TAX AVOIDANCE AND INVESTMENT: DISTINGUISHING THE EFFECTS OF CAPITAL RATIONING AND OVERINVESTMENT

A Dissertation

by

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ABSTRACT

I examine the relation between tax avoidance and firm investment by drawing on two capital market imperfections, adverse selection and moral hazard, to provide a link between tax avoidance and investment. Firms experiencing capital rationing because of adverse selection rely on internal resources to fund investment opportunities because of costly external financing. Tax avoidance can provide additional cash-flows that may alleviate capital rationing. Alternatively, tax avoidance can exacerbate problems of moral hazard by facilitating managerial rent extraction in the form of overinvestment. I find a positive relation between tax avoidance and investment suggesting effects of either capital rationing or overinvestment. To distinguish between these two effects, I examine how the relation between tax avoidance and investment varies in settings where capital rationing or overinvestment is more likely to occur. My findings suggest that firms rely on the cash savings from tax avoidance to alleviate capital rationing.

DEDICATION

To God’s Grace, Calvin’s Five Points, and Double Imputation

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CHAPTER I

INTRODUCTION

In perfect capital markets, managers should be indifferent between internal and external resources to finance their investment (Modigliani and Miller 1958). Nevertheless, numerous studies find that internal resources are significant predictors of firms' investment (Almeida and Campello 2007; Fazzari et al. 1988; Lamont 1997). Theorists posit that two capital market imperfections can lead to firms relying on internal resources to fund investment: adverse selection and moral hazard (Stein 2003). Adverse selection occurs because managers possess greater information about the true value of their firm and opportunistically obtain outside financing when it benefits current shareholders (Myers 1977; Myers and Majluf 1984). Potential new shareholders are aware of the information asymmetry problem and ration the capital they offer to managers, thus making external financing more costly. An increase in the cost of external financing encourages firms to use internal funds to finance investments.

Moral hazard refers to managers' willingness to extract rents from the firm due to the difference in utility functions between managers and shareholders (Jensen and Meckling 1976) and may lead managers to rely on internal resources because they are reluctant to expose their rent extraction to outside financiers by accessing external capital markets (Harris and Raviv 1990; Jensen 1986; Stein 2003; Stulz 1990). Moral hazard can lead managers to overinvest, where managers make unprofitable investments to increase the size of the firm for managers' personal gain (Jensen 1986).

Because of this reliance on internal resources, managers may search for means of financing investments in addition to cash flow generated by its core operations. For example, a reduction in firms' explicit tax liability (henceforth tax avoidance) increases a firm's after-tax cash flow and therefore increases the internal resources available for investment. Tax avoidance therefore can influence the level of firms' investment in circumstances in which firms must rely on internal resources. In this paper, I examine whether tax avoidance and investment are related and investigate whether adverse selection-induced capital rationing (henceforth capital rationing) or moral hazard influence that relation.

Both capital rationing and overinvestment predict a positive relation between tax avoidance and investment. In the case of capital rationing, managers use the cash savings from tax avoidance to help mitigate a lack of internal resources to fund investment. All else equal, firms with more internal resources can rely less on costly external financing and forgo fewer profitable investment opportunities (Fazzari et al. 1988; Myers and Majluf 1984). However, in addition to increasing the internal resources of the firm, tax avoidance also increases the probability of moral hazard by increasing information asymmetry between managers and investors (Balakrishnan et al. 2011; Desai and Dharmapala 2009; Hope et al. 2012). This information asymmetry decreases the ability of investors to detect unwarranted rent extraction (Jensen and Meckling 1976).[1] Because tax avoidance increases information asymmetry, Desai and Dharmapala (2009) argue

[1] Managers are unable to maintain a higher level information asymmetry with taxing authorities than they have with their shareholders. The IRS is able to observe public disclosures made by corporate managers to shareholders and apparently use such disclosures during the audit process (Mills 1998).

that tax avoidance lowers the marginal cost of rent extraction. In the case of overinvestment, managers exploit the increase in information asymmetry from tax avoidance and use the cash savings of tax avoidance to invest beyond what is optimal for shareholders for reputational or job security reasons, resulting in greater investment.

I find that tax avoidance is positively associated with both firm-level investment and unexpected investment, which controls for firms' investment opportunities. On average, firms' invest between 10.3 and 17.9-cents for every dollar of cash flows saved through tax avoidance.[2] This finding is consistent with the relations predicted by both capital rationing and overinvestment.

To distinguish whether the positive relation between tax avoidance and investment is evidence of the benefits of alleviating capital rationing or the exacerbation of overinvestment, I follow recent finance research by investigating how the positive relation between internal resources and investment varies cross-sectionally (Babenko et al. 2011; Hadlock 1998; Ozbas and Scharfstein 2010; Richardson 2006). More specifically, I distinguish between capital rationing and overinvestment by investigating the relation between tax avoidance and investment across different levels of managerial ownership, relative internal resources, and volatility in tax avoidance.

Adverse selection, and therefore capital rationing, increases with firms' managerial ownership because managers internalize more of the benefits of

[2] While the amount firms invest from tax avoidance might appear low, the investments associated with tax avoidance are approximately equal to the investments associated with pre-tax cash flows, suggesting that firms do not behave radically different when investing the cash savings from tax avoidance. My research design does not allow me to determine how firms spend remaining 89.7-cents to 82.1-cents of cash savings from tax avoidance. However, a portion of the remaining cash savings from tax avoidance likely recoups the up-front costs associated with tax avoidance. My estimates of the cash savings from tax avoidance do not incorporate the legal fees, accountants fees, and organizational costs associated with tax avoidance.

opportunistically seeking external financing (Hadlock 1998; Ozbas and Scharfstein 2009). However, overinvestment decreases with managerial ownership because managers internalize more of the costs of overinvestment (Hadlock 1998; Jensen 1986). Thus, a finding of a significantly more positive relation between tax avoidance and investment among firms with a high level of CEO ownership is consistent with firms that experience a higher level of capital rationing alleviating its effect on investment through tax avoidance. A finding of a significantly less positive association between tax avoidance and investment among firms with a high level of CEO ownership suggests managers refrain from overinvestment when they bear a greater portion of its costs and would suggest that overinvestment is more likely to be the source of the positive relation.

Firms with low investment opportunities and positive free cash flow have greater internal resources relative to investment opportunities and are less likely to experience financing deficits than firms with more investment opportunities and negative free cash flow (Hadlock 1998; Hoshi et al. 1991). [3] To the extent that capital rationing affects firms' investment, firms with greater relative internal resources would not need to rely as heavily on tax avoidance to fund all investment opportunities as firms with lower relative internal resources. Therefore, if firms engage in tax avoidance to increase their internal resources and alleviate capital rationing, the relation between tax avoidance and investment will be less positive among firms with greater relative internal resources and more positive among firms with high investment opportunities and negative free cash

[3] Free cash flow is cash flow beyond what is necessary to finance positive net present value (NPV) investments (Jensen 1986; Richardson 2006)

flow (less relative internal resources). Overinvestment, on the other hand, should be more salient when relative internal resources are greater because managers' preference for larger firms is independent of investment opportunities (Hoshi et al. 1991) and positive free cash flow provides an opportunity for managers to grow the size of the firm (Jensen 1986). A significantly more positive relation between tax avoidance and investment among firms with greater relative internal resources suggests overinvestment as the likely source of the positive relation.

Firms with higher cash flow volatility are more likely to experience financing deficits and forgo investment because of capital rationing (Minton and Schrand 1999). Firms with volatile tax avoidance strategies are similarly likely to suffer shortfalls in cash flows related to tax avoidance and are less able to rely on tax avoidance to consistently fund investments. To the extent that firms rely on the cash flow from tax avoidance to overcome capital rationing and fund investments, the relation between tax avoidance and investment will be less positive for firms with volatile tax avoidance strategies and more positive for firms with less volatile tax avoidance strategies. Prior evidence suggests managers are likely to overinvest unexpected funds from cash windfalls, indicating overinvestment is more likely to occur in settings of volatile tax avoidance (Blanchard et al. 1994). A significantly more positive relation between tax avoidance and investment among firms with volatile tax avoidance strategies suggests overinvestment as the likely source of the positive relation.

I find that capital rationing is more likely to be the source of the positive relation between tax avoidance and investment, rather than overinvestment. Firms with higher

levels of managerial ownership have a significantly more positive association between tax avoidance and investment than firms with lower levels of managerial ownership. Also, firms with greater relative internal resources have a less positive association between tax avoidance and investment than firms with less relative internal resources. Finally, firms with volatile tax avoidance have a less positive association between tax avoidance and investment compared to firms with less volatile tax avoidance strategies. Overall, my findings are consistent with the view that, on average, tax avoidance is a source of internal financing for firms.

My findings are important for several reasons. First, understanding the consequences of tax avoidance is important to shareholder wealth, especially if forgone investment opportunities or overinvestment are costly to the firm (Minton et al. 2002; Minton and Schrand 1999). Second, the consequences of tax avoidance are important to policymakers as they try to understand the costs and benefits associated with curtailing tax avoidance. My findings suggest that curtailing tax avoidance may decrease investment. Third, my results are important to managers seeking to overcome financing constraints and optimize investment and suggest that tax avoidance can, on average, be used as a form of internal financing.

I contribute to several areas of accounting research. Previous literature examines the measurement (Dyreng et al. 2008; Frank et al. 2009) and determinants (Badertscher et al. 2010; Chen et al. 2010; Gaertner 2010; Higgins et al. 2011; McGuire et al. 2011b; Minnick and Noga 2010; Rego and Wilson 2012; Wilson 2009) of tax avoidance. It is only recently that researchers have examined the financial effects of tax avoidance,

including leverage (Graham and Tucker 2006), cash holdings (Dhaliwal et al. 2011), firm value (Desai and Dharmapala 2009; Koester 2011; Wang 2010; Wilson 2009), and investor reaction (Frischmann et al. 2008; Hanlon and Slemrod 2009; Kim et al. 2010). I contribute to this line of literature by examining the effect of tax avoidance on investment, providing real effects to support the prior financial policy and price effects. Blaylock (2011) and Khurana et al. (2011) find conflicting evidence on whether tax avoidance is related to firm's investment.[4] I am able to provide additional evidence on a positive relation between tax avoidance and investment that may help to reconcile the results of these studies. Second, I contribute to the corporate governance view of tax avoidance, Desai and Dharmapala (2006) theorizes a moral hazard framework for a manager's tax avoidance decisions. I expand this by examining tax avoidance from the perspective of adverse selection, another prevalent capital market imperfection that can affect investment through capital rationing. Third, I contribute to the corporate finance literature by providing additional evidence on the capital market imperfection which links investment to internal resources (Stein 2003; Hadlock 1998). Lastly, I contribute to the literature on firms' responses to financing constraints that considers financial reporting quality (Biddle et al. 2009; Biddle and Hilary 2006), blockholder ownership (Allen and Phillips 2000), and cross-subsidies within the firm (Hadlock et al. 2001) as means of alleviating financing constraints. I propose another firm-level response for the alleviation of financing constraints, tax avoidance.

