LYON TAMING BY THE IRS: EVIDENCE ON TAX DEDUCTIONS*

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ABSTRACT

Graham (2005) calls for increased market-based research to prove the existence of the tax benefits of debt without non-tax related, asymmetric information effects confounding the interpretation. This study examines a unique situation where the Internal Revenue Service (IRS) denied the deductibility of interest payments on a particular debt instrument. Consequently, the debt instrument defaults in structure to a bond where the full interest costs and default risk are borne by the firm without the countervailing interest tax shield. My results show that loss of tax deductibility results in a value decrease that is statistically and economically significant. The IRS subsequently reversed its position and restored the deductibility of interest payments resulting in a value increase that was symmetric to the value decrease when deductibility was first denied. The results from these two exogenous events show robustly that debt financing draws a significant advantage from tax-based benefits.

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1. Introduction

Finance research continues to be fascinated by the relationship between capital structure and corporate taxes. For example, the recent meta-study by Feld, Heckemeyer, and Overesch (2013) reviews the empirical literature on taxes and corporate capital structure. There also is a history of doubt whether there is a connection between firm value and debt via tax deductibility of interest payments (e.g., Fama and French, 1998; Parrino and Weisbach, 1999). Relatedly, in a comprehensive survey of the relevance of taxes for corporate finance, Graham (2005) calls for research along three lines. With respect to the first of these three, Graham states, "First, we need more market-based research ... ... where tax effects are isolated from information and other factors and therefore the interpretation is fairly unambiguous." Specifically, Graham appears to take the position that several of the studies that examine the value of the tax deductibility of interest payments on debt provide results that are ambiguous because there may also be non-tax related, asymmetric information-based effects that could yield the same results. In particular, Graham refers to the exchange offer studies that are purportedly "pure capital structure" changes.

Thus, given Graham's suggestion, the proper research design should control for informational effects. In the absence of the ideal experimental setting, Graham suggests the Irvine and Rosenfeld (2000) study as the "next-best" possibility. Irvine and Rosenfeld (2000) examine the use of monthly income preferred stock (MIPs) to substitute for regular preferred stock. The preferred dividend on MIPs is tax deductible for the corporation, while the dividend on the original preferred stock is not. Graham's perspective is that given that the two instruments are similar on most other dimensions, the MIPs investigation should provide a truer picture of the value of tax deductibility which is hopefully untainted by any asymmetric information

effects.

However, there could still be some information effects associated with the use of MIPs because it is the ***firm itself*** that chooses which security to issue. Specifically, there could be self-selection; under asymmetric information about future taxable earnings, issuance of a security that provides tax-deductibility of payments to the issuer serves as a signal that future taxable earnings are bound to be higher. In a separating equilibrium, less profitable firms cannot mimick this strategy since they may not have adequate taxable income to fully exploit the tax deduction provided by the MIPs. As a result, the reaction to issuance of MIPs may be driven by the signal of higher future taxable earnings as opposed to the pure value of tax deductibility. Managerial discretion in the choice of which security to issue will thus be associated with informational effects and consequently, the study of MIPS is not free of endogeneity concerns.

In this respect, I argue that to reduce the likelihood of informational effects driving the results, the firm ***should not*** be the first mover. In other words, to truly respond to the research call in Graham (2005), the ideal experimental setting should be an ***exogenous shock*** where the borrowing firm is not responsible for initiating the event in question. Consequently, the event will not be perceived by investors as a "signal" emanating from the firm (i.e. the event has no informational effects that may be ascribed to managerial motives). Thus, any reaction by the markets should be purely due to the tax implications of the event. This is important given the results of Fama and French (1998) who state (p. 821),

> *The bottom line, then, is that our regressions fail to measure how (or whether) the tax effects of financing decisions affect firm value.*

In effect, Fama and French (1998) seem to suggest that, at the margin, tax effects of financing do not affect firm value. If we can use an exogenous event to demonstrate that there is a significant effect between tax effects and firm value, then this would address in a clearer light the Fama and French (1998) conclusion.

To be true to the desired experimental conditions called for by Graham (2005), I examine the effect of tax deductibility on firm value using exactly

such an exogenous situation. The event specifics are as follows. In November 1991, the Internal Revenue Service (IRS) disallowed the deductibility of interest payments on a specific type of debt security. Shortly thereafter, the IRS reversed its earlier position and reinstated the tax deductibility of those interest payments. Since these exogenous events were not initiated by the borrowing firms, there is little likelihood of informational effects (i.e., signaling by management). The possibility of elimination of tax deductibility and its subsequent reinstatement is a unique and ideal experimental setting to examine the issue raised by Graham (2005). It also allows the study to draw market-based inferences about the value of the tax deductibility of interest payments.

In the empirical analysis, I examine the market's reaction to the news that the IRS had denied the deductibility of interest payments for all affected firms with that specific debt security outstanding. This market reaction is negative and significant, implying that there is a value decrease that is purely associated with the loss of tax deductibility. I also examine the market reaction to the reinstatement of tax deductibility for those firms. This reaction is positive and significant. More importantly, the market reaction to this latter event is symmetric to the reaction to the earlier event. Specifically, the initial value decrease, in response to the denial of deductibility, is reversed at the reinstatement of tax deductibility. This evidence is robust proof of the value implicit in tax deductibility of interest payments.

The rest of this paper proceeds as follows. Section 2 presents a description of the unique situation that is examined in this paper, and develops the main hypotheses. Section 3 describes the data and the empirical methods employed for the analysis. I present and discuss the results in Section 4 and provide a summary in Section 5.

