

Essays on Tax Avoidance and Risk

Anna Alexander

University of Padua, Venice, and Verona - Italy

November 2014

Table of Contents

Acknowledgements	4
Introduction	5
Real Effects of Corporate Tax Avoidance: A Review	8
1. Introduction	9
2. Tax avoidance and Capital Structure	13
2.1 Proxies for the tax incentive	16
2.2 Non-debt tax shields	17
2.2 Debt-ratio measurement	18
2.4 Cost of bankruptcy and financial distress	19
2.5. Summary and suggestions for future research	19
3. Tax Avoidance and investment decisions	21
3.1 Tax avoidance and cash holdings	23
3.2. Summary and suggestions for future research	26
4. Tax avoidance, tax risk and investors' valuation	26
4.1 Pricing of tax liabilities	26
4.2 Pricing of tax avoidance	27
4.3 The pricing of tax risk	28
4.4. Tax avoidance and the cost of debt	30
4.5. Summary and suggestions for future research	30
5. Conclusion	31
References	32
Executive Inside Debt and Corporate Tax Avoidance	38
1. Introduction	39
2. Theoretical background	43
3. Hypothesis development	44
4. Variable measurement and empirical design	47
4.1 Tax variables measurement	47
4.2 Incentives variables	48
4.3 Endogenous choice of compensation and tax policies	49
4.4 Empirical design	50

5. Data and summary statistics	50
6. Results	51
7. Conclusion	54
Appendix	56
References	58
Tables	61
Equity Risk Incentives and Corporate Tax Avoidance in the Banking Industry	71
1. Introduction	72
2. Literature review	75
2.1 Executive compensation and risk taking	75
2.2 Tax avoidance and tax risk	78
3. Hypothesis development	80
4. Data definitions and summary statistics	80
5. Empirical design	81
6. Robustness check	81
7. Results	83
8. Robustness tests	84
9. Conclusion	85
Appendix	86
References	88
Tables	91

Acknowledgements

First and foremost my gratitude goes to my supervisor, Antonio Parbonetti, for he played a fundamental role in my choice to study empirical financial accounting. I would also like to thank Stephen Penman, my sponsor at Columbia University, who gave me the opportunity to measure myself with one among the finest research environments in the world and grow academically. Moreover, I am grateful to Martin Jacob for the professional support and opportunity that he is granting me.

For substantial feedbacks and interesting objections, I would like to thank Mihir A. Dharmapala, Jeri Seidman, Kevin Markle, Dan Amiram, Sharon P. Katz, Patrick Bolton, Igor Goncharov, and Daniel W. Collins. I am also grateful to Bruno Bernardi, Giorgio Brunetti, Saverio Bozzolan, Giovanna Michelon, Andrea Menini, Michele Fabrizi, Saskia Kohlhase, Jochen Pierk, Luminita Einache, and Inga Bethmann.

Special thanks go to Juliana Bernhofer and Giulia Redigolo for being my pillars over these last intense years; Stefano Li Pira, Patrick Zoi, Michele Pinelli and Tim Wegener for the academic and moral support in this adventure. My mother and brother for understanding and coping with me while studying and coding. Moreover, this work would have never been accomplished without the constant accompaniment of Mogwai.

Finally, I am most grateful to Fabio, thanks to whom this and all my accomplishments to come have sense.

Introduction

Research on tax avoidance is at the intersection of several disciplines: public economics, microeconomics, behavioural economics, finance, and accounting. In this work, I am looking at corporate tax avoidance through the eyes of financial accounting.

We are all well aware of the public ongoing debate over international tax avoidance. The OECD has recently published recommendations designed to create a single set of international tax rules to end the erosion of tax bases and the artificial shifting of profits to jurisdictions to avoid paying tax. The call for closer international co-operation aims at closing the gaps that, on paper, allow income to be shifted for tax purposes by using multiple deductions for the same expense and “treaty-shopping”. Despite the OECD debate on base erosion and profit shifting, empirical literature shows that there is substantial cross-sectional variation in the extent of tax planning activities across firms and across industries and that some firms have effective tax rates close to or even above the statutory tax rate (Dyreng et al., 2008).

What is puzzling from the researcher’s perspective is not that some firms engage in tax avoidance, but rather why some firms appear to forgo avoidance opportunities. The question of why so many firms decide to under-optimize corporate tax avoidance has been called the *under-sheltering puzzle*.

Understanding the determinants of this cross-sectional variation might help researchers and policy makers to comprehend the costs and benefits that firms incur when engaging in tax avoidance and eventually succeed in their intent to curb illicit practices.

Following Dyreng et al., (2008), tax avoidance is broadly defined as the reduction of explicit taxes per dollar of pre-tax accounting earnings. Hanlon and Heitzman (2010) argue that tax avoidance is a continuum of tax planning strategies, ranging from perfectly legal tax-reduction activities such as investments in municipal bonds to abusive tax avoidance such as tax sheltering and reportable transactions.

To understand the effects of tax avoidance, we have to consider both benefits and costs. Tax avoidance increases current cash flows, therefore activities that reduce the firm’s

tax payments may have a positive expected value. Nevertheless, the possibility that the firm's tax positions will be challenged and overturned, resulting in higher future payments of tax and penalties, makes these tax positions risky. Hence, tax avoidance may also increase future tax uncertainty. The net benefit arising from tax avoidance activities results in an empirical issue as extant evidence is still mixed.

My work aims investigating determinants and consequences of corporate tax avoidance and is divided in three chapters. In the first chapter, I present a review of empirical studies on the consequences of tax avoidance. In particular, I examine the real effects of corporate tax avoidance on capital structure, investment policies, and investors' valuations.

In the second chapter, I examine one of the possible determinants of tax avoidance, i.e. executive compensation. Specifically, I focus on executives' inside debt holdings that consist of pension plans and deferred compensation that for the top management team are unsecured and unfunded. Theory predicts (Jensen and Meckling, 1976) that inside debt holdings align executives with outside creditors' interests, modifying their risk preferences and making them act more conservatively towards risk. In our setting, we consider the tax risk component of tax avoidance strategies and examine whether inside debt holdings hinder executives' attitude towards it.

In the third chapter, my co-authors and I turn to the banking industry as there is scant evidence on the taxation strategies of financial institutions. Often, these institutions are dropped from the sample because of concerns over regulatory differences. As the role of executive compensation has been blamed for creating excessive risk taking that lead to the recent financial crisis, the collapse of banks whose executives were allegedly paid for performance clearly raised many questions about the link between executive pay and risk-taking. Therefore, we examine the association between executive equity-risk incentives set through stock and option-based compensation and tax risk.

Overall, my research shows that tax avoidance and tax risk should be considered separately. Reducing the corporate tax burden does not necessarily translate into ineffective and less persistent effective tax rates, suggesting that the volatility of those measures is a better proxy for tax risk. Therefore, when studying the association with executive compensation, equity-risk incentives and inside debt holdings, as possible determinants of tax

avoidance, is important to disentangle the tax risk component from the sustainable tax planning activity in order to capture a significant relation.

Further theoretical and empirical research is needed in this direction to study the link with overall firm risk and the consequences of increased tax risk on the firm's financing and investing policies.

Real Effects of Corporate Tax Avoidance: A Review

Anna Alexander

University of Padua, Italy

September 2014

WORKING PAPER - PLEASE DO NOT QUOTE OR CIRCULATE

Abstract

This paper reviews the empirical literature on the real effects of tax avoidance. I survey three main areas of the literature: (1) capital structure choices, (2) investments and cash holdings, (3) investors' valuation. In each section, I summarize the existing works focusing on the existing empirical issues and sources of measurement errors that possibly explain the inconsistencies across studies.

1. Introduction

This paper presents a survey of the empirical research on the real consequences of tax avoidance, namely on the effects on corporate structure, investing activities and investors' valuation.

Few previous studies have described the notion of tax avoidance used in the literature and several are the definitions employed in the different approaches, such as tax planning strategies, tax aggressiveness, tax avoidance, tax sheltering, and tax risk.

In their well-known review, Hanlon and Heitzman (2010) argue that tax avoidance is a continuum of tax planning strategies, ranging from perfectly legal tax-reduction activities such as investments in municipal bonds to abusive tax avoidance such as tax sheltering and reportable transactions. Following Dyreng, Hanlon, and Maydew (2008), tax avoidance is broadly defined as the reduction of explicit taxes per dollar of pre-tax accounting earnings.

Lisowsky, Robinson, and Schmidt (2013) conceptualize tax aggressiveness to be a subset of tax avoidance, in which the underlying positions are uncertain and likely to have weak legal support. Tax uncertainty arises because of the difficulties in applying ambiguous tax laws and anticipating the consequences of a future audit (Mills, Robinson, and Sansing, 2010). They agree with Hanlon and Heitzman (2010) that tax positions fall along a continuum from highly certain (least aggressive) to highly uncertain (most aggressive). While, tax avoidance encompasses all tax positions (certain and uncertain), tax aggressiveness encompasses tax positions with relatively weaker facts thus containing greater uncertainty, and tax sheltering encompasses tax positions with the weakest facts and therefore carry the greatest amount of uncertainty.

Other studies (Rego and Wilson, 2012; Badertscher, Katz, and Rego, 2013) focus on tax avoidance as a risky activity, since the tax treatment will possibly be challenged by the taxing authorities and result in higher future payments of tax and penalties. Guenther, Matsunaga, and Williams (2013) borrow the concept of risk from the finance literature, namely the dispersion of possible outcomes or payoffs, reflecting the degree of uncertainty about the future (Brealey and Myers, 1991) and transfer it to the notion of tax risk. They

consider tax risk as the degree of uncertainty about future payments of taxes and penalties stemming from tax avoidance activities and argue that tax risk cannot be captured by measures of reduced corporate tax burden. Therefore, they distinguish between the level of tax avoidance as proxied by the prevailing measures (i.e., cash effective tax rate, book-tax difference, unrecognized tax benefits) and tax risk (i.e., the volatility of the cash effective tax rate over consecutive fiscal years).

These definitions of tax avoidance are coined by extant research in the light of the observed cross-sectional and within industry variation of firm's tax avoidance proxies. While it has been shown that firms engage in tax planning activities to diminish their tax burden (Dyreng, Hanlon, and Madew, 2008), empirical evidence also shows that tax avoidance varies across firms, and some firms appear not to take full advantage of the tax avoidance opportunities (Weisbach, 20002). This is the so-called "under-sheltering puzzle" (Desai and Dharmapala, 2006; Hanlon and Heitzman, 2010) and it suggests the existence of costs related to aggressive tax positions that force firms to forgo sheltering opportunities.

To understand the effects of tax avoidance, we have to consider both benefits and costs. Tax avoidance increases current cash flows, therefore activities that reduce the firm's tax payments may have a positive expected value. Nevertheless, the possibility that the firm's tax positions will be challenged and overturned, resulting in higher future payments of tax and penalties, makes these tax positions risky. Hence, tax avoidance may also increase future tax uncertainty. The net benefit arising from tax avoidance activities results in an empirical issue as extant evidence is still mixed.

I therefore limit this review to the empirical research in tax avoidance since it has become an important field of study, witnessing a surge in recent works. The two-faced effect of tax avoidance (i.e., the trade-off between the benefits arising from the reduced tax burden and the costs of the increased tax uncertainty) has important implications for both theoretical and empirical research. While tax theory is strong and well established, empirical research, as previously mentioned, presents ambiguous results and represents an ongoing challenge for future research. Therefore, this review aims at explaining the inconsistencies in some of the findings across previous studies.

Most empirical research has tried to explain the clear variation across firms, investigating the determinants of tax avoidance. But while research on the determinants of tax avoidance has grown to a considerable level,¹ the stream of research on the effects of corporate tax avoidance strategies is receiving increasing attention. Therefore, the focus of this review is the effect on real decisions, namely the consequences of tax avoidance strategies on investing and financing activities and investors' valuations.

First, corporate taxes play an important role in the decision to finance with debt. The fundamental argument for a tax effect on corporate finance decisions relies on the tax benefit of debt, namely the interest tax shield. While debt financing provides with the benefit of a tax shield, it also increases the probability of bankruptcy and of incurring costs of default. Tax avoidance, on the other hand, can provide non-debt tax shields, thus affecting capital structure decisions.

Second, investment is a fundamental source of firm value.² The calculation of a project's net present value, and hence the decision to invest, are directly affected by the amounts, timing, and uncertainty of tax payments.

Third, while the literature contains conflicting evidence on the role of tax incentives on the price of investment assets (see Goolsbee, 1998a; Hassett and Hubbard, 1998), implicit taxes are included in a project's net present value. Tax avoidance has consequences for managers, shareholders, creditors, and the government. As discussed in Hanlon and Heitzman (2010), the effect of taxes on decision making is important also from the government perspective. Governments set tax policy to provide incentives and disincentives for investment and thus the degree to which taxes actually affect corporate decisions determines the effectiveness of such policies.

Tax avoidance concerns interests of different stakeholders that have conflicting incentives. Empirical tax research has a multidisciplinary nature and frequently integrates theoretical approaches from accounting, finance, and economics (Maydew, 2001).

¹ See Hanlon and Heitzman (2010) for a review on the literature on the determinants of tax avoidance.

² See section 3.

Shackelford and Shevlin (2001) provide a thorough account of the archival microeconomic-based income tax literature published in accounting journals. Later, Hanlon and Heitzman (2010) present a comprehensive review of tax accounting research and the related economics and finance literature affected by research in accounting. More recently, Graham, Raedy, and Shackelford (2012) examine accounting for income taxes research and emphasize the association with earnings management and investors' valuation models.

Research on the real effects of taxes in general, and tax avoidance in particular, has received a recent surge in empirical studies, trying to overcome the existing inconsistencies between predictions of theoretical models and empirical findings. The irregularities can be ascribed mostly to the research design limitations that are common to all empirical work such as model specification, data limitations, and measurement error. Moreover, since tax planning decisions are likely to be jointly determined with investing and financing decisions, tax research must deal with simultaneity and endogeneity concerns that are likely to affect empirical results.

Extending the work of Shackelford and Shevlin (2001) and Hanlon and Heitzman (2010), this paper aims at filling the recent gap by providing an updated overview of the relevant academic literature, highlight the inconsistencies and focus on explaining the mixed evidence.

To my knowledge this is the first survey with a sole focus on the real consequences of tax avoidance, thus complementing the earlier though thorough Hanlon and Heitzman' (2010) review of tax research in accounting, finance, and economics. Several studies in this promising area of tax research have not been examined in the aforementioned review, for brevity reasons or because they had simply not yet been published.

Without overlooking seminal contributions, I mainly focus on recent published and working papers in the attempt to provide an updated overview of the relevant literature and to highlight some suggestions for future research. Moreover, where deemed useful I provide a short overview of the theoretical models that drive the empirical research.

This review proceeds as follows. In section 2 I provide an overview of the theoretical arguments for the tax sensitivity in capital structure decisions and then focus on the empirical research on tax avoidance and capital structure, providing some explanations to the

inconsistency across empirical findings. In section 3 I focus on the effect of tax avoidance on investment decisions and cash holdings. Section 4 reviews the empirical literature on capital market reactions and investors' valuations to tax avoidance and tax risk. Section 5 concludes.

2. Tax avoidance and Capital Structure

While the effect of taxes on capital structure decisions has been investigated vastly both at the theoretical and empirical level, here I primarily focus on the consequences on debt policy of non-debt tax shields achieved through aggressive tax planning activities, tax avoidance, and tax sheltering.

Starting from an overview of the theoretical arguments for the tax sensitivity of capital structure,³ I review the most recent empirical literature that aimed at testing the theoretical models, classifying it according to the source of measurement error and reporting issues that are likely to explain the mixed evidence.

Although theoretical arguments for the tax sensitivity of capital structure are well established in the literature, the empirical literature has not provided yet with strong evidence and often results validate opposing standpoints, ranging from positions that support the tax sensitivity argument to studies that do not find any conclusive evidence.

The fundamental argument for a tax effect on corporate finance decisions relies on the tax benefit of debt, namely the interest tax shield. According to most tax systems, interest expenses are deductible from corporate taxable income while equity payouts are not. Modigliani and Miller (1963) show that the value of the implied tax shield from interest deductions grows with the marginal tax rate.

If debt financing only had benefits, we should be able to observe the majority of firms financed with 100% debt. But this is not the case. Unlike Modigliani and Miller's theory, which seemed to say that firms should take on as much debt as possible, trade-off theory⁴ avoids extreme predictions and rationalizes moderate debt ratios. It suggests the existence of

³ Graham (2003) reviews the corporate finance theory on taxes and the empirical predictions.

⁴ A. Kraus and R.H. Litzenberger, "A State-Preference Model of Optimal Financial Leverage", *Journal of Finance*, September 1973, pp. 911-922.

costs and benefits in the decision to finance with debt and introduces costs of financial distress. More specifically, the event of bankruptcy presents direct and indirect costs. Direct costs of bankruptcy include, for example: administrative and court cost, legal and advisory fees, time and resources spent by management and creditors dealing with bankruptcy, mismanagement by judges (blocking/delaying non-routine expenditures), time spent in bankruptcy. There are also some indirect costs of bankruptcy such as loss of intangible assets (brand name, reputation, long-term relationships) and agency conflicts between equity and debt claimants (Jensen and Meckling, 1976; Myers, 1977).

Overall, while debt financing provides with the benefit of a tax shield, it also increases the probability of bankruptcy and of incurring costs of default. Therefore, according to trade-off theory, companies with safe, tangible assets and plenty of taxable income to shield ought to have high target ratios. Unprofitable companies with risky, intangible assets ought to rely primarily on equity financing.⁵

In spite of theoretical predictions, Graham and Leary (2011) note that not only existing determinants struggle to explain leverage variation, their explanatory power has declined over time. Their study also shows that there is more cross-sectional variation than within-firm variation, the latter has increased over time, and most of the cross-sectional variation is within industries as opposed to across industries. Moreover, while standard proxies provide explanations for cross-industry variation, they struggle to explain leverage variation within firms.

Even though trade-off theory predictions appear to be consistent with many of the observed cross-sectional and within-firm variation in the leverage ratio, the inverse relation between leverage and profitability remains unsolved. According to trade-off theory, profitable firms should value more the tax deductions from interest of debt. Despite this, Graham (2000) estimates the amount of interest expense a firm could pay before the expected tax benefits of

⁵ Brealey Meyers (2003) Principle of Corporate Finance. J. Mackie-Mason, "Do Taxes Affect Corporate Financing Decisions?" *Journal of Finance* 45 (December 1990), pp. 1471–1493. Mackie-Mason found that tax-paying companies are more likely to issue debt (vs. equity) than nontaxpaying companies. A study by E. F. Fama and K. R. French, covering over 2,000 firms from 1965 to 1992, failed to find any evidence that interest tax shields contributed to firm value. See "Taxes, Financing Decisions and Firm Value," *Journal of Finance* 53 (June 1998), pp. 819–843

debt begin to diminish. Graham's analysis suggests that 44% of firms could double their debt and still receive full tax benefits from interest deductions, a result that has been used to support arguments that many firms do not take advantage of an optimal amount of debt in their capital structure, the so-called debt conservatism puzzle.

A traditional alternative to trade-off theory is provided in Myers and Majluf (1984) by the pecking order view. According to this theory, the adverse selection costs of issuing equity are large enough to make other costs and benefits of debt and equity second-order. As a result, due to financial slack, firms will favour internal sources of funds and resort to debt financing only once these funds are exhausted. Additionally, this hierarchical prediction holds also in presence of other frictions, such as transaction costs, taxes, agency costs, and managerial optimism.⁶

Another validated explanation⁷ to the debt conservatism puzzle is to account for other strategies firms might implement to diminish the tax burden through interest deductions than financing with debt. Therefore, the observed variation across firms could be explained by how the variables of interest are estimated. The measure of tax incentives necessarily implies estimations, given that data on taxable income is confidential in many countries (included the U.S.). On the other hand, as pointed out in Hanlon and Heitzman (2010), accounting rules allow to report many economic liabilities off-balance sheet, resulting in an underestimation of the true leverage ratio than will bias the tax sensitivity.

Overall, the inconsistencies between capital structure theories and observed evidence are driven by several factors that can be briefly summarized in the two following categories. First of all, the set of explanatory variables used in the empirical literature significantly affect the results. Feld, Heckemeyer, and Overesch (2011) conclude that capital structure choices are positively affected through taxes, after accounting for potential econometric misspecification biases and variable mis-measurement of the tax incentive and debt characteristics. In particular, financial reporting issues can bias the estimation of economic liabilities, therefore altering the tax sensitivity results. Moreover, Graham and Leary (2011)

⁶ See Stiglitz (1973), Myers (2003), and Heaton (2002).

⁷ Hanlon and Heitzman (2010), Feld et al. (2011).

highlight the issues arising from measuring of the cost of distress in a trade-off theory setting. In the following subsections 2.1, 2.2, and 2.3 I will discuss the issues arising from variables mis-measurement of the tax incentive, leverage ratio, and cost of default respectively.

2.1 Proxies for the tax incentive

The quantification of the tax effect on corporate debt levels relies on an adequate approximation of the unobserved marginal tax incentive to finance with debt. The underlying idea is that firms with higher tax benefits from debt financing will choose higher leverage ratios.

The previous empirical literature has mainly focused on the average tax rate and the marginal tax rate. The average tax rate is computed as taxes divided by pre-tax income. As Feld et al. (2011) point out, the tax payments that figure in the numerator of the average tax rate implicitly capture the degree of tax exhaustion and its implications for the incentive to finance with debt.

The marginal tax rate (MTR) is the firm-specific present value of current and expected future taxes paid on an additional dollar of income earned today (Shevlin, 1990). The computation of the MTR takes into account the carryover provisions of net operating losses.