[4] Both Blaylock (2011) and Khurana et al. (2011) consider tax avoidance from a moral hazard perspective arguing that a positive relation between tax avoidance and investment results from moral hazard problems. In addition to evaluating the moral hazard argument, I also consider adverse selection as an explanation for any positive relation.

The remainder of the paper is structured as follows. In the next section, I discuss prior literature on investment and tax avoidance and develop my hypotheses. In Section 3, I define variables and describe the methodology. Section 4 details my sample while Section 5 discusses the univariate and multivariate. In Section 6, I perform robustness tests. Section 7 concludes.

CHAPTER II

HYPOTHESIS DEVELOPMENT

Investment with Imperfect Capital Markets

When capital markets contain perfect information, internal and external resources are perfect substitutes for financing investments (Modigliani and Miller 1958). Under this view of the firm, managers invest resources until the marginal benefit of investment equals the marginal cost and investment is driven by investment opportunities (Hayashi 1982; Tobin 1969). If firms experience a financing deficit, where investment opportunities exceed internal resources, external resources can be obtained without excessive cost. However, prior research documents a strong relation between firms' internal resources and the level of investment indicating that managers must, at least partially, rely on internally generated cash flow for financing (Lamont 1997; Richardson 2006; Stein 2003). Fazzari et al. (1988) demonstrate that firm-level cash flow is a significant determinant of investment, even after controlling for investment opportunities. Alternatively, Blanchard et al. (1994) find that firms increase their investment in response to cash windfalls from favorable legal settlements, despite low investment opportunities.

Two different capital market imperfections can lead to this positive relation between internal resources and investment: adverse selection and moral hazard (Stein 2003). Adverse selection arises because of information asymmetry between the manager and outside financiers (Myers and Majluf 1984; Stiglitz and Weiss 1981). Myers and

Majluf (1984) model adverse selection for equity financing and suggest that managers exploit their informational advantage by issuing equity when they have information that the firm is overvalued.[5] As a result, the capital obtained from new shareholders benefits current shareholders at the expense of new shareholders. In equilibrium, potential shareholders are aware of this transfer of wealth and increase their required return by reducing the quantity of equity capital available to managers, a phenomenon described as capital rationing. In Myers and Majluf (1974), management is unable to obtain outside financing for all positive net present value (NPV) projects because of capital rationing. As a result, firms rely on internal resources to fund investments and may forgo positive NPV investments when they face a financing deficit.[6]

In contrast to capital rationing, which arises because of the increased cost of external financing, moral hazard arises because managers take actions to benefit themselves at the expense of all shareholders. Jensen and Meckling (1976) model moral hazard as the difference in utility functions between managers and shareholders. Managers' interests are not perfectly aligned with shareholders' interests because managers do not bear the full cost of suboptimal behavior. Managers' preference for firm size or complexity may be different than shareholders because their private benefits of control increase with firm size (Hart and Moore 1995; Jensen 1986). As a result,

[5] In terms of debt financing, Myers (1977) notes that managers are able to either distribute debt proceeds to shareholders or invest in riskier assets to benefit shareholders at the expense of debtholders. Anticipating this misappropriation, debtholders increase their required return by decreasing the amount of debt capital offered to managers.

[6] Adverse selection and capital rationing are related concepts in that adverse selection induces capital rationing (Hadlock 1998; Hubbard 1998; Rauh 2006; Stein 2003; Vogt 1994). Adverse selection arises because of managers exploiting new shareholders and debtholders. Capital rationing arises because of shareholders' and debtholders' response to adverse selection, namely, the increased cost of external financing. All else equal, firms with larger adverse selection problems face greater capital rationing.

managers invest in negative NPV projects to increase the size of the firm, a phenomenon referred to as overinvestment. In the case of overinvestment, managers do not seek external financing because it would discipline their self-interested behavior (Harris and Raviv 1990; Jensen 1986; Stein 2003; Stulz 1990). Therefore, firms rely on internal resources to fund investments.

Tax Avoidance

Tax avoidance is "the reduction of explicit taxes" (Hanlon and Heitzman 2010). Following Hanlon and Heitzman (2010), I consider tax avoidance to be a continuum that ranges from objectively legal strategies (e.g., investments in municipal bonds) to those of uncertain legality (e.g., tax shelters). [7] Traditionally, researchers have examined tax avoidance in the context of a trade-off where the benefits of reducing taxes are balanced against financial reporting and regulatory costs (Shackelford and Shevlin 2001; Scholes et al. 2008). Under this traditional view, a firm's level of tax avoidance balances marginal benefit and marginal cost and is therefore beneficial to shareholders. However, Desai and Dharmapala (2006) discuss tax avoidance in the context of a moral hazard framework, in which tax avoidance is not always optimal for shareholders because it may facilitate management's self-interested behavior. The traditional and the moral hazard views of tax avoidance provide theoretical links to a firm's investment.

[7] While it is difficult to operationally distinguish tax avoidance and tax evasion, tax evasion is the fraudulent and illegal reduction of explicit taxes whereas extreme forms of tax avoidance involve tax benefits that are uncertain and might exploit tax regulations in a manner unintended by taxing authorities (Frank et al. 2009; Hanlon and Heitzman 2010).

By definition, tax avoidance increases firms' after-tax cash flows.[8] All else equal, firms with higher levels of tax avoidance pay less (as a percentage of income) to the government than firms with lower levels of tax avoidance. Firms can use the increased after-tax cash flow from tax avoidance to alleviate the effects of capital rationing and maintain a higher level of investment compared to firms with a lower level of tax avoidance.[9] A dollar kept from taxing authorities is therefore an additional dollar of internal resources and, therefore, an additional dollar available for investment. The income shifting literature provides limited evidence of this positive relation between tax avoidance and investment. Oversech (2009) provides evidence that foreign firms invest more in Germany as their ability to shift profits outside of Germany increases. Grubert (2003) similarly finds an increase in R&D investment among multinationals that shift income to low tax jurisdictions. Both Oversech (2009) and Grubert (2003) attribute their findings to tax avoidance increasing firm profitability, a form of internal resources. However, the extent to which Oversech's (2009) and Grubert's (2003) findings apply to US firms as well as to tax avoidance that is not income shifting is an open, empirical question. Evidence from the valuation literature is also consistent with capital rationing. Koester (2011) and Wang (2010) find that tax avoidance is, on average, positively valued by the market. A positive valuation could imply that tax avoidance alleviates capital rationing and allows firms to invest in positive NPV projects. If firms use the

[8] This assumes that implicit taxes do not equal tax preferences (Jennings et al. Forthcoming). Implicit taxes are decreases in pre-tax returns of tax-favored assets. Jennings et al. (Forthcoming) find that after 1986, implicit taxes do not equal tax preferences. To the extent that tax avoidance leads to implicit taxes, my tests are biased against finding results.

[9] Tax avoidance can be used to reduce the effects of capital rationing on investment but does not directly alleviate adverse selection problems. It is unclear whether future shareholders benefit from current period tax avoidance.

cash flow savings from tax avoidance to mitigate the effects of capital rationing, there should be a positive relation between tax avoidance and investment.

Desai and Dharmapala (2006) consider tax avoidance from an agency cost perspective, where managers are able to use tax avoidance to facilitate their rent extraction. Because the value of tax avoidance is decreasing in the probability of detection (Allingham and Sandmo 1972), there must be a level of obfuscation for tax avoidance to be beneficial to shareholders.[10] Balakrishnan et al. (2011) and Hope et al. (2012) provide empirical confirm of Desai and Dharmapala's (2009) theory and find that tax avoidance is positively associated with information asymmetry among shareholders. The greater the obfuscation, the lower the marginal cost of manager's rent extraction because monitoring is one primary constraint on a manager's rent extraction (Desai and Dharmapala 2006; Jensen 1986; Jensen and Meckling 1976). If tax avoidance increases the information asymmetry associated with public disclosures for both shareholders and taxing authorities then it likely not only reduces detection risk but also hides rent extraction from shareholders. Empirical evidence supports the moral hazard view of tax avoidance (Desai and Dharmapala 2006; Koester 2011; Wang 2010; Wilson 2009). Tax avoidance may, therefore, increase a manager's ability to conceal from shareholders the consumption of internal resources for personal gain. Managers can use tax avoidance to facilitate overinvestment because tax avoidance provides both increased after-tax cash flows and the ability to conceal self-interested actions from shareholders. To the extent that mangers overinvest the cash savings, there should be a positive relation between tax

[10] This obfuscation is not only related to taxing authorities, but also to shareholders. Taxing authorities are aware of financial statement disclosures and employ them in the audit process (Mills 1998).

avoidance and investment. Given the similarly positive predictions from capital rationing and moral hazard and the inconsistency of prior empirical evidence, I hypothesize in the alternative form:

H1: Tax avoidance is significantly and positively associated with the level of firm's investment.

A positive relation would suggest managers use the cash savings from tax avoidance to alleviate capital rationing or that managers exploit the information asymmetry associated with tax avoidance by using the cash savings from tax avoidance to overinvest. I discuss how to distinguish capital rationing and overinvestment in the following section.

Distinguishing Capital Rationing and Overinvestment

A simple association test between tax avoidance and investment cannot distinguish adverse selection's capital rationing and moral hazard's overinvestment because both predict a positive association. Previous research establishing a relation between tax avoidance and investment has exclusively relied on overinvestment as motivation (Khurana et al. 2011; Blaylock 2011). However, as Stein (2003), Bergstresser (2006), and Hadlock (1998) argue, capital rationing can also produce a positive relation between internal resources and investment. To determine if a positive relation between tax avoidance and investment is the result of capital rationing or overinvestment, I further examine the relation in three different settings.

First, adverse selection and moral hazard make different assumptions about the behavior of managers. Realizing this difference between capital rationing and

overinvestment, Hadlock (1998) and Ozbas and Scharfstein (2010) partition their samples on managerial ownership to determine if a positive relation between internal resources and investment is due to capital rationing or overinvestment. Managerial ownership exacerbates adverse selection because CEOs internalize a greater portion of the benefits from issuing overvalued securities. Therefore, managerial ownership increases the adverse selection problem, thus increasing capital rationing, and increasing firm's reliance on the cash savings from tax avoidance. To the extent that capital rationing is the source of a positive relation between tax avoidance and investment, then the association will be significantly greater when managerial ownership is high. Managerial ownership, on the other hand, alleviates moral hazard because CEOs internalize a greater portion of the costs associated with overinvestment. To the extent that overinvestment is the source of the positive association between tax avoidance and investment, then the association should be significantly less positive when managerial ownership is high. Given the different predictions offered by capital rationing and overinvestment, I offer a hypothesis in the null form:

> H2: The association between tax avoidance and the level of firm's investment is not significantly different between firms with high CEO ownership and firms without high CEO ownership.

