Debt, Bankruptcy Risk, and Corporate Tax Aggressiveness

Akanksha Jalan, Jayant R. Kale, and Costanza Meneghetti

Abstract

We examine the effect of leverage and bankruptcy risk 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 maximizes her payoff. The theory predicts that sheltering relates negatively to leverage, monitoring, manager's bankruptcy costs, and, under certain parametric conditions, manager's equity stake in the firm. Our empirical tests provide evidence that is consistent with these theoretical predictions. We show that leverage and bankruptcy risk relate negatively to sheltering and 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 use two changes to the bankruptcy law to show that our findings are robust to endogeneity concerns.

This version: September 20, 2017

Corresponding author: Jayant R. Kale. Jalan is at the Rennes Business School, France; e-mail: Jalan.akanksha@gmail.com. Kale is in the Finance Group, D'Amore-McKim School of Business, Northeastern University, Boston (MA) – 02115; e-mail: j.kale@neu.edu. Meneghetti is at the Department of Finance, West Virginia University, Morgantown (WV) – 26506; e-mail: comeneghetti@mail.wvu.edu.
This research is supported in part by the National Stock Exchange, Mumbai, India under the Commissioned Research Initiative. We acknowledge the helpful comments from Vikas Agarwal, Rajesh Aggarwal, Felipe Cortes, Dirk Hackbarth, Lixin Huang, Vikram Nanda, Chip Ryan, Baozhang Yang, and seminar participants at Boston University, Georgia State University, Indian Institute of Management – Bangalore, Indian School of Business - Hyderabad, National Stock Exchange – Mumbai, University of Massachusetts – Amherst, and University of Texas – Dallas. We thank Jingrui Li for excellent research assistance. We are responsible for all errors.

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"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)

Over the last two decades, US corporations have made their tax departments active profit centers with annual targets for effective tax rates and tax savings (Hollingsworth, 2002; Clark, Martire, and Bartolomeo, 2000). Therefore, tax departments' primary activity is determining ways to shelter income in order to reduce taxes. The incentives to avoid paying income taxes are understandable since more than a third of the firm's profits can potentially be taken away by the IRS through taxes. Extant theoretical research (e.g., Slemrod, 2004, and Desai, Dyck, and Zingales, 2007) examines corporate tax sheltering behavior in the context of an all-equity firm. We extend the existing theoretical frameworks by considering a levered firm. The introduction of debt into the analysis provides new insights and empirically testable predictions with respect to optimal levels of tax aggressiveness. First, interest payments on debt reduce taxable income and thereby reduce the incentive to shelter income. Second, the presence of risky debt allows us to examine how tax aggressiveness levels are affected by bankruptcy risk. For example, since the benefits of aggressiveness do not accrue in bankruptcy, the presence of risky debt reduces the number of states in which the firm can shelter income. Third, creditors such as banks and institutional debtholders monitor firm activities, which will likely reduce the ability of the firm to shelter income.

We derive the optimal level of tax aggressiveness 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 maximizes her payoff. The debt is risky and, therefore, bankruptcy is possible and is more costly to the manager than to shareholders since she bears additional personal and possibly non-pecuniary costs in bankruptcy. Further, only the manager observes the true cash flow and others observe only the cash flow that is reported by the manager. In our framework, the manager determines *ex ante* the optimal amount to shelter in the next period. This assumption is realistic since shelters are sophisticated financial products and would require considerable time to materialize and generate benefits. Since the sheltering decision is made before cash flows are realized and outsiders, including debtholders, observe only the reported cash flows that have been reduced by sheltering, greater sheltering increases the number of states in which the firm is bankrupt.

The firm's manager owns an equity stake in the firm. Thus, she can shelter income from taxes which benefits all shareholders but, in addition, she can also divert part of the sheltered income for her sole use. Since we assume that diversion by the manager happens only out of sheltered income and that bankruptcy is more costly to the manager, on the one hand the manager wants to shelter more in order to be able to divert more but, on the other hand, she must shelter only up to the point where the risk of bankruptcy is not too high. The optimal sheltering level chosen by the manager is thus a trade-off between her benefits in the form of tax savings (accruing to her through owning equity) and diverted income and the costs associated with increased likelihood of bankruptcy.

In the above setting, we show that the optimal level of sheltering is decreasing in the level of debt. We also show that a higher probability of detection and a higher personal cost of bankruptcy both reduce the optimal level of tax sheltering. We demonstrate that, under certain parametric conditions, the effect of the manager's equity stake in the firm on tax sheltering is negative, and that the effect of leverage on sheltering is weaker for high levels of managerial equity compensation. Finally, we show that tax sheltering decreases in bankruptcy risk.

We test all the predictions of our theory on a large sample of U.S. firms over the period 1986-2012 and find results that are largely consistent with our predictions. In our sample, the level of sheltering relates negatively with leverage, monitoring, the managers bankruptcy costs, and the firm's CEO incentive alignment. We also find support for the prediction that incentive alignment makes the relation between debt and sheltering weaker.

Our theoretical framework assigns a crucial role to bankruptcy risk and our empirical analysis includes a number of tests to validate this role. Since, as mentioned earlier, 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. We find strong evidence of a negative relation between sheltering and the probability of default. Furthermore, the negative effects of probability of default and debt on sheltering are significantly amplified in firms that have riskier cash flows. We also find that the negative relation is weaker for larger, better governed, and more profitable firms as well as firms that are in the "public eye".

The negative effects of leverage and default probability on tax aggressiveness are robust to alternative measures of aggressiveness and leverage and 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 default probability with 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, namely, the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005 and the Bankruptcy Reform Act (BRA) of 1979 as well as in a two-stage least squares IV estimation.

The BAPCPA of 2005 heightened the scrutiny of firms in distress/bankruptcy and increased creditor power, which improved creditors' expected cash flows in bankruptcy. We argue that the passage of BAPCPA engenders two effects. First, greater scrutiny brought about by the Act has the direct effect of reducing tax sheltering by firms. Second, it reduces the creditors' incentives to monitor the firm by improving the value of creditors' claims in bankruptcy. In our framework this implies that the passage of the BAPCPA weakens the efficacy of debt as a monitoring mechanism. Consistent with this intuition, we find that the negative relation between leverage and sheltering became less negative in post-BAPCPA years. In contrast to the BAPCPA, the BRA of 1979 is essentially pro-debtor. As such, it increases the creditors' incentives to monitor the firm by reducing the creditors' cash flows in bankruptcy. In the context of our model this implies that the passage of the Act strengthens the efficacy of debt as a monitoring mechanism. Consistent with this intuition we find that the negative relation between leverage and sheltering is stronger after 1979.

The main contribution of our paper is to highlight the roles of bankruptcy risk and corporate leverage as significant determinants of tax aggressiveness. We also 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) is one of the first theoretical papers to highlight the need for analyzing the corporate tax avoidance decision in an agency-theoretic framework but does not consider the role of debt.[1] Desai, Dyck and Zingales (2007) (DDZ) present a theoretical framework to explain the cross-sectional variation in managerial diversion. They too model an all-equity firm and, thus, cannot offer insights into the effects of bankruptcy and shareholder-bondholder agency problems on tax aggressiveness. Desai and Dharmapala (2009) analyze tax avoidance as a function of the efficacy of the firm's corporate governance but do so only for the all-equity firm. The working paper by Joulfaian (2011) includes debt in the analysis but ignores the shareholder-bondholder agency problem.

Our empirical analysis contributes to the extant literature in two ways. First, we are not aware of any empirical study that considers the role of bankruptcy risk on tax aggressiveness. Ours is likely the first study to show that there is a negative relation between tax aggressiveness and bankruptcy risk as measured by a firm's probability of default. Second, empirical studies generally include leverage only as a control variable in explaining the cross-sectional determinants of tax avoidance/ aggressiveness and, therefore, there is only indirect evidence on how the presence of debt affects sheltering.[2] Furthermore, the evidence is mixed. For example, Rego and Wilson (2012) find that firms with high leverage ratios are associated with lower effective tax rates, which is consistent with higher tax avoidance. Wilson (2009) and Lisowsky (2010), on the other hand, provide evidence that tax shelter firms are associated with lower leverage ratios.[3] Our empirical findings add several empirical insights to this strand of literature by

[1] Following Slemrod (2004), Chen and Chu (2005) study corporate tax evasion and show 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) use a costly state falsification framework and demonstrate that penalties on tax evasion imposed directly on tax managers are more effective in curbing evasion that those imposed on the firm.

[2] A recent paper by Hasan *et al* (2014), however, considers a somewhat different aspect of the relation between leverage and tax avoidance. Their study shows 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 in Hasan *et* al, our approach differs from theirs in important ways. We propose and empirically show that higher leverage results in lower tax aggressiveness whereas Hasan *et al* implicitly assume 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 managers decide on tax avoidance activities taking the firm's leverage as given.

[3] Edwards et al. (2016) find a positive relation between a firm's financial constraints and tax planning. Unlike our paper, the focus of this study is on tax planning rather than tax aggressiveness.

providing strong evidence for a negative relation between tax sheltering and leverage and by showing that the negative leverage-sheltering relation is stronger 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 aggressiveness.[4] Following Slemrod (2004), there have been a number of papers on the interaction of firm-level corporate governance with the decision to avoid taxes (e.g., Desai and Dharmapala, 2006; Desai, Dyck and Zingales, 2007; Rego and Wilson, 2012; Armstrong et al, 2015). Citing examples of firms such as Enron, Parmalat, and Tyco, researchers have argued that strong complementarities exist between tax avoidance and managerial rent-seeking. The cost of indulging in one, reduces the cost of another (Desai, 2005; Desai and Dharmapala, 2006; Desai, Dyck and Zingales, 2007). Desai and Dharmapala (2009) address the issue of whether tax avoidance activities advance shareholders' interests and argue 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 resources. They further suggest 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 (2009) who finds that the benefits of engaging in tax shelters accrue to shareholders of well-governed firms only. Some researchers propose that firms, like individuals, differ in their preference for undertaking risky tax avoidance and have stressed the need for identification of determinants 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 behavior.

[4] 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 was concern that the 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 with on a regular basis, verification of the 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."

Our findings on the relation between managerial equity ownership on tax sheltering add to the literature by highlighting the importance of debt in this relation. Desai and Dharmapala (2006) study finds that higher incentive compensation reduces tax avoidance and that this relationship is driven primarily by poorly-governed firms. This is in contrast to Hanlon, Mills, and Slemrod (2005) and Rego and Wilson (2012) who find a positive association between equity risk incentives and tax aggressiveness but find no variation by firm-level corporate governance. Armstrong et al (2015) provide evidence that 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 and, furthermore, 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 discipline management because default allows creditors the right to force the firm into bankruptcy (Harris and Raviv, 1990). Studies also show that bankruptcy is costly to the firm (Ang, Chua and McConnell, 1982; Lawless and Ferris, 1997; Altman, 1984; Altman and Hotchkiss, 2006), but it is "costlier" to the manager because she bears non-pecuniary costs (Gilson, 1989; Gilson and Vetsuypens, 1993; Hotchkiss, 1995; Ayotte and Morrison, 2009). There are also papers that examine the monitoring role of debt and debtholders' involvement in firm governance (Gilson, 1989; Gilson and Vestyupens, 1993; Kroszner and Strahan, 2001; and Nini *et al*, 2012). Our finding that the presence of debt is associated with lower levels of tax sheltering identifies yet another aspect of the monitoring role of debt.

