Deferred tax assets and liabilities: tax benefits, obligations and corporate debt policy

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ABSTRACT

Prior studies have indicated that book-tax reporting differences influence corporate debt policy. However, observation of the sources of book-tax differences is often difficult due to lack of disclosure or may require hand collection. To capture temporary book-tax differences, this paper proposes to harness the information in net deferred tax assets/liabilities (NDTA/L) reported on the balance sheet and available in Compustat. The NDTA/L directly measures future expected changes in tax payments that will likely affect the firm's future marginal tax rate. This study considers how the NDTA/L, as a composite measure of temporary non-debt tax benefits/obligations, influences debt policy when firms make financing decisions. A NDTA/L is present in 37% of the observations in a sample of U.S. public corporations from 1994-2008. Consistent with the substitution hypothesis, the results indicate that firms with NDTA are significantly less likely to issue debt at a refinancing point and have lower leverage ratios following a refinancing. Similarly, firms with NDTL are more likely to issue debt and tend to have higher leverage after a refinancing. The NDTA/L helps alleviate the problem of identifying individual non-debt tax shields because it bundles the probable net tax effects of temporary book-tax differences.

Keywords: capital structure, debt, leverage, deferred tax asset, tax shield

INTRODUCTION

There is growing evidence that book-tax earnings differences influence corporate capital structure. Much of this research is motivated by DeAngelo and Masulis (1980), who have suggested that corporations use non-debt tax shields to substitute for the tax benefits of debt (e.g., MacKie-Mason, 1990; Graham, Lang, & Shackelford, 2004; Kahle & Shastri, 2005; Graham & Tucker, 2006; Wilson, 2009; Lisowski, 2010; Shivdasani & Stefanescu, 2010).

Book-tax earnings differences (BTDs) arise from several sources and may be either temporary or permanent. Normal BTDs may occur because of differing U.S. GAAP and tax treatments of revenues and expenses. BTDs may also result from deliberate attempts to defer or avoid taxes that range from full legal compliance to "pushing the envelope of tax law" (Hanlon & Heitzman, 2010, p. 137). A number of studies suggest that BTDs are strategically managed to either avoid/defer taxes through sheltering (e.g., Wilson, 2009), avoid/defer tax payment through tax planning (e.g., Ayers, Jiang, & Laplante, 2009), or manage earnings (e.g., Phillips, Pincus, & Rego, 2003).

Observability of the components of BTDs is a major obstacle to understanding how non-debt tax shields (NTDS) influence leverage. First, U.S. corporate tax return information is private. Second, U.S. public corporations are not required to fully disclose the sources of BTDs. For temporary BTDs, SFAS 109 requires disclosure of only the major items used to determine the periodic deferred tax expense, and the items disclosed are often "choice" variables (Hanlon & Heitzman, 2010). Lack of transparency regarding temporary BTDs has resulted in focus on individual (e.g., tax loss carryforwards in MacKie-Mason, 1990) or aggregate (e.g., book-tax spreads in Schallheim & Wells, 2006) measures of NDTS. Studies based on unconventional samples have shown that off-balance sheet NDTS have a significant impact on leverage decisions. Graham and Tucker (2006), Frank, Lynch, and Rego (2009), Wilson (2009), and Lisowsky (2010) have presented evidence that firms with tax shelters use less debt compared to control firms. Graham, et al. (2004), Kahle and Shastri (2005), and Shivdasani and Stefanescu (2010) have suggested that book-tax differences arising from employee compensation serve as NDTS. Graham and Leary (2011) have argued that missing NDTS variables potentially bias the understanding of the cross-sectional variation in leverage.

This paper addresses the concerns of observability and potential omitted variable bias in studies of capital structure by examining how net deferred tax assets and liabilities (NDTA/L) influence debt issuance decisions and leverage of U.S. public corporations. The NDTA/L is a summary measure of the total estimated future tax benefit/obligation attributable to temporary differences and carryforwards after elimination of future benefits not likely to be realized (FASB 109). Prior studies provide rich detail on how individual tax shields influence leverage decisions (e.g., MacKie-Mason, 1990; Graham, et al., 2004; Kahle & Shastri, 2005; Shivdasani & Stefanescu, 2010). MacKie-Mason (1990) has argued that tax shields only matter through their effect on the firm's marginal tax rate. The NDTA/L directly measures future expected changes in tax payments that will likely affect the firm's future marginal tax rate. Similar to prior studies (Hanlon, 2005; Blaylock, Shevlin, & Wilson, 2010), this study focuses only on temporary BTDs because of the difficulty in observing permanent BTDs.

The empirical tests in this paper are in the context of the dynamic trade-off theory in which capital market frictions lead to relatively infrequent rebalancing of capital structure (Fischer, Heinkel, & Zechner, 1989; Leary & Roberts, 2005; Strebulaev, 2007). Consistent with the dynamic trade-off theory, the sample in this paper is limited to firms at a "refinancing" point,

or when firms issue (retire) debt or issue (repurchase) equity. Around 37% of sample firm years have a NDTA/L. Conditional on being at a refinancing point, firms are predicted to issue less (more) debt when a NDTA (NDTL) is available. The influence of the NDTA/L on the cross-sectional variation in leverage is also examined, again conditional on firms being at a refinancing point. Firms are predicted to have relatively less (more) leverage when a NDTA (NDTL) is available. The empirical tests strongly support both predictions and are robust to alternative measurements of security issues, leverage, and estimation techniques.

