The Journal of the American Taxation Association
Vol. 44, No. 1
Spring 2022

CEO Sports Hobby and Firms' Tax Aggressiveness

THE JOURNAL OF THE AMERICAN TAXATION ASSOCIATION
Vol. 44, No. 1
Spring 2022
pp. 000–000

American Accounting Association
DOI: 10.2308/JATA-19-038

CEO Sports Hobby and Firms' Tax Aggressiveness

Shuqing Luo
The University of Hong Kong

Terry Shevlin
University of California, Irvine

Lirong Shi
University of Nottingham Ningbo

Aimee Shih
National University of Singapore

ABSTRACT: Recent accounting research suggests that individual executives play a significant role in shaping a firm's tax planning. Building on psychology research that finds sports interests reflect an individual's risk-taking preferences, we develop a novel measure of innate and non-pecuniary CEO risk attitudes based on the riskiness of CEOs' sports hobbies and examine whether the measure is associated with corporate tax aggressiveness. We find that firms managed by CEOs with riskier sports hobbies are more aggressive in their tax planning. This association is more pronounced for CEOs with greater financial incentives and greater power in making decisions. Our results are robust to using alternative measures of CEO sports risks, and after accounting for the self-selection of the disclosure of CEO sports hobbies.

Data Availability: Public sources cited in the paper.

JEL Classifications: H26; M41; G41; G34.

Keywords: sports hobbies; CEO risk preferences; tax aggressiveness.

I. INTRODUCTION

We examine the relation between CEO sports hobby risk and firms' aggressiveness in tax planning.[1] Our research question is motivated by Dyreng, Hanlon, and Maydew (2010), who find a significant role of individual executives in firms' tax planning but are not able to identify specific managerial characteristics associated with the documented

We thank Alex Edwards, Alison Koester, Edward Maydew, and Ryan Wilson for helpful comments and suggestions on an earlier version of this paper. We appreciate comments from Jim Stekelberg and participants at the 2017 AAA Annual Meeting. Terry Shevlin acknowledges financial support from the Paul Merage School of Business at the University of California, Irvine. Shuqing Luo acknowledges financial support from the AcRF Tier 1 grant from Singapore Ministry of Education (R-521-000-039-115) when she was affiliated with the National University of Singapore. Aimee Shih acknowledges financial support from the National University of Singapore. All errors are our own.

Shuqing Luo, The University of Hong Kong, HKU Business School, Department of Accounting and Law, Pok Fu Lam, Hong Kong; Terry Shevlin, University of California, Irvine, UCI Paul Merage School of Business, Department of Accounting, Irvine, CA, USA; Lirong Shi, University of Nottingham Ningbo, Nottingham University Business School China, Department of Finance, Accounting and Economics, Ningbo, China; Aimee Shih, National University of Singapore, Department of Accounting, Singapore.

Editor's note: Accepted by Connie D. Weaver.

Submitted: September 2019
Accepted: June 2021
Published Online: July 2021

[1] The tax literature often uses the terms "tax avoidance" and "tax planning" interchangeably to describe actions firms undertake to reduce their explicit tax burdens. S. Chen, X. Chen, Cheng, and Shevlin (2010) suggest that tax-planning activities can include both legal tax strategies that are in full compliance with tax laws and more aggressive tax strategies resulting from aggressive interpretations of ambiguous areas within the tax laws. Because we are interested in CEOs' personal risk tolerance as reflected in their sports hobbies, we predominantly use the term "tax planning" and focus mostly on empirical measures that reflect more aggressive and risky tax planning.

manager fixed effects on firms' tax planning. Although an emerging stream of research after Dyreng et al. (2010) attempts to associate managers' personal risk preferences as a distinct managerial characteristic that affects corporate tax planning (e.g., Chyz 2013; Christensen, Dhaliwal, Boivie, and Graffin 2015), the proxies used to measure personal risk preferences in these studies likely capture multiple managerial characteristics that could confound their documented results. We differ from those earlier studies by considering a CEO's *innate* and *intrinsic* risk proclivities captured by the CEO's risk preferences of his/her sports hobby.

We expect that individuals develop specific sports interests based on their personal risk preferences after trading off the utility derived from participating in sports with potential risks of injuries. We propose that CEOs' personal risk-taking preferences, measured by their self-disclosed sports hobbies, extend across both the personal and corporate decisions they make (Dohmen, Falk, Huffman, Sunde, Schupp, and Wagner 2011), including corporate tax aggressiveness.

While new to the accounting and finance literature, the association between an individual's sports hobbies and their personal risk preferences has long been recognized by psychology researchers, who suggest that the pursuit of sports can be indicative of personal attitudes toward risk. Zuckerman (1983) documents that individuals loving sports with high injury risks are risk seekers and tend to underestimate risks associated with their chosen sports. Freixanet (1991) shows that participants in sports with high injury risks tend to be more risk tolerant. Building on these studies, we argue that individuals' personal risk preferences associated with sports hobbies also apply to CEOs, and that CEOs with riskier sports hobbies take greater risks in corporate decisions, specifically by pursuing more aggressive tax planning.

As evidenced by a number of prior studies, corporate tax planning offers an interesting setting to study the effect of CEOs' innate risk preferences on corporate risk taking. A firm's tax aggressiveness is a unique and strategic decision made by its top management, where such a decision is an outcome of cost-benefit trade-offs. On one hand, firms can generate considerable tax savings by taking aggressive tax positions through structuring business transactions in gray areas of tax laws or operating in regimes with low tax rates that may test the limits of tax compliance; on the other hand, aggressive tax positions can expose firms to uncertainty in compliance and tax risks including regulatory fines, penalties, and reputation risk (Christensen et al. 2015). Ultimately, executives' risk preferences likely play a significant role in the trade-offs.

To capture firms' tax aggressiveness, we use four different measures: (1) a predicted tax shelter score (Wilson 2009), (2) predicted unrecognized tax benefits (Rego and Wilson 2012), (3) the coefficient of variation of the cash effective tax rate (McGuire, Neuman, and Omer 2013), and (4) the long-term cash effective tax rate adjusted for industry size (Balakrishnan, Blouin, and Guay 2019). Using a sample of 732 CEOs for firms in Execucomp with available data on CEO self-reported sports hobbies from 1992 to 2016, we find evidence consistent with our expectation of a positive and significant association between CEO sports risk and all four measures of firms' tax aggressiveness. These results are robust to using alternative measures of CEO sports risks and after controlling for other factors that may affect firms' risk-taking decisions, including firm-level characteristics, CEOs' equity incentive compensation, CEOs' personal characteristics (e.g., CEO gender, past military experience, CEO overconfidence), as well as industry fixed effects, headquarter state location fixed effects (that broadly control for differences in religiosity and political beliefs), and year fixed effects.

To gauge the magnitudes of the effect of CEOs' personal risk proclivity on firms' tax aggressiveness, we follow the econometric technique developed in Abowd, Kramarz, and Margolis (1999; hereafter, AKM) to disentangle managerial effects from firm fixed and time-variant effects based on a small number of CEO turnover events in our sample. We show that CEOs' sports risks explain 46 to 61 percent of the heterogeneity in firms' tax aggressiveness, confirming the significance of CEOs' innate risk proclivity in explaining firms' tax aggressiveness.

Our results may be subject to the self-selection concern, because our analyses are based on a relatively small sample of CEOs in Execucomp who voluntarily choose to disclose their sports hobbies information. We employ a two-stage Heckman (1979) model to address this self-selection issue. In the first stage, we model the likelihood that a CEO discloses a sports hobby after controlling for a set of CEO and firm characteristics suggested in the literature that affect firms' voluntary disclosure decisions (e.g., Ajinkya, Bhojraj, and Sengupta 2005; Feng, Li, and McVay 2009). In the second stage, we model firms' tax aggressiveness on CEOs' sports risk and include the inverse Mills ratio generated from the first-stage regression. Our main results continue to hold using the Heckman two-stage model specification.

Finally, we use the framework of the fraud triangle theory (Cressey 1953; Davis and Pesch 2013) and investigate cross-sectional variation in the relation between CEOs' sports risk and firms' tax aggressiveness. We find the positive association between CEOs' sports risks and firms' tax aggressiveness is more pronounced both for CEOs with greater monetary incentive (proxied by equity risk incentive) and for CEOs with greater power (proxied by CEO pay slice, which captures the extent of freedom that CEOs have in making their aggressive tax-planning decisions). These results are consistent with financial incentives playing an important role in amplifying CEOs' risky tax-planning behavior (Rego and Wilson 2012); they also show the importance of institutional control mechanisms in constraining powerful CEOs in overriding resistance from subordinates when implementing aggressive tax planning (Feng, Ge, Luo, and Shevlin 2011).

We contribute to the literature in two ways. First, our study complements and extends the recent literature on the determinants of tax planning/avoidance. Tax avoidance/aggressiveness has drawn significant public and academic attention in

recent years. While researchers have identified various factors affecting tax planning/avoidance, including the documented manager fixed effects in Dyreng et al. (2010), our understanding of the specific managerial attributes that contribute to cross-firm manager effects is still limited. Our paper focuses on executives' personal intrinsic risk preferences and provides a direct answer to Hanlon and Heitzman's (2010) call for more research on the "manager effect" on firms' tax planning.

Second, and more importantly, we develop a novel measure of executives' innate and intrinsic personal risk preferences and find evidence consistent with our hypothesis that CEOs who participate in riskier sports are more aggressive in their firms' tax planning. Recognition that executives' personal risk preferences has long been a central and important executive personal trait in finance, economics, and accounting has motivated researchers to develop measures to capture corporate top executives' underlying risk preferences, including religiosity (Boone, Khurana, and Raman 2013), gender (Francis, Hasan, Wu, and Yan 2014), political orientation (Christensen et al. 2015), and facial masculinity (Jia, Lent, and Zeng 2014). Unlike these measures that likely capture multiple individual characteristics, and thus confound the interpretation of their associations with firms' tax aggressiveness, we argue (in Section II) that our measure based on CEOs' sports hobbies more likely captures a unique dimension of a CEO's utility function—the CEOs' innate risk-taking preferences, not confounded by other elements such as their personal wealth—and provides insights into its effects on firms' tax aggressiveness.

Third, sports risk is an *ex ante* measure that boards of directors can use to evaluate future CEO candidates' potential risk-taking behavior, ultimately leading to more informed corporate decisions. For example, boards of directors searching to fill top management positions may ask the interviewees about their sports hobbies, as this can help identify their degree of risk aversion. Banks and lenders could directly ask the firm's top managers about their sports hobbies to help assess risk associated with loans to client firms. Financial analysts and institutional investors (blockholders) could also ask top management about their sports activities to help gauge the management's risk preferences and assess the influence of such risk preferences on management's tax-planning decisions. Our results highlight the differential implications of individuals' risk-taking decisions driven by individuals' innate preferences as opposed to those that are incentive induced: when firms want CEOs to take more risky tax-planning decisions, innate risk-taking proclivity emphasizes the type of CEOs to be hired; in contrast, financial incentive-induced risk taking emphasizes the role of CEO compensation design in motivating risk-adverse CEOs to take greater risks.

The remainder of the paper proceeds as follows: Section II reviews prior literature and develops the hypotheses. Section III describes our sample, data, and research design. Section IV provides empirical results. Section V concludes.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Individual Executives' Risk Preferences on Corporate Tax Planning

Firms are exposed to different levels and types of risks along the spectrum of tax planning. On one end of the spectrum, firms may take "benign tax-favored investments" that are unlikely to be challenged by the Internal Revenue Services (IRS) or in court, resulting in low effective tax rates that can be sustained for a long period of time without a substantial increase in the uncertainty regarding firms' future tax payments. On the other end of the spectrum, firms can engage in high-risk aggressive tax shelters (Hanlon and Heitzman 2010) and structure business transactions in gray areas of tax laws or operate in regimes with low tax rates that may test the limits of tax compliance.

While tax planning can generate significant tax savings for a firm,[2] aggressive tax positions can expose managers and firms to significant risks and uncertainty regarding the sustainability of these tax positions and whether related business transactions will be challenged by tax authorities.[3] Ultimately, the decision to engage in aggressive tax planning is an outcome of strategic cost-benefit analyses in which top executives' risk preferences play a significant role (Chyz 2013).[4]

[2] Mills, Erickson, and Maydew (1998) estimate that an additional $1 investment in tax planning leads to an average reduction of $4 in tax liabilities. Graham and Tucker (2006) note that firms with tax shelters typically report annual tax deductions of about 9 percent of total assets. Anecdotal evidence in Rowland (2013) suggests that some firms spend more money on tax lobbyists than they pay in taxes, and the return on tax lobbying investments could be as large as 6,700 percent.

