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STAKEHOLDER AGENCY RELATIONSHIPS:

CEO STOCK OPTIONS AND CORPORATE TAX AVOIDANCE

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ABSTRACT

Infusing stakeholder agency theory with insights from behavioral agency theory, we describe a frame-dependent relationship between CEO stock option incentives and tax avoidance. Our theoretical framework highlights the role of competing shareholder demands in providing a salient reference point for a CEO contemplating the implications of tax avoidance for their stock option wealth. In a study of 2,573 publicly listed U.S. firms between 1993 and 2014, we show that the implications of CEO stock option incentives are contingent on whether the firm's effective tax rate is anticipated to be below or above the tax rate of peer firms—an outcome that the CEO can cast as balancing stakeholder demands. Consistent with our theoretical reasoning, we also show that, both above and below this reference point, the implications of option incentives for corporate tax avoidance are amplified by the level of activist institutional ownership and attenuated by the CEO's ability to unwind their bond with shareholders through hedging. In doing so, our study offers an impetus for a broader stakeholder approach to governance research examining CEO incentive alignment.

Keywords: Behavioral agency, stakeholder agency, executive compensation, corporate tax avoidance

INTRODUCTION

Classical agency literature on agent opportunism arising from the separation of ownership and control focused predominantly on contractual mechanisms that ensure CEOs (agents) make decisions in the best interests of shareholders (principals) (e.g., Jensen and Meckling, 1976). This focus reflected the assumption of shareholder primacy (see Smith, 1998) which dominated financial economists' thinking. Within this literature, stock options have been offered as a key mechanism for ensuring alignment between agents and the principal as options tie a portion of CEO wealth to that of shareholders (Nyberg et al., 2010). Notwithstanding classical agency reasoning on the utility of stock options in aligning CEO and shareholder interests, there is growing public and academic concern that stock option incentives can have severe negative consequences for a broad range of non-shareholder stakeholders (e.g., Martin et al., 2019; Stiglitz, 2010; Wowak et al., 2015).

An important challenge to the shareholder primacy perspective arises from stakeholder theory which calls for a broader analysis of managerial incentives, decision making, and goal setting (e.g., Macey, 1998; Stout, 2001; 2013). Stakeholder agency theory (e.g., Hill and Jones, 1992) has sought to shift the agency literature beyond a shareholder primacy perspective that focuses solely on CEO-shareholder interest alignment. Stakeholder agency theory advances the argument that the CEO has to balance the competing demands of multiple stakeholders (Barney, 2018; Hill and Jones, 1992; Jones et al., 2016). While acknowledging the role of agent self-interest, stakeholder agency scholarship has yet to develop theory on how stock options influence CEO decision making when faced with competing stakeholder demands. In the current study, we address this gap in the literature by integrating stakeholder agency theory and behavioral agency theory to explore how CEOs make sense of their stock option incentives in the context of corporate tax avoidance—a decision with material implications for shareholders and other firm stakeholders.

Highlighting the CEO's challenge of balancing competing stakeholder demands, firms perceived to have engaged in aggressive tax avoidance are vulnerable to negative stakeholder reactions including IRS audits, negative media attention, and customer boycotts (Dyreng et al.,

2016; Hoopes et al., 2012; Zimmerman, 1983). For example, Campbell and Helleloid (2016) describe how Starbucks' failure to pay taxes in Great Britain resulted in a major public relations scandal. Conversely, shareholders (another stakeholder) tend to react unfavorably when their firms are perceived to have inadequately shielded income from tax exposure, leading to forced CEO turnover (e.g., Chyz and Gartner, 2018). Hence, CEOs have to strike a balance when deciding how much corporate income to shield from taxes: shielding too much could trigger negative reactions from non-shareholder stakeholders whereas shielding too little may raise shareholder ire. Thus, as with most corporate decisions, the CEO faces a mixed-gamble in which the choice to avoid taxes has the potential for both gains and losses (Bromiley, 2010; Martin, Gomez-Mejia & Wiseman, 2013).

Adding complexity to CEOs' tax avoidance decisions is the prevalence of equity-based compensation arrangements. Given the information asymmetry between agents and principals, the challenge of controlling costs created by agent opportunism generally rests on compensation mechanisms designed to create incentive alignment. This is often done through granting stock options that allow CEOs to share in the benefits from increasing firm value. Thus, CEOs are faced with balancing the risks to the firm and to themselves under contractual schemes designed to encourage a preference for maximizing shareholder wealth through their choices, including whether and to what extent their firms should engage in tax avoidance. Striking variation in the level of tax avoidance among firms (Desai and Dharmapala, 2006; Dyreng et al., 2008) coupled with the ubiquity of stock options in CEOs' compensation arrangements poses an important question: under what conditions would option incentives encourage or temper the CEO's pursuit of tax avoidance? To address this question, we infuse stakeholder agency theory with a behavioral perspective emphasizing the frame-dependent nature of agent decision making (Wiseman and Gómez-Mejía, 1998). Behavioral agency recognizes systematic departures from the assumptions underlying classical agency theory and has proven useful in exploring the behavioral consequences of CEO stock options (e.g., Devers et al., 2007).

We reason that the implications of CEO stock option incentives for tax avoidance are likely to be dependent on whether the CEO anticipates that the firm's corporate tax rate will be above or below that of peer firms (a rate of tax that can be justified as balancing competing stakeholder demands). Given that the firm's relative tax rate impacts the value of a CEO's stock options, we expect CEOs to engage in further tax avoidance when they anticipate that their

firm's effective corporate tax rate will be higher than that of peer firms (a loss context). Conversely, they are less likely to engage in tax avoidance when they anticipate the firm's effective tax rate will be below that of peers (a gain context).

We further reason that the implications of CEO stock options for tax avoidance increase with institutional ownership—due to greater option risk bearing—and decrease with the CEO's ability to hedge their option wealth. Here again, we posit that considerations of personal wealth influence CEO decisions consistent with behavioral views of incentive alignment. That is perceived risk to wealth is likely to influence choices that can materially impact the value of that wealth.

Our study makes several important theoretical contributions. First, we advance the stakeholder agency literature by describing how CEOs make sense of their personal incentives in light of competing stakeholder interests. We show that in addition to affecting shareholders, CEO decisions have consequences that go beyond shareholders and transactional parties to affect society in general. We challenge the expectation that stock options lead to CEOs uniformly making decisions that favor shareholder interests over societal stakeholder interests (Hill and Jones, 1992). Instead, we describe a more complete—frame-dependent—relationship between CEO stock option incentives and social welfare, where CEO efforts to preserve wealth can lead to decisions that benefit shareholders or enhance social welfare.

Second, we extend behavioral agency by illuminating the role of firm-level reference points in CEO decision framing. To date, the behavioral agency literature on CEO stock options has assumed that personal wealth provides the salient reference point when CEOs frame strategic risk decisions—leading to a predicted monotonic negative relationship between CEO option wealth and risk taking (Devers et al., 2008; Larraza-Kintana et al., 2007; Martin et al., 2013). Drawing on a stakeholder agency perspective, we offer an augmented behavioral framework acknowledging the role of firm-level framing in CEO decision making under uncertainty. This important refinement provides a possible explanation for mixed prior evidence on the behavioral consequences of CEO stock option wealth where the concept of a firm-level reference point has been largely overlooked (e.g., Devers et al., 2008; Larraza-Kintana et al., 2007).

Third, we establish boundary conditions for CEO tax avoidance choices in response to option incentives. Specifically, we extend prior research by demonstrating that CEO decisions to address the concerns of important stakeholders through increasing or decreasing tax avoidance

are largely nullified when: (1) activist institutional ownership is higher and (2) CEOs can hedge their exposure to the firm's share price. Collectively, our exploration of boundary conditions highlights important contrasts in the effects of governance variables from a stakeholder agency perspective.

THEORY AND HYPOTHESES DEVELOPMENT

Our theoretical framework integrates stakeholder agency theory and behavioral agency theory. Thus, our literature review first explores agency theory and details the contrasts with stakeholder agency theory, before explaining how behavioral agency was derived from classical agency theory. To provide a summary of the differences in the assumptions and focus in agency, behavioral agency, and stakeholder agency theories, we refer the reader to Table I.

[INSERT TABLE I ABOUT HERE]

Agency Theory and Stakeholder Agency Theory

An agency problem is created when ownership and management are separated, meaning that an opportunistic manager can exploit the fact that owners find it difficult and costly to monitor managerial behaviors and choices (Eisenhardt, 1989). This approach to the agency problem focuses on minimizing costs to shareholders or owners. However, analyzing the consequences of CEO decision making for the shareholder to the exclusion of other stakeholders overlooks (1) the normative (moral) claims of stakeholders (Carroll, 1989); (2) the residual claims that multiple stakeholders have over the firm (Barney, 2018) and (3) an increasing prescience with regard to instrumental stakeholder theory's insight that the nurturing of relationships with multiple stakeholders can provide a competitive advantage (Donaldson and Preston, 1995; Jones, 1995). Hence, agency theory has been gradually extended and adapted to consider the possibility that the agent's (CEO's) opportunism can have consequences for stakeholders other than the shareholder (Werder, 2011; Wowak et al., 2015; Martin et al., in press).

A stakeholder approach to agency problems and the consequences of CEO opportunism has pushed governance research beyond focusing on agency costs solely due to divergence of interests between CEO and shareholders (Hambrick et al., 2008; Hill and Jones, 1992; Werder, 2011). Stakeholder agency theory recognizes that other stakeholders may also have claims against the firm and that management acts as the de facto agent for their claims. Thus, stakeholder agency stipulates that the managerial agent enters into an implicit contract with all

other stakeholders (Hill and Jones, 1992). While a stakeholder agency approach does not assume that the non-shareholder stakeholder is a "principal" of the firm, "nevertheless, there is a parallel between the general class of stakeholder-agent relationships and the principal-agent relationships articulated by agency theory" (Hill and Jones, 1992: 134). As noted in Table I, the assumption of CEO self-interest is maintained, yet the contractual focus shifts from principal-agent to stakeholder-agent.