This paper contributes to the capital structure literature by demonstrating that temporary BTDs in the form of NDTA/L influence debt issuance and leverage decisions. Recent studies suggest that off-balance sheet NDTS are relatively important to understanding the cross-sectional variation in leverage (e.g., Graham & Tucker, 2006; Shivdasani & Stefanescu, 2010) yet are difficult to capture using standard research data. The NDTA/L contains the complete set of realized deferred tax items from temporary and carryforward sources. This variable arises from differing treatments for tax and financial reporting and is a running total of future tax reductions (obligations) that have occurred up through the date of the balance sheet. The NDTA/L is on-balance sheet and is readily available to researchers in Compustat. Further, the NDTA (NDTL) reflects the monetary value of probable future tax reductions (obligations) that potentially influence the future marginal tax rate. The NDTA/L captures only temporary BTDs; however, the measure is a step forward in explaining corporate leverage when information on sources of BTDs is difficult to obtain. The findings in this study support the notion that non-debt tax shields substitute for the tax benefits of debt (DeAngelo & Masulis, 1980). By limiting the sample to firms at a refinancing point, the results in this study support the predicted positive relationship between profitability and leverage in the dynamic trade-off theory (Strebulaev, 2007). Similar to Harford, Klasa, and Walcott (2009), this paper provides additional evidence related to the existence of leverage targets. The results in this paper suggest that when at a refinancing point, firms with leverage exceeding historical averages are less likely to issue debt, and vice versa.

The paper proceeds as follows. In section two the NDTA and NDTL are described and related to prior studies that examine the influence of non-debt tax shields on debt policy. The empirical hypotheses are developed in section three. The research method is explained in section four. The data and sample are described in section five. The empirical results are discussed in section six along with robustness tests, and section seven concludes. Empirical results are tabulated in the Appendix.

COMPONENTS OF DEFERRED TAXES AND RELATION TO PRIOR STUDIES

A deferred tax asset (DTA) is the estimated future tax savings related to book income and represents temporary differences in the timing of cash flows. A DTA is created when an expense is deductible for determining book income in the current period but is not deductible for tax purposes until some future period, when income is includible in current taxable income but not in book income until a future period, or when carryforwards exist. Items in the DTA include compensation related expenses (e.g., health insurance coverage for retirees, stock options and deferred compensation), other accrued expenses (e.g., warranty expenses), asset impairments

(e.g., intangible assets,[1] inventory write-offs), and net operating loss and tax credit carryforwards, among others.

A deferred tax liability (DTL) is the estimated future tax increase related to book income. A DTL is created when an expense is deductible for tax purposes in the current period but is not deductible for book income until some future period, or when revenue is includible for book purposes but not for taxable income until a future period. Common DTL components include book-tax depreciation differences (accelerated for tax purposes), installment sales, and undistributed or reinvested foreign earnings.

Most firms report only the net DTA or DTL on the balance sheet. If the DTA minus the DTL is positive (negative), the firm reports a NDTA (NDTL). The components of NDTA/L may vary widely across firms and are subject to managerial discretion (Hanlon & Heitzman, 2010). SFAS 109 requires annual calculation of the DTA (including its valuation allowance) and DTL to keep the balance sheet current. The valuation allowance must be created if "it is more likely than not that some portion or all of the deferred tax assets will not be realized" (FASB 109). Poterba, Rao, and Seidman (2007) have indicated that within-firm reporting of the DTA/L is fairly consistent over time. Further, Poterba, et al. have suggested that the estimated total tax offset from any tax loss carryforwards is a relatively minor amount of the total DTA on average.

Prior studies have examined various components of the DTA/L in the context of capital structure choice. Individual components of the DTA that have been studied include operating loss and tax credit carryforwards (e.g., MacKie-Mason, 1990; Graham, 1996; & others). Post-employment retirement benefits (Shivdasani & Stefanescu, 2010) may influence the DTA or DTL, depending on under- or overfunding, respectively. A common element of the DTL is the spread between book and tax depreciation expense.[2] Book depreciation as a non-debt tax shield has been examined extensively in the literature (e.g., Bradley, Jarrell, & Kim, 1984). The leverage implications of accelerated depreciation have not been examined extensively due to data limitations. The DTL also captures future tax obligations related to foreign-based income.

This study examines the effects of non-debt tax shields on corporate structure using the NDTA and NDTL found on the firm's balance sheet. NDTA/L has the advantage of providing the net expected impact on future tax payments from all temporary differences and carryforwards. Management discretion is included through the valuation allowance. The NDTA (NDTL) indicates that the future marginal tax rate is likely to decrease (increase), possibly reducing (increasing) the tax benefits of debt. While NDTA/L provides a summary measure of temporary and carryforward sources that create BTDs, it is a "black box" variable. U.S. GAAP does not require firms to fully disclose the sources of DTA/L.

EMPIRICAL HYPOTHESES

The trade-off theory and the pecking order model dominate the finance literature as explanations of corporate capital structure. Each theory predicts debt issues under certain conditions, and is capable of explaining why some firms may have relatively low leverage. In

[1] According to Smith, Raabe, and Maloney (2011, Ch. 3, p. 6), goodwill and some other intangibles are not amortizable for financial reporting. However, GAAP requires an annual determination of whether the intangible has suffered a reduction in value (i.e., impairment). If an impairment exists, the intangible asset is written down to its fair value. For tax reporting post-1993, intangible assets are amortized over 15 years.

