Journal Of Financial And Strategic Decisions
Volume 8 Number 2 Summer 1995

THE 1986 TAX REFORM ACT AND STRATEGIC LEVERAGE DECISIONS

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Abstract

The 1986 Tax Reform Act (TRA) repealed the investment tax credit, lowered corporate tax rates and lengthened depreciation schedules. These tax law changes have important implications for firms' strategic decisions regarding leverage and for testing DeAngelo and Masulis' tax shield substitution hypotheses. First, the effect of the TRA on firms' leverage, effective tax rates, and non-debt tax shields are examined. Second, the substitutability between debt and non-debt related tax shields is investigated within the DeAngelo and Masulis framework. The results of the paired t-tests, analysis of covariance, and regression analysis provide empirical support that, on average, firms have increased their leverage ratios during the post-TRA period. This increase is primarily in response to an increase in effective tax rates and a reduction in non-debt tax shields. This finding supports the view that firms tend to make strategic changes in leverage in response to tax law changes. Additionally, the evidence is consistent with two of DeAngelo and Masulis' hypotheses, H:3 and H:5.

INTRODUCTION

The strategic choice between debt and equity financing is based on the long-run relative merits of each form of financing. The passage of the 1986 Tax Reform Act (TRA) changed the relative advantage of debt versus equity financing. Hence, the corporate choice between debt and equity will have to be reanalyzed from a strategic decision making perspective. The objective in this paper is to investigate the changes in firm leverage, effective tax rates, and use of non-debt tax shields (NDTS) in response to the tax law changes provided in the TRA.

The corporate debt choice is, to a certain extent, based on the value of interest expense as a tax deduction. However, investment related tax shelters such as depreciation, the investment tax credit (ITC), and loss carry-forward provisions are considered to be substitutes for interest tax deductions available to the firm. The 1986 Tax Reform Act (TRA) lengthened depreciation schedules, eliminated the availability of the ITC to firms, and lowered marginal tax rates. The elimination of the ITC and the lengthening of depreciation schedules should have reduced the non-debt tax shields available to firms. Also, as indicated by subsequent discussion, firms would probably be facing higher effective tax rates during the post-TRA period. Therefore, these changes in the tax laws provide an opportunity to empirically test hypotheses related to the strategic choice between debt and equity financing.

EFFECT OF 1986 TRA TAX LAW CHANGES

The reduction in the highest marginal tax rate from 46 to 34 percent will, in general, decrease the effective tax rates of firms which are subject to taxation at the highest marginal rate. However, the elimination of the ITC may increase a firm's tax liability and, hence, increase the firm's effective tax rate. An increase in the effective tax rate

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will especially hold true for firms whose effective tax rates prior to the TRA were substantially below the highest marginal tax rate.

If the loss in ITC exactly offsets the gain from the reduction in tax rates, there should be a relatively insignificant change in a firm's effective tax rate. Otherwise, whether there is an increase or a decrease in a firm's effective tax rate will depend on which of the two effects dominates. According to DeAngelo and Masulis [9], hereafter DM, a firm's capital structure depends on the marginal benefit to the corporation of NDTS (e.g., ITC). Therefore, the net effect of these two changes on a firm's tax burden is of interest from a capital structure viewpoint.

The repeal of the ITC decreases the level of NDTS available to firms. The extension of depreciation schedules should also result in lower levels of NDTS after the passage of the TRA. Therefore, a priori one would expect that, on average, firms' NDTS during the post-TRA period should be lower relative to their levels during the pre-TRA period.

The 1986 TRA decreased corporate tax rates at various levels of income. This suggests a decrease in effective tax rates at the firm level during the post-TRA period. However, there are three reasons to believe that effective tax rates have probably increased during the post-TRA period. First, the lowering of corporate tax rates can not be expected to have any discerning effect in lowering the firms' effective tax rates because most firms appear to have an effective tax rate below the top marginal tax brackets (see Block [2] and Cordes and Sheffrin [6]). Second, the repeal of ITC may, in fact, have increased the tax liabilities of firms. Third, the 1986 TRA has lengthened the time period during which firms can depreciate assets, resulting in a lower per annum depreciation deduction and an increase in tax liability.