2. Background and Hypotheses

LYONs or liquid yield option notes are zero coupon, convertible, putable bonds and were developed by Merrill Lynch Capital Markets Group in 1985.[1] For a zero coupon bond, the proceeds of the issuance are far less than the

[1]See McConnell and Schwartz (1992) for a discussion of the evolution of this complex financial instrument and McConnell and Schwartz (1986) for valuation details.

par value that will be paid out at maturity. This difference between the proceeds received and the final par value is called Original Issue Discount (OID). Under the tax code, OID should be amortized over the life of the bond using the effective interest rate method, and the amortized amount can be deducted as interest paid by the issuer. Consequently, the amortized OID provides a tax shield to the issuer over the life of the zero coupon bond even though no real cash expense is incurred on a yearly basis. It is only at maturity when the full par value is paid out that the actual expense is "experienced" by the issuer. Thus, in a conventional zero coupon bond, the issuer can exploit the tax deductions for interest payments before actually experiencing the associated real cash expense of the par value payment at maturity.

Unlike conventional zero coupon bonds however, LYONs are convertible, and it is this conversion feature that is the cause of the sequence of events examined in this paper. If the issuing firm experiences a large increase in stock price, the conversion option underlying the LYON may go "in-the-money". As such, if LYON holders convert into common stock of the issuing firm, the said firm never pays out the full par value of the bond at maturity. This gives rise to the contention of the IRS that no real interest may have effectively been paid on the LYON by the issuing corporation. The position taken by the IRS is the basis of the events examined in this paper.

I summarize the sequence of events in Table I and describe them below. On November 27, 1991 (event 1 in Table I), Tate & Lyle PLC, the firm that acquired A. E. Staley Manufacturing Co. (one of the early LYON issuers) filed a petition in federal tax court for "redetermination of deficiencies" assessed against it by the IRS. From this petition, it was first learned by the public that the Chicago office of the IRS had disallowed a tax deduction associated with Staley's LYONs. Specifically, the IRS position was that it had not been established that any deduction was allowable on the original issue discount on a LYON if conversion into common stock occurs. This suggests that Staley and other LYON issuers could lose the tax deductibility of the interest expense associated with OID.[2]

It could be argued that at the time of the filing, the Tax Court would only

[2]Prior to the filing, the IRS had already denied the tax deductibility of LYON interest expense for Staley Manufacturing. The court filing was actually to challenge this denial.

uphold the IRS position with a finite probability and that there remained some doubt, however small, as to whether the IRS would prevail.[3] Consequently, any stock price reaction by the market to the news of the filing with the court is based on a probabilistic loss of the equity value derived from tax deductibility of interest payments. Since the market's assessment of this probability can range from 0 to 1, any market reaction may not fully reflect the entire magnitude of the equity value of the tax implications of debt (denoted as VTD). Assuming that the market's assessment of the probability that the IRS's position would be upheld by the Tax Court is $p; p \in [0, 1]$, the expected loss in equity value that will be reflected in any market reaction will be equal to $(p \times VTD)$.

Further information regarding this petition (see event 2 in Table I) against the possible loss of tax shields to LYON issuers appeared in the Investment Dealers' Digest (or IDD) published on December 16th, 1991.[4] The Wall Street Journal published a similar story on December 17th, 1991.[5] Then on December 23rd, 1991 (see event 3 in Table I), IDD published a report that Merrill Lynch had disclosed that one of its clients who had issued a LYON had received a Private Letter Ruling from the IRS supporting the tax deductibility of LYON original issue discounts. However, the report speculated that this private letter ruling by no means resolved the issue completely, and that some uncertainty still remained. Neither the identity of the client nor the text of the ruling was revealed. Following this, on Wednesday, January 22, 1992 (event 4 in Table 1), the New York Times reported that in a recent court filing, the IRS had conceded that the interest on LYONs was indeed tax deductible. This filing effectively ended the IRS effort to challenge the tax status of the securities.

I use the sequence of events in Table I to answer several research questions. First, in response to Graham (2005), I am able to obtain market-based evidence on the significantly positive effect of tax deductibility on corporate value that is not contaminated by information effects or endogeneity concerns. My hypotheses are as follows - If tax deductibility affects corporate

[3]There is no clear technique to determine the said probability.

[4]See Investment Dealers' Digest, December 16th 1991, page 10, "LYONS OID tax deductions challenged by IRS agents".

[5]Wall Street Journal, December 17th 1991, page C-1, "Tax Status of LYONs, One of Street's Hottest Products, Gets IRS Challenge".

value, then when the market learns that the tax deductibility of LYON OID is threatened, there should be a decrease in equity value. This phenomenon could occur at event 1 or event 2 (or both). Subsequently, when the tax deductibility is reinstated, stock prices should react in an opposite fashion as compared to when tax deductibility was initially denied. Additionally, this evidence allows me to obtain market based estimates for the value of tax deductibility of interest expense. Of course, these estimates must take into account the probability, p described previously.

Another hypothesis that I am able to test is the market's reaction to a Private Letter Ruling (PLR). At first glance, this may not seem to be an important issue. However, the legal stance on PLRs is that the ruling only applies to the entity (i.e., corporation) that requested it, and may not be extended to other entities. This position is explicitly stated in §6110(j)(3) of the Tax Code, which provides that a private letter ruling may not be used or cited as a precedent. Under the null hypothesis, the news that a Merrill Lynch client had obtained a PLR affirming the deductibility of the LYON OID should not affect stock prices, in general. Under the alternate hypothesis, the market may react to this news if it believes that the PLR results are generalizable to all LYON issuers. This may be reasonable since (a) LYONs are fairly standardized instruments, and (b) the market expects the IRS to make its rulings in a consistent manner when similar situations present themselves.