[2] Tax accounting requires the use of the modified accelerated cost recovery system (MACRS) including accelerated depreciation methods that usually result in higher tax depreciation than book depreciation leading to a DTL. In rare circumstances, book depreciation may be initially higher than tax depreciation leading to a DTA.

the trade-off theory, a firm chooses its optimal capital structure by balancing the tax benefits of additional debt with the increased risk of financial distress and bankruptcy. The pecking order model suggests that firms requiring external financing will issue debt when there is sufficient debt capacity and relatively low information asymmetry related to firm value (Myers & Majluf, 1984).

The influence of taxes on leverage enters directly into the trade-off theory, in which debt offers a potential reduction to the firm's marginal tax rate through the deductibility of interest expense. Since debt provides a desirable offset to taxable income, firms with higher marginal tax rates are more likely to issue debt, everything else held constant. When a firm has a NDTS, the model in DeAngelo and Masulis (1980) predicts less debt issues and lower leverage, a proposition known as the substitution hypothesis.

MacKie-Mason (1990) has argued that a tax shield should matter only through its effect on the firm's marginal tax rate. The NDTA/L summarizes the probable future tax offsets/obligations that potentially influence future marginal tax rates. If the arguments of DeAngelo and Masulis (1980) hold for NDTS that reduce taxable income, then these same arguments are expected to hold for NDTA since this is a reduction in the future tax obligation. Similarly, if firms are interested in managing their marginal tax rate, then the anticipated tax obligation represented by a NDTL is expected to positively influence the attractiveness of interest as a tax shield.

The dynamic trade-off theory (Fischer, et al., 1989; Leary & Roberts, 2005; Strebulaev, 2007) suggests that firms identify an optimal capital structure, but allow leverage to deviate from this optimum due to financing frictions. Adjustments to capital structure are infrequent, where firms rebalance capital structure only if the expected benefits exceed the adjustment costs. Consistent with the dynamic trade-off theory, NDTA/L is expected to influence debt issues and leverage only when a firm reaches a cost effective refinancing point. A refinancing point is approximated by conditioning the analysis on observed seasoned debt and equity issues. Stated in alternative form, the first hypothesis is:

H_1: Conditional on reaching a refinancing point, firms with NDTA (NDTL) are less (more) likely to issue debt, ceteris paribus.

Similar to debt issues, the NDTA/L is expected to influence the cross-section of leverage following a refinancing. A refinancing could occur at any time during year t, and leverage is observed at the end of year t. If a beginning-period NDTA (NDTL) influences future marginal tax rates, then firms with NDTA (NDTL) are expected to have less (more) demand for interest tax shields, and therefore are expected to have lower (higher) leverage following a refinancing in year t. Stated in alternative form, the second hypothesis is:

H_2: Firms with NDTA (NDTL) will have lower (higher) leverage following a refinancing that occurs in the same period, ceteris paribus.

RESEARCH METHOD

Tests of the two hypotheses concern the influence of NDTA/L on debt issuance when firms discontinuously rebalance capital structure. A refinancing point occurs in period t when the firm has a net debt issue (retirement) or net equity issue (repurchase). Following prior studies (Hovakimian, Opler, & Titman, 2001; Leary & Roberts, 2005; Ovtchinnikov, 2010), net debt issues (retirements) occur when the period t net change in long-term debt from t-1 to t divided by t-1 assets exceeds 5% (falls below -5%). A period t net equity issue (repurchase)

occurs when the net change in common equity from t-1 to t exceeds 5% (falls below -1.25%) of the book value of assets. Long-term debt is the sum of long-term debt and debt in current liabilities. This definition captures both public and private net issues, but not off-balance sheet financing (Hanlon & Heitzman, 2010). Net long-term net debt issues reported on the statement of cash flows are considered for robustness. Debt issues may differ between the balance sheet and statement of cash flows because non-cash investing/financing activities are not included on the statement of cash flows (e.g., the exchange of a note for a building). Non-cash activities are summarized in a supporting schedule or in a footnote to the statement of cash flows.

Similar to prior studies (e.g., MacKie-Mason, 1990; Kahle & Shastri, 2005), the likelihood of issuing debt is estimated for the first hypothesis as a way to describe changes in debt. Estimating the likelihood of debt issues instead of the change in debt levels also avoids any potential influence of scale factors for the independent variables.

To test the second hypothesis, period t leverage is defined in four alternative ways: long-term book leverage (long-term debt/total assets), long-term market leverage (long-term debt/market value of assets), total book leverage (total liabilities/total assets), and total market leverage (total liabilities/market value of assets). The market value of assets is the sum of total liabilities and the market value of equity. The experimental variables NDTA and NDTL (discussed next) are included as categorical variables to remove any potential influence of the scale factor on the dependent variable.

Net deferred tax variables

The net deferred tax asset (liability) is the positive (negative) difference between the deferred tax asset (adjusted for the valuation allowance) minus the deferred tax liability in a given year. The net value is provided in Compustat [mnemonic TXNDB, Tax Asset (Liability), Total Net Deferred, item number n.a.]. The signs of the raw NDTA/L data are retained because the numbers result from an equation, similar to the calculation of net income. Prior-year levels of the deferred tax variables are initially scaled by total assets to test the hypotheses. To eliminate any influence of the scale factor on leverage, NDTA and NDTL are alternatively defined as categorical (NDTA=1 if TXNDB>0, NDTL=-1 if TXNDB<0, 0 otherwise). The two definitions of the NDTA/L are appropriate for testing the two hypotheses. According to the trade-off theory, the demand for additional interest tax shields is based on the marginal tax rate (MTR). The NDTA/L is a summary of items which may affect the future MTR and thus the value of interest tax shields. The NDTA and NDTL are expected to affect capital structure decisions in the ways described in the hypotheses.

