requires assumptions about Π , or economic profit. If flow economic profits evolve according to an AR(1) process, where ω_i is the persistence parameter for firm i , then economic profits can be expressed in terms of current-year earnings and book value as follows:

$$\Pi_{it} = \left(\frac{\omega_i}{\rho_i - \omega_i} \right) [(1-t_d)NI_{it} - r_i (C_{it} + (1-t_d)RE_{it})] . \quad (10)$$

Substituting equation (10) into equation (9) leads to the following expression for the market-to-book ratio:

$$\begin{aligned} \frac{P_{it}}{BV_{it}} = & \left[1 - \left(\frac{1}{1-t_g} \right) \left(\frac{\omega_i}{\rho_i - \omega_i} \right) r_i \right] - \left[\left(\frac{t_d - t_g}{1-t_g} \right) - \left(\frac{1}{1-t_g} \right) \left(\frac{\omega_i}{\rho_i - \omega_i} \right) r_i t_d \right] \left(\frac{RE_{it}}{BV_{it}} \right) \\ & + \left(\frac{1-t_d}{1-t_g} \right) \left(\frac{\omega_i}{\rho_i - \omega_i} \right) \left(\frac{NI_{it}}{BV_{it}} \right) . \end{aligned} \quad (11)$$

Two important factors confound a simple interpretation of the (RE/BV) coefficient in equation (11). First, both the discount factor and the persistence parameter likely vary across firms for non-tax reasons. Second, estimating the dividend tax discount is challenging because (RE/BV) is expected to play two roles in firm valuation. If one assumed no economic profits (so $\Pi = 0$ in equation (9)), equation (11) would yield a very simple test. One could regress (P/BV) on (RE/BV) and (NI/BV) and interpret the coefficient on (RE/BV) as an estimate of the tax discount term $(t_d - t_g)/(1 - t_g)$. However, equations (7) and (10) suggest that for any given level of net income, the economic profit portion of the income increases in (RE/BV) , *i.e.*, $\partial \Pi / \partial (RE/BV) > 0$. Hence (RE/BV) both reduces (P/BV) from dividend tax capitalization and increases (P/BV) through its magnification of economic profits. The difference between these two effects only equals the present value of the future tax benefits provided by contributed capital relative to retained earnings, which may be small. This implies that the estimated coefficient on (RE/BV) in a regression of (P/BV) on (RE/BV) and (NI/BV) will not capture the dividend tax discount.

To address this issue, we isolate the economic profits effect of (RE/BV) by including an interaction term in the valuation model, $(RE/BV) \times (NI/BV)$, the coefficient on which we expect to be positive. Controlling for this economic profits effect allows us to capture the full value of the tax discount in the (RE/BV) coefficient without any reference to the timing of the equity payouts or to the present value of the tax difference between contributed capital and retained earnings--essentially because we separate the normal and economic profit effects of (RE/BV) that would largely offset each other in the absence of the interaction term.

Because realistic measurement issues generally complicate interpretation of the magnitude of the estimated (RE/BV) coefficient as a conclusive measure of tax capitalization, we focus on two sets of applications for the model. First, we use U.S. data to analyze the valuation effects of

differences in dividend tax rates across different tax regimes. Second, we analyze the valuation effects of cross-country differences in dividend tax rates, especially focusing on the effects of the dividend tax relief provided by tax imputation credits. In addition, we examine some possible alternative explanations for our findings.

IV. DIVIDEND TAX CHANGES AND “TAX CAPITALIZATION” IN THE UNITED STATES

In this section, we investigate whether accumulated retained earnings are valued less than dollar-for-dollar by the U.S. equity market. In particular, we exploit both variation in the firm-level mix of retained earnings and contributed capital and time-series variation in dividend tax rates.

A. *The Sample*

The original U.S. sample for the empirical tests consists of all U.S. firms reported on the 1995 Compustat Industrial file, which covers the 1975-1994 time period. We eliminate observations: (1) if at least one of the variables in equation (11) is missing; (2) with negative net income, book value, or accumulated retained earnings;⁹ (3) in the top one percent of the distributions of price, earnings, retained earnings, or book value (all scaled by shares outstanding) to control for outliers, and observations for which the market-to-book ratio exceeds ten. The remaining sample consists of 27,646 firm-years.

⁹ The rationale for excluding observations with negative net income is that we assume economic profits follows an AR(1) process, and this assumption is not plausible for observations with negative earnings (see, *e.g.*, Frankel and Lee, 1996). However, incorporating the negative values (while controlling for outliers) does not qualitatively alter our results.

We divide the sample into five basic tax-regime periods: (1) the pre-ERTA period from 1975 to 1981 when the top personal tax rate was 70 percent, (2) the ERTA period from 1981 to 1986 when the top personal tax rate was 50 percent, (3) 1987, when the top rate was 38.5 percent, (4) the TRA 86 period from 1987 to 1992 when the top personal tax rate ranged from 28 percent to 33 percent, and (5) the OBRA 93 period from 1993 to 1994 when the top rate on dividends increased to 39.6 percent. The expected magnitude of the tax discount increases in the tax rate on dividends.

B. Estimation Results

We begin by estimating a basic empirical model from equation (11):

$$\frac{P_{it}}{BV_{it}} = \alpha_0 + \gamma_t + \beta_1 \left(\frac{RE_{it}}{BV_{it}} \right) + \beta_2 \left(\frac{NI_{it}}{BV_{it}} \right) + \beta_3 \left(\frac{RE_{it}}{BV_{it}} \right) \left(\frac{NI_{it}}{BV_{it}} \right) + \varepsilon_{it} . \quad (12)$$

where γ_t represent time dummies. Table 1A provides descriptive statistics for regression variables for each of the five periods, and Table 1B provides univariate correlations. Table 2 provides ordinary-least-squares (OLS) estimates of equation (12) for the United States.

Consistent with a tax discount for retained earnings, the estimated (RE/BV) coefficient is negative in all five time periods.¹⁰ The estimated tax discount is higher for the ERTA period than

¹⁰ As reflected in the (RE/BV) coefficients, the magnitude of the estimated tax discounts are generally greater than $(t_d - t_g)/(1 - t_g)$. As previously discussed, the relationship between (RE/BV) and economic profits complicates interpretation of the absolute magnitude of this coefficient, so we focus on differences in estimated tax discounts across tax regimes.

for the pre-ERTA period, but the difference is statistically insignificant.¹¹ Consistent with expectations, the estimated tax discount then decreases from the ERTA period to the transition year (1987), and the estimated discount declines even more as the tax rate continues to fall for the 1988-1992 period. The estimated discount then rises along with the dividend tax rate for 1993-1994.¹² The increasing discount for the OBRA 93 period is especially instructive, suggesting that the general decline in the retained earnings discount documented in Table 2 does not merely reflect some unidentified, steadily declining non-tax trend. The patterns in the estimated values of β_3 across the tax regimes also are generally consistent with the assumptions underlying equation (12). A Chow test indicates the differences among the separate periods are statistically significant ($F = 110, p = 0.001$).¹³

Table 3 presents fixed-effects results. While fixing firm-level effects shifts the focus from

¹¹ Moreover, although the estimated tax discount is higher for the ERTA period than for the pre-ERTA period, the estimated coefficient for total book value (represented by the intercept) also is higher.

