Are Dividend Taxes Capitalized into Share Prices?

Evidence from Real Estate Investment Trusts

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This Draft: March 14, 2000

We would like to thank Mary Ellen Carter, Charlie Himmelberg, Laurie Hodrick, Glenn Hubbard, Doron Nissim, Lynne Sagalyn, Todd Sinai, Nick Souleles, and seminar participants at Columbia Business School, Stanford University, the University of California at Berkeley, and The Wharton School for helpful comments. Geoffrey Jervis provided excellent research assistance. We also express our appreciation for funding from the Columbia Business School Real Estate Program.

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Abstract

Financial economists have long debated how shareholder-level taxes should influence corporate financial policy. This debate turns critically on the impact of dividend taxes on share prices, but existing evidence of this effect is mixed. In this study, we exploit institutional characteristics of Real Estate Investment Trusts to examine a fundamental implication of dividend tax capitalization, which is that share prices decrease in the magnitude of future investor dividend taxes, after controlling for the fair market value of the firm's assets. Our evidence suggests that investors fully capitalize future dividend taxes into share prices at the top federal tax rate for individuals. To the extent this result is generalizable to other industries, it indicates that current dividends do not impose an incremental tax penalty on shareholders, which could help resolve a key aspect of the long-standing dividend puzzle. It also leads to a financing pecking order, in which the cost of using internal equity is substantially lower than the cost of using external equity, even before considering the information asymmetry costs of raising outside equity.

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I. Introduction

Financial economists have long debated how shareholder-level taxes should influence corporate financing and investment decisions. These debates turn critically on the share price effects of dividend taxes. If, for example, investors fully capitalize dividend taxes into share prices, then paying dividends would not impose an incremental tax penalty on shareholders. Therefore, optimal dividend policy would not be a direct function of dividend taxes. By reducing equity issue prices, dividend tax capitalization would also increase the cost of raising outside equity above the cost of using internal equity, even before considering the information asymmetry costs of new equity. In addition, dividend tax capitalization could impact the level of corporate investment through its influence on the relative costs of different forms of financing. Despite the importance of these corporate decisions, existing evidence of the share price effects of dividend taxes is mixed.

A central empirical implication of dividend tax capitalization is that the market value of the firm generally should not equal the market value of the assets within the firm, because the market value of inside assets does not reflect the shareholders' future dividend taxes on undistributed earnings. Therefore, the ratio of the market value of the firm to the replacement cost of its assets should be less than one, or $q < 1$ (see Auerbach, 1979, Bradford, 1981, and King, 1977).[1] That is, tax capitalization leads to the hypothesis that share prices decrease in the

[1] While many prior models focus on marginal q, which is the market value of a marginal project relative to its replacement cost, much of our analysis focuses on average q, which is the market value of

magnitude of future investor dividend taxes, after controlling for the market value of the firm's assets. Prior studies have not directly examined this hypothesis because the market value of inside assets is not available for most firms. In this study, however, we focus on Real Estate Investment Trusts (REITs), which have relatively simple investment portfolios of inside assets that analysts appraise on a regular basis.

In particular, we examine whether investors value the inside tax basis REITs have in their properties, after controlling for the market values of the properties. Inside tax basis offsets future taxes by providing depreciation tax shields for firms and by decreasing the firms' capital gains on the sale of properties. Using event-study methodology, previous research has found that investors price the corporate tax benefits of depreciation (see, e.g., Cutler, 1988, and Givoly and Hayn, 1991). However, REITs generally are exempt from corporate-level taxes as long as they pay out their taxable income as dividends, so REITs pass depreciation tax benefits directly onto investors as reductions in shareholder-level dividend (or capital gains) taxes. Unlike prior studies, therefore, finding that investors value inside tax basis for REITs would provide evidence that share prices are a function of shareholder-level taxes. This would imply that the marginal investor is a taxable entity, not a tax-exempt institution.[2]

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the firm relative to its replacement cost of all its assets. As we discuss below, we control for non-tax factors that might affect measures of average q.

[2] The "new view" of dividend taxation (see Zodrow, 1991) critically depends on the tax rate for the marginal investor. If the marginal investor capitalizes a substantial amount of dividend taxes into share prices, then q would be less than one, dividends *per se* generally would not impose incremental tax penalties on shareholders, and from the marginal investor's perspective, dividend taxes would increase the cost of using external equity above the cost of using internal equity (all else equal). However, some predictions ascribed to the new view of dividend taxation do not necessarily follow from dividend tax capitalization. For example, if firms have access to debt financing, or if dividends play significant signaling or agency roles, then dividend tax capitalization would not necessarily imply that firms should regularly alter dividend policy according to fluctuating investment opportunities.

Tax rules that require REITs to pay out essentially all of their taxable income as dividends help provide a relatively clean setting for studying the share price effects of dividend taxes. First, these rules imply that share repurchases, which typically offer favorable tax treatment relative to dividends, often are not a viable substitute for REIT dividends. Second, relative to investors in other industries, REIT investors do not face a great deal of uncertainty about the timing and taxation of future corporate distributions.[3]

Understanding the effects of investor-level taxes on REIT share prices also may help untangle perceived security pricing anomalies. Market analysts have been puzzled by the recent decline in REIT share prices relative to the market values of their inside assets. Analogously, studies have examined the premia and discounts of closed-end mutual fund prices relative to the funds' asset values (see Lee, Shleifer, and Thaler, 1990, and Malkiel, 1977) and whether these funds' share prices are consistent with the efficient capital markets hypothesis.[4] While taxes are unlikely to explain all of the deviations between share prices and the value of the assets inside a firm, they may provide a rational pricing response that explains some deviations.

Empirically, we examine the relation between share prices and a proxy for REITs' tax bases in their properties, after controlling for the fair market value of the properties, debt, and

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[3] However, approximately one-half of REITs make voluntary nontaxable return-of-capital distributions to shareholders, in excess of required taxable dividends. In our sample, 23 percent of the sample firms' mean annual distributions represent voluntary nontaxable returns of capital.

[4] Although their empirical examination of tax effects is limited, the authors of these studies suggest that tax basis in inside assets has little effect on the valuation of closed-end mutual fund shares. However, mutual funds can only use their inside tax basis to reduce capital gains taxes on the sale of securities, whereas REITs can use inside tax basis to reduce taxes on ordinary income. Since most taxpayers face higher tax rates on ordinary income than on capital gains, the potential tax effects for REITs are greater than the potential tax effects for mutual funds.

other factors. We examine this relation using 305 observations for the period from 1992 to 1998. If the marginal investor is taxable, and if investors capitalize REITs' depreciation tax shields into share prices, then we would expect a positive relation between share prices and tax bases. Our findings are consistent with this expectation. In particular, our evidence suggests that each dollar of future tax depreciation deductions is associated with an additional 20 cents of firm value. This result is robust to several alternative specifications, including controlling for firm fixed effects. To the extent this result is generalizable to other industries, it indicates that dividend tax capitalization may have a substantial effect on corporate financial and investment decisions.

The remainder of the paper proceeds as follows. In section II, we briefly review the importance of dividend tax capitalization for corporate financial decisions and the controversy surrounding previous empirical tests of dividend tax capitalization. We also provide background on the tax and nontax characteristics of REITs. In section III, we present a simple valuation model with taxes. Section IV discusses our data and empirical methodology. Section V presents our empirical results and section VI provides results from an alternative specification which provides a broader view of tax capitalization within the firm. Section VII concludes by discussing the general applications of our results.

II. Background

Prior Research

In 1976, Fischer Black framed a key puzzle for corporate finance economists to consider, which is: Given that dividends are taxed more heavily than capital gains, why do firms pay dividends? Bernheim (1991) clarifies that there are at least three aspects to the dividend puzzle.

While Black's initial question appears to focus on the decision to pay dividends or retain earnings, Bernheim points out that particularly puzzling aspects of corporate dividends are that firms pay dividends instead of repurchasing shares (see also Bagwell and Shoven, 1989) and that firms simultaneously pay dividends and issue new shares. Several potential solutions have been offered for the various aspects of the dividend puzzle. One common explanation is that the signaling or agency benefits of dividends offset the tax costs (for a discussion, see Poterba and Summers, 1985, and Bernheim, 1991). A second possibility is that the marginal investor faces the same tax rate on dividends as on capital gains, like tax-exempt institutions and dealers in securities (see Miller and Scholes, 1978). If the marginal investor is indifferent between dividends and capital gains, dividend policy should not affect the value of the firm.

In this study, we examine a third potential solution for the dividend puzzle, which is that investors capitalize future dividend taxes into share prices (see Auerbach, 1979, Bradford, 1981, and King, 1977). If investors fully capitalize dividend taxes into share prices, then dividends *per se* do not impose an incremental tax penalty on shareholders. That is, if a firm retains earnings so shareholders do not pay explicit dividend taxes to the government, the shareholders pay implicit dividend taxes when they sell the stock to buyers who "charge" the sellers for any unpaid dividend taxes they inherit (see Ball, 1984). Whether or not shareholders actually receive dividends, therefore, they either explicitly or implicitly incur dividend taxes. As a result, firms are free to distribute dividends whenever profitable investment opportunities have been exhausted, or whenever managers desire to use dividends for signaling or agency purposes, without imposing incremental taxes on their shareholders.

