The Non-Linear Relationship Between CEO Compensation Incentives And Corporate Tax Avoidance

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ABSTRACT

This study examines the effect of CEO compensation incentives on corporate tax avoidance. Unlike prior literature that assumes a monotonic relation between executive compensation incentives and tax avoidance, we find a non-linear relation between the two. Specifically, we find that CEO compensation incentives exhibit a positive relation with corporate tax avoidance at low levels of compensation incentives, whereas they show a negative relation at high levels of compensation incentives. We further find that the non-linear relationship between CEO compensation incentives and corporate tax avoidance does not exist for the subsample of S&P500 firms. Collectively, we provide evidence of the two counter effective forces, namely, - the incentive alignment effect and the risk-reducing effect, - that help explain the effect of CEO compensation incentives on tax avoidance.

Keywords: Tax Avoidance; CEO Compensation Incentives; Risk-Taking Activities

INTRODUCTION

*I*n this study, we examine CEO compensation incentives as one determinant of corporate tax avoidance. Prior studies regarding the effects of executive compensation incentives on tax avoidance generally find a positive relation between executive compensation incentives and tax avoidance (Hanlon, Mills & Slemrod, 2005; Minnick & Noga, 2010; Rego & Wilson, 2012). They argue that executive compensation incentives improve the alignment of managerial incentives with shareholder value, thereby encouraging managers to engage in tax avoidance activities that increase firm value. On the other hand, several studies find no or negative relation between executive equity incentives and tax avoidance (Desai & Dharmapala, 2006; Armstrong, Blouin & Larcker 2012). Desai and Dharmapala (2006) posit that executive compensation incentives reduce managerial opportunism, thereby discouraging the manager's tax avoidance activities that are in complementary relationship with managerial opportunism. Also, a recent paper by Armstrong et al. (2012) finds no association between CEO compensation incentives and tax avoidance. To provide a possible answer for these mixed empirical results regarding the effect of CEO compensation incentives on corporate tax avoidance, this study examines the linearity of the relationship between CEO compensation incentives and corporate tax avoidance.

Prior studies examining the effect of executive compensation incentives on tax avoidance consistently assume that compensation incentives help align the incentives of managers with shareholders. However, these studies do not consider the possibility that compensation incentives may actually make managerial incentives diverge from those of shareholders' because high level of compensation incentives exacerbates manager's exposure to firm risk, leading to decreased risk tolerance. As the manager makes decisions based on his or her personal risk tolerance which is lower than those of other shareholders, the manager may take insufficient risk from the shareholders' perspective (Hölmstrom 1979; Amihud & Lev 1981; Hirshleifer & Suh 1992; Low 2009). In a tax strategy setting, as managers have personal concerns about the risk of being challenged by the IRS and the resulting punishment or reputational damage (Hanlon & Slemrod 2009; Boone, Khurana & Raman 2013), managers with high compensation incentives may reject risky tax avoidance strategies that have positive net present value.

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Hence, executive compensation incentives have two opposing effects on tax avoidance decisions. On one hand, compensation incentives encourage a manager to engage in tax avoidance activities that produce a sufficient increase in firm value (*the incentive alignment effect*). On the other hand, compensation incentives may reduce corporate tax avoidance as large equity incentives may discourage the manager from taking risky tax avoidance strategies (*the risk reducing effect*). These two opposing effects may help explain why prior research finds mixed evidence on the relationship between executive compensation incentives and tax avoidance.

We expect CEO compensation incentives to exhibit a "hump-shaped" relation with corporate tax avoidance. At low levels of incentives, we expect a positive relation between compensation incentives and corporate tax avoidance because CEO's own stake on the additional value due to tax savings increases with compensation incentives. However, at high levels of incentives, we expect a negative relation between compensation incentives and corporate tax avoidance because large equity incentives exacerbate manager's insufficient risk taking problem (Low 2009; Hayes, Lemmon & Qiu 2012). A manager's utility loss due to the incremental risk from tax avoidance activities increases with the level of compensation incentives, whereas his utility gain due to the incremental firm value decreases with the level of compensation incentives. Therefore, beyond a certain level of compensation incentives, the negative risk reducing effect is expected to subsume the positive incentive alignment effect. Furthermore, large stock ownership gives a manager sufficient voting rights that protect him from disciplinary penalties when he makes suboptimal risk choices from the shareholders' perspective (Kim & Lu 2011). In sum, we expect that the relationship between CEO compensation incentives and corporate tax avoidance is non-linear with both positive and negative associations.