[3] Such risks include potential monetary fines and penalties levied by regulators, as well as reputation losses in capital markets (Christensen et al. 2015). Wilson (2009) reports that firms identified as using tax shelters are charged by the IRS an average amount of $155 million interest, representing an average 40 percent of total tax savings resulting from the shelters, and the average associated penalties and fees paid are approximately 9.3 percent of taxes saved. Graham, Hanlon, Shevlin, and Shroff (2014) report that 69.5 percent of the 595 corporate tax executives surveyed respond that potential harm to firm reputation and the risk of detection and challenge by the IRS are two important reasons not to implement a tax-planning strategy. Even in cases where reputational harm does not occur on average (Gallemore, Maydew, and Thornock 2014), studies have found that top executives' perceived reputation risks prevent these executives from pursuing risky corporate strategies (e.g., Westphal and Deephouse 2011; Boivie, Graffin, and Pollock 2012).

[4] There are a number of ways that top executives play an important role in corporate tax planning. They can variously set "the tone at the top" by placing different levels of emphasis on the tax department relative to other departments (Dyreng et al. 2010), provide explicit incentive compensation to tax directors (Crocker and Slemrod 2005; Dyreng et al. 2010; Armstrong, Blouin, and Larcker 2012), advocate tax-minimizing policies (Koester, Shevlin, and Wangerin 2016), and/or be directly involved in the internal tax department (Olsen and Stekelberg 2016).

We examine top executives' personal risk proclivities and their risk-taking behavior in firms' tax planning. We argue that top executives who have higher risk proclivities will take greater risk in their firms' tax planning. This argument is consistent with other accounting and finance studies, which suggest that managers exhibit consistency in their personal preferences and behaviors and their corporate decisions. For example, Davidson, Dey, and Smith (2015) find that a CEO with prior personal legal infractions and disregard for laws is more likely to disregard the rules in corporate financial reporting by engaging in financial misreporting. Similar behavioral consistency is also documented in Cronqvist, Makhija, and Yonker (2012), who show that CEOs who take on more personal leverage to finance the purchase price of their personal residences tend to run firms with higher leverage levels. Law and Mills (2017) argue that CEOs with military service experience have stronger beliefs in the legitimacy of government structures and are more compliant with laws, thus they are less likely to pursue aggressive tax-planning strategies. Chyz (2013) shows that CEOs who take risks in evading personal income taxes by using option backdating are more likely to take aggressive tax planning for their firms.

However, top executives' personal risk proclivities are unobservable and challenging to measure. The positive effect documented in Chyz (2013) can be confounded by financial incentives associated with CEOs evading personal income taxes by backdating their options.[5]

A number of other studies propose and test other individual characteristics to proxy for CEOs' risk proclivities and show a positive association with firms' risky decisions. However, these measures may proxy for a number of other personal characteristics that confound the interpretation of their positive associations with corporate risk-taking decisions/tax aggressiveness. For example, religiosity (Boone et al. 2013) also proxies for individuals' ethical and moral standards, personal political orientation (Christensen et al. 2015) also proxies for the extent of individuals' belief in the role of government and taxation, possession of small aircraft pilot licenses (Cain and McKeon 2016) also proxies for individuals' preferences for flexibility in their schedule and time management, and gender (Francis et al. 2014) also proxies for the difference between males and females in their ethical standards and their prioritization of corporate social responsibility (and thus have divergent opinions on paying corporate taxes) (e.g., Beutel and Marini 1995; Adams and Funk 2012).

In contrast, our measure of CEOs' innate risk preference based on CEOs' sports hobby can better isolate CEOs' innate and personal risk preferences from other factors, such as financial incentives that are associated with observed risk-taking behaviors, and thus are less likely to suffer from alternative explanations. In addition, our measure is a continuous variable that captures more variations in CEO risk preference and thus can apply to the general population of CEOs, whereas measures such as pilot licenses, religiosity, political orientation, or gender are all categorical variables. Moreover, facial masculinity in Jia et al. (2014) may not be applicable to individuals with different genders or racial backgrounds.

Sports Hobby and Executive Risk Preference

Drawing from psychology research, we propose that individual attitude toward risk in one's profession is reflected in the personal choice of sports hobbies. Individuals evaluate the risk associated with sports participation based on objective criteria, such as the physical challenges, including the speed, height, depth, or natural forces, that may be required for the sport activity, as well as the terrain where the sports activity takes place (Freixanet 1991). However, an individual's risk attitude may not be reflected by occasional participation in a sport. It is the regular and consistent participation in a sport activity with a specific risk level, thereby developing it into a hobby, that demonstrates an individual's risk preference. Moreover, an individual's risk assessment of a setting is significantly influenced by their sensation-seeking personality, which is defined by Zuckerman (1994, 2007) as a genetic personality trait that is related to the individual's propensity toward risk-taking behavior in a wide range of settings, including driving, sports, vocation, and in financial and legal contexts. Consistent with this view, Zuckerman (1983) and Freixanet (1991) show that individuals who love risky sports tend to underestimate risk, and such a choice reflects individuals' sensation-seeking traits. Similarly, Eysenck, Nias, and Cox (1982) note that sports participants tend to exhibit risk taking, extroversion, increased pain tolerance, non-conformity, high need for achievement, and aggressiveness and dominance, suggesting that such individuals are better equipped to deal with potential downsides and failures.

We argue that executives' risk taking in their personal choice of sports hobbies with varying degrees of risks also affect their corporate tax-planning decisions. Our argument is supported by the empirical evidence in the sports psychology literature,

[5] Guay (1999) describes the wealth effect and risk-aversion effect as two components of the effect of firm risk on a manager's preferences. The wealth effect is the change in a manager's expected wealth as firm risk changes and is affected by holding securities with convex payoffs. The risk-aversion effect reflects the relation between a manager's risk tolerance and personal utility, and depends, in part, on the manager's specific risk-aversion constraints. Guay (1999, 47) focuses on the wealth effect due to readily accessible data on managers' stock options and common stock holdings, rather than the risk-aversion effect, "which requires manager-specific data that is much more difficult, if not impossible, to obtain." Guay's (1999) findings suggest that CEOs' risk-taking incentives induced by equity compensation vary due to differences in their wealth.

such as Kirkcaldy and Cooper (1992), who document individuals' behavioral consistency between work and leisure activities. They show that individuals who prefer traditional "masculine" competitive leisure activities such as basketball show higher work-oriented competitiveness. Likewise, Dohmen et al. (2011) show that individuals' risk attitudes are strongly correlated across personal decisions, including their car driving, financial matters, sports/leisure choices, and career choices. Anecdotal evidence also supports managers' behavioral consistency concerning their personal risk preferences and their firms' corporate risk-taking decisions. For example, Charles Ergen, the CEO of the DISH Network Corporation, is described in the press as an avid rock climber and "a risk-taker with a history of proposing highly leveraged buyouts" (Segan 2013). We argue that a risk-loving attitude in sports by corporate top executives carries over to their corporate risk-taking behaviors, specifically the aggressiveness of their firms' tax planning. This hypothesis is formally stated as follows:

H1: Firms run by CEOs with riskier sports hobbies engage in more aggressive tax planning.

However, a CEO may choose to participate in a specific sport for reasons unrelated to their underlying risk preference, which may add noise and confound the above-predicted association. For example, the sport may be a social activity within the network of chief corporate executives or within the local community. In other words, a CEO may enjoy social networking benefits when playing the sport regularly. Therefore, whether CEOs' sports risks are associated with firms' tax aggressiveness is an empirical question.

Cross-Sectional Predictions

We apply the fraud triangle framework from the auditing literature in our cross-sectional analyses with regard to the effect of CEOs' sports risk on firms' tax aggressiveness (Cressey 1953; Davis and Pesch 2013).[6] The fraud triangle model suggests that a fraud occurs if an individual has attitude, motive, and opportunity to commit fraud. Attitude refers to an individual's ability to rationalize fraudulent behavior. Our CEO sports risk preference aligns with the attitude dimension, reflecting an individual's innate ability to convince themself to take risks in corporate tax planning. Motive refers to the situation-specific incentives of an individual to commit fraud, such as reaping monetary benefits or avoiding unexpected personal losses. Opportunity refers to characteristics that affect the effectiveness of the internal control system within the organization. For example, CEOs in an organization with greater power are more likely to override resistance from the board or other executives, thus getting their way in making decisions, which is heavily influenced by their own risk proclivities. Based on this framework, we expect that in addition to a risk-taking attitude, motive and opportunity can affect the association between CEOs' personal risk attitude and firms' tax aggressiveness.

Prior studies suggests that financial incentives engender individuals to expend greater effort to engage in a task because the monetary extrinsic incentive is a signal of high status or high achievement in general (Deci and Ryan 1980; Titmuss 2018). Therefore, we expect that the extent of influence of CEOs' innate risk proclivity exhibited via their sports risk on firms' aggressive and risky tax planning is strengthened by CEOs' financial motives. We expect that the extrinsic CEO compensation incentive is additive to the CEOs' personal risk-taking preferences, and the combination of these two effects can lead to a stronger effect of CEOs' sports risks and firms' tax aggressiveness. Thus, we hypothesize:

H2: The positive relation between CEO sports risks and firms' tax aggressiveness is more pronounced for CEOs with greater financial incentive.

There are countervailing forces that work against us finding evidence supporting H2. In particular, the psychology literature argues that financial incentives can crowd out individuals' intrinsic motivation, suggesting that providing extrinsic incentives, such as monetary rewards, can undermine intrinsic motivation for performance (Shi, Connelly, and Hoskisson 2017; Titmuss 2018). Whether financial incentives crowd out or reinforce CEOs' intrinsic motivations to take risky tax-planning decisions is an empirical question. Additionally, given that all managers respond to financial incentives (regardless of their level of risk tolerance), equity risk incentives likely encourage risk-averse managers to engage in additional risky tax avoidance (Rego and Wilson 2012), but risk-seeking managers may not have additional tax avoidance opportunities because they have exhausted all of their options. As a result, it is possible that the association between equity risk incentives and aggressive tax avoidance will not vary based on whether a CEO participates in risky sports activities.

[6] A similar framework is adopted in the criminal literature. Chow, Ke, Yuan, and Zhang (2018) adopt the "motive-ability-opportunity" framework to select explanatory variables for their tax-evasion model. In their model, the firm is the decision maker. In our framework, we treat the CEO as the unit whose decision to engage in risky tax planning depends on personal attitude, motive, and opportunity. Adopting the framework to develop our cross-sectional predictions does not mean we think that tax aggressiveness is fraudulent.

We also consider the impact of opportunities on the effect of CEO sports risk and firms' tax aggressiveness. We expect that more powerful CEOs have greater freedom and opportunities to pursue more aggressive corporate policies because these CEOs are more likely to use their power in the firm to override resistance from the boards and other executives when implementing risky firm policies that are in line with their own preferences (Feng et al. 2011). Powerful CEOs may also be able to better execute "the tone at the top" that is aligned with their risk preferences. Therefore, we expect that the effect of CEO sports risk on firms' tax aggressiveness is stronger when the CEO is more powerful. We therefore hypothesize:

H3: The positive relation between CEOs' sports risks and firms' tax aggressiveness is more pronounced in firms when CEOs have greater power.

III. SAMPLE, DATA, AND DESCRIPTIVE STATISTICS

Sample Selection

Our sample begins with 801 CEOs who have disclosed their sports hobby information based on the universe of 7,686 CEOs listed in Execucomp up to December 2016. We collect CEOs' sports hobby information from two sources: Boardroom Insiders[7] and hand collection through Google searches.[8] We note that our theoretical construct of CEO sports hobby is the CEO's perceived risks associated with playing the sport. However, it is possible that some of the CEO self-reported sports hobbies are not consistent with this construct. For example, a CEO who discloses football as a sports hobby might simply enjoy watching others play the sport rather than participating in the sport personally. As football is more likely to be a spectator game rather than participative game for CEOs, in our sample selection process, we exclude 69 CEOs whose disclosed sports hobby is football.[9] This procedure reduces our sample from 801 to 732 CEOs (700 male CEOs and 32 female CEOs) who have self-reported sports hobbies other than football. The reported sports hobbies range from car racing and wind surfing, to running and golfing.

We then obtain firm- and tenure-related data for the 732 CEOs from Execucomp and retrieve financial data from Compustat based on the starting and ending dates of these CEOs in the CEO position in the firm. Our final sample comprises 4,448 firm-year observations, representing 732 distinct CEOs in 708 distinct firms. Table 1 describes our sample selection process.