The article is organised as follows: Section 1 presents the model, Section 2 discusses the data sources, Section 3 presents univariate statistics, Section 4 summarizes empirical results, and Section 5 offers some concluding remarks.

1. The model

1.1. The manager-owned firm

In this section, we present a simple framework that allows us to obtain a closed-form solution for a firm's optimal level of sheltering and present comparative statics that we can test on data. We derive the optimal level of sheltering for a levered firm and assume that the level of debt is exogenous. In Appendix B, we present a more general model in which we solve for the optimal levels of both debt and sheltering.

Consider a manager-owned firm that has access to a project requiring an investment of *I* at time t = 0, which we assume is raised through debt with face value *D*. The debt must be repaid at time t = 1 when the payoffs from the investment are realized and the firm ends. 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 Chapter 11 reorganization is not feasible. All agents in the model 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 $[a - \theta, a + \theta]$ with $\theta > 0$. For $a - \theta < y < a + \theta$, the density function *f(.)* is $1/ 2\theta$, and the cumulative density function $F(y \leq x)$ is $[x-(a - \theta)]/ 2\theta$. We have verified that our results go through for all distributions that have an increasing hazard rate, a condition required for satisfying the second order condition for a maximum. The theoretical frameworks in Grossman and Hart (1982) and Kale, Noe, and Ramirez (1991) make similar distributional assumptions. The uniform distribution satisfies the increasing hazard rate property and also enables us to obtain a closed-form solution for the optimal level of sheltering, which provides clear-cut comparative static predictions that we can test on data.

The expected cash flow from the project is *a* and we assume that $D < a$ but greater than $a - \theta$, implying that the expected value of this project without sheltering is positive, and that debt is risky even when the manager does not shelter any income. We also assume that, the *true* payoff *y* is observable to the manager alone. This is an important assumption since, without it, the manager does not have the incentive to shelter income from taxes because these activities are readily detected. This assumption is common in models of agency (Grossman and Hart, 1982) and the literature on tax sheltering (Desai and Dharmapala, 2006; Desai, Dyck and Zingales, 2007; and Crocker and Slemrod, 2005). All other agents (debtholders and the taxing authority) observe only the income that the manager reports and bankruptcy occurs when reported income is lower than the promised repayment to debtholders.

The presence of corporate taxation at the rate *t* reduces the residual 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 in t = 0 based on her expectations of the future cash flow *y* and the probability of bankruptcy implied by the distribution of *y*.[5] Once the payoff *y* is realized at t = 1, the manager shelters the amount *S* and reports a cash flow of *y* – *S*, out of which debtholders are paid.

Extant literature (e.g., Desai, Dyck, and Zingales, 2007) generally assumes that the firm and the manager are monitored, and thus that sheltering is detected with some probability and entails costs in the form of penalties. We similarly assume that sheltering is detected and deemed illegal with probability $\gamma \in [0,1]$ and that, if caught sheltering, the firm has to give back the entire sheltered amount and pay a penalty that is proportional to the sheltered amount. We denote this penalty by $P_F = p_F * S$, where $p_F \in [0,1]$. For simplicity, we assume that if $y < S + D$ the sheltering is always detected and the manager has to pay the penalty P_F. If $y < p_F S + D$ the firm has to declare bankruptcy. Thus, the cumulative density function $F(y < p_F S + D) = (p_F S + D - a)/2\theta$ represents the probability the firm goes bankrupt. Since only the reported income *y* – *S* is available for paying bondholders, sheltering increases the number of states in which the firm is bankrupt.

Since our objective is also to examine the effect of bankruptcy risk on tax aggressiveness, we sharpen the focus on bankruptcy by assuming that, in bankruptcy, sheltering activity is detected with certainty and the sheltered income then has to be used to pay the unpaid taxes (due to sheltering) and any failure-to-pay penalties imposed by the tax code. There are several reasons to assume that it is difficult for the manager or the firm to retain the benefits of sheltering in 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 subjected to much greater scrutiny, which makes it

[5] We note here that our results go through if we define *S* as a proportion of *y*.

highly likely that tax avoidance activities will be revealed. Thus, in our setting, the benefits of sheltering exist only in the non-bankruptcy states and that too only if the firm is not caught sheltering. This assumption is simply for mathematical tractability and does not alter any of the model's predictions. [6]

In the above setting, the manager chooses the S which maximizes the following:

$$E(V_M) = \int_{S+D}^{b} [(y-S-D)(1-t)+S](1-\gamma) f(y)dy + \int_{S+D}^{b} [(y-D)(1-t) - p_F S]\gamma f(y)dy + \\ + \int_{p_F S+D}^{S+D} [(y-D)(1-t) - p_F S] f(y)dy \tag{1}$$

In the above expression, a, θ, D, γ, and p_F are exogenously given and constant.[7] The manager maximizes $E[V^M]$ assuming that debt providers will optimally choose the optimal level of debt D^*.

Solving equation (1) for the first order condition yields the following expression for the optimal level of sheltering. In Appendix A we show that the second order condition for the maximum is also satisfied.

$$S^* = \frac{(a+\theta-D)[(1-\gamma)t - \gamma p_F]}{\{2[(1-\gamma)t-\gamma p_F] + (1-t)p_F^2 + 2p_F(1-p_F)\}} \tag{2}$$

In order to focus on the relevant outcomes we assume that $[(1-\gamma)t - \gamma p_F] > 0$, which imposes an upper bound on the monetary cost incurred by the firm in case of bankruptcy and guarantees that S^* is positive. Further, we make the simplifying assumption that that $a - D > \theta$. This assumption guarantees that $S^* + D < a$, so that the expected profit for the lenders is positive.

Our objective is to determine the relation between debt level and sheltering as measured by S^*, which we formally establish above in equation (2). Comparative statics on equation (2) yield the following results (all proofs are in Appendix A).

Result R1. The relation between the optimal level of sheltering S^* and the debt level D is negative.

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[6] Lenders may or may not receive some money back in bankruptcy. We explicitly model the lenders' outcome in the model in Appendix B in which we simultaneously solve for optimal levels of debt and sheltering.

[7] For computational simplicity, we allow for tax shields on the entire amount of debt D, rather than on the interest component only. In unreported results, we confirm that our results go through when we assume that only the interest is tax deductible.

Intuitively, a higher S increases the probability of bankruptcy for the firm, in which case, the manager loses everything since she is the sole owner. A higher S also increases the probability that $p_F S + D < y < S + D$ in which case, although there is no bankruptcy, the manager has to give back the amount sheltered and has to pay the penalty p_F. Thus, it is in the manager's interest to avoid bankruptcy (and the penalty) by sheltering less when the firm's debt burden is elevated. The negative relation between debt level and sheltering also arises because debt provides the firm tax shields, which should reduce the incentive to resort to costly tax avoidance activities (Graham and Tucker, 2006).

Result R2. The relation between the optimal level of sheltering S^* and the probability of being caught γ is negative.

A higher probability of being caught in sheltering activities increases the expected cost of the penalties and the probability of losing the benefits from sheltering. Thus, the probability of being caught is a deterrent to sheltering activities. This rationale also implies the following corollary.

Result R3. The relation between the optimal level of sheltering S^* and debt level becomes more positive (less negative) when the probability of being caught γ is higher.

Next, we show that the relation between the level of sheltering and the expected cash flow a is positive. As the a increases, *ceteris paribus,* the firm has a lower ex ante (and ex-post) probability of bankruptcy for a given level of debt. Thus, this result also illustrates the link between bankruptcy risk and the firm's incentive to shelter income from taxes.

Result R4. The relation between the optimal level of sheltering S^* and a is positive.

Similarly:

Result R5. The relation between the optimal level of sheltering S^* and θ is positive.

In the following sections, we test the above predictions of our simple theoretical framework on a large sample of US firms.

1.2. Manager and shareholders

We now assume that that the manager is just a shareholder in the firm and owns a fraction λ, with $\lambda \in [0,1]$, of the firm's equity. While the manager's interests are partly aligned with the shareholders', as argued in the extant literature (e.g., Desai, Dyck, and Zingales, 2007), she has the opportunity and the incentive to divert a part of the sheltered income to her personal advantage and share only the remaining sheltered income with the outside shareholders. In our framework, diversion takes place out of the sheltered income only.[8] Let k, with $k \in [0,1]$, be the fraction of sheltered income that the manager chooses to divert. Finally, we assume that if the firm goes bankrupt the manager incurs a non-monetary cost $B > 0$ and a monetary penalty $P_M = p_M * S$, where $p_M \in [0,1]$.

The manager's objective function now is the following:

$$E[V^M] = \int_{S+D}^{a+\theta} \begin{Bmatrix} \{\lambda[(y-S-D)(1-t)+S(1-k)]+Sk\}(1-\gamma) \\ +\{\lambda[(y-D)(1-t)-p_F S]-p_M S\}\gamma \end{Bmatrix} f(y)dy - \int_{a-\theta}^{S+D} (B+p_M S) f(y)dy \qquad (3)$$

In the above expression, λ, a, θ, k, D, γ, p_F, p_M, and B are exogenously given and constant. The manager maximizes $E[V^M]$ assuming that debt providers will optimally choose the optimal level of debt D^*. Solving equation (3) for the first order condition yields the following expression for the optimal level of sheltering. In Appendix A we show that the second order condition for the maximum is also satisfied.

$$S^* = \frac{(a+\theta-D)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F + p_M)\} - B - p_M[D-(a-\theta)]}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)} \qquad (4)$$

In order to focus on the relevant outcomes we assume that $B < (a+\theta-D)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F + p_M)\} - p_M[D-(a-\theta)]$, which imposes an upper bound on the non-monetary cost incurred by the manager in case of bankruptcy and guarantees that S^* is positive. Further, we assume that $[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F + p_M) - p_M < 0$. This assumption guarantees that $S^* + D < a$, so that the expected profit for the lenders is positive.

[8] Our assumption is different from that in Desai, Dyck and Zingales (2007), who allow for the possibility of diversion out of the true payoff, which also has the effect of reducing taxable income.

Results 1 to 5 from the previous simplified model still hold when we relax the assumption that the manager is the sole owner of the firm. The richer model gives us four additional results (all proof are in Appendix B). The non-monetary cost *B* makes bankruptcy more expensive for the manager, which gives her the incentive to reduce sheltering. This intuition is formalized below.