Control variables

Financial distress risk

Firms balance the tax benefits of leverage with the costs associated with financial distress in the trade-off theory. Altman (2000) has suggested that the original Z-score below a 1.81 threshold reasonably indicates financial distress. The Z-score is calculated as [(1.2*working capital+1.4*retained earnings+3.3*earnings before interest and taxes+1.0*sales)/total assets]+[0.6*market value of equity/book value of total liabilities]. Lower expected bankruptcy costs may induce firms to increase leverage (Rajan and Zingales, 1995). A higher Z-score is

expected to positively influence the likelihood of issuing debt (H_1). Similarly, firms with higher Z-scores are expected to have higher leverage following a refinancing (H_2).

Financial distress risk may also be reflected in the spread between Baa- and Aaa-rated bonds. As in other studies on debt issues (e.g., Gomes & Phillips, 2007), the Baa-Aaa yield spread is used to approximate credit market conditions. Since the data are annual and the lowest-frequency of reporting for corporate bond yields is a monthly average of daily yields (on a bond-equivalent basis), the difference in yields on Baa- and Aaa-rated debt is calculated for each month, and then the nominal spread is averaged over each calendar year. To the extent that the Baa-Aaa yield spread approximates credit market conditions for all issuers, a larger credit spread is expected to reduce the likelihood of debt issues (H_1) and be inversely related to the leverage ratio (H_2).

Profitability

In the trade-off theory, more profitable firms are less likely to face financial distress and bankruptcy. Profitability is a robust explanatory variable for the cross-sectional variation in leverage (Frank & Goyal, 2009). Operating ROA (defined as t-1 earnings before interest, taxes, depreciation and amortization scaled by t-1 total assets) is included in the tests of both hypotheses. Profitability is regularly observed as inversely related to debt issues (e.g., Kahle & Shastri, 2005; Lemmon, Roberts, & Zender, 2008). An inverse relationship between profitability and debt issues is predicted in the dynamic trade-off theory if the firm is not at a refinancing point (Strebulaev, 2007), and is also consistent with the pecking order model (Myers & Majluf, 1984) where more profitable firms generate greater financial slack and therefore have a reduced demand for external funds. The dynamic trade-off theory predicts a positive relationship between debt issues and profitability only at refinancing points, where more profitable firms have greater demand for interest tax shields to manage the marginal tax rate (Strebulaev, 2007). Consistent with the dynamic trade-off theory, profitability is expected to positively influence the likelihood of debt issues (H_1). Regarding the cross-sectional variation in leverage (H_2), more profitable firms are expected to have higher leverage following a refinancing to benefit from interest tax shields (Strebulaev, 2007).

Size and growth opportunities

Firm size approximates the degree of capital market frictions, where larger firms face proportionately lower transactions costs (Fischer, et al., 1989). Firm size is approximated by the natural log of prior-year total assets and is expected to positively influence debt issues (H_1) and leverage ratios (H_2).

Growth opportunities theoretically influence the likelihood of issuing debt. Firms with higher growth opportunities may encounter costly contracting or loan renegotiation, leading to the underinvestment problem in Myers (1977). Thus, issuing debt is relatively more costly for high-growth firms. Growth opportunities are approximated with prior-year market-to-book assets, calculated as t-1market value of assets (total liabilities+market value of equity) divided by t-1 total assets. Baker and Wurgler (2002) have suggested that market-to-book ratios are associated with the debt-equity choice in the sense that firms time equity issues when valuations are relatively high. Therefore, leverage and debt issues may be more associated with market timing than with growth opportunities. To the extent that the market-to-book ratio approximates

growth opportunities, debt issues are expected to vary inversely with the market-to-book ratio (H_1). After refinancing, leverage ratios are expected to vary inversely with market-to-book ratio (H_2).

Growth opportunities are additionally approximated as the prior-year ratio of R&D expense to sales. Consistent with Myers (1977), firms with higher growth prospects are less likely to issue debt and are expected to have lower leverage levels after a refinancing. R&D expense is also a NDTS and is regularly observed to negatively influence debt issues and leverage levels (e.g., Bradley, et al., 1984). Consistent with either interpretation, R&D expense is expected to vary inversely with debt issues at a refinancing point (H_1) and leverage following a refinancing (H_2). Because R&D expense is often not reported, the regression function includes an indicator variable equal to one for firm years with missing observations. This approach follows Kayhan and Titman (2007). The R&D dummy in Kayhan and Titman is significantly positively related to leverage, consistent with firms that do not have R&D expense. However, R&D expense is sometimes combined with other financial statement items, potentially resulting in an inverse relationship between the R&D dummy and leverage. Therefore, no prediction is made for the R&D dummy variable.

Debt capacity

Several studies have found prior-period leverage to be an important state variable for debt issues and leverage. Lemmon, et al. (2008) have suggested that firms orient their financial policies toward maintaining leverage ratios that are close to their long-run means. Harford, et al. (2009) have found that overleveraged firms are relatively more likely to reduce leverage following an acquisition. The sample in this study considers seasoned offerings for any reason. Deviation from a leverage target may influence the debt v. equity decision via debt capacity constraints as well as managerial preference for leverage. Following Lemmon, et al., a firm's target leverage is defined as its historical average market leverage ratio. Market leverage is (long-term debt+debt in current liabilities)/(market value of assets). The long-run mean market leverage ratio is estimated for each firm from all available observations from 1950 through 2008 (prior to any reductions of the sample for other missing data items). Similar to Harford, et al., deviation from target leverage is beginning-period t market leverage minus the long-run mean market leverage. The likelihood of debt issues is expected to vary inversely with a firm's deviation from its leverage target (H_1). For the cross-section of leverage, firms with above-target leverage are expected to have higher leverage ratios and vice versa (H_2).