Although dividend tax capitalization offers a clearly defined solution for why firms pay dividends instead of retaining earnings, it does not resolve the question of why firms often pay dividends instead of repurchasing shares. Rather, dividend tax capitalization assumes that firms eventually distribute their equity as taxable dividends.[5] Because firms sometimes distribute equity by repurchasing shares, buying other companies for cash, or liquidating, it is unclear, *a priori*, whether the market assumes future distributions will be taxable as dividends or not, or whether the marginal investor is a taxable entity.[6] Therefore, empirical investigation of the share price effects of dividend taxes is required.

Prior studies have pursued three lines of inquiry regarding the share price effects of dividend taxes.[7] First, many studies have examined the hypothesis that share prices only decline by the after-tax value of dividends on ex-dividend days, which would suggest that the marginal investor is taxable. Elton and Gruber (1970) provide early evidence that share prices decline by less than a dollar for each dollar of dividends, which is consistent with later evidence provided by Litzenberger and Ramaswamy (1979), Poterba and Summers (1984), Barclay (1987), and Lasfer (1995). However, Gordon and Bradford (1980) and Miller and Scholes (1982) provide evidence to the contrary, and Kalay (1982) expresses concern that expected arbitrage activity around ex-

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[5] Sinn (1991) points out that introducing share repurchases does not overturn many of the implications of the Auerbach, Bradford, and King model.

[6] Although tax rules generally require REITs to distribute taxable income as dividends, cash flow often exceeds taxable income, and REITs sometimes use this excess cash flow to repurchase shares. However, these repurchases do not offer substantial tax advantages since REITs have the alternative of distributing this cash as a nontaxable return of capital distribution.

[7] In addition to the following three lines of research examining the price effects of dividend taxes, many studies have examined the effect of dividend taxes on financing decisions and dividend policy (e.g., Auerbach, 1984, Poterba and Summers, 1985, Poterba, 1987, and Nadeau, 1988), the effect of dividend taxes on investment decisions (e.g., Poterba and Summers, 1985, and Auerbach and Hassett, 1998), and the relation between dividend taxes and dividend signaling effects (e.g., Bernheim and Wantz, 1995). Zodrow (1991) summarizes much of this research.

dividend days confounds interpretation of the ex-dividend-day event studies. Consistent with this concern about the event study methodology, the magnitudes of the estimated tax effects in the ex-dividend day studies have declined in recent years, as arbitrage costs have declined.[8]

In addition to the expressed concerns about ex-dividend-day studies, some of the inferences drawn from this research program are difficult to support. Although finding that share prices decline by less than a dollar for each dollar of dividends may suggest that the marginal investor is taxable, it does not necessarily support the hypothesis that dividends impose an incremental tax penalty on shareholders, as often purported in these studies. Indeed, if firm value only decreases by the after-tax value of a dividend payment, then these share price effects essentially absorb the dividend tax, so the dividends themselves do not impose an incremental tax penalty on shareholders (i.e., the Miller and Modigliani, 1961, dividend displacement property is preserved on an after-tax basis; for a discussion, see Harris, Hubbard, and Kemsley, 1999). By abstracting from potential dividend tax capitalization explanations for their findings, therefore, inferences from the ex-dividend-day studies are difficult to interpret.

Second, if dividends impose an incremental tax penalty on shareholders, then as many researchers have hypothesized, high dividend yields should increase the pretax rate of return for investors in order to compensate them for the tax penalty they incur. Empirical examinations of

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[8] As Harris, Hubbard, and Kemsley (1999) illustrate, arbitrage activity could very well mask the less than dollar-for-dollar decline in share prices on ex-dividend days *per se*, thus confounding results from event studies. However, they argue that in the presence of an upward-sloping supply curve for a firm's equity (see Bagwell, 1992), the percentage of a firm's shares involved in this arbitrage should be strictly bounded (typically less than one percent). Furthermore, this should only result in temporary price effects around ex-dividend days that do not alter the substantive effects of dividend tax capitalization for all shareholders except the few engaging in the arbitrage activity. Empirically, they avoid the confounding effects of this arbitrage by using price-level regressions instead of event studies, as we also do.

this hypothesis have led to mixed results. On the one hand, Black and Scholes (1974) find no statistical relationship between monthly stock returns and long-run dividend yields. On the other hand, Rosenberg and Marathe (1979) and Litzenberger and Ramaswamy (1982) find a positive relationship between returns and dividends, after controlling for the information effects of dividends. However, Chen, Grundy, and Stambaugh (1990) conclude that the positive relation between returns and dividend yields appears to be a function of risk, not taxes. Naranjo, Nimalendran, and Ryngaert (1998) find that total returns and dividend yields are positively correlated but claim that their results are too large to be pure tax effects and show that the correlation is unrelated to changes in tax rates over time.

The difficulty these researchers have had identifying a tax penalty for dividends in returns could suggest that the marginal investor is indifferent between dividends and capital gains, as proposed by Miller and Scholes (1978). However, it also could simply suggest that investors capitalize dividends taxes into share prices, so that dividend taxes do not impose an incremental tax penalty on shareholders. The studies are not designed to distinguish between these two explanations.

Third, certain recent studies have examined the effect of dividend taxes on prices. For example, Fama and French (1998) examine tax effects by regressing price on dividends and various control variables, including profitability. They hypothesize that if dividends are tax penalized, then dividends should reduce firm value. Instead, they find a positive relation between dividends and firm value, concluding that the signaling effects of dividends outweigh any tax effects that may exist.

If investors capitalize future dividend taxes in prices, however, then current dividends would not impose an incremental tax penalty on shareholders and it should not be possible to capture dividend tax effects in dividend yields. Therefore, Harris and Kemsley (1999) and Harris, Hubbard, and Kemsley (1999) shift the emphasis away from the valuation effects of current dividends by focusing on the valuation of the retained earnings equity from which dividends are paid. In particular, they examine the hypothesis that investors discount the value of taxable retained earnings equity below the value of contributed equity, which firms can return to shareholders as tax-free returns of capital. Together, the two studies provide evidence consistent with substantial dividend tax capitalization, which varies in a predictable manner across five different U.S. tax regimes, and across five countries with different levels of dividend taxation.

As recognized by the authors, however, a firm's ratio of retained earnings to contributed capital could proxy for many potential nontax factors that may confound the tax interpretation of their results. In addition, the researchers did not have access to market value information for the inside assets of their sample firms, which is a fundamental component of any tax capitalization analysis. Therefore, they had to rely on explicit assumptions regarding the decomposition of earnings into normal and supranormal (i.e., economic profits) components to design their tests, which suggests the need for caution in making inferences.

Given the inconclusive nature of the evidence in these three lines of research, therefore, we return to what may be the most basic prediction of tax capitalization – dividend taxes should drive a wedge between the market value of the firm's inside assets and the market value of the firm's equity. To examine this prediction, we focus on a group of entities with easily observable market prices for their inside assets: REITs.

REITs

A REIT is a special type of limited liability corporation that is permitted to have publicly-traded shares. Congress created REITs in 1960, primarily to facilitate passive investments in real estate. As long as they invest in real estate assets and pay out at least 95 percent of their taxable income as dividends, and meet the other conditions specified in Table 1, REITs are exempt from corporate taxes. Much like mutual funds, REITs pass taxable ordinary income and capital gains directly to their shareholders.

As illustrated in Figure 1, REITs grew more popular in the early 1990s. Specifically, total REIT equity capitalization grew from $16 billion in 1992 to $143 billion in 1998, and the number of REITs grew from 142 to 211. Furthermore, the average size of REITs quadrupled from 1992 to 1998 to nearly $700 million of market capitalization, with a consequent gain in liquidity and trading volume.[9] Three factors led to the REIT boom in the early 1990s. First, the Tax Reform Act of 1986 increased the relative attractiveness of REITs by curtailing the tax shelter aspects of partnerships, and by relaxing some REIT restrictions on managing commercial properties. Second, the credit crunch of the early 1990s reduced private market capital and pushed real estate owners toward public markets. Third, the development of umbrella partnership REITs (UPREITs) fueled growth in REITs. The UPREIT structure allows the owners of partnership units in a real estate property to swap their ownership interest for partnership units in the REIT without triggering capital gains taxes (see Sinai and Gyourko, 1999, for more details on UPREITs). Because the REIT tax rules, the size of REITs, and the incentives to form REITs all changed dramatically near the beginning of the REIT boom around

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[9] Source: National Association of Real Estate Investment Trusts

1992, our empirical sample also begins in that year. The REIT boom starting in 1992 also attracted increased analyst coverage of the industry.