Result R6. The relation between the optimal level of sheltering S^* and the manager's non-monetary bankruptcy cost B is negative.

The next result establishes the relation between S^* and the manager's share in the firm's equity.

Result R7. 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.*

The result above shows that when the probability of getting caught and the resulting risk of losing the benefits from sheltering and of having to pay a penalty is high enough, the relation between S^* and λ is negative. If γ is below the threshold, the direction of the derivative is ambiguous and depends on the value of the parameters. When the condition on γ above is met, it follows that when the manager's ownership in the firm is high, the leverage-sheltering relation becomes less negative.

Result R8. If $\gamma > \frac{t-k}{p_F + t - k}$ *the relation between sheltering and debt level becomes more positive (less negative) when the manager's equity ownership in the firm is higher.*

We next derive the relation between the CEO diversion of funds and sheltering, which is driven by our assumption that the manager can only divert money out of sheltered income.

Result R9. The relation between the optimal level of sheltering S^* and k is positive.

2. Sample and variable description

2.1. Sample description

Our initial sample consists of all U.S. firms, excluding financial firms and utilities (SIC codes 4900 – 4999 and 6000 – 6999, respectively), listed in Compustat for the period 1986 – 2012. We obtain data on compensation from Execucomp and on institutional ownership from CDA/Spectrum. Our main sample consists of 73,515 firm-years (10,451 unique firms) over the period 1986-2012. The subsample which includes the compensation variables consists of 16,618 firm-year observations and is available for the period 1993 – 2012. For one of the tests, we construct a sample of all firms on Compustat during the period 1978 – 1983. Detailed definitions of all variables are in Appendix C.

2.2. Tax sheltering measure

We measure the level of firm's tax sheltering as follows. First, we compute a variable suggested by Manzon and Plesko (2002) that captures the difference between the income a firm reports to its shareholders based on Generally Accepted Accounting Principles (GAAP) and the one it reports to the income tax authorities based on tax laws. Since income reported to tax authorities is not directly observable, we impute it by dividing the tax expense reported by the firm in its financial statements by the top statutory corporate tax rate of 35% as follows.

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

The first two terms in the above computation are pre-tax income and foreign pre-tax income, respectively, and *TXFED* is the amount paid in federal taxes for the year. Next, we adjust the *Unadjusted Spread* by accounting for inherent differences between book and tax accounting that do not represent tax aggressive activities, and compute the variable

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

where *TXS* represents state income taxes, *TXO* other income taxes, and *ESUB* measures unremitted earnings in non-consolidated subsidiaries. The three items subtracted from *Unadjusted Spread* are either included in book income and not in tax income or vice-versa and, therefore, 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. In order to avoid including firms with tax losses, which may have very different tax sheltering incentives compared to firms with a positive tax liability during the year, we only keep in the sample firms that report a positive current tax expense in a given year (Desai and Dharmapala, 2006). The variable *Book Tax Gap* has been widely used and interpreted as evidence of tax avoidance/ sheltering behavior (Mills, 1998; Desai, 2003, 2005; Manzon and Plesko, 2001; Mills, 2002). Similarly, the *U.S. Department of Treasury White Paper* titled 'The Problem of Corporate Tax Shelters' (1999) identified large and increasing book-tax gaps and interpreted them as evidence suggesting the increased use of tax shelters by corporations.

In order to ensure that our results are not sensitive to the variable definitions used in the tests, we repeat our tests using alternate definitions for tax sheltering. Instead of the *Book Tax Gap*, we use two other measures, permanent and discretionary permanent book-tax differences, suggested in Frank, Lynch and Rego (2009), which have been shown to be positively associated with tax aggressiveness. Unreported results reveal that using these alternative measures of sheltering does not alter our findings.

2.3. Variables to measure leverage, and bankruptcy risk

2.3.1 Leverage

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. In Section 4.5 we employ for rubusteness three alternate definitions of leverage based on market and book values. From unreported results, we note that our results are not affected by the use of these alternate measures of leverage.

2.3.2 Bankruptcy risk

Our primary variable to measure bankruptcy risk is *Default Probability*, which is based on the naïve measure of distance to default in Bharath and Shumway (2008). To construct this measure, we compute the approximate total volatility of the firm as $\sigma_V = E/(E+D)\sigma_E + D/(E+D)\sigma_D$. In this computation, we compute the volatility of stock returns σ_E using the previous 260 daily returns with a minimum of 180 returns, and the volatility of debt σ_D 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 0.5 (Bharath and Shumway, 2008). Then, we compute the naïve distance to default as:

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

where $r_{i,t\text{-}1}$ is the firm's stock return over the previous year. The variable *Default Probability* that we use in our tests is computed as $-N(DD)$.

We also use the *Z score* in Altman (1984) as an alternate measure of the bankruptcy risk. We do not report the results but note that all the findings are qualitatively similar.

2.4. Other variables

We use a number of variables in our multivariate analysis to test the various empirical predictions of our model. *Size* is the firm's total book assets, while *Profitability* is a dummy that takes a value of 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, and compute it as the standard deviation of the firm's return on assets for the previous six years with a minimum of three observations.

Hanlon and Slemrod (2009) argue that tax avoidance activities have a reputational cost and Dyreng, Hoopes and Wilde (2015) find that public scrutiny affects tax behaviour. We capture a manager's prestige with the variable *Fort500 Dummy*, which takes a value of 1 for firms in the *Fortune 500* list, and zero otherwise (Meneghetti and Williams, 2016). In order to capture potential reputational costs of tax aggressiveness arising out of being in the public glare, we include the variable *Advertising,* computed as the ratio of advertising expense to total assets.

Our measure for firm governance (the monitoring parameter γ in the model) is *%Institution*, computed as the percentage of the firm's outstanding shares held by institutional investors using the 13F filings data from the CDA/Spectrum database. This measure can also be used as a proxy for the manager's ability to divert firm value for personal consumption. Finally, in order to capture the manager's incentives alignment with the firm's shareholders we compute the variable *Stock Option Ratio,* defined as the ratio of the Black-Scholes value of stock options granted to the CEO and the sum of her salary, bonus and stock options.

Our measure of tax aggressiveness, *Book Tax Gap*, could be affected by earnings management on the part of managers. Any upward smoothing of income could result in overstatement of our measure. In order to control for this effect we include in our analysis the variable *Total Accruals*, computed as in Bergstresser and Phillipon (2006) (see Appendix C).[9],[10] Following Manzon and Plesko (2002) we also include as control variables the lagged *Book Tax Gap*, the pre and post 1993 values for goodwill, annual *Sales Growth*, the absolute value of the firm's foreign income, a dummy for Net Operating Losses (NOLs), change in NOL carry-forwards, 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 total assets. Since extant literature shows that firms that report high R&D expenses shelter more income from taxes and set up more tax haven operations (Desai, Foley and Hines, 2006), we also include the variable *R&D*, measured as the ratio of R&D expense to total assets.

3. Descriptive statistics

Table 1 reports the descriptive statistics for the whole sample. The main independent variable, *Book Tax Gap*, has a mean of -0.257 and a median of -0.007.[11] The average (median) firm in our sample has a *Leverage* of 0.161 (0.104), a *Default Probability* of 0.057 (0.000) and total assets of $1,195 ($105) million. The size variable is skewed, so in the multivariate analysis we use the natural logarithm of firm size. Table 2 presents the correlation matrix for the main regression variables. While the correlation between *Book Tax Gap* and *Leverage* (0.006) is not significantly different from zero, that between *Book Tax Gap* and *Default Probability* is significantly negative (-0.150). As expected, the *Leverage* and *Default Probability* are highly positively correlated with a correlation coefficient of 0.579. The correlations in column 1 suggest that firms in the Fortune 500 and firms with high institutional holdings,

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

[10] Consistent with the intuition that accruals can affect our tax aggressiveness measure, Blaylock et al. (2012) investigate the effect of upward earnings management on *Book Tax Gap* and on the usefulness of *Book Tax Gap* as a signal of future earnings and accruals persistence,

[11] These numbers are consistent with Desai and Dharmapala (2009). Their measure of tax gap is what we denote as *Unadjusted Spread* and is computed as the difference between domestic pre-tax book income and inferred taxable income, before making adjustments for earnings in subsidiaries and state income taxes. Our sample size of 73,515 firm-years too is significantly greater than their sample of 4,492 firm-years.

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.

4. Effects of leverage and bankruptcy risk on sheltering

In this section we present our findings on the relation between sheltering, as measured by the variable *Book Tax Gap*, and the two variables of interest *Leverage* and *Default Probability* in a multivariate setting. We start by presenting the findings from OLS regressions first on *Leverage* and then on *Default Probability*. In both cases, we include all the control variables described in the previous section. We then control for the effect of CEO alignment and include the variable *Stock Option Ratio* in the base regression.

Next, we control for endogeneity using two methods. First, we examine how the level of sheltering and the effect of leverage and bankruptcy risk on sheltering changed following two exogenous changes in bankruptcy law, the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005 and the Bankruptcy Reform Act (BRA) in 1979. Second, we estimate a 2-stage least squares specification (2SLS) with instruments for *Leverage* and *Default Probability*. Lastly, we investigate how the effect of *Leverage* and *Default Probability* on sheltering varies for firms with higher values for ROA volatility, profitability, institutional holdings, size, advertising, accruals, and managerial stock option ratios, and for firms that are included in the Fortune 500 list.

Depending on the specification, we use industry as well as firm fixed effects to control for time invariant industry and firm unobserved variables, respectively. For industry fixed effects, we define industry dummies at the 2-digit SIC code level. Year dummies are always included unless specified otherwise. In all regressions, standard errors are robust to heteroscedasticity and are clustered by firm.

4.1. Tax aggressiveness, leverage, and probability of default

We first estimate the regression of *Book Tax Gap* on *Leverage* and other control variables to determine the association between a firm's leverage and its tax sheltering. We present the results from this analysis in the first two columns of Table 3. The first column presents findings with industry fixed effects (IFE) and the second with firm fixed effects (FFE), respectively. Consistent with the prediction in result *R1*, the coefficient on *Leverage* is negative and significant at the 1% level in both columns indicating that higher leverage is associated with lower sheltering. To gain a perspective on the significance of the effect of *Leverage* on tax sheltering, we note that the coefficients from the first column imply that if the debt level increases from the 25th percentile to the 75th percentile value, the *Book Tax Gap* decreases by 31.79%.

With respect to the effects of other variables on sheltering, the coefficient on *%Institution* is negative and significant, suggesting that higher institutional ownership, an indicator of better governance, deters firms from sheltering income.[12] To the extent that *%Institution* measures monitoring, and thus the probability that the manager is caught sheltering, this result is consistent with result *R2*. Since monitoring potentially reduces the manager's ability to divert funds for personal consumption, this finding is also consistent with the positive relation between the diversion parameter *k* and sheltering (result *R7*). The coefficients on *Advertising* and *Fort500* are negative and significant in all specifications. These findings are consistent with the prediction in result *R4* that managers with greater personal costs of bankruptcy will shelter less. The intuition is that managers of firms that advertise more and/or are in the Fortune 500 list are in the "public glare" and thus have more to lose in terms of prestige and reputation and, therefore, they care more about the potential personal cost of sheltering (Hanlon and Slemrod, 2009).