Second, the level of internal resources relative to investment opportunities affects capital rationing and overinvestment differently. Hoshi et al. (1991) and Richardson (2006) partition on Tobin's Q and free cash flow, respectively, to take advantage of the different effects internal resources have on capital rationing and overinvestment in order

to identify the source of a positive relation between internal resources and investment. All else equal, capital-rationed firms with more investment opportunities and insufficient internal resources are more likely to experience a financing deficit and would be more likely to forgo investments because of the excessive cost of external financing. Firms with less relative internal resources would therefore benefit the most from tax avoidance.[11] If tax avoidance and investment are related due to capital rationing, then the association between tax avoidance and investment should be significantly less positive among firms with greater relative internal resources as these firms are most likely to forgo investments. On the other hand, overinvestment is most likely to occur in firms with greater relative internal resources (poor investment opportunities and positive free cash flow). Managers' incentive to overinvest does not decrease with investment opportunities (Hoshi et al. 1991; Jensen 1986). Moreover, managers with positive free cash flow have the opportunity to invest beyond the optimal level (Jensen 1986; Richardson 2006). All else equal, firms with greater relative internal resources are more likely to invest suboptimally. If tax avoidance and investment are related due to overinvestment, then the association should be greater among firms with high relative internal resources. I hypothesize:

> H3: The association between tax avoidance and the level of firm's investment is not significantly different between firms with greater relative internal resources and firms with less relative internal resources.

[11] Greater relative internal resources do not impact adverse selection, directly, but exacerbate the effect capital rationing has on investment by increasing the need for costly external financing.

Finally, the volatility of tax avoidance has different effects on capital rationing and overinvestment. Firms experiencing capital rationing must seek internal forms of financing. When forms of internal financing are volatile, firms are more likely to experience financing deficits and, because of capital rationing, forgo investment (Minton and Schrand 1999). [12] If capital rationing contributes to the positive relation between tax avoidance and investment, volatile tax avoidance strategies will be less able to finance investment because of the risk that cash flows from tax avoidance do not materialize.[13] To the extent that tax avoidance and investment are related due to capital rationing, then the association between tax avoidance and investment should be significantly less positive among firms with volatile tax avoidance strategies compared to firms with less volatile tax avoidance strategies. While volatile tax avoidance is less likely to finance investments under capital rationing, volatile cash flows from tax avoidance are more likely to fund overinvestment. Blanchard et al. (1994) argue that firms with large cash windfalls are likely to overinvest as the unexpected cash flow provides managers an opportunity to grow the firm. Controlling for the level of tax avoidance, more volatile tax avoidance strategies are likely to reflect one-time cash windfalls from short-term tax strategies or settlements with taxing authorities. If overinvestment influences the positive relation between tax avoidance and investment, then the association will be significantly

[12] Interacting tax avoidance with the volatility of operating cash flows would not aide in distinguishing capital rationing and overinvestment. As discussed above, volatile operating cash flows lead firms that are experiencing capital rationing to forgo investment. However, to the extent that volatile operating cash flows represent one-time cash flows, then overinvestment is also likely to be exacerbated (Bates 2005; Blanchard et al. 1994).

[13] The volatility of operating cash flows, not the volatility of tax planning, is likely to be the primary reason a firm forgoes investment due to capital rationing. However, firms that are already experiencing capital rationing are the most likely to seek stable (i.e. less volatile) forms of internal financing to alleviate the effects of capital rationing. Thus, I interact tax avoidance with the volatility of tax avoidance.

more positive among firms with more volatile tax avoidance. Given the conflicting expectations, I hypothesize:

H4: The association between tax avoidance and the level of firms' investment does not significantly vary with the volatility of firms' tax avoidance.

CHAPTER III

VARIABLE DEFINITION AND METHODOLOGY

I test my hypotheses using two different methods. First, I test the association between tax avoidance and investment, controlling for other documented determinants of investment. Second, I distinguish whether capital rationing and overinvestment are the likely source of a positive association by investigating how the association varies between firms with high managerial ownership, greater relative internal resources, and the volatility of tax avoidance.

Model Development

I use Model (1) as the primary test for my first hypothesis. Model (1) is an OLS regression of firms' investment, defined as either as investment or unexpected investment, on my measure of tax avoidance and other control variables. I estimate Model (1) over the entire sample, adjust standard errors for firm and year clustering, and include industry fixed effects (b_j).

$$I_{i,t} = b_0 + b_1\, negCETR5_{i,t-1} + Controls'_{k,t-1} + b_j + e_{i,t} \quad (1)$$

where:

$negCETR5_{i,t-1}$ = My proxy for tax avoidance, defined in Equation (3)

$Controls'_{k,t-1}$ = Control variables detailed below

b_j = Industry fixed-effects based on Fama-French 48 definitions

The dependent variable of Model (1) is either *Invest* or *UnExp_Invest*. Investment (*Invest*) is the sum of capital expenditure (*CAPX*), research and development

(*XRD*), and acquisitions (*AQC*) less the sale of property, plant, and equipment (*SPPE*) and scaled by lagged total assets (*AT*) in accordance with Biddle et al. (2009).[14] Invest has the advantage of not making assumptions about firms' investment functions but suffers the disadvantage of not controlling for growth opportunities. Therefore, my second measure of investment, *UnExp_Invest*, is the residual from an industry-year regression of investment (*Invest*) on investment opportunities (*Opportunities*) (Model (2)). *UnExp_Invest* controls for how a firm's industry invests based on its investment opportunities.[15] Model (2) follows directly from Verdi (2006) as well as conceptually with the two-stage approach used by Richardson (2006). This measure allows me to distinguish between two firms' investment levels with different investment opportunities that are in the same industry.

$$Invest_{i,t} = a_0 + a_1\ Opportunities_{i,t-1} + e_{i,t} \quad (2)$$

Model (2) is based on the idea that when capital markets are perfect and frictionless, a firm's investment should be a function of investment opportunities (Hayashi 1982; Hubbard 1998; Tobin 1969). Traditionally, a firm's optimal investment is a linear function of its Tobin's Q.[16] However, recent research acknowledges that Q's denominator, the book value of assets, can be biased by the accounting system's conservatism and suggests sales growth as an alternate proxy for a firm's investment

[14] Following Biddle et al. (2009), I also analyze only capital expenditures (*CAPX*) and research and development (*XRD*) as measures of firm-level investment. Results are inferentially similar for both capital expenditures and research and development forms of investment.
[15] I continue to use industry fixed-effects to control for the industry-average value of tax avoidance and control variables for firms in my sample.
[16] Tobin's Q is the ratio of a firm's market value of assets to book value of assets ((*AT* + (*PRCC_F*CSHO*) – *CEQ*)/ *AT*).

opportunities (Biddle et al. 2009; Richardson 2006).[17] I present results using sales growth as a proxy for investment opportunity to avoid potential biases associated with using Tobin's Q, consistent with Biddle et al. (2009) and Verdi (2006). However, I acknowledge that sales growth is also not a perfect proxy for investment opportunities. Therefore, I remove observations where residuals have conflicting signs across the Tobin's Q and sales growth specification (6,254 firm-years).[18, 19]

The variable of interest in Model (1) is *negCETR5*, which is the five-year cash effective tax rate from Dyreng et al. (2008) multiplied by negative one.[20] Using cash taxes paid has the advantage of capturing both permanent and temporary forms of tax avoidance without the effects of GAAP tax accruals, such as tax cushions or valuation

[17] The potential bias in Tobin's Q can produce spurious results in my study for two reasons. First, financial accounting introduces conservatism to the measure of Tobin's Q and thus could potentially create spurious correlations. I want to avoid spurious correlations with tax avoidance measures because there is evidence that tax avoidance and financial reporting quality are positively correlated (Frank et al. 2009). Second, research and development expenditures can qualify for the R&D tax credit, which lowers a firm's ETR and, through the expensing of R&D, increases a firm's Tobin's Q. This also can introduce a spurious correlation because the level of research and development expenses is likely mechanically related to Tobin's Q.

[18] Comparing the relation between investment and sales growth within an industry allows for a benchmark across firms but the OLS specification of Model (1) forces deviations from expected investment to average to zero in every industry-year. Verdi (2006) notes that deviations from expected investment can be pervasive across industries, suggesting that an OLS residual may be an inappropriate measure because they mechanically average to zero. In an untabulated robustness test, I allow for a given industry to experience pervasive deviations from expected investment by adding the difference between the industry-year average investment and total sample average investment to the residual from Model (1). This adjustment assumes that, in the long run, all firms invest optimally and allows for a given industry-year to broadly experience incentives to deviate from expected investment. Results are qualitatively similar.

[19] Results are qualitatively similar when I include firms with conflicting signs across Tobin's Q and sales growth. In addition, my results hold when I simply use the traditional Tobin's Q variable as a proxy for investment opportunities.

[20] In untabulated analysis, I use firms' five-year current ETR to measure tax avoidance. Using the current ETR, I find a positive relation between tax avoidance and investment among firms that invest above their expected investment level. I also find significant and positive interactions between current ETRs and CEO ownership. Both findings are consistent with firms using tax avoidance to alleviate capital rationing and not overinvestment. I present results using *negCETR5* as this variable is arguably more highly correlated with the cash savings from tax avoidance than current ETR. As firms fund investments with cash and not earnings, *negCETR5* appears a stronger measure for testing my hypotheses. In addition, financial statement accruals, such as valuation allowances or tax cushions, do not influence cash ETRs but positively bias current ETR measures.

allowances. However, cash taxes may suffer from a mismatching problem because estimated tax payments for future periods and payments of back taxes are included in the variable. Therefore, I accumulate cash taxes paid over the period t-5 to t-1 and scale by pretax income net of special items over the same time period to minimize this mismatching problem. To ease interpretation, I multiply *negCETR5* by negative one so that it is increasing in tax avoidance. It is important to note that the measurement of *negCETR5* precedes investment (i.e. the accumulation of numerator and denominator ceases in year t-1) and does not overlap with the year that investment occurs (year t). Current period investment and current period tax avoidance are mechanically related because of accelerated tax depreciation and the research and development tax credit. Measuring tax avoidance before the investment occurs minimizes the likelihood that results are due to this mechanical association.[21]

$$negCETR5 = (-1)*[\Sigma TXPD / \Sigma (PI-SPI)] \quad (3)$$

While use of effective tax rates (ETRs) is common in accounting literature, one notable drawback of ETRs is their inability to provide a dollar-value quantification of the cash of the savings from tax avoidance. Therefore, I use Equation (4) in order to provide a quantification of the cash savings from tax avoidance. Equation (4) assumes that absent tax avoidance strategies, firms pay the US federal statutory tax rate of 35%.[22]

[21] In a robustness test, I measure tax avoidance two periods prior to investment to further minimize the risk of a mechanical association (i.e. I accumulate from year t-6 to t-2). Results are inferentially similar.

