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Abstract

We examine the effect of bankruptcy risk and leverage on corporate incentives to shelter income from taxes. We derive the optimal level of sheltering for a levered firm in a two-date, single-period model in which a firm's perquisite-consuming manager with an equity stake in the firm maximises her/his payoff. The theory predicts that sheltering relates negatively to bankruptcy risk, leverage, and the manager's bankruptcy costs, and it relates positively to the manager's equity stake in the firm. Moreover, the theory predicts that the negative relation between leverage and sheltering becomes weaker as the manager's equity stake increases. Our empirical tests provide evidence that is consistent with these theoretical predictions. Leverage and bankruptcy risk relate negatively to sheltering, whereas greater managerial ownership increases sheltering and weakens the negative sheltering-leverage relation. Further, we show that the negative effects of bankruptcy risk and debt on sheltering are stronger for riskier firms and weaker for larger, better governed, more profitable firms, and for firms that are in the public eye. We show that while a change in bankruptcy law in 2005 that enhanced creditor rights in the event of bankruptcy decreased the sheltering levels, it weakened the negative sheltering-leverage relation. Finally, our analysis indicates that tax sheltering reduces firm value.

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Debt, Bankruptcy Risk, and Corporate Tax Sheltering

Any one may so arrange his affairs that his taxes shall be as low as possible; he is not bound to choose that pattern which will best pay the Treasury; there is not even a patriotic duty to increase one's taxes.

Judicial Opinion, Judge Learned Hand, Helvering v. Gregory, 69 F.2d 809, 810-11 (2d Cir. 1934)

Over and over again courts have said that there is nothing sinister in so arranging one's affairs as to keep taxes as low as possible. Everybody does so, rich or poor; and all do right, for nobody owes any public duty to pay more than the law demands: taxes are enforced exactions, not voluntary contributions.

Judicial Opinion, Judge Learned Hand, Commissioner v. Newman, 159 F2d 848 (1947)

1. Introduction

The incentive to avoid paying income taxes is understandable since more than a third of a firm's profits could potentially be taken away by the state through taxes. Over the last two decades, U.S. corporations have turned their tax departments into active profit centres with annual targets for effective tax rates and tax savings (Clark et al., 2000; Hollingsworth, 2002); therefore, determining ways to shelter income in order to avoid taxes is the primary activity of these departments. Theoretical papers that examine a firm's optimal level of income sheltering (e.g., Slemrod, 2004; Desai and Dharmapala, 2009) typically consider an all-equity firm that offsets the tax benefits of sheltering with the expected costs of sheltering. Sheltering activities need not necessarily be deemed illegal by regulatory authorities. Therefore, the expected costs of sheltering are determined by the probability of detection, the potential penalties if found guilty, and the loss of reputation and prestige. In this paper, we consider a levered firm and examine the role of bankruptcy risk on the determination of its level of tax sheltering. The rationale is that when firms enter bankruptcy (or possibly even simply experience financial distress), they are subject to greater scrutiny by creditors, regulators, and even the media, which should reveal sheltering activities. We propose that bankruptcy risk acts as a deterrent to the sheltering of income from taxes.

A firm's bankruptcy risk can increase if it takes on more debt in its capital structure and/or invests in assets that generate riskier cash flows. In order to assess the effects of both these aspects of bankruptcy risk, we theoretically and empirically examine how a firm's level of sheltering relates to the level of debt in its capital structure as well as to its probability of default. We extend the existing theoretical frameworks that model an all-equity firm by

considering a levered firm, which enables us to introduce bankruptcy risk into the analysis; we show that greater bankruptcy risk may be associated with a firm's optimal level of sheltering. In addition to affecting a firm's sheltering level through bankruptcy risk, there are other ways in which the presence of risky debt in the firm's capital structure can affect its ability to shelter income. First, interest payments on debt reduce taxable income and thereby reduce the incentive to shelter income. Second, since the benefits of sheltering do not accrue in bankruptcy, there are fewer states in which the firm can shelter income. Third, since creditors such as banks and institutional debtholders monitor the activities of a firm, the ability of the firm to shelter income is likely to be reduced. We attempt to include bankruptcy risk and these aspects of debt financing in our theoretical and empirical analyses.

We derive the optimal level of sheltering for a firm with a given level of debt in a simple two-date, single-period model in which a firm manager with an equity stake in the firm maximises her/his payoff. The debt in the firm is risky; therefore, bankruptcy is possible. We assume that bankruptcy is more costly to the manager since she/he bears additional personal and possibly non-pecuniary costs if the firm goes bankrupt. Further, only the manager observes the true cash flow; others observe only the cash flow that is reported by the manager.

We assume that the manager determines *ex ante* the optimal amount to shelter in the next period. This assumption is reasonable since shelters are sophisticated financial products that require considerable time to materialise and generate benefits. The sheltering decision is made before the cash flows are realised; moreover, outsiders (including debtholders) observe only the reported cash flows that have been reduced by sheltering. Therefore, greater sheltering increases the number of states in which the firm is bankrupt. Further, all sheltering activities would be revealed if the firm went bankrupt, and all the benefits from sheltering would be lost.[1]

The firm's manager owns an equity stake in the firm. Thus, she/he can shelter income from taxes, which would benefit all the shareholders; however, she/he can also divert part of the sheltered income for her/his sole use. We assume that diversion by the manager happens only out of sheltered income and that bankruptcy is more costly to the manager. Therefore, on the

[1] There are several reasons to assume that it is difficult for the manager or the firm to retain the benefits of sheltering in a state of bankruptcy. First, in bankruptcy, all payments to the firm's executives become subject to the approval of the bankruptcy court. Further, since the IRS is a senior claimant on the assets of the bankrupt firm, taxes shown to be "evaded" must be returned to the IRS, i.e., there can be no waiver of such dues. Second, anecdotal evidence indicates that bankrupt or financially troubled firms (e.g., Enron) are subject to greater scrutiny; therefore, it is likely that tax avoidance activities will be revealed.

one hand, the manager would want to shelter more in order to be able to divert more; on the other hand, she/he must shelter only up to the point where the risk of bankruptcy is not too high. Thus, the optimal sheltering level chosen by the manager is a trade-off between the costs associated with the increased likelihood of bankruptcy and her/his benefits in the form of tax savings (accruing to her/him because she/he owns equity) as well as diverted income.

We show that the optimal level of sheltering decreases with the level of debt as long as the increase in the likelihood of bankruptcy is sufficiently high. Further, we show that the optimal level of sheltering in a levered firm increases with the manager's equity ownership only as long as the increase in the likelihood of bankruptcy is not too high. An increase in the manager's personal costs in bankruptcy, however, unconditionally reduces tax sheltering. We obtain these three results in a setting with minimal restrictions on a firm's cash flow distribution. We then assume that the firm's cash flows are uniformly distributed, which allows us to explicitly determine the optimal sheltering level and demonstrate a key result of our paper, namely, that an increase in bankruptcy risk reduces the optimal level of sheltering. Further, we show that increasing the manager's equity stake in the firm weakens the effect of debt on sheltering. In other words, the negative relation between debt and sheltering becomes less negative as the manager's equity ownership increases.

We test all the predictions of our theory on a large sample of U.S. firms over the period 1986–2012; we find the results are largely consistent with our predictions. We find that the level of sheltering relates negatively with leverage and the manager's bankruptcy costs; however, it increases with the alignment incentives of the firm's CEO. Further, our analysis indicates that, in general, tax sheltering activities reduce firm value.

Our theoretical framework assigns a crucial role to bankruptcy risk, and our empirical analysis includes a number of tests to validate this role. Since leverage may affect sheltering through channels others than bankruptcy risk, we construct a variable that measures a firm's bankruptcy risk more directly, namely, a firm's probability of default using the method proposed in Bharath and Shumway (2008). In support of our framework, we find strong evidence of a negative relation between sheltering and the probability of default. In further support of the importance of bankruptcy risk, we find that the negative effects of the probability of default and debt on sheltering are significantly amplified in firms that have riskier cash flows. Additionally, we find that the negative leverage-sheltering relation is weaker for larger, better governed, and more profitable firms as well as for firms that are in the public eye.

The negative effects of leverage and the probability of default on sheltering are robust to alternative measures of sheltering and leverage as well as to the inclusion of firm and industry fixed effects to control for endogeneity arising from time-invariant unobserved variables. To show that these relations are also robust to corrections for endogeneity arising from time-varying unobserved variables, simultaneity of leverage and tax sheltering, and reverse causality, we show that they hold in a quasi-natural experimental setting that uses changes in the U.S. Bankruptcy Code, i.e., the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005. This Act heightened the scrutiny of firms in distress/bankruptcy and increased creditor power, which improved creditors' expected cash flows during bankruptcy. We argue that the passage of the BAPCPA produced two effects. First, greater scrutiny brought about by the Act had the direct effect of reducing tax sheltering by firms. Our empirical tests offer strong support for this hypothesis as we find a significant decline in the level of sheltering in the years after the BAPCPA was passed (henceforward, "post-BAPCPA years").

Second, we hypothesise that since the BAPCPA improved the value of creditors' claims during bankruptcy, it reduced the creditors' incentives to monitor firms. The underlying rationale is that creditors are much more concerned about the value of a firm's assets during a state of bankruptcy than during non-bankruptcy. Thus, by improving their claims during bankruptcy, the BAPCPA reduced the creditors' incentives to monitor firms. In support of this hypothesis, we find that while the BAPCPA reduced the level of sheltering, it also weakened the efficacy of debt as a monitoring mechanism. We show that the negative relation between leverage and sheltering became less negative in the post-BAPCPA years. Further, we find that the negative relation between the probability of default and sheltering is unaffected by the passing of the BAPCPA. Since the probability of default is less likely to be linked to monitoring, this finding offers (indirect) support for our hypothesis that the creditors' incentive to monitor was lower after the BAPCPA was passed.

The term tax sheltering has specific connotations in our setting. Hanlon and Heitzman (2010) define tax avoidance to be a continuum of activities that enable corporations to reduce taxes. At one extreme of this continuum are perfectly legal activities (such as the purchase of tax-exempt bonds); at the other end, are egregiously abusive tax-saving transactions (such as the use of prohibited tax-shelter products, transfer mispricing etc.), which will certainly result in fines and penalties if detected by the IRS. The activities that we refer to as tax sheltering fall between these two extremes. These activities are generally based on a weaker set of facts and

are often undertaken after a rigorous reading of the tax laws. Therefore, it is *a priori* not clear whether these activities will be deemed illegal or even detected.[2]

The main contribution of our paper is to highlight the roles of bankruptcy risk and corporate leverage as significant determinants of tax sheltering. Additionally, we explicitly consider a manager's incentives to divert a portion of the sheltered income for personal consumption. To the best of our knowledge, there is no theoretical paper that considers both these aspects. Slemrod (2004) was one of the first theoretical papers to highlight the need for analysing the corporate tax avoidance decision in an agency-theoretic framework; however, this study did not consider the role of debt.[3] Desai et al. (2007) presented a theoretical framework to explain the cross-sectional variation in managerial diversion. Since they modelled an all-equity firm, they could not offer insights into the effects of bankruptcy and shareholder-bondholder agency problems on tax aggressiveness. While Joulfaian's working paper (2011) di include debt in the analysis, it ignored the shareholder-bondholder agency problem. Desai and Dharmapala (2009) analysed tax avoidance as a function of the efficacy of a firm's corporate governance; however, they did so from the perspective of all-equity firms alone.