Adopting the principles of stakeholder theory, the firm can be viewed as a nexus of incomplete contracts between the CEO (managerial agent) and multiple stakeholders (Werder, 2011). The assumptions of agent opportunism and self-interest remain, but stakeholder agency examines interest divergence between the CEO and any firm stakeholder, defined as "any group who can affect or is affected by the achievement of organizational objectives" (Freeman, 1984: 46). Stakeholders, such as employees, customers, suppliers, or society clearly meet this definition. Despite that they are not meeting a definition of "principal" according to agency theory, stakeholder agency invites the analysis of interest divergence between the CEO and the non-shareholder stakeholder and how opportunism could negatively affect the stakeholder (Hill and Jones, 1992). This provides an appealing theoretical framework for exploring the consequences of CEO decision making for social welfare, which has been conspicuously absent from governance research confined by the restrictive approach of classical agency theory.

Shareholders are impacted by tax avoidance both as firm owners and as members of society. However, as owners of the firm, shareholders are likely to focus on the implications of tax avoidance for their financial stake in the firm. While tax avoidance has an immediate and direct effect on the cash balance available for distribution to shareholders, its effect on the shareholders through reduced public services and public infrastructure is more indirect, diffused, and delayed (Belz et al., 2017). Moreover, shareholder behaviors and decision making are more likely to be affected and influenced by events that are immediately apparent (such as the dividend they receive in the next quarter or year), available, or memorable (Benartzi and Thaler, 1995; Tversky and Kahneman, 1973). Hence, while being both firm owners and members of society, it is the former that shareholders are most likely to focus on in their assessments of firms' tax avoidance policies.

Behavioral Agency and Prospect Theory

Behavioral agency research integrates classical agency theory with behavioral decision

theory to enhance the conception of agent risk preferences and the behavioral consequences of stock options (please see Table I for a depiction of differences between behavioral agency theory and classical agency theory). A goal of behavioral agency research is to advance agency-theoretical understanding of how CEOs make sense of the risk inherent in their compensation prior to making decisions (i.e. *ex ante* sense-making). Said differently, behavioral decision research focuses on understanding ex ante sense-making and cognition with regard to the risk inherent to a focal decision. This approach to understanding risk taking distinguishes behavioral agency research from empirical studies in accounting and finance exploring the effect of firm behaviors and CEO decisions on *ex post* indicators of firm risk such as earnings volatility and stock return volatility.

Behavioral agency replaced classical agency theory's assumption of agent risk aversion with that of loss aversion. Loss aversion derives from prospect theory and suggests that individuals are more affected by losses than gains of equivalent value—with potential losses and gains from taking risk being gauged relative to the anticipated outcome in the absence of risk taking (Kahneman and Tversky, 1979). Loss aversion is reflected in individuals, on average, requiring prospective gains to be twice as much as losses in order to accept a gamble with equal probabilities for gain and loss (Tversky and Kahneman, 1992). As individuals have subjectively determined reference levels of attainment, potential outcomes are perceived as losses or gains depending on whether they deviate negatively or positively from their reference point. An individual anticipating that they will achieve their reference level in the absence of risk frames the decision as a gain domain and loss aversion suggests they will seek to avoid losses by eschewing alternatives that threaten the prospective gain. Conversely, an individual anticipating that they will not achieve their reference level in the absence of risk frames the decision as recovering a loss; loss aversion suggests they will embrace risk-laden alternatives that may reverse the prospective loss.

The intrinsic value of executive stock options is typically close to zero when granted (as options give the right to buy stock at the price on the grant date). This changes when the stock price increases, as stock options accumulate value. To the extent that the accumulated value of stock options—option wealth—is included by CEOs in assessments of their current wealth (that is, the wealth is endowed), option wealth creates risk bearing for CEOs (Wiseman and Gómez-Mejía, 1998). CEOs are likely to make sense of the risk to their option wealth by considering the

risks to firm performance, given firm performance is positively correlated with the value of their option wealth (Eisenhardt, 1989; Jensen and Meckling, 1976). The CEO's perception that their option wealth correlates with firm performance is reflected by research demonstrating that CEOs attempt to mitigate risk to option wealth through manipulating reported earnings (Zhang et al., 2008). Hence, the consequences of option risk bearing for risk behavior are contingent on firm performance. When firm performance is above the salient reference point, the CEO is likely to refrain from risk taking—to protect their option wealth; conversely, when firm performance is below, or anticipated to fall below, the salient reference point, CEOs are likely to engage in further risk taking—in an attempt to minimize losses to their option wealth (Wiseman and Gómez-Mejía, 1998).

Tax Avoidance

Corporate tax avoidance is commonly defined as actions that reduce a firm's taxes relative to its pre-tax accounting income (Christensen et al., 2015; Dyreng et al., 2010). Firms can quickly change their tax-related positions (Kim et al., 2019; Kubick and Lockhart, 2016). This change can be implemented through a range of mechanisms such as the use of accelerated depreciation, financial derivatives, hybrid financial instruments, and deferral of residual tax on foreign income (e.g., Belz et al., 2017; Donohoe, 2015; Johannesen, 2014). There is a striking variation among U.S. firms in the extent to which they engage in tax avoidance. A substantial share of profitable U.S. corporations pays little tax, making some observers view tax avoidance as the most severe compliance issue in the U.S. tax system (Desai and Dharmapala, 2006); conversely, approximately one-fourth of U.S. firms engage in little tax avoidance (Dyreng et al., 2008). Said differently, the tax planning strategies firms adopt can be viewed as a continuum (Hanlon and Heitzman, 2010).

Prior research provides strong evidence that, when successful, tax avoidance can have a material impact on firms' bottom line. For example, Mills et al. (1998) report that $1 of investment in tax planning can generate up to $4 reduction in firms' tax liability. Prior literature also demonstrates that, when unsuccessful, tax avoidance has a material negative impact on firms' bottom line and is viewed by executives, ex ante, as a risky decision (Armstrong et al., 2015; Christensen 2015; Dunbar et al., 2007; Graham et al., 2014). For example, as Christensen (2015) notes, IRS levies from audit adjustments and penalties against corporations amounted to over $28.9 billion in 2008 (IRS, 2008). This assessment of costs does not include interest and

back taxes which commonly approach the amount paid in fines (Wilson, 2009). Corporate tax avoidance can also have negative reputational consequences for the firm in its relationships with external stakeholders (Hoi et al., 2013). When external stakeholders are negatively impacted by firm policy, it can lead to an erosion of the reputational capital that good corporate citizenship provides (Hanlon and Slemrod, 2009). Hence, in addition to fines and legal fees, aggressive tax avoidance may lead to substantial costs due to reputational damage to the firm (Armstrong et al., 2015). In a survey of tax executives, Graham et al., (2014) found that various risks— i.e., reputational, legal, and financial—accounted for four of the top five reasons for firms not undertaking a tax avoidance initiative.[1]

Below, we integrate stakeholder and behavioral agency reasoning to advance the argument that CEO option wealth is (1) negatively related to tax avoidance when the firm's tax rate is anticipated to be lower than that of peer firms (a gain domain); and (2) positively related to tax avoidance when the firm's tax rate is anticipated to be higher than that of peer firms (a loss domain).

Tax Avoidance and CEO Stock Option Wealth

Although CEOs are typically not tax experts, they impact their firm's tax strategy by setting the "tone at the top" (Dyreng et al., 2010). In determining the firm's tax policy the CEO faces competing demands from multiple stakeholders (shareholder and non-shareholder). Complicating the CEO's calculus further, there is likely to also be heterogeneity of preferences or demands within each of these stakeholder groups (Doellman et al., 2016; Hillenbrand et al., 2019). Stakeholder agency theory suggests that when faced with competing stakeholder demands, the CEO will focus on an outcome that can be readily cast as balancing shareholder interests (e.g., Hill and Jones, 1992; Mitchell et al., 2016). Prior studies suggest that when CEOs frame their corporate tax strategy, they pay close attention to the tax choices of—and thus the rate of tax likely to be paid by—peer firms (Armstrong et al., 2019; Bird et al., 2018; Chyz and Gaertner, 2018; Cook et al., 2017; Kubick and Lockhart, 2016). Firms that "stand out" among their peers in terms of the aggressiveness of their tax planning are more likely to be audited by tax authorities or face legislative and regulatory scrutiny (Armstrong et al., 2019; Heitzman and Ogneva, 2018). On the other hand, a tax rate above that of peer firms gives rise to shareholder disquiet (Hanlon and Slemrod, 2009). Kubick and Lockhart (2016), for example, find that external labor market incentives motivate CEOs to adopt more aggressive tax strategies than peer

firms. Cook et al. (2017) show that firms with a higher effective tax rate than similar firms incur a higher cost of capital. Bird et al. (2018) show that CEOs have strong motivations to assess their firm's anticipated tax liability with reference to the likely tax liability of peer firms as they are more likely to be terminated when their firm has a higher tax rate than peers. A report by *PWC* cited by Bird et al. (2018, p 99), notes that top management "must be prepared to explain and justify their company's effective tax rate (ETR). As such, they must understand the spread of ETRs of firms in their industry, identify the drivers for the rate, and be able to assess their position against the ETR trends of their peer group.'' Similar anecdotal evidence of top management's focus on the tax planning activities of peer firms has been reported in other studies (e.g., Chyz and Gaertner, 2018; Crocker and Slemrod, 2005).[2]

Taking the anticipated tax rate of peer firms as a salient reference point when the CEO frames tax avoidance decisions, we argue that CEO stock option wealth is positively related to tax avoidance when the firm's tax rate is anticipated to be above that of peer firms and negatively related to tax avoidance when the firm's tax rate is anticipated to be below that of peers. We outline our logic below.