The coefficient on Log(*Size*) is positive and significant, which is consistent with the fact that large firms face a lower risk of bankruptcy as compared to smaller firms with similar debt ratios. The intuition underlying the positive coefficient on the *Profitability Dummy* is similar to that for firm size. Furthermore, only firms that are profitable will need to shelter income. The coefficient on *ROA Volatility* is negative and significant indicating that riskier firms shelter less. This result is consistent with the prediction in result *R9* that an increase in the dispersion parameter θ reduces the level of sheltering.

The model suggests that leverage reduces sheltering because a higher debt burden increases the number of states in which the firm goes into bankruptcy. We test this intuition in columns four and five of Table 3, where we substitute *Leverage* with our measure of bankruptcy risk, *Default Probability*. The sample size for this specification is 34,698 firm-years. The coefficient on *Default Probability* is negative

[12] This reinforces the finding that tax aggressiveness may not necessarily be a value-enhancing activity for shareholders (Desai and Dharmapala, 2009).

and significant at the 1% level in both columns. The result is economically significant: the coefficients from the fourth column of Table 3 imply that if the default probability of an average firm increases from the 75th to the 90th percentile (roughly from 0.004 to 0.176) sheltering decreases by 87.91%. This finding is consistent with the intuition that leverage affects sheltering decisions through bankruptcy risk.

4.2. Sheltering and CEO incentive alignment

We next examine how the CEO's incentive alignment affects tax sheltering and the relation between leverage and tax sheltering. We expect (result *R5*) that when the CEO's incentives are better aligned, she is less likely to shelter income from taxes. Our model further suggests (result *R6*) that the negative relation between sheltering and *Leverage* should become less negative as managerial alignment with shareholders of the firm increases. We present the findings from this analysis in columns three and six of Table 3. In these estimations, we add the variables *Stock Option Ratio* and the interaction *Stock Option Ratio* * *Leverage* to the base specification. Given the limited data availability on managerial compensation in the Execucomp database, the sample size reduces to 16,618 when we include the variable *Stock Option Ratio.*

The results in column three of Table 3 show that the negative relation between *Leverage* and *Book Tax Gap* continues to hold after controlling for CEO alignment. The coefficient on *Stock Option Ratio* is negative but not significantly different from zero, while the coefficient on the interaction term *Stock Option Ratio* * *Leverage* is significantly positive, which is consistent with the prediction that the effect of *Leverage* on sheltering becomes significantly less negative when CEO alignment is high.

Column six presents the findings when we substitute *Leverage* with *Default Probability*. The coefficient on *Default Probability* is still negative but (barely) not significant. The coefficients on *Stock Option Ratio* and on the interaction term are not statistically significant. A reason for these weaker results with *Default Probability* may be the significant reduction in sample size to 9,821 firm-years.

4.3. Endogeneity in leverage, bankruptcy risk and sheltering

In the above analysis, there is a potential difficulty in inferring the causality in the relation between sheltering and leverage/bankruptcy risk because the variables may be endogenously determined. The inclusion of firm fixed effects in the regression thus far alleviates concerns regarding endogeneity owing to time invariant unobserved variables. However, since 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. If that is the case, the observed effects of debt and bankruptcy risk on sheltering could be the manifestation of the separate relations of these variables with managerial type. Furthermore, 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, to address these causality concerns we (i) use the changes in the U.S. Bankruptcy law in 2005 and in 1979 as quasi-natural experiments, and (ii) estimate the baseline model using a two stage least square IV method.

4.3.1. The Impact of the Bankruptcy Abuse Prevention and Consumer Protection Act

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 for reckless borrowers. In the case of corporations, the BAPCPA resulted in closer scrutiny of corporations filing for bankruptcy under Chapter 11 (reorganization) and greater restrictions on fraudulent transfers to insiders. These features had the effect of increasing creditors' power in bankruptcy (Hotchkiss, John, Mooradian, and Thoburn, 2008; Alanis, Chava, and Kumar, 2015).

Greater scrutiny by regulators, particularly in the bankruptcy states, implies that the level of sheltering by corporations should decrease following the passage of BAPCPA. Further, since BAPCPA offers better protection to creditor claims in bankruptcy states and because creditors care more about the value of a firm's assets in the bankruptcy states than in non-bankruptcy states, the BAPCPA should reduce the creditors' incentive to monitor firms' activities. In our model, the parameter γ represents the level of monitoring and it does not distinguish between "external" monitoring by regulators and "internal" monitoring by institutional investors and firm lenders. The BAPCPA increases external monitoring by requiring closer scrutiny of corporations filing for bankruptcy, while at the same time it reduces lenders' incentives to monitor the firm by increasing the expected payoff that creditors/ debt-holders receive in default through restrictions on fraudulent transfers. Thus, the passage of BAPCPA, in addition to reducing the level of sheltering, should decrease the efficacy of debt as a monitoring mechanism to reduce sheltering. Therefore, we hypothesize that the negative relation between *Leverage* and sheltering will become less negative after the passage of the Act.

The effect of the passage of the BAPCPA on the relation between *Default Probability* and sheltering is more difficult to assess, since bankruptcy risk has two components. The first component is related to the risk arising from the presence of leverage in the firm's capital structure. The second relates to the risk inherent in the cash flows from firm's assets (operating leverage) and is not explained by leverage. The effect of the leverage component of *Default Probability* on sheltering is likely affected by the passage of the BACPA as in the case of *Leverage.* However, the negative effect of the inherent risk component on sheltering should be even stronger (more negative) after 2005. The intuition is that since firm riskiness increases the number of states in which the firm is in bankruptcy and the passage of the Act makes bankruptcy more costly to the firm, after 2005 the firm has more incentives to be less tax aggressive and avoid bankruptcy.

We construct the indicator variable *BAPCPA Dummy* that equals 1 for years after 2007 and is zero for prior years. We choose the year 2007 because most of the provisions of the BAPCPA were applicable from October 17, 2005 and therefore, we expect to observe its full impact from 2007 onwards. In order to test the second prediction on the effect of BAPCA on the effects of *Leverage* and *Default Probability* on sheltering, we include the interaction terms *Leverage***BAPCPA Dummy* and *Default Probability***BAPCPA Dummy* in the specifications with *Leverage* and *Default Probability*, respectively. We consider two- and three-year pre- and post-BAPCPA sample periods, namely, 2004-5 and 2007-8, and 2003-5 and 2007-9.

The first two columns of Table 4 present our findings for *Leverage*. The coefficients on *Leverage* are always negative and significant, indicating that the negative effect of debt on sheltering holds in all these periods. Further, the coefficients on *BAPCPA Dummy* are always significantly negative. Therefore, there is significant support for our first hypothesis that the passage of BACPA reduces sheltering. The coefficients on the interaction term *Leverage***BAPCPA Dummy* is significantly positive, indicating that the negative effect of *Leverage* on sheltering becomes less negative in the post-BAPCPA years, which is consistent with our hypothesis that BAPCPA has likely weakened the monitoring incentives for creditors.

Consistent with the findings from the first two columns, the coefficients on *Default Probability* and *BACPA Dummy* are negative and significant in columns three and four. The coefficients on the interaction term *Default Probability***BAPCPA Dummy* are, however, always negative, although significant only in column four. These coefficients imply that, unlike the effect of *Leverage*, the negative effect of bankruptcy risk does not become weaker after BAPCPA but may, in fact, become stronger. In order to further examine this issue, we disentangle the components of bankruptcy risk by regressing *Default Probability* on *Leverage* and computing the predicted value *Default Probability – Predicted*, which captures the volatility arising for the presence of debt in the capital structure, and the residuals *Default Probability – Residuals*. We then re-estimate the model in columns three and four using these new variables instead of *Default Probability*. The results are presented in columns five and six of Table 4.

Consistent with our previous findings, the coefficients on *Default Probability – Predicted* and the post BACPA dummy are always negative and significant. The coefficients on *Default Probability – Residuals* are not significantly different from zero. The coefficient for the interaction between *Default Probability – Predicted* and the BACPA dummy is positive in column five, which is consistent with the findings for *Leverage*, but is not significant at conventional levels. In column six, the coefficient is negative but not significantly different from zero. The coefficient on the interaction term *Default Probability – Residuals*BACPA Dummy* is negative and significant in both columns five and six. This finding is consistent with the intuition that since risky firms have a higher risk of bankruptcy and bankruptcy is more costly to the firm after the passage of the BAPCPA, risky firms have the incentive to shelter less after 2005.

4.3.2. The Impact of the Bankruptcy Reform Act

We employ a second quasi-natural experiment made possible by the Bankruptcy Reform Act (BRA) of 1979. Unlike the BAPCPA of 2005, the BRA was essentially "pro –debtor" and as such it had two effects on firms' sheltering activities. On the one hand, it increased the firms' incentives to shelter income by making bankruptcy less onerous; on the other hand, it reduced the creditors' expected outcome in bankruptcy, thereby increasing their incentives to monitor firms after the passage of the Act. By increasing creditors' incentives to monitor, BRA increased the efficacy of debt as a monitoring mechanism to reduce sheltering. Therefore, we hypothesize that (i) *ceteris paribus*, firms shelter more, and (ii) the negative relation between *Leverage* and sheltering becomes even more negative after the passage of the Act in 1979.

We construct the indicator variable *BRA Dummy* that equals 1 for years after 1981 and is zero for prior years. We consider two- and three-year pre- and post-BRA sample periods, namely, 1978-79 and 1981-82, and 1977-79 and 1981-83. In columns one and two of Table 5 we report the results for *Leverage*. The coefficients on *Leverage* are always negative (although significant only in the second column), indicating that the negative effect of debt on sheltering holds in all the time windows. Further, the coefficients on *BRA Dummy* are always positive and significant, consistent with our first hypothesis that the passage of BRA induces firms to shelter more. The coefficients on the interaction term *Leverage***BRA Dummy* is negative and significant in the first two columns, implying that the negative effect of *Leverage* on sheltering becomes even more pronounced in the post-BRA years, which supports our hypothesis that after the passage of BRA lenders have stronger incentives to monitor the firm.

In columns three and four of Table 5 we use *Default Probability* instead of *Leverage*. The coefficients on *BRA Dummy* and on its interaction with *Default Probability* are never significantly different from zero, although they are directionally consistent with our hypothesis. We obtain similar results when we use *Default Probability – Predicted* and *Default Probability – Residuals* in the estimation.