Measurement of Sports Risk

Sports psychology researchers broadly define high physical risk sporting activities as having high likelihoods of injury and death (e.g., Freixanet 1991; Jack and Ronan 1998). Thus, to quantify a CEO's risk-taking preference, we develop a measure to capture the risk of the CEO's sports hobbies, labeled *SPORTS_RISK,* based on the actual injury rate of a particular sport, constructed for each sport using the total number of injuries for the sport divided by the total number of people participating in that sport during the same period.[10] To the best of our knowledge, we are the first to develop and apply this measure in accounting research.

We obtain the number of sports-related annual injuries from the National Electronic Injury Surveillance System (NEISS) produced by the Consumer Product Safety Commission (CPSC), a nationwide system that collects information on patient hospital visits in the United States.[11] The NEISS details the activity (sports and otherwise) that caused the injury and classifies

[7] Boardroom Insiders is a sub-module under LexisNexis and provides profiles of top executives, mostly of Fortune 500 companies. The executive profiles in Boardroom Insiders are custom designed for business analysts based on publicly available sources and include biographical details, such as top executives' personal attributes, interests, and hobbies.

[8] For each CEO, we conduct a Google keyword search based on a combination of the CEO's full name and a list of sports (e.g., "golf," "fish," "yoga"). The full list of sports included in the keyword search is comprised of the most popular sports reported by CEOs on Boardroom Insiders. We then follow each web link on the first three pages of search results and record all sports hobbies cited in the links. For example, Edward Tilly, the CEO of CBOE Holdings, Inc., is discussed in https://www.chicagobusiness.com/article/20130615/ISSUE01/306159974/how-cboes-new-boss-differs-from-the-old-boss. The article reports that Tilly cycles, runs, golfs, and fishes, and is "known for his adventures flying balloons and small aircraft."

[9] Similar arguments for categorization of spectator games can also be made for basketball, soccer, hockey, and baseball. We conduct robustness tests on categorization of spectator games in Section IV of the paper.

[10] While there are studies that provide categorical groupings of sports into high-, medium-, and low-risk sports (e.g., Zuckerman 1983; Jack and Ronan 1998), there is no standard methodology to determine probabilities of injury and death, motivating us to develop a new measure that can be operationalized in our setting.

[11] The NEISS data are gathered from the emergency departments of approximately 100 U.S. hospitals, which are selected as a probability sample of over 5,000 U.S. hospitals with emergency departments. The data collection process begins when a patient is admitted to the emergency department of a NEISS hospital with an injury. An emergency department staff member records information about the patient, the incident, and the consumer product, if any, associated with the injury.

TABLE 1

Sample Selection Procedure

Sampling Procedure	n
CEO-level sample	
(0a) Distinct CEOs in the universe of Execucomp during 1992 to 2016	7,686
(0b) Number of CEOs disclosing sports information	801
Percentage of CEOs disclosing sports information	10.4%
(1a) CEOs disclosing sports hobby on Boardroom Insiders	161
(2a) Google search of CEOs' sports hobbies	640
(3a) CEOs only with sports hobby of tackle football	(69)
Final sample with CEO sports information ((1a) + (2a) − (3a))	732
Firm-year-level sample	
(1b) Total firm-year observations from 1992 to 2016	5,636
(2b) Missing data for variables required in the regression	(1,188)
Final firm-year observations ((1b) − (2b))	4,448

Table 1 reports sample selection procedures that result in a final sample of 4,448 firm-year observations with 732 distinct CEOs during the sample period from 1992 to 2016.

the consumer product, if any, involved in the injury.[12] For example, NEISS provides information on the number of hospital patient visits with injuries related to golf carts, which we consider as injuries associated with playing golf. It is possible that injuries associated with the same sport are caused by multiple NEISS-defined sports-related products (i.e., golfers can be injured by the activity itself, or by accidents related to golf carts and other golf-related equipment). In such cases, we aggregate the total number of related hospital injury visits associated with playing golf as the numerator in measuring golf risk.[13] In consideration of the age range of our sample CEOs, we include the number of injuries reported in the database for the population between ages 25 and 85.

Next, we divide the total number of annual hospital injury visits associated with a sport by the total annual number of participants between ages 25 and 85 in the same sport. The participation data are obtained from the U.S. Census Bureau's Statistical Compendia Branch, which publishes annual statistics on participation in common recreational sports across different age groups.[14] We use the total number of injuries scaled by the total participation associated with a sport over the period from 2001 to 2009 as our proxy to measure the sport risk and interpolate this measure across our sample period.[15] Our computation of sport risk begins in 2001 because the NEISS significantly changed its data collection methodology in 2000,[16] and it ends in 2009 because the Census Bureau terminated the Statistical Compendia program in 2011, where data lag by two years.

[12] The NEISS Coding Manual describes CPSC's rules on reporting patient cases by participating hospitals. Cases to be reported are, "all consumer product-related emergency visits to your hospital, including emergency department cases, hospital admissions, trauma center and burn center cases, and cases transferred to other hospitals" (https://www.cpsc.gov/s3fs-public/pdfs/blk_media_2016NonTraumaNEISSCodingManual.pdf, p. 2). A few specific examples of cases reported in the NEISS database are "injuries that occur during sports or recreational activities" and "injuries associated with bicycles, even if a motor vehicle was involved." NEISS excludes injuries related to automobiles, motorcycles, trains, boats, and planes. However, NEISS provides the injury data on other types of motor vehicles, such as all-terrain and utility vehicles. We therefore replace the value of sports risk for five CEOs reporting racing cars and two CEOs reporting flying planes with the sports risk for motorized vehicles (other than the excluded vehicles listed above). We replace the value of sports risk for boats with the broader category of motorized/powered boating. To the extent that racing cars and flying planes represent two of the riskiest sports hobbies among the top executives, our measure of sports risk for these two sports may underestimate the risk preferences of the related CEOs.

[13] A cleaned, full list of sports codes and related descriptions is available upon request. The source information is available at https://www.cpsc.gov/s3fs-public/pdfs/blk_media_2016NonTraumaNEISSCodingManual.pdf

[14] The data are based on an annual sampling of households and include questions about the gender and age of household members, the types of recreational sports household members participated in, and the number of days they participated in the sports in the data year. These recreational sports cover most of the sports hobbies that we collected for corporate top executives.

[15] We note that sports injury data are interpolated after 2009 because such information is no longer provided by NEISS. In a robustness test, we repeat our analyses by restricting our firm-year observations to 2001–2009 when the NEISS injury data are available. Our results remain unchanged. In addition, the selection of the hospitals and households to collect the information by the two independent government agencies, CPSC and the Census Bureau, is random and, thus, we are unaware of any systematic bias that contributes to our sports risk measure, and how it affects its relationship with firms' aggressive tax planning. We also note that the numerator of our sport risk measure is based on the number of injuries reported by the participating hospitals with NEISS, while the denominator is based on the number of sports participants based on a randomly selected 10,000 households. It is therefore possible that the value of *SPORTS_RISK* can be greater than one due to the scale difference.

[16] A significant change in data collection was implemented by the CPSC in year 2000. Recorded patient cases were changed to include *all* injuries, rather than only consumer product-related injuries, thereby considerably expanding the scope of injuries reported in the NEISS.

TABLE 2

~~Top 20~~ Most Popular Sports Sorted by Sports Risks

Name of the Sport	*SPORTS_RISK* (1)	*POPULARITY* (2)
Motorized vehicles	1.19	7
Windsurfing	0.53	18
Non-motorized cycling	0.31	5
Basketball	0.29	2
Soccer	0.29	12
Hockey	0.19	9
Baseball	0.18	6
Hunting	0.16	8
Skating	0.15	20
Martial arts	0.12	20
Swimming	0.12	15
Skiing	0.11	3
Volleyball	0.08	20
Racquet games	0.07	4
Mountain/rock climbing	0.07	16
Wrestling	0.05	12
Golf	0.04	1
Waterskiing	0.03	19
Fishing (net)	0.03	17
General aerobic	0.02	11
Running/jogging	0.00	10
Boating motor/power	0.00	12

Table 2 reports the ~~top 20~~ most popular sports among our sample CEOs, sorted by the value of *SPORTS_RISK* in Column (1). Column (2) ranks the popularity of each sport listed in the table (*POPULARITY*), after excluding tackle football, as it is likely to be a spectator sport for our sample CEOs.

We assume that CEOs who play the same sport(s) are likely to have similar personal risk preferences. To estimate an individual CEO's risk preferences for our empirical analyses, we match the calculated sport risk as described above to the reported sports hobby of each CEO in our sample. If an individual CEO has multiple sports hobbies, we set their risk preference as the maximum sport risk value among all sports hobbies of that CEO (i.e., their riskiest sports hobby). For example, if a CEO indicates both golfing and skiing as sports hobbies, we set the risk preference to the higher of the two calculated sport risks, which is skiing.[17]

Table 2 reports the ~~top 20~~ most popular sports among our sample CEOs (i.e., most frequently reported as sports hobbies) and their respective risks. Not surprisingly, motorized vehicles, including car racing and flying planes, is the most risky sport, and golf is the most popular sport (for both female and male CEOs based on untabulated statistics) yet is relatively low risk based on hospital visits scaled by number of participants.[18] In addition, the state of California is the most common state in which our sample CEOs are located, comprising 16 percent (117/732) of the CEOs in the sample, followed by the State of New York (11 percent = 79/732) and Texas (9 percent = 64/732). The most common sports hobbies these CEOs have are golfing, baseball, and skiing, respectively.

Research Design

To test our hypotheses, we use the following regression model in our empirical analyses. Because our variable of interest, *SPORTS_RISK*, is fixed at the CEO level, we follow prior studies (e.g., Jia et al. 2014) and cluster standard errors from all regression models at the CEO level to account for potential within-CEO correlation. We also include industry and year fixed

[17] We also use the average value of sports risks for all hobby sports for the CEOs in our sample as an alternative measure and find consistent results. The related results are discussed in the robustness tests in Section IV.

[18] It is possible that individuals likely assess their own skill levels in a sport before participation. Thus, the *ex post* realization of sport-related injuries might be lower than expected due to the participation by more skilled individuals. This argument may explain why we observe the same sports risk for lacrosse and golf.

effects in the model.

$$TAX\_AGGRESSIVE = \beta_0 + \beta_1 SPORTS\_RISK + \beta_2 RD\_RATIO + \beta_3 INTAN + \beta_4 PPE + \beta_5 CAPX + \beta_6 LEV + \beta_7 SPI + \beta_8 MNE + \beta_9 NOL + \beta_{10} \Delta NOL + \beta_{11} MB + \beta_{12} \log ASSETS + industry\,fixed\,effects + year\,fixed\,effects + \varepsilon$$

In the model, the dependent variable is a firm's tax aggressiveness. Hanlon and Heitzman (2010) provide a review of the most widely used tax avoidance and tax aggressiveness metrics. They caution researchers in their choices of appropriate tax-planning measures, because each metric captures different aspects of a firm's tax planning, ranging from low-risk benign tax-exempt investments, such as municipal bonds, to riskier strategies that might be challenged by the IRS, such as tax shelters. Because of the lack of a well-established definition of tax aggressiveness, we follow prior studies and employ four measures in our main analyses to test our hypothesis that CEOs who participate in riskier sports pursue more aggressive tax planning. These measures include (1) a predicted tax shelter score (*PRED_SHELTER*) (Wilson 2009), (2) predicted unrecognized tax benefits (*PRED_UTB*) (Rego and Wilson 2012), (3) the coefficient of variation of the cash effective tax rate (*CV_CASHETR*) (McGuire et al. 2013), and (4) the industry size-adjusted long-term cash effective tax rate (*ADJ_CASH_ETR*) (Balakrishnan et al. 2019).

Usage of tax shelters is considered by many researchers and practitioners as aggressive tax planning (e.g., Chen et al. 2010; Blouin 2014). Following Wilson (2009), we construct *PRED_SHELTER* based on the probability that a firm uses tax shelters rather than on the actual usage of tax shelters, due to the scarcity of the related data.[19]

Our second measure of tax aggressiveness is based on unrecognized tax benefits (*UTB*s), which represent the uncertainty about a firm's tax positions being upheld in the future. As *UTB*s have only been required to be publicly disclosed since December 15, 2006 (FIN 48), we estimate each firm's *UTB* using Rego and Wilson's (2012) prediction model and label this variable *PRED_UTB*.[20]

Our third proxy for aggressive tax planning is the coefficient of variation in cash effective tax rates (*CV_CASHETR*) (McGuire et al. 2013). Large fluctuations in a firm's cash effective tax rates suggest higher risks in the tax positions the firm has taken (Guenther, Matsunaga, and Williams 2017). We follow McGuire et al. (2013) and construct *CV_CASHETR* as the standard deviation of the annual cash effective tax rate from year t to year t+3, scaled by the mean annual cash effective tax rate during the same period. Higher values of *CV_CASHETR* indicate higher levels of *ex post* volatility in tax payments and thus higher levels of tax risk for the firm.