We further test for the non-linear relation using a subsample of S&P500 firms. One of the risk factors of aggressive tax strategy is reputational risk. According to Graham, Hanlon, Shevlin and Shroff (2014), publicly traded companies, larger companies, and more profitable companies are significantly more concerned about the adverse reputational consequences of tax planning. S&P500 firms, above being large in size and likely being profitable, are also under greater news coverage. As S&P500 firms are more likely to have high *ex-ante* reputational concerns, we expect those firms to engage in lower level of risky tax avoidance, and thus the non-linear relation to be diminished.

The contributions of this study are: First, the findings of this study add to the literature on the relation between managers' compensation incentives and tax avoidance. Specifically, we show that the positive incentive effect is overturned at high levels of compensation incentives because excessive stakes on the company entrenches a manager and causes him or her to reject value-enhancing tax strategies. Our findings of the hump-shaped relation may explain why prior research that assumes a monotonic relation finds mixed evidence on this issue. Second, we provide empirical support for the theory stating that the high compensation incentives magnifies manager's insufficient risk-taking problem. Although the theory has been suggested by extant research (Hölmstrom, 1979; Low, 2009), empirical findings are relatively scarce on the issue (Kim & Lu, 2011). We add to the literature by exploiting the discretionary and risky characteristics of tax avoidance activities. Third, whereas numerous studies attempt to find the reasons for the "under-sheltering puzzle", this study contributes to the literature by documenting that effective tax rates increase beyond a certain level of CEO incentives. By showing that the non-linear relation fades out for firms with greater reputational risk (i.e., S&P500 firms), our study may be interpreted as providing an indirect evidence of the reputational concerns deterring tax avoidance activities.

The rest of the paper proceeds as follows. In the next section we review related studies and develop our hypotheses. Section 3 describes our research design. Section 4 presents the main results, and Section 5 offers an additional analysis. Finally, Section 6 concludes.

RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

Executive Incentives as a Determinant of Firms' Tax Avoidance

In their survey paper, Shackelford and Shevlin (2001) point out that corporate tax strategies can be in large part influenced by managerial incentives of a firm. Where there have emerged papers searching for the relation between executive incentives and corporate tax avoidance, the results thus far are not consistent (Armstrong, Blouin, Jagolinzer & Larcker, 2015). In this section, we review papers that examine executive incentives as one determinant of corporate tax avoidance.

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Hanlon et al. (2005) examine corporate characteristics regarding tax noncompliance firms and document a positive association between pay-for-performance sensitivity and a chance of a firm to be challenged by the IRS. This result can be interpreted as higher pay-for-performance sensitivity leading to more aggressive tax planning. In a following study, Minnick and Noga (2010) directly test the relation between pay-for-performance sensitivity and tax avoidance, and demonstrate that a one-unit increase in CEO pay-performance-sensitivity reduces GAAP effective tax rate (ETR) by 0.541% and cash ETR by 0.571%. The paper demonstrates that high pay-performance-sensitivity alleviates agency conflict and induces managers to choose tax strategies that lead to long-term value enhancement. As equity incentives are provided with the objective of aligning the incentives of managers to those of shareholders, it is reasonable to expect that greater compensation incentives lead managers to be more aggressive about increasing the bottom-line income through tax avoidance.

On the other hand, Desai and Dharmapala (2006) find negative association between compensation incentives and the level of tax avoidance. They suggest that managers of firms with high level of tax avoidance can use the complex nature of tax sheltering to engage in managerial diversion. As the level of compensation incentives becomes higher, managerial incentives are better aligned with the shareholders, as thus the managers reduce opportunistic tax sheltering, which result in lower levels of tax avoidance. There is also an empirical study that finds no association between CEO compensation incentives and corporate tax avoidance. Armstrong et al. (2012) searches for the association between CEO incentives and the level of tax avoidance but fails to find a significant relation between the two.

Overall, although many prior studies examine the relationship between executive compensation incentives and firms' tax avoidance, the results thus far are not consistent. Certain papers show a positive association, whereas others show a negative or no association. In this study, we attempt to reconcile the mixed results by introducing a non-linear property of the relationship.

CEO Incentives, Risk Taking, and Tax Avoidance

Recent literature on corporate tax avoidance views aggressive tax planning as one type of risk-taking activities. The risk of taking aggressive tax strategies include not only potential challenges by tax authorities, but also reputational penalties when public acknowledges the engagement in aggressive tax strategies. Hanlon and Slemrod (2009) examine the stock price reaction of firms accused of engaging in tax shelters, and find evidence of adverse price reaction following public revelation of aggressive tax strategies. Rego and Wilson (2012) state that a one standard deviation increase in CEO equity risk incentives decreases cash ETR by 16.6%, suggesting that equity risk incentives encourage CEOs to undertake more aggressive tax avoidance strategies that entail risk.

Boone et al. (2013) demonstrate that under the separation of ownership and control, managers may be risk-averse, and with personal concerns on detection and penalties, take less tax risk. They show that because higher levels of religiosity are expected to be associated with higher levels of risk-aversion (Hilary & Hui, 2009), higher levels of religiosity leads to less risky tax positions, thereby leading to lower tax avoidance.