I am also able to perform a test of the market's perspective on the importance of tax deductibility on managers' financing decisions.[6] For this, I rely on the fact that LYONs were trademarked by Merrill Lynch, and this firm held an 80% market share for zero coupon convertible bond issuance.[7] Under the null hypothesis, if tax deductibility does not affect firm value, then the market will not expect the volume of zero coupon convertible bond issuance to change. Consequently, Merrill Lynch will not experience any change in value since there will be no change in its underwriting fee revenue stream.

[6]Some evidence on the impact of taxes for financing decisions is presented by Mackie-Mason (1990), but Graham (2005) raises measurement issues with the results therein.

[7]Wall Street Journal, Dec. 17, 1991, p. C1. Other investment banks had also developed "LYON-like" securities but Merrill Lynch was the dominant player. This is consistent with the results in Tufano (1989) where the innovator of a security dominates the market share in that innovation.

On the other hand, if the elimination of tax deductibility makes zero coupon convertibles less attractive, this will cause a reduction in the volume of issuance. Consequently, Merrill Lynch will experience a drop in its stock price as underwriting fee revenues decrease. Conversely, when the tax deductibility is reinstated, the opposite should occur.[8]

3. Data, Sample, and Methodology

3.1. Data and Sample

A sample of firms that had LYONs and LYON-like securities outstanding, as well as the relevant bond information were compiled from data provided by Merrill Lynch and from Moody's Bond Record.[9] A LYON-like security is defined for the purpose of this study as any zero coupon, convertible bond. First, only firms with the relevant securities outstanding at the end of December 1991 were used. This resulted in 48 firms. Following this, only firms whose stock returns were available from the CRSP Daily Stock Files for the duration of the examination period were retained. This resulted in the loss of two firms for a final sample of 46 firms. Details for this 46 firm sample and the affected bonds are provided in Table II. To construct Table II, I obtained financial statement information from the COMPUSTAT database and stock price data from the CRSP files. Marginal tax rates used in the analysis are from simulations as described in Graham (1996a, 1996b).[10]

Data on the original issue discount, as well as the Yield to Maturity at the initial issue date were obtained from offering prospectii that were solicited from the issuing companies or obtained from Merrill Lynch or from Disclosure Inc. Information on the amount of relevant securities outstanding was obtained from Moody's Bond Record. Data on aggregate interest expense, earnings before taxes and the taxes paid for 1991 (the fiscal year of the sequence of events), were obtained from COMPUSTAT.

[8]This test also sheds light on the importance of financial innovation to investment banks and provides a market based estimate of the innovation's value.

[9]I thank the late Lee R. Cole, who was managing director of the convertibles group at Merrill Lynch at that time for graciously providing some of the data used in this study.

[10]I thank John Graham for supplying the marginal tax rate data. Graham refers to two marginal tax rates: pre- and post-financing. I used the post-financing marginal tax rate in the analysis. Also see Graham and Lemmon (1998).

Panel A of Table II presents financial characteristics while Panel B shows the composition of the sample with respect to industry groups. LYON issuers have assets (market value of equity) that range from $258 ($148) Million to $39 ($31) Billion. The mean long term debt to total assets ratio for these firms range from 4% to 98%, with a mean of 32.9%, which implies a wide range of leverage in these firms. The marginal tax rate for these firms ranges from 0% to 34%.[11]

The ratio of the amount of the LYON issue outstanding relative to the total long term debt of the firm ranges from 0.9% to 35.1%, and has a mean of 8.3%. This ratio is statistically significantly different from zero using both a t-test and a nonparametric Wilcoxon z-statistic. This implies that, on average, LYONs are a nontrivial portion of the total long term debt for the sample of firms. Furthermore, the sixth row of Panel A provides the magnitude of the book amount of LYONs outstanding. The mean, minimum, and maximum amounts are $742.7 Million, $125 Million, and $3,200 Million, respectively. These amounts could lead to sizeable tax related consequences. In the seventh row of Panel A, the LYON interest expense in the upcoming year ranges from $5.6 to $63.3 million. These amounts are not trivial and could significantly affect corporate value if the associated tax deductibility is eliminated.

The remaining maturity of the LYONs has a median value of 13.5 years. Thus, the amortized OID over this period could result in a significant tax shield if no conversion into equity occurs prior to maturity. Lastly, the yield to maturity at the initial issuance also shows considerable dispersion in the rate of interest which suggests differential tax shields across the sample. In Panel B, it is clear that the sample firms come from a diverse group of industries, and the effects I document in this paper are likely not due to any industry related effects.

3.2. Empirical Methods

The sequence of events in Table I was compiled from the IDD and the New York Times. The stories from these sources either appear on the same day as

[11] Given this variation in tax rates, it is to be expected that the stock price reaction to the tax-related events should be related to this marginal tax rate.

they did in the Wall Street Journal or precede it. Consequently, the day of the story in the IDD/New York Times and the following day (two-day event windows) are taken to be the event periods for the empirical analyses.