4.3.3. Two-Stage Least Squares

We estimate a two-stage least square regression of *Book Tax Gap*, treating *Leverage* and *Default Probability* as the endogenous variables. We use *Mean Leverage* and *Lagged Idiosyncratic Risk* as instruments for *Leverage* and *Mean Default Probability* and *Lagged Idiosyncratic Risk* as instruments for *Default Probability*. We compute mean values at the industry level excluding the relevant firm.

Idiosyncratic risk is computed as in Leary and Roberts (2014).[13] Following Baum et al. (2003), we check the relevance of the instruments (correlation with the suspected endogenous variable) and their validity (orthogonality to the error process). The F statistics are all above 110.24, so the instruments seem to be relevant. The p-values on the Sargan-Hansen statistics fail to reject the null hypothesis that the instruments are not correlated to the error process, implying that the instruments are valid. We report our findings in Table 6. Columns one and three report the coefficients for the first stage regressions and columns two and four for the second stage. The coefficients on *Leverage* (*Default Probability*) in column two (four) are negative and significant, indicating that our main result holds in the 2SLS specification.

4.4. Cross-sectional analysis of the effects of leverage and bankruptcy risk on sheltering

In order to provide cross-sectional identification for our hypothesis, we next investigate how the negative relations of firm leverage and default probability with sheltering differ for high and low values of *ROA Volatility*, *Profitability*, institutional ownership, firm size, inclusion in Fortune 500 list, *Advertising*, *Total Accruals*, and CEO incentive compensation. In each test, we create a dummy variable that equals one 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 and present the findings in Table 7. Panel A reports the finding from the relation between sheltering and *Leverage* and Panel B for the relation with *Default Probability*. The table reports the coefficients and t-statistics only for *Leverage*, *Dummy*, and *Leverage * Dummy*; we omit reporting the coefficients on other variables in the regressions for brevity.

In column one of Panel A, the variable *Dummy* equals one for firms with *ROA Volatility* greater than the median. The findings offer support for the appropriateness of our theoretical framework. When there is debt in the capital structure, greater business risk implies greater likelihood of bankruptcy which, according to our theoretical framework, would mean greater costs to the CEO of sheltering income. Thus, the negative effect of *Leverage* on sheltering will be amplified when the risk is high. The significantly negative coefficient on the interaction term supports this intuition. However, in the absence of debt, as the

[13] Leary and Roberts (2014) compute idiosyncratic risk for peer firms, while we compute it for the relevant firm.

positive coefficient on *Dummy* implies, riskier firms will shelter more. While this positive coefficient is contrary to expectation, a possible interpretation is that when cash flow volatility is high, the CEO shelters more to have a "guaranteed" cash flow. This strategy is possible only when the risk of bankruptcy is extremely low, such as when the firm has no debt. We note here that, in unreported results, when we regress *Book Tax Gap* on *ROA Volatility* and the interaction term *ROA Volatility * Leverage*, both coefficients are negative and significant, which is consistent with expectations.

The positive coefficients on *Dummy* and the interaction term with *Profitability* in column two are consistent with expectations. Highly profitable firms have a greater incentive to shelter income from taxes and, further, the efficacy of debt in reducing sheltering will be lower as higher profit means that the distance from bankruptcy states is greater. To the extent that *Profitability* is a proxy for the expected value of the project (*a* in the model) this result is also consistent with result *R8*.

In the third column of the table, the sorting variable for *Dummy* is institutional ownership, the measure for quality of firm governance. In the model framework, institutional ownership measures the probability that the manager is caught sheltering income (γ). Consistent with *R2* the coefficient on 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. Further, consistent with *R3*, the coefficient on 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. To the extent that the diversion of funds is lower in better governed firms, the coefficient is also consistent with the model prediction that sheltering increases in the level of diversion *k* (*R7*). This finding suggests that leverage and governance can both reduce sheltering and that they are substitute mechanisms. When the *Dummy* is constructed using firm size (column four), 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 one if the firm is in the *Fortune 500* list (column five), the coefficient on *Dummy* is negative and significant. Assuming that the *Fortune 500* dummy captures the manager's prestige, this result is consistent with the intuition in *R4* that the manager will shelter less when his non-monetary cost of bankruptcy – in this case the loss of prestige – is high. Further, the coefficient on the interaction term is positive, which implies that the negative relation between debt and sheltering is less pronounced for *Fortune 500* firms. Similarly, in column six where the *Dummy* represents high advertising expense the coefficients on *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", giving the manager of the firm considerable prestige and reputation, which she stands to lose if the firm goes bankrupt.

In the seventh column, we present results when *Dummy* represents firms with high *Total Accruals*, our measure for earnings management. The positive coefficient on *Dummy* in this specification implies that, in the absence of debt, firms that manage earnings are also more tax aggressive.[14] The coefficient on the interaction term is not significantly different from zero. The last column presents the findings when the CEO's alignment incentives are high. The coefficient on *Leverage* is significantly negative and the coefficient on *Leverage * Dummy* is not significant. These coefficients weakly support the earlier interpretation (Table 3) and results *R5* and *R6* that the CEO incentive alignment reduces tax sheltering and that the negative effect of debt on sheltering is smaller when the CEO is more aligned with shareholders.

In Panel B of Table 7, we present 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 and *Stock Option Ratio*, the coefficients on the interaction term are not significant at conventional levels. In the case of *Total Accruals* the coefficient on the interaction term is positive and significant, which is contrary to expectation.

4.5. 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 alternate definitions for some of our key variables. For sheltering, instead of the

[14] This may also be a mechanical relationship. High accruals imply a higher reported book income, and higher book income also results in a higher book-tax gap.

Book Tax Gap, we use two other measures, permanent and discretionary permanent Book-tax differences, suggested in Frank, Lynch and Rego (2009), which have been shown to be positively associated with tax aggressiveness. Unreported results reveal that using these alternative measures of sheltering does not alter the negative relation between leverage and sheltering.

We employ three alternate 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 total debt and the market value of equity. We define the first alternate book leverage measure as the ratio of long-term debt to the book value of total assets. The second book leverage variable is the ratio of total liabilities net of deferred taxes and equity and the book value of total assets. From unreported results, we note that leverage relates significantly negatively to tax aggressiveness in all cases.

5. Conclusion

We develop a simple two-date, single period model to capture the manager's choice of the optimal level of tax aggressiveness in the presence of debt. The model predicts that higher levels of debt reduce the level of sheltering. The model also predicts that the level of sheltering is lower when the manager's personal costs in bankruptcy are greater and when the risk of being caught sheltering is higher. Finally, the model also derives the parameter restrictions under which higher ownership in the firm attenuates the manager's incentives to shelter higher income from taxes and predicts that the negative relation between sheltering and debt becomes less negative as the managers alignment incentives increase.

Our empirical tests on large sample of U.S. firms over the period 1986-2012 offer considerable support to our theoretical predictions. We find that both higher leverage and bankruptcy risk deter sheltering. We show that these negative relations are robust to adjustments for endogeneity by using a two-stage least square methodology and by taking advantage of two quasi natural experiments, the passage of the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA) and the Bankruptcy Reform Act of 1979 (BRA). The BAPCPA improved creditors' power and their payoffs in bankruptcy. Therefore, we hypothesize that the passage of this Act decreases sheltering but reduces the efficacy of debt as a monitoring mechanism. Our empirical results support both these hypotheses. The

BRA, on the other hand, increased the debtor power in bankruptcy, thereby giving lenders more incentives to closely monitor the firm. Consistent with this intuition, we find that after the passage of BRA firms shelter more and that the negative effect of leverage on sheltering is stronger.

In a cross sectional analysis 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 sheltering level. 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 CEO alignment incentives, as well as for firms in the public eye.

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

Appendix A – Proofs

From equation (A1) we can solve for the first order condition (FOC) with respect to S.

$$E(V_M) = \int_{S+D}^{b} [(y-S-D)(1-t)+S](1-\gamma) f(y)dy + \int_{S+D}^{b} [(y-D)(1-t)-p_F S]\gamma f(y)dy + \\ + \int_{p_F S+D}^{S+D} [(y-D)(1-t)-p_F S] f(y)dy \tag{A1}$$

The FOC is $f'(S)=0$. Solving the FOC with respect to *S* we get equation (A2):

$$S^* = \frac{(a+\theta-D)[(1-\gamma)t-\gamma p_F]}{\{2[(1-\gamma)t-\gamma p_F]+(1-t)p_F{}^2+2p_F(1-p_F)\}}. \tag{A2}$$

It is easy to show that:

$$f''(S) = -\frac{1}{2\theta}\{-(1-t)p_F^2 - 2[(1-\gamma)t-\gamma p_F] - 2p_F(1-p_F)\} \Rightarrow f''(S)<0$$

Thus, *S** is a maximum.

Result R1

We differentiate (A2) with respect to *D*:

$$\frac{\partial S^*}{\partial D} = -\frac{[(1-\gamma)t-\gamma p_F]}{\{2[(1-\gamma)t-\gamma p_F]+(1-t)p_F{}^2+2p_F(1-p_F)\}} \to \frac{\partial S^*}{\partial D} < 0 \tag{A3}$$

R1 follows. QED.

Result R2

We differentiate (A2) with respect to γ:

$$\frac{\partial S^*}{\partial \gamma} = -\frac{(a+\theta-D)(t+p_F)[(1-t)p_F{}^2+2p_F(1-p_F)]}{\{2[(1-\gamma)t-\gamma p_F]+(1-t)p_F{}^2+2p_F(1-p_F)\}^2} \to \frac{\partial S^*}{\partial \gamma} < 0 \tag{A4}$$

R2 follows. QED.

Result R3

We differentiate (A4) with respect to *D*:

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

R3 follows. QED.

Result R4

We differentiate (A2) with respect to *a*:

$$\frac{\partial S^*}{\partial a} = \frac{[(1-\gamma)t-\gamma p_F]}{\{2[(1-\gamma)t-\gamma p_F]+(1-t){p_F}^2+2p_F(1-p_F)\}} \rightarrow \frac{\partial S^*}{\partial a} > 0 \qquad \text{(A6)}$$

R4 follows. QED.

Result R5

We differentiate (A2) with respect to θ:

$$\frac{\partial S^*}{\partial\theta} = \frac{[(1-\gamma)t-\gamma p_F]}{\{2[(1-\gamma)t-\gamma p_F]+(1-t){p_F}^2+2p_F(1-p_F)\}} \rightarrow \frac{\partial S^*}{\partial\theta} > 0 \qquad \text{(A7)}$$

R5 follows. QED.

Appendix B – Proofs

From equation (A1) we can solve for the first order condition (FOC) with respect to S.

$$f(S)=\int_{S+D}^{a+\theta}\left\{\begin{array}{l}\{\lambda[(y-S-D)(1-t)+S(1-k)]+Sk\}(1-\gamma)\\+\{\lambda[(y-D)(1-t)-p_F S]-p_M S\}\gamma\end{array}\right\}f(y)dy-\int_{a-\theta}^{S+D}(B+p_M S)f(y)dy \quad \text{(B1)}$$

The FOC is $f'(S)=0$. Solving the FOC with respect to *S* we get equation (A2):

$$S^*=\frac{(a+\theta-D)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F+p_M)\}-B-p_M[D-(a-\theta)]}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)}. \quad \text{(B2)}$$

It is easy to show that:

$$f''(S)=-\frac{1}{2\theta}\{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)\}\Rightarrow f''(S)<0$$

Thus, *S** is a maximum.