[22] Even though the US Federal statutory tax rate is 35%, firms may be taxed at different rates if their earnings are only taxable in foreign jurisdictions. The extent to which firms do not save at a rate of 35% on tax avoidance activities introduce noise in my estimates of *Tax Cash Savings* and biases against my finding results as my estimate of tax cash savings would deviate from the actual tax cash savings, reducing the explanatory power of my estimate (Hanlon 2003).

I then multiply the difference between the statutory tax rate and a firm's *CETR5* by a firm's pretax income to transform the cash savings from a scaled value to a dollar value.

$$Tax\ Cash\ Savings_{i,t-1} = [(.35\text{-}CETR5_{i,t-1})*PI_{i,t-1}]/AT_{i,t-1} \quad (4)$$

I then include Tax Cash Savings in Equation (5) to estimate the portion of tax cash savings that firms invest, on average. Equation (5) is a modified version of Equation (1) and includes pretax cash flows (*PTCF*) as well as firm (b_i) and year (b_t) fixed-effects.[23] Pretax cash flows are operating cash flows (*OANCF*) plus cash taxes paid (*TXPD*) scaled by lagged total assets. The firm and year fixed-effects allow me to interpret the coefficient on *Tax Cash Savings* as the amount that firms invest from one additional dollar of cash savings from tax avoidance controlling for the firm and year's average *Tax Cash Savings* and *Invest*.

$$Invest_{i,t} = b_0 + b_1\ Tax\ Cash\ Savings_{i,t-1} + b_2 PTCF_{i,t-1} + Controls'_{k,t-1} + b_i + b_t + e_{i,t} \quad (5)$$

In my second set of tests, I provide evidence on whether capital rationing or overinvestment is, on average, more likely to be the source of the positive association. I use Model (1) and interact *negCETR5* with three variables: managerial ownership, relative internal resources, and the volatility of tax avoidance. All three variables provide unique directional-predictions for capital rationing or overinvestment.

First, I obtain CEO ownership from Compustat's *Execucomp* database. Then, I sort firms into quintiles based on CEO ownership. I create an indicator variable, *HighCEO*, which equals one if the firm is in the top quintile of CEO ownership and zero

[23] I only use *Invest* as the dependent variable for Equation (5) to match the cash inflow of tax avoidance with the cash outflow of investment. Because *Invest* represents the entire cash outflow of investment for a given firm-year and *UnExp_Invest* only represents a portion of the investment outflow, estimating a regression with *UnExp_Invest* as the dependent variable may underestimate the magnitude of investment associated with the cash savings from tax avoidance.

otherwise. I interact *HighCEO* with my tax avoidance measure. A positive coefficient on the interaction suggests that firms that avoid taxes and have high CEO ownership invest more than firms that avoid taxes and have low CEO ownership, consistent with capital rationing being the source of the positive relation. A negative coefficient on the interaction suggest that as CEO's incentives are increasingly aligned with shareholders, investment levels decrease among firms that avoid taxes, consistent with overinvestment being the source of the positive relation.

Second, I partition my sample on firms' internal resources relative to investment opportunities. I follow Hoshi et al. (1991) and Richardson (2006) by measuring firms' investment opportunities using Tobin's Q and the sign of free cash flow for internal resources. I follow Richardson (2006) by defining free cash flow as the sum of operating cash flows (*OANCF*), research and development (*XRD*), less depreciation (*DPC*) and the predicted investment value from Model (2). I measure relative internal resources based on the dimensions of free cash flow and investment opportunities. I create an indicator variable (*High_RIR)* that equals one for firms with positive free cash flow and with Tobin's Q in the bottom two quintiles of its industry-year.[24] Firms with high relative internal resources have cash flow in excess of expect investment and low investment opportunities for their industry and time period. I interact *High_RIR* with my tax avoidance measure. A negative coefficient on the interaction suggests that firms that avoid taxes and have high relative internal resources investment opportunities rely less

[24] In untabulated analysis, I also interact tax avoidance with positive free cash flow and low values of Tobin's Q separately. Results for Tobin's Q are inferentially similar to *High_RIR*. The interaction between tax avoidance and positive free cash flow is insignificant.

on tax avoidance to fund investments than firms that avoid taxes and have low relative internal resources, consistent with firms with a high level of preexisting internal resources relative to investment opportunities relying on tax avoidance less to alleviate capital rationing and fund investment. A positive coefficient on the interaction suggests that firms that avoid taxes and have high relative internal resources invest more than firms that avoid taxes and have less relative internal resources; supporting the notion that overinvestment is the likely source of the positive relation.

Third, I partition on the volatility of a firm's tax avoidance. I follow McGuire et al. (2011a) by measuring the volatility of tax avoidance using the coefficient of variation over the five year period in which I measure tax avoidance.[25] Specifically, *CVCETR5* equals the standard deviation of annual cash ETRs from year t-6 to t-1 divided by the absolute value of the mean of annual cash ETR over the same five-year period. *CVCETR5* is increasing in the volatility of tax avoidance, controlling for the average level of tax avoidance. I interact *CVCETR5* with *negCETR5*. A negative coefficient on the interaction suggests that firms that have high volatility in their tax avoidance rely less on tax avoidance to fund investment, consistent with firms facing the risk of suffering a shortfall in cash savings from tax avoidance not relying on tax avoidance to alleviate capital rationing. A positive coefficient on the interaction suggests firms that avoid taxes, but do so inconsistently, overinvest their cash flow windfalls from tax avoidance.

[25] McGuire et al. (2011a) refer to their measure as the sustainability of tax avoidance. I refer to their measure as the volatility of tax avoidance to conceptually link my research question with prior literature on the volatility of cash flows.

Controls

I control for other determinants of investments that have been cited in the literature. Biddle et al. (2009) and McNichols and Stubben (2008) find that financial reporting quality decreases investment inefficiency. I control for financial reporting quality using one of two proxies. I follow Biddle et al. (2009) and use the cross sectional Dechow and Dichev (2002) model supplemented with variables suggested in McNichols (2002). I measure *Dechow* as the standard deviation of the previous five years' residuals ($e_{i,t}$) from Model (6). I multiply *Dechow* by negative one for ease of interpretation, such that higher values of *Dechow* indicate better financial reporting quality. I also follow Ayers et al. (2009) and use the absolute value of discretionary accruals calculated with the modified Jones (1991) model. *AbsDACC* is the absolute value of the residual ($u_{i,t}$) from Model (7). I estimate both Models (6) and (7) for every industry-year with at least 20 valid observations.[26]

$$Accruals_{i,t} = c_0 + c_1 CF_{i,t-1} + c_2 CF_{i,t} + c_3 CF_{i,t+1} + c_4 dRev_{i,t} + c_5 PPE_{i,t} + e_{i,t} \quad (6)$$

$$Accruals_{i,t} = d_0 + d_1 1/A_{i,t-1} + d_2(dRev_{i,t} - dRec_{i,t}) + d_3 PPE_{i,t} + u_{i,t} \quad (7)$$

where:

$Accruals_{i,t-1}$ =The difference between income before extraordinary items and operating cash flows scaled by lagged total assets [(*IB*-*OANCF*)/*AT*]

CF = Operating cash flow scaled by lagged total assets (*OANCF*/*AT*)

[26] Requiring only ten valid observations for an industry-year only increases my sample size by 426 firm-year observations. Results are robust to the inclusion of these additional observations.

dRev = Change in revenue (*SALE*) from year t-1 to year t scaled by average total assets (*AT*)

dRec = Change in receivables (*RECT*) from year t – 1 to year t scaled by average total assets (*AT*)

1/A = The invest of lagged total asset (*AT*)

PPE = Gross property, plant, and equipment scaled by lagged assets (*PPEGT*/*AT*)

Because deviations from expected investment are the result of capital market imperfections, I include proxies for corporate governance and the firm's information environment based on prior research that links firms operating and investing decisions to these variables (Core et al. 2006; Ferreira and Matos 2008). *IO* is the percentage of shares held by institutional ownership from Thompson Reuters. To control for a firm's information environment, I include analyst following (*Numest*) from I/B/E/S. *InvG* is the inverse of a firm's G-index from Risk Metrics. Due to Risk Metrics issuing the G-index biannually, I assume that a firm's G-index in year t is the same in year t+1 (with an updated score being issued in t+2). Because not all sample firms have a G-index, I create an indicator variable *Ginddum,* which is set equal to one to indicate that a firm does not have a G-index.[27] Approximately two-thirds of my sample lacks a G-index. For firms with missing G-indexes, I follow Biddle et al. (2009) and replace their G-index with zero. Omitting such a large portion of my sample would limit the generalizability of my

[27] I follow Biddle et al. (2009) in setting missing G-index to zero and creating a variable for a missing G-index. As a robustness test, I follow an alternative data imputation method and set all missing variables equal to the sample average (-9.21). Results are inferentially similar.

findings. I use both *InvG* and *Ginddum* in my models so I can control for the effect of governance without unnecessarily limiting my sample size. I predict firms with greater *IO*, *InvG*, and *Numest* engage in less overinvestment as monitoring and governance should alleviate both the moral hazard and adverse selection problems.

I expect firms with greater leverage to invest less than firms with less leverage because returns to investment may accrue to debtholders and not benefit management or shareholders (Myers 1977). I calculate leverage as the ratio of long-term debt (*DLTT*) to assets (*AT*). Firms with higher levels of cash are less reliant on external financing and more likely to overinvest (Blanchard et al. 1994; Jensen 1986). I measure *Cash* as the ratio of cash and short term investments (*CHE*) to assets (*AT*). *LnAT* is the natural log of a firm's assets (*AT*) and proxies for size. Larger firms are likely to have fewer capital constraints and more sophisticated internal controls and thus be less prone to under- and overinvestment (Biddle et al. 2009). *MTB* is a firm's market-to-book ratio, calculated as the ratio of the market value of equity (*PRCC_F*CSHO*) scaled by the book value of equity (*CEQ*). As prior literature finds that *MTB* is positively correlated with growth opportunities, I expect firm with higher values of *MTB* to have larger investment.