Related to debt capacity is the availability of collateral for loans in the form of tangible assets. Firms with a higher proportion of tangible assets may have greater debt capacity (Kayhan & Titman, 2007; Harford, et al., 2009). In prior studies, asset tangibility is a robust positive influence on the likelihood of debt issues (e.g., Graham & Tucker, 2006; Lemmon et al., 2008) and leverage levels (e.g., Frank & Goyal, 2009). Asset tangibility is measured as t-1 net property, plant, and equipment divided by t-1 total assets. Asset tangibility is expected to positively influence the likelihood of debt issues (H_1) and leverage levels (H_2).

Marginal tax rate

The trade-off theory indicates that the firm's marginal tax rate (MTR) drives the demand for interest tax shields. Because U.S. corporate tax return information is not publicly available,

the MTR can only be approximated. Graham (1996b) demonstrates that his simulated MTR is a superior approximation of a firm's marginal tax rate. The simulated MTR is described in Graham (1996a,b).[3] Graham's after-financing simulated MTR lagged one period is used to capture any influence of the prior-period MTR on debt issues at a refinancing point.[4] The trade-off theory predicts a positive relationship between a firm's MTR and the demand for debt. If firms utilize leverage to lower taxes, then a higher prior-period MTR is expected to increase the likelihood of issuing debt at a refinancing point (H_1). Similarly, a higher prior-period MTR is expected to be positively associated with leverage following a refinancing (H_2).

Regression functions

To test the first hypothesis, coefficients are estimated with a panel logistic regression. The dependent variable is equal to one if the year-over-year difference in debt is positive and exceeds 5% of prior-period total assets, zero otherwise. The regression function for the first hypothesis is:

$$\text{Prob(Debt Issue}_{it}=1)=\alpha+\gamma_1 NDTA_{it-1}+\gamma_2 NDTL_{it-1}+\beta_i X_{it-1}+\eta_i+\upsilon_t+e_{it} \quad (1)$$

NDTA(L) is the net deferred tax asset (liability) observed at the end of t-1, X_{it-1} is a set of t-1 control variables described above, η_i is a firm fixed effect, ν_t is a year fixed effect, and e_{it} is a random error term. Lemmon, et al. (2008) have suggested that leverage is relatively stable over time and related to an unobserved firm fixed effect. The regression function includes a firm fixed effect to reduce any omitted variable bias in the parameter estimates (GVKEY in the estimation procedure) and a time fixed effect (calendar year) to reflect cyclical influences not already represented by the other independent variables.

The influence of NDTA/L on leverage is estimated using ordinary least squares with standard errors corrected for heteroskedasticity. The regression function for the second hypothesis is:

$$Leverage_{it}=\alpha+\gamma_1 NDTA_{it-1}+\gamma_2 NDTL_{it-1}+\beta_i X_{it-1}+\upsilon_t+e_{it} \quad (2)$$

Equation (2) includes a time trend (calendar year) to approximate time fixed effects (ν_t). A firm fixed effect is approximated by including in the set of control variables (X) the year t-1 deviation from average market leverage for each firm (described above), a variation of the approach in Lemmon, et al. (2008).

[3] The deferred tax expense, which equals the change in the deferred tax liability, is considered in the simulated marginal tax rate (MTR) described in Shevlin (1990) and augmented in Graham (1996).

[4] Tests are also conducted with the year t before-financing simulated MTR (not tabulated). Because of the large number of missing observations for the before-financing simulated MTR, this variable is divided into reported values and a categorical variable for those firm years with missing values. The results using the lagged after-financing versus year t before-financing MTRs are very similar.

DATA SELECTION AND SAMPLE DESCRIPTION

Data Selection

Annual accounting data are from Compustat, interest rate data are from the Federal Reserve Bank of St. Louis FRED database, and simulated marginal tax rates are courtesy of John Graham. Because firms are first required to report deferred tax assets and liabilities according to SFAS 109 in 1993, the sample begins in 1993 and ends in 2008. The sample contains publicly traded, U.S.-incorporated, non-financial and non-utility firms. Financial firms (SIC codes 6000-6999) are excluded because their leverage differs substantially from non-financial firms, and regulation of utility firms (SIC codes 4900-4999) restricts profitability.[5] For any given year, a firm is included in the sample if the following data items are available: positive net sales (mnemonic SALE/item 12), operating income before depreciation (OIBDP/13), pretax income (PI/170), total assets (AT/6), property, plant and equipment (PPENT/8), total liabilities (LT/38), long-term debt (DLTT/9), debt in current liabilities (DCL/34), working capital (WCAP/179), positive common equity (CEQ/60), total equity (SEQ/216), retained earnings (RE/36), common shares outstanding at fiscal year-end (CSHO/25), and a closing common stock price at fiscal year-end (PRCC_F/24). Firms with missing t-1 after-financing marginal tax rates are excluded for that year. Unreported (missing) intangible assets (INTAN/33) are recorded as zero.[6] Because many firms do not report R&D expense (XRD/46), a categorical variable is created for missing R&D expense. Firms with lagged intangible assets that exceed 100% of lagged total assets are excluded for that year.