Evidence from Cordes and Sheffrin [6] suggests that approximately 28.5 percent of all firms will not benefit from a reduction in the marginal tax rate because these firms are already operating at a marginal tax rate below 35 percent. Data presented in Block [2] are also useful in making preliminary predictions. Computations based on that information show that, for 1985, the average effective tax rate of fourteen large corporations is 4.9 percent. This relatively low tax rate suggests that, on an individual basis, firms are able to effectively manage their tax liabilities with the appropriate use of various tax deductions. If the above firms had not been able to manage their tax liabilities their average tax rate would have been 45.9 percent. Because firms are able to manage their tax liability to a level below the highest marginal rate, lowering tax rates may not be beneficial to most large and profitable firms in a real sense. Thus, the effect of the loss of ITC should dominate and, on average, one would expect to see higher effective tax rates during the post-TRA period. Additionally, the new law requires that, for tax purposes, firms depreciate assets over a longer time period; thus giving rise to a lower depreciation related tax benefit during the post-TRA period. This also should have the effect of increasing effective tax rates during the post-TRA period.

PRIOR RESEARCH AND TESTABLE HYPOTHESES

The tax deductibility of interest expense has been a major attraction of debt financing to corporations. Modigliani and Miller [12] show that, in the presence of corporate taxes, but no bankruptcy costs, firm value is maximized under 100 percent debt financing. Subsequently, DM [9] have shown that the value of the tax benefit from debt financing to a firm depends on the existence of non-debt tax shields. DM argue that, in the presence of tax shield substitutes, the expected marginal corporate tax benefit associated with debt financing declines as a firm's capital structure becomes more leveraged. According to DM's analysis, the existence of corporate tax shield substitutes leads to a market equilibrium in which each firm will have a unique interior optimum leverage decision. The hypotheses posited by DM may be considered an important contribution to capital structure theory. According to DM (H:3, p. 21), “in cross-sectional analysis, (holding before-tax earnings constant) firms with lower investment related tax shields will employ greater debt in their capital structures.” In another hypothesis (H:5, p.21), DM state that, “cross-sectionally, firms subject to lower corporate rates will employ less debt in their capital structures (holding earnings constant).”

DM's hypotheses suggest that firms will manage their debt equity ratios in response to changes in the corporate tax structure. While prior research contains some empirical evidence on these hypotheses the results, at best, provide mixed evidence in support of DM's H:3. The empirical evidence concerning DM's H:5 is scant.

DM's H:3 has been investigated at both the industry and firm levels with mixed results. At the industry level the correlation analysis of Bowen, Daley, and Huber [4] provide some evidence in support of DM's H:3. One limitation

of their study is that the sample sizes are relatively small (six to nine firms per industry). Another limitation is that correlation analysis does not control for other factors influencing leverage decisions. Boquist and Moore [3] extend the Bowen, Daley, and Huber [4] analysis by performing correlations at the firm level and by defining leverage with and without noninterest bearing debt. At the industry level, when noninterest bearing debt is included in the ratio, the results support DM 's H:3. However, when only interest bearing debt is used to define the debt to assets ratio, the results are contrary to DM's H:3. At the firm level and regardless of whether or not noninterest bearing debt is included, the results of Boquist and Moore [3] do not support DM's H:3.

Using regression analysis, Kim and Sorensen [12] find support for DM's prediction of a negative relationship between non-debt tax shields and leverage. On the other hand, Bradley, Jarrell, and Kim [5] and Manuel and Pilotte [13] find a positive relationship between the non-debt tax shield and leverage ratios. Titman and Wessels [13] examine the determinants of capital structure choice using a LISREL model. They employed non-debt tax shelters as an indicator variable reflecting attributes to explain cross-sectional variations in the measure of debt. They estimated six different equations with different debt measures as the dependent variable but the non-debt tax shelter variable was not statistically significant in any of their models. However, consistent with DM's hypothesis, they found the simple correlations between non-debt tax shelters and different leverage measures to be negative.