While REITs could manage their properties, tax rules during our sample period still restricted the types of income they can earn.[10] For example, too much revenue from outside property management or auxiliary services could disqualify a REIT's special tax status, as could revenue earned from managing hotels. Consequently, management has a much more limited impact on the value of a typical REIT than it would for other corporations. Since REITs do not have the flexibility and intangibles of other corporations, analysts develop baseline REIT valuations by focusing on the market values of their underlying real estate properties. As discussed later, our empirical tests rely on such appraisals by REIT analysts.

III. A Valuation Model with Taxes

To examine the effects of shareholder-level taxes on REITs, we begin with the no-tax setting from Modigliani and Miller (hereafter MM) (1958) in which the total market value of the firm (V) equals the market value of the firm's common equity (MVE) plus the market value of the firm's debt (D), which we assume also equals the book value of debt, or V=MVE +D. Given this identity, we can express the market value of equity in terms of V and D as follows:

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[10] Subsequent to our sample period, a number of tax law changes and private letter rulings from the IRS have eroded some of the restrictions that REITs face in earning outside income. REITs may now set up wholly-owned taxable subsidiaries to earn outside income from such operations as telecommunications and property management, except for hotels. Previously, these taxable subsidiaries could not be fully owned and controlled by the REIT and faced both income and ownership limits, leading to potential conflicts of interest and making these structures much less attractive to REITs. See Edwards (1999) for more detail.

$$MVE = V - D. \tag{1}$$

As posited by MM, the total value of the firm (V) equals the present value of expected future returns on assets. Similarly, analysts in the REIT industry use expected future returns on assets to estimate the market value of tangible assets (MVA). To facilitate our empirical investigation, therefore, we replace V with MVA + μ, where μ represents factors influencing the value of V beyond the influence of the market value of tangible assets. In other words, μ represents intangible assets and liabilities. Making this substitution yields:

$$MVE = MVA - D + \mu . \tag{2}$$

Although this substitution introduces a potential error term in our model, several factors suggest that this term is of less consequence for REITs than for other corporations. First, in comparison to other firms, the market value of REIT assets are much more transparent to investors. Second, tax restrictions on REIT operating and financing decisions, including the requirement to distribute essentially all of their taxable income to shareholders each year, limit the effects of intangible factors like managerial discretion or agency costs. Third, REIT debt often consists of secured, nonrecourse loans, which reduces potential bankruptcy costs. In addition, the typical REIT has a debt to value ratio of about 40 percent, suggesting a low probability of bankruptcy.

MVA represents the market prices outside investors would be willing to pay for the REIT properties. If an outside investor purchased all of the REIT's properties for their market value of MVA, the buyer's tax basis in the properties (TB) would equal MVA, or TB = MVA. That is, the outside investor would have full tax basis in the properties, to generate depreciation tax deductions and/or to reduce future taxable gains on the eventual sales of the properties. In contrast, REITs typically do not have full tax basis in their properties, because they already have exhausted some of the depreciation tax deductions from the properties, and because the property values may have changed since their purchase dates. Over our sample period, commercial real estate values have mainly increased, so for most REITS, TB is less than MVA.

To the extent that TB is less than MVA, REITs face greater future tax liabilities on earnings from their properties than an outside buyer would face, which the REITs pass out to shareholders through taxable dividends or sometimes through taxable capital gains. Given that MVA reflects the market value of assets for outside buyers, the after-tax value of the assets to REIT shareholders is only MVA - INCTAX, where INCTAX equals the incremental tax burden faced by the REITs. After taxes, therefore, equation (2) can be rewritten as:

$$MVE = MVA - D - INCTAX + \mu \ . \tag{3}$$

To define INCTAX more precisely, we let it equal τ(MVA - TB), where τ is the discounted tax rate on distributions for the marginal investor. *A priori*, it is not possible to identify a specific value for τ, because the marginal investor could be a tax-exempt institution, a high-tax individual, or some other entity. Empirically, therefore, we do not specify a value for τ. Instead, as discussed later, we infer the value of τ from the data. Our primary research question then is whether the shareholder-level tax rate capitalized into share prices is positive, i.e., whether $\tau > 0$. Substituting our definition for INCTAX into (3) and simplifying leads to:

$$MVE = (1 - \tau)MVA + \tau TB - D + \mu \ . \tag{4}$$

If the REIT has full tax basis in its assets (i.e., TB is equal to MVA), then the REIT has no incremental tax relative to the outside owner and the expression simplifies back to equation (2). Over time, however, the REIT's tax basis can diverge from the value of the assets, and in equation (4), we posit that this divergence drives a wedge between the market value of equity and the market value of net assets.

Rather than focusing on the market value of gross assets, REIT analysts report the market value of net assets (NAV), where NAV = MVA - D, so that MVA = NAV + D. Making this substitution and simplifying results in:

$$\mathrm{MVE} = (1 - \tau)\mathrm{NAV} + \tau\,\mathrm{TB} - \tau\,\mathrm{D} + \mu\ . \tag{5}$$

Implications of the Model

If the marginal investor is taxable (i.e., if $\tau > 0$), and if NAV is included as a control, then equation (5) leads to the rather intuitive testable prediction that MVE should increase in the firm's inside tax basis in its assets. The equation also suggests that MVE should decrease in debt for a given level of NAV and TB. Algebraically, the negative tax effect for debt is a mechanical result of substituting NAV + D for MVA. Intuitively, increasing debt while keeping NAV constant implies that MVA must increase; since TB remains constant, this increase in MVA is associated with a larger incremental tax burden for the shareholders and this incremental tax burden decreases equity value based on the tax rate.

In addition to these two empirically-testable implications, equation (5) indicates that if an all-equity firm has zero tax basis in its assets (and $\mu = 0$), then MVE = $(1-\tau)$ NAV, and average q = $(1-\tau)$. Although this is a long-recognized property of dividend tax capitalization, it is based on the premise that a dollar of retained earnings equity is worth less than a dollar to taxable shareholders, who must pay a dividend tax to extract the equity from the firm. REITs typically do not retain realized earnings, so at first blush, it might appear counter-intuitive for us to posit that shareholder taxes can drive average q below one for REITs.

However, both q and our model are based on the replacement cost of assets, not the book value of assets. When accounting for firm value under a mark-to-market replacement cost system, both assets and retained earnings must include any unrealized gains or losses on the assets. Unrealized gains or losses arise any time the change in market values for the REITs' properties differs from tax depreciation, either because tax depreciation deductions exceed economic depreciation, or because of random shocks in market values (i.e., property appreciation). These unrealized gains essentially represent unrecorded retained earnings equity, which is equal to the difference between MVA and TB. The tax on this unrecorded retained earnings equity is τ(MVA - TB), which is precisely the tax captured by equation (5). Shareholders recognize this tax on unrecorded retained earnings equity whenever REITs sell the underlying assets for capital gains, or more commonly, when REITs realize taxable earnings from the assets which are not shielded by tax depreciation deductions.[11]

[11] From an investment perspective, the financing pecking order for REITs is different from the financing pecking order for other corporations in the presence of dividend tax capitalization. For non-REITs, dividend tax capitalization decreases the cost of using internal retained earnings equity below the cost of using external equity. However, tax rule restrictions generally prevent REITs from using realized retained earnings to finance new assets, so they must use external equity (for which marginal q = 1). Conceptually, however, REITs also use unrecorded retained earnings equity to finance investment any time they choose to hold onto appreciated assets rather than sell the assets and distribute the taxable gains to shareholders. This choice to reinvest unrecorded retained earnings is in some ways identical to the choice other types of firms often make to reinvest realized retained equity in new assets rather than distribute the equity as taxable dividends to shareholders.

Because share prices reflect the after-tax value of assets, rather than the pretax value of assets, equation (5) also suggests that share prices should only decline by the after-tax value of distributions of the assets to shareholders. If share prices only decline by the after-tax value of distributions, REITs are free to trigger taxes by distributing taxable assets to shareholders whenever the firms' profitable investment opportunities have been exhausted. That is, price effects absorb tax effects. For example, REITs could sell buildings with unrealized capital gains and distribute the proceeds to shareholders without an incremental tax penalty. More generally, firms do not impose an incremental tax penalty on shareholders by distributing taxable income to shareholders, which provides a potential solution for the dividend puzzle.

IV. Data and Empirical Specification

For our empirical work, we use two primary databases. We begin with financial data for 196 equity REITs from 1992 to 1998 from SNL Securities, Inc., which includes virtually the entire universe of REITs.[12] These firms are in the sample for an average of 5 years, for a total of 981 REIT-year observations. These data include essentially all publicly-reported accounting variables. However, REITs do not consistently disclose reliable tax basis information. Therefore, we must use the accounting book value of assets (BVA) to proxy for the tax basis of the assets.[13]

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[12] We exclude mortgage REITs – firms that invest exclusively in mortgages and debt securities – from the sample because they cannot depreciate their assets and are a poor fit for this project.

[13] Discussions with industry accountants and analysts suggest that book value is a good approximation for the tax basis of most REITs. Furthermore, it is the only publicly-available proxy for tax basis that investors can use to value REITs.