The firm's effective tax rate is anticipated to be lower than that of peer firms. In this setting, the firm will pay less tax than the CEO can readily justify as balancing competing stakeholder demands. When an individual anticipates that they will achieve the salient reference point (or goal) without further risk taking—a gain domain—individuals shun further risk taking (Kahneman and Tversky, 1979). Consistent with this, when firms are anticipated to exceed their reference point, executives tend to avoid risky initiatives (Fiegenbaum and Thomas, 1988; Greve, 1998). In our setting, there are strong motivations for CEOs to pursue less aggressive tax planning when anticipating that their firm will pay a lower rate of tax than peers—given the consequences of non-shareholder stakeholder disquiet and the aforementioned associated firm-level and CEO penalties (e.g., Armstrong et al., 2019; Dyreng et al., 2016; Hoopes et al. 2012; Zimmerman, 1983). In particular, CEOs are likely to be mindful of the negative stakeholder reactions—IRS audits, negative media attention and customer boycotts associated with aggressive tax avoidance (Dyreng et al., 2016; Hoopes et al., 2012; Zimmerman, 1983).

As discussed earlier, behavioral agency predicts that CEO option risk bearing increases CEO loss aversion—that is, the CEO becomes more sensitive to downside risk (Wiseman and Gómez-Mejía, 1998). Applied to our setting, the intensity of the CEO's risk aversion in a gain

domain will be proportionate to the option wealth they would lose (risk bearing) if tax avoidance results in the aforementioned fines and reputational harm. This line of reasoning suggests that when a firm's effective tax rate is anticipated to be lower than that of peer firms, there will be a negative relationship between the CEO's option wealth and tax avoidance.

The firm's effective tax rate is anticipated to be higher than that of peer firms. Faced with the possibility of failing to meet the salient reference point in the absence of further risk taking—a loss domain—individuals are willing to take risky initiatives in an attempt to achieve their goal (Kahneman and Tversky, 1979). Consistent with this logic, when firms are anticipated to fall below their reference point, executives tend to take more risk (Fiegenbaum and Thomas, 1988; Greve, 1998). In our setting, there are strong motivations for CEOs to pursue more aggressive tax planning when anticipating that their firm will pay a higher rate of tax than peers—given the aforementioned shareholder disquiet with failure to reduce the firm's effective tax rate to the reference level (Chyz and Gaertner, 2018; Graham et al., 2014; Hanlon and Slemrod, 2009). This suggests that when the firm's anticipated effective tax rate is above that of firm peers, the CEO is likely to frame tax avoidance decisions as an opportunity to mitigate firm losses. Similar to our logic used in the gain domain, we suggest that this tendency to take more risk in a loss domain will increase with CEO option wealth. This is because the CEO's motivation to avoid loss is proportionate to the personal wealth they have tied to firm performance (Wiseman and Gómez-Mejía, 1998). According to the above logic, we argue there will be a positive relationship between CEO option wealth and tax avoidance when a firm's effective tax rate is anticipated to be higher than that of peer firms.

In sum, our logic suggests that (1) when the firm's effective tax rate is anticipated to be below the reference point, CEO option wealth will be negatively related to tax avoidance, and (2) when the firm's effective tax rate is anticipated to be above the reference point, CEO option wealth will be positively related to tax avoidance. Hence, we predict:

Hypothesis 1a: *CEO option wealth is negatively related to tax avoidance when the firm's effective tax rate is anticipated to be below the tax rate of peer firms*.

Hypothesis 1b: *CEO option wealth is positively related to tax avoidance when the firm's effective tax rate is anticipated to be above the tax rate of peer firms*.

Boundary Conditions

Our core argument is that the impact of CEO risk bearing—arising from the stock option

wealth—on tax avoidance is contingent on whether the decision to engage in tax avoidance is framed as an opportunity to realize further gains or an opportunity to mitigate losses. This gives rise to a predicted negative (positive) relationship between CEO option wealth and tax avoidance when the firm's tax rate is anticipated to be below (above) the tax rate of peer firms. To further explore the mechanisms underpinning the relationship between CEO option wealth and tax avoidance, we explore two governance variables that influence CEOs' risk bearing.

Activist institutional ownership. Management scholars have highlighted the impact of institutional investors on executive decision making and firm outcomes (e.g., Connelly et al., 2010; Connelly et al., 2016; Goranova et al., 2010; Hoskisson et al., 2002; Shi et al., 2017). In contrast to retail investors, who typically hold very small stakes in a firm, institutional investors have both the motivation and the ability (through their concentrated ownership stake in a firm) to monitor and influence executive conduct (Shleifer and Vishny, 1986). The management literature on institutional ownership and executive conduct emphasizes the distinction between passive and activist institutional investors (e.g., Connelly et al., 2010). Passive institutional investors hold stock in a firm based on an index-type trading strategy. Consequently, passive institutional investors play little or no role in holding executives to account (Connelly et al., 2010). Activist institutional investors—e.g., pension and hedge funds—buy and/or sell stock in specific firms based on their assessment of firms' performance and/or future prospects. As they are generally free of management pressure, intervention by activist institutional investors tends to have a greater impact than intervention by other shareholders (Cremers and Nair 2005; Brav et al.2008). Consequently, active institutional owners play an important role in holding executives to account (Connelly et al., 2010). Furthermore, arising from their concentrated holdings in the firm, activist institutional investors are focused on protecting and enhancing firm value (Hoskisson et al., 2002).

Behavioral agency reasoning suggests that active institutional ownership amplifies CEO option risk bearing. First, the CEO's estimate of their option risk bearing increases with vulnerability to dismissal (Cruz et al., 2010). When activist institutional investors have a larger stake in the firm, CEOs face a greater likelihood of dismissal following declining financial performance (Warner et al., 1988). When the CEO is dismissed, unexercised options are typically sacrificed, and the time available to exercise vested options is reduced (Devers et al., 2008). Second, as activist institutional investors tend to have significant stock holdings in the

firm, their exit could lead to a drop in a firm's stock price which would, in turn, have an adverse effect on executives' wealth, such as their option wealth (Connelly et al., 2010). In the context of tax planning, activist institutional investors are thought to encourage management to enhance firm value by engaging in tax avoidance that maximizes after-tax cash flows while protecting firm value by shunning overly aggressive tax avoidance (Chen et al., 2012). Thus, if less tax avoidance leads to lower cash flows, there is a greater risk of both CEO dismissal and of the CEO losing option wealth due to a sell down of stock by the activist institutional investor.

We reason that, due to increased CEO option risk bearing, activist institutional ownership is likely to amplify the relationship between CEO option wealth and tax avoidance. When the firm is anticipated to pay a lower rate of tax than peers, activist institutional ownership is likely to amplify the extent to which the CEO views further tax avoidance as a threat to their option wealth—in the event that tax avoidance gives rise to penalties and activist investor disquiet that the CEO has failed to protect firm value. Conversely, when the firm is anticipated to pay a higher rate of tax than peers, CEO is likely to view further tax avoidance as a means of protecting their option wealth from the consequences of activist investor disquiet that the CEO has been ineffective in shielding corporate income from taxes. Said formally:

Hypothesis 2a: *Activist institutional ownership amplifies the negative relationship between CEO option wealth and tax avoidance when the firm's effective tax rate is anticipated to be below the tax rate of peer firms*.

Hypothesis 2b: *Activist institutional ownership amplifies the positive relationship between CEO option wealth and tax avoidance when the firm's effective tax rate is anticipated to be above the tax rate of peer firms*.

CEO hedging ability. Agency literature has noted that CEOs may have the ability to hedge their exposure to firm performance risk (Gao, 2010). Hedging is a means of active risk management through investments in financial instruments that protect wealth from adverse price movements (Martin et al., 2013). For example, if CEOs have significant exposure to the firm's share price as a result of holding stock options that have accumulated value, they could buy put options (granting the right to sell a stock at a specified price) which become more valuable as the share price declines, thereby offsetting any losses of wealth the CEO experiences due to losses in the value of their stock options (Gao, 2010). Various agency scholars have investigated the consequences of the active management of stock price risk for CEO behaviors (e.g., Bettis et al.,

2001; Fu and Ligon, 2010). We follow this lead by exploring the consequences of CEOs' hedging abilities for the CEO option wealth-tax avoidance relationship.

In Hypotheses 1a and 1b, we advanced the argument that CEO option risk bearing discourages tax avoidance in a gain domain and encourages tax avoidance in a loss domain. The underlying logic was that, due to loss aversion, the CEO is risk averse in a gain domain and risk seeking in a loss domain; the more they have to lose—the higher their option risk bearing—the more motivated they are to avoid or take risk in the form of tax avoidance. If the CEO has the opportunity to reduce the exposure of their option wealth to losses, they reduce their assessment of option wealth-at-risk. That is, according to the logic of hedging, if the CEO is able to hedge their exposure to stock price declines, they effectively insulate their accumulated equity-based wealth from adverse movements in their firm's market value. When the link between CEO option wealth and shareholder wealth weakens, the effects of option risk bearing described in Hypotheses 1a and 1b are attenuated. Hence, we reason that when the CEO is able to hedge exposure to the firm's share price, tax avoidance decisions aimed at preserving their option wealth become less urgent. Therefore, the ability to hedge will attenuate the impact of CEO option wealth on tax avoidance. Hence, we predict:

Hypothesis 3a: *The availability of hedging instruments to the CEO attenuates the negative relationship between CEO option wealth and tax avoidance when the firm's effective tax rate is anticipated to be below the tax rate of peer firms*.