Our empirical analysis contributes to the existing literature in two ways. First, we are not aware of any empirical study that considers the role of bankruptcy risk in tax sheltering. Ours is likely the first study to show that there is a negative relation between tax sheltering and bankruptcy risk as measured by a firm's probability of default. Second, prior empirical studies generally included leverage only as a control variable to explain the cross-sectional determinants of tax avoidance/aggressiveness; therefore, there is only indirect evidence about how the presence of debt affects sheltering.[4] Further, the existing evidence is mixed. For example, Rego and Wilson (2012) found that firms with high leverage ratios are associated

[2] Corporate tax shelters are examples of tax aggressiveness. The U.S. Government Accountability Office defines abusive tax shelters as "very complicated transactions promoted to corporations and wealthy individuals to exploit tax loopholes and provide large, unintended tax benefits." The IRS detects such a shelter only after it has been used by many and has resulted in significant reduction in tax collection.

[3] Following Slemrod (2004), Chen and Chu (2005) studied corporate tax evasion and showed that when avoidance is costly to the manager, the optimal wage contract of the principal-agent framework turns out to be inefficient. Crocker and Slemrod (2005) used a costly state falsification framework and demonstrated that penalties on tax evasion imposed directly on the tax manager are more effective in curbing evasion that those imposed on the firm.

[4] Hasan et al. (2013), however, considered a rather different aspect of the relation between leverage and tax avoidance. Their study showed that firms that have higher levels of tax avoidance incur a higher cost for bank debt. While the negative effect of debt on tax avoidance that we show is not inconsistent with the finding reported in Hasan et al. (2013), our approach differs from theirs in an important way. We propose and empirically show that higher leverage results in lower tax aggressiveness, whereas Hasan et al. (2013) implicitly assumed the opposite direction of causality. While these two approaches are not mutually exclusive, we believe that a firm's capital structure is likely to be a long-term decision whereas tax avoidance decisions will vary from period to period. In other words, it is more likely that the managers take decisions related to tax avoidance activities taking the firm's leverage for granted.

with lower effective tax rates, which is consistent with higher tax avoidance. Wilson (2009) and Lisowsky (2010), on the other hand, provided evidence that tax shelter firms are associated with lower leverage ratios. Our empirical findings add several empirical insights to this strand of literature. First, we provide strong evidence for a negative relation between tax sheltering and leverage. Second, by showing that the negative leverage-sheltering relation is weaker for high-risk firms, we highlight the importance of bankruptcy risk as a channel by which leverage affects sheltering.

Our study also contributes to the literature that examines the relationship between corporate governance and tax avoidance.[5] Following Slemrod (2004), there were several papers on the interaction of firm-level corporate governance with the decision to avoid taxes (e.g., Desai and Dharmapala, 2006; Desai et al., 2007; Armstrong et al., 2012; Rego and Wilson, 2012). Citing examples of firms such as Enron, Parmalat, and Tyco, researchers have argued that strong complementarities exist between tax avoidance and managerial rent-seeking behaviour. The cost of indulging in one reduces the cost of the other (Desai, 2005; Desai and Dharmapala, 2006; Desai et al., 2007). Desai and Dharmapala (2009) addressed the issue of whether tax avoidance activities advance shareholders' interests. They argued that while tax avoidance may enhance shareholder value by saving tax outflows, such savings may be offset by higher opportunities for managerial diversion of the firm's resources. Further, they suggested that better-governed firms are more likely to be able to retain the benefits of tax avoidance. Their empirical tests support the hypothesis that tax avoidance enhances firm value only in well-governed firms. This is consistent with Wilson's (2009) finding that the benefits of engaging in tax shelters accrue only to the shareholders of well-governed firms. Some researchers propose that firms, like individuals, differ in their preferences for undertaking risky tax avoidance, and they have stressed the need to identify the determinants

[5] The link between tax avoidance and corporate governance dates back to the year 1909, when corporate income tax was introduced in the U.S. One of the key reasons for introducing the new tax on corporate income was to address corporate governance issues. There were concerns that corporations would not provide accurate financial information to shareholders as there was a marked absence of effective corporate governance mechanisms. Since tax returns had to be filed on a regular basis, the verification of a firm's true income became much easier (at that time, tax returns were public documents). President William Taft, in his June 16, 1909 speech on the introduction of corporate taxation said, "Another merit of this tax (the federal corporate excise tax) is the federal supervision which must be exercised in order to make the law effective over the annual accounts and business transactions of all corporations. While the faculty of assuming a corporate form has been of the utmost utility in the business world, it is also true that substantially all of the abuses and all of the evils which have aroused the public to the necessity of reform were made possible by the use of this very faculty. If now, by a perfectly legitimate and effective system of taxation, we are incidentally able to possess the Government and the stockholders and the public of the knowledge of the real business transactions and the gains and profits of every corporation in the country, we have made a long step toward that supervisory control of corporations which may prevent a further abuse of power."

of tax avoidance (Slemrod, 2004; Hanlon and Heitzman, 2010). Our study contributes to this literature by highlighting the role of leverage as an important determinant of tax aggressive behaviour.

Our findings on the relation between managerial equity ownership on tax sheltering add to the literature by highlighting the importance of debt in this relationship. Desai and Dharmapala (2006) found that higher incentive compensation reduces tax avoidance and that this relationship is driven primarily by poorly governed firms. This is in contrast to the findings of Hanlon et al. (2005) and Rego and Wilson (2012), who reported a positive association between equity risk incentives and tax aggressiveness but found no variation in terms of firm-level corporate governance. Armstrong et al. (2012) provided evidence that a CEO's equity risk incentives are positively associated with tax avoidance primarily in the right tail of the tax avoidance distribution. Our findings add to this literature by showing that the negative leverage-sheltering relation is weaker when the CEO has greater alignment incentives; further, alignment incentives appear to have no effect on sheltering in the absence of debt.

Finally, our empirical results contribute to the literature on the role of debt as a monitoring mechanism. Debt helps to discipline management because default allows creditors the right to force the firm into bankruptcy (Harris and Raviv, 1990). Prior studies have shown that while bankruptcy is costly to the firm (Ang et al., 1982; Altman, 1984; Lawless and Ferris, 1997; Altman and Hotchkiss, 2006), it is "costlier" to the manager because she/he bears non-pecuniary costs (Gilson, 1989; Gilson and Vetsuypens, 1993; Hotchkiss, 1995; Ayotte and Morrison, 2009). Some studies examined the monitoring role of debt and debtholders' involvement in firm governance (Gilson, 1989; Gilson and Vestyupens, 1993; Kroszner and Strahan, 2001; Nini et al., 2012). Our finding that the presence of debt is associated with lower levels of tax sheltering identifies another aspect of the monitoring role of debt.

The rest of this paper is organised as follows: Section 2 presents the model, Section 3 discusses the data sources, Section 4 presents the univariate statistics, Section 5 summarises the empirical results, and Section 6 offers some concluding remarks.

2. The Model

Consider an all-equity firm that has access to an investment opportunity that requires an investment of I at time $t = 0$, which we assume must be raised through debt with face value

D. The debt must be repaid at time $t = 1$, when the payoffs from the investment are realised and the firm ceases to exist. Debt is risky since the payoff y may not be sufficient to repay the debt in full. For simplicity and given the single-period framework, we assume that default leads to bankruptcy and necessarily implies liquidation under Chapter 7 of the U.S. Bankruptcy Code, and that reorganisation under Chapter 11 is not feasible. All agents are risk neutral, and the risk-free rate is zero.

The stochastic payoff from investing I is y, which has a cumulative distribution function $F(.)$ and a density function $f(.)$. We assume that the cash flow y from the project is uniformly distributed over the interval $[(a - \theta), (a + \theta)]$, where a is the expected value and θ the dispersion parameter. For $(a - \theta) < y < (a + \theta)$, the density function $f(.)$ *is* $1/\theta$, the cumulative density function $F(y \leq x)$ is $[x - (a - \theta)]/\theta$, and the hazard function $h(x)$ is $1/\{(a + \theta) - x\}$. We assume that $D < (a - \theta)$, so that without sheltering, the firm never defaults. Further, we assume that the *true* payoff y is observable to the manager alone. This is an important assumption; without it, the manager will not have the incentive to shelter income from taxes and/or divert funds for personal consumption because these activities will be readily detected. This assumption is common in models of agency (Grossman and Hart, 1982) and the literature on tax avoidance (Crocker and Slemrod, 2005; Desai and Dharmapala, 2006; Desai et al., 2007). Additionally, we assume that all the other agents (shareholders, debtholders, and the taxing authority) observe only the income that the manager reports. This assumption implies that bankruptcy occurs when the reported income is lower than the promised repayment to the debtholders.

The presence of corporate taxation at the rate t reduces the payoff to equity, which creates incentives to shelter some part of the firm's taxable income. Let S denote the dollar amount to be sheltered at time $t = 1$, and assume that it is determined by the manager at time $t = 0$ based on her/his expectations of the future cash flow y and the probability of bankruptcy. Once the payoff y is realised at $t = 1$, the manager shelters the amount S and uses the remaining cash flow $(y - S)$, which is the reported income, to pay the debtholders. In other words, the firm goes bankrupt if and only if $y < S + D$.[6] Thus, the cumulative density function $F(y \leq S + D) = [(S + D) - (a - \theta)]/\theta$ represents the probability that the firm goes bankrupt. Since only the reported income $(y - S)$ is available for paying the bondholders, sheltering increases the number of states in which the firm is bankrupt.

[6] We note here that our results hold good if we define s as a proportion of y.

The extant literature (e.g., Desai et al., 2007) generally assumes that sheltering is detected with some probability, and if it deemed to be illegal, entails costs in the form of penalties. We assume that sheltering is detected and deemed illegal with probability $\gamma \in [0,1]$. We further assume that if caught sheltering, the firm has to give back all the sheltered amount and pay a penalty that is proportional to the sheltered amount; the penalty is defined as $P_F = p_F * s$, where $p_F \in [0,1]$. Further, the manager has to pay a penalty $P_M = p_M * s$, where $p_M \in [0,1]$. Since our objective is to examine the effect of bankruptcy risk on sheltering, we sharpen the focus on bankruptcy by assuming that sheltering is detected with certainty and that the benefits of sheltering are lost if a firm declares bankruptcy. In other words, when the firm enters bankruptcy, the subsequent scrutiny by tax authorities identifies sheltering with certainty. As a result, the sheltered income needs to be used to pay the unpaid taxes (due to sheltering) and any failure-to-pay penalties that the tax code may impose. The loss of sheltering proceeds in the bankruptcy state imposes a cost on sheltering as sheltering increases the number of states in which the firm goes bankrupt and sheltering benefits are lost. In other words, the benefits of sheltering exist only in the non-bankruptcy states (if the firm is not caught sheltering).[7] In order to keep the analysis simple enough to draw inferences regarding optimal sheltering, we assume that in bankruptcy, after paying back taxes and the failure-to-pay penalties, there is nothing left over from the detected sheltered income to pay the debtholders.

We assume that the manager is a shareholder in the firm and owns a fraction λ of the firm's equity, with $\lambda \in [0,1]$. While the manager's interests are partly aligned with those of the shareholders, as argued in the extant literature (e.g., Desai et al., 2007), she/he has the opportunity and the incentive to divert a part of the sheltered income to her/his personal advantage and share only the remaining sheltered income with the outside shareholders. We assume that diversion takes place out of the sheltered income only.[8] Let *k* be the fraction of sheltered income that the manager chooses to divert, with $k \in [0,1]$. We assume that the

[7] In view of the greater scrutiny into the financial transactions of firms that file for bankruptcy, this assumption is reasonable. There is anecdotal evidence (Enron and Tyco) that the tax avoidance activities of financially troubled corporations are revealed due to increased investigations. After the initiation of the bankruptcy process, the IRS is a claimant on the assets of the firm. Further, taxes that can be proved to have been evaded can be recovered in full.