Armstrong, Blouin Larcker and Taylor (2013) note that the sensitivity of a CEO's equity portfolio to changes in stock price "amplifies the effect of equity risk on the total riskiness of the manager's portfolio, generally discouraging risk-averse managers from taking risky projects." Armstrong et al. (2015) later interpret this finding that CEO's equity compensation can possibly lead to lower level of tax avoidance under the situation that the tax avoidance strategy entails risk. In summary, it is widely accepted that aggressive tax planning can be viewed as one type of risk-taking activities.

Hypotheses

As summarized in the previous section, prior literature shows conflicting results on whether managers' stock-based compensation incentives should lower or raise corporate tax avoidance. While the results of prior studies vary, these studies consistently assume that compensation incentives help align the incentives of managers with those of shareholders, thereby encouraging the managers to determine the level of tax avoidance to increase stock price and firm value. However, compensation incentives may actually make managerial incentives diverge from those of

shareholders because compensation incentives exacerbate the manager's exposure to firm risk, and reduce his or her risk-tolerance (Hölmstrom, 1979). As a result, from the shareholders' perspective, the manager may take insufficient risk because he makes decisions based on his own risk preference which is more conservative than those of other shareholders (Hölmstrom, 1979; Low, 2009). In a tax strategy setting, Slemrod (2004) suggests that shareholders expect managers to utilize all tax strategies that will lead to increase firm value, but under the separation of ownership and control, managers may be risk-averse and take less tax risk. In particular, with excessively high stakes on the firm, managers have personal concerns about the risk of IRS detection and the resulting punishment, and thus take a less aggressive tax position (Boone et al., 2013). This risk-reducing effect under high compensation incentives may lead to lower corporate tax avoidance. With the above reasoning, it is reasonable to expect that over the spectrum of CEO compensation incentives, managers with high stakes on the firm are more likely to take less risk compared to managers with low stakes on the firm.

We hypothesize that two contradicting effects of managerial incentives will drive a non-linear relationship between CEO compensation incentives and tax avoidance; one being an *incentive alignment effect*, and the other being a *risk-reducing effect*. Specifically, at low levels of incentives, we expect a positive relationship between compensation incentives and corporate tax avoidance because CEO's own stake of the additional value due to tax savings increases with compensation incentives. However, at high levels of incentives, we expect a negative relationship between compensation incentives and corporate tax avoidance because large equity incentives exacerbate manager's insufficient risk taking problem (Low, 2009; Hayes et al., 2012). A manager's utility loss due to the incremental risk from tax avoidance activities increases with the level of incentives, whereas his utility gain due to the incremental firm value decreases with the level of incentives. Therefore, beyond a certain level of compensation incentives, the negative risk reducing effect will subsume the positive incentive alignment effect. Large stock ownership also gives a manager sufficient voting rights that protect him from disciplinary penalties when she makes suboptimal risk choices from the shareholders' perspective (Kim & Lu, 2011). Accordingly, we formally state our main hypothesis as follows:

Hypothesis: The relationship between CEO compensation incentives and corporate tax avoidance will exhibit a hump-shape.

Specifically, we expect CEO compensation incentives to exhibit a positive relation with corporate tax avoidance at low levels of incentives and a negative relation at high levels of incentives. Recent paper by Armstrong et al. (2015) states that if the expected benefit of aggressive tax positions exceeds the expected costs, the relation between CEO compensation incentives and tax avoidance will be positive. However, if the tax strategy entails sufficient risk, then the relation is likely to be negative. The paper goes on to demonstrate that the strength of corporate governance should help explain the relative size of the expected costs and expected benefits of tax avoidance. Whereas Armstrong et al. (2015) conjecture a differential association between corporate governance and tax avoidance in the extreme levels of tax avoidance, our paper hypothesizes a differential association between CEO compensation incentives and tax avoidance in the high levels of compensation incentives.

RESEARCH DESIGN

Measures of Tax Avoidance

For the measurement of corporate tax avoidance, we use several measures that are widely used in the literature: long-run cash effective tax rates, book-tax differences, and discretionary permanent book-tax differences. The first measure, long-run cash effective tax rates (*CASH_ETR*), is calculated as the ratio of the three-year sum of cash taxes paid to the three-year sum of pre-tax book income. Higher values of cash ETR reflect lower tax avoidance. To be consistent with the signs of other tax avoidance measures, we multiply the cash effective tax rate by minus 1. The second measure, book-tax difference (*BTD*), is the difference between book income and estimated taxable income, measured as pre-tax income minus the sum of grossed up current federal and foreign tax expense. Higher values of BTD reflect higher tax avoidance. The third measure, discretionary permanent book-tax-differences (*DTAX*), is the unexplained portion of the permanent book-tax-differences. Higher values of *DTAX* reflect higher tax avoidance and it is documented to be reflecting tax shelter involvement (Frank, Lynch & Rego, 2009). See Appendix A for details on measurement.