<u>Result R1</u>

We differentiate (A2) with respect to *D*:

$$\frac{\partial S^*}{\partial D}=-\frac{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F+p_M)+p_M}{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)}\Rightarrow\frac{\partial S^*}{\partial D}<0 \quad \text{(B3)}$$

R1 follows. QED.

<u>Result R2</u>

We differentiate (B2) with respect to γ:

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

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

(B4)

R2 follows. QED.

Result R3

We differentiate (B4) with respect to *D*:

$$\frac{\partial^2 S^*}{\partial\gamma\partial D} = \frac{\left[k+\lambda(t-k)+\lambda p_F + p_M\right]\lambda(1-t)}{\left\{2\left\{\left[k+\lambda(t-k)+p_M\right](1-\gamma)-\lambda\gamma p_F\right\}+\lambda(1-t)\right\}^2}$$
$$\Rightarrow \frac{\partial^2 S^*}{\partial\gamma\partial D} > 0 \qquad \text{(B5)}$$

R3 follows. QED.

Result R4

We differentiate (B2) with respect to *a*:

$$\frac{\partial \mathrm{S}^*}{\partial a} = \frac{\left[k+\lambda(t-k)\right](1-\gamma)-\gamma(\lambda p_F + p_M)+p_M}{2\left\{\left[k+\lambda(t-k)+p_M\right](1-\gamma)-\lambda\gamma p_F\right\}+\lambda(1-t)} \Rightarrow \frac{\partial \mathrm{S}^*}{\partial a} > 0 \qquad \text{(B6)}$$

R4 follows. QED.

Result R5

We differentiate (B2) with respect to *θ*:

$$\frac{\partial \mathbf{S}^*}{\partial\theta} = \frac{\left[k+\lambda(t-k)\right](1-\gamma)-\gamma(\lambda p_F + p_M)-p_M}{2\left\{\left[k+\lambda(t-k)+p_M\right](1-\gamma)-\lambda\gamma p_F\right\}+\lambda(1-t)} \Rightarrow \frac{\partial \mathbf{S}^*}{\partial\theta} < 0 \qquad \text{(B7)}$$

R5 follows. QED.

Result R6

We differentiate (B2) with respect to *B*:

$$\frac{\partial \mathrm{s}^*}{\partial B} = -\frac{1}{2\left\{\left[k+\lambda(t-k)+p_M\right](1-\gamma)-\lambda\gamma p_F\right\}+\lambda(1-t)} \Rightarrow \frac{\partial \mathrm{S}^*}{\partial B} < 0 \qquad \text{(B8)}$$

R6 follows. QED.

Result R7

We differentiate (B2) with respect to λ:

$$\frac{\partial S^*}{\partial \lambda} = \left\{ \begin{array}{l} \{[(t-k)(1-\gamma)-\gamma p_F]\{(a+\theta-D)[2p_M+\lambda(1-t)]+2\{B+p_M[D-(a-\theta)]\}\}\} \\ -(1-t)\{(a+\theta-D)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F+p_M)\}-B-p_M[D-(a-\theta)]\} \end{array} \right\} / \tag{B9}$$
$$/\{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)\}^2$$

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

R7 follows. QED.

Result R8

We differentiate (B3) with respect to λ:

$$\frac{\partial^2 S^*}{\partial D \partial \lambda} = -\frac{[\gamma p_F-(t-k)(1-\gamma)]\lambda(1-t)+(1-t)\{[k+\lambda(t-k)](1-\gamma)-\gamma(\lambda p_F+p_M)+p_M\}}{\{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)\}^2} \tag{B10}$$

Thus, if $\gamma > \frac{t-k}{p_F+t-k} \Rightarrow \frac{\partial^2 S^*}{\partial D \partial \lambda} > 0$

And, thus, R8 follows. QED.

Result R9

We differentiate (B2) with respect to k:

$$\frac{\partial S^*}{\partial k} = \frac{(1-\lambda)(1-\gamma)\{(a+\theta-D)[2p_M+\lambda(1-t)]+2\{B+p_M[D-(a-\theta)]\}\}}{\{2\{[k+\lambda(t-k)+p_M](1-\gamma)-\lambda\gamma p_F\}+\lambda(1-t)\}^2} \Rightarrow \frac{\partial S^*}{\partial k} > 0 \tag{B11}$$

R9 follows. QED.

Appendix C – Model with Endogenous Levels of Debt and Sheltering

In order to endogenize *S* and *D* we modify the model as follows. We assume that a firm needs to invest *I* in a project that has a stochastic outcome *y*, which is uniformly distributed over the interval $[0, \theta]$. We assume that $I < \theta$ and we exclude from the model pecuniary penalties and the probability of getting caught γ. Further, we define ϕ as the percentage of sheltered income that is not recoverable by lenders, and we assume that lenders are competitive.

In the above setting, the manager chooses the *S* which maximizes the following:

$$E[V_M] = \int_{S+D}^{\theta} \{\lambda[(y - S - D)(1-t) + s(1-k)] + sk\} f(y)dy - \int_{0}^{S+D} Bf(y)dy \tag{A11}$$

In our setting, λ, k, θ, t, and B are exogenously given and constant. The manager maximizes $E[V_M]$ anticipating the lender's choice of D^*. Thus, the manager's reaction function is:

$$S(\lambda, k, \theta, t, B, D^*) = \frac{(\theta - D)[k + \lambda(t-k)] - B}{2[k + \lambda(t-k)] + \lambda(1-t)} \tag{A12}$$

We assume for simplicity that lenders are competitive, and thus set their expected return to 0. If $y \geq S + D$ lenders are paid back the full amount *D*. However, if $y < S + D$ and the firm declares bankruptcy, we assume that lenders only get back $y - \phi S$ where ϕ is the percentage of the sheltered amount that is not recoverable by the lender. Thus, the lender's chooses D^* by anticipating the manager's choice of S^*:

$$E[V_L] = \int_{\phi S+D}^{\theta} Df(y)dy + \int_{0}^{\phi S+D} (y - \phi S) f(y)dy - I = 0 \tag{A13}$$

Thus, the lender's reaction function is:

$$D(I, \theta, \phi, S^*) = (\theta - \phi S) - \sqrt{\theta(\theta - 2I - 2\phi S)} \tag{A14}$$

Combining equations (A11) and (A13) we find the following solutions for the optimal S^*:

$$S^* = \frac{\sqrt{(B*X+G)^2 + X^2*(Z-B^2)} - (B*X+G)}{X^2} \quad \text{(A15)}$$

where

$$X = (2-\phi)[k+\lambda(t-k)] + \lambda(1-t), G = \phi\theta[k+\lambda(t-k)]^2, \text{ and } Z = \theta(\theta-2I)[k+\lambda(t-k)]^2.$$

In order to guarantee that the $S^* > 0$ we assume that $B < \sqrt{\theta(\theta-2I)}[k+\lambda(t-k)]$. This condition simply imposes an upper bound on the private cost *B*. Substituting (A14) into (A13) gives us the optimal D^*.

Using equation (A14) we formalize the relation between the optimal level of sheltering S^* and the cost of the project *I* in *Proposition A1* below. Note that since *D* is now endogenously determined, *D* is not in the expression for S^* and, thus, there is no comparative static for S^* with *D*; see equation (A14). In our setting, since the project is financed completely by debt, the choice of *D* is equivalent to the choice of the level of investment *I*; and the relation between S^* and *I* is the equivalent of the S^*-*D* relation in the model in the main section. Intuitively, a higher level of sheltering *S* increases the probability the firm ends up in a bankruptcy state. In bankruptcy the manager loses her stake in the firm and the amount she managed to divert, and sustains a personal cost *B*. Thus, it is in the manager's interest to avoid bankruptcy by sheltering less when the firm's debt burden is elevated. The following proposition formalizes this relation.

Proposition A1: The relation between the optimal level of sheltering S^* and the debt level *I* is always negative.

Proof: Differentiating (A14) with respect to *I* yields

$$\frac{\partial S^*}{\partial I} = -\frac{2\theta[k+\lambda(t-k)]^2}{2\sqrt{(BX+G)^2 + X^2(Z-B)^2}} < 0. \text{ Q.E.D}$$

Proposition A2: The relation between the optimal level of sheltering S^* and the bankruptcy cost *B* is always negative.

Proof: Differentiating (A14) with respect to *B* yields

$$\frac{\partial S^*}{\partial B} = \frac{G - \sqrt{(BX + G)^2 + X^2 (Z - B)^2}}{X \sqrt{(BX + G)^2 + X^2 (Z - B)^2}} < 0 \text{. Q.E.D.}$$

We are unable to sign the derivatives of S^* with λ and ϕ in equation (A14) unambiguously. We can, however, show that the proposed relations below hold numerically.

- The relation between the optimal level of sheltering S^* and the manager's share in the firm's equity λ is always positive when $t > k$.
- The relation between the optimal level of sheltering S^* and percentage of the sheltered amount that is recoverable by the lender in bankruptcy (φ) is always negative.