Hypothesis 3b: *The availability of hedging instruments to the CEO attenuates the positive relationship between CEO option wealth and tax avoidance when the firm's effective tax rate is anticipated to be above the tax rate of peer firms.*

METHODS

Sample and Measures

Our initial sample consists of all firms in the Standard and Poor's (S&P) ExecuComp database for the years 1993–2014. ExecuComp provides annual data on CEO compensation for firms in the S&P 1500. The S&P 1500 combines three leading indices, the S&P 500, the S&P MidCap 400, and the S&P SmallCap 600, which represent the large-cap, mid-sized, and small-cap segments of the U.S. equity market, respectively. Firms included in the S&P 1500 cover approximately 90% of the U.S. equity market capitalization. Data on institutional ownership and stock option trading were obtained from SDC Spectrum and OptionMetrics, respectively. We

obtain firm financial information from the Compustat Fundamental Annual files; we obtain stock price information from the Center for Research on Security Prices (CRSP)/Compustat merged files. A final sample of 21,243 observations for 2,573 U.S. firms was available to test our main hypotheses (Hypotheses 1a and 1b). The number of firms in our sample is greater than 1500—greater than the number of firms in the S&P 1500 index—as, during the sample period, some firms were added to the index and some firms were deleted. The sample size used to test the boundary conditions varied depending on the availability of data used to construct the variables capturing the hypothesized boundary conditions.

Dependent variable. Tax avoidance refers to actions that reduce a firm's taxes relative to its pretax accounting income (Christensen et al., 2015). Following prior studies (e.g., Armstrong et al. 2019; Bird et al. 2018; Cheng et al. 2012; Christensen et al., 2015; Chyz and Gaertner 2018), we operationalize tax avoidance using the firm's cash effective tax rate. We calculate the cash effective tax rate (*Effective tax rate*) as the ratio of taxes paid to the tax base. This cash flow-based variable is the most direct measure of a firm's corporate tax burden (Edwards et al., 2016) and is heavily relied upon by stakeholders when assessing the extent to which a firm engages in corporate tax avoidance (Cheng et al. 2012, Graham et al. 2014) and in market assessments of firm value (e.g., Kim et al. 2011). Of particular relevance to our setting, there is strong evidence that CEOs seek to match the effective tax rate paid by peer firms—viewing this as an outcome that can be justified to multiple stakeholders and thus an outcome that minimizes the likelihood of stakeholder disquiet (Armstrong et al., 2019; Bird et al., 2018). A lower *Effective tax rate* indicates greater tax avoidance. Consistent with prior research (e.g., Christensen et al., 2015; Dyreng et al., 2008), we exclude firm-years with negative pre-tax income to avoid negative denominators in the *Effective tax rate*, in which cases the measure is difficult to interpret.

Independent variables. CEO option wealth represents the option wealth the CEO has accumulated due to past option grants that have subsequently increased in value. Accumulated option wealth is at risk of loss given that it is positively correlated with the firm's share price. Following prior studies, we calculate *CEO option wealth* as the number of options from each option grant, multiplied by their corresponding spread (for in-the-money options) on the final day of the fiscal year (Kish-Gephart and Campbell, 2015; Larraza-Kintana et al., 2007). This is a heuristic for the CEO's estimate of their potential personal wealth losses (losses to endowed

wealth) if risk taking fails, given that negative firm outcomes will negatively impact the share price and therefore the value of the CEO's options. As *CEO option wealth* is highly skewed, we log-transform the variable.

We construct the *Activist institutional ownership* variable as the proportion of a firm's shares held by activist institutional investors.[3] Our classification of activist investors is based on two sources. Our first source is Cremers and Nair (2005) who provide a list of the 18 largest public pension funds. Our second source is Cohn et al. (2016) who use sharkrepellent.net's SharkWatch50 list of known activist investors. This list constitutes a compilation of 50 significant activist investors, which is based on factors such as the number of publicly disclosed activism campaigns and the ability to effect change at targeted companies (Cohn et al., 2016). We classify an institutional investor as an activist if they belong to either the Cremers and Nair (2005) or Cohn et al. (2016) activist investors lists.

The purchase of put options allows a CEO to sell firm stock at a fixed price; these put options will increase in value if the share price declines, offsetting losses in (or hedging) the value of a CEO's call options when stock prices decline. Based on the above discussion, we follow Martin et al. (2013) and construct the *CEO hedging ability* variable as the trading volume of put options on firm's stock; for the firms with no record of publicly traded stock options we set the value of the *CEO hedging ability* variable equal to zero. Higher trading volume indicates lower cost and ease of CEO hedging (Gao, 2010).

Control variables. We include a variety of control variables following prior research on the determinants of tax avoidance (Chen et al., 2017; Dyreng et al., 2008; Edwards et al., 2016; Hasan et al., 2017; Rego, 2003). We include *Firm size* to control for the economies of scale in tax avoidance and *Firm age* to account for a firm's lifecycle. *Firm size* is the natural logarithm of a firm's total assets and *Firm age* is the natural logarithm of a firm's age, defined as the number of years of financial data available in Compustat prior to a firm's fiscal year-end. To control for debt-related tax shields, we include a firm's leverage (*Leverage*) calculated as the ratio of long-term debt to total assets. We also include a firm's return on assets (*ROA*) to control for a firm's profitability. We include *Past stock returns*, a log-return on a firm's stock over the fiscal year, to control for a firm's stock market performance. To control for multinational firms' foreign operations, we include a foreign income dummy variable (*Foreign income*), which takes a value of 1 if a firm has reported non-zero pretax foreign income in a fiscal year and zero otherwise (our

results are robust to using a continuous foreign income metric). We further include a loss carry-forward dummy variable (*Loss carry-forward*) to control for the impact of prior operating losses on a firm's tax burden. To control for the volatility of a firm's performance, we include the standard deviation of the return on assets over the five years prior to the firm's fiscal year-end (*ROA volatility*). To control for the effects of extraordinary expenses and discontinued operations on taxes paid, we include the *Extra/Disc* dummy variable which takes a value of 1 if a firm reported extraordinary expenses or discontinued operations for the fiscal year and zero otherwise. Equity income in earnings (*Equity income*) and new investments (*New investments*) are included to control for a firm's investment activities, as these activities might generate additional tax shields. We calculate *Equity income* as the ratio of equity income in earnings over a firm's total assets. We calculate *New investments* as the sum of R&D expenditures, capital expenditures, and cash outflows related to acquisitions minus the sum of cash inflows from sales of property, plant, and equipment and depreciation and amortization from the cash flow statement, divided by a firm's total assets. We also include changes in goodwill (*ΔGoodwill*) to control for the impact of asset impairment on a firm's tax position. We calculate *ΔGoodwill* as the ratio of change in goodwill to a firm's total assets. To control for a firm's growth opportunities, we include the market-to-book ratio (*Market to book*), calculated as the ratio of the market value of a firm's equity to its book value. We also include *Financial constraints* to control for a firm's access to capital, and *Inventory intensity* to control for the level of a firm's inventory. We measure *Financial constraints* using the Kaplan and Zingales (1997) financial constraints index. We measure *Inventory intensity* as the ratio of a firm's inventory to total assets. We control for firm and year fixed effects; the latter control for the potential impact of economy-wide conditions and/or time trends in corporate tax avoidance.

Model and Estimation Method

Model. Our aim is to model the interplay between CEO option wealth and a firm-level reference point in influencing tax avoidance decisions. Building on prior studies (e.g., Bird et al., 2018; Chyz and Gaertner, 2018), we take the median effective tax rate for peer firms—i.e., firms with similar operating and financial characteristics as the focal firm—as our proxy for the reference point that CEOs are likely to use when framing corporate tax avoidance decisions. While peer firms' tax rates are only fully known at the end of the fiscal year, their anticipated tax

liabilities can be estimated during the year based on observable financial and operating characteristics, such as size, leverage, and market to book ratio (e.g., Bratten et al., 2017).

We test our hypotheses using quantile regression (Koenker and Basset, 1978). Quantile regression has been applied in a wide range of disciplines (Koenker and Hallock, 2001; Li, 2015). In particular, management scholars have pointed to the benefits of employing quantile regression in settings where a focus on the conditional mean is not appropriate (Li, 2015; Makino and Chan, 2017). Unlike a linear regression model, that has one set of parameters, quantile regression produces a set of parameters for each quantile. Therefore, inferences can be made at different quantiles. Also, quantile regression does not segment the response variable into subsets according to its unconditional distribution (i.e., it does not condition on the dependent variable) (Koenker and Hallock, 2001). This feature of quantile regression constitutes an important advantage over traditional (linear regression) methods: It allows researchers to make inferences regarding the impact of the explanatory variable of interest (in our context, CEO option wealth) on the dependent variable (in our context, the effective tax rate) across various quantiles of the distribution of the dependent variable without partitioning it into subsamples (if implemented, such partitioning would introduce severe bias in estimation).[4]

We use quantile regression to estimate the relationship between firms' effective tax rates and CEO option wealth for the upper and lower quantiles of the effective tax rate distribution. The upper and lower quantiles capture situations when the firm's effective tax rate is anticipated to be above and below the reference point, respectively.