Corporate tax avoidance strategies include not only the illegal tax evasion strategies but also the legal tax avoidance strategies and differentiating between the two can be obscure (Slemrod, 2004). Whereas *CASH_ETR* or *BTD* measures both the level of legal tax avoidance and the level of aggressive (risky) tax avoidance, conceptually, *DTAX* captures tax avoidance activities that are in the more aggressive end of the tax avoidance continuum (McGuire, Omer & Wang, 2012). Our study predicts a nonlinear relationship between CEO compensation incentives and tax avoidance using an explanation of both *incentive alignment effect* and *risk-reducing effect*. While the incentive alignment effect in the low CEO incentive zone predicts increased tax avoidance that may either be legal *or* risky, the risk-reducing effect predicts reduced tax strategies that entail risk. Therefore, we expect that the hypothesized hump-shaped relationship is tested more appropriately with the *CASH_ETR* or *BTD* measure, as opposed to the risky tax avoidance measure, *DTAX*.

Research Design

To test our hypothesis, we estimate the following cross-sectional regression:

$$TAXAVOID_{i,t} = \beta 0 + \beta 1\ CEO\_INC_{i,t} + \beta 2\ (CEO\_INC)^2_{i,t} + \beta 3\ VEGA\ i,t + \beta 4\ SIZE_{i,t}$$
$$+ \beta 5\ LEV_{i,t} + \beta 6\ FI_{i,t} + \beta 7\ PPE_{i,t} + \beta 8\ CAP\_EXP_{i,t} + \beta 9\ R\&D_{i,t} + \beta 10\ MB_{i,t}$$
$$+ \beta 11\ ROA_{i,t} + \beta 12\ NOL_{i,t} + \text{Year Dummies} + \text{Industry Dummies} + \varepsilon_{i,t} \qquad (1)$$

where *TAXAVOID*$_{i,t}$ is the three measures (*CASH_ETR*, *BTD*, and *DTAX*) discussed above; *CEO_INC*$_{i,t}$ is measured as the log of the value of the CEO's stock and option portfolio; $(CEO\_INC)^2_{i,t}$ is included to reflect any non-linear relation between *CEO_INC*$_{i,t}$ and *TAXAVOID*$_{i,t}$; *VEGA*$_{i,t}$ is the sensitivity of the change in wealth associated with a 1% change in stock return volatility; *SIZE*$_{i,t}$ is the log of total assets; *LEV*$_{i,t}$ is the leverage measured as the sum of long-term debt and short-term liability scaled by lagged assets; *FI*$_{i,t}$ is the foreign income scaled by lagged assets; *PPE*$_{i,t}$ is the plant, property, and equipment scaled by lagged assets; *CAP_EXP*$_{i,t}$ is the capital expenditures scaled by the plant, property, and equipment; *R&D*$_{i,t}$ is the R&D expenditures scaled by lagged assets; *MB*$_{i,t}$ is the market-to-book ratio measured as market value of equity, scaled by book value of equity; *ROA*$_{i,t}$ is the return on assets measured as operating income scaled by lagged assets; and *NOL*$_{i,t}$ is the indicator variable for net operating loss carry-forwards.

The main variables of interest in this paper are *CEO_INC* and $(CEO\_INC)^2$. If a hump-shaped relation exists between CEO compensation incentives and corporate tax avoidance, β1 will show a positive sign, whereas β2 will show a negative sign. *VEGA* is included to control for CEO's risk incentives that can affect corporate tax avoidance. *SIZE, LEV,* and *FI* are included to control for firm characteristics reported in prior literature to be correlated with corporate tax avoidance (Rego 2003; Frank et al. 2009). *PPE, CAP_EXP,* and *R&D* are included to capture differences in book and tax reporting that can affect the tax avoidance measure (Chen, Chen, Cheng and Shevlin 2010). We also control for firm growth (proxied by MB) as growth firms are more likely to invest in assets that are given favourable tax treatments. Finally, we control for firm profitability (ROA) and net operating loss carry-forwards (NOL) to proxy for firms' tax saving needs (Rego, 2003; Chen, Chen, Cheng, & Shevlin, 2010). For all regressions, we include year and industry dummies to control for fixed effects.