¹² Qualitative empirical results are the same when pooling all five periods into a single sample, and then interacting period-specific dummy variables with each of the regression variables. Using this approach, we find that the decrease in the estimated tax discount from ERTA to 1987, and the increase in the estimated tax discount from TRA 86 to OBRA 93 both are statistically significant at the 10 percent level. The change in the estimated tax discount from 1987 to the TRA 86 period is not statistically different from zero.

¹³ After excluding observations with price-earnings ratios greater than 50 (to control for outliers), the mean price-earnings ratio for each period is: pre-ERTA: 8.9; ERTA: 13.4; 1987: 13.6; TRA 86: 14.9; OBRA 93: 15.2. The rising price to earnings ratios through the TRA 86 period are consistent with declining tax rates for shareholders. In contrast, the increase in ratios from TRA 86 to OBRA 93 is inconsistent with the rising tax rate on dividends. However, at a more local level, the mean price to earnings ratio dropped from 17.3 in the 1991-1992 period to 15.2 in 1993-1994. Although these patterns are consistent with the expected effects of tax capitalization, numerous non-tax factors likely contribute to the results, so the multivariate tests are required to more thoroughly examine the tax capitalization hypothesis.

cross-sectional tax effects, it also controls for the mean effects of omitted variables. In particular, equation (11) suggests the relevance of a firm fixed effect when ω and ρ vary across firms. Here we divide the sample into three periods instead of five to allow for sufficient firm-specific variation in the variables for each period. Consistent with expectations, the tax discount declines along with the decreasing tax rate on dividends across the three periods.¹⁴ Thus both Table 2 and Table 3 provide evidence consistent with tax capitalization.

C. Robustness Tests

To examine the robustness of our findings for the United States, we pursue three lines of inquiry, investigating: (1) the extent to which the estimated value of β_1 is biased by the possible omission of other variables correlated with the persistence of economic earnings or the firm's discount rate; (2) the possibility that the retained earnings discount results from agency costs associated with accumulated internal funds; and (3) whether the results are robust to share repurchase practices.

C1. Omitted Variables

To examine the influence of possible omitted variables correlated with (RE/BV) , we include the one-period lagged value of net income (relative to book value) along with three lead values as controls for additional variation in the economic profit component of net income. We

¹⁴ Qualitative empirical results for Table 3 are the same when pooling all periods into a single sample, and then interacting period-specific dummy variables with each of the regression variables. Using this approach, we find that the decrease in the absolute value of β_1 from the pre-ERTA period to the ERTA period, and from the ERTA period to the TRA 86 period both are statistically significant at the 5 percent level.

also include dividends over book value and its interaction with (RE/BV) to capture the possibility that dividend payments are a signal of future economic profits or are correlated in other ways with risk or expected future growth in profitability. Finally, we add firm sales and its interaction with (RE/BV) as controls for size.

Including the lag and lead values for net income requires us to focus on the three sub-periods provided in Table 3 instead of the original five periods. After including the control variables, we find the estimated (RE/BV) coefficient remains negative in all three time periods, and as before, the estimated magnitude of the tax discount declines across periods. Specifically, the OLS estimates are: pre-ERTA: -1.90, $t = -12.4$; ERTA: -1.75, $t = -8.8$; TRA 86: -1.69, $t = -9.7$, and the fixed-effects estimates are: pre-ERTA: -1.17, $t = -5.0$; ERTA: -1.10, $t = -3.4$; TRA 86: -0.64, $t = -2.2$.

The firm-fixed-effects results presented in Table 3 also address the concern that the estimated coefficients reflect omitted-variable bias. Three concerns are troublesome in this respect. First, younger, fast-growing firms likely have lower levels of accumulated retained earnings than mature firms. By focusing on the “within” effect of retained earnings, it is evident that the firm-fixed-effects estimates of β_1 and β_3 in Table 3 are not simply driven by unobserved cross-firm heterogeneity in growth opportunities. Second, inflation induces a departure of the accounting book value of assets from their replacement cost. High- (RE/BV) firms may be older firms with a greater inflation bias in (P/BV) . Again, including firm fixed effects reduces the problem. Third, returning to equation (11), variation in firm risk (and hence in ρ) is obscured in the basic estimation equation; high-risk firm could also be low- (RE/BV) firms. Such a concern is

less significant for the within estimates reported in Table 3.

C2. Agency Costs

Another concern is that the market discount for retained earnings could result from agency costs, not dividend taxes. In particular, high ratios for (RE/BV) may be associated with firms that are “wasting” shareholder wealth by over-investing internal funds (see, *e.g.*, Easterbrook, 1984; and Jensen, 1986). While the predictable pattern in the (RE/BV) coefficient across tax regimes provides some comfort regarding the tax-capitalization interpretation of results, we present some additional evidence.

The agency explanation is somewhat difficult to test because agency costs could influence managerial decision making over a range of “investment” decisions, including fixed capital, R&D, or acquisitions. We investigate one possible channel, which is that firms with high values for (RE/BV) ignore signals about fundamental investment opportunities (“ Q ”) and overinvest in fixed capital when internal funds are available to do so.

Specifically, we estimate a model for investment (I_{it}) relative to the beginning-of-period capital stock ($K_{i,t-1}$) as a function of Tobin’s Q and the ratio of firm cash flow (CF_{it}) to the beginning-of-period capital stock:¹⁵

¹⁵ Such a specification was suggested in a different context by Fazzari, Hubbard, and Petersen (1988). In this specification, I_{it} is capital expenditures for firm i at period t . $K_{i,t-1}$ is net property, plant, and equipment for firm i at period $t-1$. Q_{it} is defined as [Market value of common equity + Market value of preferred equity + Book value of total liabilities]/Assets, for firm i at time t (where the market value of preferred equity is estimated by letting it equal 10 times preferred dividends). Following other studies, CF_{it} is defined as operating income after depreciation plus depreciation less interest and income taxes. We note that this is not likely to be the same as operating cash flow.

$$\frac{I_{it}}{K_{i,t-1}} = \alpha_i + \beta_1 Q_{it} + \beta_2 \frac{CF_{it}}{K_{i,t-1}} + \varepsilon_{it} . \quad (13)$$

To examine whether firms with a greater relative stock of accumulated retained earnings have a greater sensitivity of investment to cash flow, we allow the terms in equation (13) to vary with (RE/BV) as follows:

$$\frac{I_{it}}{K_{i,t-1}} = \alpha_i + \beta_1 Q_{it} + \beta_2 \left(\frac{CF_{it}}{K_{i,t-1}} \right) + \beta_3 \left(\frac{RE_{it}}{BV_{it}} \right) + \beta_4 \left(\frac{RE_{it}}{BV_{it}} \right) Q_{it} + \beta_5 \left(\frac{RE_{it}}{BV_{it}} \right) \left(\frac{CF_{it}}{K_{i,t-1}} \right) + \varepsilon_{it} . \quad (14)$$

Under this simple form of the agency-cost hypothesis, we would expect that $\beta_5 > 0$.¹⁶ Table 4 presents results from estimation of equation (14). β_5 is negative in all three tax regimes, suggesting that high- (RE/BV) firms invest less available cash flow than low- (RE/BV) firms, which is inconsistent with the agency-cost hypothesis.^{17,18}

¹⁶ One problem with this simple test is that it assumes that Q adequately captures firms' fundamentals. For a review of potential pitfalls, see Hubbard (1998), and for the "fundamental Q " approach, see Gilchrist and Himmelberg (1995).