Appendix C
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*
Control Variables – Firm Characteristics		
Leverage	Firm market leverage.	*(DLTT+DLC)/(AT-CEQ+CSHO*PRCC_F)*
Default Probability	Computed as in Bharath and Shumway (2008)	$N(-\{[(PRC*SHROUT/1,000)+(DLC+1.5*DLTT)]/[(DLC+1.5*DLTT)*T]+(RETt-1-0.5*\sigma_V^2)*T \}/ \sigma_V*sqrt(T))$
Size	Total assets (in millions).	*AT*
Fort500 Dummy	Dummy equal to 1 if the firm is the 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*
%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*
Control variables – CEO compensation		
Stock Option Ratio	Ratio of value of CEO 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 C (continued)

Variable	*Description*	*Calculation based on Compustat / CDA Spectrum/Execucomp data items*
Instruments		
Mean Leverage	Mean SIC industry leverage excluding the firm.	
Mean Default Probability	Mean SIC industry default probability excluding the firm.	
Idiosyncratic Risk	Defined as in Leary and Roberts (2014)	
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 forward.	$TLCF_t - TLCF_{t-1}$
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|*

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Table 1
Summary Statistics
The sample consists of firm-years with available data in the period 1986—2012. All variables are defined in Appendix C. 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	-0.257	-0.007	-11.084	0.222	73,515
Control Variables – Firm Characteristics					
Leverage	0.161	0.104	0.000	0.741	73,515
Default Probability	0.057	0.000	0.000	1.000	34,698
%Institution	0.246	0.038	0.000	1.021	73,515
Size	1,194.99	105.484	0.096	24,636	73,515
Fort500 Dummy	0.059	0.000	0.000	1.000	73,515
Profitability	0.638	1.000	0.000	1.000	73,515
ROA Volatility	0.209	0.053	0.006	6.715	73,515
Total Accruals	-0.048	-0.041	-1.542	1.075	73,515
Intangibles	0.109	0.021	0.000	0.736	73,515
R&D	0.073	0.000	0.000	1.148	73,515
Advertising	0.014	0.000	0.000	0.261	73,515
Manzon and Plesko (2002) controls					
NOL	0.376	0.000	0.000	1.000	73,515
ΔNOL	3.912	0.000	-109.100	213.30	73,515
Sales Growth	0.219	0.084	-0.993	7.235	73,515
PP Ratio	0.503	0.507	0.044	0.977	73,515
ΔPost-retirement Benefits	0.532	0.000	-11.200	37	73,515
Foreign Pre-tax Income	22.462	0.000	0.000	655.713	73,515
Pre 1993 Goodwill	13.162	0.000	0.000	446.961	73,515
Post 1993 Goodwill	93.300	0.000	-18.194	2,532.065	73,515
Other Intangibles	52.858	0.000	-10.334	1566.800	73,515
Stock Option Ratio	0.729	0.837	0.000	0.996	16,618

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 C. 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*	*12*
1 - Book Tax Gap	1											
2 – Leverage	0.006	1										
	0.109											
3 - Default Probability	**-0.150**	**0.579**	1									
	0.000	0.000										
4 - %Institution	**0.162**	**-0.111**	**-0.149**	1								
	0.000	0.000	0.000									
5 – Size	**0.077**	**0.025**	**-0.074**	**0.202**	1							
	0.000	0.000	0.000	0.000								
6 - ROA Volatility	**-0.690**	**-0.047**	**0.049**	**-0.160**	**-0.081**	1						
	0.000	0.000	0.000	0.000	0.000							
7 - Total Accruals	**0.313**	**-0.031**	**-0.095**	**0.055**	0.004	**-0.174**	1					
	0.000	0.000	0.000	0.000	0.231	0.000						
8 - Intangibles	**0.033**	**0.093**	0.003	**0.167**	**0.144**	**-0.017**	**-0.027**	1				
	0.000	0.000	0.518	0.000	0.000	0.000	0.000					
9 - R&D	**-0.447**	**-0.186**	**-0.030**	**-0.109**	**-0.095**	**0.338**	**-0.112**	**-0.090**	1			
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
10 – Fort500 Dummy	**0.059**	0.003	**-0.076**	**0.160**	**0.459**	**-0.063**	**0.007**	**0.036**	**-0.075**	1		
	0.000	0.389	0.000	0.000	0.000	0.000	0.044	0.000	0.000			
11 - Advertising	**-0.045**	**-0.035**	-0.006	**-0.034**	0.004	**0.030**	**-0.020**	**-0.021**	**-0.038**	**0.041**	1	
	0.000	0.000	0.287	0.000	0.332	0.000	0.000	0.000	0.000	0.000		
12 - Stock Option Ratio	**0.035**	**-0.077**	**-0.105**	**0.133**	**0.132**	-0.003	-0.004	**0.102**	**0.125**	**0.103**	**-0.025**	1
	0.000	0.000	0.000	0.000	0.000	0.672	0.616	0.000	0.000	0.000	0.001	

Table 3
Effects of *Leverage* and *Default Probability* on sheltering

The sample consists of firm-years with available data in the period 1986—2012. All variables are defined in Appendix C. 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*		
	(1)	(2)	(3)	(4)	(5)	(6)
X	-0.283***	-0.416***	-0.531**	-0.168***	-0.144***	-0.170
	(-11.01)	(-10.08)	(-2.37)	(-8.68)	(-7.27)	(-1.52)
Stock Option Ratio			-0.025			0.023
			(-0.79)			(1.30)
*X*Stock Option Ratio*			0.497**			0.036
			(2.03)			(0.20)
%Institution	-0.139***	-0.198***	0.005	-0.009*	-0.009	0.010
	(-13.81)	(-10.98)	(0.45)	(-1.81)	(-1.06)	(1.05)
Log(*Size*)	0.063***	0.225***	0.017	0.014***	0.036***	-0.009*
	(17.24)	(16.29)	(1.45)	(6.60)	(5.94)	(-1.87)
Fort500 Dummy	-0.094***	-0.055***	-0.004	-0.027***	-0.011***	0.002
	(-11.93)	(-7.29)	(-1.01)	(-6.46)	(-3.22)	(0.75)
Profitability	0.084***	0.122***	0.086***	0.108***	0.121***	0.099***
	(9.53)	(13.29)	(5.33)	(13.80)	(21.51)	(14.30)
ROA Volatility	-0.582***	-0.577***	-0.811***	-0.725***	-0.590***	-0.430***
	(-17.88)	(-12.28)	(-3.28)	(-7.50)	(-3.85)	(-2.84)
Total Accruals	0.771***	0.642***	0.237**	0.281***	0.214***	0.113***
	(15.39)	(12.24)	(1.97)	(7.54)	(6.14)	(4.10)
Intangibles	0.031	0.140**	-0.047	-0.063***	-0.026	-0.022
	(0.97)	(2.43)	(-1.58)	(-3.73)	(-0.80)	(-0.96)
R&D	-1.234***	-1.905***	-1.834***	-1.021***	-1.647***	-1.238***
	(-18.57)	(-20.33)	(-4.11)	(-15.10)	(-12.96)	(-6.12)
Advertising	-0.901***	-1.551***	-0.116	-0.364***	-0.775***	-0.198*
	(-6.19)	(-4.62)	(-1.48)	(-3.50)	(-3.87)	(-1.79)
Lagged Book Tax Gap	0.313***	0.063***	0.182***	0.176***	-0.035	-0.007
	(13.88)	(3.01)	(2.83)	(4.57)	(-1.09)	(-0.09)

(Continued)

Table 3 (continued)

	Dependent variable: *Book Tax Gap*					
	X=Leverage			*X=Default Probability*		
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Additional Manzon-Plesko controls</u>						
NOL	0.042***	0.044***	0.011***	0.016***	0.007	0.004
	(5.66)	(4.70)	(2.70)	(3.81)	(1.41)	(1.19)
ΔNOL	-0.000***	-0.000***	-0.000*	-0.000***	-0.000***	-0.000
	(-6.62)	(-6.61)	(-1.85)	(-4.52)	(-3.77)	(-1.63)
Sales Growth	0.073***	0.044***	0.058*	0.034***	0.018***	0.007
	(9.69)	(6.29)	(1.82)	(5.94)	(2.87)	(0.69)
PP Ratio	-0.092***	-0.057	-0.130***	-0.069***	0.000	-0.062
	(-3.52)	(-1.32)	(-2.59)	(-4.39)	(0.01)	(-1.53)
ΔPost-Retirement Benefits	-0.001***	-0.001***	-0.000	-0.000***	-0.000***	-0.000
	(-6.03)	(-3.18)	(-1.04)	(-4.00)	(-2.89)	(-0.09)
Foreign Pre-Tax Income	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(-10.28)	(-6.87)	(-3.70)	(-6.12)	(-4.92)	(-4.36)
Pre 1993 Goodwill	-0.000***	-0.000	-	-0.000***	0.000	-
	(-8.48)	(-0.93)		(-4.69)	(0.54)	
Post 1993 Goodwill	-0.000***	-0.000***	0.000	-0.000***	-0.000	0.000
	(-8.35)	(-6.08)	(0.64)	(-4.26)	(-1.03)	(1.45)
Other Intangibles	-0.000***	-0.000***	-0.000	-0.000	-0.000***	-0.000
	(-5.94)	(-6.54)	(-1.12)	(-0.82)	(-3.07)	(-0.72)
Intercept	-0.164***	-0.766***	0.032	-0.052*	-0.178***	0.074*
	(-4.43)	(-14.68)	(0.62)	(-1.92)	(-4.43)	(1.71)
Industry Fixed Effects	Yes	No	No	Yes	No	No
Firm Fixed Effects	No	Yes	Yes	No	Yes	Yes
R^2	0.621	0.356	0.367	0.564	0.332	0.222
# of firms		10,451	2,325		7,594	2,044
N	73,515	73,515	16,618	34,698	34,698	9,821

Table 4

The effect of the Bankruptcy Abuse Prevention and Consumer Protection Act on tax sheltering

The sample consists of firm-years with available data in the period 2003—2009. *Post BAPCPA Dummy* takes a value of 1 for years after 2006, zero otherwise. All other variables are defined in Appendix C. 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*					
	Pre: Yrs. 2004-5 Post: Yrs 2007-8	Pre: Yrs. 2003-5 Post: Yrs 2007-9	Pre: Yrs. 2004-5 Post: Yrs 2007-8	Pre: Yrs. 2003-5 Post: Yrs 2007-9	Pre: Yrs. 2004-5 Post: Yrs 2007-8	Pre: Yrs. 2003-5 Post: Yrs 2007-9
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage	-0.803***	-0.888***				
	(-4.50)	(-5.55)				
Default Probability			-0.204***	-0.081		
			(-2.66)	(-1.39)		
Def. Probability - Predicted					-0.862***	-0.467***
					(-5.80)	(-4.02)
Def. Probability - Residuals					0.005	0.022
					(0.07)	(0.37)
BAPCPA Dummy	-0.218***	-0.240***	-0.064***	-0.044***	-0.066***	-0.044***
	(-7.41)	(-8.59)	(-3.94)	(-3.19)	(-4.02)	(-3.17)
*BAPCPA Dummy*Leverage*	0.355***	0.358***				
	(2.76)	(3.02)				
*BAPCPA Dummy*Default Probability*			-0.042	-0.126**		
			(-0.57)	(-2.00)		
*BAPCPA Dummy*Def. Prob. Predicted*					0.138	-0.082
					(1.44)	(-0.99)
*BAPCPA Dummy*Def. Prob. Residuals*					-0.148*	-0.154**
					(-1.85)	(-2.27)
%Institution	-0.365***	-0.415***	-0.046	-0.043**	-0.073**	-0.061***
	(-5.25)	(-6.90)	(-1.55)	(-2.02)	(-2.31)	(-2.63)

(Continued)

Table 4 (continued)