We then obtain NAV data from Green Street Advisors, Inc. Green Street covered 18 REITs in 1992. Their coverage doubled to 36 REITs by 1994, and increased even further to 66 firms by 1998. When we merge the two data sets, we are left with 305 REIT-year observations.[14] While Green Street provides NAV estimates for a little less than one-third of the REIT-years in the SNL sample, those firm-years represent about 60% of the total REIT capitalization in SNL.

Several factors motivate using the Green Street NAV estimates. First, industry observers and participants almost uniformly agree that Green Street produces the most careful and accurate estimates in the REIT industry. It is the only analyst or firm to have a consistent set of estimates prior to 1996. Green Street focuses exclusively on real estate firms and each of its analysts follows only a few firms; in 1999, for example, Green Street had 8 analysts following a total of 77 REITs. These analysts specialize by type of property and compute NAV by determining the fair market value of each property owned by a REIT, often visiting larger properties. Finally, Green Street does not perform any investment banking functions for REITs and thus is immune from the potential conflicts of interest that may impact the research of banks that also underwrite securities.

Given these data, equation (5) suggests using some version of the following basic empirical equation to estimate tax effects:

$$MVE_{it} = \alpha_0 NAV_{it} + \alpha_1 BVA_{it} + \alpha_2 D_{it} + \mu_{it}, \tag{6}$$

[14] We exclude observations with missing data (or zero) for net properties, or with BVCE/NAV < 0.1, where BVCE equals the book value of common equity. The capital structures of the REITs covered by Green Street are similar to the capital structures of other REITs. However, 65 percent of the REIT-years in the Green Street sample are UPREITs, compared to 46 percent for all REIT-years in the SNL data.

where the subscripts i and t refer to firms and time periods, respectively.

Although we expect the error term in equation (6) to be of less consequence for REITs than for other corporations, it could still be correlated with the other regression variables. Therefore, we attempt to identify some important potential components of μ. For example, firms with small market capitalizations may have less liquid shares than larger firms, leading to valuation discounts relative to NAV. In addition, Sagalyn (1996) argues that UPREITs face certain conflicts of interest and restrictions on sales and refinancings that could reduce firm value relative to NAV.[15] Finally, relative to NAV, REIT valuations may vary over time.

Because each of these nontax components of μ influences the premium or discount relative to NAV, we deflate equation (6) by NAV. In addition, we control for year fixed effects, and certain firm effects as follows:

$$\frac{MVE_{it}}{NAV_{it}} = \alpha_0 + \alpha_1 \frac{BVA_{it}}{NAV_{it}} + \alpha_2 \frac{D_{it}}{NAV_{it}} + \alpha_3(\text{Year, Firm Effects}) + \epsilon_{it}, \tag{7}$$

where ϵ captures any remaining component of μ for which we do not specifically control. If investors capitalize future shareholder-level taxes into share prices, then we expect α_1 to be positive and α_2 to be negative. More precisely, we expect α_1 to equal τ and α_2 to equal $-\tau$ (see equation (5)), so that $\alpha_1 = -\alpha_2$. The actual magnitudes of α_1 and α_2 should depend on the identity of the marginal investor, as well as on the applicable tax rate and the timing of the benefits

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[15] If a REIT has acquired assets through an UPREIT transaction, refinancing assets or selling through a "like-kind exchange" may trigger a capital gain for the original property contributor. In many UPREITs, these contributors include the current managers. The potentially large tax liabilities triggered by these transactions may discourage such managers from undertaking certain transactions that would be in the best interest of outside shareholders.

shareholders garner from the REITs' tax bases in their assets.

For example, if the marginal investor is a high-tax individual, and if the tax basis is used to reduce the capital gain on an impending liquidation of assets, then τ should reflect the top capital gains tax rate, which is equal to 0.20 for most of the sample period. More commonly, however, tax basis provides depreciation tax shields that reduce the taxable portion of dividend distributions.[16] Dividends are subject to a top federal tax rate of 0.396 for most of the sample period, and for tax purposes, REITs depreciate most of their assets over a period ranging from 27.5 to 39 years. Given this depreciation schedule, the present value of the depreciation tax shield for shareholders should roughly equal one-half of the statutory rates, or approximately 0.20. Therefore, the tax benefits of realizing tax basis through reductions in immediate capital gains taxes or through reductions in future dividend taxes are approximately the same.[17]

To model the firm effects, we include dummy variables for small firms, equal to one if equity capitalization is less than $400 million (which is the smallest one-third of the sample), and zero otherwise, and for UPREITs, equal to one for UPREITs and zero otherwise. Since our data focus on common equity, we also control for preferred stock (measured at book value) relative to

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[16] Asset liquidations among REITs are rare. Furthermore, if a REIT sells some of its buildings, it can defer recognition of these gains indefinitely through "like-kind exchange" rules that allow for tax deferral (by allowing for a carryover basis from the asset that is sold to the asset that replaces it in the REIT's portfolio). Therefore, tax basis is primarily realized through depreciation tax shields.

[17] Our model concentrates on the effects of the REITs' tax basis in their inside assets, while abstracting from investors' outside tax basis in REIT shares. Accounting for the investors' outside tax basis could decrease the estimated value for τ to some degree. In particular, passing out taxable dividends to shareholders not only triggers ordinary taxes, but it also decreases share prices without decreasing shareholders' outside tax basis in their stock. This creates potential capital losses for the shareholders when they eventually sell their REIT shares (see Malkiel, 1977, for a discussion of this issue in relation to closed-end mutual funds). Empirically, if the present value of the tax benefits from the outside capital losses is material, then we would expect it to decrease the estimated value for τ.

NAV. The coefficient on preferred stock relative to NAV has the same predictions as the coefficient on the debt variable. However, given that preferred stock is concentrated among a few REITs, this variable may also capture any unobserved differences between REITs that issue preferred stock and those that do not.[18] In some specifications, we employ firm fixed effects to control for the mean effects of all potential firm-specific components of ϵ.

Along with any unobserved heterogeneity in REITs, the regression error term (ϵ) is affected by any possible measurement error in the variables.[19] Despite our confidence in the Green Street NAV estimates as the best available measures of NAV, they may still suffer from measurement error. Below we consider the possibility that reported NAV equals true NAV (NAV^T) plus an error term, so $NAV = NAV^T + \eta$.

The most direct impact of any potential measurement error in NAV for our basic specification (equation (7)) is that it would induce positive correlation among our major variables of interest, because we scale all of the variables by NAV. In particular, scaling the dependent variable (MVE), BVA, and D all by NAV could bias the estimated BVA/NAV and D/NAV coefficients positively. Empirically, we can get a feel for the magnitude of this bias by focusing on our hypothesis that $\alpha_1 = -\alpha_2$. Because measurement error in NAV would bias both α_1 and α_2 in the same direction, it would increase the likelihood that we would reject this hypothesis.

Any potential measurement error in NAV creates additional concerns if it is correlated

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[18] Market analysts report that only "top-flight" REITs issue preferred stock because investors are averse to buying preferred from weaker REITs (see Schwimmer,1995). Overall, preferred stock is a small component of REITs' capital structure. Only about one-third of the REIT-years in our sample use preferred and, for these REITs, the average amount of preferred is about 17 percent of NAV.

[19] For a more detailed discussion of the econometric issues surrounding measurement error, see Greene (1997), pages 435-44.

with BVA or D. If this correlation exists, to a first-order approximation, the bias in the estimated BVA/NAV coefficient (α_1) would depend on the cov(BVA,η), while the bias in the estimated D/NAV coefficient (α_2) would be related to cov(D,η). (This bias is more clearly seen in equation 6 than in equation 7 because equation 6 does not scale the variables by NAV.) However, Green Street analysts have access to information about BVA and D when they form their NAV estimates, so *a priori*, it is not clear that the estimation error in NAV should be correlated with BVA or D.

Nevertheless, given this potential measurement error in NAV, we take three steps in our empirical analysis to ensure that measurement error does not materially influence our estimates. First, we focus on the hypothesis that $\alpha_1 = -\alpha_2$. The bias in the estimated BVA coefficient depends on the covariance between BVA and η, whereas the bias in the estimated D coefficient depends on the covariance between D and η. Unless measurement error biases α_1 and α_2 by a similar magnitude but opposite sign, substantial measurement error would lead us to reject our hypothesis that $\alpha_1 = -\alpha_2$. Second, we add control variables to our model that may be correlated with η. If the estimated coefficients for BVA or D are driven by correlation between these control variables and η, then adding the control variables should reduce the magnitudes of the estimated BVA and D coefficients. Third, we directly address potential measurement error biases by regressing future profits on NAV and BVA. If noise in NAV biases the estimated BVA coefficient when we regress MVE on NAV and BVA, then we would expect to find a similar bias when we regress future profits on NAV and BVA.