To analyze the stock price effects for firms with LYONs outstanding, I use four methods. All methods are based on a variation of the Multivariate Regression Model (MVRM) proposed by Schipper and Thompson (1983). The MVRM is derived using the SUR methodology (Zellner, 1962). In what follows, I describe the most general method first, and then provide details on how that general method was modified across the four methods to test the robustness of the results. Standard event study methods assume that across the firms in the sample, market model residuals are independent and identically distributed. Since the event dates in this study are the same for all firms, contemporaneous cross-sectional correlation may be a potential problem. This problem arises since the assumption of independently distributed residuals implicit in standard event study methods is violated.

Cross-sectional heteroscedasticity may be another problem in this study because the magnitude of the tax shield that is affected may vary across firms. A modification of the original Schipper and Thompson (1983) method, proposed by Schipper, Thompson, and Weil (1987), that adjusts for both cross-correlation and heteroscedasticity is thus employed as the general model. This method conditions the return generating model (the market model, in this case) on the occurrence or non-occurrence of an event. This is accomplished by adding unique dummy variables to the market model that take on a unit value for each event in Table I and zero otherwise.[12] The following model was estimated using portfolio returns, R_{pt}, as shown below:

$$\begin{aligned} R_{pt} &= \alpha_p + \beta_p\, R_{mt} + \gamma_1\, IRSFILE_t + \\ &\qquad \gamma_2\, REPORT_t + \gamma_3\, PLR_t + \gamma_4\, FINAL_t + \epsilon_t \end{aligned} \tag{1}$$

[12]These dummy variables are defined later. Several other studies have used a similar structure – see, for example, Allen and Peristiani (2004), Brown, Cummins, Lewis, and Wei (2004), Chang and Nichols (1992), Espahbodi, Strock and Tehranian (1991), Foerster and Karolyi (1999), and Zhang (2005).

where R_{mt} is the return on the CRSP Value Weighted Index on day t, and α_p, β_p, and $\gamma_i, i = 1, ..., 4$ are regression coefficients to be estimated.[13]

The γ_i are estimates of the abnormal return in response to each event, i, i=1,...4. The variable $IRSFILE_t$ is a dummy variable that is zero for all days except for the two trading days beginning on November 27, 1991 (see event 1 in Table I). Recall that this is the date when Staley Manufacturing filed a petition against the IRS, and presumably the first time that the market learned of the threat to the deductibility of LYON OID. The variable $REPORT_t$ is a dummy variable that is zero for all days except for the two trading days beginning on December 16, 1991. This is the date that the IDD first reported on the Staley petition. The variable PLR_t is a dummy variable that is zero for all days except for the two trading days ending on December 23, 1991, which is the day that the IDD reported on the private letter ruling obtained by a Merrill Lynch client. Finally, the variable $FINAL_t$ is a dummy variable that is zero for all days except for the two trading days ending on January 22, 1992, which is the date that the New York Times reported that the IRS had dropped its case.

To construct the portfolio whose returns are used as the dependent variable in eq. (1), the vector of weights, $\mathbf{W}$, is obtained from an estimated sample covariance matrix, $\mathbf{S}$. This covariance matrix results from computing pair matched covariances between residuals obtained from estimating equation (1) on individual firms in the sample. This firmwise estimation is conducted using daily stock returns over a period that begins 125 days before the first event and ends 125 days after the last event in Table 1 or 282 trading days in all. The portfolio weights are then computed using:

$$\mathbf{W} = (\mathbf{\Psi}'\mathbf{S}^{-1}\mathbf{\Psi})^{-1}\mathbf{S}^{-1}\mathbf{\Psi} \tag{2}$$

where $\mathbf{\Psi}$ is a vector containing the tax shield from amortized OID arising from the LYON for each firm. An element of this tax shield vector, ψ_j, for firm j was computed as follows:

[13]The use of the Value Weighted Index appears appropriate based on Canina, Michaely, Thaler, and Womack (1998).

$$\psi_j = \left\{ \frac{k_j \times L_j}{INT91_j} \right\} \tau_j \tag{3}$$

where k_j is the effective interest rate on the zero coupon bond issued by firm j (i.e. yield to maturity computed at issuance based on issuance price less flotation costs), L_j is the dollar amount of the LYON outstanding at the end of December 1991, $INT91_j$ is the total interest expense for firm j in fiscal 1991, and τ_j is the tax rate faced by firm j. Thus, the weight, ψ_j, measures the tax shield that would be lost (as a fraction of the total interest expense for the year) if the deductibility of amortized LYON OID was denied by the IRS. In the empirical tests, I employ two proxies for the tax rate, τ_j. The first is the average tax rate obtained by dividing the taxes paid in 1991 by the earnings before taxes for 1991. The second is the post-financing marginal tax rate as per Graham (1996a, 1996b).

I provide descriptive statistics for the two variants of ψ_j – i.e. one for each proxy for the tax rate, τ_j, in Panel C of Table II. In the first row of Panel C, the mean weight is about 5.4%, which means that the tax shield offered by the LYON is about 5.4% relative to the total tax shield from interest payments. This number is higher when the Graham marginal tax rate is used. Interestingly, one of the firms in the sample had a negative average tax rate which resulted in a negative value for ψ_j. No such negative value was obtained using the Graham post-financing marginal tax rate. To estimate the regression in eq. (1), stock return data using the various weighting schemes described below were obtained for the period beginning 125 trading days before the first event date in Table I and ending 125 trading days after the last event date in Table I. Thus, portfolio returns encompass the entire sequence of events in Table I. The empirical methods proceed as follows:

Method 1

In this method, I use the average tax rate to compute ψ_j. The rest of the method proceeds as described earlier.