Our baseline empirical model is as follows:

$$Q_{i,t}(\tau) = \beta_\tau CEO\ option\ wealth_{i,t-1} + \boldsymbol{\theta_\tau Z_{i,t}} \quad (1)$$

$\boldsymbol{Z_{i,t}}$ is the vector of firm *i*'s control variables, and $Q_t(\tau)$ is a conditional τ-th quantile of *Effective tax rate*$_{i,t}$ given values of $CEO\ optionwealth_{i,t-1}$and $\boldsymbol{Z}_{i,t}$ for $\tau \in (0,1)$. Consistent with prior research (e.g., Devers et al., 2008; Larraza-Kintana et al., 2007), we use one-year lagged CEO option wealth to account for the time difference between managerial incentives and the managerial risk-taking decision (i.e., tax avoidance). The coefficient of *CEO option wealth*$_{i,t-1}$ (β_τ) and the coefficient vector of control variables ($\boldsymbol{\theta_\tau}$) are estimated using the whole sample and are both allowed to vary across different quantiles of the *Effective tax rate* (i.e., they are allowed to vary across different values of τ). Using the notations of

Equation (1), the reference point (the anticipated effective tax rate of peer firms) is captured by the conditional median of the effective tax rate distribution (i.e., when τ = 0.5), reflecting the anticipated effective tax rate for firms with the same operating and financial characteristics as the focal firm. We estimate the median regression where the dependent variable is the effective tax rate, and the explanatory variables are the control variables from our baseline model: firm size, leverage, ROA, foreign income, loss carry-forward, ROA volatility, extraordinary and discretionary items, equity in earnings, new investments, change in goodwill, market-to-book and financial constraints. We then take the values of these variables for each firm in a given year, to calculate the projected median effective tax rate for firms with exactly the same characteristics as the focal firm. An advantage of this approach is that it provides an exact matching of the anticipated tax rate of the peer firms. Hence, there is no variance in the quality of matching.[5]

Estimation method. We estimate the model parameters (i.e., β_τ and $\boldsymbol{\theta_\tau}$) using Bayesian estimation (Chernozhukov and Hong, 2003). We use the Bayesian panel quantile regression estimator developed by Powell (2016). This estimator provides a flexible yet parsimonious way to control for firm fixed effects in panel quantile regressions, using within-firm unit variation for identification purposes. In contrast, using non-Bayesian methods involves imposing stringent assumptions on the fixed-effects parameters as well as creating substantial statistical and computational issues (Chernozhukov and Hong, 2003; Powell, 2016). Controlling for firm fixed effects is particularly important in our setting, where both the firm's effective tax rate and CEO option wealth could be driven by some unobservable firm-level attribute (Desai and Dharmapala, 2006). As controlling for firm fixed effects estimates the impact of CEO option wealth on the effective tax rate within a given firm, it also eliminates the need to control for a firm's enduring attributes such as a firm's industry affiliation or a firm's location (e.g., incorporation in tax haven jurisdictions) (Atwood and Lewellen, 2019). Bayesian estimation methods have been widely applied in various fields (Kruschke et al., 2012) and recently have gained momentum in management research (e.g., Li, 2015; Zyphur and Oswald, 2015).

In Bayesian statistics, a researcher makes probability statements about the parameter of interest (in our context, β_τ) given the observed data. Put differently, the parameter of interest is viewed as a random variable whereas observed data are treated as fixed. Uncertainty regarding the effect of β_τ is quantified by the conditional probability distribution of β_τ given the observed

data (in our context, data on effective tax rates, CEO option wealth, and control variables), referred to as "posterior probability distribution" or "posterior distribution". Estimation of the posterior distribution requires specification of the prior probability distribution of the parameter of interest (or simply "the prior"), which reflects initial beliefs regarding the parameter of interest prior to observing the data. After a prior has been specified, the posterior probability distribution is computed using an iterative algorithm, where posterior values for each parameter are estimated in multiple iterations. Corresponding statistical inferences are made by inspecting the estimate of the central location of the posterior distribution for the parameter of interest (i.e., mean, median, or peak) and the range of parameter estimates that captures 95% of the posterior distribution, commonly referred to as the "95% credibility interval". Further, a Bayesian analog of the *p*-value can be constructed as the proportion of the posterior distribution that exists on the other side of the hypothesized value.[6]

RESULTS

We report the descriptive statistics (location, scale, and robust estimates of minima and maxima) and correlations in Table II. A typical firm in our sample has an *Effective tax rate* of 0.25 and *CEO option wealth* of 8.13. The minimum and maximum estimates of *Effective tax rate* are largely consistent with prior literature (e.g., Dyreng et al., 2008), indicating a wide variation among firms in the extent to which they engage in tax avoidance. The largest Variance Inflation Factor is 2.05, suggesting that multicollinearity does not pose a concern in our analysis (Kennedy, 2003).

[INSERT TABLE II ABOUT HERE]

We first tested Hypotheses 1a and 1b, which predict that CEO option wealth is negatively associated with tax avoidance in a gain domain (i.e., when a firm's effective tax rate is anticipated to be below the reference point) and positively associated with tax avoidance in a loss domain (i.e., when a firm's effective tax rate is anticipated to be above the reference point), respectively. As discussed in the preceding section, Hypothesis 1a predicts that the coefficient of *CEO option wealth* will be positive in the 10th percentile equation of *Effective tax rate* (indicating reduced tax avoidance) and Hypothesis 1b predicts that the coefficient of *CEO option wealth* will be negative in the 90th percentile equation of *Effective tax rate* (indicating increased tax avoidance).

We report estimates of the 10th and 90th percentile equations of *Effective tax rate* in Table III. For each coefficient, we report the mean of its posterior distribution (tabulated in the "Coefficient" column) and the range of coefficient estimates that capture 95% of the posterior distribution (i.e., the 95% credibility interval), tabulated in the "Two-sided 95% CI" column. For each hypothesis, we also report the Bayesian "*p*-value", calculated as the proportion of the posterior distribution that exists on the other side of a value range predicted by that hypothesis. As we make no directional predictions for the control variables, we do not include Bayesian *p*-values for these variables. Nonetheless, a reader can still make inferences about estimation uncertainty of the coefficients of control variables by inspecting the corresponding 95% credibility intervals—a range of parameter estimates that captures 95% of the posterior distribution. The results show that the coefficient of *CEO option wealth* in the 10th percentile equation is positive (b=0.012, Bayesian $p < 0.01$), providing strong support for Hypothesis 1a. The results also show that the coefficient of *CEO option wealth* in the 90th percentile equation is negative (b=-0.010, Bayesian $p < 0.01$), providing strong support for Hypothesis 1b.[7]

The documented effects are economically meaningful. The results for the 10th percentile equation of *Effective tax rate* suggest that, in a gain domain (i.e., when a firm's effective tax rate is anticipated to be below the reference point rate), a one standard deviation increase in CEO option wealth, on average, reduces tax avoidance by 0.012/0.25 = 4.8% relative to the median. In our sample, this corresponds, on average, to an increase of $7.88 million in firms' annual tax payments. The results for the 90th percentile equation of *Effective tax rate* suggest that, in a loss domain (i.e., when the firm's effective tax rate is anticipated to be above the reference point rate), a one standard deviation increase in CEO option wealth, on average, increases tax avoidance by 0.010/0.25 = 4.0% relative to the median. In our sample, this corresponds, on average, to a reduction of $6.57 million in firms' annual tax payments.

[INSERT TABLE III ABOUT HERE]

Next, we tested Hypotheses 2a and 2b which predict that activist institutional ownership amplifies the negative relationship between CEO option wealth and tax avoidance in a gain domain and the positive relationship between CEO option wealth and tax avoidance in a loss domain. To test these predictions, we modified our baseline models to include the interaction term between *CEO option wealth* and *Activist institutional ownership*. We report the results in Table IV. For the 10th percentile equation of *Effective tax rate*, the coefficient of *CEO option*

wealth × *Activist institutional ownership* is positive (b=0.002, Bayesian p=0.08), providing support for Hypothesis 2a. For the 90th percentile equation of *Effective tax rate*, the coefficient of *CEO option wealth* × *Activist institutional ownership* is negative (b=-0.013, Bayesian p<0.01), providing strong support for Hypothesis 2b.

[INSERT TABLE IV ABOUT HERE]

Next, we tested Hypotheses 3a and 3b which predict that CEO ease of hedging attenuates the negative relationship between CEO option wealth and tax avoidance in a gain domain and the positive relationship between CEO option wealth and tax avoidance in a loss domain. To test these predictions, we modified our baseline models to include the interaction term between *CEO option wealth* and *CEO hedging ability*. We report the results in Table V. For the 10th percentile equation of *Effective tax rate*, the coefficient of *CEO option wealth* × *CEO hedging ability* is negative (b=-0.002, Bayesian $p < 0.01$), providing strong support for Hypothesis 3a. For the 90th percentile equation of *Effective tax rate*, the coefficient of *CEO option wealth* × *CEO hedging ability* is positive (b=0.003, Bayesian $p = 0.07$), providing support for Hypothesis 3b.

[INSERT TABLE V ABOUT HERE]

Robustness tests. To assess the robustness of our findings, we carried out an extensive set of sensitivity tests and report the results of these tests in Table VI. For brevity, we only report the coefficients of the variable of interest (i.e., *CEO option wealth*) for the 10th and 90th percentile equations. Control variables (untabulated) are included in all regression models.

We considered the possibility that our findings are driven by an omitted variable that influences both CEO option wealth and tax avoidance. We conducted five tests to examine this potential endogeneity issue. In the first test, we controlled for CEO stock ownership, CEO inside debt, and CEO total wealth which were shown to influence CEO risk taking (Anderson and Core, 2018). The data used to construct these variables were obtained from Execucomp and Anderson and Core (2018) supplemental appendix. In the second test, we controlled for risk-taking incentives induced by the sensitivity of CEO wealth to stock volatility. To that end, we controlled for the sensitivity of CEO options to stock volatility (CEO vega) and the sensitivity of CEO equity wealth (stock options and restricted stock grants) to stock volatility (Core and Guay, 2002; Anderson and Core, 2018). In our third test, we controlled for board monitoring (Jensen and Meckling, 1976) by including board independence, board size, the proportion of non-busy directors on the board, and CEO-Chairman of the Board duality as additional controls. In the

fourth test, we modified our model to include CEO fixed effects to verify that our findings are not driven by some omitted CEO-level persistent attribute(s) (e.g., CEO personal characteristics) that could impact both CEO option wealth and tax avoidance. In the fifth test, we estimated our model using an instrumental variable (IV) quantile regression (Chernozhukov et al., 2015) with effective tax rates adjusted to firm-fixed effects following Canay (2011). Yonker (2016) find that the compensation of local CEOs is affected by local labor market factors, concluding that the market for CEOs in the U.S. is geographically segmented. Consistent with this, Chen et al. (2015) document a substantial degree of commonality among executives' option grants for firms headquartered in the same geographical area. Building on these studies, we used the local firms' *CEO option wealth* based on two-digit ZIP codes as an instrument. The partial *F*-statistic of instrument exclusion test is 664.96, suggesting that a weak instrument problem is not a concern in our setting (Stock et al., 2002). Further, we are not aware of any theory linking segmentation of the market for CEOs—through our instrument—to the focal firm's tax avoidance. Hence, we reason that local firms' *CEO option wealth* is a valid instrument in our setting (Semadeni et al., 2014). Following Chernozhukov et al. (2015), statistical inferences in this analysis were made based on bootstrapped confidence intervals. The results of these tests remained qualitatively similar to those reported in our baseline analysis.