V. Empirical Results

As reported in Table 2, the mean MVE/NAV ratio is 1.11, suggesting a mean share price premium over the market value of assets equal to 11 percent. However, 37 percent of the sample exhibits a discount in share prices. The average MVE/NAV ratio has generally decreased over time. For example, mean MVE/NAV is less than one for 1998, the last year of our sample period. On average, the sample REITs hold 85 percent of their total assets in real estate properties, suggesting that non-real estate assets (mostly cash and marketable securities) are limited. The mean dividend yield is a rather high 6.6 percent, which reflects the tax requirement to distribute 95 percent of annual taxable income to shareholders.

In Table 3, we report results from estimating equation (7) for the full sample of 305 observations. As indicated in column (1), the estimated BVA/NAV coefficient is positive (0.20) and highly significant, which is consistent with the hypothesis that investors capitalize the dividend tax savings from tax basis into share prices (all standard errors are corrected for within-firm clustering). The implied tax rate is 20 percent, which could reflect full capitalization of the capital gains tax rate for impending liquidations of REIT assets. Because liquidations are rare, however, it more likely reflects future depreciation deductions reducing future dividend taxes. If we assume that the discounted value of these future tax benefits is approximately one-half of their undiscounted value, then the estimated coefficient of 0.20 implies that the marginal shareholder has a tax rate of approximately 40 percent, the maximum federal marginal tax rate for individuals over most of this time period. Even when considering state taxes, therefore, the coefficient suggests close to full tax capitalization at the highest marginal tax rates.

Also as expected, we find that the estimated D/NAV coefficient is negative (-0.17) and significant and quite close to the coefficient on BVA/NAV (0.20). As previously discussed, by controlling for NAV and tax basis (BVA), a one dollar increase in debt implies a one dollar increase in the taxable gain inside the REIT (i.e., market value of assets less tax basis). Therefore, the negative D/NAV coefficient is consistent with the hypothesis that investors capitalize the incremental shareholder taxes associated with larger unrealized gains into share prices.[20] Furthermore, our prediction that $\alpha_1 = -\alpha_2$ is not rejected; the absolute value of the estimated D/NAV coefficient is not statistically different from the estimated BVA/NAV coefficient (with a p-value of 0.55). The similarity of our two estimates of the implied tax rate provides some preliminary evidence that measurement error does not materially bias our estimates of the capitalized tax rate. In regard to the other variables, we find that the estimated coefficients for preferred equity (0.07) and UPREITs (-0.05) are not statistically different from zero, but that small REITs trade at a 17 percent discount to net asset value relative to larger REITs.[21]

Finding that investors capitalize shareholder-level taxes into REIT share prices essentially places REIT investment on equal footing with direct real estate investment, at least from a tax perspective. When investors directly purchase real estate properties through proprietorships or

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[20] To further examine this tax interpretation for the negative D/NAV coefficient, we estimate equation (7) without the BVA/NAV variable. Without this variable, we no longer expect the D/NAV coefficient to capture incremental REIT taxes. Consistent with this expectation, the D/NAV coefficient (-0.007) in this alternative specification is not statistically different from zero.

[21] The coefficient on preferred equity is inconsistent with tax capitalization since preferred equity should function similarly to debt. However, if we exclude the BVA/NAV variable from the regression, the preferred equity coefficient is positive (0.24) and statistically significant different from zero, consistent with the possibility that preferred stock is associated with high-quality REITs (i.e, REITs that sell at a premium to NAV). Adding the BVA/NAV variable reduces the coefficient on BVPE/NAV by 0.17 which is close to our estimate of the effective tax rate.

partnerships, they typically benefit from early depreciation deductions that they recapture as taxable gains (along with appreciation) when they sell the properties. In the absence of tax capitalization, however, REIT investors could consume depreciation tax shields without ever having to recapture the deductions as taxable gains, by merely selling their shares on the secondary market before the REITs sold the underlying properties. However, our findings suggest that new REIT investors implicitly charge sellers for the tax depreciation deductions they have consumed, as well as for any unpaid taxes on property appreciation, via lower purchase prices for the stock.

General Robustness Tests

To further examine the tax interpretation for these findings, we conduct a variety of robustness tests. First, we estimate equation (7) using a median regression to control for the possibility that outliers may drive our results by using a median regression to estimate equation (7). As reported in Table 3, column 2, we find that the estimated BVA/NAV (0.12) and D/NAV (-0.15) coefficients decline somewhat in magnitude, but remain highly significant. As before, the absolute values of the two coefficients are not statistically different from each other.

Second, we address the concern that approximately one fourth of the REITs in our sample have a material portion of their total assets in securities, as opposed to real estate properties. This is a concern for us because our measure of the firm's tax basis (BVA) only captures the firms' tax basis in their properties, not their tax basis in securities. To control for this potential measurement error in our tax basis measure, we estimate equation (7) for the subsample of observations (n=238) for firms whose real estate properties account for at least 80 percent of total assets. As reported in Table 3, column 3, the estimated BVA/NAV (0.24) remains positive, and the estimated D/NAV coefficient (-0.22) remains negative, and the absolute values of the two coefficients are not statistically different from each other. Indeed, focusing on this sample for which there may be less error in our tax basis measure strengthens results.

Third, we use fixed effects and first differences to control for the mean effects of any unidentified omitted cross-firm variables, including managerial talent. That is, we focus on the within-firm effects of tax basis and debt. As reported in Table 3, column 4, controlling for mean firm effects actually increases the estimated BVA/NAV coefficient, to 0.29, which provides some evidence that the positive BVA/NAV coefficient is not driven by any potential measurement error in NAV. The estimated D/NAV coefficient is -0.22, and again, the absolute values of the two coefficients are not statistically different from each other. When first differencing the data (Table 3, column 5), we find that the estimated BVA/NAV coefficient remains positive (0.22) and the estimated D/NAV coefficient is negative (-0.09), although the D/NAV coefficient is not statistically different from zero.

Fourth, we examine the robustness of the primary results over time. While tax rates remained rather stable during our sample period, the REIT market grew substantially. It is at least possible, therefore, that the identity of the marginal investor changed over time. To assess this possibility, we separately estimate equation (7) for two time periods: 1992-1995, and 1996-1998. When doing so, we find that the estimated BVA/NAV coefficients are positive in both the early and late subsamples (0.28, t=3.0 and 0.17, t=2.5, respectively), and the estimated D/NAV coefficients are negative (-0.29, t=-3.0 and -0.13, t=-2.3, respectively). While the BVA/NAV and D/NAV coefficients decline in magnitude from the early time period to the later time period, the change in coefficients is not statistically significant.

Controlling for Potential Measurement Error in NAV

As discussed above, the correlation between measurement error in NAV and the variables of interest could upwardly bias our estimated tax rates. If this bias exists, we would expect the magnitude of the bias to decrease as we add other explanatory variables to the regression equation that help predict MVE/NAV. For example, if firm fixed effects are correlated with the measurement error, including them should reduce the magnitudes of the BVA/NAV and D/NAV coefficients. As reported above, however, controlling for fixed effects increases the magnitudes of these coefficients.

As an additional check, we include current and future FFO (Funds From Operations) as control variables to see if they influence the coefficients of interest.[22] FFO is the most commonly used measure of cash flow in the real estate industry. It is particularly relevant for our study because analysts typically express REIT values in terms of FFO multiples. If FFO is correlated with the measurement error in NAV, and if the measurement error in NAV contributes to the positive estimated BVA coefficient and the negative estimated D coefficient, then controlling for FFO should reduce the magnitudes of the BVA and D coefficients.

As reported in the last column of Table 3, the estimated coefficient for current FFO is 0.40 (t=0.51), and the estimated coefficient for future FFO is 1.76 (t=2.1). Hence future FFO provides incremental value-relevant information that is not captured by our measure for NAV. Nevertheless, including these two control variables does not reduce the magnitudes of the BVA

[22] Current FFO is not available for all REITs in our database, and future FFO requires us to shorten the sample period by one year for each firm. Therefore, including these variables decreases sample size by 38 percent. The inferences we draw from adding FFO are not sensitive to using only a sub-sample of the observations in our main specification.

and D coefficients. Indeed, when controlling for FFO_t and FFO_{t+1}, we find slight increases in the magnitudes of the estimated BVA and D coefficients to 0.24 and -0.24, respectively. Thus, these results cast doubt on measurement error driving our findings.

We also consider the possibility that scaling the regression variables by NAV biases the estimated coefficients, which would result from any potential measurement error in NAV. To investigate this potential bias, we estimate equation (7) with NAV as a separate regressor, rather than scaling the regression variables by NAV. As reported in Table 4, column (1), the estimated BVA (0.26) remains positive as expected, and the estimated D (-0.27) coefficient remains negative. Moreover, as one would expect from equation (5), the coefficient on NAV (0.76) is roughly one minus the coefficient on BVA. With firm fixed effects (Table 4, column (2)), the estimated BVA coefficient is 0.24 and the estimated D coefficient is -0.35. In both specifications, the absolute values of the estimated BVA and D coefficients are not statistically different from each other.