¹⁷ This finding is consistent with the results presented in Hubbard, Kashyap, and Whited (1995), who use an Euler equation approach and find that mature firms most likely to face such agency costs display no excess sensitivity of investment to cash flow. Again, a caveat is in order. These results only suggest that managers do not appear to "waste" internal funds on fixed capital projects. The possibility remains that agency costs could influence managerial decisions in other areas.

¹⁸ Another concern relating to agency costs is that (RE/BV) may be positively correlated with cash and other short-term investments. If so, the value discount for retained earnings could merely reflect overinvestment in these low-yield assets. However, the correlation between

This finding also casts doubt on another possible explanation for the discount on retained earnings, which is that the discount simply reflects a low relative cost of retained earnings because of “financing constraints” for the high (RE/BV) firms (as in Myers and Majluf, 1984; and Fazzari, Hubbard, and Petersen, 1988). As an additional test of whether our results reflect only the influence of financing constraints, we follow the sample split suggested by Fazzari, Hubbard, and Petersen (1988), and divide the sample into zero-dividend and positive-dividend firms. The estimated coefficients on (RE/BV) are qualitatively similar between the two samples. This result not only mitigates concerns about the financing constraint explanation for our results, but it also suggests that tax capitalization occurs whether or not firms pay current dividends.

C3. Share Repurchases

Tax capitalization relies on the assumption that taxable earnings and profits will eventually be distributed as dividends. In practice, however, corporations can distribute accumulated earnings through share repurchases, complete liquidations qualifying for capital gains treatment under Section 331 (a) of the Internal Revenue Code, or certain forms of mergers and acquisitions.¹⁹ Accordingly, if investors believe that earnings will be distributed in non-dividend forms, then the estimated (RE/BV) coefficient in equation (12) is not expected to be different from zero.

(RE/BV) and cash plus other short-term investments (scaled by total assets) is low (0.02, $p=0.01$). In addition, adding cash plus other short-term investments (scaled by either total assets or book value) to equation (12) does not materially influence the estimated coefficients.

¹⁹ The practical importance of this consideration was noted initially by Bagwell and Shoven (1989). Auerbach and Hassett (1997) note that the fraction of firms repurchasing shares peaked in the late 1980s, and has averaged only between five and ten percent in the early and middle 1990s; the proportion has increased recently.

Contrary to this expectation, Tables 2 and 3 document a negative estimated (RE/BV) coefficient. Nevertheless, it is possible that the estimated (RE/BV) coefficient varies across firms according to firm-level share repurchase practices. Because share repurchases are reported as treasury stock on firms' balance sheets, the ratio of treasury stock to total book value (TS/BV) provides a proxy for cumulative share repurchase practices.²⁰ To examine the influence of share repurchases on the scope of dividend tax capitalization, we reestimate equation (12) after adding (TS/BV) and interactions between (TS/BV) and the other explanatory variables. If the capitalization of dividend taxes decreases in share repurchases, then one would expect the estimated coefficient of (TS/BV) x (RE/BV) to be positive and the estimated coefficient of (TS/BV) x (RE/BV) x (NI/BV) to be negative.

The estimated coefficient for (TS/BV) x (RE/BV) is positive for the TRA86 period (3.09, $t=3.4$), but is not statistically different from zero in the other four tax regimes. The estimated coefficient for (TS/BV) x (RE/BV) x (NI/BV) is negative in the ERTA (-41.0, $t=-3.3$) and TRA86 (-14.1, $t=-3.6$) periods, but is not statistically different from zero in the remaining three periods. The treasury stock interaction term changes the (RE/BV) coefficient in the different periods as follows: pre-ERTA, from -1.14 to -1.15; ERTA, from -1.24 to -1.29; 1987, from -0.72 to -0.70; TRA 86, from -0.56 to -0.65; OBRA 93, from -0.86 to -0.89. Hence, at least for this proxy, share repurchases do not materially affect the scope of dividend tax capitalization in at least three

²⁰ Measurement error can influence this proxy because repurchased shares are sometimes reissued, as for the exercise of employee stock options.

of the five periods.²¹

We find further evidence by reestimating equation (12) for observations in the top quartile of (TS/BV) for each of the tax regimes. If evidence of substantial share repurchases limits the scope of dividend tax capitalization, then the (RE/BV) and $(RE/BV) \times (NI/BV)$ coefficients should be zero for these subsamples of high (TS/BV) observations. In fact, the (RE/BV) coefficient is negative and statistically different from zero for all five subperiods, and the $(RE/BV) \times (NI/BV)$ coefficient is positive and statistically different from zero for all tax regimes except ERTA, where the coefficient is 0.59 ($t = 0.4$). Together with the results using the interactive term $(TS/BV) \times (RE/BV)$, the findings seem to suggest that share repurchases mitigate the effects of dividend tax capitalization in some periods, but that this effect is limited.

D. Tax Capitalization, Arbitrage, and Clienteles

As emphasized by many researchers (*e.g.*, Miller and Scholes, 1982; Kalay, 1982; and Scholes and Wolfson, 1992), tax capitalization creates arbitrage opportunities for investors facing the same tax rate on dividends and capital gains, such as tax-exempt institutions and broker-dealers. To illustrate, note that a tax-exempt investor could buy stocks immediately prior to the ex-dividend date, capture the dividend, and then sell the stock. The tax-exempt investor would derive full dollar-for-dollar benefit from the dividend, while the share price would decrease by less than a dollar for the subsequent sale. The difference between the value of the dividend and the

²¹ Such a finding is consistent with the observation that dividends and share repurchases may not be perfect substitutes for nontax reasons (see, *e.g.*, the discussions in Bernheim, 1991; Sinn, 1991; and Auerbach and Hassett, 1997).

decline in share price would provide an arbitrage profit.

Consistent with this incentive, Lakonishok and Vermaelen (1986) study trading volume around ex-dividend days and report evidence of unusual patterns consistent with short-term trading activity. Short-term traders are also found to capture dividends both in the NYSE (Karpoff and Walkling, 1988) and in the NASDAQ (Karpoff and Walkling, 1990). Although this evidence is consistent with tax capitalization, it raises the possibility that tax-exempt investors could become the marginal investor by arbitraging all of the tax discount.²² In this case, the expected share price discount for personal taxes would be zero.