For completeness, we considered the possibility that historical tax rates may also play a role in reference point formation. To examine the robustness of our findings under this scenario, we conducted two tests. In the first test, we modified our baseline model to include a focal firm's historical effective tax rate measured over the previous three fiscal years as an additional control. Inclusion of the focal firm's historical tax rate also controls for potential mean reversion effects. In the second test, we included the lagged effective tax rate of peer firms, which we defined as the firms in the same 2-digit SIC industry and the same size and profitability quintiles as the focal firm. We also examined the sensitivity of our results to the exclusion of firms in regulated (i.e., finance and utilities) industries, as tax planning in these firms may have different dynamics from the rest of the firms in our sample. We also re-estimated our baseline model with effective tax rates winsorized at 1st and 99th percentiles to verify that our findings are not driven by outliers. The results of these tests are qualitatively similar to those of our baseline analysis.

[INSERT TABLE VI ABOUT HERE]

As discussed, we take the upper and lower percentiles of the distribution of the effective tax rate as the deviations from the reference point. The lower the percentile, the more the CEO will frame tax avoidance in a gain domain—and thus refrain from tax avoidance. The higher the percentile, the more the CEO will frame tax avoidance in a loss domain—and thus engage in tax avoidance. In developing H1a and H1b, we predict that both of these effects will be amplified by CEO option wealth. Accordingly, we expect to observe a U-shaped pattern in the CEO option wealth coefficient across different regression quantiles: i.e., the magnitude of the CEO option wealth coefficient should increase as we move from the center of the distribution to its tails. To examine this issue, we simultaneously estimated panel quantile regressions for the 10^{th}, 15^{th}, 20^{th}….90^{th} percentiles following Canay (2011). Next, we plotted the coefficients of CEO option wealth obtained from this estimation along with the 95% bootstrapped confidence intervals against the corresponding percentiles. The results are reported in Figure 1, showing that the magnitude of the coefficients exhibits a distinct U-shaped pattern around the median. These results provide further support for our expectation that CEO option wealth increases (reduces) tax avoidance in the loss (gain) domains.

[INSERT FIGURE 1 ABOUT HERE]

To further gauge the robustness of our findings, we conducted several additional tests (untabulated for brevity). As the diversification of firm operations could influence CEO risk-taking, we included the measure of geographic dispersion of firm operations developed by Garcia and Norli (2012). As managerial efficiency could influence incentives to engage in tax avoidance, we included the measure of managerial efficiency proposed by Demerjian et al. (2012). Demerjian et al. (2012) use Data Envelopment Analysis (DEA) to form an efficient frontier by measuring the amount and mix of resources used to generate revenue by the firms within each industry; the further the firm is from the frontier, the lower the firm's efficiency score. We also estimated our baseline model using residual book-tax difference as an alternative measure of tax avoidance. Each of these robustness tests returned results consistent with our reported findings. Lastly, we explored the governance role of the corporate board in the relationship between CEO option wealth and tax avoidance. Based on prior literature (e.g., Fich and Shivdasani, 2006; Hauser, 2018), we used the proportion of non-busy directors—directors who do not serve on multiple boards—to capture the efficacy of board-related governance. The results of this analysis suggest that greater efficacy of board-related governance amplifies the

effect of CEO option wealth on tax avoidance and are consistent with our finding using active institutional ownership as a moderator.

DISCUSSION

Our study aimed to explore the impact of CEO option incentives on corporate tax avoidance. We theorize and find that: (1) CEO option wealth is negatively related to tax avoidance when a firm's effective tax rate is anticipated to be lower than that of peer firms; (2) CEO option wealth is positively related to tax avoidance when a firm's effective tax rate is anticipated to be higher than that of peer firms; (3) activist institutional ownership in the firm amplifies the relationship between CEO option wealth and tax avoidance in both settings; and (4) the ability of the CEO to hedge option wealth attenuates the relationship between CEO option wealth and tax avoidance in both settings. We tested our arguments in a longitudinal sample of firms listed in the U.S. — the world's largest economy with well-established corporate tax regulations. Our findings offer important theoretical and practical contributions, which we elaborate on below.

First, our findings contribute to the stakeholder agency literature. We do so by offering the insight that option incentives (as a form of equity-based pay) increase the urgency with which the CEO attempts to achieve firm outcomes that strike a balance between stakeholders' competing demands. In offering this insight, we challenge the assumption that stock options incentivize the CEO to make decisions that consistently favor shareholders over non-shareholder stakeholders (Hill and Jones, 1992). Our findings support a more complete, stakeholder-centric and frame-dependent, description of the implications of CEO stock option incentives. While we do no assess stakeholder consequences directly, our findings provide a framework for exploring the behavioral implications of executive incentives for multiple stakeholders. Specifically, our findings suggest that stock options incentivize the CEO to focus on outcomes that balance stakeholder demands as a means of protecting their personal wealth. In doing so, our findings illuminate: (1) the importance of a broader stakeholder approach to examining the impact of CEO compensation incentives, and (2) the limitations of classical principal-agent models as a lens for describing the relationship between CEO compensation incentives and behavior. Our findings also point to the utility of equity-based pay in incentivizing behaviors that are aligned with the interests of stakeholders other than shareholders. In underlining the value of employing a stakeholder agency lens to explore the implications of CEO incentive alignment mechanisms,

we hope that our findings further invigorate a broader stakeholder approach to research on corporate governance.

Second, we contribute to behavioral agency literature exploring how CEO risk bearing—arising from option wealth—interacts with firm-level reference points to affect risk behavior. Specifically, we describe how the CEO frames decisions based on a firm-level reference point and how risk bearing influences the intensity with which they pursue that outcome. Our findings contrast with empirical behavioral agency literature that has focused predominantly on CEO equity wealth—in particular, option wealth—as the salient reference point that CEOs use to frame strategic risk decisions, leading to a predicted monotonic negative relationship between option risk bearing and tax avoidance. In contrast, we offer an augmented behavioral framework for predicting CEO risk behavior in response to option wealth describing how decision framing, CEO option wealth, and CEO risk taking interrelate. In offering this refinement, we underline the utility of integrating behavioral agency with stakeholder theory research, given that the reference level is shaped by anticipated responses of various stakeholder groups to CEO decisions. These insights provide a potential explanation for mixed prior evidence on the behavioral consequences of CEO stock options where the concept of a firm-level reference point has been largely overlooked (e.g., Devers et al., 2008; Larraza-Kintana et al., 2007). In doing so, we describe an important aspect of the interplay between decision framing and option risk bearing that has largely remained unexplored since Wiseman and Gómez-Mejía's (1998) original articulation of the behavioral agency model.

Third, we extend behavioral agency literature through our consideration of boundary conditions. Findings with respect to our first boundary condition—activist institutional ownership—provide further insight into the role that institutional investors can play in guiding firm strategy by actively engaging with the firm's management (Connelly et al., 2010; Hoskisson et al., 2002). Empirical evidence suggests that, as financially sophisticated investors, activist institutional owners enable (through the provision of guidance and expertise) firms to reduce tax exposure while avoiding extremely aggressive tax strategies. That is, while activist institutional ownership is associated with a lower effective tax rate, the lower rate has been found to come from better tax planning rather than from aggressive tax sheltering activities (Cheng et al., 2012). We offer an alternate explanation as to how activist institutional investors shape tax behaviors—by impacting on CEO risk bearing and thus risk taking. Notwithstanding institutional investors

favoring shareholder interests, our findings demonstrate that activist institutional ownership can also lead to outcomes that align with the interests of non-shareholder stakeholders: specifically, activist institutional ownership amplifies the influence of option wealth in discouraging the CEO from engaging in further tax avoidance when the firms tax rate is anticipated to be lower than that of peers. The second boundary condition we considered—CEO hedging ability—explored how the tax avoidance decision is moderated by the availability of hedging instruments that allow the CEO to hedge the downside risk to their option wealth. Our findings support the idea that the CEO's ability to hedge their exposure to share price declines has a material impact on the relationship between equity wealth and decision making. While hedging is generally thought to give rise to agency concerns (e.g., Gao, 2010), we show that, in the context of corporate tax avoidance, the CEO's ability to hedge can be beneficial for shareholders.

Fourth, we extend research on tax avoidance. Tax is argued to be "the forgotten element in the corporate social responsibility debate—and probably the most important" because of the role of tax revenues in funding infrastructure (Muller and Kolk, 2015: 437). Scholars have long pondered why firms vary in the extent to which they engage in tax avoidance (Desai and Dharmapala, 2006; Hanlon and Heitzman, 2010). Dyreng et al. (2008), for example, find that while some firms engage extensively in tax avoidance, one-fourth of firms paid over 35% of their pre-tax income in taxes over a ten-year period indicating that these firms engage in little or no tax avoidance (given a 35% statutory corporate tax rate in the U.S.during the period of our study). Our findings point to CEO option wealth as an important antecedent to tax avoidance. Our findings demonstrate that when a firm's effective tax rate is anticipated to be below that of peer firms, the CEO is likely to view further tax avoidance as a threat to their option wealth. Thus, CEO stock options incentivize behaviors that are consistent with the broader interests of society. Yet, when the firm's tax rate is anticipated to exceed that of peer firms, the CEO is likely to frame further tax avoidance as an opportunity to mitigate losses to their option wealth.