Taken together, these sensitivity findings support tax interpretations for the positive BVA/NAV coefficient and the negative D/NAV coefficient. That is, investors appear to capitalize the shareholder-level tax benefits from depreciation tax shields into share prices. In all cases, we have used the book value of real estate properties to proxy for inside tax basis, focusing on the properties section of the asset side of the balance sheet. In the next section of the paper, we broaden our view of tax capitalization to encompass all assets, liabilities, and equity of REITs. This broader view provides an additional test of tax capitalization.

VI. Broad Tax Basis Measure

Like other corporations, REITs typically have inside tax basis in all of their assets, not just in their real estate holdings. For example, their tax basis in the securities of other corporations equals their original purchase price for the securities. In addition, they have dollar-for-dollar tax basis in cash, which carries over to any other assets they purchase with the cash. Because most assets are recorded at their historical cost on the REITs' financial statements, reported assets generally represent reasonable proxies for the firms' cost-based tax bases in the assets. Therefore, instead of letting TB equal the book value of real estate properties as we do above, we could let it equal the book value of total assets. Then, because the book value of total assets is equal to the book value of common equity (BVCE) plus debt, we can define TB = BVCE + D.

Defining TB as BVCE + D is especially appropriate for REITs because they essentially have no retained earnings. Because REITs must distribute their annual income to shareholders, their BVCE consists almost entirely of contributed capital. This is critical, for as Harris, Hubbard, and Kemsley (1999) point out, shareholders are taxed on distributions of retained-earnings-financed assets. In effect, therefore, shareholders only benefit from the tax basis a firm has in its contributed-capital-financed assets. That is, contributed capital (or BVCE for REITs) is a summary measure of the amount of assets a firm can distribute to shareholders as a tax-free return of capital.

Substituting BVCE + D for TB in equation (5), and simplifying, yields the following alternative valuation equation:

$$MVE = (1 - \tau)NAV + \tau BVCE + \mu \,. \tag{8}$$

This equation posits that after controlling for NAV, firm value should increase in BVCE, which is our broad measure for the shareholders' portion of a REIT's inside tax bases in its assets. Note that when we substitute BVCE + D for TB, debt falls out of the equation. Also note that if a REIT has full tax basis in its assets, so BVCE is equal to NAV, then MVE simply equals NAV + μ. However, if a REIT does not have full tax basis in its assets, then (8) posits that MVE falls below NAV + μ, which could result in a price discount relative to NAV.

We estimate the following equation to test whether firm value increases in BVCE:

$$\frac{MVE_{it}}{NAV_{it}} = \alpha_0 + \alpha_1 \frac{BVCE_{it}}{NAV_{it}} + \alpha_2 \frac{D_{it}}{NAV_{it}} + \alpha_3(\text{Year, Firm Effects}) + \epsilon_{it} \,. \tag{9}$$

As before, the firm effects include controls for UPREITs and small firms. In this specification, we include debt and preferred equity to control for any non-tax related effects of capital structure on MVE/NAV. If investors capitalize tax basis into share prices according to equation (8), then we expect α_1 to be positive and α_2 to be zero.

As reported in Table 5, column (1), the results are consistent with this expectation. Specifically, the estimated BVCE/NAV coefficient is 0.23, and the estimated D/NAV coefficient (0.024) is not statistically different from zero. The implied capitalized tax rate of 23 percent is similar to the 20 percent tax rate implied from estimation of equation (7) reported in Table 3. The estimated BVCE coefficient remains positive and significant when estimating a median regression (see column 2 of Table 5), and when controlling for fixed firm effects (see column 3 of Table 5). However, the size of the estimated tax effect varies substantially, from 12 percent in the median regression to 59 percent in the fixed-effects regression. While the estimated coefficient of 59 percent is too high to only reflect taxes, the signs of the implied tax rates are consistent with the hypothesis that investors capitalize shareholder-level taxes into share prices.

Assessing Potential Measurement Error Effects

Similar to our earlier tests, measurement error in NAV would bias the estimated BVCE coefficient if BVCE is correlated with the measurement error. Here, we directly model the potential impact of measurement error in NAV by focusing on the present value relationship between stock prices and future cash flows. Ignoring the capitalization of investor-level taxes, the pretax market value of a REIT (PMVE) can be represented as the present discounted value of the future cash flows of the REIT, or:

$$\mathrm{PMVE}_{it} = \sum_{s=t}^{\infty} \rho^{-s} \pi_{is}, \tag{10}$$

where π_{is} are the pretax cash flows that firm i earns in period s, and ρ is the discount factor (i.e., one plus the appropriate discount rate). If we had the infinite stream of future pretax REIT cash flows, as well as the appropriate discount rate, we could estimate the pretax value of the firm's equity. If we then regressed PMVE on NAV and BVCE, the estimated BVCE coefficient would reflect any nontax valuation effects from book value that are not captured by NAV.

While we do not have the full path of future cash flows, the same logic applies to a regression of future earnings on NAV and book value over a shorter horizon. After controlling for NAV, any relation between book value and future earnings reflects the inadequacies of NAV in predicting future earnings that are captured by book value. That is, after controlling for our measure of NAV, a significant coefficient for BVCE would suggest BVCE is related to future cash flows and any measurement error in NAV along nontax dimensions.

As reported in Table 6, the estimated NAV coefficient is positive and significant when regressing future cash flows on NAV and BVCE, whether we use FFO_{t+1}, or the sum of FFO for the next three years, as a proxy for future cash flows. In contrast, the estimated BVCE coefficient is not statistically different from zero (with t-statistics less than one). These findings suggest that even if measurement error in NAV is material, it does not appear to be correlated with BVCE, which helps confirm our tax interpretation for the positive BVCE coefficient.

VI. Conclusion

In this study, we exploit three characteristics of REITs to estimate the influence of shareholder-level taxes on share prices. First, a REIT's tax basis in its assets provides depreciation tax shields and reduces taxable gains on the sale of properties. Second, REITs do not pay corporate taxes, so any benefit they derive from tax basis reduces shareholder-level taxes only. Third, analysts regularly appraise the market value of REIT properties, and the tax basis REITs have in their properties invariably differs from the market value of the assets. Given this unique institutional setting, we design tests to examine the hypothesis that investors capitalize the shareholder-level tax benefits from tax basis into share prices, after controlling for the market value of the assets.

Our evidence indicates that each dollar of tax basis increases REIT share prices by about 20 cents, conditional on the fair market value of properties. These estimates are robust to a variety of specifications, including firm fixed effects specifications and the use of different measures for tax basis. Furthermore, the results remain strong in a number of specifications that include future profits, suggesting that measurement error in NAV is unlikely to be driving our findings. Because investors often derive their benefits from tax basis over time through tax depreciation deductions, the 20 percent capitalization rate we estimate represents the present value of future benefits. Given the length of tax depreciation schedules for real estate, our evidence suggests that the undiscounted tax rate capitalized in share prices could easily reach 40 percent, or full capitalization at the top federal statutory tax rate for individuals.

By focusing on REITs, we have set aside at least some investment and dividend policy issues that complicate the analysis for regular corporations. In an environment without flexibility over the timing of dividends, tax-advantaged share repurchases, or the complexity of the corporate tax, we find that investors appear to fully capitalize dividend taxes into share prices. Our finding provides a benchmark comparison for future examinations of the share price effects of dividend taxes. Starting from this benchmark, future research could examine how greater flexibility in the timing of dividends, the possibility of tax-advantaged share repurchases, and the addition of a corporate tax affect the extent of tax capitalization.

If investors fully capitalize dividend taxes into share prices as our evidence suggests, then current dividends do not impose an incremental tax penalty on shareholders, which could help resolve at least one key aspect of the long-standing dividend puzzle. Capitalization of future dividend taxes also leads to a financing pecking order, in which the cost of using internal equity is substantially lower than the cost of using external equity, even before considering the information asymmetry costs of external equity. From an asset pricing perspective, our findings suggest that the market value of the firm differs from the market value of its assets whenever the replacement cost of assets differs from the firm's tax basis in the assets. Finally, tax capitalization implies that many of the professed benefits from reducing or eliminating individual taxes on investment, by integrating the corporate and personal tax systems or by moving to a broad-based consumption tax, would be dissipated in windfall profits for current shareholders.[23]

[23] See Zodrow (1991) and Gentry and Hubbard (1998) for summaries of the tax policy implications of dividend tax capitalization.

References

Auerbach, A. 1984. "Taxes, Firm Financial Policy, and the Cost of Capital: An Empirical Analysis." *Journal of Public Economics* 23: 27-57.

Auerbach, Alan J. 1979. "Share Valuation and Corporate Equity Policy," *Journal of Public Economics* vol. 11, pp. 291-305.

Auerbach, Alan J. and Kevin Hasset. 1998. "On the Marginal Source of Investment Funds," University of California at Berkeley, Mimeo.

Bagwell, Laurie S. 1992. "Dutch Auction Repurchases: An Analysis of Shareholder Heterogeneity." *Journal of Finance* 47, pp. 71-105.

Bagwell, Laurie S. and John B. Shoven. "Cash Distributions to Shareholders," *Journal of Economic Perspectives* 3: 129-140.