Method 2

In this method, I use Graham's post-financing marginal tax rate to compute ψ_j. The rest of the method proceeds as described earlier.

Method 3

In this method, the matrix $\mathbf{S}$ is assumed to contain zeroes in the off-diagonal elements, i.e. cross-sectional correlation is assumed away. The rest of the method proceeds as described earlier.

Method 4

In this method, the vector $\mathbf{\Psi}$ is assumed to be the unit vector. Specifically, this assumption implies that all firms are uniformly affected by the loss of the tax shield regardless of the tax rate that it faces or the amount of the OID on the LYON. However, cross-sectional correlation due to the same event dates is taken into account through the use of the weighting matrix $\mathbf{S}$.

Once the portfolio returns for each method are obtained, the analysis is performed using ordinary least squares, and the t-statistics use White's (1980) correction.[14]

To estimate the effect on Merrill Lynch's stock returns, I conduct a similar estimation as in eq. (1). The only difference in procedure here is that instead of portfolio returns, I use Merrill Lynch's stock returns as the dependent variable. No weighting scheme is necessary since only one firm is being analyzed.

[14]In addition to the MVRM approaches listed above, I also used a standard event study method based on Mikkelson and Partch (1988). Prabhala (1997) claims that standard event study methods are adequate compared to more elaborate approaches to detect abnormal return behavior. The results from this analyses are similar to those from the MVRM approach and are omitted for brevity.

4. Results and Discussion

4.1. Firms with LYONs Outstanding

The results from estimating eq. (1) using the four methods described earlier are provided in Table III. For the first method, the coefficient, γ_1, is significantly negative. Thus, the abnormal return associated with the loss of tax deductibility of OID for LYONs is negative.[15] This implies that the stock market views the loss of the tax shield from LYONs as detrimental for the value of the stock. This decrease in equity value is roughly on the order of 1.4% using the first method. The decline in equity value shows that tax deductibility of interest payments is an important feature of debt securities, and is priced by the market.

Further evidence consistent with this view is obtained from the positive and significant coefficient estimate, γ_3, across all four methods employed. This coefficient estimate is the abnormal return in response to the disclosure of the Private Letter Ruling that affirmed the deductibility of the LYON OID. This positive abnormal return implies that the market views the reinstatement of tax deductibility as value increasing.

It is interesting to note that the point estimate (approximately 1%) for the coefficient, γ_3, in reaction to the affirmation of tax deductibility is very close and opposite in sign to the point estimate (-1.4%) for the coefficient, γ_1, in response to the denial of tax deductibility. To further test if the symmetry between γ_1 and γ_3 is valid, I impose the restriction that:

$$\gamma_1 = -\gamma_3 \tag{4}$$

Substituting the restriction of eq. (4) into the unrestricted model of eq. (1) results in:

[15] This result is robust across the first three methods. Only in method 4 is γ_1 not significant at (at least) the .05 level. However, the coefficient is still negative and significant at the .1 level in a two-tailed test.

$$R_{pt} = \alpha_p + \beta_p\, R_{mt} + \gamma_1\, (IRSFILE_t - PLR_t) + \gamma_2\, REPORT_t + \gamma_4\, FINAL_t + \epsilon_t \quad (5)$$

I estimate the above restricted model using all four methods described earlier.[16] The results for this analyses appear in Table IV. In all four methods, the coefficient γ_1 is highly significant, which further supports the relationship between tax deductibility and equity value.

Using the regression statistics from estimation of the unrestricted model in eq. (1) and the restricted model in eq. (5), an F-statistic can be computed to see whether the restriction in eq. (4) can be rejected. For the four methods, the F-statistics are -0.77, -1.60, 3.69, and 0.00, respectively. These are all below the 0.05 and 0.01 critical values (3.84 and 6.63, respectively) for an F-statistic with (1,∞) degrees of freedom.[17] Thus, the null hypothesis of the restriction in eq. (4) cannot be rejected. This further supports the symmetry in the abnormal return to the removal of tax deductibility and the subsequent reinstatement. This symmetry in the abnormal returns to the two events is robust evidence that serves to clearly answer Graham's call for market-based research showing evidence of the positive value of tax benefits from debt financing. Specifically, there definitely is positive firm value derived from tax deductibility of interest payments on debt based on this exogenous event. Next, I provide inferences on market-value based estimates of this increase in firm value.

As mentioned previously, on the date of the initial filing for redetermination of deficiencies, the market would have inferred that there was some probability, p, that the IRS position would be upheld. Further, if there is a tax advantage to debt, and assuming that the market value of the tax shield to equity holders is VTD, the stock price reaction to the information, AR, would reflect a probabilistic loss of the tax shield, $p \times VTD$. Consequently,

[16] One of the main econometric advantages in using the MVRM approach is that hypotheses about subsets of the coefficient estimates, such as the restriction in eq. (4), can be tested.