A strand of literature eludes the use of marginal tax rate (MTR) proxies (MacKie-Mason, 1990; Dhaliwal et al., 1992; Trezevant, 1992; Downs, 1993; Barklay and Smith, 1995; Graham and Tucker, 2006). These studies rely on DeAngelo and Masulis (1980) and the correlation between non-debt tax shields and the unobserved true MTR.

Another key issue arises with endogeneity concerns over tax status and debt levels (Graham, 2003) that are examined by Graham et al. (1998) for the case of a simulated marginal tax rate.

More problems arise with the estimation of taxable income, since the information is not publicly available. While Graham's and Shevlin's MTR calculations assume that the level of a firm's future taxable income follows a random walk, Blouin, Core, and Guay (2011) argue that future income does not follow a random walk. Re-examining the claim that many corporations are underleveraged in that they fail to take full advantage of debt tax shields,

their evidence suggests that MTRs calculated using the random walk approach are too high (low) for profitable (unprofitable) firms.

2.2 Non-debt tax shields

As previously discussed, *static* trade-off theory argues that firms choose optimal capital structure by balancing the tax benefits of debt against the present value of financial distress. Therefore, to see whether a firm is targeting its optimal debt ratio, we must take into account all the possible tax benefits that can be exploited by the firm. Along with tax shields that originate from interest deductions on debt, there are also non-debt tax shields that can be accomplished through strategic aggressive tax planning.

DeAngelo and Masulis (1980) conjecture and find a substitution effect between debt and non-debt tax shields. They show that non-debt tax shields, such as depreciation deductions and investment tax credits, serve as substitutes for tax benefits of debt, thus moderating the demand for debt. Consistent with DeAngelo and Masulis (1980), firms will choose to use available non-debt tax shields before resorting to debt related tax shields. Graham and Tucker (2006) examine a sample of 44 tax shelter cases to investigate the magnitude of tax shelter activity and whether participating in a shelter is related to corporate debt policy. Compared to companies with similar pre-shelter debt ratios, the debt ratios of firms engaged in tax shelters fall by about 8%. The tax shelter firms in their sample appear underlevered if shelters are ignored but do not appear underlevered once shelters are considered.

Nevertheless, evidence is not consistent throughout the studies. Bradley, Jarrell, and Kim (1984) test the debt substitution hypothesis and find an anomalous positive relation between debt and non-debt tax shields. As discussed in Graham (2006), the findings in Bradley et al. (1984) may result from two sources: (1) non-debt tax shields matter in leverage decisions only if they affect a firm's marginal tax rate on interest deductions and (2) non-debt tax shields as measured by depreciation and investment tax credits positively relate to a firm's profitability and growth. Moreover, (3) according to the risk hypothesis and agency issues,

equity-based compensation incentivizes executives to take on more risk: both increasing debt to equity ratios and engaging in tax avoidance activities.

More recently, Rao and Yu (2013), using a change specification, find a negative association between the level of tax avoidance (proxied by book-tax difference and the cash effective tax rate) and the leverage ratio. They also find that the factors like size, profitability, and credit ratings invalidate the substitution of non-debt tax avoidance for debt.

2.2 Debt-ratio measurement

As pointed out in Hanlon and Heitzman (2010), research on capital structure decisions relies on financial statement data. Leverage is mostly measured as long-term debt over book or market value of total assets. However, accounting rules allow to report many economic liabilities off-balance sheet (e.g., operating lease commitments, debt of unconsolidated equity method investments, and until 2006 pension obligations). In particular, as documented by Cornaggia, Franzen, and Simin (2009), the role of leases has increased in time, and increased operating leases appear to substitute for debt usage.

The tradeoff between tax and non-tax costs on the choice of financing breaks down when there is flexibility on how financial claims are classified for tax and non-tax purposes (Auerbach, 2002). Financial instruments, for example, can provide interest deductions for tax purposes while being reported off-balance sheet for financial reporting purposes.

Graham and Leary (2011) summarize several studies that argue how the mis-measurement of the leverage variable has impaired previous studies inference on the determinants of capital structure. Welch (2011) points out that using measures of leverage that exclude non-debt liabilities from the numerator leads to underestimate a firm's leverage.

Additionally, international debt shifting within foreign subsidiaries allows parent companies to exploit differences in tax treatment across jurisdictions and activities. Huizinga and Laeven (2008) provide evidence on tax motivated debt shifting in a EU setting. Møen, Schindler, Schjelderup, and Tropina (2011) model the companies' choice between internal and external debt shifting and show that it is optimal for them to use both types of debt to shield from taxes.

Overall, liabilities may be underestimated and firms may appear to be underlevered when they are not.

2.4 Cost of bankruptcy and financial distress

As Graham and Leary (2011) emphasize one problem of the trade-off literature is that measuring the probability of distress with historic default data researchers have obtained underestimated results. *“Based on these probabilities the expected cost of distress appears to be much smaller than the apparently large corporate tax benefits that could be achieved by using more debt (Miller, 1977; Graham, 2000), implying that observed debt ratios are smaller than optimal debt implied by some traditional static trade-off models.”* (Graham and Leary, 2011). Almeida and Philippon (2007) and Molina (2005) also note that default probabilities are underestimated in the literature. Following their approaches, the expected cost of distress may be large enough to offset on average the expected benefits of debt.

2.5. Summary and suggestions for future research

On one hand, empirical research has shown that firms appear to be more conservative towards financing with debt, than trade-off theory would predict. Pecking order theory of capital structure provides an alternative explanation of why firms prefer to exhaust internal resources before resorting to debt.

On the other, tax research has coined the term under-sheltering puzzle to indicate that firms forgo tax sheltering opportunities, suggesting that there are also risks concerning aggressive tax planning. Recent studies have investigated the costs of tax avoidance and more extreme tax planning strategies as explanations for the tax under-sheltering puzzle. Gallemore, Maydew, and Thornock (2014) study the reputational costs of tax avoidance. Guenther et al. (2014) measure tax risk as the dispersion of future tax payments and fees around the mean and study its association with firm risk.

If tax avoidance comes at a cost in terms of firm risk, then non-debt tax shields achieved through aggressive tax planning might affect the probability of default and they are

not risk-free tax shields substitutes. The tax risk component of tax avoidance decisions has not been investigated by extant research in terms of capital structure decisions.

Another promising direction of future research deals with dynamic specifications. Traditionally, changes of capital structure are examined in the empirical literature with the association of contemporaneous changes in their determinants (static setting). Nevertheless, adjusting the debt structure is likely to imply adjustment costs and require time to reach the new optimal debt ratio. Some studies have model dynamically this adjustment process (Fama and French, 2002; Flannery and Rangan, 2006; Anoniu et al., 2008, Lemmon et al., 2008, and Huang and Ritte, 2009).

Bolton, Chen, and Wang (2014) analyse a model of optimal capital structure and liquidity choice based on a dynamic trade-off theory for financially constrained firms. In addition to the classical trade-off between the expected tax advantages of debt and bankruptcy costs, they introduce a cost of external financing for the firm, which generates a precautionary demand for liquidity and an optimal liquidity management policy for the firm. A new cost of debt financing in this context is an endogenous debt servicing cost: debt payments drain the firm's valuable liquidity reserves and thus impose higher expected external financing costs on the firm. The precautionary demand for liquidity also means that realized earnings are separated in time from payouts to shareholders, implying that the classical Miller-formula for the net tax benefits of debt no longer holds. Their model show that financially constrained firms choose to limit debt usages in order to preserve their liquidity and in some cases, they may not even exhaust their risk-free debt capacity.

Liquidity concerns also play an important role in recent studies that are analysed in section 3.1, when discussing the consequences of tax avoidance in terms of investment decisions and cash holdings.

Furthermore, international activities provide multinational corporations with the possibility to shift debt across borders, suggesting new avenues of research. Frank and Goyal (2007) identify six other determinants of corporate structure that are likely to affect empirical results if omitted. These are firm size, tangibility, profit, inflation, firm-specific growth options and industry median leverage. Moreover, the presence of international debt shifting

is ostensibly correlated both with capital structure and tax incentives, thus empirical results will differ according to whether this control variable is included in the model specification.⁸

3. Tax Avoidance and investment decisions

The amount, timing, and uncertainty of tax payouts and deductions affect the calculation of a project's net present value, therefore tax incentives are likely to be taken into considerations in investment policies. Neoclassical theory of investment posits that as long as the marginal benefits are greater than the marginal costs, the net present value of an investment is positive, hence the decision to invest.

Despite the vast theoretical literature on tax incentives and investment, Hines (1998) points out that “[...] *the apparent inability of tax incentives to stimulate aggregate investment spending is one of the major puzzles in the empirical investment literature*”. The explanation to the inconsistency between theoretical and empirical literature can be identified in the complications arising in the empirical settings in which the models are operationalized.

First of all, there are simultaneity concerns. A potential problem with the analyses is that the explanatory variables are endogenous. For example, contemporaneous sales growth may lead to incremental investment or incremental investment may lead to sales growth. In addition, the theoretical models imply that investment and tax planning decisions are taken jointly.

The underlying assumption is that while corporations are all subjected to the same tax code, firms face idiosyncratic tax environments dependent on their specific operations and corresponding tax positions. As a result, even firms with similar operational risk differ substantially in their effective tax rates from year to year (see, for example, McGuire et al. (2011) and Jacob and Schütt (2014)).

Cummins, Hassett, and Hubbard (1996) explore the extent to which fixed investment responds to tax reforms in 14 OECD countries. Unlike foregoing studies that have often found

⁸ Huizinga and Laeven (2008).

that investment does not respond to changes in the marginal cost of investment, they identify some of the factors responsible for this finding and find evidence of statistically and economically significant investment responses to tax changes in 12 of the 14 countries.

More recently, Jacob and Brandstetter (2014) study the effect of corporate tax cuts on investments. Following the 2008 German tax cut, domestically owned firms increased investments to a larger extent than foreign-owned firms. Alstadsæter and Jacob (2014) test whether dividend taxes affect corporate investment. Becker, Jacob, and Jacob (2013) show the effect of payout taxes on corporate investments. In particular, they show that investment is “locked in” in profitable firms when payout is heavily taxed.

Becker and Riedel (2012) hypothesize cross-border tax effects on affiliate investment. Their main hypothesis is that corporate taxation at the parent location can have an impact on capital stocks at affiliates abroad, reducing both the parent’s and the affiliate’s capital stock.

Barrios, Huizinga, Laeven, and Nicodeme (2012) explore the role of host and additional parent home country taxation in the decision where to locate a foreign subsidiary. They find that tax motivated decisions are of secondary order in the firm’s decision to locate foreign subsidiaries, suggesting that other factors (i.e.) exert greater influence in the decision process. Markle (2011) investigates whether tax-motivated income shifting of multinationals varies in territorial and worldwide countries.

McGuire, Omer, and Wilde (2013) investigate whether the firms’ opportunity sets, the operating uncertainty, and capital market pressure explain why some firms do not fully exploit the benefits of tax planning. Their study contributes to the stream of research on the determinants of tax avoidance and the causes of under-sheltering.⁹ The results suggest that firms with large investment opportunity sets and higher operating uncertainty are less likely to invest in tax shelters, while firms with greater capital market pressure are more likely to invest in tax shelter activities.

Edwards, Schwab, and Shevlin (2014) investigate tax planning as a source of internal funds, arguing that when facing financial constraints (i.e. macroeconomic or firm-specific)

⁹ The tax under-sheltering puzzle (Desai and Dharmapala 2006; Hanlon and Heitzman 2010; Weisbach 2002) refers to the fact that some firms do not take full advantage of the tax sheltering opportunities, thus suggesting the existence of costs implied in tax sheltering activities.

firms resort to tax avoidance strategies to save up cash. They find that firms' one year-ahead cash effective tax rates are approximately 1.5% lower following periods of macroeconomic financial constraint relative to periods with no macroeconomic constraint and approximately 2% lower for firms facing higher firm-level financial constraints.

This study opens the door to research questions on the relation between tax avoidance activities and cash holding that will be discussed in the following sub-section.

3.1 Tax avoidance and cash holdings

Hanlon and Heitzman (2010) identify four non-mutually exclusive theories of why firms hold cash. The first is a transaction cost motive. Converting noncash assets into cash is costly, therefore to avoid the cost of depleting all liquid assets (Baumol 1952; Tobin 1956; Miller and Orr 1966). According to this theory, the existence of economies of scale related to transaction costs leads to larger firms holding less cash.

Secondly, firms might hold cash to protect themselves against unfavourable events when accessing the capital markets is more costly, thus they hold cash driven by a Opler et al. (1999) find evidence supportive of a static tradeoff model of cash holdings, where firms with strong growth opportunities and riskier cash flows hold relatively high cash ratios. Firms that have the greatest access to the capital markets, such as large and highly rated firms tend to have lower cash holdings. At the same time, they also find evidence that firm that perform well tend to accumulate more cash than predicted by the static tradeoff model where managers maximize shareholders' wealth. Bates et al. (2009) document a dramatic increase in cash ratio of US industrial firms in the years from 1980 to 2006. They associate the increase in cash holdings to riskier cash flows, fewer inventories and receivables, and increasing research and development expenditures, also consistent with precautionary motives for holding cash.

Additionally, agency theories predict that the value of corporate cash holdings declines with poor governance. Therefore, cash value is predicted to be less in countries with poor investor protection because of the greater ability of controlling shareholders to extract private benefits from cash holdings in such countries. Consistent with this this view, Dittmar et al. (2003) find that firms in countries with low investors protection hold twice as much cash

as firms in countries with good shareholders protection. Later, Dittmar and Mahrt-Smith (2007) show that governance has a substantial impact on firm value through cash holdings and that good governance approximately doubles this value. Pinkowitz, Stulz, and Williamson (2006) also find that the relation between cash and firm value is much weaker in countries with low investor protection. Faulkender and Wang (2006) find that the value of cash declines with larger cash holdings, higher leverage, better access to capital markets, and as firms choose to distribute cash via dividends rather than repurchases. Consistent with these findings, Dechow, Richardson, and Sloan (2008) find that retained cash is less valuable because it tends to be associated with declines in return on investment, and it is not priced efficiently by the market.

Finally, in worldwide corporate tax systems, firms are taxed on their global earnings, but tax on foreign earnings is often deferred until the earnings are repatriated. Therefore, bringing foreign earnings back from foreign subsidiaries to the home country implies a repatriation tax cost. While foreign earnings do not need to be held in the form of cash, there is some evidence that the U.S. tax upon repatriation leads to cash buildup in foreign subsidiaries (Foley et al. 2007). However, some later papers question the importance of the repatriation tax as a determinant of cash holdings (Bates et al. 2009; Pinkowitz et al. 2013). Campbell et al. (2013) find that the market discounts foreign cash holdings, consistent with its eventual effect on tax expense when repatriated

Dhaliwal, Huang, Moser, and Pereira (2011) study the relation between tax avoidance and cash holdings. They posit that the greater the tax avoidance, the greater the likelihood that managers are diverting rents from shareholders and thus, greater tax avoidance leads to lower cash balances because cash is easily diverted.

Moreover, recent studies have focused in particular on the concept of tax uncertainty in relation to cash holdings. Hanlon, Maydew, and Saavedra (2014) examine whether tax uncertainty causes firms to hold more cash than they otherwise would. *“However, whether tax avoidance will be sustained is often uncertain at the time it is initiated, and we know little about how this uncertainty affects firm behaviour. Due to the complexities and ambiguities present in the tax laws, upon audit the tax authorities may have a different opinion of the firm’s true taxes, particularly if the firm has engaged in aggressive tax avoidance. Faced with*

the potential of additional cash demands from tax authorities, we hypothesize that firms have a precautionary motive to hold cash balances that are increasing in their degree of tax uncertainty". (Hanlon, Maydew, and Saavedra, 2014). They document a wide cross sectional variation in the amount of cash held across firm, despite the fact that holding cash on the balance sheet is costly. The costs of holding cash stem both from agency problems associated with large cash holdings and from the fact that retained cash is less valuable to the firm, associated with declines in return on investment, and is subject to mispricing by the market (Dechow et al. 2008). On the other hand, as Hribar et al. (2013) point out, there can be benefits of large cash holdings as well, such as increased flexibility to issue special dividends ahead of dividend tax increases. Their results suggest that firms that engage in tax avoidance (proxied by cash effective tax rate and unrecognized tax benefits – FIN 48) hold extra cash. An important issue when examining the determinants of cash holdings is whether the firm is financially constrained.

Blouin, Derereux, and Shackelford (2012) analyse the relationship between tax uncertainty and investment decisions through cash balances. They proxy tax uncertainty with the FIN 48 UTB (Unrecognized Tax Benefits) and expect the relation to be not linear. Since FIN 48 additions relate to transactions that reduce current tax payments, they expect investments to be increasing in FIN 48 additions. However, the FIN 48 additions relate to transactions whose tax treatment is also uncertain. Thus, firms should undertake activities that trigger FIN 48 additions until the marginal benefit of immediately lower taxes equals the marginal cost arising from the uncertainty about the additional taxes to be paid. Their results show a concave relation between investments and FIN 48 additions.

While Blouin et al. (2012) focus on the effect of tax uncertainty on incremental investment from aggressive tax avoidance which uses a measure available only after 2006, Jacob, Wentland, and Wentland (2014) use a more general measures of tax uncertainty and a sample from 1977-2012 to allow for more variation and general inferences. Moreover, they argue that large investments are lumpy and not incremental in the way they are financed and happen in spikes. They test whether firm-specific tax uncertainty affects the timing and incidence of these investment spikes made by firms. They find that firms with higher tax uncertainty (captured by the volatility of the effective tax rate) have higher cash holdings and

lower investment, and that this adverse impact is stronger at higher levels of investment where the trade-off effect is supposed to be larger. As for the timing of large investments, greater tax uncertainty delays large capital investments.

3.2. Summary and suggestions for future research

Extant research has identified cash holdings as an important mechanism through which tax avoidance and sheltering decisions affect investment policies, thus suggesting a reconciliation with previous literature that found mixed results on tax sensitivity to investment policies.

Starting from Edwards et al. (2014) argument that when facing financial constraints, firms engage in tax avoidance activities to free cash flows, further research is needed to reconcile studies on tax avoidance and cash holdings held for precautionary motives.¹⁰

The trade-off between tax uncertainty and investment implies that, from a policy standpoint, a reduction in tax uncertainty could free up valuable financial capital for firm investment, which may currently be tied up as a cash buffer for firms that are highly uncertain about their future tax incidence.

4. Tax avoidance, tax risk and investors' valuation

Before discussing whether investors consider the implication of tax avoidance in their valuations, I first briefly assess the main empirical literature concerning the pricing of tax liabilities to provide a quick overview of the role played by taxation in valuation models.

4.1 Pricing of tax liabilities

The American Jobs Creation Act of 2004 was signed into law on October 22, 2004. One of the most significant aspects of this legislation was a temporary tax holiday for dividend repatriations from foreign subsidiaries. U.S. multinational corporations were allowed during a one-year window to deduct 85% of extraordinary cash dividends received from foreign

¹⁰ See Hanlon, Maydew and Saavedra (2014); Jacob, Wentland, and Wentland (2014).

subsidiaries. This setting provides an exogenous shock to tax regulation that enables researchers to study investors' assessment of corporate tax planning decisions.

Oler, Shevlin, and Wilson's (2007) indicate that investors repriced the tax liability consistent with investors anticipating that U.S. multinational corporations will repatriate a significant portion of their permanently reinvested foreign earnings during the tax holiday.

Thomas and Zhang (2014) study the valuation of tax expense. As tax expense reflects value lost to taxes paid, it should be negatively associated with value. They attribute the previous mixed evidence to the omission of expected future profitability.

McGuire, Neuman, Olson, and Omer (2014), assuming that a majority of tax losses are carried forward, estimate the present value of tax loss carryforwards and use this estimate to investigate whether investors assign value to the cash savings from tax loss carryforwards.

These studies find evidence that tax liabilities are taken into account in investors' valuations. I now turn to studies that investigate whether investors' value corporate tax avoidance and how it is associated to firm value.

4.2 Pricing of tax avoidance

Desai and Dharmapala (2009) use a framework in which managers' tax sheltering decisions are related to their ability to divert value. Their study find that abnormal book-tax differences (their proxy for tax avoidance) have no average association with firm value measured by market-to-book. They predict that the effect of tax avoidance on firm value should vary systematically with the strength of firm governance institutions. The empirical results indicate that the average effect of tax avoidance on firm value is not significantly different from zero; however, consistent with the prediction, the effect is positive for well-governed firms. Firms with high institutional ownership have a stronger positive association between book-tax differences and market-to-book, which suggests that the value shareholders place on corporate tax avoidance depends on their ability to control the manager, consistent with governance differences explaining cross-sectional variation in the consequences of tax avoidance

De Simone and Stomberg (2013) investigate whether investor valuation of tax avoidance differs based on the nature of the underlying tax avoidance. After documenting a

positive association between low cash effective tax rates and Tobin's q , they use firm characteristics to identify firms whose mobile income and asset structures afford them greater opportunities to engage in long-term, sustainable tax avoidance. They find that on average, current year cash savings from tax avoidance are associated with a 6.5 percent greater Tobin's q for income mobile firms.

Hanlon and Slemrod (2009) study the market reactions to news about corporate involvement in tax shelters. They show an initial stock price decline to the news. Firms in the retail sector appear to suffer the most, suggesting that part of the reaction may be a consumer/taxpayer backlash. In addition, the reaction is less negative for firms that are viewed to be generally less tax aggressive, as proxied by the firm's cash effective tax rate.

Kim, Li, and Zhang (2011) provide evidence that corporate tax avoidance is positively associated with firm-specific stock price crash risk, consistent with the view that tax avoidance facilitates managerial rent extraction.