DATA AND EMPIRCAL RESULTS

Data

We construct a sample of US firms from 1992 through 2010 using accounting data provided in Compustat. In using the CEO compensation incentive measure, we use the definition and data provided by Coles, Daniel and Naveen (2013) to minimize potential measurement error, and to be consistent with other studies.[1]

We require each firm-year observation to have all necessary data for use in regression equation. However, if a firm has missing values of R&D expenditures, we replace the missing values with zero to preserve data. We remove observations with total assets less than $1 million and also exclude firms in the financial service industries and in the

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[1] Coles et al. (2013) provide the data on CEO compensation incentive measures – delta (pay-performance sensitivity) and vega (risk-taking incentives) for the period 1992-2010 on their websites.

utility sector. Lastly, we winsorize all continuous variables at the 1st and 99th percentiles. This procedure yields a final sample of 13,364 CEO-year observations.

Table 1 provides descriptive statistics for all of the variables used in the regression analysis. The mean (and median) value of *CASH_ETR* is -0.27, which is consistent with the distributional properties reported in Rego and Wilson (2012). The mean (and median) value of *BTD* is 0.02, which is consistent with the non-family firm BTDs reported in Chen et al. (2010). Although *DTAX* is calculated as the residual from cross-sectional regressions, it is not zero as it is first calculated with the Compustat variables and then matched with the compensation data. Table 1 also shows that sample firms are on average profitable with mean (median) *ROA* of 0.13 (0.11), and make relatively low mean and median capital (*CAP_EXP*) and R&D (*RND*) expenditures. We also note that 33 percent of the sample firms report an NOL carry forward.

Table 1. Descriptive statistics

(N=13,364)	Mean	Std Dev	Percentiles		
			25th	Median	75th
CASH_ETR	-0.27	0.13	-0.35	-0.27	-0.19
BTD	0.02	0.06	0.00	0.02	0.04
DTAX	0.01	0.08	-0.01	0.01	0.03
CEO_INC	3.03	1.34	2.08	2.95	3.88
VEGA	0.11	0.15	0.02	0.05	0.13
SIZE	7.23	1.41	6.21	7.10	8.14
LEV	0.22	0.19	0.05	0.20	0.33
FI	0.02	0.03	0.00	0.00	0.03
PPE	0.30	0.24	0.12	0.24	0.42
CAP_EXP	0.07	0.06	0.03	0.05	0.08
RND	0.03	0.05	0.00	0.00	0.04
MB	3.68	57.25	1.71	2.50	3.81
ROA	0.13	0.09	0.07	0.11	0.17
NOL	0.33	0.47	0.00	0.00	1.00

Notes: See Appendix A for details on measurement. All continuous variables are winsorized at the 1st and 99th percentiles except for *CASH_ETR*, which is truncated at -1 and 0.

Table 2 presents Pearson correlation coefficients among tax avoidance measures, CEO compensation incentives, and other control variables. As expected for different tax avoidance measures, *CASH_ETR*, *BTD*, and *DTAX* are all positively correlated with each other. Correlation coefficients between *CEO_INC* and both *CASH_ETR* and *BTD* show a positive sign, which is in line with the incentive alignment effect. Correlation between *CEO_INC* and *DTAX* lacks statistical significance.

Table 2. Pearson Correlations between Tax Avoidance, CEO compensation incentives, and Other Control Variables

	CASH_ETR	BTD	DTAX	CEO_INC	VEGA	SIZE	LEV	FI	PPE	CAP_EXP	RND	MB	PT_ROA	NOL
CASH_ETR		0.25	0.03	0.07	0.12	0.08	0.05	0.10	0.07	0.06	0.14	0.06	0.00	0.14
BTD			0.13	0.07	0.06	0.02	0.02	0.13	0.11	0.11	0.00	0.10	0.17	0.10
DTAX				0.00	0.01	0.00	-0.01	0.10	-0.02	-0.01	0.09	-0.02	-0.04	0.02
CEO_INC					0.38	0.26	-0.04	0.09	-0.01	0.07	0.05	0.33	0.26	-0.03
VEGA						0.52	0.05	0.18	-0.06	-0.11	0.06	0.14	0.00	0.10
SIZE							0.29	0.15	0.10	-0.12	-0.17	-0.02	-0.24	0.13
LEV								-0.07	0.24	0.02	-0.24	-0.05	-0.25	0.05
FI									-0.10	-0.05	0.24	0.15	0.15	0.13
PPE										0.70	-0.23	-0.04	0.00	-0.12
CAP_EXP											-0.03	0.10	0.24	-0.13
RND												0.20	0.15	0.07
MB													0.54	-0.05
PT_ROA														-0.14

Notes: See Appendix A for details on measurement. Bold indicates significantly different from zero at the 0.10 level.