The empirical evidence in this paper suggests that tax arbitrage activity has limited influence on the estimated tax discount. At least two factors could contribute to this result. First, potential arbitrageurs incur transactions costs on both the purchase and sale of stock, including the costs of bid-ask spreads. While these transaction costs generally are quite small for institutional investors, the arbitrage profits relative to the share price from a dividend capture strategy also are small. Second, Bagwell (1992) and Landsman and Shackelford (1995) provide evidence suggesting that the capital gains tax raises the reservation prices of some shareholders, leading to an upward-sloping supply curve for the stock of a particular company. This suggests that arbitrageurs generally could not purchase substantial amounts of a single firm's stock to

²² Numerous studies provide evidence that tax-exempt investors are not the marginal investors in the bond market (see, *e.g.*, Litzenberger and Rolfo, 1984; Jordan, 1984; Hockman, Palmon, and Tang, 1993; and Guenther, 1994), which is consistent with the easily observable yield-spread between municipal and U.S. Treasury bonds. By analogy, therefore, it is possible that tax-exempt investors are not the marginal investors in the equities markets, so identification of the marginal investor becomes an empirical issue. However, bondholders are taxed on any interest income accrued to the date of sale of their bonds, so the arbitrage opportunities available on ex-dividend days are not available on bond coupon payment dates.

capture dividends without compensating shareholders for their capital gains taxes in the form of higher purchase prices.²³

Even in the absence of these transaction costs, however, only complete arbitrage of all accumulated retained earnings would eliminate our estimated effect. Arbitraging a single upcoming dividend payment would not frustrate our empirical tests, and the opportunity costs of arbitrage rise substantially when holding the stock long enough to capture more than a single dividend.²⁴

V. EVIDENCE FROM NON-U.S. INTEGRATION EXPERIMENTS

Several countries outside the United States provide varying degrees of dividend tax relief through the provision of tax imputation credits. In some cases, the tax credit can exceed the gross tax on dividends, effectively creating a negative tax rate on dividends. In this section, we exploit this cross-country variation in dividend tax rates by estimating equation (12) for Australia, France, Germany, Japan, and the United Kingdom from 1984 to 1994. As we describe below, the

²³In addition to possible arbitrage activity, the original analysis of dividends by Miller and Modigliani (1961) and subsequent work by Long (1977) and others predict the formation of clienteles, wherein tax-exempt investors invest in high-dividend-yield stocks and high-tax investors purchase zero-dividend-yield stocks. Substantial evidence exists that dividend clienteles form (see, *e.g.*, Pettit, 1977; and Chaplinsky and Seyhun, 1990). If such clientele formation were complete, then dividend tax capitalization would be zero because all dividends would be paid to tax-exempt investors. However, the evidence suggests that the formation of clienteles is not complete, leading Miller and Scholes (1978) to observe that “the separation of shareholdings by dividend yield is nowhere as sharp as the raw tax differentials might seem to suggest.”

²⁴To illustrate, concern over ex-dividend-day arbitrage strategies relating to foreign stocks prompted the Clinton administration to propose a 15-day holding period for stock before investors could benefit from the arbitrage. Commentators note that the costs associated with the 15-day holding period would “stop the activity dead” (Martin, 1997).

tax rate on dividends varies substantially across these tax jurisdictions.

A. Tax Summaries and Predictions

To focus on integrated tax systems, we must define the “dividend tax” more carefully. To begin, we define the personal tax rate t_p as the marginal investor’s gross tax rate on dividends, and the imputation credit rate t_c as allowable imputation credits divided by gross dividends. Thus, the net tax rate on dividends t_d equals $(t_p - t_c)$. Of course, t_d is difficult to identify, because it depends on the country’s top personal tax rate, the progressivity of tax rates, the treatment of tax imputation credits for tax-exempt investors, the identification of marginal investors, and other factors. Instead of estimating t_d , therefore, we provide the following descriptive information about the relevant tax factors in each sample country, which we believe is sufficient to permit some general predictions.

Australia. Australia provides a generous tax imputation credit system that likely leads to a negative tax rate on dividends for the marginal investor. The imputation system became effective on July 1, 1987; all sample observations for Australia occur after this date. The imputation credit rate was 49 percent until July 1, 1989, when it fell to 39 percent. Tax imputation credits provide significant benefits for pension funds because funds are only subject to a 15 percent tax on investment income. Therefore pension funds receiving full imputation credits at the 39 percent or 49 percent rate generate excess imputation credits, which they can use to shelter tax on other investment income. During this time period, the top individual income tax rate ranged between 47 and 49 percent. The top capital gains tax rate matched the top individual tax rate for assets

acquired after September 19, 1985. Capital gains on assets purchased before that date are not taxed, and the tax basis is indexed for inflation.

The possibility of a negative tax rate on dividends during this period has been noted by Australian firms. For example, Wesfarmers, Inc. is a major Australian company that has been quite clear that it is exploiting this tax benefit in setting its dividend policy. Following the introduction of integration, Wesfarmers surveyed its shareholders and estimated that the weighted-average shareholder tax rate was less than half of the imputation rate, which created an incentive to increase dividends in conjunction with a dividend reinvestment plan.²⁵

France. The French imputation credit rate is 33.3 percent (*i.e.*, the imputation credit equals 50 percent of the actual dividend payment, or 33.3 percent of the dividend after the gross-up for the credit). The credit generally is not refundable to tax-exempt shareholders, but notable exceptions include retirement and disability benefit funds, as well as certain foundations and associations of “public utility.” The maximum individual income tax rate is 56.8 percent plus a 4.4 percent surtax beginning July 1, 1993. Although the French imputation credit rate is relatively high, it is lower than the rate in Australia. In addition, the personal tax rate is relatively high. Therefore t_d is expected to be higher in France than in Australia, and it well may be positive. The maximum individual tax rate on capital gains is 16 percent (plus a 3.4 percent surtax beginning July 1, 1993).

Germany. The German imputation credit rate is 36 percent, which reflects the corporate tax rate on distributed profits. However, tax-exempt shareholders generally are not entitled to the

²⁵ See the discussion of Wesfarmers in Moreton (1993).

tax imputation credit, and the maximum individual income tax rate is high (56 percent through 1989, and 53 percent thereafter). Therefore t_d is expected to be higher in Germany than it is in Australia; as with France, we expect t_d to be positive.²⁶ The tax rate for capital gains on the sale of stock is zero.

Japan. Japan eliminated its partial integration system in 1983, which predates our sample period. Accordingly, the Japanese imputation credit rate is zero. Japan offers a special 35 percent individual income tax rate for dividends, which is considerably lower than the top personal tax rate in Japan of 50-60 percent. As in the United States, we expect a tax discount for retained earnings. Capital gains taxes arising from the sale of securities ranged from zero to one percent of gross proceeds during the sample period.

United Kingdom. Two very different tax regimes exist for the United Kingdom during the sample period. The imputation credit rate remained relatively stable during the sample period, equaling 27 percent through 1988, and then declining to 25 percent through 1993 (the rate dropped to 20 percent for 1994).²⁷ In contrast, the top personal tax rate dropped from 60 percent

²⁶The German system taxes retained earnings at a rate 14 percent above the distributed earnings tax rate. The predistribution taxes are tracked via different retained earnings accounts referred to as Eigenkapital (EK) accounts. For example, retained earnings which have borne a 56 percent corporate tax rate are placed in the EK 56 basket (EK 50, EK 45, EK36, and EK0 baskets also exist). Upon distribution of dividends from the EK56 basket, shareholders are entitled to a 36 percent imputation credit, and the corporation receives a tax refund for the difference between the 56 percent corporate tax rate and 36 percent imputation credit rate.