Ball, Ray. 1984. "The Natural Taxation of Capital Gains and Losses When Income is Taxed," *Journal of Banking and Finance*, September: 471-481.

Barclay, M. 1987. "Dividends, Taxes, and Common Stock Prices: The Ex-Dividend Day Behavior of Common Stock Prices Before the Income Tax." *Journal of Financial Economics* 19: 31-43.

Bernheim, B. Douglas. 1991. "Tax Policy and the Dividend Puzzle," *RAND Journal of Economics* 22 (Winter): 455-476.

Bernheim, B. Douglas and Adam A. Wantz. 1995. "A Tax-Based Test of the Dividend Signaling Hypothesis," *American Economic Review* vol. 85, no. 3 (June 1995), pp. 532-51.

Black, Fischer. 1976. "The Dividend Puzzle." *Journal of Portfolio Management*, (Winter): 72-77.

Black, Fischer and Myron Scholes. 1974. "The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns." *Journal of Financial Economics* vol. 1, pp. 1-22.

Bradford, David F. 1981. "The Incidence and Allocation Effects of a Tax on Corporate Distributions." *Journal of Public Economics* vol. 15, pp. 1-22.

Chen, Nai-Fu, Bruce Grundy, and Robert F. Stambaugh. 1990. "Changing Risk, Changing Risk Premiums and the Dividend Yield Effect." *Journal of Business* 63 (January): 178-206.

Cutler, David M. 1988. "Tax Reform and the Stock Market: An Asset Price Approach."

American Economic Review 78 (December): 1107-1117.

Edwards, Tony. 1999. "REITs Modernized," National Association of Real Estate Investment Trusts mimeo, December.

Elton, Edwin J. and Martin J. Gruber. 1970. "Marginal Stockholder Tax Rates and the Clientele Effect." *Review of Economics and Statistics* vol. 52, pp. 68-74.

Fama, Eugene F. and Kenneth R. French. 1998. "Taxes, Financing Decisions, and Firm Value," *Journal of Finance* vol. 53, no. 3 (June), pp. 819-843.

Gentry, William M. and R. Glenn Hubbard. 1998. "Fundamental Tax Reform and Corporate Financial Policy." In *Tax Policy and the Economy*, vol. 12, edited by James M. Poterba, Cambridge, MA: MIT Press.

Givoly, Dan and Carla Hayn. 1991. "The Aggregate and Distributional Effects of the Tax Reform Act of 1986 on Firm Valuation." *Journal of Business* 64: 363-392.

Gordon, R. and D. Bradford. 1980. "Taxation and the Stock Market Valuation of Capital Gains and Dividends: Theory and Empirical Results." *Journal of Public Economics* 14: 109-136.

Greene, William H. 1997. *Econometric Analysis*, Prentice Hall, Inc., Upper Saddle River, NJ, Third Edition.

Harris, Trevor S., and Deen Kemsley. 1999. "Dividend Taxation in Firm Valuation: New Evidence." *Journal of Accounting Research* 37 (Autumn): 275-292.

Harris, Trevor., R.Glenn. Hubbard, and Deen Kemsley, 1999, "The Share Price Effects of Dividend Taxes and Tax Imputation Credits." NBER Working Paper W7445, forthcoming in the *Journal of Public Economics*.

Kalay, A. 1982. "The Ex-Dividend Day Behavior of Stock Prices: A Re-examination of the Clientele Effect." *Journal of Finance* 37: 1059-1070.

King, Mervyn. 1977. *Public Policy and the Corporation*. London: Chapman and Hall.

Lasfer, M. A. 1995. "Ex-Day Behavior: Tax or Short-Term Trading Effects?" *Journal of Finance* 50 (July): 875-897.

Lee, Charles M. C., Andrei Shleifer, and Richard H. Thaler. 1990. "Closed-End Mutual Funds," *Journal of Economic Perspectives* 4 (Fall): 153-64.

Litzenberger, R. and K. Ramaswamy. 1979. "The Effect of Personal Taxes and Dividends on

Capital Asset Prices: Theory and Empirical Evidence." *Journal of Financial Economics* 7 (June): 163-195.

Litzenberger, R. and K. Ramaswamy. 1982. "The Effects of Dividends on Common Stock Prices: Tax Effects or Information Effects?" *Journal of Finance* 37 (June): 429-443.

Malkiel, Burton G. 1977. "The Valuation of Closed-End Investment-Company Shares," *Journal of Finance* 32 (June): 847-859.

Miller, M. and F. Modigliani. 1961. "Dividend Policy, Growth and the Valuation of Shares." *Journal of Business* (October): 411-433.

Miller, Merton H., and Myron Scholes. 1978. "Dividends and Taxes." *Journal of Financial Economics* 6 (December): 333-364.

Miller, Merton H., and M. Scholes. 1982. "Dividends and Taxes: Some Empirical Evidence." *Journal of Political Economy* 90 (December): 1118-1141.

Modigliani, Franco, and Merton H. Miller. 1958. "The Cost of Capital, Corporation Finance and the Theory of Investment." *The American Economic Review* (June): 261-297.

Nadeau, Serge. 1988. "A Model to Measure the Effects of Taxes on the Real and Financial Decisions of the Firm." *National Tax Journal*, 41(4), pp. 467-81.

Naranjo, Andy, M. Nimalendran, and Mike Ryngaert. 1998. "Stock Returns, Dividend Yields, and Taxes." *Journal of Finance* vol. 53, no. 6 (December), pp. 2029-57.

Poterba, James M. 1987. "Tax Policy and Corporate Saving." *Brookings Papers on Economic Activity*, no. 2, pp. 455-503.

Poterba, James M., and Lawrence H. Summers. 1984. "New Evidence That Taxes Affect the Valuation of Dividends." *Journal of Finance* 39 (December): 1397-1415.

Poterba, James. M. and Lawrence H. Summers. 1985. "The Economic Effects of Dividend Taxation." In *Recent Advances in Corporate Finance*, edited by Edward I. Altman and Marti G. Subrahmanyam, Homewood Illinois: Richard D. Irwin.

Rosenberg, B., and V. Marathe. 1979. "Tests of Capital Pricing Hypotheses." *Research in Finance* 1: 115-223.

Sagalyn, Lynne. 1996. "Conflicts of Interest in the Structure of REITs," *Real Estate Finance*, 13: 34-51.

Schwimmer, Anne. 1995. “Underwriters Attract REITs to Swooning Preferred Market,” *Investment Dealers’ Digest* (May 29): 13.

Sinai, Todd and Joseph Gyourko. 1999. “The Asset Price Incidence of Capital Gains Taxes: Evidence from the Taxpayer Relief Act of 1997 and Publically-Traded Real Estate Firms,” Wharton School mimeo, October.

Sinn, Hans-Werner. 1991. “Taxation and the Cost of Capital: The ‘Old View,’ the ‘New View,’ and Another View.” In David F. Bradford, ed., *Tax Policy and the Economy*, vol. 5. Cambridge: MIT Press.

Zodrow, George R. 1991. “On the "Traditional" and "New" Views of Dividend Taxation.” *National Tax Journal*, vol 44, pp. 497-509.

Table 1: Summary of Restrictions for a Corporation to Qualify as a REIT

1) Ownership test	A REIT must have at least 100 shareholders and any 5 shareholders are prohibited from owning more than 50 percent of a given REIT
2) Income test	At least 75 percent of a REIT's income must come from real estate-related sources (including rents or gains from real property, mortgage interest, dividends or gains from owning other REITs, and mortgages) and at least 95 percent of its income must be in those sources plus non-mortgage interest and dividends and gains from non-REIT securities;
3) Asset test	At least 75 percent of a REIT's assets must be cash, government securities, and real estate related assets, including direct ownership, leaseholds, or options in land or improvements, shares in other REITs, and mortgages. At least 95 percent of its assets must be in those sources plus non-mortgage interest and dividends and gains from non-REIT securities. Also, a REIT cannot own more than 10 percent of the voting shares of a company or invest more than 5 percent of its assets in another company.
4) Distribution test	A REIT must distribute at least 95 percent of taxable income to its shareholders annually.

Table 2: Summary Statistics for REIT Sample

	Mean	Median	Standard Deviation
Market (Equity) Capitalization ($Millions)	889.0	588.0	943
Total Capitalization ($Millions)	1800.0	1126.0	2172.0
MVE/NAV	1.11	1.09	0.22
BVA/NAV	1.43	1.41	0.55
BVCE/NAV	0.60	0.60	0.22
D/NAV	0.83	0.75	0.51
BVPE/NAV	0.06	0	0.11
UPREIT (Yes=1)	0.65	1	0.48
Small firm (dummy if market cap < $400m)	0.33	0	0.47
Proportion of Total Assets in Net Properties	0.85	0.89	0.12
Dividend Yield (%)	6.6	6.5	2.6
FFO/NAV	0.10	0.097	0.031

All variables have 305 observations except for the Flow of Funds from Operations (FFO), which has 260 observations. MVE is the market value of common equity, NAV is the net (of liabilities) market value of assets, BVA is the book value of real estate properties, which proxies for tax basis in inside assets, BVCE is the book value of common equity, D is the book value of debt, which is assumed to equal the market value of debt, and BVPE is the book value of preferred equity.