Empirical Results

Columns (1) and (2) of Table 3 present the regression analysis of our hypothesis using *CASH_ETR* as a measurement variable for *TAXAVOID*. Column (1) shows the result without $(CEO\_INC)^2$, thereby assuming a linear relation between CEO compensation incentives and tax avoidance. The result shows that the coefficient on *CEO_INC* has a positive sign, which is in support of the incentive alignment effect, but lacks statistical significance. On the contrary, Column (2) shows that when $(CEO\_INC)^2$ is included as an explanatory variable, the coefficients on *CEO_INC* and $(CEO\_INC)^2$ become significantly positive and negative, respectively, each at the 1% level. This finding is consistent with our hypothesis that the relation between CEO compensation incentives and corporate tax avoidance is hump-shaped. Looking at the control variables, the coefficient on *VEGA* shows a positive sign, which is consistent with Rego and Wilson (2012), demonstrating that equity risk incentives increase the level of tax avoidance. Also, the result suggests that firms with net operating loss (*NOL*) and larger foreign income and capital expenditures (*FI* and *CAP_EXP*) have higher tax avoidance.

Columns (3) to (6) show the results using *BTD* and *DTAX* as tax avoidance measures, and the implications are consistent with the results in Columns (1) and (2). First, Columns (3) and (5) show that when the $(CEO\_INC)^2$ term is excluded from the regression, the coefficients on *CEO_INC* are insignificant. However, when $(CEO\_INC)^2$ is included in the regression, the coefficients on *CEO_INC* become significantly positive and the coefficients on $(CEO\_INC)^2$ become significantly negative, which represents the hump-shaped relationship between CEO compensation incentives and the two tax avoidance measures, *BTD* and *DTAX* [Column (4) for *BTD* and Column (6) for *DTAX*]. As expected, the significance level decreases when *DTAX* is used as a tax avoidance measure. This finding is consistent with the measurement construct that *DTAX* is expected to capture only the risky component of the tax avoidance strategy, whereas *CASH_ETR* and *BTD* are expected to capture overall (from perfectly legal to risky) tax avoidance activities.

In sum, the results suggest that tax avoidance increases below a certain threshold of CEO compensation incentives and then decreases. This is consistent with our hypothesis that two different forces, *the incentive alignment effect* and *the risk reducing effect*, induce the relationship between CEO compensation incentives and the level of tax avoidance to be non-linear. In other words, under low levels of incentives, a positive relation exists between CEO compensation incentives and corporate tax avoidance because CEO's share of the incremental value due to tax savings increases with compensation incentives (i.e. the incentive alignment effect). However, at high levels of incentives, a negative relation exists between CEO compensation incentives and corporate tax avoidance because large equity incentives exacerbate manager's insufficient risk taking problem. Specifically, the result suggests that at high levels of incentives, the risk of reputational penalties or potential adverse market reaction induces CEOs to take less risky tax avoidance strategy (i.e. the risk reducing effect).

Table 3. Examination of the relation between tax avoidance and CEO compensation incentives

	Dependent Variable					
	CASH_ETR		**BTD**		**DTAX**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept	-0.309***	-0.323***	0.004	-0.001	-0.029***	-0.033***
	(-25.34)	(-25.34)	(0.68)	(-0.17)	(-3.90)	(-4.25)
CEO_INC	0.001	0.013***	0.000	0.004***	0.000	0.003 *
	(1.21)	(3.95)	(0.61)	(2.88)		(1.79)
(CEO_INC)²		-0.002***		-0.0006***		-0.0005*
		(-3.76)		(-2.83)		(-1.800)
VEGA	0.033***	0.032 ***	0.006	0.006	0.008	0.008
	(3.61)	(3.54)	(1.54)	(1.49)	(1.40)	(1.37)
SIZE	0.002	0.001	0.000	0.000	-0.001	-0.001
	(1.56)	(1.27)	(-0.88)	(-1.09)	(-0.80)	(-0.93)
LEV	0.046 ***	0.045 ***	0.011	0.011	-0.001	-0.002
	(7.29)	(7.11)	(4.12)	(3.99)	(-0.32)	(-0.40)
FI	0.108 ***	0.108***	0.157***	0.157***	0.230***	0.230***
	(2.81)	(2.81)	(9.61)	(9.61)	(9.85)	(9.85)
PPE	0.074 ***	0.075***	0.032***	0.032***	0.010**	0.011 **
	(9.21)	(9.31)	(9.32)	(9.39)	(2.12)	(2.16)
CAP_EXP	0.085 ***	0.085***	0.019	0.019	-0.011	-0.011
	(3.05)	(3.03)	(1.59)	(1.58)	(-0.66)	(-0.67)
RND	0.296***	0.295***	-0.055***	-0.056 ***	0.019	0.018
	(9.75)	(9.70)	(-4.29)	(-4.33)	(1.01)	(0.99)
MB	0.002***	0.002	0.000	0.000	-0.001	-0.001
	(3.22)	(3.26)	(0.76)	(0.79)	(-1.41)	(-1.39)
ROA	-0.007	-0.010	0.115***	0.114***	-0.041***	-0.042***
	(-0.44)	(-0.62)	(17.45)	(17.29)	(-4.35)	(-4.44)
NOL	0.020 ***	0.020***	0.011***	0.011***	0.002	0.002
	(8.23)	(8.19)	(10.93)	(10.90)	(1.23)	(1.21)
N	13,364	13,364	13,364	13,364	13,364	13,364
Adj. R²(%)	11.9	12.0	9.7	9.8	5.9	6.0

Notes: All regressions control for year and two-digit SIC industry codes. Robust t-statistics are reported in parentheses.