I include *StdCFO*, *StdSales*, and *StdInvest* to capture a firm's operating environment. Firms in volatile operating environments are likely to face greater difficulty accessing outside capital (Minton and Schrand 1999). *StdCFO* is the standard deviation of a firm's scaled operating cash flows (*OANCF*/*AT*) calculated over the prior five years. *StdSales* is the standard deviation of a firm's scaled sales (*SALE*/*AT*) calculated over the prior five years. *StdInvest* is the standard deviation of a firm's scaled

investment (*Invest*/*AT*) calculated over the prior five years. I require three out of five observations for *StdCFO*, *StdSales*, and *StdInvest* to be included in my sample.

I measure a firm's financial distress using the *Zscore* from Kaplan and Zingales (1997).[28] I expect firms closer to financial distress to invest significantly less. I include *Tang*, the ratio of PPE to total assets (*PPEGT*/*AT*) to control for a firm's collateral. Firms with more collateral have more access to outside debt financing and therefore invest more than firms with less collateral (Almeida and Campello 2007). Firms with greater cash flows invest more than firms with less cash flows (Stein 2003). Therefore, I control for *CFOSale*, the ratio of *OANCF* to *SALE*. Firms that pay dividends have greater cash flows and therefore are expected to invest less. I include *DIV*, an indicator variable equaling one when DV or *DVC* is greater than zero and zero otherwise. *Age* and Opcycle are meant to capture a firm's business cycle. Mature firms tend to have fewer investment opportunities. I expect older firms and firms with longer operating cycles to invest less than younger firms and firms with shorter operating cycles. I measure operating cycle as the natural log of the sum of receivables turnover (*RECT*/*SALE*) and inventory turnover (*COGS*/*INVT*), multiplied by 360. I measure age as the number of years since a firm was first reported in CRSP. Finally, I control for firms with losses (when $IB < 0$) as firms with losses have less internal resources to invest (Stein 2003).

[28] I calculate *Zscore* as (3.3**PI*+*SALE*+.25**RE*-.5(*ACT*-*LCT*))/*AT*.

CHAPTER IV

SAMPLE SELECTION

To develop my various subsamples, I select all Compustat firms between 1992 and 2008 that have positive asset values, sales, and PPE, are incorporated in the United States, and have non-negative values of capital expenditure (*CAPX*), research and development (*XRD*), cash acquisitions (*AQC*), and sales of property, plant, and equipment (*SPPE*) (129,293 firm-years).[29] The sample period begins in fiscal year 1993 because ASC 740 became effective for fiscal years beginning after December 15th, 1992, ensuring consistent reporting for income taxes throughout the entire sample period.[30] The sample period ends in 2008 to allow for a one year lead value to calculate the dependent variable. I remove financial firms as their investment behavior is likely to be constrained by regulations (119,352 observations).

I then limit the sample to firms with at least 20 industry-year observations to estimate Model (2) (96,263 firm-years remaining). I define industries using the Fama-French 48 industry definitions. Because the moral hazard tests require analysis on truncated samples, I require observations to have similarly-signed residuals across the Tobin's Q and sales growth versions of Model (2) (90,009 observations remaining).

[29] FIN 48 became effective in 2007. My sample therefore contains two years in which FIN 48 was effective. To allow for the possibility that FIN 48 changed the relation between tax avoidance and investment, I include an indicator variable that equals one for years following FIN 48 and interact it with *negCETR5*. Both the main effect and the interaction are insignificant, suggesting that FIN 48 did not alter the relation between tax avoidance and investment.

[30] As fiscal years and calendars years are not perfectly correlated, an immaterial portion of my sample has fiscal years ending before December 15th, 1992 (26 observations) and are thus reporting their taxes under APB 11 rather than ASC 740. Results are inferentially similar when removing these observations.

Observations with conflicting signs are not clearly identifiable as either investing above or below an expected level and likely contain excessive measurement error.

I eliminate firms that do not have adequate information for the control variables specified in Model (1). Because earnings quality, cash flow, and sales reporting were unlikely to have been affected by SFAS 109, I use information prior to 1992 in order to calculate *Dechow, StdCFO*, and *StdSales.* I obtain institutional ownership data from Thompson Reuters, *Numest* from the I/B/E/S summary file, and G-indexes from Risk Metrics. I follow Biddle et al. (2009) and assume that if a firm has missing institutional ownership or missing analyst following then these variables are equal to zero.[31] After eliminating firms because of these constraints, the sample has 57,153 firm-year observations. Next, I require firms to have a nonmissing, valid value for negCETR5. I require firms to have positive values for both the numerator, cash taxes paid (*TXPD*), and denominator, pretax income less special items (*PI* less *SPI*) because I am not able to determine if firms receiving refunds or experiencing losses are avoiding taxes. This produces my final samples: 30,232 observations for models using *Dechow* and 29,585 observations for models *AbsDACC*.

[31] Missing institutional ownership occurs for approximately 16 percent of my sample. Approximately 18 percent of the sample lacks analyst following.

CHAPTER V

RESULTS

Univariate Statistics

Table 1 contains univariate statistics for my sample. Approximately one percent of observations have negative investment, indicating asset sales in excess of new investment. Approximately 65 percent of my sample invests below their expected level. This distribution of unexpected investment is similar to the findings of Biddle et al. (2009) and Verdi (2006). My measures of tax avoidance are slightly higher than Dyreng et al. (2008). My sample has an average *negCETR5* of -31.1 percent. On average, *Tax Cash Savings* is 0.006, suggesting that, on average, firms save 0.6 percent of assets through tax avoidance.

Correlations

Table 2 examines the correlations between tax avoidance and investment. Pearson correlation coefficients are above the main diagonal and Spearman correlation coefficients are below the main diagonal. I find a positive correlation between both measures of investment (*p-value* < 0.001), suggesting firm's investment responds to investment opportunities as suggested by Hayashi (1982) and Tobin (1969). Finally, I find significantly positive correlations between *negCETR5* and both investment measures (*p-value* < 0.001). However, I am unable to fully determine this relation without the inclusion of additional control variables.

Multivariate Results

I estimate Model (2) by industry-year. As expected, sales growth is positively associated with a firm's investment (*p-value* < 0.001). Of the 763 industry-year groups, sales growth is significantly positive in 262 specifications and significantly negatively in only 14 industry-years (untabulated).

Table 3 presents the results of estimating Model (1); the dependent variable of Columns (1) and (2) is *Invest* while *UnExp_Invest* is the dependent variable of Columns (3) and (4). Even-numbered columns control for financial reporting quality using *Dechow* while odd-numbered columns use *AbsDACC* to control for financial reporting quality. The coefficients on *negCETR5* are significantly positive, indicating that, on average, firms' investment increases with tax avoidance (*p-value* < 0.001). I fail to reject H1 as I find a positive association between tax avoidance and firm-level investment.

The control variables in Table 3 are broadly consistent with expectations and prior research. Firms with better financial reporting quality (*Dechow* and *AbsDACC*) invest less than firms with worse financial reporting quality (McNichols and Stubben 2008). Similarly, firms with fewer antitakeover provisions invest less than firms with more antitakeover provisions (*InvG*) (Biddle et al. 2009; Khurana et al. 2011). Firms with greater institutional ownership and greater cash, on average, invest significantly more than firms with less institutional ownership or cash (Biddle et al. 2009; Richardson 2006). This suggests firms with more internal resources and greater access to external capital are able to invest more. Also, the market-to-book ratio and cash flow volatility are significantly and positively associated with investment as in Biddle et al. (2009) and

Richardson (2006). Firms with higher leverage and that are closer to financial distress invest significantly less, consistent with Myers (1977). *StdSales* is significantly negative, suggesting firms in more volatile consumer markets invest less than firms in steadier consumer markets (Biddle et al. 2009; Khurana et al. 2011). *StdInvest* is significantly positive, as in Biddle et al. (2009). *Tang* is significantly positive, consistent Almeida and Campello (2007). Firms with longer operating cycles as well as older firms invest less than firms with shorter operating cycles and younger firms, consistent with prior research indicating that the operating environment and life cycle of firms affecting investment decisions (Biddle et al. 2009; Khurana et al. 2011). *CFOSale* is significantly negative, consistent with prior research (Biddle et al. 2009; Khurana et al. 2011). Firms with losses and firms that pay dividends invest significantly less, consistent with firms with less internal resources investing less than firms with more internal resources.

Table 4 presents my results of estimating Equation (5). The dependent variable in all columns is *Invest*. Columns (1) and (2) include my full sample of firms while Columns (3) and (4) limit my sample to firms with positive pre-tax income. I continue to fail to reject H1 as the coefficients on *Tax Cash Savings* are significant and positive in all columns (*p-value* = 0.002, 0.010, 0.000, and 0.000, respectively). On average, firms invest between 10.3-cents and 17.9-cents of one additional dollar of cash savings from tax avoidance. Firms invest between 20.0-cents and 22.4-cents of every additional dollar of pre-tax cash flows. The coefficients on *PTCF* as significantly greater than *Tax Cash Savings* in both columns, with *p-values* equaling 0.098 and 0.000, respectively. In all but Column (3), firms invest a significantly greater portion of pretax cash flows than cash

savings from tax avoidance (*p-value* = 0.098, 0.029, and 0.087, respectively). In Columns (3), the coefficients for *Tax Cash Savings* and *PTCF* are statistically indistinguishable with *p-value* = 0.398.

Determining the Source of the Positive Relation

The positive relation documented in the previous section is consistent with adverse selection's capital rationing and moral hazard's overinvestment being the source of the positive relation between tax avoidance and investment. To distinguish between these sources, I partition the sample on CEO ownership, relative internal resources, and the volatility of tax avoidance because each of these variables has unique predictions associated with either capital rationing or overinvestment.

The results for CEO ownership are presented in Table 5.[32] The dependent variable in Columns (1) and (2) is *Invest* while the last two columns' dependent variable is *UnExp_Invest.* A positive coefficient is consistent with firms that face greater adverse selection problems, and therefore greater capital rationing, relying on tax avoidance to fund investments whereas a negative coefficient is consistent with firms with less moral hazard problems overinvesting less. Although *negCETR5* is only significant in Column (2), the coefficients for tax avoidance are significantly positive when interacted with the top quintile of CEO ownership (*p-value* = 0.050, 0.041, 0.053, and 0.038 respectively). I therefore reject H2 in support of a positive interaction between tax avoidance and high CEO ownership. Ownership appears to encourage, rather than discourage, managers to use tax avoidance as a form of internal financing. This is consistent with capital

[32] The results presented here are only for CEO ownership. Results also hold when I use total ownership of the top five managers as well as the average ownership of the top five managers.

rationing being the likely source of the positive relation between tax avoidance and investment and inconsistent with overinvestment.