Table 3: Regressions Measuring Tax Basis with Property Value

Dependent Variable: MVE/NAV

Variable	(1) Primary Regression	(2) Median Regression	(3) Properties > 80% Assets	(4) Firm Fixed Effects	(5) First Differences	(6) Control for FFO
BVA/NAV	0.20	0.12	0.24	0.29	0.22	0.24
	(0.07)	(0.03)	(0.12)	(0.12)	(0.09)	(0.09)
D/NAV	-0.17	-0.15	-0.22	-0.22	-0.09	-0.24
	(0.06)	(0.03)	(0.09)	(0.13)	(0.10)	(0.09)
BVPE/NAV	0.07	0.17	-0.10	0.12	0.075	-0.08
	(0.12)	(0.08)	(0.15)	(0.20)	(0.179)	(0.16)
Small Firm Dummy	-0.17	-0.15	-0.15	-0.085	-0.079	-0.22
	(0.03)	(0.019)	(0.03)	(0.047)	(0.027)	(0.04)
UPREIT Dummy	-0.050	-0.020	-0.048	-0.033	-0.026	-0.085
(Yes = 1)	(0.035)	(0.019)	(0.036)	(0.061)	(0.035)	(0.039)
FFO_t /NAV						0.40
						(0.78)
FFO_{t+1}/NAV						1.76
						(0.85)
# of Observations	305	305	238	305	227	189
R-squared	0.39	-	0.44	0.71	0.55	0.40
F-test p-value: α_1=-α_2	0.55	0.10	0.61	0.13	0.005	0.91

All regressions include year fixed effects and a constant. The dependent variable is the ratio of the market value of equity to the estimated asset value of the REIT net of any liabilities. Standard errors are corrected for within-firm clustering. All variables in column 6 represent first differences. MVE is the market value of common equity, NAV is the net (of liabilities) market value of assets, BVA is the book value of real estate properties, which proxies for tax basis in inside assets, D is the book value of debt, which is assumed to equal the market value of debt, and BVPE is the book value of preferred equity.

Table 4: Regressions Measuring Tax Basis with Property Value Levels Equations

Dependent Variable: MVE		
Variable	(1) Base Equation	(2) Firm Fixed Effects
NAV	0.76 (0.10)	0.80 (0.20)
BVA	0.26 (0.06)	0.24 (0.10)
D	-0.27 (0.09)	-0.35 (0.17)
BVPE	0.43 (0.23)	0.16 (0.31)
Small Firm Dummy ($ millions)	-122 (32)	4.8 (41.7)
UPREIT Dummy ($ millions)	-65 (35)	-9.2 (59.9)
# of Observations	305	305
R-squared	0.95	0.98
F-test p-value: Book value = -Debt	0.87	0.37

All regressions include year fixed effects and a constant. Standard errors are corrected for within-firm clustering. MVE is the market value of common equity, NAV is the net (of liabilities) market value of assets, BVA is the book value of real estate properties, which proxies for tax basis in inside assets, D is the book value of debt, which is assumed to equal the market value of debt, and BVPE is the book value of preferred equity.

Table 5: Regressions Measuring Tax Basis with Book Value of Common Equity

Dependent Variable: Market Value of Equity to Net Asset Value of Properties			
	(1) Base Equation	(2) Median Regression	(3) Firm Fixed Effects
BVCE/NAV	0.23 (0.10)	0.12 (0.04)	0.59 (0.18)
D/NAV	0.024 (0.043)	-0.026 (0.021)	0.064 (0.043)
BVPE/ NAV	0.22 (0.12)	0.21 (0.08)	0.29 (0.20)
Small Firm Dummy	-0.16 (0.03)	-0.13 (0.02)	-0.067 (0.047)
UPREIT Dummy	-0.022 (0.037)	0.005 (0.021)	-0.038 (0.061)
# of observations	305	305	305
R-squared	0.39		0.74

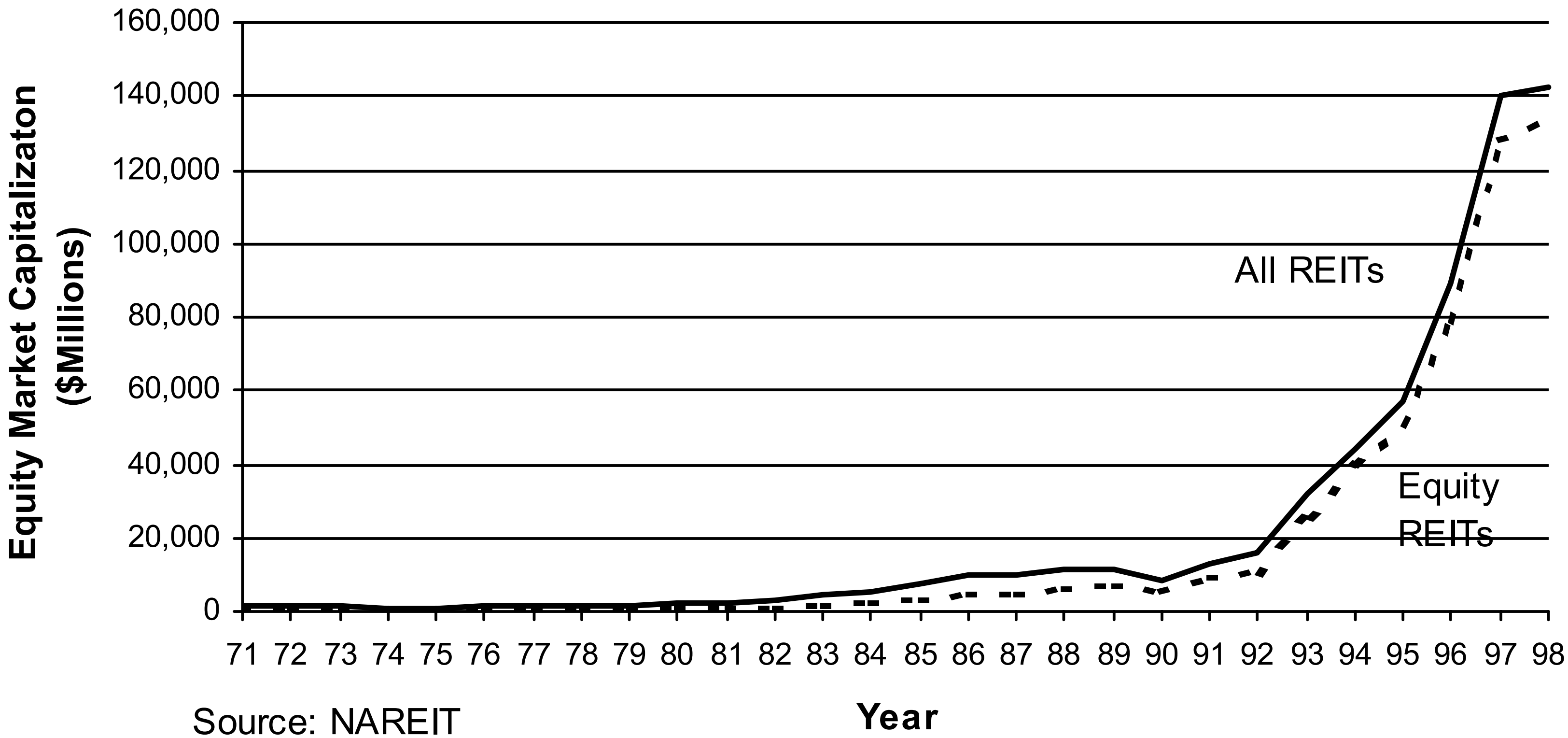
All regressions include year fixed effects and a constant. Standard errors are corrected for within-firm clustering. MVE is the market value of common equity, NAV is the net (of liabilities) market value of assets, BVCE is the book value of common equity,which proxies for tax basis, D is the book value of debt, which is assumed to equal the market value of debt, and BVPE is the book value of preferred equity.

Table 6: Regressions of Leading FFO on Book Value of Common Equity and NAV

Dependent Variable: Future FFO per share (dollars)		
Variable	(1) Next year's FFO per share	(2) Sum of FFO per share for next 3 years
NAV	0.095 (0.017)	0.28 (0.06)
BVCE	0.0073 (0.0201)	0.048 (0.074)
# of Observations	217	101
R-squared	0.37	0.38

The dependent variable is the future funds from operations in either the next year or next 3 years. All FFO numbers are discounted at 7% per year. The results are unchanged if we use a higher discount rate of 10 percent or a lower discount rate of 3 percent. Standard errors are corrected for within-firm clustering. FFO proxies for firm earnings, NAV is the net (of liabilities) market value of assets, BVCE is the book value of common equity, which is the tax basis in inside assets.

Figure 1
REIT Market Capitalization, 1971-1998 ($Millions)



Source: NAREIT