[17] In my tests, I should theoretically be using a F distribution with (1; 281) degrees of freedom. The use of the F with (1,∞) degrees of freedom should make the rejection of the null easier. Despite this, I am unable to reject the null hypothesis of $\gamma_1 = -\gamma_3$.

we have:

$$AR = \frac{(p \times VTD)}{MVE} \tag{6}$$

where $p \in [0, 1]$, and MVE = the market value of equity of the firm. Correspondingly, VTD is:

$$VTD = \frac{AR \times MVE}{p} \tag{7}$$

Since $p \in [0, 1]$, the lower bound on VTD occurs when $p = 1$. Therefore, using $p = 1$, and given that I have estimates of the market reaction, AR, and the pre-event Market Value of Equity, MVE, I can compute the lower bound on the equity value of tax implications on debt. The mean of the absolute value of γ_1 and γ_3 is 1.075%; these is my estimate for AR. Applying this estimate to the median equity value (i.e., the variable MVE) of the sample of \$3021.6 Million implies that the equity value associated with deductibility of LYON OID is \$32.5 Million. From Table II, the median LYON face value is \$601 Million, the median remaining maturity is 13.5 years, and the median yield to maturity is 7.25%. Using these three figures, the median debt outstanding (in present value terms, i.e., the accreted value of the LYON since its initial issuance) is \$233.6 Million. Therefore, under the assumption of $p = 1$, the change in equity value of \$32.5 Million relative to this median debt value of \$233.6 Million is 13.9% or \$0.139 per dollar of debt outstanding, which constitutes the lower bound on the equity value derived from the tax benefits of debt.

Graham (2005) states that Engel, Erickson, and Maydew (1999) estimate the value of tax deductibility to be \$0.28 per dollar of face value for MIPs while Irvine and Rosenfeld (2000) estimate it at \$0.26. My estimate of \$0.139 in this study is lower than both the above mentioned estimates for MIPs.[18]

[18]If I assume a value of $p = 0.5$, i.e, a naive prior for the probability that the IRS position will be upheld, I obtain a value of \$0.278 per dollar of debt, which is comparable

This difference may arise because (a) my estimate is a lower bound based on probability that the market believes the IRS position will prevail in court, (b) LYONs are convertible whereas MIPs are not, and (c) LYONs are debt securities while MIPs are preferred stock. The issue underlying the lower bound has already been fully discussed earlier. I now discuss the two latter points. First, the conversion feature may result in the LYON being shorter lived than the full stated maturity. As a result, the value of tax deductibility could be less than for MIPs.[19] Second, LYONs are not default free, and therefore, vulnerability to bankruptcy reduces the value of tax deductibility from LYONs as compared to MIPs. This is because preferred stockholders cannot force bankruptcy, while debtholders can. Despite the fact that I am able to only provide a lower bound estimate of the equity value implicit in tax deductibility of interest payments, I am the first to conclusively demonstrate using a natural experiment, that equity value is enhanced by tax deductibility of interest payments. This evidence, in and of itself, is a significant contribution since this natural experiment is free of any endogeneity biases and information effects due to firms being first-movers in standard debt-issuance / exchange-offer events.

4.2. Private Letter Ruling Effect

In Table III, all four methods demonstrate robustly that the γ_3 coefficient is positive and significant. This coefficient is the abnormal return to the disclosure that a client of Merrill Lynch had obtained a private letter ruling affirming the deductibility of LYON OID. This abnormal return evidence for the whole portfolio is not driven by any one firm. I confirmed this by estimating eq. (1) using a procedure where I dropped each firm and used the remaining firms in the estimation. I repeated the process until each firm had sat out once from the estimation. For each of these 46 estimations, the γ_3 coefficient was always positive and significant. The minimum t-statistic on the γ_3 coefficient among the 46 values was 2.05 – significantly positive at the .05 level in a two-tail test.

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to values reported in Engel et al (1999) and Irvine and Rosenfeld (2000). However, unlike those studies, my resuls are from an exogenous event.

[19]This argument is not valid if the firm reissues new LYONs to replace the one that is converted into stock.

This result shows that the market behaves as though the PLR is applicable to all firms with LYONs outstanding even though the IRS specifically states that a PLR is applicable only to the entity that requests it. In other words, the market regards a PLR to be generalizable to other firms in a similar situation. I suggest that it is the LYON's standardized structure that provides this generalizability. Thus, the standardization of features for a security helps in removing perceived ambiguity about regulations pertaining to the security.

4.3. Effect on Merrill Lynch

The results pertaining to Merrill Lynch's stock price response appear in Table V. On the date when the Staley Manufacturing petition was filed in federal tax court (event 1 in Table I), there is a stock price response of -1.9% which is statistically significant. This decline in the stock price of Merrill Lynch may arise because the market infers that Merrill Lynch is going to earn lower revenues from underwriting LYON issuances as firms shy away from this tax-disadvantaged financing vehicle. This is only valid if ***financing choices of corporations are dependent on tax benefits***.

Later, in response to the IDD report on the private letter ruling received by one of Merrill Lynch's clients affirming the tax shield's status, there is a statistically significant positive abnormal return of 3.4% in Merrill Lynch's stock. A possible explanation here is that the market revises its beliefs regarding the magnitude of underwriting revenues to be earned from future LYON issuances. Specifically, the market infers that the tax shield's affirmation may encourage more firms to issue LYONs. This is the reverse of what happens when the threat to the tax shield was disclosed (Event 1). The significant stock price reactions to the possible removal and the subsequent affirmation of the tax shield imply that the market views taxes to be relevant for corporate financing decisions. Furthermore, the stock price responses also show that financial innovations are not "neutral mutations" but are valuable to the originator. The removal of an innovation's feature may be detrimental to the value of the instrument as a revenue generator.