Frischmann, Shevlin, and Wilson (2008) show that stock returns around FIN 48 pronouncements suggest investors were not concerned about an increase in tax costs, and investors responded favourably to initial disclosures required under FIN 48. However, they document a significant negative market reaction to subsequent news of a Senate inquiry into these disclosures consistent with investors revising their beliefs over the potential for additional tax costs.

4.3 The pricing of tax risk

Risk refers to uncertainty about the payoffs from an investment. Tax risk is associated with the eventual repayment of the tax savings plus the penalties that would increase the firm's future tax payments and it is captured by the variance or standard deviation of the effective tax rates.

Guenther, Matsunaga, and Williams (2014) argue that the firm's ability to take advantage of tax-favoured investments is determined by the firm's production function and operating environment. For example, firms that rely more heavily on research and development in their production function are better able to reduce their taxes through R&D

tax credits. In many cases there is little, if any, risk that the firm will be assessed future taxes and penalties for lowering their current tax payments. Therefore, the relation between a firm's overall tax avoidance and the riskiness, or uncertainty, of future tax related cash flows depends on the extent to which the tax avoidance is driven by managers taking tax positions that are risky and not necessarily by lowering the effective tax rates. They show that ETRs volatility are better proxies for tax risk. In addition, they study the relationship with firm risk, measured by the volatility of stock returns, and the results show a positive association. They do not find evidence that either the level of Cash ETR or the Unrecognized Tax Benefits reserve is related to future firm risk, suggesting that only the risk implied in tax avoidance strategies contributes to the firm overall risk.

In this regard, Hutchens and Rego (2012) study the relation between tax risk and the cost of equity capital. While they find a positive association between tax risk (proxied by firms' reserve for income taxes) and the cost of equity capital, this relation becomes negative when they use other measures of tax avoidance that capture lower risk levels (effective tax rates).

Drake, Lusch, and Stekelberg (2014) examine whether investors valuation of tax avoidance is contingent upon the level of uncertainty (i.e. tax risk) and find that, despite an overall positive valuation, higher tax risk attenuates this relationship.

Jacob and Schütt (2014) develop a valuation framework that incorporates two outcome dimensions of corporate tax avoidance strategies: the stability and the level of expected tax rates. They argue that, for a given level of tax avoidance, investors' valuation of pre-tax earnings is more positive if a firm has a lower effective tax rate volatility. Likewise, for a given level of variation in tax rates, investors value pre-tax earnings more positively if a firm has a lower effective tax rate. Moreover, they show that pre-tax earnings have a stronger effect on firm value for firms with effective and persistent tax planning (that have a low impact on effective tax rates volatility).

On the other hand, Goh, Lee, Lim, and Shevlin (2013) investigate the association between low-risk corporate tax avoidance and the cost of equity capital. They study the relation between the cost of equity and corporate tax avoidance using three measures that capture less extreme forms of corporate tax avoidance: book-tax differences, permanent book-

tax differences, and long-run cash effective tax rates. They find that less aggressive forms of corporate tax avoidance significantly reduce a firm's cost of equity. Further analyses reveal that this effect is stronger for (i) firms with better outside monitoring, (ii) firms that likely realize higher marginal benefits from tax savings, and (iii) firms with better information quality.

4.4. Tax avoidance and the cost of debt

Shevlin, Urcan, and Vasvari (2012) document that corporate tax avoidance is associated with higher bond offering yields and that this effect is largely explained through the negative effect of tax avoidance on future cash flows levels and volatility.

Hasan et al. (2014) the effect of corporate tax avoidance on the cost of bank loan.

Tax avoidance measures such as tax shelters can reduce the risk of debt covenant violation and reduce the cost of debt. Lisowsky et al. (2010) show that firms that engage in high tax avoidance, as reflected in tax shelter participation or large positive book-tax difference, incur lower cost of debt financing than more tax-conservative firms.

Finally, tax avoidance may have an impact on the firm's credit ratings. Through the tax avoidance – leverage substitution effect, the firm can rely on less debt, thus increasing its financial slack and decreasing the probability of financial distress. Ayers, Laplante, and McGuire (2010) find that negative credit rating changes are associated with book-tax differences arising from earnings management but not from tax avoidance.

4.5. Summary and suggestions for future research

Recent empirical research has distinguished between tax avoidance in general and the risk related to aggressive tax planning strategies. When studying the association with firm value, these studies show that the direction of the association is conditioned upon the risk rather than upon the level of tax avoidance. In fact, the latter might not correspond to increased tax risk, but only results from operational activities, thus freeing cash flows without increasing the uncertainty related to future tax payments.

This appears to be a promising direction to reconcile previous mixed evidence on the association between tax avoidance and firm value and investors' valuation.

5. Conclusion

The focus of the paper is on the role of tax avoidance, broadly defined as the reduction of explicit taxes over pre-tax accounting earnings, in business decisions. Investment and financing policy, and investors' valuation models are all affected by taxes. Therefore, extant research on tax avoidance has investigated the impact of the strategies that firm implement to reduce the overall tax burden on those business decisions.

Moreover, I limit this review mostly on studies that are not included in previous reviews, such as Hanlon and Heitzman (2010) that thoroughly analyse tax research in accounting, finance, and economics. Nonetheless, tax research has progressed and witnessed a surge in recent studies that examine the real consequences of tax avoidance strategies.

The relevance of the topic is increasing, due to its macroeconomic implications as governments exploit tax policies to stimulate or curb aggregate investment. Therefore, the consequences of tax avoidance must be considered when designing those tax policies.

One issue of empirical research on investing and financing decisions is the variable mis-measurement that are responsible for some of the inconsistencies between theoretical models on capital structure and investment decisions and empirical results. In addition, most studies suffer from endogeneity concerns that represent a major flaw and limit any inference that can stem from empirical studies.

Further studies are needed in order to reconcile theoretical predictions with the empirical observations, and I look forward to new research in this direction.

References

- Aggarwal, R., and N.A. Kyaw, 2008. Internal Capital Networks as a Source of MNC Competitive Advantage: Evidence from Foreign Subsidiary Capital Structure Decisions. *Research in International Business and Finance* 22, 409{439.
- Aggarwal, R., and N.A. Kyaw, 2010. Capital Structure, Dividend Policy and Multinationality: Theory versus Empirical Evidence. *International Review of Financial Analysis* 19, 140{150.
- Altshuler, R., Grubert, H., (2003). Repatriation Taxes, Repatriation Strategies and Multinational Financial Policy. *Journal of Public Economics* 87, 73-107.
- Alworth, J., Arachi, G., (2001). The Effect of Taxes on Corporate Financing Decisions: Evidence from a Panel of Italian Firms. *International Tax and Public Finance* 8, 353-376.
- Amromin, G., Liang, N., (2003). Hedging Employee Stock Options, Corporate Taxes and Debt. *National Tax Journal* 56, 513-533.
- Antoniou, A., Guney, Y., Paudya, K., (2008). The Determinants of Capital Structure: Capital Market-Oriented versus Bank-Oriented Institutions. *Journal of Financial and Quantitative Analysis* 43, 59-92.
- Auerbach, A.J., 2002. Taxation and Corporate Financial Policy. In: Auerbach A.J., and M. Feldstein (eds.), *Handbook of Public Economics*, Vol. 3, Amsterdam, 1251{1292.
- Ayers, B.C., Cloyd, C.B., Robinson, J.R., (2001) The Influence of Income Taxes on the Use of Inside and Outside Debt by Small Businesses. *National Tax Journal* 54, 27-55.
- Ayers, B., Laplante, S., McGuire, S., (2010). Credit Rankings and Taxes: The Effect of Book/Tax Differences on Ratings Changes. *Contemporary Accounting Research* 27, 359–402.
- Baker, M., Wurgler, J., (2002). Market Timing and Capital Structure. *Journal of Finance* 57, 1-32.
- Barion, F., R. Miniaci, P.M. Panteghini, and M.L. Parisi, 2010. Profit-Shifting via Debt Financing in Europe. CESifo Working Paper No. 2985, Munich.
- Buettner, T., and G. Wamser, 2009. Internal Debt and Multinationals' Profit Shifting Empirical Evidence from Firm-level Panel Data. Oxford University Centre for Business Taxation WP 09/18, Oxford.
- Buettner, T., M. Overesch, U. Schreiber, and G. Wamser, 2009. Taxation and Capital Structure Choice. Evidence from a Panel of German Multinationals. *Economics Letters* 105, 309{311.

- Blouin, J., Core, J.E., Guay, W., (2010). Have the Tax Benefits of Debt Been Overestimated?. *Journal of Financial Economics* 98, 195-213.
- Booth, L., Aivazian, V., Demircuc-Kunt, A., Maksimovic, V., (2001). Capital Structures in Developing Countries. *Journal of Finance* 56, 87-130.
- Bradley, M., Jarrell, G., Kim, E., (1984). On the Existence of an Optimal Capital Structure: Theory and Evidence. *Journal of Finance* 39, 857–878.
- Byoun, S., (2008). How and When Do Firms Adjust Their Capital Structures toward Targets?. *Journal of Finance* 63, 3069-3096.
- Charalambakis, E.C., Espenlaub, S.K., Garrett, I., (2008). Leverage Dynamics, the Endogeneity of Corporate Tax Status and Financial Distress Costs, and Capital Structure. Working Paper, Manchester Business School.
- Collins, J.H., Kemsley, D., (2000). Capital Gains and Dividend Taxes in Firm Valuation: Evidence of Triple Taxation. *The Accounting Review* 75 (4), 405–427.
- Cornaggia, K., Franzen, L., Simin, T., (2009). Capital Structure and the Changing Role of Off-Balance-Sheet Lease Financing. Working Paper.
- DeAngelo, H., Masulis, R.W., (1980). Optimal Capital Structure under Corporate and Personal Taxation. *Journal of Financial Economics* 8, 3-29.
- De Jong, A., Kabir, R., Nguyen, T.T., (2008). Capital Structure Around the World: The Roles of Firm- and Country-Specific Determinants. *Journal of Banking and Finance* 32, 1954-1969.
- De Long, J.B., Lang, K., (1992). Are All Economic Hypotheses False?. *Journal of Political Economy* 100, 1257-72.
- De Mooij, R.A., Ederveen, S., (2003). Taxation and Foreign Direct Investment: A Synthesis of Empirical Research. *International Tax and Public Finance* 10, 673-693.
- De Simone, L., Stomberg, B., (2013). Do Investors Differentially Value Tax Avoidance by Income Mobile Firms?. Working Paper.
- Desai, M.A., Foley, C.F., Hines, J.R., (2004). A Multinational Perspective on Capital Structure Choice and Internal Capital Markets, *Journal of Finance* 59, 2451-2487.
- Desai, M.A., Foley, C.F., Hines, J.R., (2008). Capital Structure with Risky Foreign Investment. *Journal of Financial Economics* 88, 534-553.
- Desai, M.A., Dharmapala, D., (2009). Corporate Tax Avoidance and Firm Value. *Review of Economics & Statistics* 91 (3), 537–546.
- Dhaliwal, D., Trezevant, R., Wang, S., (1992). Taxes, Investment Related Tax Shields and Capital Structure. *Journal of the American Taxation Association* 14, 1-21.
- Dhaliwal, D., Erickson, M., Frank, M.M, Banyi, M. (2003). Are Shareholder Dividend Taxes on Corporate Retained Earnings Impounded in Equity Prices? Additional Evidence and Analysis. *Journal of Accounting and Economics* 35 (2), 179–200.

- Dischinger, M., Glogowski, U., Strobel, M., (2010). Leverage, Corporate Taxes and Debt Shifting of Multinationals: The Impact of Firm-Specific Risk. Working Paper, University of Munich.
- Downs, T.W., (1993). Corporate Leverage and Non-Debt Tax Shields: Evidence on Crowding-Out. *Financial Review* 28, 549-583.
- Fama, E.F., French, K.R., (2002). Testing Trade-Off and Pecking Order Predictions about Dividends and Debt. *Review of Financial Studies* 15, 1-33.
- Faulkender, M., Petersen, M.A., (2006). Does the Source of Capital Affect Capital Structure?. *Review of Financial Studies* 19, 45-79.
- Flannery, M.J., Rangan, K.P.,(2006). Partial Adjustment toward Target Capital Structures. *Journal of Financial Economics* 79, 469-506.
- Feld, L.P., Heckemeyer, J.H., (2011) FDI and Taxation: A Meta-Study. *Journal of Economic Surveys* 25, 233-275.
- Frank, M.Z., Goyal, V.K., (2007). Capital Structure Decisions: Which Factors Are Reliably Important?. *Financial Management* 38, 1-37.
- Goh, B. W., Lee, J., Lim, C. Y., Shevlin, T., (2013). The Effect of Corporate Tax Avoidance on the Cost of Equity. SSRN Working Paper.
- Gordon, R.H., (2010). Taxation and Corporate Use of Debt: Implications for Tax Policy. *National Tax Journal* 63, 151-174.
- Gordon, R.H., Lee, Y., (2001). Do Taxes Affect Corporate Debt Policy? Evidence from U.S. Corporate Tax Return Data. *Journal of Public Economics* 82, 195-224.
- Gordon, R.H., Lee, Y., (2007). Interest Rates, Taxes and Corporate Financial Policies. *National Tax Journal* 60, 65-84.
- Graham, J.R., (1996a). Debt and the Marginal Tax Rate. *Journal of Financial Economics* 41, 41-73.
- Graham, J.R., (1996b). Proxies for the Corporate Marginal Tax Rate. *Journal of Financial Economics* 41, 187-221.
- Graham, J.R., (1999). Do Personal Taxes Affect Corporate Financing Decisions?. *Journal of Public Economics* 73, 147-185.
- Graham, J.R., (2003). Taxes and Corporate Finance: A Review. *Review of Financial Studies* 16, 1075-1129.
- Graham, J., Kim, H., (2009). The Effects of the Length of the Tax-Loss Carryback Period on Tax Receipts and Corporate Marginal Tax Rates. Working Paper, Duke University.
- Graham, J.R., Mills, L.F., (2008). Using Tax Return Data to Simulate Corporate Marginal Tax Rates. *Journal of Accounting and Economics* 46, 366-388.
- Graham, J., Raedy, J., Shackelford, D. (2012). Research in Accounting for Income Taxes. *Journal of Accounting and Economics* 53, 412-434.

- Graham, J.R., Lemmon, M.L., Schallheim, J.S., (1998) Debt, Leases, Taxes, and the Endogeneity of Corporate Tax Status. *Journal of Finance* 53, 131-162.
- Graham, J.R., Lang, M.H., Shackelford, D.A., (2004). Employee Stock Options, Corporate Taxes, and Debt Policy. *Journal of Finance* 59, 1585-1617.
- Graham, J.R., Tucker, A.L. (2006). Tax Shelters and Corporate Debt Policy. *Journal of Financial Economics* 81, S. 563-594.
- Hanlon, M., Heitzman, S., (2010). A Review of Tax Research. *Journal of Accounting and Economics* 50 (2-3), 127–178.
- Hanlon, M., Myers, J. N., Shevlin, T., (2003). Dividend Taxes and Firm Valuation: A Re-examination. *Journal of Accounting and Economics* 35 (2), 119–153.
- Hanlon, M., Slemrod, J., (2009). What Does Tax Aggressiveness Signal? Evidence from Stock Price Reactions to News about Tax Shelter Involvement. *Journal of Public Economics* 93 (1–2), 126–141.
- Harris, T. S., Kemsley, D., (1999). Dividend Taxation in Firm Valuation: New Evidence. *Journal of Accounting Research* 37 (2), 275–291.
- Huizinga, H., Laeven, L., Nicodème, G., (2008). Capital Structure and International Debt Shifting in Europe. *Journal of Financial Economics* 88, 80-118.
- Inger, K. K., (2013). Relative Valuation of Alternative Methods of Tax Avoidance, SSRN Working Paper.
- Jensen, M., (1986) Agency Costs of Free Cash Flow, Corporate Finance and Takeovers. *American Economic Review* 76, 323-329.
- Jensen, M., Meckling, W.H., (1976) Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure. *Journal of Financial Economics* 42, 159-185.
- Kesternich, I., Schnitzer, M., (2010). Who is Afraid of Political Risk? Multinational Firms and their Choice of Capital Structure. *Journal of International Economics*, forthcoming.
- Klapper, L., Tzioumis, K., (2008). Taxation and Capital Structure: Evidence from a Transition Economy. Policy Research Paper No. 4753, World Bank.
- Kraus, A., Litzenberger, R.H., (1973) A State-Preference Model of Optimal Financial Leverage. *Journal of Finance* 28, 911-922.
- Lasfer, A. M., (1995). Agency Costs, Taxes and Debt: The UK Evidence. *European Financial Management* 1, 265-285.
- Lemmon, M.L., Roberts, M.R., Zender, J.F., (2008) Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure. *Journal of Finance* 63, 1575-1608.
- MacKie-Mason, J., (1990). Do Taxes Affect Corporate Financing Decisions?. *Journal of Finance* 45, 1471-1493.
- Miller, M., (1977). Debt and Taxes. *Journal of Finance* 32, 261-276.

- Mills, L.F., Newberry, K.J., (2004) Do Foreign Multinational's Tax Incentives Influence their U.S Income Reporting and Debt Policy?. *National Tax Journal* 57, 89-107.
- Modigliani, F., Miller, M., (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review* 53, 433-443.
- Myers, S., (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics* 5, 147-175.
- Myers, S., (1984). The Capital Structure Puzzle. *Journal of Finance* 15, 81-102.
- Myers, S., Majluf, N., (1984). Corporate Financing and Investment Decisions when Firms Have Information that Investors Do not Have. *Journal of Financial Economics* 13, 187-222.
- Newberry, K.J., Dhaliwal, D.S., (2001). Cross-Jurisdictional Income Shifting by US Multinationals: Evidence from International Bond Offerings. *Journal of Accounting Research* 39, 643-662.
- Overesch, M., Voeller, D., (2010). The Impact of Personal and Corporate Taxation on Capital Structure Choices. *FinanzArchiv* 66, 263-294.
- Overesch, M., Wamser, G., (2010). Corporate Tax Planning and Thin-Capitalization Rules: Evidence from a Quasi Experiment. *Applied Economics* 42, 563-573.
- Parrino, R., Weisbach, M.S., (1999). Measuring Investment Distortions Arising from Stockholder–Bondholder Conflicts. *Journal of Financial Economics* 53, 3-42.
- Pfaffermayr, M., Stoeckl, M., Winner, H., (2008). Capital Structure, Corporate Taxation and Firm Age. Working Paper, Oxford University Centre for Business Taxation.
- Rajan, R.G., Zingales, L., (1995). What Do We Know about Capital Structure? Some Evidence from International Data. *Journal of Finance* 50, 1421-1460.
- Shackelford, D. A., Shevlin, T., (2001). Empirical Tax Research in Accounting. *Journal of Accounting and Economics* 31 (1-3), 321–387.
- Sharpe, S.A., Nguyen, H.H. (1995). Capital Market Imperfections and the Incentive to Lease. *Journal of Financial Economics* 39, 271-294.
- Shevlin, T., (1990). Estimating Corporate Marginal Tax Rates with Asymmetric Tax Treatment of Gains and Losses. *Journal of the American Taxation Association* 12, 51-67
- Scholes, M., Wolfson, A., Erickson, M., Maydew, E., Shevlin, T., (2008). *Taxes and Business Strategy: A Planning Approach*. Pearson Prentice-Hall, Upper Saddle River, NJ, 4th edition.
- Stulz, R., (1990). Managerial Discretion and Optimal Financing Choices. *Journal of Financial Economics* 26, 3-28.
- Thomas, J., Zhang, F., (2013). Valuation of Tax Expense. *Review of Accounting Studies*, forthcoming.

- Titman, S., Wessels, R., (1988). The Determinants of Capital Structure Choice. *Journal of Finance* 43, 1-19.
- Trezevant, R., (1992). Debt Financing and Tax Status: Tests of the Substitution Effect and the Tax Exhaustion Hypothesis Using Firms' Response to the Economic Recovery Tax Act of 1981. *Journal of Finance* 47, 1557-1568.
- Wang, X., (2010). Tax Avoidance, Corporate Transparency, and Firm Value. SSRN Working Paper.

Executive Inside Debt and Corporate Tax Avoidance

Anna Alexander
University of Padua, Italy
Novemembr 2014

WORKING PAPER - PLEASE DO NOT QUOTE OR CIRCULATE

Abstract

This study examines the relation between CEO and CFO inside debt holdings and corporate tax avoidance. As executives' inside debt holdings are unsecured and unfunded, they should align CEOs and CFOs interests with those of outside debtholders. As theory suggests, inside debt holdings incentivize executives to act more conservatively towards risk. Therefore, we focus on the level of tax risk of the corporate tax planning strategy and use proxies to capture the difference in tax risk. While we expect inside debt holdings to curb executives' risk taking behaviour towards risky tax avoidance, the effect on the overall tax planning strategies is unclear, as tax avoidance increases current cash flows and can also be beneficial to debtholders. Consistent with the prediction, we document a negative association between CEOs and CFOs inside debt holdings and higher levels of tax risk (proxied by the GAAP and cash effective tax rate volatility).

1. Introduction

In this study, we tackle the tax under-sheltering puzzle i.e., why firms apparently under-optimize corporate tax avoidance (Weisbach, 2002; Desai and Dharmapala, 2006; Hanlon and Heitzman, 2010), and examine the determinants of tax avoidance at the corporate level. While previous studies show that there is a wide variation in tax avoidance across firms, the determinants of this variation are still under exam.