Our last measure is a firm's long-term cash effective tax rate relative to that of similarly sized firms and firms in the same industry. Such adjustment controls for normal tax-planning opportunities among peer firms, resulting in an adjusted measure that better captures firms' aggressive tax planning (Balakrishnan et al. 2019). Similar to Balakrishnan et al. (2019), we calculate a firm's industry size-adjusted cash effective tax rate as the sum of cash taxes paid from year t to year t+3 divided by the sum of pretax income over the same period, minus the average cash effective tax rate over the same period for a portfolio of firms in the same quintile of total assets and in the same industry category (as delineated by Fama and French [1997]). We then multiply the difference by −1, denoted *ADJ_ CASH_ETR,* so that a higher *ADJ_CASH_ETR* value corresponds to greater tax aggressiveness by a firm.[21]

Our main independent variable of interest is *SPORTS_RISK,* for which we predict the coefficient, β_1, in the equation to be significantly positive across the four measures of tax aggressiveness, suggesting that firms run by CEOs who participate in risky sports hobbies are more tax aggressive.

With regard to the control variables, we follow prior studies (e.g., Chen et al. 2010; Dyreng et al. 2010; Dyreng, Hanlon, Maydew, and Thornock 2017) and include the following variables in the regression: research and development expenditure (*RD_RATIO*), intangible assets (*INTAN*), property, plant, and equipment (*PPE*), capital expenditure (*CAPX*), leverage (*LEV*),

[19] We also use the actual usage of tax havens as an alternative measure for firms' tax aggressiveness as in Law and Mills (2017). Untabulated results suggest that our main results remain unchanged.

[20] De Simone, Nickerson, Seidman, and Stomberg (2020) find that current-year additions to *UTB* provide a more powerful test of uncertain tax avoidance relative to other measures used in the literature. However, we note that the literature is mixed with regard to whether the actual level of *UTB* balance or current-year addition to *UTB* is superior in reflecting the degree of firms' tax uncertainty. For example, Ciconte, Donahoe, Lisowsky, and Mayberry (2014) and Guenther et al. (2017) suggest that future tax payments associated with a firm's *UTB* reserve are predictable, suggesting that the amount in the reserve for uncertain tax benefits based on the actual reported *UTB* balance in a firm's financial statement may not reflect the degree of uncertainty or risk in the firm's tax payment. Guenther et al. (2017) also find that predicted *UTB* is positively associated with the volatility of a firm's future tax rate, while actual *UTB* balance is not. When we replace the predicted *UTB* with the actual level of *UTB*s or current-year additions to *UTB,* untabulated results show that the estimated coefficient on *SPORTS_RISK* is not significant at conventional p-values.

[21] There are some "shared" control variables in our regression model that are also used to construct *PRED_SHELTER* and *PRED_UTB* in measuring firms' tax aggressiveness. We conduct two tests on the sensitivity of our results to this issue. First, we omit the "shared" variables in the regression model predicting firms' tax aggressiveness. Second, we exclude these "shared" variables in generating our proxies for firms' tax aggressiveness. Untabulated results show that our main results remain positive and significant in all four specifications using either of the approaches, suggesting our results are insensitive to these "shared" variables in the regression model.

TABLE 3

Summary Statistics

Panel A: Descriptive Statistics for Selected Regression Variables

Variables	Observations	Mean	Std.	Q1	Median	Q3
PRED_SHELTER	4,448	0.20	0.40	0.00	0.00	0.00
PRED_UTB (%)	4,357	1.02	0.75	0.57	0.90	1.37
CV_CASHETR	3,714	0.37	0.31	0.14	0.30	0.54
ADJ_CASH_ETR	3,240	−0.02	0.14	−0.08	0.00	0.07
SPORTS_RISK	4,448	0.20	0.28	0.04	0.11	0.29
D_SPORTS_RISK	4,448	0.08	0.27	0.00	0.00	0.00
RD_RATIO	4,448	0.04	0.08	0.00	0.00	0.03
INTAN	4,448	0.22	0.25	0.03	0.15	0.35
PPE	4,448	0.29	0.26	0.08	0.19	0.41
CAPX	4,448	0.25	0.15	0.14	0.21	0.32
LEV	4,448	0.26	0.22	0.08	0.23	0.37
SPI	4,448	−0.01	0.03	−0.01	0.00	0.00
MNE	4,448	0.68	0.47	0.00	1.00	1.00
NOL	4,448	0.71	0.45	0.00	1.00	1.00
Δ*NOL*	4,448	0.01	0.05	0.00	0.00	0.00
MB	4,448	3.58	3.83	1.58	2.43	4.00
log*ASSETS*	4,448	8.04	1.72	6.71	8.01	9.38
PAY_SLICE	4,388	0.36	0.13	0.28	0.36	0.44
CEO_AGE	4,184	55.09	7.45	50.00	55.00	60.00
log*DELTA*	4,221	5.80	1.73	4.75	5.85	6.91
log*VEGA*	3,682	4.26	2.05	3.29	4.47	5.59
MILITARY	4,448	0.33	0.47	0.00	0.00	1.00
CEO_DUALITY	4,448	0.56	0.50	0.00	1.00	1.00
CEO_ABILITY	3,588	0.03	0.16	−0.07	−0.01	0.09
MALE	4,448	0.95	0.22	1.00	1.00	1.00
OC	3,784	0.52	0.50	0.00	1.00	1.00

(continued on next page)

special items in the financial year (*SPI*), multinational (*MNE*), and firm size (log*ASSETS*). Following other prior studies (Chen et al. 2010), we also include control variables for net operating loss (*NOL*), changes in net operating loss (Δ*NOL*), and market-to-book ratio (*MB*) in the baseline regression model. Detailed definitions for these variables are in Appendix A.[22]

Table 3 reports the summary statistics of our sample. First, Panel A provides descriptive statistics of variables used in our baseline regressions. The mean (median) values of *PRED_SHELTER* and *PRED_UTB* are 0.20 (0.00) and 1.02 (0.90), respectively, and the mean (median) values of *CV_CASHETR* and *ADJ_CASH_ETR* are 0.37 (0.30) and −0.02 (0.00), respectively, which are all comparable to what are reported in prior studies (e.g., Dyreng, Hanlon, and Maydew 2008; Rego and Wilson 2012; McGuire et al. 2013; Guenther et al. 2017; Balakrishnan et al. 2019). The mean (median) injury rate of CEOs' hobby sports (*SPORTS_RISK*) is 0.20 (0.11), and its 25th (75th) percentile value is 0.04 (0.29), suggesting that our sample CEOs participate in a range of sports with varying levels of risk. The descriptive statistics of other firm characteristics are mostly consistent with those reported in prior studies (e.g., Dyreng et al. 2008).

Panels B and C of Table 3 present the Pearson correlations for the main variables used in our regressions. Injury rate of CEOs' sports hobby (*SPORTS_RISK*) is significantly and positively correlated with all four proxies for firms' tax aggressiveness, providing univariate support for our first hypothesis. While the correlation coefficients among the four proxies for tax aggressiveness are not as high as we might expect, ranging from −0.01 (the correlation between *PRED_SHELTER* and *CV_CASHETR*) to 0.21 (the correlation between *CV_CASHETR* and *ADJ_CASH_ETR*), they are generally consistent with those reported in prior studies (e.g., Rego and Wilson 2012; McGuire et al. 2013).

[22] In robustness tests reported below, we extend our baseline results by including CEOs' equity incentives and other personal characteristics variables, including their duality as a chairman of the board of the firm, whether they have past military experience, and whether they are male. Our results continue to hold with these additional control variables. However, we do not include these variables in our baseline regressions because of the reduced sample after adding these variables in the regressions.

TABLE 3 (continued)

Panel B: Pearson Correlations for Selected Regression Variables

	Variable Names	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	*PRED_SHELTER*	1.00							
(2)	*PRED_UTB*	**0.20**	1.00						
(3)	*CV_CASHETR*	**−0.01**	**0.04**	1.00					
(4)	*ADJ_CASH_ETR*	**0.03**	**0.20**	**0.21**	1.00				
(5)	*SPORTS_RISK*	**0.04**	**0.09**	**0.07**	**0.11**	1.00			
(6)	*D_SPORTS_RISK*	**0.04**	**0.12**	**0.08**	**0.09**	**0.66**	1.00		
(7)	*RD_RATIO*	**0.09**	**0.69**	**0.15**	**0.20**	**0.09**	**0.08**	1.00	
(8)	*INTAN*	**0.04**	**−0.02**	**−0.03**	**−0.06**	**−0.04**	−0.01	**0.02**	1.00
(9)	*PPE*	**−0.08**	**−0.30**	**0.06**	**0.02**	**0.06**	**0.08**	**−0.26**	**−0.27**
(10)	*CAPX*	**0.03**	**0.14**	**0.09**	**0.02**	−0.01	−0.01	**0.26**	**0.02**
(11)	*LEV*	**−0.04**	**−0.23**	**0.02**	**−0.04**	0.01	−0.01	**−0.22**	**0.27**
(12)	*SPI*	**0.06**	**−0.05**	**0.01**	**0.05**	**−0.01**	**0.02**	**−0.15**	**−0.04**
(13)	*MNE*	**0.23**	**0.31**	**−0.03**	0.01	**−0.03**	**0.02**	**0.24**	**0.19**
(14)	*NOL*	**0.03**	**0.08**	**−0.03**	**−0.01**	**0.05**	**0.05**	**0.03**	0.01
(15)	*ΔNOL*	**0.06**	**0.02**	**0.01**	**0.00**	0.00	**−0.03**	**0.12**	**0.05**
(16)	*MB*	**0.10**	**0.23**	**0.02**	**0.09**	**0.07**	**0.08**	**0.15**	**−0.01**
(17)	log*ASSETS*	**0.42**	0.01	**−0.03**	**−0.07**	−0.01	0.01	**−0.13**	**0.14**

Panel C: Pearson Correlations for Selected Regression Variables, continued from Panel B

	Variable Names	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(9)	*PPE*	1.00								
(10)	*CAPX*	**−0.28**	1.00							
(11)	*LEV*	**0.26**	**−0.23**	1.00						
(12)	*SPI*	**0.07**	**−0.02**	0.00	1.00					
(13)	*MNE*	**−0.35**	**0.07**	**−0.10**	**−0.06**	1.00				
(14)	*NOL*	**−0.07**	**0.01**	**−0.05**	**0.03**	**0.06**	1.00			
(15)	*ΔNOL*	0.01	**0.05**	**0.02**	**−0.13**	−0.01	**−0.03**	1.00		
(16)	*MB*	**−0.07**	**0.15**	**0.05**	**0.04**	**0.10**	**0.02**	**0.04**	1.00	
(17)	log*ASSETS*	**−0.04**	**−0.22**	**0.25**	**0.06**	**0.17**	**−0.05**	**−0.05**	**−0.03**	1.00

Numbers in bold represent statistical significance at the $p < 0.10$ level.
Panel A reports descriptive statistics of the variables in the main regression.
Panels B and C report the Pearson correlations for the variables used in the main regression.
Variable definitions are in Appendix A.

IV. EMPIRICAL RESULTS

Baseline Regressions in Testing H1

Table 4 reports the regression results of the effects of CEOs' sports risk on firms' tax aggressiveness. Consistent with H1, we find a positive and significant coefficient on *SPORTS_RISK* in all four regressions, suggesting that CEOs with riskier sports hobbies pursue riskier and more aggressive tax strategies that lower their overall tax burden compared with their comparable peer firms in the industry as reflected in *ADJ_CASH_ETR*.