5. Summary

In this paper, I examine a sequence of events where a corporate debt tax shield faces the prospect of removal but the adverse decision is reversed and the tax deductibility of the tax-shelter is subsequently affirmed. Since these events are initiated by the IRS and not the borrowing firms, they are devoid of self-selection and endogeneity biases that may be ascribed to managerial intent or objectives. The natural experiment setting of this study satisfies the design requirements and research conditions called for in Graham (2005). I demonstrate that there is a loss in value when the tax shield is threatened, and restored subsequently when the threat is eliminated. This symmetry in the stock market response is robust evidence of the importance of the tax deductibility of interest in valuation. My estimate of the equity valuation effect of tax deductibility for LYONS has a lower bound of \$0.139 per dollar of debt outstanding which is lower than the value of \$0.26 for MIPs reported by Irvine and Rosenfeld (2000). However, it is important to realize that my estimate is a lower bound based on the probability implicit in the IRS's position prevailing in court. Further, the value differential may be due to bankruptcy risk that is associated with LYONs (which is essentially debt), but not with MIPs (which is preferred stock).

This paper also addresses the issue of the role of IRS private letter rulings in resolving tax uncertainty and the associated impact on security prices. This aspect has not been examined in the literature and consequently, the paper seeks to enhance our knowledge in this area. The official IRS position is that a private letter ruling is applicable only to the firm that obtained it. Contrary to this, I report evidence that supports the hypothesis that private letter rulings exert an effect on firms in general, and not just the firm that obtained the private ruling. The market may use the private letter ruling to conditionally revise its beliefs regarding the after tax cash flow stream of all LYON issuers. I also provide evidence that supports the view that taxes and corporate financing decisions are related by examining the impact on the investment banker that dominates the market share for LYONs. Finally, the paper supports the contention that financial innovations have valuation implications for the originator. Specifically, investment banker stock is priced taking into consideration the future earnings potential of their innovations.

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Table I
Sequence of Events Examined

The events below were compiled from Investment Dealers Digest and the New York Times. The stories from these sources either appear on the same day as they did in the Wall Street Journal or precede it.

Event	Date	Description
1	Nov 27, 1991	Case filed by Tate & Lyle PLC, acquirer of Staley Manufacturing in federal tax court for redetermination of deficiencies. Public first learns of the impending loss of tax shields from LYONs.
2	Dec 16, 1991	Investment Dealers Digest reports on the event above
3	Dec 23, 1991	Investment Dealers Digest reports that Merrill Lynch has obtained a Private Letter Ruling from the IRS affirming the tax deductibility of original issue discount. However the identity of the client and the text of the ruling are unavailable.
4	Jan 22, 1992	The New York Times reports that the IRS has filed to dismiss the case against Staley Manufacturing, and has withdrawn all objections to the tax deductibility for original issue discounts on LYONs.

Table II
Sample Details

The sample consists of firms with LYONs and LYON-like securities outstanding as of December 31, 1991 as confirmed using Moody's Bond Record. Out of 48 such firms, stock return data were available for 46 firms. The results below apply to this 46 firm sample and are computed using data for fiscal 1991 obtained from COMPUSTAT, and augmented using Moody's Bond Record, CRSP daily stock files, and issuance prospectii.

Panel A. Descriptive Statistics on Firms and Bonds

Measure	Number of observations	Mean	Median	Minimum	Maximum	Standard Deviation
Total Assets ($ million)	46	7253.2	3012	258.1	39195.3	9077.3
Market Value of Common Equity[a] ($ million)	46	5416.3	3021.6	148	31296.6	6515
Long Term Debt Ratio[b]	46	0.329	0.3	0.044	0.982	0.202
Marginal Tax Rate (from Graham simulation[c])	40	0.27	0.34	0.00	0.34	0.12
LYON as fraction of long term debt	46	0.083	0.063	0.009	0.351	0.07
Amount of LYON outstanding ($ million)	46	742.7	601	125	3,200	558.5
Amortized Interest Expense for next year from LYONs ($ million)	46	18.90	16.20	5.60	63.30	12.20
Remaining Maturity (1992=first year)	46	14.10	13.50	3.00	20.00	3.24
Yield to Maturity (original issue)	46	7.236%	7.25%	5.5%	9.0%	0.91%

[a] Measured 7 calendar days before the first event.
[b] Computed as the ratio of long term debt to total assets.
[c] The number of firms with Graham's tax rate measure is 40 whereas the total number of firms with all other available data is 46.

Table II cont'd
Sample Details

Panel B. Composition of Sample by Industry

SIC Codes in	Frequency
1000 - 1999	7
2000 - 2999	8
3000 - 3999	7
4000 - 4999	11
5000 - 5999	5
6000 - 6999	3
7000 - 7999	3
8000 - 8999	2
Total sample	46

Panel C. Descriptive Statistics for ψ_j, Weights Used in Regressions

Measure	Number of observations	Mean	Median	Minimum	Maximum	Standard Deviation
Using average tax rate computed as tax expense for 1990 divided by taxable income in 1991	46	0.054	0.039	-0.425	0.664	0.145
Using Graham's post-financing marginal tax rate	40	0.072	.0410	0.000	0.620	0.109

Table III
Returns on Event Dates - Full Model

The sample consists of firms with LYONs and LYON-like securities outstanding as of December 31, 1991 as reported in Moody's Bond Record. Out of 48 such firms, stock return data was available for 46 firms. For this 46 firm sample, the estimations below are performed using portfolio returns, R_{pt}, computed from the individual firmwise daily stock returns. Each method uses its own unique weighting scheme to compute the portfolio return. Methods 1 and 2 use a weighting scheme that incorporates (a) the cross-sectional correlation between the stocks, and (b) the unique tax shield that each firm stands to lose or gain from the LYON. In Method 1, the tax rate used to calculate the tax shield for (b) above is the average tax rate, whereas in Method 2, Graham's post-financing marginal tax rate is employed. Method 3 incorporates (a) but not (b). Method 4 is the exact opposite of Method 3 and uses the average tax rate. The estimations use data over a period that begins 125 days before the first event and ends 125 days after the last event, and take the following form:

$$\mathrm{R}_{pt} = \alpha_p + \beta_p \; R_{mt} + \gamma_1 \; IRSFILE_t + \gamma_2 \; REPORT_t + \gamma_3 \; PLR_t + \gamma_4 \; FINAL_t + \epsilon_t$$

The $\gamma_i, i \in (1, ..., 4)$ represent the abnormal returns over the various two day periods associated with the events in Table I. Estimations are performed using OLS and t-statistics employ White's (1980) correction.