²⁷ The U.K. imputation system operates through an Advance Corporation Tax. Specifically, U.K. corporations must pay an Advance Corporation Tax to the Inland Revenue when they pay dividends to shareholders. The ACT then acts as a credit that reduces the corporation's income taxes at the end of the year. Therefore, from the firm's perspective, the ACT can be viewed as any other corporate tax payment to tax authorities, much like quarterly tax payments made by U.S. corporations. The difference, of course, is that unlike U.S. shareholders,

to 40 percent in 1988. Thus t_d is lower in the post-1988 period than it is in the pre-1989 period. Capital gains are taxed at ordinary rates, but tax basis is indexed for inflation, and individuals are eligible for an annual exemption from capital gains (equal to £5,800 in 1994).

Although t_d is positive during the pre-1989 period, it is unclear whether the tax rate is positive or negative in the post-1988 period. Given an imputation credit rate of 25 percent, t_d is negative if the personal tax rate for the marginal investor (*i.e.*, t_p) is less than 25 percent. Notably, fully refundable imputation credits are provided to tax-exempt entities, for which t_p equals zero (this issue is currently being debated in the context of the new Labour government's budget). The only clear prediction is that the tax discount for retained earnings is expected to be greater in the pre-1989 period than it is in the post-1988 period.

B. The Data

The firm-level sample we use consists of all Australian, French, German, Japanese, and U.K. companies reported on the 1995 Compustat Global Vantage industrial file, which covers the period from 1984 through 1994.²⁸ By country, the original sample contains the following number of firm-year observations: Australia (1751), France (1009), Germany (1223), Japan (8512), and the United Kingdom (1841 in the pre-1989 period and 4900 in the post-1988 period). We apply the same sample selection procedures to the non-U.S. samples as we applied to the U.S. sample, leaving 1034 observations for Australia, 759 for France, 845 for Germany, 6024 for Japan, 1787

U.K. shareholders receive a tax credit for the corporate tax.

²⁸ The number of observations is generally small during the early part of the period (*i.e.*, 1984-1986).

for the United Kingdom (pre-1989), and 4076 for the United Kingdom (post-1988).²⁹ We report summary mean statistics for our key variables in Table 5.

C. *Results for Non-U.S. Tax Changes*

Table 6A presents empirical results for Japan, France, Germany and Australia. Similar to the U.S. results, the estimated (RE/BV) coefficient is negative and statistically significant for Japan (-1.86, $t = -11.1$), where tax imputation credits equal zero. In contrast, the estimated (RE/BV) coefficient is positive and statistically significant for Australia (1.13, $t = 4.8$), where generous imputation credits exist and t_d is expected to be less than zero.³⁰ The estimated (RE/BV) coefficients for the two partial-integration countries, France and Germany, fall in the middle and are statistically insignificant. Results are qualitatively similar when using fixed firm effects. In particular, the estimated (RE/BV) coefficient is negative for Japan (-1.36, $t = -5.5$), positive for Australia (1.06, $t = 3.0$), and statistically insignificant for France and Germany.

Table 6B presents results for the two U.K. tax regimes. As expected, the estimated (RE/BV) coefficient is negative and statistically significant in the pre-1989 period (-0.78, $t = -4.9$),

²⁹ Although the data for each of the samples primarily consist of consolidated financial statement information, some parent-only data also are included (especially for Japan). Separately estimating equation (12) for the parent-only data yields qualitatively similar results to the results presented in Tables 6A and 6B.

³⁰ In principle, we would like to compare results for Australia before and after integration, but the Australian data on the Compustat Global Vantage database are not available before 1987. Nevertheless, the finding that Australian tax imputation credits are capitalized into share prices is consistent with the evidence in Bellamy (1994), who finds the ex-dividend price fall is greater for “franked” dividends (*i.e.*, dividends with attached tax imputation credits) than for “unfranked” dividends during the post-1986 period.

when the top personal tax rate was 60 percent. In addition, the estimated tax discount decreases when moving to the post-1988 period (-0.10 , $t = -1.2$), during which the top tax rate dropped to 40 percent. This difference in coefficients across periods is statistically significant ($t = 3.3$).³¹ The change in the estimated value of β_3 also is consistent with the predictions from equation (12). When using fixed effects, the estimated (RE/BV) coefficient is -0.84 ($t = -2.4$) in the pre-1989 period, and 0.76 ($t = 4.2$) in the post-1988 period. Again, the difference is statistically significant ($t = 4.1$).

Analogous to the specification check reported in Section IV C1 for the U.S. sample, we reestimate equation (12) for each non-U.S. country after including dividends, sales, and future net income, all scaled by book values, as control variables.³² None of these control variables materially affects the results.

D. Tax Imputation Credits and Dividend Payouts

In principle, one might wish to examine dividend payouts to test for dividend tax capitalization. Tax capitalization is generally associated with the irrelevance of (the long-run level of) the dividend tax for payout decisions, while models stressing a tax penalty for dividends are

³¹This result is qualitatively consistent with the findings of Lasfer (1995), who uses an ex-dividend-day price reaction approach and finds a larger tax price effect in the pre-1989 period than in the post-1988 period.

³² Given the limited number of years included in the non-U.S. samples, we only include the one-period lead value for net income in the test.

associated with a negative relation between dividend payouts and dividend taxes.³³ As we discussed in section II, however, simultaneous changes in the tax rate on interest income along with the tax rate on dividends is one factor that can confound interpretation of payout studies of the responsiveness of dividends to dividend taxes using data from the United States.

Ideally, integration experiments could be used to avoid this confounding factor because changes in tax imputation credits only influence the tax rate on dividends. However, tax imputation credits can introduce another confounding factor. If the tax credit exceeds the gross tax on dividends, then shareholder wealth is maximized by paying out dividends and then having shareholders reinvest the dividends as contributed capital, even in the presence of dividend tax capitalization. This incentive exists because the strategy allows the firm to substitute relatively low-cost contributed capital for high-cost retained earnings capital.³⁴

The payout-cum-reinvestment strategy is consistent with value maximization whenever the dividend tax rate is negative. The results in Table 6A suggest a negative tax rate in Australia, and as we discussed previously, Australian firms have recognized this opportunity to maximize value by increasing dividends in conjunction with a dividend reinvestment plan. Indeed, Bellamy (1994) finds that the number Australian firms offering dividend reinvestment plans increased by almost

³³ La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) use firm-level data for a large set of countries and find that the tax bias against dividends is not statistically significantly related to dividend payouts, which is consistent with dividend tax capitalization.

³⁴ Consider, for example, shareholders facing a net tax rate on dividends of -0.25. That is, a dividend of \$1.00 is worth \$1.25 to shareholders. If shareholders reinvest a dollar in the firm, the firm's future earnings will be unaffected by the dividend payment. However, the payout-cum-reinvestment scheme triggers an immediate realization of the \$0.25 of net tax benefits for shareholders.

five times upon introduction of the tax imputation credit system. Hence one would expect higher dividend payouts for Australian firms whether or not future dividend taxes are capitalized in share values.

Consistent with this expectation, the mean Australian payout ratio for the sample period is 0.60, which is higher than the mean payout ratios in Japan (0.43), France (0.36), Germany (0.54), and the United Kingdom (pre-1989: 0.40; post-1988: 0.55).³⁵ Also consistent with the payout-cum-reinvestment strategy, Chan, McColough, and Skully (1992) find positive abnormal returns for Australian firms on the day they announce dividend reinvestment plans, which is consistent with our finding that tax imputation credits are priced by market participants.