Practically, we offer guidance to directors and regulators attempting to anticipate and limit behaviors of executives that are inconsistent with social goals and may threaten their social license to operate. Specifically, when anticipating CEO behaviors that could negatively impact stakeholders beyond shareholders, we underline the importance of considering both the CEO's personal wealth situation and the context in which the firm is performing relative to its peers. By

doing so, we offer an advancement to those seeking to design and refine compensation contracts to create alignment with a broad base of firm stakeholders.

Limitations and Future Directions

Our study is not without limitations. First, we take the tax liabilities of firms similar to the focal firm as a reference point in framing tax avoidance decisions. Our choice of reference point is motivated by prior research suggesting that executives devote close attention to the tax liabilities of peer firms (Bird et al., 2018; Chyz and Gaertner, 2018). Future research could explore other potential factors that influence how executives frame tax avoidance decisions. For example, peer CEOs and/or firm employees may be influential in the formation of a reference point for the effective tax rate. Relatedly, studies exploring the salience of other reference points—for example, the rate of corporate tax paid by the firm in previous years—would be welcome. Second, as our sample is limited to U.S. firms, studies in other jurisdictions would be helpful in testing the generalizability of our findings. Third, the CEO is likely to have other sources of personal wealth in addition to option wealth. While our results suggest that CEO option wealth is material enough to influence decisions made on behalf of the firm, future research may consider the interplay between option wealth and other components of CEO wealth. Fourth, CEOs can be contractually restricted in the use of derivatives, creating a potential contingency in the influence of hedging. Future studies may seek to explore this avenue by drawing on data from CEO employment contracts. Fifth, CEOs and the firms they lead may vary in the weight they place on the needs of non-shareholder stakeholders. Therefore, it would be interesting to explore whether stock option wealth varies in its influence over CEOs with a track record for overseeing socially responsible (or irresponsible) corporate conduct when anticipating a tax rate above (or below) that of peer firms. Sixth, as discussed above, while we do not assess stakeholder consequences directly, we hope that our findings provide the basis for future studies exploring the consequences of CEO options incenitves for nonshareholder stakeholders. Finally, we note that estimation of posterior probability distribution—based on which Bayesian statistical inferences are made—is highly computationally intensive and time-demanding in our setting. Hence, in choosing between Bayesian versus frequentist (i.e., non-Bayesian) estimation of panel quantile regressions, researchers are well-advised to weigh the flexibility afforded by Bayesian estimation approach against its computational intensity.

NOTES

[1] Several studies (e.g., Desai and Dharmapala, 2006; Rego and Wilson, 2012) have shown that executive risk taking incentives lead to greater tax avoidance—providing indirect evidence that executives view tax avoidance as risk taking ex ante.

[2] The CEO receives guidance regarding the tax planning activities of peers, and the likely tax rate of peers, from several external sources including banks—Gallemore et al. *(*2019) show that banks provide firms with soft information on the tax planning activities of peers; board connections—Brown *(*2011) and Brown and Drake (2014) show that tax planning activities propagate through board connections; auditors—McGuire et al. *(*2012) demonstrate that auditors with industry expertise assist their clients in achieving lower effective tax rates and *s*upply chain partners—Cen et al. *(*2018) show that firms derive insights on tax planning from supply chain partners.

[3] Activist institutional owners buy and/or sell stakes in firms based on their assessment of firms' current performance and/or prospects. Hence, activist institutional owners are thought to play a role in holding executives to account for the decisions they make. In contrast, as passive institutional investors buy in and out of firms based on a quasi-index trading strategy, they are thought to have "abdicated" their role in holding executives to account (Connelly et al., 2010).

[4] Similarly, testing our hypotheses using traditional linear regression with interaction effects is not suitable. Such an approach would involve regressing effective tax against the interaction of CEO option wealth with the difference between the effective tax rate and the reference point. Having the effective tax rate in both sides of the regression model would introduce severe endogeneity-driven bias (e.g., Koenker and Hallock, 2001)—up to the point of a mechanical relation in the regression.

[5] Our approach mirrors the approach that CEOs are likely to adopt when assessing the likely tax rate of peer firms. That is, we construct our measure based on peer firm data that is (a) predictive of the effective tax rate and (b) readily available to the CEO of the focal firm.

[6] We use non-informative priors to ensure that our estimation results are not influenced by the specific choice of prior distribution (Kass and Wasserman, 1996). To estimate model parameters and compute posterior probabilities, we use the Metropolis-within-Gibbs sampling algorithm. For each model, we run the chain with 40,000 iterations and discard the first 10,000 iterations as a "burn-in" sample to allow the sampling algorithm enough time to converge to a posterior distribution (Geyer, 2011). To control for the potential impact of serial correlation between the iterations, we follow common practice and "thin" the chain by retaining only every third iteration of the converged chain (Junker et al., 2016).

[7] The validity of inferences from Bayesian estimation hinges on the convergence of the iterative process to a stationary posterior distribution. Thus, in our setting, it is important to verify that inferences are based on a stationary posterior distribution of *b*(*CEO option wealth*) in the 10th and 90th percentile equations. To examine this issue, we conducted two (untabulated) analyses. In the first, we compared the mean estimates of *b*(*CEO option wealth*) from the early versus late parts of the chain (Geweke, 1992). For both the 10th and 90th percentile equations, the estimates from the early versus late parts of the chain were identical up to a fifth decimal point and the difference between the two was not significant (smallest *p*-value=0.905), suggesting that the iterative algorithm converged to a stationary posterior distribution (Geweke, 1992). In the second analysis, we estimated the models using multiple chains with different vectors of starting values and calculate Scale Reduction Factor statistics (Gelman and Rubin, 1992). The Scale Reduction Factor statistics of *b*(*CEO option wealth*) in the 10th and 90th percentile equations were both very close to 1 (largest statistic =1.001), again suggesting successful convergence (Gelman and Rubin, 1992).

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Table I: Contrasting Focus and Assumptions: Classical Agency Theory, Stakeholder Agency and Behavioral Agency

	Classical Agency Theory	**Stakeholder Agency Theory**	**Behavioral Agency Theory**
Problem domain	Goal conflict and risk preference divergence between owners and managerial agents	Goal conflict between owners, managerial agents and other stakeholders	Goal conflict and risk preference divergence between owners and managerial agents
Contracting	Explicit, complete, addresses moral hazard and adverse selection. Contract is between agent (manager) and principal (shareholder).	Implicit, incomplete, addresses moral hazard. Implicit contract is between agent (manager) and stakeholder (anyone affecting or affected by the firm).	Explicit, complete, addresses moral hazard and adverse selection. Contract is between agent (manager) and principal (shareholder).
Agent decision making	Risk averse	Risk averse	Loss averse, frame dependent, boundedly rational
Agent motivation	Opportunistic, self-interested	Opportunistic, self-interested	Opportunistic, self-interested
Agent's objective	Personal wealth	Interest balancing and personal wealth	Personal wealth
Information asymmetry	Asymmetry between shareholders and managerial agent. Mitigated by board monitoring and incentives	Asymmetry between agent and stakeholder. Non-shareholder stakeholders find monitoring more	Asymmetry between shareholders and managerial agent. Partially mitigated by

		difficult without board representation.	board monitoring and incentives

Table II. Descriptive statistics and correlations

		Median	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Effective tax rate	0.25	0.17	-0.26	2.15																			
2	CEO option wealth	8.13	2.06	0.00	11.93	-0.002																		
4	Activist institutional ownership	0.04	0.02	0.00	0.18	0.013	-0.045	-0.010																
5	CEO hedging ability (000s)	5.63	122.6	0.00	1470	-0.007	0.116	0.168	-0.041															
6	Firm size	7.45	1.60	4.59	11.38	0.000	0.261	0.384	0.005	0.341														
7	Market-to-book	2.38	1.57	-2.23	18.07	-0.002	0.041	0.034	-0.013	0.010	0.007													
8	Leverage	0.18	0.18	0.00	0.63	0.004	-0.043	0.006	0.056	-0.023	0.255	-0.006												
9	ROA	0.07	0.05	-0.002	0.31	-0.057	0.231	0.078	-0.106	0.064	-0.181	0.078	-0.248											
10	ROA volatility	0.03	0.03	0.003	0.33	0.001	-0.037	-0.069	-0.068	0.030	-0.269	0.021	-0.123	0.277										
11	Firm age	24.00	22.24	4.27	61.71	-0.003	-0.005	0.116	0.091	0.100	0.478	0.003	0.123	-0.180	-0.257									
12	Past stock returns	0.07	0.32	-1.103	1.04	-0.036	-0.233	-0.113	0.004	-0.006	-0.017	0.016	-0.008	0.079	0.056	0.003								
13	Foreign income	1.00	0.49	0.00	1.00	0.017	0.099	0.151	0.047	0.102	0.157	0.003	-0.094	0.016	0.008	0.119	0.021							
14	Loss carry-forward	0.00	0.48	0.00	1.00	0.001	0.026	0.056	-0.004	-0.001	0.032	-0.005	0.034	-0.042	0.097	-0.038	0.039	0.241						
15	Extra/Disc	0.00	0.43	0.00	1.00	0.019	-0.034	0.029	0.076	0.007	0.183	-0.011	0.141	-0.172	-0.061	0.176	0.001	0.013	0.045					