[8] Our assumption is different from that of Desai et al. (2007), who allowed for the possibility of diversion out of the true payoff, which also has the effect of reducing the taxable income.

manager incurs a non-monetary cost B (where $B > 0$) in case the firm goes bankrupt, in addition to the penalty (P_M) she/he has to paid if caught sheltering.[9]

In the above setting, the manager chooses s that maximises the following:

$$E[V^M] = \int_{S+D}^{a+\theta} \begin{Bmatrix} \{\lambda[(y-S-D)(1-t)+S(1-k)]+Sk\}(1-\gamma) \\ +\{\lambda[(y-D)(1-t)-p_F S]-p_M S\}\gamma \end{Bmatrix} f(y)dy - \int_{a-\theta}^{S+D}(B+p_M S)f(y)dy \quad (1)$$

In our setting, λ, a, θ, k, D, γ, p_F, p_M, and B are exogenously given and constant.[10]

Solving Equation (1) for the first-order condition yields the expression in Equation (2) for the optimal level of sheltering.[11]

$$S^* = \frac{(a+\theta-D)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F + p_M)\} - B - p_M[D-(a-\theta)]}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)} \quad (2)$$

Our objective is to determine the relation between the level of debt and sheltering as measured by S^*. The presence of risky debt in the capital structure can reduce or increase the level of sheltering; we show that the direction of the relation depends on how increased sheltering affects the probability of bankruptcy. Since debt reduces the number of (non-bankruptcy) states in which the owner-manager can benefit from sheltering, the manager has the incentive to shelter more in the non-bankruptcy states, which suggests a positive relation between debt and S^*. However, the greater likelihood of bankruptcy resulting from higher debt implies a higher probability that the manager bears the cost B and loses her/his part of the sheltering benefits. This possibility implies a negative relation between S^* and the level of debt. Further, since higher debt implies greater tax shields, higher leverage should reduce the manager's incentives to resort to costly tax avoidance activities (Graham and Tucker, 2006). Increasing sheltering increases the probability of bankruptcy in which the manager not only risks losing what she/he could have earned in the non-bankrupt state but also incurs non-pecuniary costs (B).

Using Equation (2), we formalise the relation between the optimal level of sheltering (S^*) and the level of debt (D) in Proposition 1 (all proofs are included in Appendix A).

[9] For the sake of simplicity, we assume $B > P$.

[10] For simplicity of computation, we allow for tax shields on the entire amount of debt D, rather than on the interest component alone. In unreported results, we confirm that our results hold good when we assume that only the interest is tax deductible.

[11] It is easy to show that the second-order condition for a maximum is also satisfied (see Appendix A).

Proposition 1: The relation between the optimal level of sheltering (*S**) and the debt level (*D*) is always negative.

Intuitively, a higher level of sheltering (*S*) increases the probability that the firm ends up bankrupt. In bankruptcy, the manager loses her/his stake in the firm as well as the amount she/he managed to divert, and sustains a personal cost (*B*). Thus, it is in the manager's best interests to avoid bankruptcy by reducing the sheltering activities when the firm's debt burden is high.

Proposition 2 establishes the relation between *S** and the manager's share in the firm's equity.

Proposition 2: If $\gamma > \frac{t-k}{p_F + t - k}$, then the relation between the optimal level of sheltering (*S**) and the manager's share in the firm's equity is negative.

One would expect the relation between the level of sheltering and the manager's share in equity to be positive since a higher share in ownership results in better alignment of the manager's and the shareholders' interests, giving the manager more incentives to enhance the firm's value by reducing the total tax outflows. However, Proposition 2 shows that when the probability of getting caught—and thereby the risk of losing the benefits from sheltering and of having to pay a penalty—is high enough, the relation between S^* and λ is actually negative.

Next, we investigate the relation between sheltering and the manager's bankruptcy costs (*B*).

Proposition 3: The relation between the optimal level of sheltering (*S**) and the probability of being caught (γ) is always negative.

The higher the probability of being caught in illegal sheltering activities, the higher is the expected cost of the penalties as well as the probability of losing the benefits from sheltering. Thus, the probability of being caught is a deterrent to sheltering activities.

Proposition 4: The relation between the optimal level of sheltering (*S**) and the manager's non-monetary bankruptcy cost (*B*) is always negative.

The intuition underlying Proposition 4 is that the non-monetary cost (*B*) makes bankruptcy more expensive for the manager, which gives her/him the incentive to reduce sheltering in order to avoid bankruptcy.

Proposition 5: The relation between sheltering and the level of debt becomes more positive (less negative) when the manager's equity ownership in the firm is higher iff $\gamma > \frac{t-k}{p_F + t - k}$.

Notice that if the condition from Proposition 5 is met, the relation between the manager's equity stake and S^* is negative (Proposition 2).

Proposition 6: The relation between the optimal level of sheltering (S^*) and a is always positive.

Note that as a decreases, *ceteris paribus*, the firm has a greater probability of going bankrupt for a given level of debt. Thus, Proposition 6 offers a direct link between bankruptcy risk and the firm's incentive to shelter income from taxes.

Proposition 7: The relation between the optimal level of sheltering S^* and θ is always positive.

Interpreting Proposition 7 is difficult in the case of uniform distribution because an increase in θ has two connotations: an increase in the upper limit for the cash flow or an increase in variance. The former effect should imply an increase in sheltering since there is more income to shelter. An increase in variance would generally imply both an increase in the upper bound for the cash flow as well as an increase in the probability of bankruptcy. However, these two effects will affect sheltering in entirely opposite directions—a higher upper bound will increase sheltering, while greater probability of bankruptcy will decrease sheltering.

2.1. Empirically Testable Predictions

Our theoretical framework offers the following predictions, which we test on data in the subsequent sections.

Prediction 1: Proposition 1 shows that under certain parameter restrictions, the level of sheltering should be decreasing in the level of debt.

Prediction 2: By Proposition 2, for given parametric restrictions, sheltering should be decreasing in the manager's ownership in the firm's equity.

Prediction 3: Proposition 3 suggests a negative relation between the level of sheltering and the probability that the firm's sheltering activities will be caught and punished.

Prediction 4: Proposition 4 suggests a negative relation between the level of sheltering and the manager's non-pecuniary costs in bankruptcy.

Prediction 5: Under certain parametric conditions, the relation between the level of sheltering and debt becomes more positive as the manager's ownership in the firm increases (Proposition 5).

3. Sample and Variables

3.1. Sample Description

Our initial sample consists of all the U.S. firms listed in Compustat for the period 1986–2012. We obtain data on executive compensation from Execucomp and on institutional ownership from CDA/Spectrum. We exclude financial firms and utilities (SIC codes 4900–4999 and 6000–6999, respectively) from the sample. Our main sample consists of 66,198 firm-years (9,648 unique firms) over the period 1986–2012. The subsample that includes the executive compensation variables consists of 16,621 firm-year observations and is available for the period 1993–2012. Detailed definitions of all the variables are provided in Appendix B.

3.2. Measures of Tax Sheltering

We measure a firm's tax sheltering as follows. First, we use the measure suggested by Manzon and Plesko (2002) that attempts to capture the difference between the income a firm reports to its shareholders based on the generally accepted accounting principles (GAAP) and the one it reports to the income tax authorities based on tax laws. Since the income reported to the tax authorities is not directly observable, it is imputed by dividing the tax expenses reported by the firm in its financial statements by the top statutory corporate tax rate. Using 35% as the top statutory tax rate, we compute the difference between the domestic pre-tax financial income and the imputed taxable income as

$$Unadjusted\ Spread = PI - PIFO - TXFED/0.35$$

where the first two terms are the pre-tax income and the foreign pre-tax income, respectively, and *TXFED* is the amount paid in federal taxes for the year. Next, we account for the inherent differences between book income and tax accounting that do not represent tax aggressive activities. We compute the variable

$$Adjusted\ Spread = Unadjusted\ Spread - TXS - TXO - ESUB$$

where *TXS* represents state income taxes, *TXO* represents other income taxes, and *ESUB* measures the unremitted earnings from non-consolidated subsidiaries. The three items subtracted from *Unadjusted Spread* are either included in the book income and not in the tax income or vice-versa; therefore, they can affect the gap for reasons unrelated to tax sheltering. Finally, we define our main tax sheltering variable as

$$Book\ Tax\ Gap = Adjusted\ \ Spread/AT$$

where *AT* represent the firm's total assets.[12] In order to avoid including firms with tax losses (which may have very different incentives for tax sheltering compared to firms with a positive tax liability during the year), in the sample, we keep only those firms that report a positive current tax expense in a given year (Desai and Dharmapala, 2006).

3.3. Variables to Measure Firm Value, Leverage, and Bankruptcy Risk

In most of the analyses that follow, the dependent variable is firm value, which we measure with *Tobin's q*, computed as the book value of debt plus the market value of common equity divided by the book value of assets. The main independent variables of interest are leverage and bankruptcy risk. We define *Leverage* as the book value of debt divided by the book value of assets minus the book value of common equity plus the market value of equity.

We measure bankruptcy risk with the variable *Default Probability*, which is based on the "naive" measure of the distance to default proposed in Bharath and Shumway (2008).[13] The volatility of stock returns (σ_E) is computed using the previous 260 daily returns with a minimum of 180 returns, while the volatility of debt (σ_D) is computed as $\sigma_D = 0.05 + 0.25\sigma_E$. We measure the market value of equity *E* by multiplying the number of shares by the stock price, and we approximate the market value of debt *D* by adding the current portion of long-term debt and long-term debt multiplied by a factor of 1.5 (Bharath and Shumway, 2008). Using these values, we approximate the total volatility of the firm as $\sigma_V = E/(E + D)\sigma_E + D/(E + D)\sigma_D$. We compute the naive distance to default as:

$$Distance\ to\ Default\ (DD) = \left\{ \ln\left[E + \frac{D}{F * T} \right] + \left(Return_{t-1} - 0.5\sigma_{\upsilon}^{\ 2} \right) * T \right\} / \sigma_{\upsilon}\sqrt{T}$$

[12] *Book Tax Gap* has been widely used and interpreted as evidence of tax avoidance/sheltering behaviour (Mills, 1998; Mills et al., 2002; Desai, 2003, 2005; Manzon and Plesko, 2001). Similarly, the U.S. Department of Treasury White Paper entitled 'The Problem of Corporate Tax Shelters' (1999) identified large and increasing book-tax gaps and interpreted them as evidence for the increased use of tax shelters by corporations.

[13] Additionally, we use the *Z score* proposed in Altman (1984) as an alternate measure of bankruptcy risk. All the (unreported) findings are qualitatively similar.

Finally, the variable *Default Probability* that we use in our tests is computed as -*N*(*DD*).

3.4. Control Variables

In our multivariate analysis, we control for a variety of firm characteristics. *Size* represents the firm's total book assets, while *Profitability* is a dummy that takes the value 1 if the firm reports a positive domestic pre-tax book income for the year. We include the variable *ROA Volatility* to capture the risk associated with a firm's profitability; it is computed as the standard deviation of the firm's return on assets for the previous six years, with a minimum of three observations.