Givoly, Hayn, Ofer, and Sarig [11] examine the interaction between firms' taxes and leverage decisions for the years 1986-87. The results of the study provide preliminary evidence of a substitution effect between debt and NDTS. However, there are at least three limitations to the study. First, it may be considered presumptuous of the authors to assume that, in response to the TRA, firms would have already adjusted their capital structures by 1987. Second, the effects of pretax output were ignored in their regression model. Third, by including the years 1986 and 1987 the results of their study are confounded by the passage of the TRA.

Davis [8] tested DM's H:5 using a sample of 115 Canadian firms for the period 1963 to 1982. The author argues that the appropriate corporate tax rate for testing DM's H:5 is the effective tax rate. In cross-sectional analysis, the study provides weak support for DM's H:5.

Before testing the firm's choice between debt and equity financing and debt versus non-debt tax shield substitutes, it is important to verify at the firm level whether NDTS, effective tax rates, and leverage have changed between the pre- and post-TRA periods. If NDTS and effective tax rates did change at the firm level, one can then test whether there is a corresponding change in leverage. Given a change in leverage, one can then investigate to what extent this change is related to the change in NDTS and effective tax rates. Based on prior discussion the specific hypotheses tested in this study are:

Ha1: At the firm level, there is an inverse relationship between changes in NDTS and changes in leverage (i.e., testing DM H:3).

Ha2: At the firm level, there is a direct relationship between changes in firms' effective tax rates and changes in leverage (i.e., testing DM H:5).

RESEARCH DESIGN

A random sample equal to one-third of the NYSE firms on the COMPUSTAT database for the years 1983 through 1990 is selected. Two types of firms are then excluded from the sample: financial institutions and firms in regulated industries [e.g., utilities]. Firms in regulated environments such as financial institutions and utilities are excluded because their financing decisions and capital structures are impacted by regulatory restrictions. As a result of these exclusions, a net sample of 228 firms meeting the data definitions is available to test our hypotheses.

A pre- and post-TRA period research design is used to investigate whether the NDTS, effective tax rates, and leverage of firms did change between the pre- and post-TRA time periods. Because this test only compares means from two different periods, paired t-tests are employed.

Prior research has employed cross-sectional analysis to test the relationship between leverage and NDTS and found mixed results. In this context, Dammon and Senbet [7] demonstrate that the relationships posited by DM may not necessarily hold in cross-sectional analysis if firms have less than perfectly correlated pre-tax output. Because the research design in this study pair-matches firms with themselves, the problem described by Dammon and Senbet [7] should be minimized. Furthermore, in the analysis of covariance (ANCOVA) and regression

models the operating income before depreciation (OIBD) variable is included as a control measure for changes in pre-tax output. The ANCOVA model for testing Ha1 and Ha2 is:

Equation 1

$$L_{i,t} = \mu. + \beta_1(X_{1,i,t} - \overline{X}_1) + \beta_2(X_{2,i,t} - \overline{X}_2) + \beta_3(X_{3,i,t} - \overline{X}_3) + \varepsilon_{i,t}$$

The variables in our model are defined as: $L_{i,t}$ is the leverage of firm i, with t = 0 for the pre-1986 period and t = 1 for the post-1986 period; $\mu.$ is the overall mean leverage; $X_{1,i,t}$ is the effective tax rate for firm i at period t; $X_{2,i,t}$ is the NDTS for firm i at period t; $X_{3,i,t}$ is the OIBD for firm i at period t; and $\varepsilon_{i,t}$ is the error term for firm i at period t. The variables are measured as follows. Leverage is equal to the sum of short-term debt plus long-term debt divided by total assets; the effective tax rate is the sum of federal tax plus deferred tax divided by pretax income; NDTS is equal to the sum of depreciation plus ITC and NOL divided by earnings before interest and taxes (EBIT); and OIBD is equal to net sales less cost of goods sold and selling, general and administrative expenses divided by sales.

For the pre-TRA period the variables are computed as the average of 1984 plus 1985 year-end values. For the post-TRA period the variables are computed as the average of 1988 plus 1989 year-end values. The data for all variables are taken from the COMPUSTAT annual industrial tape. The data from 1986 and 1987 are excluded from the analysis because of the potential for "noise" resulting from the actual passage of the TRA.