16	Equity in earnings	0.00	0.01	-0.005	0.026	0.001	0.018	0.030	0.013	0.050	0.076	-0.001	0.014	0.036	-0.006	0.073	0.003	0.026	-0.016	0.014			
17	New investments	0.05	0.08	-0.06	0.60	0.013	0.119	0.021	-0.047	-0.003	-0.090	0.010	0.009	0.188	0.146	-0.159	-0.032	0.035	0.031	-0.062	0.011		
18	ΔGoodwill	0.00	0.01	-0.07	0.45	0.011	0.063	0.018	-0.010	-0.007	0.010	0.001	0.051	0.055	0.014	-0.070	0.006	0.014	0.035	-0.011	-0.004	0.508	
19	Financial constraints	0.32	0.63	-2.85	2.28	0.005	0.058	0.010	0.035	-0.056	0.024	-0.022	0.403	-0.186	0.006	-0.156	0.055	-0.071	0.053	0.046	-0.016	0.118	0.085
20	Inventory intensity	0.09	0.12	0.00	0.67	-0.002	-0.030	-0.069	-0.037	-0.059	-0.133	-0.006	-0.082	0.075	-0.052	-0.005	0.010	-0.035	-0.043	-0.062	-0.033	-0.001	0.026	-0.014

Table III. The relationship between CEO option wealth and corporate tax avoidance

Percentile of *Effective tax rate*→	10th percentile equation			90th percentile equation		
	Coefficient	Two-sided 95% CI	Bayesian *p*	Coefficient	Two-sided 95% CI	Bayesian *p*
CEO option wealth	**0.012**	**(0.009, 0.014)**	**<0.01**	**-0.010**	**(-0.016, -0.005)**	**<0.01**
Firm size	0.029	(0.023, 0.036)		-0.023	(-0.041, -0.001)	
Market-to-book	-0.001	(-0.005, 0.003)		0.002	(-0.000, 0.005)	
Leverage	-0.008	(-0.012, -0.005)		0.002	(-0.002, 0.006)	
ROA	0.004	(0.002, 0.006)		-0.118	(-0.124, -0.112)	
ROA volatility	-0.013	(-0.015, -0.011)		0.049	(0.041, 0.059)	
Firm age	-0.033	(-0.041, -0.025)		-0.034	(-0.053, -0.020)	
Past stock returns	-0.003	(-0.005, -0.002)		-0.028	(-0.032, -0.024)	
Foreign income	0.018	(0.011, 0.025)		0.003	(-0.013, 0.019)	

Loss carry-forward	-0.018	(-0.022, -0.013)	0.019	(0.011, 0.028)
Extra/Disc	-0.006	(-0.010, -0.002)	0.059	(0.049, 0.070)
Equity in earnings	-0.001	(-0.002, 0.000)	-0.003	(-0.005, -0.001)
New investments	0.007	(0.005, 0.009)	0.021	(0.015, 0.027)
ΔGoodwill	-0.004	(-0.005, -0.002)	0.001	(-0.003, 0.005)
Financial constraints	-0.008	(-0.011, -0.005)	-0.006	(-0.009, -0.003)
Inventory intensity	0.021	(0.017, 0.026)	0.015	(0.004, 0.029)
Obs.	21,243		21,243	
Mean objective function	-8.63		-9.38	

Table IV. The effect of activist institutional ownership on the CEO option wealth—corporate tax avoidance relationship

Percentile of *Effective tax rate*→	10th percentile equation			90th percentile equation		
	Coefficient	Two-sided 95% CI	Bayesian *p*	Coefficient	Two-sided 95% CI	Bayesian *p*
CEO option wealth	0.015	(0.012, 0.019)	<0.01	-0.011	(-0.016, -0.005)	<0.01
CEO option wealth× Activist institutional ownership	**0.002**	**(-0.000, 0.006)**	**0.08**	**-0.013**	**(-0.018, -0.007)**	**<0.01**
Activist institutional ownership	0.003	(0.000, 0.006)		0.001	(-0.006, 0.008)	
Firm size	0.029	(0.021, 0.039)		-0.036	(-0.053, -0.015)	
Market-to-book	-0.001	(-0.007, 0.003)		0.002	(-0.001, 0.004)	
Leverage	-0.010	(-0.014, -0.006)		0.003	(-0.002, 0.008)	
ROA	0.003	(0.001, 0.006)		-0.117	(-0.124, -0.109)	

ROA volatility	-0.014	(-0.016, -0.012)	0.047	(0.037, 0.059)
Firm age	-0.036	(-0.046, -0.028)	-0.042	(-0.057, -0.029)
Past stock returns	-0.003	(-0.005, -0.001)	-0.032	(-0.037, -0.028)
Foreign income	0.016	(0.008, 0.022)	0.014	(0.001, 0.028)
Loss carry-forward	-0.018	(-0.023, -0.012)	0.018	(0.009, 0.028)
Extra/Disc	-0.004	(-0.008, 0.000)	0.049	(0.039, 0.061)
Equity in earnings	-0.004	(-0.007, -0.001)	-0.003	(-0.005, -0.002)
New investments	0.008	(0.006, 0.009)	0.022	(0.016, 0.031)
ΔGoodwill	-0.004	(-0.006, -0.002)	0.003	(-0.001, 0.007)
Financial constraints	-0.008	(-0.012, -0.004)	-0.007	(-0.011, -0.003)
Inventory intensity	0.023	(0.017, 0.027)	0.011	(0.000, 0.025)
Obs.	18,971		18,971	
Mean objective function	-9.87		-9.88	

Table V. The effect of CEO hedging ability on the CEO option wealth—corporate tax avoidance relationship

Percentile of *Effective tax rate*→	10th percentile equation			90th percentile equation		
	Coefficient	Two-sided 95% CI	Bayesian *p*	Coefficient	Two-sided 95% CI	Bayesian *p*
CEO option wealth	0.012	(0.009, 0.015)	<0.01	-0.009	(-0.013, -0.005)	<0.01
CEO option wealth×CEO hedging ability	**-0.002**	**(-0.003, -0.001)**	**<0.01**	**0.003**	**(-0.003, 0.008)**	**0.07**
CEO hedging ability	-0.002	(-0.004, -0.001)		0.008	(-0.001, 0.028)	
Firm size	0.029	(0.024, 0.035)		-0.011	(-0.026, 0.019)	
Market-to-book	-0.001	(-0.005, 0.003)		0.003	(0.000, 0.005)	
Leverage	-0.008	(-0.012, -0.005)		0.002	(-0.002, 0.007)	
ROA	0.004	(0.002, 0.006)		-0.117	(-0.123, -0.112)	
ROA volatility	-0.012	(-0.015, -0.010)		0.048	(0.040, 0.059)	
Firm age	-0.034	(-0.042, -0.026)		-0.041	(-0.068, -0.028)	
Past stock returns	-0.003	(-0.005, -0.002)		-0.026	(-0.031, -0.023)	
Foreign income	0.018	(0.012, 0.025)		0.010	(-0.004, 0.023)	
Loss carry-forward	-0.017	(-0.022, -0.012)		0.019	(0.009, 0.029)	
Extra/Disc	-0.006	(-0.010, -0.002)		0.061	(0.051, 0.074)	
Equity in earnings	-0.001	(-0.002, 0.001)		-0.003	(-0.005, -0.001)	
New investments	0.007	(0.005, 0.008)		0.020	(0.014, 0.026)	
ΔGoodwill	-0.004	(-0.006, -0.002)		0.000	(-0.003, 0.004)	
Financial constraints	-0.008	(-0.011, -0.005)		-0.006	(-0.009, -0.003)	
Inventory intensity	0.021	(0.017, 0.026)		0.018	(0.006, 0.034)	
Obs.	21,243			21,243		

Mean objective function	-9.30	-13.73

Table VI. Robustness tests

Percentile of *Effective tax rate*→		10th percentile equation			90th percentile equation	
	Coefficient	95% CI	*p*	Coefficient	95% CI	*p*
Panel A. Potential endogeneity						
(1) Control for CEO inside debt, stock ownership, and total wealth (*n*=6,111 obs.)						
CEO option wealth	0.017	(0.006, 0.024)	<0.01	-0.037	(-0.066, -0.013)	<0.01
(2) Control for CEO wealth sensitivity to stock volatility (*n*=11,098 obs.)						
CEO option wealth	0.012	(0.008, 0.016)	<0.01	-0.009	(-0.018, -0.001)	0.02
(3) Control for board characteristics (*n*=15,502 obs.)						
CEO option wealth	0.018	(0.014, 0.022)	<0.01	-0.005	(-0.012, 0.000)	0.03
(4) Control for CEO fixed effects (*n*=21,243 obs.)						
CEO option wealth	0.016	(0.012, 0.021)	<0.01	-0.006	(-0.013, 0.000)	0.04
(5) Instrumental variable estimation (*n*=21,243 obs.)						
CEO option wealth	0.030	(0.021, 0.041)	<0.05	-0.027	(-0.043, -0.009)	<0.05
Panel B. Reference point modifications						
(1) Lagged firm-level effective tax rate included (*n*=19,316 obs.)						
CEO option wealth	0.007	(0.005, 0.012)	<0.01	-0.009	(-0.015, -0.004)	<0.01
(2) Lagged effective tax rate of peer firms included (*n*=19,705 obs.)						

CEO option wealth	0.006	(0.004, 0.008)	<0.01	-0.012	(-0.018, -0.007)	<0.01
Panel C. Alternative variable/sample specifications						
(1) Using winsorized effective tax rate (*n*=21,243 obs.)						
CEO option wealth	0.012	(0.009, 0.014)	<0.01	-0.010	(-0.015, -0.005)	<0.01
(2) Excluding firms in regulated industries (*n*=19,470 obs.)						
CEO option wealth	0.013	(0.010, 0.015)	<0.01	-0.010	(-0.015, -0.005)	<0.01

The number of observations varies due to data availability. The data on CEO inside debt is available starting only from 2006 (Anderson and Core, 2018). Therefore, the sample size used in this test is considerably smaller compared to other analyses.

Figure 1: Coefficients of CEO option wealth estimated for different quantile regression equations of the effective tax rate.