	Dependent variable: *Book Tax Gap*					
	Pre: Yrs. 2004-5 Post: Yrs 2007-8	Pre: Yrs. 2003-5 Post: Yrs 2007-9	Pre: Yrs. 2004-5 Post: Yrs 2007-8	Pre: Yrs. 2003-5 Post: Yrs 2007-9	Pre: Yrs. 2004-5 Post: Yrs 2007-8	Pre: Yrs. 2003-5 Post: Yrs 2007-9
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Size)	0.800***	0.707***	0.165***	0.105***	0.177***	0.113***
	(10.87)	(12.51)	(4.02)	(4.11)	(4.22)	(4.27)
Fort500 Dummy	-0.101***	-0.125***	-0.035***	-0.031***	-0.039***	-0.033***
	(-5.58)	(-7.11)	(-4.49)	(-4.37)	(-4.84)	(-4.53)
Profitability	0.214***	0.197***	0.115***	0.128***	0.103***	0.119***
	(5.98)	(7.21)	(7.15)	(11.93)	(5.97)	(10.28)
ROA Volatility	-0.347***	-0.498***	-0.293	-0.463	-0.294	-0.460
	(-3.84)	(-6.28)	(-1.34)	(-1.48)	(-1.36)	(-1.49)
Total Accruals	0.753***	0.733***	0.244*	0.248*	0.259*	0.258*
	(5.99)	(7.41)	(1.68)	(1.82)	(1.80)	(1.89)
Intangibles	-0.255	-0.188	0.140*	-0.013	0.190**	0.018
	(-1.29)	(-1.19)	(1.75)	(-0.17)	(2.47)	(0.25)
R&D	-1.518***	-1.509***	-1.897***	-1.893***	-1.885***	-1.886***
	(-5.39)	(-7.45)	(-5.08)	(-7.11)	(-5.12)	(-7.11)
Advertising	-4.974***	-3.462***	-0.705*	-0.222	-0.626*	-0.229
	(-3.52)	(-2.80)	(-1.89)	(-0.29)	(-1.75)	(-0.30)
Lagged Book Tax Gap	-0.008	-0.012	-0.254	-0.145*	-0.251	-0.148*
	(-0.20)	(-0.36)	(-1.52)	(-1.83)	(-1.53)	(-1.87)
Intercept	-3.503***	-3.075***	-0.964***	-0.588***	-1.005***	-0.612***
	(-10.45)	(-12.24)	(-4.63)	(-4.95)	(-4.77)	(-5.11)
R^2	0.384	0.381	0.473	0.369	0.487	0.374
# of firms	4,350	4,892	2,771	3,180	2,771	3,180
N	11,323	16,284	5,196	7,989	5,196	7,989

Table 5

The effect of the 1979 change in U.S. Bankruptcy Code on tax sheltering

The sample consists of firm-years with available data in the period 1977—1983. *BRA Dummy* takes a value of 1 for years after 1980, zero otherwise. All other variables are defined in Appendix C. 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*					
	Pre: Yrs. 1978-9 Post: Yrs 1981-2	Pre: Yrs. 1977-9 Post: Yrs 1981-3	Pre: Yrs. 1978-9 Post: Yrs 1981-2	Pre: Yrs. 1977-9 Post: Yrs 1981-3	Pre: Yrs. 1978-9 Post: Yrs 1981-2	Pre: Yrs. 1977-9 Post: Yrs 1981-3
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage	-0.035	-0.049**				
	(-1.47)	(-2.13)				
Default Probability			-0.047	-0.025		
			(-0.66)	(-0.66)		
Def. Probability - Predicted					-0.068	-0.030
					(-0.61)	(-0.54)
Def. Probability - Residuals					-0.039	-0.023
					(-0.58)	(-0.63)
BRA Dummy	0.013***	0.019***	0.005	0.006	0.002	0.006
	(2.83)	(3.28)	(0.64)	(1.31)	(0.26)	(0.86)
*BRA Dummy*Leverage*	-0.034**	-0.050***				
	(-2.38)	(-3.20)				
*BRA Dummy*Default Probability*			-0.065	-0.074		
			(-0.76)	(-1.28)		
*BRA Dummy*Def. Prob. Predicted*					-0.047	-0.068
					(-0.58)	(-1.27)
*BRA Dummy*Def. Prob. Residuals*					-0.075	-0.077
					(-0.83)	(-1.24)
Log(Size)	0.025***	0.032***	0.029**	0.021***	0.030**	0.021***
	(2.78)	(3.82)	(2.23)	(3.19)	(2.05)	(2.99)

(Continued)

Table 5 (continued)

	Dependent variable: *Book Tax Gap*					
	Pre: Yrs. 1978-9 Post: Yrs 1981-2	Pre: Yrs. 1977-9 Post: Yrs 1981-3	Pre: Yrs. 1978-9 Post: Yrs 1981-2	Pre: Yrs. 1977-9 Post: Yrs 1981-3	Pre: Yrs. 1978-9 Post: Yrs 1981-2	Pre: Yrs. 1977-9 Post: Yrs 1981-3
	(1)	(2)	(3)	(4)	(5)	(6)
Profitability	0.138***	0.145***	0.104***	0.109***	0.105***	0.109***
	(11.49)	(16.39)	(7.74)	(10.65)	(8.10)	(10.85)
ROA Volatility	-1.235***	-0.858***	-0.288	-0.138	-0.283	-0.138
	(-3.02)	(-3.50)	(-1.37)	(-1.00)	(-1.36)	(-1.00)
Total Accruals	0.093***	0.155***	0.029	0.041***	0.029	0.041***
	(3.84)	(4.73)	(1.52)	(2.96)	(1.62)	(3.00)
Intangibles	0.020	-0.065	0.030	-0.039	0.034	-0.038
	(0.33)	(-0.96)	(0.41)	(-0.66)	(0.45)	(-0.64)
R&D	-1.127***	-1.631***	-0.040	0.072	-0.034	0.075
	(-4.60)	(-5.94)	(-0.13)	(0.30)	(-0.11)	(0.31)
Advertising	-0.102	-0.232	0.107	0.070	0.102	0.069
	(-0.67)	(-0.93)	(1.09)	(0.99)	(1.10)	(0.99)
Lagged Book Tax Gap	0.012	-0.197**	0.098	0.149*	0.099	0.150*
	(0.17)	(-2.42)	(0.85)	(1.87)	(0.86)	(1.86)
Intercept	-0.211***	-0.225***	-0.271***	-0.228***	-0.276***	-0.228***
	(-3.91)	(-5.71)	(-3.40)	(-5.91)	(-3.17)	(-5.70)
R^2	0.379	0.354	0.255	0.284	0.255	0.284
# of firms	3,274	3,966	1,597	1,786	1,597	1,786
N	8,524	13,083	3,197	4,088	3,197	4,088

Table 6

Effects of *Leverage* and *Default Probability* on sheltering – 2SLS

The sample consists of firm-years with available data in the period 1986—2012. All variables are defined in Appendix C. 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.

	X=Leverage		*X=Default Probability*	
	1st stage	2nd stage	1st stage	2nd stage
	X	*Book Tax Gap*	*X*	*Book Tax Gap*
	(1)	(2)	(3)	(4)
X		-0.565***		-0.397***
		(-3.98)		(-4.04)
%Institution	-0.065***	-0.070***	-0.043***	-0.018
	(-16.54)	(-4.57)	(-5.58)	(-1.53)
Log(*Size*)	0.032***	0.097***	0.007**	0.038***
	(23.10)	(15.72)	(2.45)	(8.86)
Fort500 Dummy	-0.014***	-0.026***	0.001	-0.021**
	(-4.56)	(-2.69)	(0.17)	(-2.46)
Profitability	-0.056***	0.105***	-0.089***	0.090***
	(-28.85)	(10.58)	(-23.29)	(8.47)
ROA Volatility	0.037***	-1.015***	0.020	-0.797***
	(7.45)	(-63.33)	(1.48)	(-39.61)
Total Accruals	0.029***	0.261***	-0.041***	0.226***
	(6.03)	(16.78)	(-3.89)	(14.20)
Intangibles	0.100***	0.093***	0.002	0.007
	(14.19)	(3.56)	(0.17)	(0.35)
R&D	0.037***	-1.680***	-0.001	-1.482***
	(4.69)	(-67.47)	(-0.06)	(-54.05)
Advertising	-0.069*	-0.630***	0.110	-0.293**
	(-1.84)	(-5.45)	(1.38)	(-2.52)
Lagged Book Tax Gap	-0.012***	-0.092***	-0.014***	-0.043***
	(-5.70)	(-13.77)	(-2.78)	(-5.87)
Mean X	0.354***		0.352***	
	(20.08)		(14.77)	
Lagged Id. Risk	-0.008***		-0.003	
	(-7.94)		(-1.59)	
R^2	0.152	0.410	0.161	0.401
# of firms	3,927	3,927	2,871	2,871
N	27,895	27,895	14,951	14,951

Table 7

Cross-sectional analysis in 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. *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 C. 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 *%Intitution* > Median	*Dummy*=1 if *Size* > Median	*Dummy*=1 if *Fort500* > 0	*Dummy*=1 if *Advertising* > Median	*Dummy*=1 if *Total Accruals* > Median	*Dummy*=1 if *Stock Option Ratio* > Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A - Book Tax Gap and Leverage								
Leverage	-0.329***	-0.466***	-0.450***	-0.445***	-0.420***	-0.453***	-0.400***	-0.239***
	(-10.03)	(-8.41)	(-8.80)	(-7.47)	(-10.09)	(-9.59)	(-8.61)	(-2.68)
Dummy	0.090***	0.101***	-0.069***	-0.099***	-0.082***	-0.023	0.070***	-0.005
	(9.94)	(7.19)	(-5.16)	(-9.09)	(-7.94)	(-1.59)	(8.67)	(-0.42)
*Leverage*Dummy*	-0.219***	0.114***	0.156***	0.355***	0.164***	0.128**	-0.011	0.080
	(-4.62)	(2.58)	(3.68)	(6.77)	(4.43)	(2.34)	(-0.32)	(1.60)
R^2	0.290	0.357	0.355	0.331	0.356	0.355	0.329	0.361
# of firms	10,451	10,451	10,451	10,451	10,451	10,451	10,451	2,325
N	73,515	73,515	73,515	73,515	73,515	73,515	73,515	16,618
Panel B - Book Tax Gap and Default Probability								
Default Probability	-0.046***	-0.192***	-0.156***	-0.225***	-0.147***	-0.147***	-0.178***	-0.140***
	(-3.79)	(-7.65)	(-5.04)	(-5.13)	(-7.26)	(-6.00)	(-8.33)	(-3.86)
Dummy	0.014***	0.109***	0.001	-0.009	-0.013***	-0.014**	0.019***	0.008
	(3.82)	(17.29)	(0.09)	(-1.38)	(-3.50)	(-2.49)	(6.92)	(1.62)
*Def. Prob. * Dummy*	-0.213***	0.190***	0.029	0.139***	0.085	0.010	0.086***	-0.079
	(-5.44)	(7.55)	(0.79)	(3.04)	(1.41)	(0.31)	(2.59)	(-0.68)
R^2	0.295	0.334	0.332	0.330	0.332	0.330	0.325	0.222
# of firms	7,594	7,594	7,594	7,594	7,594	7,594	7,594	2,044
N	34,698	34,698	34,698	34,698	34,698	34,698	34,698	9,821