In terms of the economic significance of the effect of CEOs' sports riskiness on firms' tax aggressiveness, we find moving CEOs from the 25th percentile of sports risk (which is 0.04 for golf) to the 75th percentile of sports risk (which is 0.29 for basketball and soccer) increases the likelihood that a firm uses tax shelters to avoid taxes (*PRED_SHELTER*) from 7.7 percent to 8.9 percent, representing a 15.6 percent increase (1.2 percent/7.7 percent). The corresponding statistics are a 3.0 percent increase in *PRED_UTB,* a 4.2 percent increase in *CV_CASHETR,* and a 42.3 percent increase in *ADJ_CASH_ETR* (the latter

TABLE 4

The Effect of CEO Sports Risk on Firms' Tax Aggressiveness

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_RISK	+	0.671**	0.120*	0.061*	0.037**
		(2.462)	(1.911)	(1.714)	(2.578)
RD_RATIO	+	2.610**	5.658***	0.408**	0.256***
		(2.255)	(15.462)	(2.401)	(2.815)
INTAN	+	−0.830**	−0.318***	−0.072*	−0.036*
		(−2.155)	(−4.238)	(−1.963)	(−1.676)
PPE	+	2.315***	−0.127	0.078	0.060*
		(3.791)	(−1.198)	(1.297)	(1.721)
CAPX	−	1.737***	−0.138	0.098*	−0.003
		(3.009)	(−1.317)	(1.727)	(−0.091)
LEV	−	−2.057	−0.075	0.100**	0.005
		(−1.072)	(−0.928)	(2.327)	(0.218)
SPI	+	11.463***	0.887**	0.319	0.467***
		(5.471)	(2.550)	(1.585)	(2.920)
MNE	?	1.856***	0.140***	−0.064***	−0.014
		(5.623)	(3.121)	(−2.857)	(−1.205)
NOL	+	0.300**	0.060*	0.005	−0.010
		(2.008)	(1.944)	(0.254)	(−1.041)
Δ*NOL*	+	6.979***	−0.273	−0.051	−0.036
		(5.539)	(−0.847)	(−0.360)	(−0.462)
MB	?	0.065***	0.022***	−0.001	0.002*
		(3.406)	(4.929)	(−0.482)	(1.771)
log*ASSETS*	?	1.207***	0.043***	−0.003	−0.003
		(15.912)	(3.677)	(−0.411)	(−0.867)
Intercept	?	−10.943***	0.325**	0.112	0.073
		(−10.422)	(2.489)	(1.591)	(1.235)
Industry and year fixed effects		Yes	Yes	Yes	Yes
Observations		3,951	4,357	3,714	3,240
Pseudo/Adjusted R^2		0.414	0.613	0.095	0.158

***, **, * Denote statistical significance at the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels, respectively.
Table 4 presents regression results on the association between CEOs' sports risk (*SPORTS_RISK*) and firms' tax aggressiveness. Two-tailed t-statistics are in parentheses based on standard deviations of the coefficient estimates clustered at the CEO level.
Variable definitions are in Appendix A.

value is large because the mean of this variable is close to 0).[23] Overall, we find the coefficients on *SPORTS_RISK* are not only statistically significant, but also economically significant in explaining firms' tax aggressiveness.

With regard to the control variables, we find the coefficients on *RD_RATIO* and *SPI* are positive and significant in three to four specifications, suggesting firms with higher R&D expense and special items engage in more aggressive tax planning. The coefficients on *INTAN* are all negative and significant, consistent with Dyreng et al. (2017) and Law and Mills (2017) that firms with greater intangible assets are more likely to shift their income into tax havens or escape taxations entirely (Kleinbard 2011). The coefficient on *LEV* is significantly positive in the *CV_CASHETR* regression, consistent with Wilson (2009). We also find the coefficients on *MNE* are positive and significant in the *PRED_SHELTER* and *PRED_UTB* regressions, but they are negative and significant when using *CV_CASHETR* to measure a firm's tax aggressiveness. Firm size (log*ASSETS*) is positively and significantly associated with firms' tax aggressiveness in two of the four specifications, suggesting that larger firms engage in more aggressive tax-planning strategies.

[23] Following Chyz (2013), we calculate the marginal effect of CEO sports risk and all other independent variables on firms' tax aggressiveness when the variable of interest changes from the 25th percentile to 75th percentile value in the sample. We then rank the magnitude of the marginal effects of CEO sports risk measure, *SPORTS_RISK,* relative to all other independent variables included in the regression model for each of the four measures for firms' tax aggressiveness. We find that the magnitudes of the incremental increases in firms' tax aggressiveness are ranked between 6th to 8th out of the 12 independent variables included in the four specifications, suggesting reasonable marginal effects of CEO sports risk on firms' aggressive tax planning.

Disentangling CEO Fixed Effects from Firm Fixed Effects

One concern is that our documented regression results may be spurious, because it is possible that firms with aggressive tax strategies hire more risk-taking CEOs, and thus our documented effect of CEO sports risk on firms' tax aggressiveness may be driven by unobservable firm characteristics rather than CEO effects. For example, firms with entrepreneurial cultures may seek CEOs with greater risk appetites and more risky sports hobbies; in contrast, firms with strong compliance culture and strict bureaucratic procedures in place may tend to hire CEOs with more conservative and less risky sports hobbies.

To disentangle firm effects from CEO fixed effects in explaining the heterogeneity in firms' tax aggressiveness, the conventional approach in the literature is to use the Bertrand and Schoar (2003) strategy that uses firm-year observations related to CEOs moving from one firm to another firm to examine directional changes in tax aggressiveness across firms surrounding CEO turnovers. However, the limited number of CEO turnover events in our sample (n = 76) imposes significant empirical challenges employing this approach.[24]

To address this small sample size issue, we follow the technique developed in Abowd et al. (1999; AKM) and adopted in Graham, Li, and Qiu (2012) and Law and Mills (2017) that expands the number of useful observations to disentangle manager fixed effects from firm or industry fixed effects, as well as other time-varying effects on firms' tax aggressiveness. The AKM approach first generates a connectedness sample by fully utilizing the work history of all CEOs in the sample during the entire sample period, including those who move and those who never move to another firm. With the larger sample size, the observed policies of these firms can be explained by a combination of four factors: (1) CEO fixed effects, (2) firm fixed effects, (3) firm-level time-varying effects, and (4) residual effects.

As in Abowd et al. (1999), we first conduct an analysis of covariance (ANCOVA) and decompose the component of variation in each of our tax aggressiveness measures that is explained by these four factors.[25] We then regress the decomposed CEO fixed effects on firms' tax aggressiveness estimated from the AKM procedure on CEO sports risks, controlling for other CEO characteristics, and examine whether CEO sports risk is significantly associated with the decomposed component of CEO fixed effects on firms' tax aggressiveness.[26]

Table 5 reports the results from the empirical procedure. Panel A of Table 5 shows that CEO fixed effects explain 46 to 61 percent of the total variation in our four measures of firms' tax aggressiveness. These magnitudes are similar to those reported in Law and Mills (2017). Panel B of Table 5 examines whether *SPORTS_RISK* explains the variation in CEO fixed effects estimated from Panel A, after controlling for the average of other CEO personal characteristics, including CEO age (log*AVG_CEO_AGE*), gender (*MALE*), military experience (*MILITARY*), marital status (*MARRIED*), whether the sample CEOs were born during the Great Depression (*BORN_DEPRESSION*), CEO ability (*CEO_ABILITY*), CEO tenure (log*AVE_CEO_TENURE*), incentive compensation (log*AVG_VEGA* and log*AVG_DELTA*), and CEO overconfidence (*AVG_OC*). We find that the coefficients on *SPORTS_RISK* are positive in all four specifications and statistically significant in two of the four specifications at conventional p-values. These results, while somewhat weaker—likely due to low statistical power—are consistent with our expectation that CEO sports risk has additional explanatory power for the variation in CEO fixed effects on firms' tax aggressiveness.

Self-Selection of CEOs' Disclosure of Sports Hobby

Although the AKM model allows us to disentangle CEO fixed effects from firm effects in explaining the heterogeneity of firms' tax aggressiveness, and we provide evidence that CEO sports risk explains the estimated CEO fixed effects, our documented main results may still be contaminated by a sample selection issue, because our analyses are limited to a subset of CEOs who choose to disclose their personal sports hobbies. In our sampling process, even though we observe a firm's tax aggressiveness measure regardless of whether a CEO discloses sports hobby information, our estimation is based on a subset of firm-year observations when CEOs voluntarily choose to publicly disclose their sports hobby information. To the extent that

[24] The limited number of turnover observations prevents us from conducting normal multivariate regression analyses with CEO fixed effects in the model predicting firms' tax aggressiveness. Nevertheless, untabulated descriptive statistics show that when incoming CEOs have higher sports risks than their predecessors, there is an increase in all four tax aggressiveness measures. In contrast, when incoming CEOs have lower sports risks than their predecessors, all of our four measures of firms' tax aggressiveness decrease. Although these changes are statistically significant in only one of the four measures, the lack of significant results likely arises due to the low statistical power resulting from the small CEO turnover sample. These univariate results echo those in Chyz, Gaertner, Kausar, and Watson (2019), who find weaker univariate results when an overconfident CEO is replaced with a CEO who is not overconfident.

[25] Empirically, we use the Stata command "Felsdvreg," which runs a time-demeaned regression to isolate firm fixed effects first. We then estimate the magnitude of the firm characteristics, year fixed effects, CEO fixed effects, and the residual effects by plugging in the estimated coefficients from the regression analyses.

[26] Note the decomposed CEO fixed effects represent overall CEO effects without specifying what factors may drive the effects. The regression model specification in Panel B of Table 5 examines whether CEO sports risk and other CEO personal characteristics explain variation in the CEO fixed effects.

TABLE 5

Disentangling Manager Effects from Firm Effects

Panel A: Disentangling CEO Effects from Firm Effects on Firms' Tax Aggressiveness

	Decomposition of Tax Aggressiveness			
Variable Items	**Covariance (*PRED_SHELTER*, Component)/ Variance (*PRED_SHELTER*)**	**Covariance (*PRED_UTB*, Component)/ Variance (*PRED_UTB*)**	**Covariance (*CV_CASHETR*, Component)/ Variance (*CV_CASHETR*)**	**Covariance (*ADJ_CASH_ETR*, Component)/ Variance (*ADJ_CASH_ETR*)**
CEO fixed effects	0.51	0.48	0.46	0.61
Firm fixed effects	0.01	0.01	0.03	0.03
Firm characteristics time-varying effects	0.12	0.37	0.00	0.00
Residuals	0.36	0.14	0.51	0.35
Total variation	1.00	1.00	1.00	1.00
F-test: manager fixed effects = 0	4.95***	9.86***	3.58***	6.91***

(continued on next page)

CEOs' decision to voluntarily disclose their sports hobby information is not random, and omitted variables are correlated with such a decision, we may draw erroneous conclusions based on the biased coefficients estimated from a non-randomly selected sample of firms from the population.

To address this issue, we employ the two-stage Heckman approach that introduces the inverse Mills ratio as a control function to correct the sample selection bias using the following equations:

Stage 1: $DISCLOSURE = \beta_0 + \beta_1 PUBLICITY + \beta_2 \log CEO\_AGE + \beta_3 MALE + \beta_4 MARRIED + \beta_5 MV + \beta_6 BIG4 + \beta_7 \log ANALYSTS + \beta_8 LITIGATE + \beta_9 MB + \beta_{10} LOSS + \beta_{11} NEWS + \beta_{12} \sigma EARN + \beta_{13} BETA + \beta_{14} FD + \beta_{15} INST + industry\ fixed\ effects + year\ fixed\ effects + \varepsilon$

Stage 2: $TAX\_AGGRESSIVE = \beta_0 + \beta_1 SPORTS\_RISK + \beta_2 IMR + control\ variables + industry\ fixed\ effects + year\ fixed\ effects + \varepsilon$

In the first stage, we run a probit regression to predict the likelihood that a CEO discloses a sports hobby using all 29,020 firm-year observations for the universe of 7,686 Execucomp CEOs during our sample period. Since there are no existing studies that we can draw from to model a CEO's disclosure choice regarding sports hobbies, we borrow the rationale in Gow, Wahid, and Yu (2018), who show that corporate managers have capital and labor market incentives to manage their reputations and do so by strategically disclosing their directorship information in biographies in proxy statements filed with the SEC. We expect that managers' directorship disclosure decision may be correlated with their tendency to publicly share their sports hobbies in their personal biography information. We therefore propose that a CEO is more likely to disclose sports hobbies when also exhibiting a greater tendency to publicize personal information in the public domain.

We measure the extent a CEO publicizes personal information based on the total number of Google results returned through a search for the biographical information of each of the 7,686 CEOs in Execucomp, labeled as *PUBLICITY*. We expect CEOs who are more private and less active in disclosing their personal information in the public domain to also choose not to publicly disclose their sports hobby. At the same time, CEOs' decision to have more public information about themselves should not be associated with their decisions to take more risky tax-planning decisions.[27] Thus, it satisfies the criteria as the exclusion variable in the two-stage Heckman model.