Evidence shows that the degree of aggressive tax planning is not homogeneous, even after controlling for firm-level characteristics, such as profitability, foreign operations, research and development expenditure, leverage, and earnings quality (Rego, 2003; Wilson, 2009; Graham and Tucker, 2006; Frank, Lynch and Rego, 2009; Dyreng, Hanlon, and Maydew, 2010). Previous studies on tax avoidance have investigated the role played by corporate governance as a determinant of this cross-sectional variation. More specifically, these studies examine whether corporate tax avoidance is associated with executive compensation practices, but the evidence is mixed (Phillips, 2003; Hanlon, Mills, and Slemrod, 2005; Desai and Dharmapala, 2006, Armstrong et al. 2010; Rego and Wilson, 2012).

Recently, Kubick, Lockhart, and Robinson (2014) and Chi, Huang and Sanchez (2014) examine whether inside debt (i.e. deferred compensation and pension plans) held by executives is associated with reduced tax avoidance.

We further investigate the relationship between inside debt compensation and tax avoidance and focus on specific measures of tax risk. We expect inside debt holdings to curb executive risk-taking behaviour. Moreover, as Jensen and Meckling (1977) predict that risk-shifting might be mitigated through inside debt compensation, we focus on measures of corporate tax avoidance that capture how uncertain and hence risky the tax planning strategy effectively is.

According to agency theory, executive compensation is a corporate governance instrument that attempts to align managers' and shareholders' interests. Assuming risk neutral shareholders and risk-averse executives (due to their non-diversified investments), managers need to be provided with risk-taking incentives to act in the shareholders' interest, thus

providing a solution to the shareholder-manager agency conflict. However, executive compensation contracts are designed as a package of different components: a cash-based (i.e. salary and bonus), an equity-based (stocks and stock options) and a debt-based part (inside debt), the latter being, for the top management team, unsecured and unfunded. It follows that, while equity-based compensation might lead executives into risk-taking behaviours, inside debt holdings should provide managers with incentives to act more conservatively, mitigating the risk-shifting issue. In other words, as shareholders of levered firms gain when business risk increases, managers may even take risky negative present value investments that favour only shareholders' interests and that are against the interests of creditors.

John, Mehran, and Qian (2010) examine how executive compensation plays the role of a commitment mechanism that can offset risk-shifting incentives, as well as aligning managerial incentives with shareholders' interest. Moreover, Edmans and Liu (2010) Wei and Yermack (2011), Cassell, Huang, Sanchez, and Stuart (2012) examine the association between inside debt holdings and a comprehensive set of measures that capture investor's reactions and the overall riskiness of a firm's investment and financial policies.

The link between overall risk and tax avoidance stems from how tax avoidance is here characterized. We look at tax avoidance as in Hanlon and Heitzman (2010) and define it broadly as a continuum of activities to reduce explicit taxes: "A tax planning activity or a tax strategy could be anywhere along the continuum depending upon how aggressive the activity is in reducing taxes". Moreover, "Although corporate tax avoidance increases current after-tax cash flows, thus lowering default risk, it amplifies uncertainty by negatively affecting future cash flows and it facilitates more opaque reporting¹¹" (Shevlin, Urcan, and Vasvari, 2012). Hence, different degrees of riskiness are associated with various tax planning strategies, from perfectly legitimate positions to the most aggressive ones. In this context, tax aggressiveness closely relates to risk due to the level of uncertainty regarding the ability to sustain the tax benefit claimed upon audit.

¹¹ Previous research has also investigated whether tax avoidance is implemented by executives to extract personal rent. Desai and Dharmapala (2009) show that the overall effect of tax avoidance on firm value is not significantly different from zero, although the effect is positive for well-governed firms. Amiram, Bauer, and Frank (2013) provide results consistent with the view that managers engage in corporate tax avoidance to benefit shareholders.

In this regard, Hutchens and Rego (2012) study the relation between tax risk and the cost of equity capital, showing that the relation changes according to level of tax risk that is captured by the proxy used. Moreover, Jacob and Schütt (2014) show that pre-tax earnings have a stronger effect on firm value for firms with effective and persistent tax planning (that has a low impact on effective tax rates volatility). Drake, Lusch, and Stekelberg (2014) examine whether investors valuation of tax avoidance is contingent upon the level of uncertainty (i.e. tax risk) and find that, despite an overall positive valuation, higher tax risk attenuates this relationship. Shevlin, Urcan, and Vasvari (2012) document that corporate tax avoidance is associated with higher bond offering yields and that this effect is largely explained through the negative effect of tax avoidance on future cash flows levels and volatility. These studies suggest that the association between tax avoidance and firm value, and therefore how the different stakeholders view tax avoidance activities, may depend upon the degree of risk involved in the strategy implemented.

Consistent with the view that compensation contracts regulates two types of agency conflict (i.e. the managers-shareholder conflict and the risk-shifting issue discussed above), we argue that the link between executive inside debt and tax avoidance is not straightforward.

We posit that inside debt compensation may drive executives to act more conservatively, avoiding risk and preserving liquidity and therefore we expect a negative association between inside debt holdings and measures of risky tax avoidance that capture the persistence of aggressive tax planning. However, when examining how much the tax burden was reduced through tax planning, hence not disentangling the tax risk component, the association between inside debt and tax avoidance could go either way, depending on whether debtholders are more concerned with increasing current cash flow or limiting future uncertainty and managerial rent diversion.

Our main sample consists of 3350 CEO-year observations and 2770 CFO-year observations with complete compensation and financial data from 2006 through 2012. The data on inside debt holding in Execucomp is available from 2006 when the Securities and Exchange Commission (SEC) disclosure reform greatly increased the transparency of pensions and deferred compensation.

We measure inside debt incentives with different variables that capture the overall inside debt holdings and the relative (to the firm) CEO and CFO debt-to-equity ratio (Sundaram and Yermack, 2007; Wei and Yermack, 2011). To disentangle the average corporate tax avoidance from tax risk, we use the GAAP and cash effective tax rates to measure the level of aggressive tax planning and we assume that the variance of these measures are better proxies for tax risk.

Managerial incentives set through executive compensation and firm policies are likely to be jointly determined (Coles et al., 2006; Rego and Wilson, 2012), especially when looking at tax planning. Tax concerns are likely to be one determinant of how the executive compensation contract is structured and establishing causality in this framework is highly difficult. Therefore, we use a simultaneous equation approach and test it along several proxies of tax avoidance that disentangle between the tax avoidance level and the degree of tax risk, namely the levels of GAAP ETR, Cash ETR and their three-year volatility.

The results are consistent with the expectations and show that when we measure the level of tax avoidance, the results on the different measures of CEO and CFO inside debt holdings are mixed. On the other hand, when measuring the volatility of the GAAP and cash effective tax rates (i.e. tax risk), we show that inside debt holdings are negatively associated with the riskiness of the tax avoidance strategies.

We make a contribution to the tax literature on the determinants of tax avoidance, showing the role of inside debt holdings as a possible explanation for the tax under-sheltering puzzle. Prior research does not investigate the interplay between the full range of compensation contract components and tax avoidance, but limits the analysis to the link between equity risk incentives and tax aggressive strategies (Rego and Wilson, 2012). More recent works¹² do not disentangle tax risk from the level of tax avoidance. As inside debt holdings modify managers' risk preferences, we use measures that describe the volatility of the outcomes of the tax planning strategies, and hence better proxy for risk.

¹² Kubick, Lockhart, and Robinson (2014) and Chi, Huang and Sanchez (2014).

We contribute to the literature on the shareholder-manager problem and the agency cost of debt, examining the role of compensation incentives in reshaping managers' behaviour towards a particular risky activity, namely aggressive tax planning.

2. Theoretical background

From the firms' perspective, tax avoidance can be viewed as value-increasing, since it reduces tax liabilities, which increases cash flow and can also increase after-tax net income (Rego and Wilson, 2012). De Simone and Stomberg (2013) show that tax avoidance is positively associated with firm value and that the association is greater for income mobile firms.

However, the fact that not all firms fully take advantage of all tax avoidance opportunities and the tax under-sheltering puzzle suggest that it can also impose significant costs on the firm and its managers. Desai and Dharmapala (2009) argue that, by increasing the opaqueness of the firm's reporting environment, tax avoidance provides managers with opportunities for rent extraction. Moreover, they examine whether tax avoidance increases firm value, proxied by Tobin's q . They find that on average corporate tax avoidance does not raise firm value. According to their hypotheses, the effect is significantly positive only for a subsample of well-governed firms and has no significant effect for less well-governed firms. Desai and Dharmapala argue that the evidence is consistent with agency costs mitigating the tax benefits to shareholders.

Shevlin, Urcan, and Vasvari (2012) argue that two countervailing forces may drive a positive relation between debt offering yields and tax avoidance, despite the reduction in cash taxes could increase current after-tax cash flows available to service debt. First, corporate tax avoidance activities could induce higher uncertainty about the magnitude and volatility of the firms' future profits and cash flows. "Lower and more volatile future cash flows are viewed negatively by debt holders. This future cash flow uncertainty can be due to elevated tax risk, which comes about because of an increased probability of IRS audits, penalties and interest charges but also due to managerial rent extraction. Complex tax structures can be used by firm managers to enable and obscure the expropriation of firm resources. Second, in the spirit

of Scholes et al. (2008), corporate tax avoidance activities may decrease the quality and transparency of the financial statements”.

Moreover, Slemrod (2004) argues that decisions about accounting choices and tax strategies are not made by the shareholders directly but, rather, by their agents, contextualizing the tax planning and avoidance choices within an agency theory setting. According to Jensen and Meckling (1976) incentives are needed in order to mitigate the shareholder-manager conflict and to reduce the risk-shifting problem, also referred to as the agency cost of debt. Therefore, they suggest the implementation of an optimal incentive structure under which the manager's personal holdings of the firm's debt and equity should occur in a ratio that mimics the firm's overall external capital structure. Their model suggests granting managers not only equity-based but also debt compensation in the form of pensions and deferred compensation. More recent studies (Edmans and Liu, 2011; Cassell, Huang, Sanchez, and Stuart, 2012; Bolton, Mehran, and Shapiro, 2010; Wei and Yermack, 2011) have looked into the role of inside debt holdings in moderating managers' risk-taking behaviour.

3. Hypothesis development

While a large body of research studies the use of pay-for-performance and equity incentives in aligning managers' interests with those of shareholders (Guay, 1999; Rajgopal and Shevlin, 2002; Coles, Daniel, and Naveen, 2006; Rego and Wilson, 2012), Edmans and Liu (2011) discuss the use of debt as efficient compensation and formally derive the hypotheses formulated by Jensen and Meckling (1976). They claim that inside debt (i.e. pension benefits and deferred compensation) is a superior solution to the agency costs of debt than cash compensation because it exposes managers to the same default risk as outside creditors. Because inside debt obligations are unsecured, unfunded and payable at a future date, they are characterised by an asymmetric payoff function with respect to the firm's net assets (Watts, 2003). Therefore, the value of the top management team inside debt holdings is sensitive to

both the probability of bankruptcy and the liquidation value of the firm in the event of bankruptcy or reorganization (Edmans and Liu, 2011).

Due to limited reporting requirements, empirical research on inside debt compensation has been rather scant until a Securities and Exchange Commission (SEC) disclosure reform in 2007 greatly increased the transparency of pensions and deferred compensation. Wei and Yermack (2011) exploit this change in disclosure requirements to study investors' reactions to the reports of CEOs' inside debt positions. They find that bond prices rise and equity prices fall at the time of disclosure by those firms whose top managers hold large inside debt claims. Cassell, Huang, Sanchez, and Stuart (2012) examine a more comprehensive set of measures that capture the riskiness of firms' investment and financial policies. Their additional analysis reveals that the decrease in the volatility of future stock returns can be partially explained by lower expenditures in R&D and higher firm diversification when CEO's inside debt incentives are larger.

Collectively, prior literature provides empirical evidence on the use of executive compensation to mitigate agency costs. While extant research examines the connection between stock options compensation and tax avoidance (Desai and Dharmapala 2006; Rego and Wilson, 2012) to date the effect of inside debt compensation on tax avoidance is still on debate.¹³ Following prior studies that show a negative association between CEO inside debt holdings and the riskiness of firm investment, financial policies, and future stock returns (Edmans and Liu, 2011; Wei and Yermack, 2011, Bolton et al., 2011; John et al., 2010; Cassell et al., 2010), we view inside debt compensation as a plausible determinant of tax avoidance.

To understand the link among the overall firm risk, tax avoidance and the tax risk component, one has to look deeper into the potential consequences of tax avoidance over time. In the short period, tax planning may reduce current tax payments, therefore increasing current cash flows and having a positive impact on the firm's liquidity. Under this assumption,

¹³ Kubick et al.(2014) and Chen et al. (2014) examine the relation between inside debt and corporate tax avoidance.

current tax avoidance translates into lower default probability and may not increase firms' risk.

On the other hand, a reduced tax payment today might not be sustainable in the future and eventually reverse into a repayment of tax plus penalties, negatively impacting future cash flows. The increased variance of the payoffs from the tax avoidance strategy translates into lower predictability of future cash flows, hence increased risk.

Tax risk cannot be captured by the level of tax avoidance, which simply measures the amount of income taxes (or income taxes paid) over the pre-tax income (effective tax rate). As Guenther et al. (2014) argue, a low effective tax rate might reflect the firm's production function and operating environment and not signal any risky tax avoidance activity.¹⁴ Therefore, the relation between a firm's overall tax avoidance and the riskiness, or uncertainty, of future tax related cash flows depends on the extent to which the tax avoidance is driven by managers taking tax positions that are risky and not necessarily by lowering the effective tax rates. Moreover, as corporate tax departments are viewed as profit centres (Crocker and Slemrod, 2005; Robinson, Sikes, and Weaver, 2010), we expect both the CEO and CFO to have a high level of sophistication and thus a strong impact on the firm's tax planning strategy and tax avoidance activity.

Recent evidence of this is provided by Drake et al. (2014) where they argue that investors value tax avoidance according to the level of tax risk, resulting in higher valuations for tax avoidance achieved with low tax risk strategies.

It follows that from the debtholders' perspective, the costs of tax avoidance depend on the riskiness implied. As the effective tax rate does not specifically capture tax risk, we expect inside debt incentives to be associated with the level of tax avoidance, but we do not make any prediction regarding the direction of this association.

This leads us the first hypothesis:

H1. CEO and CFO inside debt holdings are associated with the level of tax avoidance.

¹⁴ Guenther et al. (2014) state: "For example, firms that rely more heavily on research and development in their production function are better able to reduce their taxes through R&D tax credits. In many cases there is little, if any, risk that the firm will be assessed future taxes and penalties for lowering their current tax payments".

On the other hand, the association might be negative considering the strategies implemented to reduce the tax burden. The effective tax rate alone or its average might not provide us with conclusive evidence. When analysing the risk associated with tax avoidance, we might argue that reducing the tax burden might amplify uncertainty by negatively affecting future cash flows. Lower and more volatile future cash flows are viewed negatively by debt holders as it might also facilitate more opaque reporting and possibly managerial rent extraction.

H2. CEO and CFO inside debt holdings are negatively associated with corporate tax risk

4. Variable measurement and empirical design

4.1 Tax variables measurement

We rely on several measures of tax avoidance to try to capture the continuum of tax planning strategies. Our first two measures are the GAAP and Cash effective tax rates. The empirical evidence on the incentives for tax planning is mixed, likely because of difficulties in measuring tax planning strategies and managerial incentives using archival data (Hanlon and Heitzman 2010). Graham, Hanlon, Shevlin, and Shroff (2014) apply a survey approach to shed some light on the incentives that drive executives' behaviour and what they are concerned with when planning tax avoidance strategies. They find that 47% of the tax executives in publicly traded companies state that top management values the GAAP ETR more Cash ETR and in another 37% the two metrics are equally valued by top management. Nevertheless, these proxies capture tax avoidance with error since they do not disentangle the tax risk level, capturing all sorts of tax avoidance. GAAP ETR is measured as income tax expense over pre-tax income less special items ($TXT/(PI-SPI)$) It is, therefore, confounded by changes in deferred tax assets/liabilities and valuation allowance. Cash ETR is measure as cash taxes paid over pretax income ($TXPD/(PI-SPI)$) and is confounded by the timing of tax payments, settlements with tax authorities, and some types of earnings management (Rego

and Wilson, 2012). Consistent with the timing of the compensation design and contract negotiation, we measure the Cash ETR as the three year rate from year t to $t+2$.

Jacob and Schütt (2014) develop a valuation framework that incorporates two outcome dimensions of corporate tax avoidance strategies: the stability and the level of expected tax rates. They argue that, for a given level of tax avoidance, investors' valuation of pre-tax earnings is more positive if a firm has a lower effective tax rate volatility. Likewise, for a given level of variation in tax rates, investors value pre-tax earnings more positively if a firm has a lower effective tax rate. Moreover, McGuire et al. (2011) uses, as a proxy for tax uncertainty, the GAAP ETR standard deviation over the absolute value of the mean over a five-year period.

We therefore use GAAP ETR volatility and Cash ETR volatility to proxy for more risky tax avoidance, where $\sigma(\text{GAAP ETR})$ and $\sigma(\text{Cash ETR})$ are the standard deviations of annual GAAP and cash effective tax rates from t to $t+2$.

4.2 Incentives variables

We compute CEO and CFO inside debt holdings following alternative measures used in prior studies. Our first measure of CEO and CFO inside debt is the natural log of the sum of the present value of accumulated deferred compensation and pension plans.

Jensen and Meckling (1976) suggest that when the executive's debt/equity ratio mirrors firm's leverage, the manager would have no incentives to shift risk from equity to debtholders because the reallocation would have no effect on his or her personal wealth. We calculate stock value by multiplying the number of shares owned by the stock price at the firm's fiscal year-end. Options value is computed applying the Black-Scholes (1973) option model (Core and Guay 1999, 2002). Our second measure is therefore the CEO and CFO to firm debt/equity ratio and the third and last measure is a dummy variable that take the value of one when the CEO or CFO to firm debt/equity ratio is greater than one, and zero otherwise.

We also control for the other components of executive compensation. We compute CEO and CFO cash compensation as the sum of salary and bonus. Equity-based incentives are computed following Core and Guay (1999). Total Vega is the sensitivity of the change in

the the Black-Scholes option value for a 1% change in stock option volatility, multiplied the number of options granted to the CEO. Total Delta is computed as $1\% \times (\text{share price}) \times (\text{number of stocks held}) + 1\% \times (\text{option delta}) \times (\text{number of options held})$. In our regressions, we use the vega to delta ratio as a measure of equity risk incentives.

4.3 Endogenous choice of compensation and tax policies

Managerial incentives set through executive compensation and firm policies are likely to be jointly determined (Coles et al., 2006; Rego and Wilson, 2012), especially when we look at tax planning. Tax concerns are likely to be one determinant of how the executive compensation contract is structured.

Therefore, establishing causality in this framework is highly difficult. OLS estimates will be biased when the independent variables are endogenously determined together with the dependent variable. To deal with this issue, previous literature uses different approaches. Coles et al. (2006) address the issue by using lagged specification on vega and delta, fixed effects, and predicted values of vega and delta as instruments. Moreover, they also use simultaneous equations models to isolate the effect of incentives on firm investment and financial policy and vice versa. Nevertheless, to implement the model through two stage least square estimation it is required to find at least one exogenous variable per equation. The problem arises because all of the observable variables potentially affect both the choice of the executive compensation and the firm's policies. Himmelberg, Hubbard, and Palia (1999) employ a change specification to deal with endogeneity issues. Assuming that the unobservable characteristics are time-invariant, then the omitted variables are differenced out of the equation.

In our setting, instrumental variables are not easy to find due to the difficulties in finding exogenous variations in the contracting variable, that is likely to be uncorrelated with tax implications. Rego and Wilson (2012) recognize that it is challenging to identify firm characteristics that are significantly associated with tax avoidance but not with risk-taking incentives. Nevertheless, untabulated correlation analyses reveal that NOL (net operating loss carry forward) are correlated with the tax avoidance variables, while AGE and TENURE are

correlated with the inside debt holdings variables. The same analyses shows that these variables generally exhibit little or no correlation with the other endogenous variable (measures of tax avoidance and inside debt holdings).

Moreover, we construct our dependent variables over years starting in year t , when the compensation incentives are supposed to be set.

4.4 Empirical design

We test our hypotheses by adapting the model of Rego and Wilson (2012) on equity risk incentives. We implement the following simultaneous system of equations where TAX AVOIDANCE and INSIDE DEBT are the endogenous dependent variables. We estimate parameters for our system of equations using two-stage least squares (where firm and time subscripts are omitted for convenience):

$$\begin{aligned}
 TAX\ AVOIDANCE = & \alpha_0 + \alpha_1\ INSIDE\ DEBT + \alpha_2\ VEGA\ to\ DELTA + \alpha_3\ SIZE + \\
 & \alpha_4\ ROA + \alpha_5\ NOL + \alpha_6\ INVESTMENT + \alpha_7\ FOREIGN + \alpha_8\ LEV + \\
 & \alpha_9\ R\&D + \alpha_{10}\ CAPX + \alpha_{11}\ DA + \alpha_{12}\ \sigma(ROA)
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 INSIDE\ DEBT = & \beta_0 + \beta_1\ TAX\ AVOIDANCE + \beta_2\ VEGA\ to\ DELTA + \beta_3\ CASH\ COMP + \\
 & \beta_4\ AGE + \beta_5\ TENURE + \beta_6\ TURNOVER + \beta_7\ SIZE + \beta_8\ BTM + \\
 & \beta_9\ LOSS + \beta_{10}\ \sigma(RET)
 \end{aligned} \tag{2}$$

A previously discussed our four measures of TAX AVOIDANCE are the GAAP ETR, Cash ETR, GAAP ETR Volatility, and Cash ETR Volatility. A positive (negative) coefficient on INSIDE DEBT (α_1) in the GAAP ETR and Cash ETR regressions, (GAAP ETR Volatility, and Cash ETR Volatility) would support our hypothesis.