Our measure of tax aggressiveness (*Book Tax Gap*) could be affected by earnings management on the part of the manager. Any upward smoothing of income could result in the overstatement of our measure. In order to control for this effect, we include the variable *Total Accruals* in our analysis, which is computed as in Bergstresser and Phillipon (2006) (see Appendix B).[14]

Additionally, following Manzon and Plesko (2002), we include as control variables the lagged *Book Tax Gap*, the pre- and post-1993 values for goodwill, the annual *Sales Growth*, the absolute value of the firm's foreign income, a dummy for net operating losses (NOLs), the change in NOL carry-forwards, the change in post-retirement obligations, and the ratio of net to gross property, plant, and equipment and total assets. In order to test whether tax aggressiveness is associated with asset opacity, we include the variable *Intangibles*, which is the dollar value of the firm's intangibles scaled by the total assets. Since the extant literature shows that firms that report high R&D expenses shelter more income from taxes and set up more tax haven operations (Desai et al., 2006), we include the variable *R&D*, measured as the ratio of R&D expense to total assets.

Hanlon and Slemrod (2009) argued that tax avoidance activities have a reputational cost. In order to capture the potential reputational costs of tax aggressiveness arising out of being in the public eye, we include the variable *Advertising*, computed as the ratio of advertising expenses to total assets. Additionally, we capture a firm's prestige with the variable *Fort500 Dummy*, which takes the value 1 for firms in the Fortune 500 list, and zero otherwise (Meneghetti and Williams, 2013).

[14] If we use discretionary accruals (Jones, 1991), the (unreported) results do not change significantly.

Our main variable for firm governance is *%Institution*, measured as the percentage of the firm's outstanding shares held by institutional investors using the 13F filings data from the CDA/Spectrum database. Finally, in order to capture the alignment of the manager's incentives with the interests of the firm's shareholders, we compute the variable *Stock Option Ratio*, defined as the ratio of the Black-Scholes value of the stock options granted to the CEO and the sum of her/his salary, bonus, and stock options.

4. Descriptive Statistics

Table 1 reports the descriptive statistics for the whole sample. The main independent variable, *Book Tax Gap*, has a mean of -0.265 and a median of -0.006.[15] The average (median) firm in our sample has a *Leverage* of 0.158 (0.100), a *Default Probability* of 0.146 (0.010), and total assets of USD 1.215 billion. Since the size variable is skewed, we use the natural logarithm of firm size in the multivariate analysis. Table 2 presents the correlation matrix for the main regression variables. While the correlation between *Book Tax Gap* and *Leverage* (0.002) is not significantly different from zero, that between *Book Tax Gap* and *Default Probability* is significantly less than zero (-0.041). As expected, *Leverage* and *Default Probability* are highly positively correlated with a correlation coefficient of 0.687. Column 1 in Table 2 suggests that firms with high institutional holdings, large size, lower ROA volatility, higher total accruals, high intangibles, low R&D and advertising expenditure, and high stock option ratios have larger book-tax gaps.

5. Effects of Leverage and Bankruptcy Risk on Sheltering

In this section, we examine the relation between sheltering (measured by the variable *Book Tax Gap*) and the two variables of interest, namely, *Leverage* and *Default Probability*, in a multivariate setting. We start by presenting the findings from the ordinary least squares (OLS) regressions, first on *Leverage* and subsequently on *Default Probability*. In both cases, we include all the control variables described in Section 3.4. We then control for the effect of CEO alignment and include the variable *Stock Option Ratio* in the base regression. Given the limited data available on managerial compensation in the Execucomp database, the sample

[15] These numbers are consistent with those reported in Desai and Dharmapala (2009). Their measure of tax gap is what we denote as *Unadjusted Spread*, which is computed as the simple difference between the domestic pre-tax book income and the inferred taxable income, without making any adjustments for earnings from subsidiaries and state income taxes. Their sample size is 4,492, while ours is 66,198.

size decreases to 16,621 when we include the variable *Stock Option Ratio*. We investigate how the effects of *Leverage* and *Default Probability* on sheltering vary for firms with higher values for cash flow volatility, profitability, institutional holdings, size, advertising, accruals, managerial stock option ratios, and inclusion in the Fortune 500 list.

Table 1: Summary Statistics

The sample consists of firm-years with available data in the period 1986—2012. All variables are defined in Appendix B. All continuous variables are winsorized at the 1st and 99th percentile. The table reports univariate statistics for the whole sample.

	Mean	Median	Min	Max	N
Dependent Variables					
Book Tax Gap	-0.265	-0.006	-10.868	0.224	66,198
Tobin's Q	2.569	1.308	0.247	63.428	66,198
Control Variables – Firm Characteristics					
Leverage	0.158	0.100	0.000	0.742	66,198
Default Probability	0.146	0.010	0.000	1.000	31,979
%Institution	0.269	0.077	0.000	1.028	66,198
Size	1,214.78	109.475	0.099	24,581	66,198
Fort500 Dummy	0.066	0.000	0.000	1.000	66,198
Profitability	0.635	1.000	0.000	1.000	66,198
ROA Volatility	0.216	0.051	0.006	7.435	66,198
Total Accruals	-0.050	-0.042	-1.382	0.887	66,198
Intangibles	0.112	0.025	0.000	0.735	66,198
R&D	0.075	0.001	0.000	1.149	66,198
Advertising	0.014	0.000	0.000	0.261	66,198
Manzon and Plesko (2002) controls					
NOL	0.373	0.000	0.000	1.000	66,198
ΔNOL	3.991	0.000	-111.300	215.500	66,198
Sales Growth	0.217	0.083	-0.995	6.897	66,198
PP Ratio	0.499	0.503	0.043	0.975	66,198
ΔPost-retirement Benefits	0.605	0.000	-11.954	40.000	66,198
Foreign Pre-tax Income	22.653	0.000	0.000	655.800	66,198
Pre-1993 Goodwill	14.142	0.000	0.000	471.783	66,198
Post-1993 Goodwill	95.980	0.000	-20.460	2,490.295	66,198
Other Intangibles	53.599	0.000	-12.791	1,555.260	66,198
Stock Option Ratio	0.730	0.838	0.000	0.996	16,621

Subsequently, we show how the level of sheltering changed following the passage of a law that strengthened creditor rights during bankruptcy as a quasi-natural experiment. Further, we examine how the effects of *Leverage* and *Default Probability* on sheltering changed following this change in the law. Finally, we present evidence on the relation between tax sheltering and firm value. Depending on the specification, we use industry and firm fixed

effects to control for time-invariant industry and firm unobserved variables, respectively. For industry fixed effects, we define the industry dummies at the 2-digit SIC code level. In all the regressions, the standard errors are robust to heteroscedasticity and are clustered by firm.

Table 2: Correlations among Variables of Interest

The sample consists of firm-years with available data in the period 1986—2012. All variables are defined in Appendix B. All continuous variables are winsorized at the 1st and 99th percentile. The table reports pairwise correlations among the variables of interest and the p-value.

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1. Book Tax Gap	1										
2. Leverage	0.002	1									
	0.598										
3. Default Probability	**-0.041**	**0.687**	1								
	0.000	0.000									
4. %Institution	**0.174**	**-0.108**	**-0.093**	1							
	0.000	0.000	0.000								
5. Size	**0.079**	**0.027**	**-0.034**	**0.223**	1						
	0.000	0.000	0.000	0.000							
6. ROA Volatility	**-0.683**	**-0.042**	**-0.033**	**-0.164**	**-0.079**	1					
	0.000	0.000	0.000	0.000	0.000						
7. Total Accruals	**0.316**	**-0.034**	**-0.073**	**0.063**	**0.006**	**-0.181**	1				
	0.000	0.000	0.000	0.000	0.103	0.000					
8. Intangibles	**0.036**	**0.100**	**0.042**	**0.187**	**0.139**	**-0.016**	**-0.026**	1			
	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
9. R&D	**-0.447**	**-0.183**	**-0.110**	**-0.120**	**-0.097**	**0.321**	**-0.121**	**-0.097**	1		
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
10. Advertising	**-0.047**	**-0.033**	**-0.013**	**-0.028**	**0.007**	**0.032**	**-0.024**	**-0.019**	**-0.038**	1	
	0.000	0.000	0.016	0.000	0.068	0.000	0.000	0.000	0.000		
11. Stock Option Ratio	**0.035**	**-0.075**	**-0.113**	**0.124**	**0.132**	-0.003	-0.004	**0.103**	**0.126**	**-0.025**	1
	0.000	**0.000**	0.000	**0.000**	**0.000**	**0.701**	**0.569**	**0.000**	**0.000**	**0.002**	

5.1. Leverage, Probability of Default, and Sheltering

We first estimate the regression of *Book Tax Gap* on *Leverage* and other control variables, which will shed light on the effect of leverage on the firm's tax aggressiveness (Propositions 1 and 2). We present the results from this analysis in the first two columns of Table 3. The first column presents the findings related to industry fixed effects (IFE) and the second column presents those related to firm fixed effects (FFE). The coefficient of *Leverage* is negative and significant at the 1% level in both the columns, indicating that higher leverage is associated with lower sheltering. To highlight the significance of the effect of *Leverage* on

tax sheltering, we note that if the debt level increases from the 25th percentile to the 75th percentile value, the *Book Tax Gap* decreases by 31.56%.

Columns 3 and 4 of Table 3 present the results when we substitute *Leverage* and *Default Probability* with IFE and FFE, respectively. The sample size for this specification is 31,979 firm-years, which is significantly smaller than the 66,198 firm-years for *Leverage*. The coefficient of *Default Probability* is negative and significant at the 1% level in both columns. This finding is consistent with our theoretical prediction that firms with a greater likelihood of bankruptcy will indulge less in sheltering.

The coefficient of *%Institution* is always negative and significant in three of the four columns, suggesting that higher institutional ownership—an indicator of better governance—deters firms from sheltering income. This reinforces the finding that tax aggressiveness may not necessarily be a value-enhancing activity for shareholders (Desai and Dharmapala, 2009). The coefficient of Log(*Size*) is positive and significant, which is consistent with the intuition that large firms face a lower risk of bankruptcy as compared to smaller firms with similar debt ratios. The intuition underlying the positive coefficient of the *Profitability Dummy* is similar to that for firm size. Further, only firms that are profitable need to shelter income. In the framework of our model, the negative coefficient of *ROA Volatility* suggests that since firms with riskier cash flows are more likely to default, the managers of such firms may choose to keep the levels of sheltering low so as to avoid the risk of going bankrupt, which would be costly to them, personally.

The coefficients of *Advertising* and *Fort500* are negative and significant in all the specifications. These findings are consistent with Prediction 4 that managers with greater personal costs of bankruptcy will shelter less. The intuition is that the managers of firms that advertise more and/or are in the Fortune 500 list are in the public eye; thus, they have more to lose in terms of prestige and reputation. Therefore, they care more about the potential personal cost of sheltering (Hanlon and Slemrod, 2009).

Table 3: Effects of *Leverage* and *Default Probability* on Sheltering

The sample consists of firm-years with available data in the period 1986—2012. The dependent variable is sheltering measured by the *Book Tax Gap* and *Default Probability* is computed using the technique in Bharath and Shumway (2008). All other variables are defined in Appendix B. Year fixed effects are included in all regressions. All continuous variables are winsorized at the 1st and 99th percentile. Standard errors used to compute *t*-statistics (in parentheses) are robust and clustered by firm. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% level respectively.