Method	Regression Coefficient and t-statistic in Parenthesis						Adjusted R^2	F-statistic
	α_p	β_p	γ_1	γ_2	γ_3	γ_4		
1	-0.001 (-3.886)***	1.025 (16.943)***	-0.014 (-3.580)**	0.00 (0.109)	0.010 (2.636)**	-0.003 (-0.775)	0.5175	62.566***
2	-0.001 (-3.270)**	0.996 (16.217)***	-0.016 (-3.968)***	0.00 (-0.083)	0.010 (2.420)*	-0.004 (-0.948)	0.4983	58.022***
3	-0.001 (-3.350)**	1.018 (16.040)***	-0.016 (-4.000)***	0.001 (0.210)	0.009 (2.290)*	-0.004 (-0.980)	0.4923	56.660***
4	-0.001 (-3.340)**	0.890 (22.430)***	-0.005 (-1.830)	-0.002 (-0.700)	0.006 (2.21)*	-0.004 (-1.76)	0.6445	105.080***

*, **, and *** : significant at the .05, .01, and .0001 levels, respectively in a two tailed test.

Table IV
Returns on Event Dates - Restricted Model

The sample consists of firms with LYONs and LYON-like securities outstanding as of December 31, 1991 as reported in Moody's Bond Record. Out of 48 such firms, stock return data was available for 46 firms. For this 46 firm sample, the estimations below are performed using portfolio returns, R_{pt}, computed from the individual firmwise daily stock returns. Each method uses its own unique weighting scheme to compute the portfolio return. Methods 1 and 2 use a weighting scheme that incorporates (a) the cross-sectional correlation between the stocks, and (b) the unique tax shield that each firm stands to lose or gain from the LYON. In Method 1, the tax rate used to calculate the tax shield for (b) above is the average tax rate, whereas in Method 2, Graham's post-financing marginal tax rate is employed. Method 3 incorporates (a) but not (b). Method 4 is the exact opposite of Method 3 and uses the average tax rate. The estimations use data over a period that begins 125 days before the first event and ends 125 days after the last event, and take the following form:

$$\mathrm{R}_{pt} = \alpha_p + \beta_p \; R_{mt} + \gamma_1 \; (IRSFILE_t - PLR_t) + \gamma_2 \; REPORT_t + \gamma_4 \; FINAL_t + \epsilon_t$$

The variables $IRSFILE_t, PLR_t, REPORT_t$, and $FINAL_t$ are dummy variables that take a value of one when day t is in a two day interval surrounding the various events depicted in Table I, and zero otherwise.

Method	Regression Coefficient and t-statistic in Parenthesis					Adjusted R^2	F-statistic
	α_p	β_p	γ_1	γ_2	γ_4		
1	-0.0013 (-4.02)***	1.026 (17.02)***	-0.0121 (-4.45)***	0.0006 (0.160)	-0.003 (-0.790)	0.520	78.89***
2	-0.0012 (-3.450)**	0.995 (16.35)***	-0.0124 (-4.54)***	-0.002 (-0.050)	-0.004 (-0.950)	0.503	73.59***
3	-0.0012 (-3.490)**	1.013 (15.99)***	-0.0127 (-4.46)***	0.009 (0.220)	-0.004 (-0.970)	0.492	70.36***
4	-0.001 (-3.340)**	0.890 (22.53)***	-0.0051 (-2.88)**	-0.002 (-0.710)	-0.005 (-1.770)	0.646	131.81***

*, **, and *** : significant at the .05, .01, and .0001 levels, respectively in a two tailed test.

Table V
Merrill Lynch Results

The OLS regression is performed using the daily stock returns for Merrill Lynch, $R_{ML,t}$ as the dependent variable. The estimation uses data over a period that begins 125 days before the first event and ends 125 days after the last event in Table I, and takes the following form:

$$\mathrm{R}_{ML,t} = \alpha_{ML} + \beta_{ML}\ R_{mt} + \gamma_1\ IRSFILE_t + \gamma_2\ REPORT_t + \gamma_3\ PLR_t + \gamma_4\ FINAL_t + \epsilon_t$$

The $\gamma_i, i \in (1, ..., 4)$ represent the abnormal returns over the various two day periods associated with the events in Table I. Estimation is performed using OLS and t-statistics employ White's (1980) correction.

Regression Coefficient and t-statistic in Parenthesis						Adjusted R^2	F-statistic
α_{ML}	β_{ML}	γ_1	γ_2	γ_3	γ_4		
-0.0019 (-1.688)	2.1011 (9.940)***	-0.0193 (-4.256)**	-0.0132 (-.623)	0.0343 (2.05)*	0.0159 (1.673)	0.2765	22.93***

*, **, and *** : significant at the .05, .01, and .0001 levels, respectively in a two tailed test.