Sample description

The sample contains 5,909 firms with some type of financing activity as defined above—net debt issues (retirements) or net equity issues (repurchases)—at least once from 1994 through 2008, with a total of 21,284 firm years. Sample averages are displayed in Table 1 (Appendix). The average market cap is $2.5 billion. Over the sample period, debt issues occur in 42.7% of firm years with an average debt issue of around 24% of prior-year assets. The typical firm supports its assets with 47.7% liabilities, and market leverage is 16% on average. The average firm is slightly underleveraged as suggested by the deviation from the leverage target. The typical firm is profitable with an operating ROA of 2.6%, and average market-to-book assets is 2.3. Around 19.5% of sample firm years are distressed as indicated by a Z-score<1.81. The average prior-year MTR is relatively low at 18.5%. Around 37% of sample firms have a prior-year NDTA or NDTL (19% and 18%, respectively). The average NDTA/L is 0.8% of assets for all firm years. For years in which firms have a NDTA (NDTL), the average is 4% (4.4%) of assets (untabulated, available from the authors).

[5] The results are generally insensitive to including firms with SIC codes of 4900-4999.

[6] Some firms do not report these items, either due to lack of materiality or because these items are combined with other figures. Coding missing data items as zero or excluding these firms from the sample does not affect the results.

RESULTS

Analysis of prior-period deferred tax variables on debt issues

Table 2 (Appendix) presents the estimation results from regressing total long term debt issues (from the balance sheet) on NTDA/L and other explanatory variables. Debt issues are regressed on NDTA/L specified as levels (scaled by assets) and as categorical (to remove any influence of the scale factor on debt issues). For both NDTA/L variable definitions, the results suggest that the beginning-period NDTA is a statistically and economically significant substitute for long-term debt with coefficient estimates of -2.82 for the assets-scaled variable definition, and -0.14 for the categorical variable definition (p-values of <0.0001 and 0.0029, respectively). NDTL is also statistically and economically significant with the predicted sign. The coefficient estimates are 2.24 and 0.10 for the assets-scaled and categorical variable definitions, respectively (p-values of 0.0008 and 0.0517). Estimates of the likelihood of net long-term debt issues based on the statement of cash flows definition of net debt issues (retirements) are as follows (not tabulated, available from the authors): NDTA scaled by assets has a coefficient estimate of -2.77 (p-value=0.0003), and the categorical NDTA estimate is -0.13 (p-value=0.0087). The assets-scaled NDTL coefficient estimate is 2.99 (p-value<0.0001) and the categorical NDTL estimate is 0.13 (p-value=0.0129).

Many of the control variables in Table 2 are significant to the likelihood of debt issues with the predicted signs, but some are not. As predicted, operating ROA is a weak positive influence on debt issues (estimates=0.17, p-values=0.02), market-to-book ratios are inversely related to debt issues (estimates=-0.03, p-values=0.002), and asset tangibility is significantly positively related to debt issues (estimates=1.1, p-values<0.0001). R&D expense has an interesting result. Reported R&D expense is insignificant, but the missing R&D expense dummy is positive and significant (estimates=0.2, p-values<0.0001). The Z-score is weakly significant and negatively related to the likelihood of debt issues (estimates=-0.01, p-values=0.02). The credit spread is significantly inversely related to debt issues (estimates=-0.79, p-values<0.0001), and the deviation from target leverage is highly significant to debt issues (estimates=-5.5, p-values<0.0001). Surprisingly, the MTR is significant but inversely related to debt issues (estimates=-0.3, p-values=0.004). Firm size is not significant to the likelihood of debt issues. The regressions have a relatively large number of statistically significant variables. However, these variables explain only 10% of the variation in the likelihood of issuing debt.

For robustness, the cutoffs for debt and equity issues are changed to 3% and 7% (-3% and -7% for retirements, -0.5% and -3% for repurchases). The results for NDTA/L are not sensitive to these alternative cutoffs. To avoid understating standard errors, Petersen (2009) recommends estimating coefficients without clustering, with clusters by year and firm, year clustering only, and firm clustering only. The results for NDTA are robust and in some cases strengthened with year or firm clustering only. The standard errors for NDTL are generally slightly higher, but the estimates remain statistically significant. To split the difference between the lowered NDTA and increased NDTL standard errors obtained by omitting one or all fixed effects, Table 2 results are presented with standard errors adjusted for year and firm clustering.

The cross-sectional variation in leverage

Employing the same set of firm years as in the previous test, each of the four alternative definitions of period t leverage is regressed on the set of independent variables defined for the above analysis. OLS regression results with a time fixed effect (calendar year) and robust standard errors are reported in Table 3 (Appendix).

The NDTA is strongly significant to the cross-sectional variation in both long-term book and long-term market leverage (t-statistics of -7.06 and -12.93), insignificant to total book leverage, but strongly significant to total market leverage (t-statistic=-11.53). The NDTL is not significant to long-term book or total book leverage (t-statistics of -0.92 and -1.39), but is significant to long-term market and total market leverage (t-statistics of 6.07 and 8.73).

Regarding the control variables, operating ROA is weakly significant and positively related to long-term book and long-term market leverage (t-statistics of 1.93 and 3.59), inversely related to total book leverage (t-statistic=-2.76), but not significant to total market leverage. The results for long-term book and long-term market leverage weakly support the dynamic trade-off theory given that the sample firms are at a refinancing point. The standard leverage regression variables of size, market-to-book, and asset tangibility are mainly significant with the predicted signs. The reported R&D/sales is inversely related to leverage with a zero marginal effect, but the missing R&D dummy is significantly positively related to leverage. The Z-score is insignificant to all four leverage definitions. The estimate for the Baa-Aaa credit spread alternates signs, negative for book and positive for market leverage. The deviation from the leverage target approximates firm fixed effects and significantly contributes to the fit of each model to the data. This variable is strongly positively related to leverage (t-statistics ranging from 18.63 to 25.67).