5. Data and summary statistics

We drop financial institutions (SIC from 6000 to 6999) and utilities (SIC from 4900 to 4999) from our sample. Our main sample period covers from 2006 to 2012, given that the SECs disclosure requirements of executive deferred compensation became effective at the end of

2006. We construct the sample by first requiring non-missing CEO debt and equity compensation from the Compustat Execucomp database.

The final sample for our main variable of interest (Cash ETR volatility) consists of 3305 CEO- and 2770 CFO-firm-year observations. Following Rego and Wilson (2012), we exclude firms with cumulative negative pre-tax income, since the incentive to avoid federal income tax is likely to be weaker for loss firms. We winsorize all continuous variables at the 1th and 99th percentile.

Table 1 presents descriptive statistics for our main variables. The mean (median) GAAP ETR is 0.24 (0.29) and the mean (median) Cash ETR is 0.26 (0.25). The mean GAAP ETR volatility (Cash ETR volatility) is 0.18 (0.15). With respect to the CEO variables, all the inside debt compensation measures are positively skewed. The average (median) CEO inside debt holdings is \$8053.79 (\$3399.60) million. The CEO debt/equity and CEO to firm debt/equity ratio mean (median) are 0.30 (0.14) and 6.85 (0.69), respectively. Delta and Vega are \$664 thousands and \$ 241thousands, respectively. The mean vega to delta is 0.51.

With respect to CFO variables, the mean CFO Inside Debt is \$986.591 million and the median is \$43.646 million. CFO debt/equity 0.32 (0.05) CFO to firm debt/equity 4.26 (0.22) CFO to firm debt/equity>1 0.43 (0.00). The CFO mean (median) vega to delta ratio 0.59 (0.30).

[Insert Table 1]

6. Results

Table 2, Panel A presents the results of simultaneous equations for the effect of CEO inside debt compensation on firm GAAP effective tax rate (GAAP ETR). In the tax avoidance model, the results on the measures of CEO inside debt holdings are mixed. While there is a significantly positive association between the logarithm of CEO inside debt and GAAP ETR, the coefficient on the CEO to firm debt/equity is negative and significant, suggesting an opposite relation. In terms of the control variables, we find that lower GAAP ETR is associated with firms having higher pre-tax foreign income, higher and more volatile ROA,

and higher discretionary accruals, consistent with prior literature. With respect to Panel B of Table 2, the estimation results show that GAAP ETR is not significantly associated with our measure of CEO inside debt holdings. Overall, the results reported in Table 3 do not support an unambiguous relation between CEO inside debt compensation and GAAP ETR, a measure of low-risk tax avoidance.

[Insert Table 2]

Table 3, Panel A presents the results of simultaneous equations for the effect of CEO inside debt compensation on another measure of tax avoidance, that tries to capture the overall levels of tax planning, Cash ETR. None of the coefficients on the three measure of CEO inside debt compensation are significant. We find that the coefficient on Vega to Delta is positive and significant, contrary to expectations, as it is a measure of equity risk incentives and previous studies show a positive association with the level of tax avoidance (i.e., negative effect on the cash effective tax rate). Moreover, lower Cash ETR is also associated with net operating loss carry forward, higher leverage, and more investments. Collectively, the results on Table 3 do not provide evidence that higher CEO inside debt holdings effect the level of low-risk tax avoidance.

[Insert Table 3]

Table 4 and Table 5 look at the effect of CEO inside debt holdings on the volatility of the previous measure of tax avoidance, hence measures that capture the tax risk of the tax planning strategies of the firm.

Table 4, Panel A presents results for the relation of CEO inside debt compensation measure with the volatility of future GAAP effective tax rate. The coefficients on all the three measures of CEO inside debt holdings are negative as predicted, suggesting that inside debt compensation incentivizes executives to act more conservatively towards tax risk, although only the coefficients on CEO inside debt and CEO to Firm D/E are significantly negative. The coefficients on Vega to Delta are positive in all three specifications, consistent with prior literature that shows equity compensation providing incentives towards riskier strategies. Higher GAAP ETR volatility is also associated with larger discretionary accruals, higher leverage, and more volatile ROA.

With respect to Panel B, the estimation results on the measures of tax avoidance when the dependent variable is the CEO to Firm D/E or CEO to Firm D/E >1 are generally significant, suggesting the presence of simultaneity. This is consistent with the tax policy being jointly determined with the firm's capital structure decisions, being the dependent variable (CEO to Firm D/E and CEO to Firm D/E>1) scaled by the firm's debt to equity ratio.

[Insert Table 4]

Table 5 Panel A shows the results for the effect of CEO inside debt holdings on the volatility of the cash effective tax rate. The coefficients on the three measure of CEO inside debt compensation are all significantly negative, suggesting that executives that are incentivized on debt engage in less risky tax avoidance. The volatility of cash effective tax rate is consistently associated with more volatile ROA across all the three model specifications. In Panel B, the coefficients on $\sigma(\text{Cash ETR})$ are not significant (except in the third specification model where the dependent variable is CEO to Firm D/E>1), suggesting that the research design has controlled for the simultaneity between tax avoidance strategies and inside debt compensation decision.

[Insert Table 5]

Table 6, Panel A presents the results of simultaneous equations for the effect of CFO inside debt compensation on firm GAAP effective tax rate (GAAP ETR). In the tax avoidance model, the results on the measures of CFO inside debt holdings are mixed. While the coefficient on the logarithm of CFO inside debt holdings is positive but not significant, the coefficients on the CFO to firm debt/equity and CFO to firm debt/equity>1 are negative and significant, suggesting an increasing effect on the level of tax avoidance. In terms of the control variables, we find that lower GAAP ETR is associated with firms having higher pre-tax foreign income, more volatile ROA, and higher discretionary accruals, consistent with prior literature. With respect to Panel B of Table 6, the estimation results show that GAAP ETR is not significantly associated with our first measure of CFO inside debt holdings, while this is not true for the CFO to firm debt/equity ratio measures.

[Insert Table 6]

Table 7, Panel A presents the results of simultaneous equations for the effect of CFO inside debt compensation on Cash ETR. None of the coefficient on the three measure of CFO inside debt compensation are significant.

In terms of the control variables, we find that lower Cash ETR is associated with firms having net operating loss carry forward, higher R&D expenses, higher capital expenditures, higher leverage and pre-tax foreign income, consistent with previous results. Moreover, Panel B shows that the coefficients on Cash ETR are significantly negative, therefore suggesting that the simultaneous equation model does not entirely control for the simultaneity issue.

[Insert Table 7]

Table 8, Panel A shows the results for the GAAP ETR volatility model. The coefficient on the logarithm of CFO inside debt holdings is significantly negative as predicted. Moreover, the coefficient on the tax avoidance proxy is not significant. When using the other two measures of CFO to firm debt/equity ratio and dummy we do not find significant results.

[Insert Table 8]

Table 9, Panel A presents the results of simultaneous equations for the effect of CFO inside debt compensation on Cash ETR volatility. Only the coefficient on the logarithm of CFO inside debt holdings is significant and negative, as in the previous table. Moreover, the coefficient on the Cash ETR volatility is not significant in the first model specification, while for the other two measures of inside debt holdings (CFO to firm debt/equity and CFO to firm debt/equity>1) results show potential simultaneity.

[Insert Table 9]

7. Conclusion

Previous literature has mainly focused on the relation between CEO cash and equity compensation and corporate tax strategies (Desai and Dharmapala, 2006; Rego and Wilson, 2012; Armstrong et al. 2012, 2013). Nevertheless, inside debt is an important part of an executive compensation contract, but previously limited disclosure requirements hindered

researchers' ability to investigate this compensation component. Because the top five executives' inside debt holdings are generally unsecured and unfunded liabilities of the firm, the top management team is exposed to default risk similar to that faced by outside debtholders (Sundaram and Yermack, 2007; Edmans and Liu, 2011; Wei and Yermack, 2011).

As in Rego and Wilson (2012), we look at CEO and CFO compensation. We argue that corporate tax departments are viewed as profit centres (Crocker and Slemrod, 2005; Robinson, Sikes, and Weaver, 2010) and therefore we expect both the CEO and CFO to have a strong impact on the firm's tax planning strategy and tax avoidance activity.

For this reason, we investigate the influence of CEO and CFO debt compensation on corporate tax avoidance, and in particular on tax risk. We predict that CEO and CFO inside debt is negatively associated with the level of corporate tax risk.

Consistent with our prediction, we find that CEO and CFO inside debt holdings negatively affect the three-year GAAP and cash effective tax rate volatility, after controlling for CEO and CFO equity risk incentives and other previously known factors relating to corporate tax avoidance. The results for our two other measures of tax avoidance, GAAP ETR and Cash ETR, that capture lower levels of tax risk are not as robust as the previous ones, suggesting that the association between inside debt compensation and low risk tax avoidance is not unambiguous. In this case, debtholders might also favour low risk tax avoidance as it increases current cash flows, while when the level of tax risk increases executives with large inside debt holdings act more conservatively towards risk.

With this study we extend the literature on executive compensation and corporate tax planning strategies (Desai and Dharmapala 2006; Rego and Wilson 2012; Armstrong et al. 2012) by focusing on CEO and CFO inside debt holdings and providing further evidence on the possible determinants of the tax-undersheltering puzzle.

Appendix

Variable definition

Dependent variables

<i>GAAP ETR</i>	Income taxes (TXT) divided by pre-tax income less income from special items (PI-SPI)
<i>Cash ETR</i>	The sum of three-year taxes paid (TXPD) ending in year t+2 divided by the sum of three-year pre-tax minus income from special items (PI-SPI) ending in year t+2.
σ (<i>GAAP ETR</i>)	The three-year standard deviation of GAAP ETR starting in year t.
σ (<i>Cash ETR</i>)	The three-year standard deviation of cash ETR starting in year t.

Independent variables

CEO and CFO variables

<i>CEO/ CFO inside debt</i>	The natural log of the sum of the present value of accumulated pension and deferred compensation.
<i>CEO/ CFO debt/equity</i>	CEO/ CFO inside debt divided by the sum of accumulated stock value (including restricted stocks) and stock option value.
<i>CEO/CFO to firm debt/equity</i>	<i>CEO/ CFO debt/equity</i> divided by the firm's debt-to-equity ratio. The firm's debt-to-equity ratio is the ratio of total debt (DLTT+DLC) to market value of equity (CSHO*PRCC_F).
<i>CEO/CFO to firm debt/equity > 1</i>	An indicator variable set equal to one if CEO/CFO to firm debt/equity is greater than one, and zero otherwise.
<i>CEO/CFO vega to delta</i>	The sensitivity of the change in the Black–Scholes option value for a 1% change in stock return volatility (vega), multiplied by the number of options in the CEO's portfolio divided by $1\% \times (\text{share price}) \times (\text{number of shares held}) + 1\% \times (\text{share price}) \times (\text{option delta}) \times (\text{number of options held})$.

<i>CEO/CFO cash comp</i>	Salary + Bonus.
<i>CEO/CFO age</i>	The age of the executive at fiscal year t.
<i>CEO tenure</i>	The tenure of the CEO at fiscal year t.
<i>New CEO</i>	An indicator variable set equal to one if the firm has a new CEO, and zero otherwise.
<i>Firm-level variables</i>	
<i>SIZE</i>	The natural log of the firm total assets (AT).
<i>BtM</i>	Book to market ratio calculated as total common equity (CEQ) divided by the common shares outstanding (CSHO) multiplied by the stock price at fiscal year end (PRCC F).
<i>LEVERAGE</i>	Total debt (DLC + DLTT) scaled by total assets (AT).
<i>FOREIGN</i>	Pre-tax foreign income (PIFO).
$\sigma(\text{Ret})$	The 60 months stock price return volatility.
<i>ROA</i>	The pre-tax return on assets.
$\sigma(\text{ROA})$	The three-year ROA volatility.
<i>NOL</i>	An indicator variable equal to one if the firm has net operating loss carry forwards, and zero otherwise.
<i>Discr. Acc.</i>	Discretionary accruals calculated using performance-adjusted modified Jones model.
<i>CAPX</i>	Capital expenditures (CAPX) scaled by beginning of year total assets (AT).
<i>R&D</i>	Research and development expense (XRD) scaled by beginning of year total assets (AT).
<i>INVESTMENT</i>	Total investments, calculated as the sum of research and development expenditures (XRD), acquisitions (AQC), and net capital expenditures (i.e., capital expenditures (CAPX) less sales of property, plant, and equipment (SPPE)) divided by average total assets (AT).

References

- Allingham, M.G., Sandmo, A., (1972). Income Tax Evasion: A Theoretical Analysis. *Journal of Public Economics* 1, 323-338.
- Armstrong, C.S., Blouin, J.L., Larcker, D.F., (2012). The Incentives for Tax Planning. *Journal of Accounting and Economics* 53, 391-411.
- Armstrong, C.S., Larcker, D.F., Ormazabal, G., Taylor, D.J., (2012a). The Relation Between Equity Incentives and Misreporting: The Role of Risk-Taking Incentives. Working Paper.
- Atwood, T.J., Omer, T.C., Shelley, M.K., (1998). Before-tax versus after-tax earnings as performance measures in compensation contracts. *Managerial Science*, Vol. 24, No. 11, 29-43.
- Black, F., Scholes, M., (1973). The pricing of options and corporate liabilities. *Journal of Political Economy* 81, 637-654.
- Bolton, P., Mehran, H., Shapiro, J., (2011). Executive compensation and risk taking. Working Paper.
- Cassell, C. A., Huang, S.X., Sanchez, J.M., Stuart, M.D., (2012). Seeking Safety: The Relations between CEO inside Debt Holdings and the Riskiness of Firm Investment and Financial Policies. *Journal of Financial Economics* 103, 588-610.
- Chen, K.-P., Chu, C.Y.C., (2005). Internal control vs. external manipulation: a model of corporate income tax evasion. *Rand Journal of Economics*, 36 (4), 151-164.
- Core, J., Guay, W., (1999). The Use of Equity Grants to Manage Optimal Equity Incentives Levels. *Journal of Accounting and Economics* 28 (2), 151-184.
- Coles, J., Daniel, N., Naveen, L., (2006). Managerial incentives and risk-taking. *Journal of Financial Economics* 79, 431-468.
- Crocker, K.J., Slemrod, J., (2005). Corporate Tax Evasion with Agency Costs. *Journal of Public Economics* 89, 593-610.
- Desai, M.A., Dharmapala, D., (2006). Corporate Tax Avoidance and High-Powered Incentives. *Journal of Financial Economics* 79(1), 145-79.
- Desai, M., Dharmapala, D., (2006).
- Desai, M., Dharmapala, D., (2009). Corporate tax avoidance and firm value. *Review of Economics and Statistics* 91, 537-546.
- Dhaliwal, D.S., Gleason, C.A., Mills, L.F., (2004). Last-chance earnings management: Using the Tax Expense to Meet Analysts' Forecasts. *Contemporary Accounting Research*, Vol. 21, No. 2, 431-459.
- Dyreng, S., Lindsey, B., (2009). Using Financial Accounting Data to Examine the Effect of Foreign Operations Located in Tax Havens and Other Countries on U.S.

- Multinational Firms Tax Rates. *Journal of Accountin Research*, Vol. 47 (5), 1283-1316.
- Dyreng, S., Hanlon, M., Maydew, E., (2010). The Effects of Executives on Corporate Tax Avoidance. *The Accounting Review* 85, 1163-1189.
- Edmans, A., Liu, Q., (2010). Inside Debt. *Review of Finance* 15(1) 75-102.
- Frank, M., Lynch, L., Rego, S.O., (2009). Tax Reporting Aggressiveness and Its Relation to Aggressive Financial Reporting. *The Accounting Review* 84, 467-496.
- Gaertner, F.B., (2013). CEO After-Tax Compensation Incentives and Corporate Tax Avoidance. Working paper, Nanyang Technological University.
- Graham, J., Tucker A., (2006). Tax Shelters and Corporate Debt Policy. *Journal of Financial Economics* 81, 563-594.
- Guay, W. R., (1999). The Sensitivity of CEO Wealth to Equity Risk: An Analysis of the Magnitude and Determinants. *Journal of Financial Economics* 53, 43-71.
- Hanlon, M., Heitzman, S., (2010). A Review of Tax Research. *Journal of Accounting and Economics* 50 (2-3) , 127-178.
- Hanlon, M., Mills, L., Slemrod, J., (2005) An Empirical Examination of Corporate Tax Non-compliance, in *Taxing Corporate Income in the 21st Century*, edited by A. Auerbach, J. R. Hines Jr., and J. Slemrod. Cambridge: Cambridge University Press, 2005, 2007.
- Hanlon, M., Rajgopal, S., Shevlin, T., (2003). Are Executive Stock Options Associated with Future Earnings? *Journal of Accounting and Economics* 36, 343.
- Hanlon, M., Slemrod, J., (2009). What Does Tax Aggressiveness Signal? Evidence from Stock Price Reactions to News About Tax Shelter Involvement. *Journal of Public Economics* 93, 126-141.
- Holmstrom, B., (1979). Moral Hazard and Observability. *Bell Journal of Economics* 10, 74-91.
- Houston, J.F., James, C., (1995). CEO Compensation and Bank Risk: Is Compensation in Banking Structured to Promote Risk Taking? *Journal of Monetary Economics* 36, 405-431.
- Jensen, M., Meckling, W., (1976). Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure. *Journal of Financial Economics* 3 (4), 305-360.
- John, K., Mehran, H., Qian, Y., (2010). Outside Monitoring and CEO Compensation in the Banking Industry. *Journal of Corporate Finance*, Vol. 16(4), 383-399.
- John, A., John, K., (1993). Top-Management Compensation and Capital Structure *Journal of Finance*, Vol. 48, No.3, 949-974.
- Laeven, L., Levine, R., (2009). Bank Governance, Regulation and Risk Taking. *Journal of Financial Economics* 93, 259-275.

- Lisowsky, P., (2010). Seeking Shelter: Empirically Modelling Tax Shelters Using Financial Statement Information. Working paper, University of Illinois.
- McGuire, S. T., Neuman, S. S., & Omer, T. C. (2011). Through the looking glass: Are sustainable tax strategies reflected in earnings persistence. Working Paper.
- Phillips, J., (2003). Corporate Tax Planning Effectiveness: The Role of Compensation-Based Incentives. *The Accounting Review* 78(3), 847-874.
- Rajgopal, S., Shevlin, T., (2002). Empirical evidence on the relation between stock option compensation and risk taking. *Journal of Accounting and Economics* Vol. 44(2), 145-171.
- Rego, S.O, Wilson, R., (2012). Equity Risk Incentives and Corporate Tax Aggressiveness. *Journal of Accounting Research* 50 (3), 775-809.
- Skinner, D., 2008. The rise of deferred tax assets in Japan: the role of deferred tax accounting in the Japanese banking crisis. *Journal of Accounting and Economics* 46,
- Slemrod, J., Yitzhaki, S., (2002). Tax avoidance, evasion and administration. In: Auerbach, A.J., Feldstein, M. (Eds.), *Handbook of Public Economics*, vol. 3. Elsevier Science, Amsterdam, pp. 1423-1470, Chapter 22.
- Watts, R., (2003). Conservatism in accounting part I: explanations and implications. *Accounting Horizons* 17, 207-221.
- Wei, C., Yermack, D., (2011). Investor Reactions to CEOs Inside Debt Incentives. *The Review of Financial Studies* Vol. 24 No. 11, 3813-3840.