VI. TAX CAPITALIZATION, SIGNALING, AND AGENCY COSTS

Although our evidence for dividend tax capitalization is inconsistent with the view that dividend payments are necessarily tax-penalized, it need not contradict the roles often stressed for signaling and agency factors in firm decisions.

To illustrate, Bernheim and Wantz (1995) directly examine the premise that signaling benefits induce firms to pay dividends despite the tax costs of doing so. They posit that the signaling benefit of dividends should increase in the signaling cost, which they argue is a positive function of the dividend tax rate. Consistent with this hypothesis, they find that the information content of dividends fell in response to reductions in the dividend tax rate in 1981 and 1986. Because dividends do not bear the burden of the dividend tax under the tax capitalization view,

³⁵ In the United Kingdom, the tax rate on interest income declined along with the tax rate on dividends in 1989.

one might posit that tax capitalization implies that changes in the tax rate on dividends should not influence the cost of paying dividends.

Consider an alternative explanation, however. Dividend tax capitalization reduces the cost of using retained earnings below the cost of using new equity. Hence the real cost of paying dividends occurs when firms replace low-cost retained earnings (distributed as dividends) with high-cost new equity in the future. The tax wedge between the cost of the two types of equity financing increases in the tax rate on dividends. Thus, as under the view dividends are tax penalized, tax capitalization implies a positive relation between the cost of paying dividends and the tax rate on dividends.

A key difference exists between the two signaling stories, however. Under the tax-penalty view, all firms face the same cost of paying dividends, and strong firms are presumed to absorb this cost more easily than weak firms. Under the tax capitalization view, the expected cost of paying dividends should decrease in expected future earnings. All else being equal, the higher the expected future earnings, the greater the amount of expected internal funds available to finance investment, and the more likely a firm can pay dividends without requiring the issuance of costly new equity (or without incurring new debt when the shadow cost of borrowing is high).³⁶ Hence it is less costly for good firms to pay dividends than for weak firms to pay dividends, illustrating

³⁶As a related point, dividend tax capitalization supports a value-maximizing role for financial slack (*e.g.*, cash, liquid assets, and debt capacity). That is, firms have an incentive under tax capitalization to develop some financial slack in order to avoid the high costs of issuing new equity to finance future investment.

that dividend tax capitalization could support the use of dividends as a signal.³⁷

Similarly, dividend tax capitalization does not preclude an important role for agency costs in firm financial policy. Easterbrook (1984) argues, for example, that shareholders weigh the tax costs of dividends against the benefits of using dividends to reduce managers' discretion over internal funds.³⁸ Given any positive costs for adjusting dividends (*e.g.*, signaling costs), however, it is plausible that it is less costly to adjust financial slack, managerial compensation, or other margins to reduce agency costs than it is to adjust dividends.³⁹

VII. CONCLUSIONS

Understanding the role of taxes in capital structure, investment, and tax policy contexts requires an understanding of how investor tax rates on dividends influence asset values and rates of return. In particular, financial economists and policymakers have focused considerable attention on the questions of whether permanent changes in the dividend tax are capitalized in equity values, and how dividend taxes affect marginal required rates of return on equity. Answers to these questions influence the dividend policy and optimal capital structure debates, and the analysis of tax proposals to change marginal tax rates on capital income, integrate the corporate

³⁷ Tax capitalization also does not preclude non-tax explanations for dividend signals. For example, Amihud and Murgia (1997) find that the information effects of dividends are essentially the same in Germany as they are in the United States. Given the low tax rate on dividends in Germany, they conclude that the information content of dividends likely is not related to the tax on dividends. If not, then tax capitalization does not influence the signaling role of dividends.

³⁸ An analogous argument is made by Poterba and Summers (1985), who assume that the required rate of return on equity decreases with the payout rate.

³⁹ For a more general discussion, see Himmelberg, Hubbard, and Palia (1997).

and individual income tax systems, or shift to broad-based consumption taxation.⁴⁰

Despite the significance of the tax capitalization question, most empirical research has pursued more indirect predictions of alternative models of dividend decisions, including predictions regarding the relation between dividend tax rates and dividend payouts or business investment. Taking a more direct approach, this paper exploits firm-level variation in the ratio of retained earnings to total book value to examine the hypothesis that retained earnings are valued less than dollar-for-dollar, consistent with capitalization of future dividend taxes. Our evidence for U.S. firms is consistent with the expected tax discount for retained earnings, and this result is robust to a variety of controls for alternative explanations. In addition, evidence from countries outside the United States, including countries with integrated tax systems, generally corroborates our findings for the United States.

These results support the hypothesis that at least a substantial portion of the dividend tax is capitalized in equity values. At least two fronts are suggested for future work. First, institutional ownership of shares has increased substantially in the 1990s, raising the question of whether dividend tax capitalization may vary between high-institutional-ownership and low-institutional-ownership firms. Second, additional work is needed to integrate debt with retained earnings and contributed capital in more comprehensive studies of capital structure that consider

⁴⁰ Dividend tax capitalization also influences the optimal investment strategies of multinational corporations, at least by analogy. Cummins and Hubbard (1995) assume that future U.S. corporate “dividend taxes” on repatriated earnings from overseas subsidiaries in low-tax countries are capitalized in share prices. Collins, Hand, and Shackelford (1997) offer empirical evidence in support of this proposition, even for subsidiary income classified as “permanently reinvested earnings” by the parent corporation. This suggests that multinationals bear the burden of corporate repatriation taxes, whether or not current repatriation occurs, thus limiting the tax benefits of investing in low-tax countries.

dividend tax capitalization and the costs of adjusting alternative financing and control mechanisms.⁴¹ This integration is an important task for future research.

⁴¹ For example, conventional models of dividend taxation abstract from the rich variety of firm-level financing contracting decisions and from the costs of adjusting alternative financing and control mechanisms.

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TABLE 1A
Descriptive Statistics Among All Variables for the U.S. Sample of Firms
Panel A: Pre-ERTA Period, 1975-1981

<u>Variable</u>	<u>Mean</u>	<u>Minimum</u>	<u>1st Quartile</u>	<u>Median</u>	<u>3rd Quartile</u>	<u>Maximum</u>
P_{it}	21.80	0.09	11.50	18.88	28.50	96.38
BV_{it}	20.08	0.06	10.60	17.41	26.55	72.79
RE_{it}	13.48	0.00	5.65	10.58	18.61	60.96
NI_{it}	2.85	0.01	1.44	2.49	3.85	10.95
P_{it}/BV_{it}	1.31	0.10	0.72	0.98	1.54	9.74
RE_{it}/BV_{it}	0.65	0.00	0.49	0.70	0.83	0.99
NI_{it}/BV_{it}	0.15	0.00	0.11	0.14	0.18	0.89

Panel B: ERTA Period, 1982-1986

<u>Variable</u>	<u>Mean</u>	<u>Minimum</u>	<u>1st Quartile</u>	<u>Median</u>	<u>3rd Quartile</u>	<u>Maximum</u>
P_{it}	26.22	0.13	14.75	23.63	34.50	96.25
BV_{it}	18.52	0.06	8.76	15.64	25.36	72.25
RE_{it}	12.16	0.00	4.23	8.96	17.09	61.31
NI_{it}	2.42	0.00	1.03	2.02	3.39	11.01
P_{it}/BV_{it}	1.80	0.05	1.02	1.43	2.15	9.73
RE_{it}/BV_{it}	0.61	0.00	0.43	0.65	0.83	1.00
NI_{it}/BV_{it}	0.14	0.00	0.10	0.14	0.17	0.97