	Dependent variable: *Book Tax Gap*			
	X = Leverage		*X = Default Probability*	
X	-0.296***	-0.461***	-0.069***	-0.059***
	(-10.55)	(-10.10)	(-7.73)	(-7.52)
%Institution	-0.154***	-0.256***	-0.009*	-0.014
	(-13.96)	(-11.86)	(-1.72)	(-1.34)
Log(*Size*)	0.071***	0.256***	0.016***	0.046***
	(17.31)	(16.32)	(7.62)	(6.44)
Fort500 Dummy	-0.114***	-0.077***	-0.032***	-0.017***
	(-12.82)	(-8.80)	(-7.32)	(-4.25)
Profitability	0.085***	0.125***	0.120***	0.128***
	(9.38)	(12.89)	(15.72)	(22.32)
ROA Volatility	-0.533***	-0.542***	-0.721***	-0.633***
	(-16.55)	(-11.20)	(-7.69)	(-3.99)
Total Accruals	0.789***	0.654***	0.271***	0.222***
	(14.86)	(11.65)	(7.63)	(5.98)
Intangibles	0.031	0.107*	-0.061***	-0.037
	(0.91)	(1.81)	(-3.55)	(-1.08)
R&D	-1.259***	-1.916***	-1.000***	-1.646***
	(-18.50)	(-19.84)	(-15.05)	(-12.16)
Advertising	-0.922***	-1.647***	-0.367***	-0.828***
	(-5.97)	(-4.84)	(-3.35)	(-3.85)
Lagged Book Tax Gap	0.318***	0.055**	0.184***	-0.051
	(13.59)	(2.55)	(4.89)	(-1.51)
Additional Manzon-Plesko controls				
NOL	0.038***	0.040***	0.014***	0.005
	(4.89)	(3.98)	(3.18)	(0.88)
ΔNOL	-0.000***	-0.000***	-0.000***	-0.000***
	(-6.24)	(-5.88)	(-4.48)	(-3.68)
Sales Growth	0.077***	0.045***	0.034***	0.018***
	(9.40)	(6.02)	(5.84)	(2.71)
PP Ratio	-0.109***	-0.095**	-0.066***	0.005
	(-3.94)	(-1.99)	(-4.02)	(0.19)
ΔPost-Retirement Benefits	-0.001***	-0.001***	-0.000***	-0.000***
	(-6.63)	(-4.30)	(-4.39)	(-3.11)

(Continued)

Table 3 (continued)

	Dependent variable: *Book Tax Gap*			
	X = Leverage		*X = Default Probability*	
Foreign Pre-Tax Income	-0.000***	-0.000***	-0.000***	-0.000***
	(-9.89)	(-6.66)	(-6.40)	(-5.11)
Pre-1993 Goodwill	-0.000***	-0.000**	-0.000***	0.000
	(-8.44)	(-2.06)	(-4.76)	(0.34)
Post-1993 Goodwill	-0.000***	-0.000***	-0.000***	-0.000
	(-8.64)	(-5.79)	(-3.99)	(-0.47)
Other Intangibles	-0.000***	-0.000***	-0.000	-0.000***
	(-5.73)	(-6.00)	(-1.11)	(-2.91)
Intercept	-0.369***	-0.887***	-0.112***	-0.288***
	(-4.45)	(-12.88)	(-3.25)	(-5.65)
Industry Fixed Effects	Yes	No	Yes	No
Firm Fixed Effects	No	Yes	No	Yes
N	66,198	66,194	31,979	31,976
R^2	0.621	0.355	0.569	0.329
# of firms		9,648		7,177

5.2. Impact of CEO's Incentive Alignment on the Relation Involving Leverage, Bankruptcy Risk, and Sheltering

We examine how the negative relation between *Leverage* and sheltering and that between *Default Probability* and sheltering vary according to how well the CEO's incentives are aligned with those of the shareholders. We expect that when the CEO's incentives are better aligned, they are more likely to shelter income from taxes since their share in the benefits of sheltering would increase according to their alignment incentives (Proposition 3). Further, our model suggests that the negative relation between sheltering and *Leverage* should become less negative as managerial alignment with the interests of the firm's shareholders increases. We present the findings from this analysis in Table 4. In the estimations in Table 4, we add the variable *Stock Option Ratio* and the interaction *Stock Option Ratio* × *Leverage* to the specifications in Table 3. The coefficient of *Stock Option Ratio* will indicate the relation of managerial incentives with sheltering and that of the interaction term will indicate whether the effect of *Leverage* on sheltering becomes more positive with an increase in the CEO's incentive alignment. While all the specifications include the Manzon-Plesko controls, we do not report their coefficients for reasons of brevity.

Table 4: Effects of *Leverage* and *Default Probability* on Sheltering in the Context of CEO Alignment

The sample consists of firm-years with available data in the period 1986–2012. The dependent variable is sheltering measured by the *Book Tax Gap* and *Default Probability* is computed using the technique in Bharath and Shumway (2008). All regressions include all the variables in Table 3 but only selected coefficients are reported. All variables are defined in Appendix B. Year fixed effects are included in all regressions. All continuous variables are winsorized at the 1st and 99th percentile. Standard errors used to compute *t*-statistics (in parentheses) are robust and clustered by firm. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% level respectively.

	Dependent variable: *Book Tax Gap*			
	X = Leverage		*X = Default Probability*	
X	-0.206***	-0.530**	-0.035***	-0.056
	(-2.88)	(-2.39)	(-4.81)	(-1.60)
Stock Option Ratio	0.037**	-0.024	0.028	0.025
	(2.38)	(-0.80)	(1.29)	(1.40)
*X * Stock Option Ratio*		0.498**		0.029
		(2.05)		(0.64)
%Institution	0.007	0.006	0.011	0.011
	(0.74)	(0.59)	(1.15)	(1.15)
Log(*Size*)	0.018	0.017	-0.007	-0.007
	(1.45)	(1.44)	(-1.41)	(-1.44)
Fort500 Dummy	-0.005	-0.004	0.002	0.002
	(-1.12)	(-1.01)	(0.68)	(0.70)
Profitability	0.086***	0.086***	0.103***	0.103***
	(5.44)	(5.46)	(14.01)	(14.09)
ROA Volatility	-0.818***	-0.804***	-0.427***	-0.428***
	(-3.26)	(-3.30)	(-2.84)	(-2.84)
Total Accruals	0.234**	0.232**	0.119***	0.119***
	(2.06)	(2.08)	(4.17)	(4.17)
Intangibles	-0.043	-0.050	-0.022	-0.022
	(-1.47)	(-1.64)	(-0.96)	(-0.96)
R&D	-1.833***	-1.824***	-1.219***	-1.219***
	(-4.05)	(-4.10)	(-6.07)	(-6.06)
Advertising	-0.109	-0.108	-0.205*	-0.204*
	(-1.38)	(-1.37)	(-1.84)	(-1.84)
Lagged Book Tax Gap	0.179***	0.180***	-0.001	-0.001
	(2.68)	(2.70)	(-0.02)	(-0.01)
Intercept	-0.019	0.031	0.049	0.053
	(-0.38)	(0.61)	(1.08)	(1.19)
Industry Fixed Effects	No	No	No	No
Firm Fixed Effects	Yes	Yes	Yes	Yes
N	16,621	16,621	9,846	9,846
R^2	0.360	0.366	0.214	0.214
# of firms	2,322	2,322	2,043	2,043

The results in Column 1 of Table 4 show that the negative relation between *Leverage* and *Book Tax Gap* continues to hold after controlling for the CEO's alignment with the shareholders' interests. The coefficient of *Stock Option Ratio* is positive and significant, indicating that managers with a higher equity stake in the company indulge in more sheltering activities. When the specification additionally includes the interaction term *Stock Option Ratio* × *Leverage*, the coefficient of *Stock Option Ratio* is insignificant and that of the interaction term is significantly positive. This finding is consistent with our theory and highlights an interesting aspect of the relation between sheltering and the CEO's alignment incentives. The insignificant coefficient of *Stock Option Ratio* in Column 2 of Table 4 suggests that when there is no debt in the firm, the incentive alignment may not lead managers to shelter income. The positive coefficient of the interaction term indicates that the alignment incentives lead to greater sheltering only in the presence of debt. Another interpretation that is not mutually exclusive is that the negative effect of *Leverage* on sheltering becomes significantly less negative when the CEO's alignment with the shareholders' interests is high. Viewed together, our findings indicate that debt and alignment incentives have opposing/offsetting effects on sheltering. Therefore, it is important to control for the joint effect (e.g., with the interaction term) of these two variables in empirical tests.

Columns 3 and 4 of Table 4 present the findings when we substitute *Leverage* with *Default Probability*. The coefficient of *Default Probability* is significantly negative in Column 3 and is not significant in Column 4. The coefficients of *Stock Option Ratio* and the interaction term are not statistically significant. A possible reason for these weaker results involving *Default Probability* could be the significant reduction in sample size to 9,846 firm-years.

5.3. Cross-Sectional Analysis of the Effects of Leverage and Bankruptcy Risk on Sheltering

We investigate whether the negative relations that a firm's leverage and probability of default have with sheltering hold across high and low values of *ROA Volatility*, *Profitability*, institutional ownership, firm size, inclusion in the Fortune 500 list, *Advertising*, *Total Accruals*, and the CEO's incentive compensation. In each test, we create a dummy variable that takes the value 1 when the value of the variable of interest is above the median, and zero otherwise (for *Profitability* and *Advertising*, the dummy takes a value of 1 for positive values). We then compute the interaction term *Leverage* × *Dummy* and estimate the specifications with FFE from Table 3 after including the dummy variable and the interaction

term in the regression. We present our findings in Table 5. Panel A of Table 5 reports the findings for the relation between sheltering and *Leverage* and Panel B reports those for the relation with *Default Probability*. Table 5 reports the coefficients and *t*-statistics for *Leverage*, *Dummy*, and *Leverage* × *Dummy* only; we omit reporting the coefficients of the other variables in the regression results for reasons of brevity.

In Column 1 of Panel A of Table 5, the variable *Dummy* equals 1 for firms with greater business risk as measured by *ROA Volatility*; the results offer support for the appropriateness of our theoretical framework. When there is debt in the capital structure, greater business risk implies a greater likelihood of bankruptcy, which would mean greater costs of sheltering income for the CEO, according to our theoretical framework. Thus, the negative effect of *Leverage* on sheltering will be amplified when the risk is high. The significantly negative coefficient of the interaction term supports this intuition. However, in the absence of debt (as the positive coefficient of *Dummy* implies), riskier firms will indulge in more sheltering, which implies that there will be more sheltering with higher variance since higher variance means a higher upper bound for cash flows.

The positive coefficients of *Dummy* and the interaction term with *Profitability* in Column 2 of Table 5 are consistent with our expectations. Highly profitable firms have a greater incentive to shelter income taxes; further, the efficacy of debt in reducing sheltering will be lower as higher profit means that the distance from a state of bankruptcy is greater.

In Column 3 of Table 5, the sorting variable for *Dummy* is institutional ownership, the measure of the quality of firm governance. The coefficient of the interaction term between the *High %Institution Dummy* and *Leverage* is positive, indicating that in better governed firms, the effect of firm leverage on sheltering is reduced. However, the coefficient of the *Dummy* is significantly negative, which implies that the presence of high institutional ownership by itself (that is, without the presence of debt) reduces sheltering. When the *Dummy* is constructed using firm size (Column 4, Table 5), the interpretation of the findings is identical to that for *%Institution*, which is not surprising, since firm size is highly positively correlated with institutional ownership.