The additional control variables in the model include other CEO personal characteristics information, including CEOs' gender (*MALE*), age (log*CEO_AGE*), and marital status (*MARRIED*). We also include a list of firm fundamental variables that

[27] Lennox, Francis, and Wang (2012) point out that an absence of "exclusion restrictions" in the first stage can lead to severe multicollinearity in the second stage in a two-stage Heckman model. We check the multicollinearity issue associated with the exclusionary variable and find that the highest VIF scores in the second-stage regression model is less than 6 across our four tax aggressiveness measures; given the conventional cut-off value of 10, this suggests that multicollinearity in the second stage is unlikely to overturn our results. We also test the association between *PUBLICITY* and firms' information environment proxied by Amihud illiquidity (Amihud 2002) and bid-ask spread of stock prices. Untabulated results show such a relationship is statistically insignificant at conventional p-values, consistent with *PUBLICITY* not proxying for firms' information environment and providing further support that *PUBLICITY* satisfies the exclusion criteria for a valid instrument in a two-stage Heckman model.

TABLE 5 (continued)

Panel B: Using *SPORTS_RISK* to Explain CEO Fixed Effects on Firms' Tax Aggressiveness

	Explaining CEO Fixed Effects			
Independent Variables	***PRED_SHELTER* CEO Fixed Effects**	***PRED_UTB* CEO Fixed Effects**	***CV_CASHETR* CEO Fixed Effects**	***ADJ_CASH_ETR* CEO Fixed Effects**
SPORTS_RISK	0.082*	0.069	0.049	0.056*
	(1.905)	(0.732)	(0.960)	(1.879)
log*AVG_CEO_AGE*	−0.139	0.482*	−0.089	−0.016
	(−0.997)	(1.829)	(−0.706)	(−0.197)
MALE	0.085	0.054	−0.074	0.090**
	(1.621)	(0.443)	(−1.197)	(2.048)
MILITARY	0.036	0.002	−0.007	0.010
	(1.107)	(0.043)	(−0.232)	(0.518)
MARRIED	0.064**	0.107*	−0.024	0.030
	(2.370)	(1.785)	(−0.805)	(1.506)
BORN_DEPRESSION	−0.083	0.112	−0.079	0.073
	(−1.040)	(0.782)	(−1.091)	(1.604)
CEO_ABILITY	0.688***	0.876***	−0.069	−0.003
	(5.635)	(3.754)	(−0.698)	(−0.046)
log*AVG_CEO_TENURE*	0.028	−0.074**	0.008	0.011
	(1.409)	(−2.245)	(0.497)	(0.778)
log*AVG_VEGA*	0.017	0.074***	0.022**	0.032***
	(1.235)	(2.763)	(2.356)	(4.699)
log*AVG_DELTA*	0.000	0.030	0.013	0.002
	(0.012)	(0.997)	(0.864)	(0.225)
AVG_OC	−0.014	−0.134	0.118***	0.026
	(−0.340)	(−1.551)	(2.733)	(0.886)
Intercept	0.184	−1.630	−0.183	−0.239
	(0.343)	(−1.638)	(−0.381)	(−0.741)
State fixed effects	Yes	Yes	Yes	Yes
Observations	398	397	364	333
Adjusted R^2	0.193	0.214	0.078	0.178

***, **, * Denote statistical significance at the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels, respectively.
Panel A decomposes the variation of the four measures of firms' tax aggressiveness into (1) CEO fixed effects, (2) firm fixed effects, (3) firm characteristics (including year fixed effects), and (4) residuals, using the estimation method by Abowd et al. (1999).
Panel B presents regression results explaining disentangled CEO fixed effects using CEO-level characteristics/variables. The dependent variable is the component of CEO fixed effects in explaining firms' tax aggressiveness estimated in Panel A, and the main variable of interest is CEO sports risk (*SPORTS_RISK*). *AVG_CEO_AGE* is the average age of a CEO across the firm-years in which the CEO is in office during the sample period. log*AVG_VEGA* (log*AVG_DELTA*) is the average pay sensitivity of a CEO's equity incentive when there is a 1 percent change in stock volatility (price) during the sample period when the CEO is in office. *AVG_OC* is the average overconfidence level for the CEO in the sample period. Two-tailed t-statistics are in parentheses based on robust standard errors of the coefficient estimates.
Definitions of all other variables are in Appendix A.

are suggested to be associated with firms' voluntary financial disclosure decisions (e.g., Ajinkya et al. 2005; Feng et al. 2009). These variables include firm size (log*MV*), the quality of firms' auditor (*BIG4*), information demands from capital markets such as analysts (log*ANALYSTS*) and institutional shareholders (*INST*), whether firms operate in a litigious industry (*LITIGATE*), firms' growth opportunities (*MB*), profitability (*LOSS*), whether firm performance exceeds market expectations (*NEWS*), and whether the firm-year observation is in the pre- or post-Regulation FD period (*FD*). We then generate the inverse Mills ratio and include it in the second-stage regression examining the effect of CEO sports hobby risk on firms' tax aggressiveness.

We present the results in Table 6. The dependent variable in Panel A of Table 6 is *DISCLOSURE,* an indicator variable that equals 1 if a CEO discloses his/her sports hobbies, and 0 otherwise. Consistent with our expectation, we find the coefficient on *PUBLICITY* to be positive and significant. We also find negative and significant coefficients on log*CEO_AGE* and *MALE,* suggesting that younger and female CEOs are more likely to have and disclose their sports hobbies. Moreover, the coefficients on market value (log*MV*) and the number of analysts following the firms (log*ANALYSTS*) are positive and significant, suggesting greater information demand from capital markets may incentivize CEOs to disclose more personal sports hobby information.

TABLE 6

Self-Selection and Heckman Two-Stage Regression Models

Panel A: Predicting the Likelihood That a CEO Discloses a Sports Hobby

First-Stage Regression	*DISCLOSURE*
PUBLICITY	0.034***
	(9.012)
log*CEO_AGE*	−0.480***
	(−5.657)
MALE	−0.501***
	(−8.219)
MARRIED	−0.011
	(−0.494)
log*MV*	0.151***
	(14.769)
BIG4	0.070*
	(1.880)
log*ANALYSTS*	0.080***
	(3.233)
LITIGATE	0.275*
	(1.661)
MB	0.000
	(0.014)
LOSS	0.037
	(1.026)
NEWS	−0.004
	(−0.172)
σEARN	0.674
	(1.166)
BETA	0.037**
	(2.276)
FD	0.106
	(0.802)
INST	−0.168**
	(−2.492)
Intercept	0.851*
	(1.784)
Observations	29,020
Year and industry fixed effects	Yes

(continued on next page)

Panel B of Table 6 reports the results of the second-stage regression of the association between CEO sports hobby risk and firms' tax aggressiveness after including the inverse Mills ratio (*IMR*) generated from the first stage. The results show that the coefficients on *SPORTS_RISK* remain positive and significant in all four specifications, suggesting our results remain robust after addressing the sample selection issue in the model.

Cross-Sectional Regressions in Testing H2 and H3

H2 predicts that the positive relation between the riskiness of a CEO's sports hobby and corporate tax aggressiveness is more pronounced for CEOs with greater financial incentives. To test this hypothesis, we follow Rego and Wilson (2012) and use equity risk incentive (*VEGA*) to proxy for the monetary payoff for CEOs to engage in aggressive tax-planning activities. We then partition the sample into two subgroups using the median value of *VEGA*. We code *HIGH_VEGA* as 1 if a CEO's *VEGA* is greater than the sample's median value, and 0 otherwise.

Results presented in Panel A of Table 7 are largely consistent with our prediction. In particular, we find that the association between *SPORTS_RISK* and firms' tax aggressiveness is significantly positive in the *HIGH_VEGA* = 1 subsample in three of the four

TABLE 6 (continued)

Panel B: The Effect of CEO Sports Risk on Firms' Tax Aggressiveness—Controlling for Self-Selection Bias

Second-Stage Regression	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_RISK	0.042*	0.268***	0.046**	0.047***
	(1.885)	(5.792)	(2.124)	(5.098)
RD_RATIO	0.003	4.071***	0.257***	0.199***
	(0.036)	(25.950)	(3.222)	(4.877)
INTAN	−0.070**	−0.434***	−0.167***	−0.057***
	(−2.137)	(−6.386)	(−5.232)	(−4.282)
PPE	0.093**	−0.338***	0.092**	0.017
	(2.022)	(−3.492)	(2.037)	(0.935)
CAPX	0.099**	−0.312***	0.094**	−0.004
	(2.110)	(−3.190)	(2.117)	(−0.222)
LEV	−0.161***	0.047	0.081**	0.021
	(−4.343)	(0.617)	(2.271)	(1.394)
SPI	0.585***	0.019	0.161	0.467***
	(3.883)	(0.060)	(1.031)	(5.059)
MNE	0.151***	0.172***	−0.071***	−0.008
	(8.146)	(4.481)	(−3.975)	(−1.126)
NOL	0.005	0.037	0.014	−0.010*
	(0.341)	(1.242)	(1.046)	(−1.717)
Δ*NOL*	0.173***	0.791***	−0.080	−0.025
	(3.421)	(7.191)	(−1.097)	(−0.855)
MB	0.004***	0.013***	−0.003*	0.000
	(2.750)	(4.267)	(−1.735)	(0.579)
log*ASSETS*	0.115***	−0.035**	−0.009	−0.004
	(15.040)	(−2.219)	(−1.343)	(−1.566)
IMR	−0.324***	−0.521***	−0.104***	−0.029**
	(−7.436)	(−5.869)	(−2.864)	(−2.168)
Intercept	−0.922***	1.724***	0.250	−0.002
	(−4.181)	(3.912)	(1.344)	(−0.024)
Observations	3,229	3,178	2,639	2,955
Pseudo/Adjusted R^2	0.4477	0.4586	0.1138	0.1668
Year and industry fixed effects	Yes	Yes	Yes	Yes

***, **, * Denote statistical significance at the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels, respectively.
Two-tailed t-statistics are in parentheses based on standard deviations of the coefficient estimates clustered at the CEO level.
Panel A presents first-stage regression results of the Heckman two-stage model. The dependent variable *DISCLOSURE* is an indicator variable that equals 1 if a CEO discloses sports hobbies in our data sources (Boardroom Insider or Google searches with the keywords specified in the paper), and 0 otherwise.
Panel B reports the second-stage results of the Heckman two-stage model. *IMR* is the inverse Mills ratio generated from Panel A of the table.
Variable definitions of all other variables are in Appendix A.

tax aggressiveness measures. In contrast, the corresponding coefficients are statistically insignificant in the *HIGH_VEGA* = 0 subsamples.[28] Chow test statistics at the foot of the table show that these differences are significant in three of the four specifications. These results are consistent with the reinforcing effect, rather than the crowding out effect, of financial rewards on intrinsic motivation on task efforts that is debated in the psychology literature (Deci and Ryan 1980; Staw 1989; Titmuss 2018).[29]

[28] It is possible that firms offering compensation packages with greater risk-based equity incentives are more likely to recruit optimistic managers with greater risk proclivity (Arya and Mittendorf 2005; Bergman and Jenter 2007; Hodge, Rajgopal, and Shevlin 2009), suggesting that incentive compensation is a sorting mechanism to separate out managers with different risk proclivities. To empirically test such a channel, we follow the CEO equity incentive grant model in Rego and Wilson (2012, Equation (3)) and Rajgopal and Shevlin (2002), and examine the association between CEO sports risk and CEO compensation *VEGA*. Untabulated results show a positive and significant coefficient on *SPORTS_RISK*.

[29] Deci and Ryan (1980) and Staw (1989) argue that financial incentives engender greater effort without crowding out motivation, because the extrinsic incentive is a signal of high status or high achievement in general; such incentives supplement the intrinsic motivation for an individual to engage in the behavior. Titmuss (2018), on the other hand, suggests that providing extrinsic incentives such as monetary rewards can undermine intrinsic motivation for performing that behavior. The result of lowered motivation, in contrast with the predictions of neoclassical economics, can be an overall decrease in the total performance.