Table 6 presents the results from my high relative internal resource tests. The dependent variable of the first two columns is *Invest* while the dependent variable for the remaining two columns is *UnExp_Invest*. A negative coefficient on the interaction of *negCETR5* and *High_RIR* is consistent with firms that require less funding for investment opportunities (and therefore less likely to forgo investment because of capital rationing) not relying on tax avoidance to fund investments whereas a positive coefficient is consistent with firms with more moral hazard problems overinvesting more. The coefficient for *negCETR5* continues to be significantly positive with *p-values* less than 0.001 in all four specifications. I reject H3 as the coefficients on *negCETR5_x_HighRIR* are negative and significant (*p-values* of 0.002, 0.005, 0.001, and 0.005, respectively). Overall, these findings suggest firms with internal resources that are relatively greater than investment opportunities relying less on tax avoidance to fund investment and inconsistent with overinvestment.

Finally, I interact tax avoidance with the volatility of tax avoidance in Table 7. A negative coefficient is consistent with firms with more volatile tax avoidance not being able to fund investment opportunities due to cash tax savings shortfalls and not relying on tax avoidance to fund investments whereas a positive coefficient is consistent with firms with greater volatility in tax avoidance overinvesting the cash windfalls. The coefficient on *negCETR5* is positive and significant in Columns (1) through (4) (*p-values* < 0.001). The coefficients on the interactions between *negCETR5* and *CVCETR5*

are also significant with *p-values* equaling than 0.003, 0.007, 0.003, and 0.007, respectively. I therefore reject H4 in all columns as the coefficients on the interaction of *negCurETR5* and *High_RIR* are negative and significant. This is consistent with firms that cannot consistently rely upon cash savings from tax avoidance not relying on it to fund investments and is inconsistent with overinvestment.[33]

[33] As noted in footnote 13, the volatility of operating cash flows likely exacerbates both capital rationing and overinvestment and thus is not useful in distinguishing the underlying source of the positive relation between tax avoidance and investment. However, the volatility of operating cash flows provides a useful setting to triangulate my results and corroborate my findings. As firms with highly volatile operating cash flows are the most likely to be experiencing capital rationing or overinvestment, the interaction between *negCETR5* and *CVCETR5* should be significantly greater in magnitude compared to firms with less volatile operating cash flows. In untabulated results, I estimate the models in Table 7 for firms in the highest quintile of operating cash flow volatility and firms in the lowest quintile of operating cash flow volatility. The interaction between *negCETR5* and *CVCETR*5 is significantly negative only for firms with the highest volatility of operating cash flow and insignificant among firms with the smoothest operating cash flows. This is consistent with firms that experience the greatest capital rationing relying on tax savings to finance investment and more so if they sustainable tax savings.

CHAPTER VI

ROBUSTNESS TESTS

I perform several robustness tests to verify my findings. First, some forms of investments have tax preferences that might lead to a mechanical association between tax avoidance and investment. Two tax preferences are salient in my setting: the research and development tax credit and the accelerated depreciation of personal (i.e. non-real) assets. To the extent that firms respond to these tax incentives, firms increase their investments in order to receive the tax benefits and decrease the firm's cash taxes paid. As a result, some current period capital expenditures and research and development and current period tax avoidance are mechanically related. Although the tax avoidance levels are lagged in the primary test, if investment is serially-correlated, then lagged tax avoidance measures may be mechanically related to research and development or to capital expenditures.

I ensure the results are not due to the research and development tax credit by limiting the sample to firms without research and development activities (where *XRD* is missing in Compustat). By definition, these firms' investments include only capital expenditures and acquisitions and are therefore ineligible for the research and development tax credit. Table 8 presents the results of estimating Model (1) over firms that do not invest in research and development. The dependent variable in Columns (1) and (2) is *Invest* while *UnExp_Invest* is the dependent variable in Columns (3) and (4). The coefficients on *negCETR5* are significantly positively in all four columns,

suggesting my primary results are not a result of the research and development credit (*p-value* < 0.01).

Next, I consider accelerated depreciation by measuring tax avoidance from year t-7 to year t-2, providing an additional year's separation between the measurement of tax avoidance and when a firm's investment occurs. By including an additional year's separation, I further minimize the possibility that the results are due to a mechanical association due to accelerated tax depreciation. Table 9 presents the results of estimating Model (1) with twice lagged tax avoidance. *Invest* is the dependent variable in Columns (1) and (2) and *UnExp_Invest* is the dependent variable in Columns (3) and (4). I continue to find significant and positive coefficients on *negCETR5* in all four columns, suggesting that accelerated depreciation is not likely to influence my primary findings (*p-value* < 0.01).

In addition, I draw on Richardson's (2006) methodology to ensure my findings are not limited to my variable and model specifications. I make two changes to the primary analysis to follow Richardson (2006) and Blaylock (2011). First, Richardson (2006) measures investment net of depreciation (*DPC*). Depreciation is a proxy for the expected amount of investment necessary to maintain assets in place. For investment to be considered to increase a firm's capital stock, it must exceed the present year's depreciation. Second, Richardson (2006) and Blaylock (2011) include profitability, cash holdings, age, leverage, size, and lagged investment in their first stage regressions. Following Richardson (2006), I include these additional explanatory variables in Model (2) to ensure that my tax avoidance measure is not capturing the effects of previously

documented determinants of investment. I estimate this augmented first stage model by industry-year and use the residuals from this model as a measure of unexpected investment. I then estimate Model (1), using the residuals from the Richardson (2006) model as the dependent variable (*Invest_Rich*) and omitting the variables previously included in the first stage.

Coefficients for the first stage model are consistent with expectations (untabulated). Firms with greater cash, greater prior period investment, greater size, more profitability, and greater investment opportunities invest significantly more, ceteris paribus. All else equal, older firms and firms with higher leverage invest less than older firms and lower leverage. The results are consistent with results from Richardson's (2006) and Blaylock's (2011) first-stage regressions.

Table 10 presents the results of using *Invest_Rich* as the dependent variable. I continue to find the coefficients on *negCETR5* are positive and significant in Columns (1) and (2), indicating tax avoidance and investment are positively associated. This positive relation is consistent with capital rationing and overinvestment.

My next robustness test is based on Bergstresser (2006), who notes that a positive relation between internal resources and investment need not imply a capital market imperfection. If internal resources are positively correlated with investment opportunities, then regressing investment on internal resources would yield a positive coefficient. However, the positive coefficient may only reflect "the joint movement in investment and cash flow caused by their correlation with investment opportunities" and not a capital market imperfection (Bergstresser 2006). If firms with more investment

opportunities engage in more tax avoidance than firms with poor investment opportunities, then my primary results may simply reflect this co-movement and not indicate tax avoidance being used as a form of internal financing. To correct for any correlation between tax avoidance activities and investment opportunities, I regress *negCETR5* on sales growth and use the residual (*Res_C5*) as a measure of tax avoidance that is independent of investment opportunities.[34] I find that investment opportunities are positively and significantly related to tax avoidance, suggesting that tax avoidance contains information about investment opportunities.

I tabulate the results of this analysis in Table 11. The dependent variable in Columns (1) and (2) is *Invest* while the dependent variable in Columns (3) and (4) is *UnExp_Invest*. I continue to find positive and significant coefficients on *Res_C5* in all four columns (*p-value* < 0.01). These findings suggest my results are not because of investment opportunities being a correlated, omitted variable with tax avoidance.

Finally, I follow Rauh's (2006) methodology to determine if the results hold in a classical investment-sensitivity-to-cash-flow methodology. I regress investment on Tobin's Q, cash flow, and tax avoidance, along with firm and year fixed effects.[35] A fixed effect design has the benefit of controlling for unobservable firm-level characteristics that determine investment (Wooldridge 2002).

[34] The extent to which foreign operations represent growth opportunities and also influence tax avoidance, my results might simply be an artifact of firms with foreign operations investing overseas in low tax jurisdictions. I address this concern by orthogonalizing tax avoidance on sales growth and an indicator variable for foreign operations and using the residual as a proxy for tax avoidance. Results are inferentially similar to those presented in Table 12.

[35] I rely on fixed effects over first differences for two reasons. First, when exogeneity assumptions are met, fixed effects are a more efficient estimator (Wooldridge 2002). Second, first-differencing cash taxes paid does not provide a clear indicator of the change in tax avoidance as one year measures have significant variation and measurement error (Dyreng et al. 2008).

I present the results of this analysis in Table 12. The dependent variable in Column (1) is *Invest* and *UnExp_Invest* is the dependent variable in Column (2). Consistent with Rauh (2006), I find positive and significant coefficients on Tobin's Q and cash flow in both columns (*p-value* < 0.01). I also find positive and significant coefficients for *negCETR5* in both columns (*p-value* < 0.01), suggesting that as firm-level tax avoidance increases above the firm-level average, investment increases. However, I do not rely heavily on this modification of investment to cash flow sensitivity methodology given that Kaplan and Zingales (1997) find that investment-to-cash-flow sensitivities are high for many subsamples of more financially constrained firms compared to firms that are less financially constrained.

CHAPTER VII

CONCLUSION

Tax avoidance, as well as other forms of internal resources, can theoretically be related to firm-level investment because of two capital market imperfections: adverse selection and moral hazard (Jensen 1986; Jensen and Meckling 1976; Myers and Majluf 1984; Stein 2003). Using these two capital market imperfections to provide theoretical links to investment, I suggest two expectations for a relation between tax avoidance and investment, both of which predict a positive relation. First, tax avoidance can be a form of internal financing to overcome adverse selection's capital rationing. Second, managers can also use the obfuscation associated with tax avoidance to grow the size of the firm beyond what is optimal by overinvesting, another form of moral hazard (Desai and Dharmapala 2006).

I provide robust evidence that tax avoidance is positively related to investment, suggesting adverse selection's capital rationing or overinvestment are potential sources of the positive relation. Further, I provide evidence that managerial ownership encourages managers to rely on tax avoidance as a form of internal financing. This is consistent with firms with CEOs that have greater incentives to exploit potential, future shareholders, relying on the cash savings from tax avoidance to alleviate capital rationing. I also find that firms with high relative internal resources rely on tax avoidance to fund investments to a significantly lesser extent than firms with low relative internal resources. This is consistent with capital rationing being the likely

source of the positive relation and suggests that firms that are less likely to forgo profitable investments because of capital rationing requiring less of the cash savings of tax avoidance to fund investment. I also find evidence that firms with volatile tax avoidance strategies rely on tax avoidance to a significantly lesser extent to fund investment than firms with less volatile tax avoidance strategies, consistent with capital rationing being the source of the positive relation between tax avoidance and investment.