When the *Dummy* equals 1 if the firm is in the Fortune 500 list (Column 5, Table 5), the coefficient of the interaction term is positive, which implies that the negative relation between debt and sheltering is less pronounced for Fortune 500 firms. These firms are more likely to be better governed because they would have high institutional ownership, and they

are in the public eye more than other firms are. Therefore, the effect of being a Fortune 500 firm should be similar to those for *%Institution*, which we find is the case. In Column 6 of Table 5, where the *Dummy* represents high advertising expense, the coefficients of *Leverage*, *Dummy*, and the interaction term are negative, zero, and positive, respectively. This is consistent with our expectations, since firms that advertise more are more likely to be in the public eye, thus reducing the negative effect of leverage on tax aggressiveness. These findings are consistent with our theory, which states that when the costs of bankruptcy to the manager increase, she/he would shelter less. Being in the public eye because of advertising and by virtue of being the CEO of a Fortune 500 firm affords the manager of such firms considerable prestige and reputation, which she/he stands to lose if the firm goes bankrupt.

In Column 7 of Table 5, we present the results when *Dummy* represents firms with high *Total Accruals*, which is our measure of earnings management. The positive coefficient of *Dummy* in this specification implies that in the absence of debt, firms that manage earnings are more tax aggressive.[16] The coefficient of the interaction term is significantly negative, implying that the negative relation of *Leverage* with tax aggressiveness is significantly more pronounced in firms with higher *Total Accruals*. This finding offers an insight into the monitoring role of debt. The presence of debt implies the likelihood of bankruptcy. In our theoretical framework, if the shareholders/CEOs shelter income, the likelihood of bankruptcy further increases. It is reasonable to assume that the scrutiny of a firm's income and other financial statements is greater once the firm is bankrupt. Greater scrutiny implies a greater likelihood that activities related to earnings management will be revealed. Therefore, as *Leverage* increases, a firm that manages earnings more will be less tax aggressive.

The last column of Table 5 presents the findings when the CEO's alignment incentives are high. The coefficient of *Leverage* is significantly negative and that of *Leverage* × *Dummy* is significantly positive. These coefficients confirm the earlier interpretation (Table 4) that the negative effect of debt on sheltering is less when the CEO is more aligned with the shareholders' interests. The insignificant coefficient of *Dummy* indicates that the positive relation of *Stock Option Ratio* with sheltering appears to exist only for firms that have debt in the capital structure.

[16] This could also be a mechanical artefact. High accruals imply a higher reported book income; higher book income also results in a higher book-tax gap.

Table 5: Cross-sectional Analysis of the Effects of *Leverage* and *Default Probability* on *Book Tax Gap*

The sample consists of firm-years with available data in the period 1986–2012. The dependent variable is sheltering measured by the *Book Tax Gap* and *Default Probability* is computed using the technique in Bharath and Shumway (2008). *Dummy* is an indicator variable that takes a value of one when the variable of interest assumes a value greater than its median or 0. All regressions include all the variables in Table 3 but only selected coefficients are reported. All variables are defined in Appendix B. Year and firm fixed effects are included in all regressions. All continuous variables are winsorized at the 1st and 99th percentile. Standard errors used to compute *t*-statistics (in parentheses) are robust and clustered by firm. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% level respectively.

	Book Tax Gap							
	Dummy = 1 if *ROA Volatility* > Median	*Dummy* = 1 if *Profitability* > 0	*Dummy* = 1 if *%Institution* > Median	*Dummy* = 1 if *Size* > Median	*Dummy* = 1 if *Fort500 Dummy* = 1	*Dummy* = 1 if *Advertising* > Median	*Dummy* = 1 if *Total Accruals* > Median	*Dummy* = 1 if *Stock Option Ratio* > Median
Panel A: Book Tax Gap on Leverage and all other variables (not reported)								
Leverage	-0.373***	-0.512***	-0.501***	-0.488***	-0.465***	-0.505***	-0.480***	-0.238***
	(-10.04)	(-8.49)	(-8.86)	(-7.39)	(-10.09)	(-9.73)	(-8.59)	(-2.70)
Dummy	0.083***	0.103***	-0.095***	-0.106***	-0.099***	-0.023	0.100***	-0.005
	(8.70)	(6.98)	(-6.82)	(-9.26)	(-8.61)	(-1.51)	(10.34)	(-0.44)
Leverage × *Dummy*	-0.217***	0.118**	0.194***	0.391***	0.139***	0.148**	-0.100**	0.083*
	(-4.07)	(2.52)	(4.02)	(6.84)	(3.39)	(2.51)	(-2.35)	(1.66)
N	66,194	66,194	66,194	66,194	66,194	66,194	66,194	16,621
R^2	0.291	0.355	0.353	0.324	0.355	0.353	0.194	0.360
# of firms	9,648	9,648	9,648	9,648	9,648	9,648	9,648	2,322
Panel B: Book Tax Gap on Default Probability and all other variables (not reported)								
Default Probability	-0.020***	-0.096***	-0.070***	-0.109***	-0.063***	-0.067***	-0.059***	-0.036***
	(-4.33)	(-6.21)	(-5.14)	(-5.29)	(-7.58)	(-6.94)	(-5.84)	(-3.86)
Dummy	0.052***	0.114***	0.009	-0.013*	-0.023***	-0.017***	0.032***	0.008
	(5.54)	(15.27)	(1.26)	(-1.73)	(-5.20)	(-2.61)	(7.74)	(1.48)
Default Prob ×*Dum*	-0.115***	0.065***	0.021	0.086***	0.047***	0.024*	-0.010	-0.001
	(-6.19)	(4.31)	(1.34)	(3.98)	(4.06)	(1.87)	(-0.81)	(-0.04)
N	31,976	31,976	31,976	31,976	31,976	31,976	31,976	9,846
R^2	0.333	0.330	0.330	0.326	0.330	0.327	0.186	0.213
# of firms	7,177	7,177	7,177	7,177	7,177	7,177	7,177	2,043

In Panel B of Table 5, we present the findings on the cross-sectional variation in the relation between sheltering and *Default Probability*, which is the measure of bankruptcy risk. The change in the relation for higher/lower values of *ROA Volatility* (Column 1), *Profitability* (Column 2), *Size* (Column 4), *Fort500* (Column 5), and *Advertising* (Column 6) are similar to those for *Leverage*. In the case of institutional investment, the coefficients of *Dummy* and the interaction term are positive and not significant at conventional levels; in the case of *Leverage*, the coefficients were significantly negative and positive, respectively. We are unable to interpret this finding.

The findings about the relation between sheltering and *Default Probability* when we vary *Total Accruals* and *Stock Option Ratio* are different than those for *Leverage*, which highlights the fact that the presence of debt brings about monitoring by the debtholders, in addition to introducing bankruptcy. In Panel A, the significantly negative coefficient of the interaction term with *Total Accruals* suggests a monitoring role for debt. The lack of a significant coefficient of the interaction term in Panel B indicates that there is no such monitoring role for *Default Probability*. In a similar fashion, when the *Dummy* represents greater CEO alignment with the shareholders' interests, a significantly positive coefficient of the interaction term in the case of *Leverage* and an insignificant one in the case of *Default Probability* offer further support for the monitoring role of debt.

5.4. Endogeneity in Leverage, Bankruptcy Risk, and Sheltering: Bankruptcy Abuse Prevention and Consumer Protection Act

The prior analyses involve a potential difficulty in inferring the causality in the effects of leverage and bankruptcy risk on sheltering because the variables may be endogenously determined. The inclusion of firm fixed effects alleviates concerns regarding endogeneity owing to time-invariant unobserved variables. However, since the decisions regarding capital structure, asset choices that determine bankruptcy risk, and sheltering are made by the firm's manager, a time-varying unobserved variable such as managerial type may affect all three variables. Thus, the observed effects of debt and bankruptcy risk on sheltering could be the manifestation of the separate relations of these variables with managerial type. Further, in the case of debt, since one reason why firms take on debt is to reduce taxes, it is also possible that firms that avoid more taxes *need* to take on less debt. This possibility is similar in spirit to the concept of tax exhaustion or the substitutability of debt and non-debt tax shields

(Graham and Tucker, 2006). In this section, we use the changes in the U.S. Bankruptcy Law in 2005 as a quasi-natural experiment to address these causality concerns.

On April 20, 2005, the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) was signed into law. The objective of this Act was to prevent the use of bankruptcy as a means of protection by reckless borrowers. While most of its provisions were meant to address consumer bankruptcy, some of its provisions applied to corporations. This Act had the effect of increasing the creditors' power in the event of bankruptcy (Hotchkiss et al., 2008; Alanis et al., 2014) through higher scrutiny of corporations filing for bankruptcy under Chapter 11 (reorganisation). In the context of our theory, greater scrutiny by regulators implies that the level of sheltering by corporations should decrease following the passage of the BAPCPA.

In addition to greater scrutiny, the BAPCPA also specified greater restrictions on fraudulent transfers to insiders. These restrictions increased the expected payoff that creditors/debtholders receive by default. Creditors such as debtholders care more about the value of a firm's assets during bankruptcy than that during non-bankruptcy. Since the BAPCPA improved the value of the creditors' claims during bankruptcy, its passage reduced the creditors' incentive to monitor the firms' activities. Thus, the passage of the BAPCPA should have a second effect in addition to reducing the level of sheltering due to increased scrutiny. By reducing the creditors' incentives to monitor, the BAPCPA will decrease the efficacy of debt as a monitoring mechanism for reducing the sheltering activities of firms. Therefore, we hypothesise that the negative relation between *Leverage* and sheltering will become less negative after the passage of the Act. Further, since *Default Probability* has no connotations for monitoring, the passage of the BAPCPA should have no effect on the negative relation between sheltering and *Default Probability*.

We construct the indicator variable *Post-BAPCPA Dummy* that takes the value 1 for the years after 2006, and zero for prior years. We choose the year 2006 because most of the provisions of the BAPCPA were applicable from October 17, 2005; therefore, we expect to observe its full impact from 2006 onwards. We consider 1-year, 2-year, and 3-year pre-BAPCPA and post-BAPCPA sample periods, namely, (i) 2005 and 2007, (ii) 2004–2005 and 2007–2008, and (iii) 2003–2005 and 2007–2009.

We first examine the effect of the BAPCPA on the level of sheltering and present the findings in Table 6. The first three columns of Table 6 deal with *Leverage*, and the last three deal with

Default Probability. The coefficients of *Leverage* are significantly negative in two of the three columns, and those of *Default Probability* are significantly negative in all three columns, indicating that the negative effect of both these variables on sheltering holds good in all these periods. The coefficients of *Post-BAPCPA Dummy* are significantly negative in all the six columns. Therefore, there is significant support for our hypothesis that the passage of the BACPA significantly reduced sheltering.

In order to test the second prediction about the effect of the BAPCA on the effects of *Leverage* and *Default Probability* on sheltering, we include the interaction terms *Leverage* × *Post-BAPCPA Dummy* and *Default Probability* × *Post-BAPCPA Dummy* in the specifications involving *Leverage* and *Default Probability*, respectively. The results from estimating these specifications for the three pre-BAPCPA and post-BAPCPA periods are presented in Table 7. Consistent with the results in Table 6, the coefficients of *Leverage*, *Default Probability*, and *Post-BAPCPA Dummy* are always significantly negative. The coefficient of the interaction term *Leverage* × *Post-BAPCPA Dummy* is significantly positive in the first three columns of Table 6, where *Leverage* is the variable of interest. This positive coefficient indicates that the negative effect of *Leverage* on sheltering became less negative in the post-BAPCPA years, which is consistent with our hypothesis that the BAPCPA is likely to have weakened the monitoring incentives for creditors. The coefficient of the interaction term *Default Probability* × *Post-BAPCPA Dummy* is not significantly different from zero in Columns 4 and 5 of Table 7, which is not inconsistent with the hypothesis about the weakening of monitoring incentives since *Default Probability* does not reflect the monitoring activities of creditors. The coefficient of the interaction term in the last column is *negative* and significant, which would imply that the negative effect of bankruptcy risk on sheltering became stronger after the BAPCPA. However, given that this coefficient is not significant in Columns 4 and 5 of Table 7, we hesitate to draw this inference.