ADDITIONAL ANALYSIS

In this paper, the major driving force leading to a potential non-linear relationship is the risk-reducing effect under the high CEO incentive zone. The risk of taking a tax avoidance strategy includes the probability of detection and the resulting punishment (penalties) as well as the potential reputational risk leading to a stock price discount. In a recent survey paper by Graham et al. (2014), 69 percent of executives have rated reputational risk as being an important factor deterring them from adopting a potential tax planning strategy. However, when Gallemore, Maydew and Thornock (2014) conduct an empirical test using 113 firms that were subject to public scrutiny of tax shelter engagements, they find no evidence of an adverse reputational effect. In a following paper, Graham et al. (2014) note that empirical studies focusing on firms' reputational concerns cannot account for the possibility that *ex ante* reputational concerns may deter firms from engaging in tax shelter activities.

According to Graham et al. (2014), publicly traded companies, larger companies, and more profitable companies are significantly more concerned about the adverse reputational consequences of tax planning. As firms with high reputational concerns should, *ex-ante*, be engaging in less risky tax avoidance activities, we expect the nonlinear relation between CEO incentives and tax avoidance to diminish for S&P500 firms, which are large in size, likely being profitable, and under greater news coverage. If S&P500 firms with greater reputational concerns are engaging in less risky tax avoidance strategy, it is likely that they have limited capacity to cut back on their tax avoidance strategies as their compensation incentives increase. Therefore, we expect that the non-linear relation between CEO incentives and tax avoidance will diminish or weaken for the subsample of S&P500 firms.

Panel A of Table 4 reports the subsample results for the S&P500 firm-years. For brevity, we have not reported the coefficients for other control variables. Regardless of tax avoidance measures, we confirm that the statistical significance on both the *CEO_INC* and *(CEO_INC)²* have disappeared for S&P500 firms, which are likely to face greater *ex-ante* reputational risk. In contrast, Panel B of Table 4, which excludes the S&P500 firm-years from the total sample, shows a result consistent with that in Table 3, suggesting that the non-linear relationship between CEO incentives and tax avoidance is derived mostly by non-S&P500 firms.

Table 4. Subsample analyses for S&P 500 firm-years and non-S&P 500 firm-years

Panel A. S&P500 firm-years

	Sign	Dependent Variable		
		(1) *CASH_ETR*	(2) *BTD*	(3) *DTAX*
Intercept		-0.320***	-0.017	-0.023
		(-14.13)	(-1.59)	(-1.21)
CEO_INC	+	0.010	0.005	-0.001
		(1.40)	(1.50)	(-0.12)
(CEO_INC)²	-	-0.001	-0.0007*	0.0001
		-1.050	(-1.70)	(0.11)
N		3,230	3,230	3,230

Panel B. Non-S&P500 firm-years

	Sign	(1) *CASH_ETR*	(2) *BTD*	(3) *DTAX*
Intercept		-0.379***	-0.005	-0.015**
		(-31.23)	(-0.97)	(-2.29)
CEO_INC	+	0.014***	0.004***	0.005**
		(3.70)	(2.69)	(2.17)
(CEO_INC)²	-	-0.002***	-0.0006**	-0.0006**
		(-3.49)	(-2.40)	(-1.97)
N		10,134	10,134	10,134

Notes: All regressions control for year and two-digit SIC industry codes. Regressions include the following control variables, *VEGA*, *SIZE*, *LEV*, *FI*, *PPE*, *CAP_EXP*, *RND*, *MB*, *ROA*, and *NOL* variables, which have not been tabulated. Robust t-statistics are reported in parentheses.

CONCLUSION

Focusing on the two different effects that CEO compensation incentives have on corporate investment strategies, the *incentive alignment effect* and the *risk-reducing effect,* we examine the relationship between CEO compensation incentives and corporate tax avoidance strategy. CEO compensation incentives are generally known to induce CEOs to maximize firm value via various methods, one possibly being the reduction of tax expense. However, CEOs under very high levels of compensation incentives may be overly conservative on risk-taking and may avoid positive NPV projects that are risky. With the view that tax avoidance strategies may entail risk, we predict that the tax avoidance strategies of CEOs with high levels of compensation incentives will be different from those of CEOs with low levels of compensation incentives.