TABLE 7

The Effect of CEO Sports Risk on Firms' Tax Aggressiveness—Cross-Sectional Tests

Panel A: Cross-Sectional Tests on the Effect of CEO Sports Risk on Firms' Tax Aggressiveness—CEO Incentives

		PRED_SHELTER		*PRED_UTB*		*CV_CASHETR*		*ADJ_CASH_ETR*	
Independent Variables	**Pred. Sign**	***HIGH_VEGA* = 1**	***HIGH_VEGA* = 0**	***HIGH_VEGA* = 1**	***HIGH_VEGA* = 0**	***HIGH_VEGA* = 1**	***HIGH_VEGA* = 0**	***HIGH_VEGA* = 1**	***HIGH_VEGA* = 0**
SPORTS_RISK	+	1.039***	0.310	0.211***	0.055	0.008	0.076	0.050***	0.027
		(3.187)	(0.633)	(3.262)	(0.597)	(0.151)	(1.623)	(2.767)	(1.210)
RD_RATIO	+	3.888***	−0.277	5.875***	5.341***	0.258	0.513*	0.204	0.184
		(2.807)	(−0.135)	(15.575)	(9.384)	(1.178)	(1.886)	(1.479)	(1.392)
INTAN	+	−1.268***	−0.872	−0.409***	−0.233**	−0.084*	−0.068	−0.060*	0.003
		(−2.718)	(−1.439)	(−4.006)	(−2.114)	(−1.684)	(−1.328)	(−1.870)	(0.146)
PPE	+	2.127**	3.113***	−0.117	−0.068	−0.061	0.105	0.038	0.085**
		(2.134)	(3.792)	(−0.889)	(−0.460)	(−0.759)	(1.518)	(0.946)	(2.496)
CAPX	−	1.647**	2.106**	−0.091	−0.262*	0.084	0.128	0.036	−0.024
		(2.399)	(2.103)	(−0.673)	(−1.823)	(0.970)	(1.562)	(0.809)	(−0.578)
LEV	−	−1.155*	−2.979***	−0.114	−0.158	0.076	0.123**	0.009	−0.003
		(−1.934)	(−4.091)	(−1.071)	(−1.239)	(1.314)	(2.011)	(0.274)	(−0.092)
SPI	+	11.554***	12.001***	0.789	0.924**	0.322	0.252	0.471**	0.348
		(4.038)	(3.121)	(1.422)	(1.968)	(1.134)	(0.921)	(2.433)	(1.489)
MNE	?	2.127***	1.871***	0.165***	0.109*	−0.084***	−0.056*	−0.023	−0.003
		(4.440)	(4.714)	(2.864)	(1.701)	(−3.131)	(−1.752)	(−1.380)	(−0.196)
NOL	+	0.491**	0.043	0.097**	0.044	0.017	0.007	−0.006	−0.014
		(2.376)	(0.177)	(2.505)	(0.959)	(0.702)	(0.250)	(−0.442)	(−1.154)
Δ*NOL*	+	7.794***	7.155***	0.196	−0.394	0.190	−0.195	0.141	−0.133
		(4.352)	(2.981)	(0.425)	(−1.099)	(0.807)	(−1.033)	(1.452)	(−1.225)
MB	?	0.073***	0.076**	0.023***	0.023***	0.000	−0.002	−0.001	0.006***
		(3.068)	(2.384)	(4.911)	(3.629)	(0.038)	(−0.606)	(−0.425)	(3.172)
log*ASSETS*	?	1.340***	1.124***	0.029*	0.027	−0.001	−0.007	−0.014**	−0.004
		(11.753)	(9.611)	(1.823)	(1.589)	(−0.132)	(−0.703)	(−2.572)	(−0.913)
Intercept	?	−13.309***	−10.250***	0.187	0.536***	0.259**	0.120	0.214***	0.048
		(−8.095)	(−7.672)	(1.008)	(2.759)	(2.076)	(1.299)	(3.817)	(0.525)
Year and industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		2,088	2,050	2,045	2,016	1,670	1,617	1,440	1,402
Pseudo/Adjusted R^2		0.422	0.392	0.676	0.555	0.106	0.109	0.262	0.143
p-value for the Chow test		0.056		0.004		0.063		0.160	

(continued on next page)

TABLE 7 (continued)

Panel B: Cross-Sectional Tests on the Effect of CEO Sports Risk on Firms' Tax Aggressiveness—CEO Power

		PRED_SHELTER		*PRED_UTB*		*CV_CASHETR*		*ADJ_CASH_ETR*	
Independent Variables	**Pred. Sign**	***HIGH_POWER* = 1**	***HIGH_POWER* = 0**	***HIGH_POWER* = 1**	***HIGH_POWER* = 0**	***HIGH_POWER* = 1**	***HIGH_POWER* = 0**	***HIGH_POWER* = 1**	***HIGH_POWER* = 0**
SPORTS_RISK	+	1.047**	0.566	0.182**	0.067	0.081	0.065	0.063***	0.002
		(2.525)	(1.546)	(2.477)	(1.121)	(1.628)	(1.394)	(3.719)	(0.093)
RD_RATIO	+	3.545***	1.573	5.528***	5.789***	0.358	0.390*	0.169	0.328***
		(2.652)	(0.847)	(13.224)	(12.323)	(1.617)	(1.726)	(1.413)	(2.644)
INTAN	+	−0.477	−1.449***	−0.430***	−0.236**	−0.141***	−0.035	−0.009	−0.019
		(−1.036)	(−2.738)	(−3.646)	(−2.415)	(−2.840)	(−0.724)	(−0.322)	(−0.752)
PPE	+	1.994**	3.499***	−0.274**	0.068	0.060	0.074	0.084**	0.091**
		(2.573)	(3.928)	(−2.255)	(0.508)	(0.826)	(0.997)	(2.326)	(2.427)
CAPX	−	1.793**	1.995**	−0.171	−0.079	0.152*	0.097	0.031	−0.012
		(2.570)	(2.179)	(−1.111)	(−0.647)	(1.939)	(1.228)	(0.747)	(−0.277)
LEV	−	−1.441**	−3.255***	−0.074	−0.089	0.135**	0.071	−0.005	0.018
		(−2.226)	(−4.754)	(−0.628)	(−0.926)	(2.215)	(1.371)	(−0.169)	(0.659)
SPI	+	12.849***	10.596***	0.647	0.775	−0.086	0.483*	0.283	0.639***
		(3.967)	(3.788)	(1.416)	(1.539)	(−0.278)	(1.911)	(1.405)	(2.732)
MNE	?	1.715***	2.336***	0.142***	0.124**	−0.080***	−0.079***	−0.019	−0.001
		(4.346)	(4.705)	(2.928)	(2.092)	(−2.876)	(−2.729)	(−1.343)	(−0.081)
NOL	+	0.326*	0.338	0.067*	0.059	0.003	0.019	−0.006	−0.022*
		(1.826)	(1.505)	(1.708)	(1.544)	(0.128)	(0.807)	(−0.478)	(−1.770)
Δ*NOL*	+	7.611***	7.648***	−0.016	−0.398	0.091	−0.197	−0.159	0.093
		(5.168)	(3.504)	(−0.041)	(−0.860)	(0.425)	(−0.986)	(−1.354)	(0.710)
MB	?	0.066***	0.053*	0.022***	0.026***	−0.001	−0.003	0.000	0.005***
		(2.860)	(1.696)	(5.143)	(4.044)	(−0.200)	(−0.883)	(0.289)	(2.894)
log*ASSETS*	?	1.153***	1.359***	0.040***	0.043***	−0.006	0.002	−0.008*	−0.002
		(11.951)	(11.463)	(3.129)	(3.050)	(−0.687)	(0.240)	(−1.719)	(−0.477)
Intercept	?	−12.312***	−10.776***	0.300*	0.252	0.183*	0.008	−0.015	0.121**
		(−9.374)	(−7.295)	(1.890)	(1.437)	(1.809)	(0.077)	(−0.121)	(2.426)
Year and industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		2,126	2,118	2,089	2,075	1,680	1,688	1,460	1,481
Pseudo/Adjusted R^2		0.413	0.453	0.620	0.614	0.101	0.085	0.200	0.188
p-value for the Chow test		0.143		0.016		0.405		0.000	

***, **, * Denote statistical significance at the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels, respectively.
Two-tailed t-statistics are in parentheses based on standard deviations of the coefficient estimates clustered at the CEO level.
Panel A presents regression results on the association between CEOs' sports risk (*SPORTS_RISK*) and firms' tax aggressiveness, after partitioning the sample into firms with high CEO incentive (*HIGH_VEGA* = 1) and low CEO incentive (*HIGH_VEGA* = 0), based on the sample median value of CEO compensation incentives *VEGA*.
Panel B presents regression results on the association between CEOs' sports risk (*SPORTS_RISK*) and firms' tax aggressiveness, after partitioning the sample into firms with high CEO power (*HIGH_POWER* = 1) and low CEO power (*HIGH_POWER* = 0), based on the sample median value of CEO *PAY_SLICE*.
Definitions of all other variables are in Appendix A.

H3 predicts that the positive relation between the riskiness of a CEO sports hobby and firms' tax aggressiveness is more pronounced for CEOs with greater corporate power. To test this hypothesis, we follow Bebchuk, Cremers, and Peyer (2011) and Feng et al. (2011) and use CEO pay slice scaled by the total pay of the top five paid executives to proxy for CEO power.[30] We then partition our sample into two subgroups using the sample median value. A CEO is classified in the *HIGH_POWER* = 1 subgroup if the pay slice is greater than the median value, and 0 otherwise. Panel B of Table 7 presents the regression results. Consistent with our prediction, we find that the association between *SPORTS_RISK* and firms' tax aggressiveness is positive and significant in the *HIGH_POWER* = 1 subgroup in three of four regressions. In contrast, none of the corresponding coefficients is statistically significant in the *HIGH_POWER* = 0 subgroup. Chow test statistics at the foot of the table show that these differences are statistically significant in two of the four model specifications.[31]

Overall Firm Risks

To the extent that CEO sports risk preferences reflect their personal risk proclivities, we expect such risk preferences to be manifested in other dimensions of corporate risk-taking decisions. While our paper mainly focuses on firms' tax aggressiveness given the significance of the tax decisions, our measure can potentially be used to examine a wide range of corporate risk-taking decisions that have been examined in the literature, including, for example, M&A decisions or diversifying M&A decisions, dividend payout policies, financing policies, etc. Instead of re-testing a laundry list of variables to verify our results, we examine the association between our sports risk measure of CEO sports hobbies and the three following aggregate outcome variables: the volatility of a firm's monthly future stock return, and the volatility of both accounting earnings and cash flow resulting from a wide range of CEOs' risky corporate decisions. Empirically, we calculate the volatility of a firm's stock return based on the monthly stock return over the subsequent year, and the volatility of future three-years' earnings and cash flow while the CEO is in the position. The results in Table 8 show positive and significant coefficients on *SPORTS_RISK* on all three firm risk measures, consistent with our tax aggressiveness results. Additionally, because our tests are a joint test of the maintained assumption that *SPORTS_RISK* and tax aggressiveness capture CEOs' innate risk preferences and risky tax planning, respectively, these results lend validity to our measures.

Robustness Tests

Controlling for CEOs' Equity Incentives and Other Personal Characteristics

We conduct robustness tests by including additional control variables to reinforce our main results.[32] First, prior accounting research has documented that firms' corporate policies are systematically associated with executive compensation structure, particularly with equity risk incentives of top executives. Equity risk incentives capture the convexity of the relation between a manager's personal wealth and firms' stock price, and they motivate managers to take risky operational, investment, and financial decisions (e.g., Guay 1999; Rajgopal and Shevlin 2002). Although there is mixed evidence on whether equity incentives effectively motivate managers to pursue more aggressive tax planning (Phillips 2003; Rego and Wilson 2012; Gaertner 2014; Powers, Robinson, and Stomberg 2016), we include CEOs' financial incentives based on the log value of the increase in the value of a manager's stock option portfolio for a 1 percent increase of stock price or stock return volatility (Guay 1999), labeled log*DELTA* and log*VEGA,* respectively, as additional control variables to distinguish non-pecuniary from pecuniary factors that influence corporate tax planning.

Law and Mills (2017) find that CEOs with past military experience engage in less tax avoidance. They suggest that this may be because CEOs with military experience have a stronger sense of obedience to the law or because they simply view tax avoidance as unethical. To control for the mitigating effect of CEOs' military experience, we include an indicator variable, *MILITARY,* which equals 1 for the CEOs in our sample who have prior military experience, and equals 0 for non-military CEOs.

---

[30] Pay slice is calculated based on the percentage of total pay, including salary, bonus, other annual pay, and the total value of restricted stock granted, the Black-Scholes value of stock option granted, long-term incentive payouts, and all other total compensation for a CEO, over the entire five top-paid executives in a firm. In cases where fewer than five executives' compensation is disclosed, we follow Feng et al. (2011) and adjust the aggregated total pay for the five top-paid executives in the firm. For example, if a firm discloses compensation information for only four executives, we assume the total pay of the fifth executive is the same as the fourth one.