The use of an ANCOVA approach to test our hypotheses accomplishes two objectives. First, in contrast to Manuel and Pilotte [11] nontax factors that may be important determinants of leverage are included in the model. The inclusion of these covariates is equivalent to testing the change in a firm's leverage while holding pretax output, effective tax rates, and NDTS constant. Second, this approach reduces the variance of the error term in the model and, hence, increases the precision of the test. The precision of the test is increased because the expected value of $L_{i,t}$ will depend not only on a firm's actual leverage, but also on the values of the associated covariates. Therefore, the actual test performed is on the adjusted group means which are denoted by:

Equation 2

$$\mu_{0,t} = L_i - \sum_{n=1}^{p} \beta_k(\overline{x}_n - \overline{x}_{i,n})$$

with $\mu_{0,t}$ equal to the mean level of leverage for each group with p equal to the number of covariates.

In testing Ha1 and Ha2, the primary concern is whether changes in effective tax rates and NDTS are significant in explaining changes in leverage. Therefore, as an additional test a regression model is employed which is specified as:

Equation 3

$$\Delta L_{i,t} = \alpha_0 + \beta_1 \Delta X_{1,i,t} + \beta_2 \Delta X_{2,i,t} + \beta_3 \Delta X_{3,i,t} + \varepsilon_{i,t}$$

with the variables $L_{i,t}$, $X_{1,i,t}$, $X_{2,i,t}$, and $X_{3,i,t}$ defined as in the ANCOVA model. The D is an operand representing the differences in the variables between the post- and pre-TRA periods. Consistent with Ha1 and Ha2, it is predicted that $\beta_1 > 0$ and $\beta_2 < 0$.

ANALYSIS OF RESULTS

The results of the paired t-tests reported in Table 1 indicate that, on average, there has been an increase in firm leverage and effective tax rates and a decrease in NDTS during the post-TRA period compared to the pre-TRA period. The mean differences are all statistically significant (p-values ranging from 0.0001 to 0.0875). The NDTS variable consists of three components: ITC, depreciation expense and NOL carryforward. As expected, the

evidence indicates significant decreases in the ITC and depreciation expense variables (p-values = 0.0001 and 0.0510).

TABLE 1
Paired T-Tests: Post- Minus Pre-TRA Time Periods, N = 228 Firms

Variable	Mean Difference*	Standard Error	T-Value	P-Value
Leverage	0.0444	0.0086	5.112	0.0001
NDTS	-0.1934	0.1422	-1.361	0.0875
Tax Rate	0.0846	0.0329	2.565	0.0055
ITC Shield	-0.0253	0.0039	-6.418	0.0001
Depreciation Shield	-0.1657	0.1009	-1.642	0.0510

*The mean difference is equal to the post-TRA period mean minus the pre-TRA period mean.

On average, the leverage variable of sample firms is significantly higher during the post-TRA period compared to the pre-TRA period with the NDTS showing a decrease during the same period (See Table 1). This finding implies an inverse relationship between NDTS and leverage. The finding of an increase in both leverage and effective tax rates from the pre- to post-TRA periods implies a direct relationship between the two variables. Hence, the evidence provides support for Ha1 and Ha2.

ANCOVA

The paired t-tests only examine the mean difference in the leverage variable between pre- and post- TRA periods without controlling for the effects of NDTS and effective tax rates. In the ANCOVA model OIBD, NDTS, and effective tax rates are employed as covariates. The test of the change in the leverage variable between pre- and post- TRA periods is then performed on the adjusted means. The type III sum of squares reported in Table 2 indicate that both the NDTS and effective tax rate variables are significant in explaining the variation in debt levels between pre- and post- TRA periods. However, even after controlling for these two covariates, the adjusted mean difference in the leverage variable shows a statistically significant increase during the post-TRA period. This unexplained variation could be due to the impact of variables which are not included in the model. It should be noted that the purpose of the ANVOCA model used in this study is primarily to test Ha1 and Ha2 after controlling for key variables relevant to the hypotheses.