The results of the cross-sectional leverage analyses are generally robust to alternate cutoffs for security issues (retirements or repurchases). The regressions are run without firm and time fixed effects, without time fixed effects, and with both fixed effects. The robust standard errors for NDTA and NDTL with firm and time effects (as presented in Table 3) are generally larger than in the other cases.

Against prediction, the lagged after-financing (and concurrent before-financing) MTR is significantly inversely related to debt issues and leverage in all of the tests. A high prior-period (or current) MTR may indicate higher profit. Higher profit could be associated with a lower need for external funds in general, a higher stock price that makes equity issues relatively more attractive, or debt retirements/equity repurchases. Alternatively, a higher MTR may result from the recognition of a NDTL or creation of a NDTA. Investigations of these alternative explanations of the inverse relationship between debt issues, leverage ratios, and the MTR are left to future research.

CONCLUSION

This paper investigates how temporary book-tax differences, as measured by net deferred tax assets and liabilities, influence debt policies of U.S. public corporations. Prior studies have made a solid argument that individual tax-related items effectively substitute for the tax benefits of debt (e.g., Kahle & Shastri, 2005; Graham & Tucker, 2006; Shivdasani & Stefanescu, 2010). However, many individual tax-related items are off-balance sheet or not readily available in standard datasets. Omitting tax related items may potentially skew empirical results related to

debt policy (Graham & Leary, 2011). The NDTA and NDTL are on the balance sheet and available in Compustat. These are black-box variables due to disclosure rules, but provide the net expected impact on future tax payments from all temporary differences between financial and tax reporting along with carryforwards. The NDTA (NDTL) indicates that the future MTR is likely to decrease (increase).

This study considers how NDTA and NDTL, as measures of collective temporary non-debt tax benefits and obligations, influence debt issues at a refinancing point and leverage following a refinancing. Thirty seven percent of sample observations have either a NDTA or NDTL at a refinancing point. The regression results indicate that firms with NDTA are significantly less likely to issue debt at a refinancing point, and have lower leverage ratios following refinancing. NDTL firms are more likely to issue debt and have higher market leverage ratios. However, the influence of NDTL on debt issues is somewhat weaker and is not significant to book leverage ratios. Overall, these results are consistent with the substitution hypothesis of DeAngelo and Masulis (1980) and are robust to alternative definitions of a refinancing point, leverage definitions, and estimation techniques.

This study also presents strong evidence that firm fixed effects influence debt policy. Lemmon, et al. (2008) have observed that firms actively pursue leverage ratios that are close to their long-run means. This study borrows from Lemmon, et al. and Harford, et al. (2009) and includes in the regressions a simple measure of a firm's deviation from its long-run average leverage ratio. This variable is highly statistically significant to both debt issues and post-refinancing leverage ratios, and its influence on the fit of the data to the model is large. Firms with leverage above the long-run mean are less likely to issue debt and have higher post-refinancing leverage ratios, and vice versa.

Future research may want to consider the NDTA/L as an explanatory variable in studies of capital structure choice. The NDTA/L partially alleviates the problem of identifying individual non-debt tax shields by providing an aggregate measure of the expected net tax effects of temporary BTDs. Future research may also want to investigate the inverse relationship between the MTR and leverage found in this study. In the context of the trade-off theory, capital structure choice today is related to the future MTR. As discussed previously, the prior-period MTR at a refinancing point may not be a strong signal of future MTRs.

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Table 1

Sample Means

The sample includes firms with year t net debt issues (repayments) and net equity issues (repurchases) defined as exceeding 5% (-5% for debt reductions, -1.25% for equity repurchases) of t-1 total assets from 1994-2008. All independent variables are year t-1. LT debt issued/assets is the change in total long-term debt and long-term debt in current liabilities from t-1 to t divided by t-1 total assets. Market leverage is LT debt divided by the market value of assets (total liabilities+market value of equity). Operating ROA is earnings before interest, depreciation and taxes scaled by total assets, ln(assets) is the natural log of total assets. Market-to-book is the market value of assets divided by total assets, PPE/assets is net property, plant, and equipment divided by total assets. R&D/sales is research and development expense as a percentage of net sales for firms that report R&D expense. Z-score is [(1.2*working capital+1.4*retained earnings+3.3*earnings before interest and taxes+1.0*sales)/total assets]+[0.6*market value of equity/book value of total liabilities], Baa-Aaa yield spread is the difference between the nominal yields on Baa and Aaa rated corporate debt (basis points). Deviation from target is the difference between long-term market leverage and the long-run mean long-term market leverage. MTR is the after-financing simulated marginal tax rate. NDTA (NDTL) is net deferred tax asset (liability) greater than (less than) zero divided by total assets.