Panel C: 1987

<u>Variable</u>	<u>Mean</u>	<u>Minimum</u>	<u>1st Quartile</u>	<u>Median</u>	<u>3rd Quartile</u>	<u>Maximum</u>
P_{it}	22.31	0.03	11.75	19.63	29.25	98.00
BV_{it}	15.21	0.04	7.06	12.17	20.72	65.78
RE_{it}	9.37	0.00	2.95	6.82	13.23	60.27
NI_{it}	2.00	0.00	0.88	1.63	2.68	9.33
P_{it}/BV_{it}	1.81	0.05	1.07	1.45	2.13	9.65
RE_{it}/BV_{it}	0.57	0.00	0.37	0.60	0.80	1.00
NI_{it}/BV_{it}	0.14	0.00	0.10	0.14	0.18	0.87

Panel D: TRA 86 Period, 1988-1992

Variable	Mean	Minimum	1st Quartile	Median	3rd Quartile	Maximum
P_{it}	24.07	0.03	12.30	21.13	32.13	98.00
BV_{it}	15.25	0.01	7.50	12.72	20.33	71.90
RE_{it}	9.49	0.00	3.04	6.87	13.08	60.74
NI_{it}	1.93	0.00	0.80	1.56	2.61	10.80
P_{it}/BV_{it}	1.91	0.03	1.11	1.53	2.24	9.92
RE_{it}/BV_{it}	0.57	0.00	0.37	0.60	0.80	1.00
NI_{it}/BV_{it}	0.14	0.00	0.09	0.13	0.17	0.93

Panel E: OBRA 93 Period, 1993-1994

Variable	Mean	Minimum	1st Quartile	Median	3rd Quartile	Maximum
P_{it}	23.19	0.50	13.25	20.50	29.75	98.00
BV_{it}	14.46	0.07	8.02	13.05	19.17	74.60
RE_{it}	8.09	0.00	2.77	6.32	11.27	56.33
NI_{it}	1.76	0.00	0.86	1.50	2.34	9.99
P_{it}/BV_{it}	1.89	0.22	1.11	1.52	2.22	9.99
RE_{it}/BV_{it}	0.52	0.00	0.32	0.53	0.73	1.00
NI_{it}/BV_{it}	0.13	0.00	0.09	0.12	0.16	0.84

TABLE 1B
Correlations Among Variables for the U.S. Sample of Firms

Panel A: Pre-ERTA Period, 1975-1981

	P_{it}/BV_{it}	RE_{it}/BV_{it}	NI_{it}/BV_{it}	$Sales_{it}$	Div_{it}/NI_{it}
P_{it}/BV_{it}		0.04	0.48	-0.04	-0.08
RE_{it}/BV_{it}	0.11		0.14	0.13	-0.02
NI_{it}/BV_{it}	0.60	0.18		-0.01	-0.19
$Sales_{it}$	0.03	0.24	0.04		0.03
Div_{it}/NI_{it}	-0.15	-0.03	-0.26	0.29	

Panel B: ERTA Period, 1982-1986

	P_{it}/BV_{it}	RE_{it}/BV_{it}	NI_{it}/BV_{it}	$Sales_{it}$	Div_{it}/NI_{it}
P_{it}/BV_{it}		0.00	0.43	-0.10	-0.06
RE_{it}/BV_{it}	0.06		0.08	0.16	-0.01
NI_{it}/BV_{it}	0.43	0.07		-0.04	-0.14
$Sales_{it}$	-0.14	0.28	0.04		0.05
Div_{it}/NI_{it}	-0.27	0.07	-0.18	0.33	

Panel C: 1987

	P_{it}/BV_{it}	RE_{it}/BV_{it}	NI_{it}/BV_{it}	$Sales_{it}$	Div_{it}/NI_{it}
P_{it}/BV_{it}		0.07	0.44	-0.04	-0.13
RE_{it}/BV_{it}	0.15		0.14	0.16	0.00
NI_{it}/BV_{it}	0.47	0.14		0.00	-0.23
$Sales_{it}$	0.00	0.28	0.09		0.13
Div_{it}/NI_{it}	-0.09	0.13	-0.14	0.31	

Panel D: TRA 86 Period, 1988-1992

	P_{it}/BV_{it}	RE_{it}/BV_{it}	NI_{it}/BV_{it}	$Sales_{it}$	Div_{it}/NI_{it}
P_{it}/BV_{it}		0.05	0.52	0.00	-0.10
RE_{it}/BV_{it}	<i>0.07</i>		0.12	0.16	0.00
NI_{it}/BV_{it}	<i>0.51</i>	<i>0.14</i>		0.03	-0.21
$Sales_{it}$	<i>0.10</i>	<i>0.26</i>	<i>0.14</i>		0.10
Div_{it}/NI_{it}	<i>-0.06</i>	<i>0.11</i>	<i>-0.13</i>	<i>0.29</i>	

Panel E: OBRA 93 Period, 1993-1994

	P_{it}/BV_{it}	RE_{it}/BV_{it}	NI_{it}/BV_{it}	$Sales_{it}$	Div_{it}/NI_{it}
P_{it}/BV_{it}		0.05	0.53	0.08	-0.02
RE_{it}/BV_{it}	<i>0.06</i>		0.14	0.14	0.04
NI_{it}/BV_{it}	<i>0.51</i>	<i>0.17</i>		0.08	-0.18
$Sales_{it}$	<i>0.40</i>	<i>0.19</i>	<i>0.23</i>		0.11
Div_{it}/NI_{it}	<i>0.09</i>	<i>0.17</i>	<i>-0.05</i>	<i>0.27</i>	

Notes:

- P_{it} is fiscal year end price per share for firm i at period t.
 BV_{it} is book value of shareholders' equity per share for firm i at period t.
 RE_{it} is book value of retained earnings per share for firm i at period t.
 NI_{it} is net income per share for firm i at period t.
 $Sales_{it}$ is gross sales for firm i at period t.
 Div_{it} is common dividends for firm i at period t.

The numbers above the diagonal are Pearson correlations and the numbers below the diagonal (in italics) are Spearman correlations. All correlations that are different from 0.00 are statistically significant at the 0.05 level.