TABLE 2
ANCOVA Model For The Post Versus Pre-TRA Periods:
Dependent Variable: Leverage; Covariates Included:
NDTS, Effective Tax Rate, and OIBD*

Variable	D.F.	Type III Sum Of Squares	F Statistic	P-Value
NDTS	1	0.1403	6.27	0.0126
Tax Rate	1	0.2155	9.63	0.0020
OIBD	1	0.0019	0.09	0.7662
Model: F-Value 6.27, P-Value = 0.0001				

TABLE 2
ANCOVA Model For The Post Versus Pre-TRA Periods: Dependent Variable: Leverage; Covariates Included: NDTS, Effective Tax Rate, and OIBD*

(CONT'D)

T Test Of The Adjusted Mean: Firm Leverage During Pre Minus Post-TRA Periods

Variable	Adjusted Mean	P-Value > T
Pre-TRA	0.2018	
Post-TRA	0.2532	
Post minus Pre-TRA	0.0514	.0003

*The results do not change when the OIBD variable is removed. However, in order to be consistent with the arguments concerning the need to control for pre-tax output, the results are reported with the OIBD variable included in the model.

Regression Analysis

The regression model specified in equation (3) is estimated using ordinary least squares (OLS) with the results reported in Table 3. As hypothesized, the coefficient for the NDTS variable is negative and statistically significant (p-value = 0.0396). The evidence indicates that, on average, firms increased their leverage in response to a drop in the availability of non-debt tax shelters. The tax rate variable has a positive coefficient, as predicted, and is marginally significant (p-value = 0.1071). This finding provides weak support for Ha2. The evidence suggests that, on average, firms increased their debt levels during the post-TRA period in conjunction with the increase in their tax rates. As previously discussed, the OIBD variable is included as a regressor in the model to control for pre-tax output differences across firms (See Dammon and Senbet [7] for related arguments). The coefficient for the OIBD variable is positive and significant (p-value = 0.0111). Overall, our results imply that firms increased their debt levels in response to decreases in the availability of NDTS and increases in the effective tax rates. The evidence from the results are considered to be consistent with both DM's H:3 and H:5. No prior study provides support for both of these hypotheses.

SUMMARY

In this study changes in firms' leverage ratios in response to corporate tax law changes are examined. Additionally, the tax law changes made in the 1986 TRA have provided an opportunity for a more direct test of two of DM's hypotheses. A pre- post research design is used to investigate the impact of the 1986 TRA on firms' NDTS, effective tax rates, and leverage ratios. Statistical procedures such as paired t-tests, ANCOVA, and regression were employed. Based on the results of the statistical analysis four conclusions were drawn. First, it was found that firms' effective tax rates and leverage ratios increased after the passage of the TRA. Second, as expected, firms' NDTS are lower during the post-TRA period. Third, firms which experienced a decrease (increase) in investment related tax shields have employed more (less) debt in their capital structures. Fourth, in response to the tax law changes in the 1986 TRA, firms subject to lower (higher) corporate tax rates have employed less (more) debt in their capital structures. These results are consistent with DM's hypotheses H:3 and H:5. The results also demonstrate that firms do make strategic changes in their capital structures in response to external influences (e.g., Congressional tax law changes).

TABLE 3
Regression Results For Post Minus Pre TRA Period
Dependent Variable: Change In Leverage

Analysis Of Variance Table

Source	df	Sum Of Squares	Mean Square	F Value	Prob > F
Model	3	0.17269	0.05756	3.448	0.0174
Error	224	3.73902	0.01669		
Total	227	3.91171			
R-Square		0.0441			
Adjusted R-Square		0.0313			

Parameter Estimates

Variable	df	Parameter Estimate	Standard Error	T-Value	Prob > |T|	Variance Inflation
Intercept	1	0.0353	0.0091	3.898	0.0001	0.0000
Tax Rate	1	0.0216	0.0173	1.246	0.1071	1.0145
NDTS	1	-0.0071	0.0040	-1.763	0.0396	1.0092
OIBD	1	0.0001	0.00001	2.560	0.0111	1.0056

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