Unlike prior literature that assumes a monotonic relation between the CEO compensation incentives and tax avoidance, we document that the risk-reducing effect at high levels of CEO incentives causes the relation to be non-linear. Compensation incentives, such as stocks and options, are intended to align managerial interests with those of shareholders, thereby inducing managers to reduce costs and increase bottom line income. Although this incentive alignment effect leads managers to lower tax costs, the findings of this study further show that CEOs reduce the risky component of tax avoidance strategy and bear paying more taxes beyond a certain level of compensation incentives. In addition, we find that the non-linear relation does not exist for the subsample of S&P500 firms. As S&P500 firms are large, profitable, and likely to be under greater news coverage, they are expected to have a high level of *ex ante* reputational concerns, which constrains them from taking risky tax avoidance strategies. This finding suggests that the reputational risk concern may deter risky tax avoidance activities.

The findings of this study add to the literature that examines the determinants of tax-avoidance (e.g., Dyreng, Hanlon & Maydew, 2008; Rego & Wilson, 2012). Although CEO compensation incentives have been extensively studied as

being one of the many determinants of corporate tax avoidance, we provide a new perspective into the relation between CEO compensation incentives and tax avoidance based on two counter effective forces – the *incentive alignment effect* and the *risk reducing effect*. These findings are expected to inform regulators, academicians, and managers about the negative effect of CEO compensation incentives on tax avoidance under the high level of compensation incentives.

A possible future extension of this study is to find the reflection point regarding the relation between CEO compensation incentives and corporate tax avoidance. Although this paper provides evidence of a hump-shaped relation between CEO compensation incentives and tax avoidance, the reflection point where the slope of the relation turns from a positive sign to a negative sign cannot be provided explicitly, as this point depends on other fundamental characteristics of the firm. We hope that future research can provide the reflection point explicitly with a more refined setting.

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APPENDIX A. Variable measurement

Measures of Tax Avoidance	
CASH_ETR	3-year cash effective tax rate, measured as the sum of cash taxes paid (TXPD) divided by the sum of total pre-tax income (PI), multiplied by (-1).
BTD	Difference between book income and tax income, measured as pre-tax income (PI) minus the sum of grossed up current federal and foreign tax expense (TXFED+TXFO), less change in tax loss carry forward (TLCF), scaled by beginning of year total assets (AT).
DTAX	Residual from the following regression estimated by year and two-digit Standard Industrial Classification (SIC) code: $PERMDIFF_{it} = \alpha_0 + \alpha_1(1/AT_{it-1}) + \alpha_2 INTANG_{it}$ $\qquad\qquad + \alpha_3 UNCON_{it} + \alpha_4 MI_{it} + \alpha_5 CSTE_{it} + \alpha_6 \Delta NOL_{it}$ $\qquad\qquad + \alpha_7 LAGPERM_{it} + \varepsilon_{it}$ where: PERMDIFF = Total book-tax differences – temporary book-tax differences = [{PI–[(TXFED+TXFO)/STR]}–(TXDI/STR)], scaled by beginning of year assets (AT); STR = Statutory tax rate; INTANG = Goodwill and other intangibles (INTAN) divided by total assets at year t–1; UNCON = Income (loss) reported under the equity method (ESUB) divided by total assets at year t–1; MI = Income (loss) attributable to minority interest(MII), scaled by beginning of year assets (AT); CSTE = Current state tax expense (TXS), scaled by beginning of year assets; ΔNOL = Change in net operating loss carry forwards (TLCF), scaled by beginning of year assets (AT); LAGPERM =PERMDIFF in year t–1.
Other variables	
CEO_INC	Natural log of the value of the CEO's stock and option portfolio ($1mil.).
VEGA	The sensitivity of the change in wealth for a 1% change in stock return volatility ($1mil.) (see Coles et al. [2013]).
SIZE	Natural log of total assets (AT).
LEV	Total debt (DLTT + DLC) scaled by beginning of year total assets (AT).
FI	Foreign income (PIFO) scaled by beginning of year total assets (AT).
PPE	Net property and equipment (PPENT) scaled by beginning of year total assets (AT).
CAP_EXP	Capital expenditures (CAPX) scaled by beginning of year total assets (AT).
RND	Research and development expense (XRD) scaled by beginning of year total assets (AT).
MB	Market value of equity (CSHO x PRCC_F), scaled by book value of equity (CEQ).
ROA	Pretax income (PI), scaled by beginning of year total assets (AT).
NOL	Net operating loss indicator variable = 1 if firm i has net operating loss carryforwards (TLCF) available at the beginning of year t, and 0 otherwise.

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