Table 6: Effect of the Bankruptcy Abuse Prevention and Consumer Protection Act (2005) on Tax Sheltering

The sample consists of firm-years with available data in the period 1986—2012. The dependent variable is sheltering measured by the *Book Tax Gap* and *Default Probability* is computed using the technique in Bharath and Shumway (2008). *Post-BAPCPA Dummy* takes a value of 1 for years after 2006, zero otherwise. All regressions include all the variables in Table 3 but only selected coefficients are reported. All variables are defined in Appendix B. Year and firm fixed effects are included in all regressions. All continuous variables are winsorized at the 1st and 99th percentile. Standard errors used to compute *t*-statistics (in parentheses) are robust and clustered by firm. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% level respectively.

	Dependent variable: *Book Tax Gap*					
	X = Leverage			*X = Default Probability*		
	Pre: Yr. 2005 Post: Yrs. 2007	Pre: Yrs. 2004-5 Post: Yrs. 2007-8	Pre: Yrs. 2003-5 Post: Yrs. 2007-9	Pre: Yr. 2005 Post: Yrs. 2007	Pre: Yrs. 2004-5 Post: Yrs. 2007-8	Pre: Yrs. 2003-5 Post: Yrs. 2007-9
X	-0.380	-0.550***	-0.667***	-0.119**	-0.116***	-0.087***
	(-1.43)	(-3.69)	(-4.94)	(-2.16)	(-5.43)	(-5.27)
Post-BAPCPA Dummy	-0.185***	-0.182***	-0.201***	-0.016*	-0.067***	-0.049***
	(-5.76)	(-7.35)	(-8.57)	(-1.67)	(-4.28)	(-3.69)
%Institution	-0.306***	-0.341***	-0.404***	0.041	-0.012	-0.029
	(-2.73)	(-5.02)	(-6.81)	(0.73)	(-0.41)	(-1.42)
Log(*Size*)	0.932***	0.791***	0.704***	0.039	0.167***	0.104***
	(6.91)	(10.88)	(12.53)	(1.24)	(4.12)	(4.33)
Fort500 Dummy	-0.166***	-0.110***	-0.137***	-0.029	-0.041***	-0.032***
	(-3.11)	(-6.18)	(-7.79)	(-0.82)	(-4.73)	(-4.51)
Profitability	0.283***	0.210***	0.195***	0.098***	0.128***	0.133***
	(4.43)	(5.93)	(7.19)	(4.63)	(8.15)	(12.81)
ROA Volatility	-0.270	-0.329***	-0.476***	-0.264	-0.327	-0.471
	(-1.54)	(-3.82)	(-6.26)	(-1.18)	(-1.40)	(-1.57)
Total Accruals	0.858***	0.792***	0.765***	0.325***	0.215*	0.254*
	(3.84)	(5.98)	(7.44)	(2.68)	(1.79)	(1.89)
Intangibles	-0.318	-0.298	-0.219	-0.091	0.149*	0.002
	(-0.82)	(-1.53)	(-1.40)	(-0.87)	(1.88)	(0.03)
R&D	-0.761	-1.459***	-1.482***	-2.014***	-1.873***	-1.875***
	(-1.55)	(-5.35)	(-7.44)	(-3.28)	(-4.92)	(-7.02)
Advertising	-0.304	-5.279***	-3.771***	-0.551	-0.740*	-0.260
	(-0.13)	(-4.04)	(-3.31)	(-1.09)	(-1.91)	(-0.34)
Lagged Book Tax Gap	0.129	-0.009	-0.012	0.105	-0.234	-0.141*
	(1.61)	(-0.20)	(-0.35)	(0.78)	(-1.56)	(-1.88)
Intercept	-4.193***	-3.505***	-3.088***	-0.140	-1.023***	-0.610***
	(-6.42)	(-10.52)	(-12.28)	(-0.79)	(-4.89)	(-5.11)
N	5,766	11,282	16,226	2,030	5,197	7,996
R^2	0.391	0.386	0.386	0.576	0.464	0.373
# of firms	3,699	4,329	4,868	1,879	2,768	3,176

Table 7: Impact of BAPCPA on the Effects of *Leverage* and *Default Probability* on Tax Sheltering

The sample consists of firm-years with available data in the period 1986—2012. The dependent variable is sheltering measured by the *Book Tax Gap* and *Default Probability* is computed using the technique in Bharath and Shumway (2008). *Post-BAPCPA Dummy* takes a value of 1 for years after 2006, zero otherwise. All regressions include all the variables in Table 3 but only selected coefficients are reported. All variables are defined in Appendix B. Year and firm fixed effects are included in all regressions. All continuous variables are winsorized at the 1st and 99th percentile. Standard errors used to compute *t*-statistics (in parentheses) are robust and clustered by firm. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% level respectively.

	Dependent variable: *Book Tax Gap*					
	X = Leverage			*X = Default Probability*		
	Pre: Yr. 2005 Post: Yrs. 2007	Pre: Yrs. 2004-5 Post: Yrs. 2007-8	Pre: Yrs. 2003-5 Post: Yrs. 2007-9	Pre: Yr. 2005 Post: Yrs. 2007	Pre: Yrs. 2004-5 Post: Yrs. 2007-8	Pre: Yrs. 2003-5 Post: Yrs. 2007-9
X	-0.731**	-0.792***	-0.877***	-0.123**	-0.107**	-0.040*
	(-2.53)	(-4.52)	(-5.50)	(-2.17)	(-2.23)	(-1.74)
Post-BAPCPA Dummy	-0.249***	-0.223***	-0.243***	-0.017*	-0.066***	-0.043***
	(-6.22)	(-7.58)	(-8.73)	(-1.69)	(-4.14)	(-3.22)
X × *Post-BAPCPA Dummy*	0.544***	0.339***	0.337***	0.010	-0.011	-0.058**
	(3.22)	(2.65)	(2.88)	(0.23)	(-0.25)	(-2.27)
%Institution	-0.309***	-0.347***	-0.410***	0.041	-0.012	-0.026
	(-2.78)	(-5.11)	(-6.91)	(0.74)	(-0.39)	(-1.30)
Log(*Size*)	0.945***	0.795***	0.707***	0.040	0.167***	0.103***
	(6.97)	(10.92)	(12.55)	(1.22)	(4.09)	(4.27)
Fort500 Dummy	-0.143***	-0.103***	-0.129***	-0.029	-0.041***	-0.033***
	(-2.65)	(-5.80)	(-7.40)	(-0.82)	(-4.78)	(-4.57)
Profitability	0.280***	0.210***	0.196***	0.098***	0.128***	0.133***
	(4.42)	(5.94)	(7.22)	(4.62)	(8.15)	(12.73)
ROA Volatility	-0.266	-0.330***	-0.477***	-0.266	-0.327	-0.471
	(-1.52)	(-3.84)	(-6.28)	(-1.19)	(-1.40)	(-1.57)
Total Accruals	0.866***	0.795***	0.767***	0.325***	0.215*	0.255*
	(3.89)	(6.01)	(7.48)	(2.68)	(1.79)	(1.90)
Intangibles	-0.313	-0.288	-0.213	-0.093	0.150*	0.002
	(-0.82)	(-1.48)	(-1.37)	(-0.88)	(1.88)	(0.03)
R&D	-0.747	-1.449***	-1.476***	-2.011***	-1.874***	-1.878***
	(-1.52)	(-5.31)	(-7.41)	(-3.30)	(-4.92)	(-7.03)
Advertising	-0.162	-5.236***	-3.760***	-0.555	-0.742*	-0.268
	(-0.07)	(-4.01)	(-3.31)	(-1.11)	(-1.92)	(-0.35)
Lagged Book Tax Gap	0.124	-0.010	-0.012	0.104	-0.234	-0.140*
	(1.57)	(-0.22)	(-0.37)	(0.78)	(-1.56)	(-1.88)
Intercept	-4.227***	-3.505***	-3.081***	-0.145	-1.020***	-0.603***
	(-6.47)	(-10.52)	(-12.28)	(-0.78)	(-4.85)	(-5.07)
N	5,766	11,282	16,226	2,030	5,197	7,996
R^2	0.394	0.387	0.387	0.577	0.464	0.373
# of firms	3,699	4,329	4,868	1,879	2,768	3,176

5.5. Tax Sheltering and Firm Value

We investigate whether tax aggressiveness affects firm value. The independent variable is now *Tobin's q*, measured as the sum of the book value of current debt, long-term debt, and market value of equity divided by the book value of total assets. The main independent variable is tax aggressiveness, measured by *Book Tax Gap*. In our earlier analyses, we regressed *Book Tax Gap* on *Leverage* and on *Default Probability*. Since *Book Tax Gap* is now included as a determinant of firm value, we construct a new variable *Res. Book Tax Gap* as a measure of the firm's level of sheltering. The variable *Res. Book Tax Gap* is the residual from the regression of *Book Tax Gap* on *Leverage* in Panel A of Table 3 and the residual from the regression of *Book Tax Gap* on *Default Probability* in Panel B of Table 3. In the regressions, we include all the other variables as controls and firm and year fixed effects; however, for reasons of brevity, we do not report their coefficients.

Our findings from the analysis of the relation between firm value and sheltering are presented in Table 8. The first two columns of Panels A and B of Table 8 present the results for the bigger sample of 66,198 and 31,979 firm-years, respectively; the last column reports the findings when the sample size is reduced because of the inclusion of *Stock Option Ratio*. In all three specifications reported in the two panels of the table, the coefficients of *Leverage* and *Default Probability* are negative. We hesitate to infer anything from this finding because the negative relation could be a mechanical artefact since, the value of equity is depressed in distressed firms, which decreases Tobin's q and increases the debt ratio.

In both the panels of Table 8, the coefficient of *Res. Book Tax Gap* is significantly negative in the first specification, which suggests that sheltering is detrimental to firm value. In Column 2 of Table 8, which includes the interaction terms *Leverage* × *Res. Book Tax Gap* and *Default Probability* × *Res. Book Tax Gap* in Panels A and B, respectively, while the coefficient of *Res. Book Tax Gap* continues to be negative, the coefficients of the interaction terms are not significantly different from zero. The specification in Column 3 of Table 8 includes *Stock Option Ratio*; as in the earlier specifications, the coefficients of *Leverage* and *Res. Book Tax Gap* are negative and significant in Panel A of Table 8. In Panel B of Table 8, the coefficient of *Res. Book Gap* is not significantly different from zero. Consistent with our results in Table 4, the coefficients of *Stock Option Ratio* are positive and significant at the 1% level in both the panels of Table 8. This result is also consistent with the findings reported in

Desai and Dharmapala (2009), which suggests that the alignment of managerial incentives with the interests of the firms' shareholders improves firm value.

Table 8: Sheltering and Firm Value

The sample consists of firm-years with available data in the period 1986—2012. The dependent variable in all regressions is *Tobin's q*. *Res. Book Tax Gap* is the residual from regressing *Book Tax Gap* on *Leverage* (Panel A) or *Default Probability* (Panel B). The regressions include all control variables in Table 3 but only selected coefficients are reported. All variables are defined in Appendix B. All continuous variables are winsorized at the 1st and 99th percentile. Year and firm fixed effects are included in all regressions. Standard errors used to compute *t*-statistics (in parentheses) are robust and clustered by firm. The symbols ***, **, and * denote significance at the 1%, 5%, and 10% level respectively.