Taken together, my findings support the notion that tax avoidance increases investment by increasing internal resources and therefore alleviating adverse selection's capital rationing. The results provide one possible mechanism, overcoming financing constraints, whereby tax avoidance increases firm value (Koester 2011; Wang 2010; Wilson 2009). Overall, my findings suggest that shareholders should view tax avoidance, at least on average, as beneficial to the firm as it increases positive-NPV investments. Moreover, my findings are important to policymakers who need to understand the benefits, as well as the costs, of legislations seeking to curtail tax avoidance strategies and managers seeking to overcome capital rationing.

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APPENDIX A

VARIABLE DEFINITIONS

Invest	The sum of capital expenditure (*CAPX*), research and development (*XRD*), and acquisitions (*AQC*) less the sale of property, plant, and equipment (*SPPE*) and scaled by lagged total assets (*AT*) in accordance with Biddle et al. (2009).
UnExp_Invest	The residual from regressing *Invest* on Sales Growth
negCETR5	The sum of cash taxes paid (*TXPD*) from t-5 to t-1 scaled by pretax income net of special items (*PI – SPI*) over the same time period and multiplied by negative one. I winsorize at 0 and 1 in accordance with Dyreng et al. (2008).
Tax Cash Savings	The difference between 35% and *CETR5*, multiplied by pretax income (*PI*) and scaled by lagged total assets (*AT*)
PTCF	Operating cash flows (*OANCF*) plus cash taxes paid (*TXPD*), scaled by lagged total assets (*AT*)
HighCEO	An indicator variable equaling 1 if the firm is in the top quintile of CEO ownership and 0 otherwise
High_RIR	An indicator variable that equals 1 if a firm's Tobin's Q is in the bottom two quintiles for its industry and has positive free cash flow and a 0 otherwise. I follow Richardson (2006) by defining free cash flow as the sum of operating cash flows (*OANCF*), research and development (*XRD*) minus depreciation (*DPC*) and the predicted value from of *Invest* Model (2).
CVCETR5	The standard deviation of annual cash ETRs (*TXPD*/(*PI-SPI*)) from years t-6 to t-1 divided by the absolute value of the mean of annual cash

	ETR over the same five-year period.
Dechow	The standard deviation of the prior five years residual from a regression of accruals on current, lagged, lead cash flows, the change in revenue, and property plant and equipment as described in Dechow and Dichev (2002) and McNichols (2002). I estimate the model for every industry-year with twenty valid observations.
IO	The percentage of shares held by institutional ownership from Thompson Reuters
Numest	Analyst following from I/B/E/S
InvG	The inverse of a firm's G-index from Risk Metrics. Since Risk Metrics issues the G-index biannually, I assume that a firm's G-index score in year t is the same in year t+1 (with an updated score being issued in t+2.
Ginddum	An indicator variable equaling 1 to for a firm does not have a G-index and 0 otherwise.
Lev	The ratio of long-term debt (*DLTT*) to assets (*AT*)
Cash	The ratio of cash and short term investments (*CHE*) to assets (*AT*)
LnAT	The natural log of a firm's assets (*AT*)
MTB	The ratio of the market value of equity (*PRCC_F*CSHO*) to the book value of equity (CEQ*)*
StdCFO	The standard deviation of a firm's scaled operating cash flows (*OANCF*/*AT*) calculated over the prior five years
StdSales	The standard deviation of a firm's scaled sales (*SALE*/*AT*) calculated over the prior five years
StdInvest	The standard deviation of a firm's investment calculated over the prior five years

Zscore	As calculated in Biddle et al. (2009), (3.3**PI*+*SALE*+.25**RE*-.5*(*ACT*-*LCT*))/*AT*
Tang	The ratio of PPE to total assets (*PPEGT*/*AT*)
CFOSale	The ratio of operating cash flows (*OANCF*) to sales (*SALE*)
DIV	An indicator variable equaling 1 if a firm pays dividends (*DV* > 0 or *DVC* > 0) and 0 otherwise.
Age	The number of years since a firm was first reported in CRSP
Opcycle	The natural log of the sum of receivables turnover (*RECT*/*SALE*) and inventory turnover (*COGS*/*INVT*) multiplied by 360
Loss	An indicator variable equaling 1 if *IB* is less than 0 and 0 otherwise
AbsDACC	The absolute value of discretionary accruals as described in Kothari et al. (2005). I estimate the model for every industry-year with twenty valid observations.

APPENDIX B

TABLES

TABLE 1
Univariate Statistics

Variables[a]	N	Mean	Std Dev	Q1	Median	Q3
Invest	33,303	10.936	9.741	4.276	8.237	14.506
UnExp_Invest	33,303	-1.648	9.515	-7.001	-2.959	2.560
negCETR5	30,232	-0.311	0.195	-0.380	-0.298	-0.196
Tax Cash Savings	27,481	0.006	0.002	-0.002	0.003	0.013
Dechow	33,303	-0.053	0.347	-0.059	-0.036	-0.022
AbsDACC	32,427	0.079	0.126	0.020	0.046	0.091
IO	33,303	0.422	0.328	0.083	0.419	0.705
Numest	33,303	7.233	7.972	1.000	5.000	11.000
InvG	33,303	-3.679	4.827	-8.000	0.000	0.000
Ginddum	33,303	0.601	0.490	0.000	1.000	1.000
Lev	33,303	0.168	0.170	0.012	0.134	0.268
Cash	33,303	0.117	0.156	0.015	0.052	0.161
LnAT	33,303	5.889	1.947	4.480	5.832	7.235
MTB	33,303	2.534	2.877	1.221	1.891	3.033
StdCFO	33,303	0.060	0.047	0.028	0.047	0.078
StdSales	33,303	0.184	0.171	0.073	0.132	0.234
StdInvest	33,303	6.703	6.595	2.291	4.481	8.717
Zscore	33,303	1.431	0.897	0.836	1.317	1.868
Tang	33,303	0.310	0.230	0.125	0.247	0.449
CFOSale	33,303	0.092	0.139	0.033	0.077	0.135
DIV	33,303	0.473	0.499	0.000	0.000	1.000
Age	33,303	19.701	16.138	8.000	14.000	27.000
Opcycle	33,303	4.613	0.722	4.225	4.694	5.089
Loss	33,303	0.150	0.357	0.000	0.000	0.000

[a]See Appendix for variable definitions.

TABLE 2
Correlations

Variables[a]	*Invest*		*UnExp_Invest*		*negCETR5*	
Invest	1		0.818	***	0.109	***
UnExp_Invest	0.698	***	1		0.061	***
negCETR5	0.141	***	0.048	***	1	

[a]See Appendix for variable definitions.

TABLE 3
Regression of Investment on Tax Avoidance

$$I_{i,t} = b_0 + b_1\, negCETR5_{i,t-1} + Controls'_{k,t-1} + b_j + e_{i,t}$$

	Invest		*UnExp_Invest*	
	(1)	(2)	(3)	(4)
negCETR5	1.501***	1.406***	1.336***	1.246***
	(0.000)	(0.000)	(0.000)	(0.000)
Dechow	-0.340		-0.525	
	(0.726)		(0.525)	
AbsDACC		5.684***		5.228***
		(0.000)		(0.000)
IO	0.801**	0.839**	0.883***	0.895***
	(0.016)	(0.011)	(0.002)	(0.002)
Numest	0.030	0.026	0.031	0.027
	(0.146)	(0.205)	(0.112)	(0.165)
InvG	-0.127***	-0.131***	-0.154***	-0.158***
	(0.003)	(0.002)	(0.000)	(0.000)
Ginddum	1.652***	1.675***	1.342***	1.346***
	(0.000)	(0.000)	(0.001)	(0.002)
Lev	-13.537***	-13.705***	-12.788***	-12.945***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	2.122**	2.383**	1.887**	2.122**
	(0.032)	(0.016)	(0.041)	(0.022)
LnAT	0.318**	0.367***	0.189	0.231*
	(0.012)	(0.005)	(0.167)	(0.096)
MTB	0.318***	0.309***	0.258***	0.250***
	(0.000)	(0.000)	(0.000)	(0.000)
StdCFO	8.818***	7.413***	8.215***	6.940***
	(0.000)	(0.000)	(0.000)	(0.000)
StdSales	-1.921**	-2.155***	-2.174***	-2.431***
	(0.015)	(0.005)	(0.004)	(0.001)
StdInvest	0.162***	0.165***	0.142***	0.144***
	(0.000)	(0.000)	(0.000)	(0.000)
Zscore	-1.549***	-1.567***	-1.665***	-1.690***
	(0.000)	(0.000)	(0.000)	(0.000)
Tang	12.539***	12.955***	12.042***	12.378***
	(0.000)	(0.000)	(0.000)	(0.000)
CFOSale	-1.365**	-1.344**	-1.092**	-1.094**
	(0.033)	(0.031)	(0.036)	(0.029)
DIV	-1.144***	-1.157***	-1.117***	-1.131***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.047***	-0.049***	-0.046***	-0.047***
	(0.000)	(0.000)	(0.000)	(0.000)
OpCycle	-1.421***	-1.450***	-1.582***	-1.622***
	(0.000)	(0.000)	(0.000)	(0.000)
Loss	-2.174***	-2.237***	-1.821***	-1.873***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	14.840***	10.762***	4.273***	5.117**
	(0.000)	(0.000)	(0.009)	(0.013)
Observations	30,232	29,585	30,232	29,585
Adjusted R-squared	0.239	0.246	0.221	0.228

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)
I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.

TABLE 4
Regression of Investment on Tax Cash Savings

$$I_{i,t}=b_0+b_1\,Tax\ Cash\ Savings_{i,\,t-1}+b_2\,PTCF_{i,\,t-1}+\ Controls'_{k,\,t-1}b_k+b_i+b_t+e_{it}$$

	Full Sample		No Loss	
	(1)	(2)	(3)	(4)
Tax Cash Savings	0.130***	0.103**	0.179***	0.131**
	(0.002)	(0.014)	(0.000)	(0.010)
PTCF	0.203***	0.200***	0.224***	0.222***
	(0.000)	(0.000)	(0.000)	(0.000)
Dechow	-0.023**			
	(0.015)			
absDACC		0.158***		0.153***
		(0.000)		(0.000)
Constant	0.231***	0.210***	0.327***	0.309***
	(0.000)	(0.000)	(0.000)	(0.000)
Firm Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Observations	27,297	26,714	23,499	22,984
Adjusted R-squared	0.479	0.487	0.499	0.506

p-values in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)
I cluster standard errors by firm and year (Gow et al. 2010). Firm and year fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions

TABLE 5

Regression of Investment on Tax Avoidance and CEO Ownership

$$I_{i,t}=b_0+b_1\,negCETR5+b_2\,HighCEO+b_3\,negCETR5*HighCEO+Controls'\,b_k+b_j+e_{it}$$

	Invest		*UnExp_Invest*	
	(1)	(2)	(3)	(4)
negCETR5	1.060	1.089*	1.057	1.078
	(0.112)	(0.092)	(0.122)	(0.104)
HighCEO	0.246	0.299	0.264	0.345
	(0.651)	(0.580)	(0.615)	(0.506)
HighCEO_x_negCETR5	2.871**	2.875**	2.821*	2.875**
	(0.050)	(0.041)	(0.053)	(0.038)
Dechow	0.248		0.169	
	(0.829)		(0.887)	
AbsDACC		5.885***		5.638***
		(0.000)		(0.000)
Constant	21.515***	24.788***	10.573***	9.553***
	(0.000)	(0.000)	(0.000)	(0.000)
Controls	YES	YES	YES	YES
Observations	14,989	14,639	14,989	14,639
Adjusted R-squared	0.250	0.256	0.243	0.250

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)

I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.