	Mean	Standard deviation
Market Cap (billions U.S.)	$2.521	$14.400
% sample with debt issues	42.7%	49.5%
LT debt issued/assets	24.0%	42.7%
Total liabilities/assets	47.7%	20.9%
Market leverage	16.0%	16.2%
Operating ROA	2.6%	26.6%
ln(assets)	5.12	2.08
Market-to-book	2.34	4.01
PPE/assets	28.3%	22.7%
R&D/sales	253.8%	5,541.0%
% sample with missing R&D expense	39.0%	48.8%
Z-score	5.96	34.59
% Z-score<1.81	19.5%	39.7%
Baa-Aaa yield spread	0.826	0.222
Deviation from target	-1.0%	11.0%
MTR	18.5%	15.9%
NDTL/assets	-0.8%	2.5%
% sample with NDTL	17.9%	38.3%
NDTA/assets	0.8%	2.5%
% sample with NDTA	19.1%	39.3%

Table 2

Panel Logistic Regressions of Debt Issues on Net Deferred Tax Assets and Liabilities

Logistic regressions of debt issues from 1994-2008. The sample includes firms with year t net debt issues (repayments) and net equity issues (repurchases) defined as exceeding 5% (-5% for debt reductions, -1.25% for equity repurchases) of t-1 total assets. The dependent variable is set to 1 in models (1) and (2) if net long-term debt issues (balance sheet) in period t are positive, 0 otherwise. All independent variables are year t-1. Operating ROA is earnings before interest, depreciation and taxes scaled by total assets, ln(assets) is the natural log of total assets. Market-to-book is the market value of assets (total liabilities+market value of equity) divided by total assets, PPE/assets is net property, plant, and equipment divided by total assets. R&D/sales is research and development expense as a percentage of net sales for firms that report R&D expense, missing R&D dummy is an indicator for firms with missing R&D expense (=1). Z-score is [(1.2*working capital+1.4*retained earnings+3.3*earnings before interest and taxes+1.0*sales)/total assets]+[0.6*market value of equity/book value of total liabilities], Baa-Aaa yield spread is the difference between the nominal yields on Baa and Aaa rated corporate debt. Deviation from target is the difference between long-term market leverage and the long-run mean long-term market leverage. MTR is the after-financing simulated marginal tax rate. NDTA (NDTL) is net deferred tax asset (liability) greater than (less than) zero divided by total assets and is included in model (1). NDTA (NDTL) dummy is an indicator for net deferred tax asset (liability) greater than (less than) zero and is included in model (2). Standard errors are adjusted for clustering by year and firm. P-values relate to Wald statistics, and the pseudo-R^2 is not rescaled.

	(1) LT net debt issues		(2) LT net debt issues	
	Estimate	p-value	Estimate	p-value
Intercept	0.120	0.1362	0.124	0.1341
Operating ROA	0.170	0.0276	0.175	0.0230
ln(assets)	-0.011	0.2138	-0.010	0.3217
Market-to-book	-0.033	0.0017	-0.033	0.0020
PPE/assets	1.158	<.0001	1.134	<.0001
R&D/sales	0.000	0.2720	0.000	0.2739
Missing R&D dummy	0.230	<.0001	0.219	<.0001
Z-score	-0.007	0.0164	-0.007	0.0160
Baa-Aaa yield spread	-0.787	<.0001	-0.787	<.0001
Deviation from target	-5.574	<.0001	-5.544	<.0001
MTR	-0.336	0.0015	-0.301	0.0044
NDTL/assets	2.241	0.0008		
NDTA/assets	-2.824	<.0001		
NDTL dummy			0.096	0.0517
NDTA dummy			-0.137	0.0029
Time effects	Yes		Yes	
Firm effects	Yes		Yes	
Pseudo R^2	0.10		0.10	

Table 3

OLS Regressions of Leverage on Net Deferred Tax Assets and Liabilities

OLS regressions of leverage ratios from 1994-2008. LT book (market) leverage is year t total long-term debt divided by total assets (market value of assets). Total book (market) leverage is year t total liabilities divided by total assets (market value of assets). The time trend is the calendar year, and all other independent variables are prior-period values defined in Table 2. Asymptotic t-statistics are in parentheses.

	(1) LT book leverage	(2) LT market leverage	(3) Total book leverage	(4) Total market leverage
Intercept	6.796	7.289	9.931	13.617
	(8.71)	(11.43)	(10.90)	(15.16)
Operating ROA	0.014	0.029	-0.027	0.020
	(1.93)	(3.59)	(-2.76)	(1.30)
ln(assets)	0.013	0.009	0.026	0.018
	(16.93)	(12.60)	(28.87)	(17.24)
Market-to-book	-0.002	-0.005	-0.002	-0.012
	(-1.99)	(-2.57)	(-1.45)	(-2.61)
PPE/assets	0.175	0.143	0.095	0.106
	(29.44)	(25.33)	(14.60)	(13.98)
R&D/sales	0.000	0.000	0.000	0.000
	(-1.10)	(-1.87)	(-3.34)	(-3.48)
Missing R&D dummy	0.052	0.057	0.058	0.083
	(20.43)	(23.34)	(19.93)	(23.72)
Z-score	0.000	0.000	-0.001	0.000
	(-1.15)	(0.26)	(-1.47)	(0.33)
Baa-Aaa yield spread	-0.027	0.010	-0.016	0.057
	(-4.20)	(1.80)	(-2.07)	(7.10)
Deviation from target	0.300	0.352	0.252	0.404
	(23.41)	(25.67)	(18.63)	(19.91)
MTR	-0.129	-0.100	-0.165	-0.147
	(-15.17)	(-13.00)	(-17.44)	(-14.27)
NDTL dummy	-0.004	0.022	-0.006	0.043
	(-0.92)	(6.07)	(-1.39)	(8.73)
NDTA dummy	-0.026	-0.044	-0.002	-0.060
	(-7.06)	(-12.93)	(-0.53)	(-11.53)
Time trend	-0.003	-0.004	-0.005	-0.007
	(-8.48)	(-11.21)	(-10.45)	(-14.80)
Adj. R^2	0.18	0.22	0.15	0.21