	Tobin's Q		
	(1)	(2)	(3)
Panel A: Tobin's q on Leverage and all other variables (not reported)			
Leverage	-2.958***	-2.841***	-2.884***
	(-13.14)	(-15.65)	(-12.39)
Res. Book Tax Gap	-1.979***	-2.072***	-2.003**
	(-16.07)	(-13.74)	(-2.44)
Res. Book Tax Gap Leverage*		0.533	
		(1.01)	
Stock Option Ratio			0.516***
			(5.11)
N	66,198	66,198	16,621
R^2	0.302	0.302	0.234
# of firms	9,648	9,648	2,322
Panel B: Tobin's q on Default Probability and all other variables (not reported)			
Default Probability	-0.788***	-0.798***	-0.844***
	(-22.00)	(-18.22)	(-14.07)
Res. Book Tax Gap	-0.667**	-0.776**	-0.440
	(-2.16)	(-2.32)	(-0.65)
Res. Book Tax Gap Z*		0.557	
		(0.66)	
Stock Option Ratio			0.511***
			(5.37)
N	31,979	31,979	9,846
R^2	0.116	0.117	0.192
# of firms	7,178	7,178	2,043

5.6. Additional Robustness Tests

In order to ensure that our results are not sensitive to the variable definitions used in the tests, we repeat our tests using alternative definitions for some of the key variables. For sheltering, instead of *Book Tax Gap*, we use two other measures, namely, permanent and discretionary permanent book-tax differences (suggested in Frank et al., 2009), which have been shown to

be positively associated with tax aggressiveness. Our (unreported) results reveal that using these alternative measures of sheltering does not alter the negative relation between leverage and sheltering.

We employ three alternative definitions of leverage based on market and book values. We define the market value leverage as the ratio of the book value of long-term debt to the sum of the total debt and the market value of equity. We define the first alternative book leverage measure as the ratio of long-term debt to the book value of total assets. The second alternative book leverage variable is the ratio of the total liabilities net of deferred taxes and equity and the book value of total assets. Our (unreported) results show that leverage relates significantly negatively to tax aggressiveness in all the cases.

To ensure that the results of our tests are due to the passage of the BAPCPA and not due to noise or accident, we choose a random year 1990 and replicate the test around this year, using three different event windows one, two, and three years before and after 1990. Our (unreported) results show that the coefficient of the interaction term is not significant.

Finally, as an additional correction for endogeneity, we estimate a 2-stage least-squares (2SLS) specification in which we use the predicted value of *Leverage* from the first stage as a predictor in the second stage where *Book Tax Gap* is the dependent variable. In the first stage, we use the lagged value of *Leverage* and either the mean industry (2-digit SIC) average value of *Leverage* (excluding the firm in question) or the industry median value as the second instrument. In all the cases, we obtain a significantly negative relation between *Leverage* and the level of sheltering.

6. Conclusion

In light of the debate on the value implications of sheltering income from taxes and agency problems, we develop a simple two-date, single-period model to capture the manager's choice of the optimal level of sheltering in the presence of debt. The model predicts that as long as the probability of bankruptcy is sufficiently high, higher levels of debt reduce the level of sheltering. Further, the model derives the parameter restrictions under which higher ownership in the firm attenuates the manager's incentives to shelter more income from taxes. Additionally, the model predicts that the level of sheltering is lower when either the bankruptcy risk or the manager's personal costs associated with bankruptcy are greater.

Finally, the model predicts that the negative relation between sheltering and debt becomes less negative as the managers' alignment incentives increase.

Our empirical tests on a large sample of U.S. firms over the period 1986–2012 offer considerable support for our theoretical predictions. We find that both higher leverage as well as bankruptcy risk deters sheltering. We show that these negative relations are robust to adjustments for endogeneity by using the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005 as a quasi-natural experiment. This Act improved creditor power and their payoffs in the event of bankruptcy. Therefore, we hypothesise that while the passage of this Act decreased the levels of sheltering, it reduced the efficacy of debt as a monitoring mechanism. Our empirical results support both these hypotheses. We find that the negative relation between sheltering and debt (and bankruptcy risk) is stronger for riskier firms, which supports our hypothesis that bankruptcy risk is an important determinant of the level of sheltering. Other cross-sectional tests reveal that the negative effects of debt and bankruptcy risk are weaker in firms with higher values for institutional ownership, profitability, size, and the CEO's alignment incentives, as well as for firms in the public eye.

The primary contribution of our theoretical and empirical results is to show that bankruptcy risk—either brought about by the presence of debt or by itself—is an important determinant of the level of sheltering of income by corporations; both these factors reduce the level of sheltering. Moreover, our results highlight that debt reduces sheltering not only by introducing the likelihood of bankruptcy but also by serving as a monitoring mechanism.

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Appendix A

Solving for the first-order condition with respect to *S* in Equation (1), we get Equation (2):

$$S^* = \frac{(a+\theta-D)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F + p_M)\} - B - p_M[D-(a-\theta)]}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)}.$$

It is easy to show that:

$$\frac{\partial^2 S^*}{\partial S^2} = -\frac{1}{2\theta}\{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)\} \Rightarrow \frac{\partial^2 S^*}{\partial S^2} < 0$$

Thus, *S** is a maximum.

Proof of Proposition 1:

We differentiate Equation (2) with respect to *D*:

$$\frac{\partial S^*}{\partial D} = -\frac{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F + p_M)+p_M}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)} \Rightarrow \frac{\partial S^*}{\partial D} < 0 \qquad \text{(A1)}$$

Proposition 1 follows. QED.

Proof of Proposition 2:

We differentiate Equation (2) with respect to λ:

$$\frac{\partial S^*}{\partial \lambda} = \left\{\begin{array}{l}\{[(t-k)(1-\gamma)-\gamma p_F]\{(a+\theta-D)[2p_M+\lambda(1-t)]+2\{B+p_M[D-(a-\theta)]\}\}\} \\ -(1-t)\{(a+\theta-D)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F+p_M)\}-B-p_M[D-(a-\theta)]\}\end{array}\right\} /$$
$$/\{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)\}^2 \qquad \text{(A2)}$$

$$\text{Thus, if} \quad \gamma > \frac{t-k}{p_F+t-k} \Rightarrow \frac{\partial S^*}{\partial \lambda} < 0$$

Proposition 2 follows. QED.

Proof of Proposition 3:

We differentiate Equation (2) with respect to γ:

$$\frac{\partial S^*}{\partial \gamma} = -\frac{[k+\lambda(t-k)+\lambda p_F+p_M]\{(a+\theta-D)[2p_M+\lambda(1-t)]+2\{B+p_M[D-(a-\theta)]\}\}}{\{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)\}^2} \qquad \text{(A3)}$$

$$\Rightarrow \frac{\partial s^*}{\partial \gamma} < 0$$

Proposition 3 follows. QED.

Proof of Proposition 4:

We differentiate Equation (2) with respect to *B*:

$$\frac{\partial s^*}{\partial B} = -\frac{1}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)} \Rightarrow \frac{\partial S^*}{\partial B} < 0 \tag{A4}$$

Proposition 4 follows. QED.

Proof of Proposition 5:

We differentiate (A1) with respect to λ:

$$\frac{\partial^2 S^*}{\partial D \partial \lambda} = -\frac{[\gamma p_F - (t-k)(1-\gamma)]\lambda(1-t)}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)}$$
$$\Rightarrow \frac{\partial^2 S^*}{\partial D \partial \lambda} > 0 \text{ iff } \gamma > \frac{t-k}{p_F+t-k} \tag{A5}$$

Thus, Proposition 5 follows. QED.

Proof of Proposition 6:

We differentiate Equation (2) with respect to *a*:

$$\frac{\partial S^*}{\partial a} = \frac{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F+p_M)+p_M}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)} \Rightarrow \frac{\partial S^*}{\partial a} > 0 \tag{A6}$$

Proposition 6 follows. QED.

Proof of Proposition 7:

We differentiate Equation (2) with respect to θ:

$$\frac{\partial S^*}{\partial \theta} = \frac{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F+p_M)-p_M}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)} \Rightarrow \frac{\partial s^*}{\partial \theta} > 0 \tag{A7}$$

Proposition 7 follows. QED.

Appendix B

Variable Construction

Variable	*Description*	*Calculation based on Compustat/CDA Spectrum/Execucomp data items*
Dependent Variables		
Book Tax Gap	Tax sheltering	(*PI - PIFO - TXFED/0.35 - TXS - TXO - ESUB*)/*AT*
Tobin's q	Ratio of firm's market value of assets to book value of assets	(*DLTT + DLC + CSHO* × *PRCC_F*)/*AT*
Control Variable: Firm Characteristics		
Leverage	Firm market leverage	(*DLTT + DLC*)/(*AT - CEQ + CSHO* × *PRCC_F*)
Default Probability	Computed as in Bharath and Shumway (2008)	$N(-\{[(PRC \times SHROUT/1{,}000) + (DLC + 1.5 \times DLTT)]/[(DLC + 1.5 \times DLTT) \times T] + (RETt - 1 - 0.5 \times \sigma_V^2) \times T\}/\sigma_V \times sqrt(T))$
Size	Total assets (in millions)	*AT*
Fort500 Dummy	Dummy equal to 1 if the firm is in the Fortune 500 list	
Profitability Dummy	Dummy equal to 1 if the pre-tax income (PI) is positive	
ROA	Firm's operating income to assets	*OIBDP/AT*
ROA Volatility	Standard deviation of *ROA* over previous six years	
Total accruals	Computed as in Berstresser and Phillipon (2006)	$[(ACT_t - ACT_{t-1}) - (LCT_t - LCT_{t-1}) - (CHE - CHE_{t-1}) + (DLC_t - DLC_{-1}) - DP_t]/AT_{t-1}$
Intangibles	Ratio of intangible assets to total assets	*INTAN/AT*
R&D	Ratio of R&D expenses to total assets (0 if missing)	*XRD/AT*
Advertising	Ratio of advertising expenses to total assets (0 if missing)	*XAD/AT*
%Institution	% of shares held by institutional investors	
R&D	Ratio of R&D expenses to total assets (0 if missing)	*XRD/AT*
Advertising	Ratio of R&D expenses to total assets (0 if missing)	*XAD/AT*
%Institution	% of shares held by institutional investors	
Control variable: CEO compensation		
Stock Option Ratio	Ratio of the value of CEO's option grants to the sum of salary, bonus, and option grants	*Black-Scholes Value of Option Grants*/(*SALARY + BONUS + Black-Scholes Value of Option Grants*)

(Continued)

Appendix B (continued)

Variable	*Description*	*Calculation based on Compustat/CDA Spectrum/Execucomp data items*
Manzon and Plesko (2002) controls		
NOL	Dummy equal to 1 if the firm reports a NOL carry-forward *(TLCF)* on its balance sheet	
ΔNOL	Change in NOL carry-forwards	$TLCF_t - TLCF_{t-1}$
Sales Growth	Sales growth rate	$(SALE_t - SALE_{t-1})/SALE_{t-1}$
PP Ratio	Ratio of net to gross fixed assets	*PPENT/PPEGT*
ΔPost-retirement Obligations	Change in post-retirement obligations	$PRBA_t - PRBA_{t-1}$
Pre-1993 goodwill	Goodwill before or in 1993	*GDWL*
Post-1993 goodwill	Goodwill after 1993	*GDWL*
Other Intangibles	Other intangible assets	*INTAN - GDWL*
Foreign Operations	Absolute value of firm's foreign pre-tax income	$\|PIFO\|$