TABLE 2
OLS Results by Tax Regime for the United States

$$\frac{P_{it}}{BV_{it}} = \alpha_0 + \gamma_t + \beta_1 \frac{RE_{it}}{BV_{it}} + \beta_2 \frac{NI_{it}}{BV_{it}} + \beta_3 \frac{RE_{it}}{BV_{it}} * \frac{NI_{it}}{BV_{it}} + \varepsilon_{it}$$

	<u>Tax Regime</u>	α_0	β_1	β_2	β_3	<u>n</u>	<u>R²</u>
United States	Pre-ERTA Top Rate: 70%	0.94 (10.7)	-1.14 (-8.5)	2.13 (3.2)	7.46 (7.7)	8474	0.26
United States	ERTA Top Rate: 50%	1.47 (11.7)	-1.24 (-6.4)	2.23 (2.3)	8.35 (5.6)	6422	0.22
United States	1987 Top Rate: 38.5%	1.25 (6.7)	-0.72 (-2.4)	2.75 (1.9)	6.32 (2.8)	1397	0.22
United States	TRA 86 Top Rate: 28%-31%	1.06 (12.7)	-0.56 (-3.5)	5.83 (8.2)	4.49 (3.4)	7117	0.28
United States	OBRA 93 Top Rate: 39.6%	1.23 (10.0)	-0.86 (-3.6)	5.91 (5.5)	5.90 (3.0)	4236	0.29

Notes: *t*-statistics are in parentheses and are based on the consistent standard errors recommended by White (1980). P_{it} is the fiscal year end price per share for firm *i* at period *t*. BV_{it} is book value of shareholders' equity per share for firm *i* at period *t*. RE_{it} is the book value of retained earnings per share for firm *i* at period *t*. NI_{it} is net income per share for firm *i* at period *t*. Controls for year effects (γ_t) are included.

TABLE 3
Fixed-Effects Results for the United States

$$\frac{P_{it}}{BV_{it}} = \alpha_i + \gamma_t + \beta_1 \frac{RE_{it}}{BV_{it}} + \beta_2 \frac{NI_{it}}{BV_{it}} + \beta_3 \frac{RE_{it}}{BV_{it}} * \frac{NI_{it}}{BV_{it}} + \varepsilon_{it}$$

<u>Tax Regime</u>		β_1	β_2	β_3	<u>n</u>	\bar{R}^2
United States	Pre-ERTA Top Rate: 70%	-0.87 (-7.4)	1.42 (4.7)	3.68 (7.9)	8474	0.78
United States	ERTA Top Rate: 50%	-0.66 (-4.1)	3.42 (7.9)	0.19 (0.3)	6422	0.82
United States	TRA 86 Top Rate: 28%-39.6%	-0.52 (-5.5)	4.56 (17.4)	-0.28 (-0.7)	12750	0.79

Notes: *t*-statistics are in parentheses. P_{it} is the fiscal year end price per share for firm *i* at period *t*. BV_{it} is the book value of shareholders' equity per share for firm *i* at period *t*. RE_{it} is the book value of retained earnings per share for firm *i* at period *t*. NI_{it} is net income per share for firm *i* at period *t*. Controls for firm and year effects are included.

TABLE 4
Fixed Effects Results for the United States

$$I_{it}/K_{it-1} = \alpha_i + \gamma_t + \beta_1 Q_{it} + \beta_2 CF_{it}/K_{it-1} + \beta_3 RE_{it}/BV_{it} + \beta_4 RE_{it}/BV_{it} * Q_{it} + \beta_5 RE_{it}/BV_{it} * CF_{it}/K_{it-1} + \varepsilon_{it}$$

	Pre-ERTA	ERTA	TRA 86
β_1	-0.01 (-0.3)	-0.02 (-0.9)	0.04 (3.3)
β_2	0.36 (7.6)	0.32 (8.0)	0.21 (12.1)
β_3	-0.02 (-0.3)	-0.09 (-1.2)	0.05 (1.5)
β_4	0.04 (1.0)	0.02 (0.6)	-0.04 (-1.8)
β_5	-0.18 (-2.9)	-0.13 (-2.1)	-0.06 (-2.3)
\bar{R}^2	0.62	0.71	0.67
n	5058	2807	6529

Notes: *t*-statistics are in parentheses. I_{it} is capital expenditures for firm *i* at period *t*. K_{it-1} is net property, plant, and equipment for firm *i* at period *t*-1. Q_{it} is defined as [Market value of common equity + Market value of preferred equity + Book value of total liabilities]/Assets, for firm *i* at time *t* (where the market value of preferred equity is estimated by letting it equal 10 times preferred dividends). CF_{it} is operating income after depreciation plus depreciation less interest and income taxes. BV_{it} is book value of shareholders' equity per share for firm *i* at period *t*. RE_{it} is book value of retained earnings per share for firm *i* at period *t*. Controls for firm and year effects are included.

TABLE 5
Mean Statistics for Japan, France, Germany, Australia, and the United Kingdom

	$\underline{P}_{it}/\underline{BV}_{it}$	$\underline{RE}_{it}/\underline{BV}_{it}$	$\underline{NI}_{it}/\underline{BV}_{it}$
Japan	3.14	0.35	0.06
France	2.00	0.20	0.14
Germany	2.18	0.31	0.09
Australia	1.56	0.24	0.12
United Kingdom Pre-1989	2.06	0.42	0.17
United Kingdom Post-1988	1.84	0.43	0.14

Notes: P_{it} is the fiscal-year-end price per share for firm i at period t . BV_{it} is the book value of shareholders' equity per share for firm i at period t . RE_{it} is the book value of retained earnings per share for firm i at period t . NI_{it} is net income per share for firm i at period t . Sample sizes are: Japan, 6024; France, 759; Germany, 845; Australia, 1034; United Kingdom Pre-1989, 1787; and United Kingdom Post-1988, 4076.

TABLE 6A
OLS Results for Japan, France, Germany, and Australia from 1984-1994
(All Australian Observations Occur After 1987)

$$\frac{P_{it}}{BV_{it}} = \alpha_0 + \gamma_t + \beta_1 \frac{RE_{it}}{BV_{it}} + \beta_2 \frac{NI_{it}}{BV_{it}} + \beta_3 \frac{RE_{it}}{BV_{it}} * \frac{NI_{it}}{BV_{it}} + \varepsilon_{it}$$

<u>Tax Regime</u>		α_0	β_1	β_2	β_3	<u>n</u>	\bar{R}^2
Japan	Special Div. Rate:35%	2.79 (42.4)	-1.86 (-11.1)	6.90 (8.6)	2.10 (1.0)	6024	0.29
France	Partial Integration: Benefit for Some Tax-Exempts	1.19 (10.4)	0.34 (0.9)	5.0 (5.9)	1.43 (0.6)	759	0.19
Germany	Full Integration: No Benefit for Tax- Exempts	1.33 (10.4)	0.44 (1.3)	8.65 (7.7)	-5.51 (-1.9)	845	0.14
Australia	Full Integration: Benefit for Key Tax- Exempts	0.60 (8.9)	1.13 (4.8)	7.14 (14.0)	-3.51 (-2.6)	1033	0.34

TABLE 6B

<u>Tax Regime</u>		α_0	β_1	β_2	β_3	<u>n</u>	\bar{R}^2
UK	Pre-1989 Partial Integration Top Rate: 60%	0.67 (10.1)	-0.78 (-4.9)	6.82 (14.4)	5.45 (6.1)	1787	0.53
UK	Post-1988 Partial Integration Top Rate: 40%	0.67 (17.7)	-0.10 (-1.2)	7.97 (24.8)	2.41 (4.3)	4075	0.51

Notes: t -statistics are in parentheses and are based on the consistent standard errors recommended by White (1980). P_{it} is the fiscal year end price per share for firm i at period t . BV_{it} is book value of shareholders' equity per share for firm i at period t . RE_{it} is the book value of retained earnings per share for firm i at period t . NI_{it} is net income per share for firm i at period t . Controls for year effects (γ_t) are included.