Tables

Table 1
Descriptive statistics

Variable	N	Mean	S.D.	Q1	Median	Q3
Tax Avoidance Proxies						
<i>GAAP ETR</i>	3305	0.24	0.33	0.20	0.29	0.35
<i>Cash ETR</i>	2173	0.26	0.18	0.17	0.25	0.32
σ (<i>GAAP ETR</i>)	2173	0.18	0.50	0.02	0.04	0.12
σ (<i>Cash ETR</i>)	2682	0.15	0.32	0.03	0.06	0.12
CEO Characteristics						
<i>CEO Inside Debt</i>	3305	7.93	1.72	6.82	8.13	9.20
<i>CEO Debt/Equity</i>	3305	0.30	0.43	0.04	0.14	0.36
<i>CEO to Firm D/E</i>	3305	6.85	34.37	0.20	0.69	2.02
<i>CEO to Firm D/E>1</i>	3305	0.41	0.49	0.00	0.00	1.00
<i>CEO Vega/Delta</i>	3305	0.51	0.39	0.20	0.43	0.72
<i>CEO Cash Comp</i>	3305	6.88	0.46	6.61	6.85	7.09
<i>CEO Age</i>	3305	55.71	5.94	52.00	56.00	60.00
<i>CEO Tenure</i>	3305	7.15	5.80	3.06	5.75	9.17
CFO Characteristics						
<i>CFO Inside Debt</i>	2770	6.47	1.39	5.33	6.59	7.75
<i>CFO Debt/Equity</i>	2770	0.32	0.48	0.05	0.14	0.36
<i>CFO to Firm D/E</i>	2770	4.26	12.57	0.22	0.74	2.30
<i>CFO to Firm D/E>1</i>	2770	0.43	0.49	0.00	0.00	1.00
<i>CFO Vega/Delta</i>	2770	0.59	0.40	0.30	0.53	0.80
<i>CFO Cash Comp</i>	2770	6.19	0.41	5.91	6.15	6.41
<i>CFO Age</i>	2770	51.11	6.04	47.00	51.00	55.00
Firm controls						
<i>BtM</i>	3305	0.48	0.34	0.27	0.43	0.63
<i>Size</i>	3305	8.20	1.38	7.19	8.05	9.09
<i>Leverage</i>	3305	0.24	0.15	0.14	0.22	0.32
<i>Foreign</i>	3305	0.03	0.04	0.00	0.02	0.05
σ (<i>Ret</i>)	3305	0.36	0.15	0.26	0.33	0.43
<i>ROA</i>	3305	0.11	0.09	0.05	0.10	0.15

<i>$\sigma(ROA)$</i>	3305	0.05	0.05	0.01	0.03	0.05
<i>NOL</i>	3305	0.55	0.50	0.00	1.00	1.00
<i>Discr. Acc.</i>	3305	0.05	0.06	0.02	0.04	0.07
<i>Capx</i>	3305	0.05	0.05	0.02	0.03	0.06
<i>R&D</i>	3305	0.02	0.04	0.00	0.01	0.03
<i>Invest</i>	3305	0.06	0.10	0.01	0.04	0.09

Table 2
CEO Inside Debt Compensation and GAAP Effective Tax Rate (GAAP ETR)

Panel A: Dependent Variable - GAAP ETR						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CEO Inside Debt</i>	0.019	2.12				
<i>CEO to Firm D/E</i>			-0.003	-2.32		
<i>CEO to Firm D/E>1</i>					-0.074	-1.42
<i>CEO Vega/Delta</i>	0.007	0.49	0.005	0.33	0.020	1.00
<i>Size</i>	-0.006	-0.84	-0.000	-0.04	0.005	1.14
<i>Pre-Tax ROA</i>	1.080	15.52	1.196	16.08	1.228	15.29
<i>NOL</i>	-0.005	-0.44	-0.003	-0.31	-0.004	-0.35
<i>Investment</i>	0.158	2.33	0.109	1.56	0.086	1.23
<i>Foreign</i>	-0.835	-5.36	-0.837	-5.13	-0.803	-4.89
<i>Leverage</i>	0.019	0.49	-0.147	-1.80	-0.056	-0.86
<i>R&D</i>	-0.225	-1.28	-0.262	-1.37	-0.306	-1.67
<i>Capx</i>	0.083	0.51	-0.001	-0.01	0.064	0.38
<i>Discr. Acc.</i>	-0.482	-4.56	-0.359	-3.23	-0.316	-2.94
<i>σ(ROA)</i>	-0.674	-5.94	-0.582	-4.61	-0.686	-5.97
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	3564		3305		3305	
<i>R²</i>	12%		6%		12%	
Panel B: Dependent Variable - CEO Inside Debt Measures						
	<i>CEO Inside Debt</i>		<i>CEO to Firm D/E</i>		<i>CEO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>GAAP ETR</i>	-0.3794	-0.92	-12.811	-1.15	0.210	0.00
<i>CEO Vega/Delta</i>	0.0669	0.96	1.700	0.95	-0.010	8.61
<i>CEO Cash Comp</i>	0.2273	3.33	3.837	2.19	0.015	-0.40
<i>CEO Age</i>	0.0422	9.73	0.540	4.78	-0.003	9.95
<i>CEO Tenure</i>	0.0547	11.83	0.263	2.19	-0.018	-2.08
<i>New CEO</i>	-0.5270	-6.58	4.688	2.29	-0.106	-0.65
<i>BtM</i>	-0.3624	-4.74	-2.321	-1.20	-0.041	-4.03
<i>Size</i>	0.5188	21.44	-4.431	-7.01	-0.042	-4.74
<i>Loss</i>	-0.2371	-1.13	-1.508	-0.27	-0.598	-0.56
<i>σ(Ret)</i>	-1.6476	-7.49	-17.002	-2.97	0.210	-7.69
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	3564		3305		3305	
<i>R²</i>	40%		5%		14%	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the GAAP ETR. The dependent variables in Panel B are the CEO Inside Debt measures (CEO Inside Debt, CEO to Firm D/E, and CEO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level.

Table 3
CEO Inside Debt Compensation and Cash Effective Tax Rate (Cash ETR)

Panel A: Dependent Variable - Cash ETR						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CEO Inside Debt</i>	-0.008	-1.21				
<i>CEO to Firm D/E</i>			0.000	0.85		
<i>CEO to Firm D/E>1</i>					-0.001	-0.02
<i>CEO Vega/Delta</i>	0.039	3.48	.0031	2.67	0.034	2.36
<i>Size</i>	0.002	0.43	-0.001	-0.16	-0.002	-0.70
<i>Pre-Tax ROA</i>	0.050	1.03	0.018	0.36	0.016	0.30
<i>NOL</i>	-0.017	-2.09	-0.014	-1.69	-0.015	-1.82
<i>Investment</i>	-0.253	-2.23	-0.160	-1.40	-0.038	-0.72
<i>Foreign</i>	-0.056	-1.11	-0.040	-0.81	-0.155	-1.30
<i>Leverage</i>	-0.097	-3.39	-0.051	-0.98	-0.088	-1.84
<i>R&D</i>	-0.251	-1.93	-0.219	-1.64	-0.229	-1.72
<i>Capx</i>	-0.222	-1.82	-0.248	-1.98	-0.256	-2.06
<i>Discr. Acc.</i>	0.111	1.53	0.1314	1.82	0.126	1.75
$\sigma(\text{ROA})$	-0.015	-0.18	-0.058	-0.70	-0.045	-0.56
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2414		2239		2239	
<i>R</i> ²	8%		7%		8%	
Panel B: Dependent Variable - CEO Inside Debt Measures						
	<i>CEO Inside Debt</i>		<i>CEO to Firm D/E</i>		<i>CEO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>Cash ETR</i>	0.384	0.33	227.359	4.36	4.841	4.87
<i>CEO Vega/Delta</i>	0.041	0.45	-0.604	-0.17	0.102	1.51
<i>CEO Cash Comp</i>	0.050	9.40	0.619	2.94	0.017	4.23
<i>CEO Age</i>	0.050	8.92	0.400	1.69	0.001	0.27
<i>CEO Tenure</i>	-0.506	-5.06	-1.021	-0.26	-0.166	-2.22
<i>New CEO</i>	-0.294	-3.22	-6.169	-1.72	-0.133	-1.95
<i>BtM</i>	0.543	16.25	-1.450	-1.13	0.008	0.33
<i>Size</i>	-0.174	-1.50	-6.018	-1.27	-0.296	-3.27
<i>Loss</i>	0.181	2.00	-6.900	-1.90	-0.170	-2.46
$\sigma(\text{Ret})$	-1.488	-5.62	3.019	0.29	-0.282	-1.41
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2414		2239		3756	
<i>R</i> ²	42%		-1.50		-3.00	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the Cash ETR. The dependent variables in Panel B are the CEO Inside Debt measures (CEO Inside Debt, CEO to Firm D/E, and CEO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level.

Table 4*CEO Inside Debt Compensation and GAAP Effective Tax Rate Volatility (σ GAAP ETR)*

Panel A: Dependent Variable - σ(GAAP ETR)						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CEO Inside Debt</i>	-0.083	-4.39				
<i>CEO to Firm D/E</i>			-0.001	-0.70		
<i>CEO to Firm D/E>1</i>					-0.259	-2.54
<i>CEO Vega/Delta</i>	0.093	3.08	0.103	3.48	0.158	4.19
<i>Size</i>	0.007	0.46	-0.043	-4.46	-0.043	-4.83
<i>Pre-Tax ROA</i>	-1.072	-8.36	-1.193	-9.53	-1.047	-7.43
<i>NOL</i>	-0.306	-2.20	0.029	1.33	-0.376	-2.64
<i>Investment</i>	0.014	0.65	-0.252	-1.92	0.027	1.21
<i>Foreign</i>	0.034	0.11	-0.127	-0.43	0.073	0.23
<i>Leverage</i>	0.139	1.81	0.091	0.69	-0.090	-0.70
<i>R&D</i>	-0.328	-0.91	-0.348	-0.99	-0.243	-0.67
<i>Capx</i>	-0.234	-0.71	-0.139	-0.43	-0.114	-0.35
<i>Discr. Acc.</i>	0.657	3.35	0.640	3.43	0.717	3.70
<i>σ(ROA)</i>	0.539	2.47	0.626	2.92	0.567	2.62
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2423		2250		2250	
<i>R²</i>	9%		13%		8%	
Panel B: Dependent Variable - CEO Inside Debt Measures						
	<i>CEO Inside Debt</i>		<i>CEO to Firm D/E</i>		<i>CEO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
σ (GAAP ETR)	1.115	1.86	-75.190	-4.20	-1.426	-4.53
<i>CEO Vega/Delta</i>	-0.057	-0.53	11.523	3.34	0.364	6.01
<i>CEO Cash Comp</i>	0.043	7.53	0.524	2.80	0.016	4.86
<i>CEO Age</i>	0.057	8.49	-0.109	-0.51	-0.010	-2.67
<i>CEO Tenure</i>	-0.545	-5.47	6.727	2.06	-0.016	-0.29
<i>New CEO</i>	-0.341	-3.13	4.388	1.25	0.063	1.02
<i>BtM</i>	0.531	16.98	-3.845	-3.66	-0.057	-3.12
<i>Size</i>	-0.696	-2.27	35.942	3.95	0.575	3.59
<i>Loss</i>	0.279	2.95	-1.241	-0.42	-0.047	-0.90
<i>σ(Ret)</i>	-2.264	-4.84	44.833	2.92	0.412	1.53
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2423		2250		2250	
<i>R²</i>	32%		-1.24		-1.70	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the GAAP ETR Volatility. The dependent variables in Panel B are the CEO Inside Debt measures (CEO Inside Debt, CEO to Firm D/E, and CEO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level.

Table 5
CEO Inside Debt Compensation and Cash Effective Tax Rate (σ Cash ETR)

Panel A: Dependent Variable - σ(Cash ETR)						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CEO Inside Debt</i>	-0.049	-4.56				
<i>CEO to Firm D/E</i>			-0.002	-2.19		
<i>CEO to Firm D/E>1</i>					-0.12	-3.10
<i>CEO Vega/Delta</i>	0.017	1.00	0.023	1.23	0.061	2.64
<i>Size</i>	0.012	1.48	-0.023	-3.73	-0.019	-3.51
<i>Pre-Tax ROA</i>	-0.791	-10.44	-0.835	-10.36	-0.725	-8.16
<i>NOL</i>	-0.005	-0.43	0.001	0.08	-0.000	-0.04
<i>Investment</i>	-0.138	-1.73	0.105	0.56	-0.171	-2.03
<i>Foreign</i>	0.166	0.93	-0.097	-1.19	0.284	1.48
<i>Leverage</i>	-0.032	-0.72	-0.196	-2.30	-0.227	-2.99
<i>R&D</i>	-0.423	-2.11	-0.427	-1.97	-0.374	-1.74
<i>Capx</i>	0.453	2.38	0.453	2.22	0.477	2.38
<i>Discr. Acc.</i>	0.148	1.26	0.146	1.19	0.220	1.82
σ (ROA)	0.802	-4.56	0.923	6.53	0.803	6.13
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2965		2753		2753	
<i>R</i> ²	9%		3%		5%	
Panel B: Dependent Variable - CEO Inside Debt Measures						
	<i>CEO Inside Debt</i>		<i>CEO to Firm D/E</i>		<i>CEO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
σ (Cash ETR)	0.243	0.44	-19.220	-1.21	-0.905	-3.63
<i>CEO Vega/Delta</i>	0.071	0.94	3.60	1.81	0.223	7.09
<i>CEO Cash Comp</i>	0.044	9.26	0.567	4.47	0.016	7.83
<i>CEO Age</i>	0.054	10.10	0.143	0.98	-0.007	-2.97
<i>CEO Tenure</i>	-0.557	-6.33	5.329	2.32	-0.026	-0.72
<i>New CEO</i>	-0.328	-3.18	-1.214	-0.43	0.023	0.51
<i>BtM</i>	0.528	20.13	-4.809	-6.84	-0.049	-4.40
<i>Size</i>	-0.171	-1.03	10.137	2.15	0.162	2.18
<i>Loss</i>	0.220	2.95	3.533	1.79	-0.005	-0.17
σ (Ret)	-1.717	-5.88	-5.719	-0.71	-0.253	-2.00
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2965		2753		2753	
<i>R</i> ²	41%		1%		-21%	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the Cash ETR Volatility. The dependent variables in Panel B are the CEO Inside Debt measures (CEO Inside Debt, CEO to Firm D/E, and CEO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level

Table 6
CFO Inside Debt Compensation and GAAP Effective Tax Rate (GAAP ETR)

Panel A: Dependent Variable - GAAP ETR						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CFO Inside Debt</i>	0.008	0.80				
<i>CFO to Firm D/E</i>			-0.009	-2.64		
<i>CFO to Firm D/E>1</i>					-0.146	-3.05
<i>CFO Vega/Delta</i>	0.042	2.52	0.040	2.32	0.049	2.88
<i>Size</i>	0.001	0.12	-0.004	-0.72	0.004	0.87
<i>Pre-Tax ROA</i>	1.150	14.61	1.332	14.50	1.338	15.20
<i>NOL</i>	-0.012	-0.99	-0.010	-0.79	-0.016	-1.32
<i>Investment</i>	0.132	1.69	0.062	0.77	0.043	0.55
<i>Foreign</i>	-0.831	-4.90	-0.973	-5.34	-0.779	-4.33
<i>Leverage</i>	-0.012	-0.28	-0.321	-2.88	-0.219	-3.13
<i>R&D</i>	-0.296	-1.44	-0.117	-0.49	-0.226	-1.03
<i>Capx</i>	0.227	1.23	0.195	0.99	0.308	1.63
<i>Discr. Acc.</i>	-0.434	-3.62	-0.276	-2.20	-0.274	-2.26
$\sigma(\text{ROA})$	-0.678	-5.12	-0.521	-3.41	-0.678	-5.08
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2989		2770		2770	
<i>R</i> ²	14%		5%		12%	
Panel B: Dependent Variable - CFO Inside Debt Measures						
	<i>CFO Inside Debt</i>		<i>CFO to Firm D/E</i>		<i>CFO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>GAAP ETR</i>	0.658	1.47	9.245	2.02	0.610	3.37
<i>CFO Vega/Delta</i>	-0.378	-5.22	0.297	0.42	0.080	2.85
<i>CFO Cash Comp</i>	0.524	6.20	-2.323	-2.84	-0.005	-0.16
<i>CFO Age</i>	0.092	21.51	0.1926	4.63	0.019	11.37
<i>BtM</i>	-0.349	-4.31	-1.316	-1.70	-0.117	-3.83
<i>Size</i>	0.490	18.08	-0.775	-2.86	-0.010	-0.90
<i>Loss</i>	0.413	1.68	3.943	1.58	0.269	2.72
$\sigma(\text{Ret})$	-0.790	-3.31	-1.778	-0.77	-0.335	-3.67
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2989		2770		2770	
<i>R</i> ²	42%		2%		0%	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the GAAP ETR. The dependent variables in Panel B are the CFO Inside Debt measures (CFO Inside Debt, CFO to Firm D/E, and CFO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level.

Table 7
CFO Inside Debt Compensation and Cash Effective Tax Rate (Cash ETR)

Panel A: Dependent Variable - Cash ETR						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CFO Inside Debt</i>	-0.003	-0.55				
<i>CFO to Firm D/E</i>			-0.002	-0.94		
<i>CFO to Firm D/E>1</i>					-0.035	-1.24
<i>CFO Vega/Delta</i>	0.024	2.12	0.021	1.90	0.022	1.98
<i>Size</i>	-0.000	-0.02	-0.005	-1.50	-0.004	-1.10
<i>Pre-Tax ROA</i>	0.025	0.51	0.013	0.24	0.020	0.36
<i>NOL</i>	-0.019	-2.32	-0.023	-2.79	-0.025	-2.94
<i>Investment</i>	0.025	0.47	0.036	0.68	0.020	0.36
<i>Foreign</i>	-0.267	-2.35	-0.145	-1.21	-0.104	-0.86
<i>Leverage</i>	-0.111	-3.86	-0.170	-2.67	-0.159	-3.57
<i>R&D</i>	-0.369	-2.67	-0.384	-2.60	-0.386	-2.65
<i>Capx</i>	-0.225	-1.78	-0.298	-2.21	-0.258	-1.96
<i>Discr. Acc.</i>	0.152	2.02	0.183	2.41	0.181	2.40
$\sigma(\text{ROA})$	0.050	0.58	0.087	0.86	0.052	0.59
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	1906		1769		1769	
<i>R</i> ²	11%		11%		11%	
Panel B: Dependent Variable - CFO Inside Debt Measures						
	<i>CFO Inside Debt</i>		<i>CFO to Firm D/E</i>		<i>CFO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>Cash ETR</i>	-3.154	-2.35	110.152	5.00	4.507	5.09
<i>CFO Vega/Delta</i>	-0.372	-4.01	0.204	0.14	0.055	0.91
<i>CFO Cash Comp</i>	0.546	5.13	-2.605	-1.47	0.003	0.04
<i>CFO Age</i>	0.010	18.05	0.342	3.54	0.027	7.05
<i>BtM</i>	-0.251	-2.35	-4.430	-2.48	-0.206	-2.87
<i>Size</i>	0.447	12.44	-0.198	-0.33	0.006	0.24
<i>Loss</i>	0.256	2.01	-2.156	-1.02	-0.136	-1.60
$\sigma(\text{Ret})$	-1.416	-4.49	3.027	0.59	-0.204	-0.99
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	1906		1769		1769	
<i>R</i> ²	39%		-2.04		-2.14	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the Cash ETR. The dependent variables in Panel B are the CFO Inside Debt measures (CFO Inside Debt, CFO to Firm D/E, and CFO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level.

Table 8

CFO Inside Debt Compensation and GAAP Effective Tax Rate Volatility (σ GAAP ETR)

Panel A: Dependent Variable - σ(GAAP ETR)						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CFO Inside Debt</i>	-0.043	-2.59				
<i>CFO to Firm D/E</i>			0.001	0.13		
<i>CFO to Firm D/E>1</i>					-0.080	-0.99
<i>CFO Vega/Delta</i>	-0.011	-0.34	0.010	0.31	0.0169	0.53
<i>Size</i>	-0.015	-1.04	-0.036	-3.60	-0.035	-3.70
<i>Pre-Tax ROA</i>	-1.298	-9.01	-1.286	-8.44	-1.240	-8.03
<i>NOL</i>	0.021	0.85	0.0234	0.98	0.0201	0.84
<i>Investment</i>	-0.240	-1.51	-0.256	-1.67	-0.284	-1.82
<i>Foreign</i>	0.287	0.85	0.191	0.57	0.2654	0.77
<i>Leverage</i>	0.205	2.44	0.295	1.66	0.182	1.46
<i>R&D</i>	-0.563	-1.35	-0.669	-1.57	-0.620	-1.47
<i>Capx</i>	-0.1934	-0.52	-0.163	-0.43	-0.142	-0.38
<i>Discr. Acc.</i>	0.810	3.62	0.879	4.06	0.881	4.06
σ (ROA)	0.626	2.45	0.648	2.20	-0.080	-0.99
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	1918		1779		1779	
<i>R</i> ²	13%		14%		13%	
Panel B: Dependent Variable - CFO Inside Debt Measures						
	<i>CFO Inside Debt</i>		<i>CFO to Firm D/E</i>		<i>CFO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
σ (GAAP ETR)	0.228	0.58	-26.886	-5.23	-1.222	-5.60
<i>CFO Vega/Delta</i>	-0.417	-5.01	2.157	1.85	0.127	2.57
<i>CFO Cash Comp</i>	0.558	5.59	-2.383	-1.71	0.0129	0.22
<i>CFO Age</i>	0.105	19.57	0.1059	1.43	0.0162	5.19
<i>BtM</i>	-0.262	-2.77	-0.987	-0.76	-0.072	-1.31
<i>Size</i>	0.458	14.15	-0.947	-2.07	-0.0334	-1.74
<i>Loss</i>	0.073	0.31	12.204	4.32	0.537	4.48
σ (Ret)	-1.500	-4.28	16.897	3.38	0.291	1.38
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	1918		1779		1779	
<i>R</i> ²	46%		-84%		-1.13	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the GAAP ETR Volatility. The dependent variables in Panel B are the CFO Inside Debt measures (CFO Inside Debt, CFO to Firm D/E, and CFO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level.