TABLE 6

Regression of Investment on Tax Avoidance and Relative Internal Resources

$$I_{i,t}=b_0+b_1\,negCETR5_{i,t-1}+b_2\,High\_RIR+b_3\,negCETR5_{i,t-1}*HighRIR+Controls'_{k,t-1}b_k+b_j+e_{it}$$

	Invest		*UnExp_Invest*	
	(1)	(2)	(3)	(4)
negCETR5	1.748***	1.645***	1.570***	1.471***
	(0.000)	(0.000)	(0.000)	(0.000)
High_RIR	-1.392***	-1.415***	-0.893***	-0.912***
	(0.000)	(0.000)	(0.001)	(0.001)
negCETR5_x_HighRIR	-1.976***	-1.849***	-1.959***	-1.829***
	(0.002)	(0.005)	(0.001)	(0.005)
Dechow	-0.381		-0.570	
	(0.691)		(0.485)	
AbsDACC		5.548***		5.073***
		(0.000)		(0.000)
Constant	14.729***	10.551***	4.202***	4.984**
	(0.000)	(0.000)	(0.009)	(0.016)
Controls	YES	YES	YES	YES
Observations	30,017	29,369	30,017	29,369
Adjusted R-squared	0.239	0.246	0.222	0.228

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)

I cluster standard errors by firm and year (Gow et al. 2010).Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.

TABLE 7

Regression of Investment on Tax Avoidance and Volatility

$$I_{i,t}=b_0+b_1\,negCETR5_{i,\,t-1}+b_2\,CVCETR5+b_3\,negCETR5_{i,\,t-1}*CVCETR5+Controls'_{k,\,t-1}b_k+b_j+e_{it}$$

	Invest		*UnExp_Invest*	
	(1)	(2)	(3)	(4)
negCETR5	3.567***	3.253***	3.387***	3.101***
	(0.000)	(0.000)	(0.000)	(0.000)
CVCETR5	-0.489*	-0.447	-0.454*	-0.425
	(0.087)	(0.135)	(0.083)	(0.121)
*negCETR5*_x_ *CVCETR5*	-1.839***	-1.636***	-1.831***	-1.646***
	(0.003)	(0.007)	(0.003)	(0.007)
Dechow	-0.289		-0.473	
	(0.765)		(0.567)	
AbsDACC		5.678***		5.227***
		(0.000)		(0.000)
Constant	15.737***	19.256***	5.094***	3.948**
	(0.000)	(0.000)	(0.002)	(0.016)
Controls	YES	YES	YES	YES
Observations	30,232	29,585	30,232	29,585
Adjusted R-squared	0.237	0.244	0.221	0.228

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)

I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.

TABLE 8
Regression of Investment on Tax Avoidance for Firms lacking R&D

$$I_{i,t} = b_0 + b_1\, negCETR5_{i,t-1} + Controls'_{k,t-1} + b_j + e_{i,t}$$

	Invest		*UnExp_Invest*	
	(1)	(2)	(3)	(4)
negCETR5	1.133***	1.125***	1.105***	1.104***
	(0.001)	(0.002)	(0.001)	(0.001)
Dechow	-0.397		-0.639	
	(0.680)		(0.452)	
AbsDACC		2.149***		1.821***
		(0.006)		(0.009)
Constant	14.810***	13.793***	5.536**	-1.515
	(0.000)	(0.000)	(0.038)	(0.529)
Controls	YES	YES	YES	YES
Observations	17,585	16,924	17,585	16,924
Adjusted R-squared	0.295	0.302	0.181	0.185

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)
I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.

TABLE 9
Regression of Investment on Twice Lagged Tax Avoidance

$$I_{i,t} = b_0 + b_1\, negCETR5_{i,t-2} + Controls'_{k,t-1} + b_j + e_{i,t}$$

	Invest		*UnExp_Invest*	
	(1)	(2)	(3)	(4)
negCETR5$_{t-2}$	0.854***	0.841***	0.955***	0.954***
	(0.000)	(0.000)	(0.000)	(0.000)
Dechow	-0.145		-0.336	
	(0.891)		(0.726)	
AbsDACC		2.810***		2.506***
		(0.000)		(0.000)
Constant	12.758***	17.245***	3.991***	2.223
	(0.000)	(0.000)	(0.007)	(0.247)
Controls	YES	YES	YES	YES
Observations	27,570	26,987	27,570	26,987
Adjusted R-squared	0.232	0.236	0.157	0.159

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)
I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions

TABLE 10

Regression of Unexpected Investment per Richardson (2006) on Tax Avoidance

$$Invest\_Rich_{i,t} = b_0 + b_1\ negCETR5_{i,t-1} + Controls'_{k,t-1} + b_j + e_{i,t}$$

	Invest_Rich	
	(1)	(2)
negCETR5	0.858***	0.701**
	(0.002)	(0.012)
Dechow	4.544**	
	(0.012)	
AbsDACC		3.449***
		(0.000)
IO	-0.197	-0.149
	(0.452)	(0.573)
Numest	-0.031**	-0.029**
	(0.013)	(0.021)
InvG	-0.157***	-0.159***
	(0.000)	(0.000)
Ginddum	1.842***	1.785***
	(0.000)	(0.000)
Zscore	-1.667***	-1.695***
	(0.000)	(0.000)
Tang	-6.299***	-6.366***
	(0.000)	(0.000)
CFOSale	-1.531***	-1.441***
	(0.007)	(0.008)
DIV	0.002	0.034
	(0.990)	(0.819)
OpCycle	-2.213***	-2.280***
	(0.000)	(0.000)
Loss	-2.901***	-3.017***
	(0.000)	(0.000)
Constant	15.351***	14.120***
	(0.000)	(0.000)
Observations	30,141	29,544
Adjusted R-squared	0.065	0.068

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)
I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.

TABLE 11

Regression of Investment on Tax Avoidance Orthogonalized on Growth Opportunities

$$I_{i,t} = b_0 + b_1\, Res\_C5_{i,t-1} + Controls'_{k,t-1} + b_j + e_{i,t}$$

	Invest		*UnExp_Invest*	
	(1)	(2)	(3)	(4)
Res_C5	1.760***	1.717***	1.930***	1.881***
	(0.000)	(0.000)	(0.000)	(0.000)
Dechow	-0.379		-0.700	
	(0.722)		(0.450)	
AbsDACC		5.705***		5.246***
		(0.000)		(0.000)
IO	0.827**	0.866***	0.914***	0.926***
	(0.013)	(0.009)	(0.001)	(0.001)
Numest	0.029	0.025	0.027	0.024
	(0.170)	(0.220)	(0.158)	(0.209)
InvG	-0.122***	-0.126***	-0.152***	-0.155***
	(0.005)	(0.004)	(0.000)	(0.000)
Ginddum	1.633***	1.657***	1.314***	1.317***
	(0.001)	(0.000)	(0.002)	(0.002)
Lev	-13.452***	-13.623***	-12.772***	-12.932***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	2.210**	2.467**	1.936**	2.166**
	(0.027)	(0.014)	(0.037)	(0.021)
LnAT	0.323**	0.372***	0.195	0.237*
	(0.012)	(0.005)	(0.154)	(0.089)
MTB	0.320***	0.308***	0.260***	0.250***
	(0.000)	(0.000)	(0.000)	(0.000)
StdCFO	8.671***	7.261***	8.027***	6.794***
	(0.000)	(0.000)	(0.000)	(0.000)
StdSales	-1.894**	-2.120***	-2.144***	-2.389***
	(0.020)	(0.008)	(0.005)	(0.002)
StdInvest	0.165***	0.168***	0.145***	0.147***
	(0.000)	(0.000)	(0.000)	(0.000)
Zscore	-1.533***	-1.545***	-1.653***	-1.671***
	(0.000)	(0.000)	(0.000)	(0.000)
Tang	12.461***	12.871***	11.907***	12.234***
	(0.000)	(0.000)	(0.000)	(0.000)
CFOSale	-1.355**	-1.329**	-1.136**	-1.132**
	(0.031)	(0.030)	(0.026)	(0.021)
DIV	-1.144***	-1.161***	-1.118***	-1.138***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.047***	-0.049***	-0.045***	-0.047***
	(0.000)	(0.000)	(0.000)	(0.000)
OpCycle	-1.423***	-1.455***	-1.595***	-1.638***
	(0.000)	(0.000)	(0.000)	(0.000)
Loss	-2.152***	-2.202***	-1.807***	-1.846***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	13.334***	13.119***	4.764***	4.886***
	(0.000)	(0.000)	(0.002)	(0.001)
Observations	29,612	28,942	29,612	28,942
Adjusted R-squared	0.240	0.246	0.222	0.229

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)

I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.

TABLE 12

Regression of Investment on Tax Avoidance using the Rauh (2006) Methodology

$$I_{i,t} = b_0 + b_1\, negCETR5_{i,t-1} + Controls'_{k,t-1} + b_i + b_t + e_{i,t}$$

	Invest	*UnExp_Inv*
	(1)	(2)
negCETR5	0.018***	1.234***
	(0.002)	(0.001)
TQ	0.023***	1.060***
	(0.000)	(0.000)
PTCF	0.189***	3.299***
	(0.000)	(0.000)
Constant	0.067***	-1.550***
	(0.000)	(0.004)
Firm Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Observations	27,452	27,452
Adjusted R-squared	0.313	0.382

p-values are in parentheses (* significant at 10%; ** significant at 5%; *** significant at 1%)
I cluster standard errors by firm and year (Gow et al. 2010). Industry fixed-effect coefficients are omitted for brevity. See Appendix for variable definitions.