Table 9*CFO Inside Debt Compensation and Cash Effective Tax Rate Volatility (σ Cash ETR)*

Panel A: Dependent Variable - σ(Cash ETR)						
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>CFO Inside Debt</i>	-0.020	-1.95				
<i>CFO to Firm D/E</i>			-0.006	-1.69		
<i>CFO to Firm D/E>1</i>					-0.084	-1.70
<i>CFO Vega/Delta</i>	-0.010	-0.52	0.002	0.12	0.006	0.30
<i>Size</i>	-0.006	-0.71	-0.021	-3.29	-0.015	-2.76
<i>Pre-Tax ROA</i>	-0.780	-9.47	-0.724	-7.48	-0.730	-7.86
<i>NOL</i>	0.009	0.66	0.019	1.30	0.0163	1.16
<i>Investment</i>	-0.070	-0.76	-0.054	-0.59	-0.077	-0.86
<i>Foreign</i>	0.048	0.25	-0.039	-0.19	0.111	0.55
<i>Leverage</i>	-0.053	-1.10	-0.220	-1.87	-0.137	-1.83
<i>R&D</i>	-0.290	-1.26	-0.191	-0.73	-0.258	-1.05
<i>Capx</i>	0.358	1.71	0.289	1.27	0.382	1.75
<i>Discr. Acc.</i>	0.0614	0.48	0.110	0.82	0.102	0.79
<i>σ(ROA)</i>	0.472	3.28	0.592	3.39	0.465	3.16
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2423		2248		2248	
<i>R²</i>	11%		4%		10%	
Panel B: Dependent Variable - CFO Inside Debt Measures						
	<i>CFO Inside Debt</i>		<i>CFO to Firm D/E</i>		<i>CFO to Firm D/E>1</i>	
	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat	Coeff.	<i>t</i> -Stat
<i>σ(Cash ETR)</i>	-0.289	-0.43	-18.733	-2.24	-1.311	-3.63
<i>CFO Vega/Delta</i>	-0.393	-5.09	0.734	0.85	0.096	2.56
<i>CFO Cash Comp</i>	0.496	5.35	-2.322	-2.25	-0.020	-0.43
<i>CFO Age</i>	0.096	20.47	0.173	3.30	0.018	8.07
<i>BtM</i>	-0.309	-2.91	0.766	0.61	0.036	0.66
<i>Size</i>	0.472	16.17	-1.241	-3.74	-0.030	-2.03
<i>Loss</i>	0.233	1.30	4.880	2.37	0.272	3.06
<i>σ(Ret)</i>	-1.043	-3.66	-1.314	-0.39	-0.230	-1.58
<i>Year fixed effects</i>	Yes		Yes		Yes	
<i>Industry fixed effects</i>	Yes		Yes		Yes	
<i>N</i>	2423		2248		2248	
<i>R²</i>	45%		-18%		-47%	

This table reports the results from the two-stage simultaneous equation model. The dependent variable in Panel A is the Cash ETR Volatility. The dependent variables in Panel B are the CFO Inside Debt measures (CFO Inside Debt, CFO to Firm D/E, and CFO to Firm D/E>1). The sample consists of firms in Execucomp from 2006 to 2012. Variable definitions are listed in Appendix A. All regressions include two-digit SIC codes and year fixed effect. Coefficients in bold denote statistical significance at 0.05 level.

Equity Risk Incentives and Corporate Tax Avoidance in the Banking Industry

Anna Alexander

Michele Fabrizi*

Antonio Parbonetti*

August 2014

* University of Padua, Italy

Abstract

In this study we analyse the association between tax avoidance and executive equity-risk incentives. We provide new evidence on the role of equity risk incentives in the design of the compensation contract of bank CEOs. In particular, we analyse whether stock and option based compensation is associated with increased tax avoidance activities. Our results show that equity-risk incentives are associated with measures that captures the level of corporate tax avoidance (i.e. GAAP ETR), while results on tax risk (i.e. volatility of effective tax rates) are not significant.

1. Introduction

In this paper, we investigate the relationship between tax avoidance and executive compensation in bank holding companies.

The role of executive compensation has been blamed for creating excessive risk taking that lead to the recent financial crisis. The collapse of banks whose executives were allegedly paid for performance clearly raised many questions about the link between executive pay and risk-taking. Philippon and Reshef's (2009) analysis reveals that the relative skill intensity and relative wages of the financial sector exhibit a U-shaped pattern from 1909 to 2006.

But the level of compensation alone may not be the main offender. Researchers have emphasized that the key issue is how the overall structure of performance pay may encourage excessive risk-taking. Op-eds from Alan Blinder¹⁵ and Raghuram Rajan¹⁶ have highlighted that, while regulating executive compensation might be slow and ineffective, board of directors through compensation committees should have the role of setting compensation packages that do align managers' interests with those of shareholders' with much more efficient results.

We assume that tax avoidance is a risky activity since it involves the possibility of incurring in future tax repayments and penalties. Therefore, we investigate whether executive compensation that encourages risk-taking behavior is associated with tax avoidance strategies.

Accounting research on financial institutions is rather scarce compared with literature on industrial firms. Unlike previous research on tax avoidance, we restrict our analysis to a sample of U.S. banks and financial institutions.

This choice is driven by multiple factors. As Hanlon and Heitzman (2010) suggest, there is scant evidence on the taxation strategies of financial institutions. Often, these institutions are dropped from the sample because of concerns over regulatory differences. Moreover, banks' idiosyncrasies may provide peculiar means through which they can perform

¹⁵ Crazy Compensation and the Crisis," *The Wall Street Journal*, May 28, 2009.

¹⁶ Bankers' Pay is Deeply Flawed, *Financial Times*, January 2008.

aggressive tax planning. Hence, the measures of tax avoidance developed for industrial and manufacturing companies may leave some sheltering activities undetected.

We argue that financial derivatives play a key role in corporate tax sheltering (Donohoe, 2012) while simultaneously representing a considerable amount of assets and liabilities in banks' financial statements. Hence, we consider the presence of financial derivatives as a potential, additional instrument to facilitate tax sheltering that characterizes financial institutions.

The issue of risk taking is particularly severe in the banking sector, as banks are highly levered¹⁷ and compensation in banks does not reflect the interests of all the different stakeholders involved¹⁸. Consistent with this view, Haldane (2011) documents that in the pre-crisis period the credit default swap markets did not distinguish strong from weak banks. Therefore, given the absence of debt markets constrains in the level of risk, risk incentives stemming from stock and option compensation might have a free reign in banks. This problem is further exacerbated if accounting regimes reduce the efficacy of capital adequacy requirements aimed at limiting risk taking behaviours.

Parbonetti et al. (2012) argue that financial institutions raise debts through depositors or the direct access to Central Banks and, as a consequence, the increase in the level of risk does not necessarily translate into an increase in the cost of debt. Typically, depositors are small uninformed investors with deposits insured by the government as thus they lack the incentives and the abilities to monitor bank investments' decision and risk profile¹⁹. Moreover, Parbonetti et al. (2012) suggest that, due to epidemic risk of failure, governments provide both explicit and implicit guarantees. As a consequence, the debt markets do not adjust the terms of their credit to account for the change in the bank risk profile.

Moreover, as Bolton, Mehran, and Shapiro (2011) suggest, while the average non-financial firm has about 40% debt, financial institutions have at least 90% debt; for investment

¹⁷ While the average non-financial firms has about 40% debt, financial institutions have at least 90% debt; for investment banks it is closer to 95% (Bolton et al. [2011], Esty [1997], [1998]).

¹⁸ Due to characteristics of financial institutions, banks' stakeholders are more than shareholders and bondholders including depositors, tax payers, and regulators.

¹⁹ Under the current Federal Deposit Insurance Corporation (FDIC) insurance system, a large proportion of deposits are fully insured. Therefore, the depositors do not have the incentive to monitor the banks vigorously.

banks it is closer to 95%. It can be easily shown how the risk-shifting problem is exacerbated in the banking sector. Moreover, banks present a wider variety of stakeholders: shareholder, debtholders, depositors, and executives and due to the particular structure, banks are monitored from outside by regulators and holders of subordinated debt.

Several studies²⁰ have examined the determinants of executive compensation in banking, moving from the bank regulatory concerns with the provision of fixed rate deposit insurance. Houston and James (1995) state: *“To the extent that depositors are insured by the Federal Deposit Insurance Corporation (FDIC) against losses, they will be indifferent to the riskiness of a bank’s investment and financing strategies. As a result, bank shareholders will face greater risk-taking incentives than shareholders of other levered firms. Whether the greater incentives for risk taking are reflected in riskier operating strategies will depend upon the effectiveness of incentives provided to bank managers to increase risk as well as the effectiveness of regulatory policies designed to mitigate risk taking”*.

One study in particular has investigated whether executive compensation in banking is structured to promote risk taking. Houston and James (1995) compare CEO compensation in banking to compensation in other industries. They find that on average bank CEOs receive less cash compensation, hold fewer stock options, and receive a smaller percentage of their compensation in the form of stocks and options than do CEOs in other industries. However, they do not focus the attention on analyzing the impact of compensation on risk across banks. Moreover, banks show specific governance characteristics. Adams and Mehran (2003) examine the differences in governance between bank holding companies (BHC) and manufacturing firms, arguing that these differences are both due to investment opportunities and to the presence of regulation. Consistent with Houston and James (1995), they find that BHC have larger boards, the percentage of outside directors is higher, these boards have more committees, and hold more meetings. Furthermore, the proportion of CEO stock option pay to salary plus bonuses as well as the percentage and market value of direct equity holdings are smaller for bank holding companies than for firms in other industries.

²⁰ Barro and Barro (1990), Crawford, Ezzell, and Miles (1995), Houston and James (1993), Hubbard and Palia (1995), Saunders, Strock, Travlos (1990).

Moreover, the FDIC Improvement Act of 1991 provides bank regulators with monitoring authority on the compensation of bank executives and requires undercapitalized institutions to receive prior written approval from bank regulators to pay senior management bonuses or to increase overall compensation

Chen, Steiner, and Whyte (2006) show that, following the deregulation enacted in the period of 1992-2000²¹, banks have increasingly employed stock option-based compensation. The time period they analyze is characterized by a series of regulatory changes that expanded the investment opportunity set of banking industry. First in 1990 the Federal Reserve Board permitted a bank to sell stocks through its subsidiaries. In 1994, the Riegle-Neal Act permitted BHCs to operate in multiple states. In 1999 the Gramm-Leach-Bliley Act (the Financial Services Modernization Act) allowed removed barriers in the market among banking companies As a consequence of deregulation, bank executives now have incentives that are comparable to their manufacturing firms counterparts.

Decisions concerning tax avoidance and executive compensation are likely to be jointly determined. To deal with this issue, we use a simultaneous equation model that treats tax avoidance variables and equity compensation as endogenous variables, and in particular we employ the option vega to delta ratio as a measure of equity-risk incentives.

We assume that vega to delta is positively associated with the level of tax avoidance and tax risk, proxied by the effective tax rate and its volatility. The findings are consistent with our prediction.

2. Literature review

2.1 Executive compensation and risk taking

Prior research in banking and finance has investigated executive compensation in the banking industry and whether CEO pay is structured to promote risk taking.

²¹ In 1992 the SEC required all firms to disclose detailed information on executive compensation in the proxy statement due to the prevalent use of incentive-based executive compensation

Houston and James (1995) find that, on average, bank CEOs receive less cash compensation, are less likely to participate in a stock option plan, hold fewer stock options, and receive a smaller percentage of their total compensation in the form of options and stock than do CEOs in other industries. Moreover, they find no evidence that equity compensation provides risk-taking incentives. Instead, they find a positive and significant association between equity compensation and bank's charter value.

More than ten years later, Chen, Steiner, and Whyte (2006) investigate the relation between option-based executive compensation and market measures of risk for a sample of commercial banks during the period of 1992–2000. The results show that, following deregulation, banks have increasingly employed stock option-based compensation and there is a positive association between stock-option based compensation and risk-taking.

Balachandran, Kogut, and Harnal (2010) study financial institutions from 1995 through 2008 to determine the relation of equity-based incentives on the probability of default. The results indicate that restricted stock and options increases the probability of default, while cash bonuses decreases it.

Fahlenbrach and Stulz (2011) investigate whether bank performance during the 2008 credit crisis is related to CEO incentives and share ownership before the crisis and whether CEOs reduced their equity stakes in their banks in anticipation of the crisis. There is no evidence that banks with CEOs whose incentives were better aligned with the interests of their shareholders performed better during the crisis and evidence that these banks actually performed worse both in terms of stock returns and in terms of accounting return on equity (ROE). Further, banks with higher option compensation and with a larger fraction of compensation given in the form of cash bonuses did not have worse performance during the crisis. All these results hold for banks that received TARP assistance as well as other banks that did not. The incentives of non-CEO top executives are unrelated to bank performance during the crisis. Bank CEOs did not reduce their holdings of shares in anticipation of the crisis or during the crisis; there is also no evidence that they hedged their equity exposure. Consequently, they suffered extremely large wealth losses as a result of the crisis. Banks with CEOs whose incentives were closely aligned with the interests of their shareholders

performed poorly during the recent credit crisis. Such poor performance was not anticipated by senior managers and subsequently led to large wealth losses

Acrey, McCumber, and Nguyen (2011) also support Fahlenbrach and Stulz (2011) conclusion that CEO compensation was not a cause of the financial crisis and does not explain bank risk.

Tung and Wang (2011) examine the portion of inside debt holdings (i.e. pension plans and deferred compensation) in executive compensation. Theory suggests that inside debt incentivizes managers to act more conservatively towards risk, hence acting in the opposite direction from stock-based compensation. Therefore, in their analysis they predict that bank CEOs' inside debt incentives correlate with reduced bank risk taking and improved bank performance during the financial crisis. Despite the regulatory oversight aimed at constraining risk, they still find results consistent with their hypotheses, confirming the role of inside debt compensation in mitigating risk-taking behaviour also in the banking context.

DeYoung, Peng, and Yan (2010) examine whether and how the terms of CEO compensation contracts at large commercial banks between 1994 and 2006 influenced, or were influenced by, the risky business policy decisions made by these firms. They find strong evidence that bank CEOs responded to contractual risk-taking incentives by taking more risk; bank boards altered CEO compensation to encourage executives to exploit new growth opportunities; and bank boards set CEO incentives in a manner designed to moderate excessive risk-taking. These relationships are strongest during the second half of our sample, after deregulation and technological change had expanded banks' capacities for risk-taking.

Mehran and Rosenberg (2008) assess the effects of CEO stock options on three key corporate policies for banks: investment choice, amount of borrowing, and level of capital. Using a sample of 549 bank-years for publicly traded banks from 1992 to 2002, they find that stock option grants lead CEOs to undertake riskier investments. In particular, higher levels of option grants are associated with higher levels of equity and asset volatility. Consistent with the role of options as a nondebt tax shield, they also show that option grants reduce the banks' incentive to borrow as evidenced by lower levels of interest expense and federal funds borrowing.

Bebchuck and Spamann (2009) analyse equity-based compensation and risk taking. Stock-option compensation induces excessive risk taking and risk shifting towards preferred shareholders, bondholders, depositors, and taxpayers. Corporate governance mechanisms (say-on-ay) align executives' interests with those of shareholders.

Bhagat and Bolton (2014) examine bank executive compensation in relation to the financial crisis. Cihák, Maechler, Schaeck, and Stolz (2009) that assesses the drivers of executive turnover for a sample of U.S. banks. They present clear evidence that executives in charge of banks which are risky or have incurred losses are more likely to be dismissed. However, such dismissals do not lead to improved bank performance. Erkens, Hung, and Matos (2009) find that CEOs employed by banks with boards comprising high proportions of independent directors and institutional investors are more likely to be replaced following large losses, than counterparts employed by banks with insider blockholders.

2.2 Tax avoidance and tax risk

Several studies on manufacturing firms investigate the connection between tax avoidance and variable compensation. Atwood, Omer, and Shelley (1998) and Carnes and Guffrey (2000) hypothesize that firms with greater tax-planning opportunities are more likely to use after-tax performance measures. These studies find that multinational status, number of operating segments, firm size, and capital intensity are positively related with after-tax CEO compensation. Atwood et al. (1998) also presents evidence that leverage is negatively associated with this choice. Phillips (2003) investigates whether compensating CEOs and business-unit managers using after-tax accounting-based performance measures (i.e. bonus plans) leads to effective tax planning. Results concerning business-unit managers show that the after-tax basis of compensation leads to lower effective tax rates, suggesting that equity risk-taking incentives motivate managers to undertake more aggressive tax planning, but this result does not hold for CEOs' compensation. As Gaertner (2013) argues, the possibility of exogenous changes in the tax rate introduces significant compensation risk to CEOs paid on an after-tax basis. Moreover, he suggests that the lack of results in Phillips (2003) may be driven by the low statistical power of his tests. Therefore, Gaertner extends Phillips' (2003)

findings and, using a larger sample of hand collected data, he finds a positive and significant relation between after-tax CEO incentives and the level of CEO cash compensation. Armstrong, Blouin, and Larcker (2012) investigate the type of tax planning included in tax directors' compensation contracts. They examine whether the incentives provided to tax directors are associated with lower effective tax rates (ETR) and/or a wider book-tax gap, finding only evidence of a strong negative relationship between tax director incentives and the GAAP ETR. However, they find no evidence that CEOs' and tax directors' incentive compensation is associated with measures of tax avoidance and tax sheltering.

Desai and Dharmapala (2006) develop a model linking equity-based compensation and aggressive tax planning, relying on two competing theories. As Rego and Wilson (2012) point out, the first argument predicts a positive relation between incentive compensation and tax sheltering since incentive compensation should align managerial incentives with those of shareholders, inducing managers to engage in tax avoidance that increases firm value. On the other hand, the second theory argues that tax sheltering facilitates managerial opportunism though extraction and corporate governance strength should play a moderating role. Overall, increasing incentive compensation should promote tax sheltering, aligning executives' interests with those of shareholders, but limit tax sheltering associated with managerial rent extraction. To clarify the ambiguity of the net impact of executive compensation on tax avoidance, Desai and Dharmapala test their model across well-governed and weaker-governed firms. They find that increases in the value of stock option grants for the top five executives reduce the level of tax sheltering, and this negative effect is driven by poorly-governed firms.

Hanlon, Mills, and Slemrod (2005), examining corporate and governance characteristics, and executive compensation find that both the percentage of annual compensation that is bonus and the level of equity incentives from exercisable stock options are positively related to the proposed IRS audit deficiencies, indicating that executive compensation may be associated with tax aggressiveness.

More recently, Rego and Wilson (2012) examine CEO and CFO's equity risk incentives of as one determinant of corporate tax avoidance. They focus on stock option compensation, as the value of an option increases with both stock price (derivative of option

value with respect to stock price; i.e. slope effect) and stock return volatility (derivative of option value with respect to stock price volatility; i.e. risk incentive effect); therefore the latter motivates managers to undertake risky projects. Their results are consistent with this argument and show that equity risk incentives motivate top executives to increase stock return volatility by undertaking risky tax strategies.

3. Hypothesis development

Following the argument that aggressive tax planning is a risky strategy and therefore managers need to be incentivized to take on more risk in order to be aligned with shareholders' interests (Rego and Wilson, 2012), we expect stock and option-based compensation to provide bank CEOs and CFOs with incentives to engage in activities to reduce the tax burden:

H1. CEO and CFO equity risk incentives are positively associated with tax avoidance.

Moreover, given that equity-risk incentives are intended to modify the managers' risk preferences, we should observe that these executives favor tax avoidance strategies that might not be effective and persistent over time, hence increasing tax risk:

H2. CEO and CFO equity risk incentives are positively associated with tax risk.

4. Data definitions and summary statistics

We focus only on financial institutions. Our main sample period covers a period from 1998 to 2012. We construct the sample by first requiring non-missing CEO equity compensation from the Compustat Execucomp database. Financial information are from Bank Regulatory, Crsp-Compustat Bank merged and Crsp-Compustat. Information on pre-tax income is not available for a large sample of financial institutions before 1998. Moreover, data on cash taxes paid (TXPD) is disclosed only from 2004. All variables are defined in Appendix A.

The final sample for our main variable of interest (GAAP ETR) consists of 833 CEO - firm-year observations. Following Rego and Wilson (2012), we exclude firms with

cumulative negative pre-tax income, since the incentive to avoid federal income tax is likely to be weaker for loss firms. We winsorize all continuous variables at the 1th and 99th percentile.

5. Empirical design

We test our hypotheses by adapting the model of Rego and Wilson (2012) on equity risk incentives. We implement the following simultaneous system of equations where TAX AVOIDANCE and Vega to Delta are the endogenous dependent variables. We estimate parameters for our system of equations using two-stage least squares (where firm and time subscripts are omitted for convenience):

$$\begin{aligned}
 TAX\ AVOIDANCE = & \alpha_0 + \alpha_1 VEGA\ to\ DELTA + \alpha_2 INTEREST\ RATIO + \\
 & \alpha_3 ASSET\ RISK + \alpha_4 DLLP + \alpha_5 SIZE + \alpha_6 CAPR1 + \alpha_7 CAPR2 + \\
 & \alpha_8 ROA + \alpha_9 \sigma(ROA) + Year\ fe + Industry\ fe + e
 \end{aligned}$$

Vega to Delta

$$\begin{aligned}
 = & \beta_0 + \beta_1 TAX\ AVOIDANCE + \beta_2 CASH\ COMP + \beta_3 AGE + \beta_4 TENURE \\
 & + \beta_5 TURNOVER + \beta_6 SIZE + \beta_7 MVE + LOSS + \beta_9 \sigma(RET) + Year\ fe \\
 & + Industry\ fe + u
 \end{aligned}$$

As previously discussed, our four measures of TAX AVOIDANCE are the GAAP ETR, Cash ETR, GAAP ETR Volatility, and Cash ETR Volatility. A negative (positive) coefficient on Vega to Delta (α_1) in the GAAP ETR and Cash ETR regressions, (GAAP ETR Volatility, and Cash ETR Volatility) would support our hypothesis.

6. Robustness check

The design of the compensation structure is influenced both by tax policy and disclosure requirements. Carter, Lynch, and Tuna (2007) show that financial reporting concerns are

positively related to stock option use and total compensation. Examining the changes in CEO compensation in firms that voluntarily begin expensing option grants in 2002 and 2003, they find that these firms decreased the number of options granted and increased the restricted stock grants, without affecting the overall level of total compensation.

In 1972 APB 25 was issued stating that stock-based compensation cost was to be recorded at its intrinsic value (the difference between the stock price and the exercise price at the moment of grant). About 95% of options are granted at the money, or at fair market value, which means that the exercise price at grant date is set equal to the stock price at grant date. The remaining 5% are either discount options (so-called in-the-money options, where the exercise price is below the stock price at grant date) or premium options (so-called out-of-the-money options, where the exercise price is above the stock price at grant date).²² The last type are the so called indexed options where the exercise price is indexed to some industry or market index.

Between 1995 and 2005 FAS 123 encouraged firms to calculate stock-based compensation expense based on fair value of options granted but allowed them to recognize the expense or disclose in the financial statement footnotes what net income would have been had the expense been recognized. Except for a limited number of voluntary adopters, the vast majority of firms did not recognize compensation expense related to employee stock options (ESO). The firm obtains a tax deduction equal to the amount of ordinary income recognized by the employee at the exercise date of a non-qualified stock option (NQSO).

Compensation expense at fair value on the grant date. If the deduction is larger than the compensation expense, then the difference is credited to shareholders' equity (lowering taxes payable) rather than causing a reduction in current tax expense. The different treatment gives rise to temporary differences.²³

²² Hall and Liebman (2000).

²³ The ESO tax benefit is credited to shareholders' equity and income tax payable is reduced. The credit increases shareholders' equity and is based on the argument that the firm's equity increases because it receives both the exercise price from the employees and the tax benefit from the Treasury when it issues the shares. In calculating net income, current tax expense is overstated by the amount of the ESO tax benefits, therefore the reduction in income taxes payable shows up in the Statement of Cash Flows as an add back to net income. This treatment has implications for how we interpret reported current tax expense and estimate taxable income. Moreover, if a firm has a net operating loss carryforward and it places a valuation allowance on the associated deferred tax asset, then the estimation of the ESO tax deduction becomes more difficult. When a valuation

Since 2005, FAS 123R requires firms to recognize as compensation expense the grant date fair value of ESOs. The fair value is amortized over the vesting period. The compensation is therefore recognized before the tax deduction (exercise date) giving rise to a temporary difference (deferred tax asset). Tax treatment did not change, and no change occurred in taxable income until option exercise or expiration.

Hayes et al. (2012) exploit the change in the accounting treatment under FAS 123R as an exogenous shock to the accounting benefits of using stock option compensation. Their findings show that providing incentives for risk taking is not the primary rationale for the use of option-based compensation, as firms decrease their use of compensating CEOs with stock options as a result of FAS 123R. Instead, they find that firms increase the portion of bonuses, restricted stock, and long-term incentive awards, increasing pay-performance sensitivity of the manager's compensation, but not providing the same convexity as option-based compensation.

7. Results

Table 1, Panel A presents the results of simultaneous equations for the effect of CEO equity risk incentive on the bank GAAP effective tax rate (GAAP ETR). In the tax avoidance model, there is a significantly negative association between the option vega to delta ratio and GAAP ETR. In terms of the control variables, we find that lower GAAP ETR (i.e. higher tax avoidance) is associated with banks having higher asset risk, more volatile ROA, and lower Tier 1 capital. However, Panel B presents a significant coefficient on the tax avoidance variable, suggesting that the simultaneous equations is not completely ruling out the presence of simultaneity.

[insert Table 1]

allowance is placed against a NOL deferred tax asset, the amount of the ESO tax benefit offset by the valuation allowance is not recognized as a credit to shareholders' equity (Scholes et al., 2009).

Table 2, Panel A presents the results of simultaneous equations for the effect of CEO equity risk incentive on the bank Cash effective tax rate (Cash ETR). In the tax avoidance model, there is a negative association between the option vega to delta ratio and Cash ETR, nevertheless the coefficient is not statistically significant. In terms of the control variables, we find that lower GAAP ETR (i.e. higher tax avoidance) is associated with banks having higher discretionary loss loan provisions, higher ROA, and lower Tier 1 and Tier 2 capital.

[insert Table 2]

Table 3, Panel A presents the results of simultaneous equations for the effect of CEO equity risk incentive on the volatility of GAAP effective tax rate (σ [GAAP ETR]). In the tax avoidance model, there is a positive association between the option vega to delta ratio and σ (GAAP ETR), suggesting that equity risk incentives are associated with higher tax risk, but the coefficient is not statistically significant.

[insert Table 3]

Table 4, Panel A presents the results of simultaneous equations for the effect of CEO equity risk incentive on the volatility of Cash effective tax rate (σ [Cash ETR]). In the tax avoidance model, there is a negative, yet not significant association between the option vega to delta ratio and σ (Cash ETR).

[insert Table 4]

8. Robustness tests

Unlike results in Hayes et al. (2012), Table 5 shows that equity risk incentives measured by the option vega to delta increase after the adoption of SFAS 123R. Our dummy variable takes value 1 for years from 2004 onwards, accounting for a possible anticipation effect. This

evidence suggests that equity risk incentives appear to have predominant role in the compensation design of bank CEOs. Banks appear not to substitute away from options towards other forms of performance-based pay as opposed to salary and bonus compensation, despite the newly prescribed rule on option expensing.

[insert Table 5]

9. Conclusion

We provide new evidence on the role of equity risk incentives in the design of the compensation contract of bank CEOs. In particular, we analyze whether stock and option based compensation is associated with increased tax avoidance activities.

This is, to our knowledge, the first study on equity risk incentives for bank CEOs as determinants of corporate aggressive tax planning.

The banking industry underwent a series of policy changes starting from the late 1990s. As a consequence of the deregulation process, banks CEOs received compensation contracts that were structured similarly to non-financial corporations. However, agency concerns and risk-shifting are exacerbated in banks due their particular leverage structure. These factors make banks an interesting setting to study the effect of equity-based compensation on tax avoidance, not to mention the paucity of research on tax avoidance related to banks.

We differentiate among different levels of risky tax avoidance, expecting equity risk incentives to have a stronger impact on tax risk, measured by the volatility of effective rates. Overall, the analysis has not provided with strong evidence. There is an indication of a positive association between tax avoidance and equity risk incentives, but the results hold mostly for measures of tax avoidance that capture low risk tax planning strategies.

Appendix

Summary of variable definitions

Dependent variables

<i>GAAP ETR</i>	Total tax expense (TXT) divided by pre-tax income (PI) adjusted for (less) special items (SPI). If SPI was missing, the variable is set equal to TXT/PI. If the numerator is positive and the denominator is negative (having tax expense when in a loss), then the variable is set equal to 100 percent. If the numerator is negative and the denominator is negative (having a tax refund when in a loss), then the variable is set equal to zero percent. The remaining cases when the variable would be less than zero (greater than 100) percent are set equal to zero (100) percent.
<i>Cash ETR</i>	The sum of three-year taxes paid (TXPD) ending in year t+2 divided by the sum of three-year pre-tax minus income from special items (PI-SPI) ending in year t+2.
σ (<i>GAAP ETR</i>)	The three-year standard deviation of GAAP ETR starting in year t.
σ (<i>Cash ETR</i>)	The three-year standard deviation of cash ETR starting in year t.

Independent variables

CEO and CFO variables

<i>CEO/CFO vega to delta</i>	The sensitivity of the change in the Black–Scholes option value for a 1% change in stock return volatility (vega), multiplied by the number of options in the CEO's portfolio divided by $1\% \times (\text{share price}) \times (\text{number of shares held}) + 1\% \times (\text{share price}) \times (\text{option delta}) \times (\text{number of options held})$.
<i>CEO/CFO cash comp</i>	Salary + Bonus.
<i>CEO/CFO age</i>	The age of the executive at fiscal year t.
<i>CEO tenure</i>	The tenure of the CEO at fiscal year t.
<i>New CEO</i>	An indicator variable set equal to one if the firm has a new CEO, and zero otherwise.

Firm-level variables

<i>Interest ratio</i>	Total interest income over total non-interest income.
-----------------------	---

<i>Asset risk</i>	Annualised standard deviation of daily stock price returns times the ratio of the market value of equity and the market value of the bank. (Gropp and Heider, 2010).
<i>Dllp</i>	Discretionary loss loan provisions.
<i>Capr 1</i>	Tier 1 capital.
<i>Capr 2</i>	Tier 2 capital.
<i>SIZE</i>	The natural log of the firm total assets (AT).
<i>BtM</i>	Book to market ratio calculated as total common equity (CEQ) divided by the common shares outstanding (CSHO) multiplied by the stock price at fiscal year end (PRCC F).
<i>MVE</i>	Market value of equity.
$\sigma(Ret)$	The 60 months stock price return volatility.
<i>ROA</i>	The pre-tax return on assets.
$\sigma(ROA)$	The three-year ROA volatility.

References

- Adams, R., Mehran, H., (2003). Is Corporate Governance Different for Bank Holding Companies? Federal Reserve Bank of New York.
- Allingham, M.G., Sandmo, A., (1972). Income Tax Evasion: A Theoretical Analysis. *Journal of Public Economics* 1, 323-338.
- Armstrong, C.S., Blouin, J.L., Larcker, D.F., (2012). The Incentives for Tax Planning. *Journal of Accounting and Economics* 53, 391-411.
- Armstrong, C.S., Larcker, D.F., Ormazabal, G., Taylor, D.J., (2012a). The Relation Between Equity Incentives and Misreporting: The Role of Risk-Taking Incentives. Working Paper.
- Atwood, T.J., Omer, T.C., Shelley, M.K., (1998). Before-tax versus after-tax earnings as performance measures in compensation contracts. *Managerial Science*, Vol. 24, No. 11, 29-43.
- Bolton, P., Mehran, H., Shapiro, J., (2011). Executive Compensation and Risk Taking. Working Paper.
- Carnes, G.A., Guffrey, D.M., (2000). The influence of international status and operating segments on firms' choice of bonus plans. *Journal of International Accounting, Auditing and Taxation*, Vol. 9, No. 1, 43-57.
- Cassell, C. A., Huang, S.X., Sanchez, J.M., Stuart, M.D., (2012). Seeking Safety: The Relations between CEO inside Debt Holdings and the Riskiness of Firm Investment and Financial Policies. *Journal of Financial Economics* 103, 588-610.
- Chen, K.-P., Chu, C.Y.C., (2005). Internal control vs. external manipulation: a model of corporate income tax evasion. *Rand Journal of Economics*, 36 (4), 151-164.
- Core, J., Guay, W., (1999). The Use of Equity Grants to Manage Optimal Equity Incentives Levels. *Journal of Accounting and Economics* 28 (2), 151-184.
- Demsetz, H., Lehn, K., (1985). The Structure of Corporate Ownership: Causes and Consequences. *Journal of Political Economy* 93(6), 1155-1177.
- Esty, C., (1997). Organizational Form and Risk Taking in the Savings and Loan Industry. *Journal of Financial Economics* 44(1), 25-55.
- Esty, C., (1998). The Impact of Contingent Liability on Commercial Bank Risk Taking. *Journal of Financial Economics* 47(2), 189-218.

- Coles, J., Daniel, N., Naveen, L., (2006). Managerial incentives and risk-taking. *Journal of Financial Economics* 79, 431-468.
- Crocker, K.J., Slemrod, J., (2005). Corporate Tax Evasion with Agency Costs. *Journal of Public Economics* 89, 593–1610.
- Desai, M.A., Dharmapala, D, (2006). Corporate Tax Avoidance and High-Powered Incentives. *Journal of Financial Economics* 79(1), 145–79.
- Desai, M.A., Dharmapala, D, (2007). “Corporate Tax Avoidance and Firm Value.” Working paper, Harvard University.
- Dhaliwal, D.S., Gleason, C.A., Mills, L.F., (2004). Last-chance earnings management: Using the Tax Expense to Meet Analysts' Forecasts. *Contemporary Accounting Research*, Vol. 21, No. 2, 431–459.
- Dyreng, S., Lindsey, B., (2009). Using Financial Accounting Data to Examine the Effect of Foreign Operations Located in Tax Havens and Other Countries on U.S. Multinational Firms' Tax Rates. *Journal of Accountin Research*, Vol. 47 (5), 1283-1316.
- Dyreng, S., Hanlon, M., Maydew, E., (2010). The Effects of Executives on Corporate Tax Avoidance.”*The Accounting Review* 85, 1163–1189.
- Edmans, A., Liu, Q., (2010). Inside Debt. *Review of Finance* 15(1) 75-102.
- Frank, M., Lynch, L., Rego, S.O., (2009). Tax Reporting Aggressiveness and Its Relation to Aggressive Financial Reporting.*The Accounting Review* 84, 467–496.
- Gaertner, F.B., (2013). CEO After-Tax Compensation Incentives and Corporate Tax Avoidance. Working paper, Nanyang Technological University.
- Graham, J., Tucker A., (2006). Tax Shelters and Corporate Debt Policy. *Journal of Financial Economics* 81, 563–594.
- Guay, W. R., (1999). The Sensitivity of CEO Wealth to Equity Risk: An Analysis of the Magnitude and Determinants. *Journal of Financial Economics* 53, 43–71.
- Hanlon, M., Heitzman, S., (2010). A Review of Tax Research. *Journal of Accounting and Economics* 50 (2-3), 127–178.
- Hanlon, M., Mills, L., Slemrod, J., (2005) “An Empirical Examination of Corporate Tax Non-compliance, in *Taxing Corporate Income in the 21st Century*, edited by A. Auerbach, J. R. Hines Jr., and J. Slemrod. Cambridge: Cambridge University Press, 2005, 2007.
- Hanlon, M., Rajgopal, S., Shevlin, T., (2003). Are Executive Stock Options Associated with Future Earnings? *Journal of Accounting and Economics* 36, 3–43.

- Hanlon, M., Slemrod, J., (2009). What Does Tax Aggressiveness Signal? Evidence from Stock Price Reactions to News about Tax Shelter Involvement. *Journal of Public Economics* 93, 126–141.
- Hodder, L., McAnally, M., Weaver, C., 2003. The influence of tax and non-tax factors on banks' choice of organizational form. *The Accounting Review* 78, 297–325.
- Holmstrom, B., (1979). Moral Hazard and Observability. *Bell Journal of Economics* 10, 74-91.
- Houston, J.F., James, C., (1995). CEO Compensation and Bank Risk: Is Compensation in Banking Structured to Promote Risk Taking? *Journal of Monetary Economics* 36, 405-431.
- Jensen, M., Meckling, W., (1976). Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure. *Journal of Financial Economics* 3 (4), 305-360.
- John, K., Mehran, H., Qian, Y., (2010). Outside Monitoring and CEO Compensation in the Banking Industry. *Journal of Corporate Finance*, Vol. 16(4), 383-399.
- John, A., John, K., (1993). Top-Management Compensation and Capital Structure *Journal of Finance*, Vol. 48, No.3, 949-974.
- Laeven, L., Levine, R., (2009). Bank Governance, Regulation and Risk Taking. *Journal of Financial Economics* 93, 259-275.
- Lisowsky, P., (2010). Seeking Shelter: Empirically Modeling Tax Shelters Using Financial Statement Information. Working paper, University of Illinois.
- Phillips, J., (2003). Corporate Tax Planning Effectiveness: The Role of Compensation-Based Incentives. *The Accounting Review* 78(3), 847–874.
- Rajgopal, S., Shevlin, T., (2002). Empirical evidence on the relation between stock option compensation and risk taking. *Journal of Accounting and Economics* Vol. 44(2), 145-171.
- Rego, S.O, Wilson, R., (2012). Equity Risk Incentives and Corporate Tax Aggressiveness. *Journal of Accounting Research* 50 (3), 775-809.
- Saunders, A., Strock, E., Travlos, N.G., (1990). Ownership Structure, Deregulation, and Bank Risk Taking. *The Journal of Finance* 45(2), 643-654.
- Skinner, D., 2008. The rise of deferred tax assets in Japan: the role of deferred tax accounting in the Japanese banking crisis. *Journal of Accounting and Economics* 46, 218–239.
- Slemrod, J., Yitzhaki, S., (2002). Tax avoidance, evasion and administration. In: Auerbach, A.J., Feldstein, M. (Eds.), *Handbook of Public Economics*, vol. 3. Elsevier Science, Amsterdam, pp. 1423-1470, Chapter 22.

Watts, R., (2003). Conservatism in accounting part I: explanations and implications. *Accounting Horizons* 17, 207-221.

Wei, C., Yermack, D., (2011). Investor Reactions to CEOs' Inside Debt Incentives. *The Review of Financial Studies* Vol. 24 No. 11, 3813-3840.

Tables

Table 1

CEO Equity Risk Incentives and GAAP Effective Tax Rate (GAAP ETR)

Panel A: Dependent Variable - GAAP ETR		
	Coeff.	t-Stat
<i>CEO Vega to delta</i>	-0.103***	-2.14
<i>Interest ratio</i>	-0.001	-1.36
<i>Asset risk</i>	-1.052***	-2.70
<i>Dllp</i>	-0.219	-0.12
<i>Size</i>	-0.001	0.19
<i>Capr1</i>	0.006***	2.31
<i>Capr2</i>	0.003	0.73
<i>ROA</i>	1.139	1.83
<i>$\sigma(\text{ROA})$</i>	2.934***	2.76
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	833	
<i>R²</i>	7%	
Panel B: Dependent Variable – CEO Vega to delta		
	<i>CEO Vega to delta</i>	
	Coeff.	t-Stat
<i>GAAP ETR</i>	-1.259***	2.10
<i>CEO Cash Comp</i>	-0.120	1.03
<i>CEO Age</i>	0.002***	3.62
<i>CEO Tenure</i>	0.016***	7.10
<i>MVE</i>	0.000	-0.82
<i>Size</i>	0.107***	6.46
<i>$\sigma(\text{Ret})$</i>	0.606***	-4.20
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	833	
<i>R²</i>	-3%	

Table 2*CEO Equity Risk Incentives and Cash Effective Tax Rate Cash ETR)*

Panel A: Dependent Variable - Cash ETR		
	Coeff.	<i>t</i> -Stat
<i>CEO Vega to delta</i>	-0.079	-0.92
<i>Interest ratio</i>	0.000	0.38
<i>Asset risk</i>	-1.244	1.52
<i>Dllp</i>	-8.981***	-2.64
<i>Size</i>	-0.015	-1.29
<i>Capr1</i>	0.139***	2.38
<i>Capr2</i>	0.295***	2.56
<i>ROA</i>	-5.319***	-4.52
$\sigma(\text{ROA})$	2.467	1.28
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	544	
<i>R</i> ²	29%	
Panel B: Dependent Variable – CEO Vega to delta		
	<i>CEO Vega to delta</i>	
	Coeff.	<i>t</i> -Stat
<i>Cash ETR</i>	0.358	1.69
<i>CEO Cash Comp</i>	0.003	1.08
<i>CEO Age</i>	-0.173***	-6.64
<i>CEO Tenure</i>	0.008	0.23
<i>MVE</i>	0.000	-0.82
<i>Size</i>	0.000***	2.22
$\sigma(\text{Ret})$	0.686***	-4.42
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	544	
<i>R</i> ²	12%	

Table 3*CEO Equity Risk Incentives and GAAP Effective Tax Rate Volatility (σ [GAAP ETR])*

Panel A: Dependent Variable – σ(GAAP ETR)		
	Coeff.	<i>t</i> -Stat
<i>CEO Vega to delta</i>	0.052	1.47
<i>Interest ratio</i>	0.000	-0.58
<i>Asset risk</i>	-0.839***	-2.90
<i>Dllp</i>	-0.069	-0.05
<i>Size</i>	-0.007	-1.92
<i>Capr1</i>	0.005***	2.61
<i>Capr2</i>	0.014***	4.20
<i>ROA</i>	-1.231	-2.73
<i>σ(ROA)</i>	0.346***	6.25
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	781	
<i>R</i> ²	35%	
Panel B: Dependent Variable – CEO Vega to delta		
	<i>CEO Vega to delta</i>	
	Coeff.	<i>t</i> -Stat
<i>σ(GAAP ETR)</i>	1.896***	4.20
<i>CEO Cash Comp</i>	0.003	1.30
<i>CEO Age</i>	0.002***	3.62
<i>CEO Tenure</i>	0.013***	-5.66
<i>MVE</i>	0.000***	3.05
<i>σ(Ret)</i>	1.188***	-5.65
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	781	
<i>R</i> ²	-6%	

Table 4*CEO Equity Risk Incentives and Cash Effective Tax Rate Volatility (σ [Cash ETR])*

Panel A: Dependent Variable - σ (Cash ETR)		
	Coeff.	<i>t</i> -Stat
<i>CEO Vega to delta</i>	-0.012	-0.22
<i>Interest ratio</i>	-0.002	1.98
<i>Asset risk</i>	-1.297***	-2.35
<i>Dllp</i>	1.604	0.70
<i>Size</i>	-0.003	-0.51
<i>Capr1</i>	0.005	1.32
<i>Capr2</i>	0.023***	3.22
<i>ROA</i>	-2.531***	-3.52
<i>σ(ROA)</i>	0.373***	4.28
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	519	
<i>R</i> ²	36%	
Panel B: Dependent Variable – CEO Vega to delta		
	<i>CEO Vega to delta</i>	
	Coeff.	<i>t</i> -Stat
<i>σ (Cash ETR)</i>	1.131***	3.06
<i>CEO Cash Comp</i>	0.004	1.49
<i>CEO Age</i>	-0.019***	-6.58
<i>CEO Tenure</i>	0.021	0.58
<i>MVE</i>	0.000	1.65
<i>σ(Ret)</i>	1.087***	-4.35
<i>Year fixed effects</i>	Yes	
<i>Industry fixed effects</i>	Yes	
<i>N</i>	519	
<i>R</i> ²	4%	

Table 5

Firm fixed effect regressions describing changes in the equity risk incentives in CEO compensation around the adoption of SFAS 123R.

Dependent Variable - CEO Vega to delta		
	Coeff.	t-Stat
<i>Post SFAS 123-R</i>	0.052***	2.11
<i>Size</i>	0.000***	4.59
<i>CEO Cash Comp</i>	-0.093***	-4.17
<i>CEO Tenure</i>	-0.003	-1.21
<i>N.</i>	941	
<i>Adj. R²</i>	50%	