[31] We note that the coefficients on *SPORTS_RISK* in the specification using *CV_CASHETR* for firms' tax aggressiveness are insignificant across both subsamples in Panels A and B of Table 7. We conjecture that the non-result may be related to lack of statistical power due to the relatively small sample size in the analyses, in comparison with Guenther et al. (2017) and McGuire et al. (2013). We also note that our sample firms are on average larger, more leveraged, and have higher growth than those in the above two papers.

[32] We did not include these additional variables in our main analyses, because the data requirement for these variables substantially reduces our sample size for the tests.

TABLE 8

Aggregate Firm Risks

Independent Variables	*σRET* (*t* to *t*+1) (1)	*σROE* (*t* to *t*+3) (2)	*σCASHFLOW* (*t* to *t*+3) (3)
SPORTS_RISK	0.015*	0.153***	0.006*
	(1.812)	(4.770)	(1.893)
PTBI	−0.186**	−0.246*	0.013
	(−2.678)	(−1.871)	(1.265)
σPTBI (*t* to *t*–3)	0.290***	0.281*	0.025
	(4.144)	(2.020)	(1.157)
BTM	0.036***	−0.391***	0.000
	(3.233)	(−9.622)	(0.021)
LEV	0.046*	0.587***	0.001
	(1.794)	(8.116)	(0.111)
log*ASSETS*	−0.013***	0.014	−0.003***
	(−3.533)	(1.264)	(−5.996)
ABN_DSC	−0.001	0.009	0.001
	(−0.359)	(1.170)	(1.619)
RET	−0.005	−0.056***	0.006*
	(−0.343)	(−3.136)	(1.964)
σOANCF (*t* to *t*–3)	0.463***	0.125	0.325***
	(5.220)	(0.320)	(8.781)
ETBSO	0.594	−3.741	0.024
	(0.499)	(−1.493)	(0.128)
Δ*NOL*	0.102	0.055	0.019
	(1.060)	(0.206)	(0.727)
NOL	0.009	0.015	0.003
	(1.296)	(0.547)	(1.721)
LOSS	0.105***	0.294***	0.014***
	(6.283)	(5.045)	(3.925)
log*DELTA*	−0.016***	−0.092***	0.001
	(−3.319)	(−8.033)	(0.854)
log*VEGA*	−0.001	0.028***	−0.002**
	(−0.417)	(5.563)	(−2.619)
CEO_DUALITY	−0.002	0.148***	0.002
	(−0.213)	(10.058)	(0.759)
CEO_ABILITY	0.009	−0.072	0.006
	(0.437)	(−1.006)	(0.989)
MALE	−0.025*	0.103*	0.004*
	(−1.840)	(1.977)	(1.895)
OC	0.018**	0.040*	−0.001
	(2.226)	(2.017)	(−1.227)
log*CEO_TENURE*	0.021***	0.001	0.001
	(6.029)	(0.106)	(1.652)
log*CEO_AGE*	−0.147***	−0.253*	−0.038***
	(−6.181)	(−1.979)	(−4.560)
BORN_DEPRESSION	0.038	−0.193*	0.024**
	(1.284)	(−1.986)	(2.825)
Intercept	0.977***	1.186**	0.169***
	(11.624)	(2.581)	(5.044)

(continued on next page)

TABLE 8 (continued)

Independent Variables	*σRET* (*t* to *t*+1) (1)	*σROE* (*t* to *t*+3) (2)	*σCASHFLOW* (*t* to *t*+3) (3)
Observations	2,683	2,290	2,290
Adjusted R^2	0.505	0.217	0.370
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes

***, **, * Denote statistical significance at the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels, respectively.
Two-tailed t-statistics are in parentheses based on standard deviations of the coefficient estimates clustered at the CEO level.
Table 8 presents regression results on the association between CEOs' sports risk (*SPORTS_RISK*) and measures of overall firm risk. *σRET*(*t* to *t*+1) is the standard deviation of monthly stock returns over the following year *t*+1; *σROE*(*t* to *t*+3) is the standard deviation of annual *ROE* measured over years *t* to *t*+3; and *σCASHFLOW*(*t* to *t*+3) is the standard deviation of annual operating cash flow scaled by total assets measured over years *t* to *t*+3. *PTBI* is pretax book income (*PI*) scaled by lagged total assets; *σPTBI* is the standard deviation of the annual pretax income (*PI*) scaled by lagged total assets (*AT*) measured over the prior four-year period; *BTM* is year-end book value of equity (*CEQ*) over the price per share (*PRCC_F*) times the total number of shares outstanding (*CSHO*); *LEV* is long-term debt (*DLTT*) scaled by lagged total assets; log*ASSETS* is the natural log of total assets (*AT*). *ABN_DSC* is the year-end discretionary accruals, estimated using the modified Jones model; *RET* is a firm's annual buy-and-hold stock return measured over the fiscal year; *σOANCF* is the standard deviation of operating cash flow (*OANCF*) scaled by lagged total assets (*AT*) measured over the prior four-year period; *ETBSO* is the excess tax benefit of stock options (*TXBCOF* + *TXBCO*) scaled by total assets (*AT*); *NOL* is the net operating loss carry-forward (*NOLCF*) scaled by total assets (*AT*); and *LOSS* is an indicator variable equal to 1 if a firm has negative pretax income, and is 0 otherwise.
Definitions of all other variables are in Appendix A.

Koester et al. (2016) argue that CEOs' ability affects the extent they can identify and exploit tax-planning opportunities by efficiently managing corporate resources to reduce firms' tax payments. Although the findings in Koester et al. (2016) do not necessarily imply that CEOs' ability affects firms' tax aggressiveness, we include CEO ability (*CEO_ABILITY*) as an additional control variable in our regressions. Following Francis et al. (2014), we also include CEO-chairman duality (*CEO_DUALITY*) and CEO gender (*MALE*) and control for the effects of CEO duality and gender differences on firms' tax planning. Chyz et al. (2019) show that overconfident CEOs are positively associated with firms' tax aggressiveness. It is possible that overconfident CEOs may underestimate risk, participate in more risky sports, and implement more aggressive corporate policies. Following Schrand and Zechman (2012) and Jia et al. (2014), we construct a CEO overconfidence measure, *OC*, and include it as an additional control.[33] We also include industry fixed effects, headquarter state location fixed effects to broadly control for differences in religiosity and political beliefs, and year fixed effects.

Results in Table 9 show that our main variable of interest, *SPORTS_RISK*, remains positive and significant in three of the four regression specifications at conventional p-values after including these additional control variables. Table 9 also shows a weak positive effect of CEOs' equity incentives on firms' tax aggressiveness. The weak effect of CEO equity incentives coupled with a significantly positive coefficient on *SPORTS_RISK* suggests that innate CEO risk preferences play an important role in corporate tax planning, incremental to financial incentives. In addition, consistent with Law and Mills (2017), the coefficients on the measure of a CEO's military experience are positively associated with *CV_CASHETR*; the overconfident variable, *OC*, is significantly negative in the *PRE_UTB* regression, but positive in the *CV_CASHETR* regression, consistent with Chyz et al. (2019).

Alternative Sports Risk Measures

A concern might be that our sports risk measure overlooks the severity of each sport-related injury in measuring CEOs' sports risks; in addition, such a measure is based on *ex post* realizations of sports-related injuries rather than an *ex ante* expectation of the risks associated with playing a sport. To address this concern, we use an alternative approach to measure CEOs' sports risk by dichotomizing CEO sports risks based on whether a CEO engages in extreme sports. While there is no single established definition of extreme sports, sports research broadly defines those as extreme ones when the *ex ante* possibility of injury or death is inherently part of the activity (Brymer and Oades 2009; Castanier, Scanff, and Woodman 2010), including, for example, using firearms, flying airplanes, ice climbing, riding motorcycle/motor bikes, mountain/rock climbing, racing cars, scuba diving, ski racing, and windsurfing, etc. We create a dummy variable, *D_SPORTS_RISK*, which equals 1 if a

[33] We also use an alternative measure for CEO overconfidence, *OC_OPTIONS*, in the model. It is an indicator variable that equals 1 if the in-the-money unexercised exercisable options held by a CEO are greater than the industry median, and 0 otherwise. Our results remain quantitatively similar.

TABLE 9

The Effect of CEO Sports Risk on Firms' Tax Aggressiveness—Additional Controls for CEO Incentives, Military Experience, Duality, Ability, and Overconfidence

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_RISK	+	1.030***	0.124*	0.050	0.043**
		(3.579)	(1.759)	(1.167)	(2.269)
RD_RATIO	+	−0.741	5.586***	0.408*	0.012
		(−0.485)	(14.611)	(1.701)	(0.101)
INTAN	+	−1.403***	−0.317***	−0.064	−0.014
		(−2.920)	(−3.159)	(−1.304)	(−0.470)
PPE	+	2.330***	0.068	−0.033	0.080**
		(2.851)	(0.584)	(−0.434)	(2.354)
CAPX	−	0.739	−0.105	0.179**	0.035
		(1.019)	(−0.778)	(2.056)	(1.057)
LEV	+	−1.661**	0.034	−0.003	−0.039
		(−2.419)	(0.326)	(−0.045)	(−1.232)
SPI	+	9.001***	1.027***	0.316	0.478**
		(3.667)	(2.819)	(1.274)	(2.361)
MNE	?	1.485***	0.158***	−0.071**	−0.013
		(4.212)	(2.964)	(−2.323)	(−0.912)
NOL	+	0.318*	0.058*	0.028	0.001
		(1.701)	(1.760)	(1.242)	(0.123)
Δ*NOL*	+	6.304***	0.025	−0.124	−0.069
		(4.209)	(0.089)	(−0.787)	(−0.829)
MB	?	0.066***	0.024***	0.000	0.001
		(3.216)	(5.913)	(0.014)	(0.958)
log*ASSETS*	?	1.014***	0.033**	0.000	−0.010**
		(10.762)	(2.171)	(0.045)	(−2.233)
log*DELTA*	+	0.187**	0.007	−0.006	−0.004
		(1.981)	(0.466)	(−0.620)	(−0.722)
log*VEGA*	+	0.169***	0.010	0.004	0.006
		(2.720)	(1.544)	(0.849)	(1.646)
MILITARY	−	−0.096	−0.006	0.041*	−0.010
		(−0.422)	(−0.145)	(1.857)	(−0.879)
CEO_ABILITY	+	2.340***	0.223*	−0.075	0.057**
		(4.784)	(1.850)	(−1.370)	(2.045)
CEO_DUALITY	+	0.037	0.001	−0.030	0.002
		(0.177)	(0.021)	(−1.334)	(0.166)
MALE	+	−0.042	−0.009	−0.060	0.013
		(−0.114)	(−0.089)	(−1.029)	(0.635)
OC	+	0.148	−0.072***	0.034**	0.006
		(0.907)	(−3.218)	(2.216)	(0.871)
Intercept	?	8.686***	0.278	0.180	−0.204**
		(4.914)	(1.276)	(1.159)	(−2.177)
Year and industry fixed effects		Yes	Yes	Yes	Yes
State fixed effects		Yes	Yes	Yes	Yes
Observations		2,735	2,710	2,235	1,931
Pseudo/Adjusted R^2		0.434	0.669	0.131	0.199

***, **, * Denote statistical significance at the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels, respectively.
Two-tailed t-statistics are in parentheses based on standard deviations of the coefficient estimates clustered at the CEO level.
Table 9 presents regression results on the association between CEOs' sports risk (*SPORTS_RISK*) and firms' tax aggressiveness, after including the additional control variables for CEOs' equity incentives (log*DELTA* and log*VEGA*), past military experience (*MILITARY*), duality (*CEO_DUALITY*), and ability (*CEO_ABILITY*).
Definitions of all other variable are in Appendix A.

TABLE 10

Alternative Measure of CEO Sports Risks

Panel A: Using a Dichotomized Measure *D_SPORTS_RISK* for Extreme Sports

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
D_SPORTS_RISK	+	0.670**	0.244***	0.058	0.033**
		(2.492)	(3.620)	(1.560)	(2.438)
Control variables		Included	Included	Included	Included
Industry and year fixed effects		Included	Included	Included	Included
Observations		3,951	4,357	3,714	3,240
Pseudo/Adjusted R^2		0.414	0.618	0.094	0.157

Panel B: Include Tackle Football in *SPORTS_RISK* (No Sports Categorized as Spectator Game)

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_RISK	+	0.551**	0.085	0.034	0.034**
		(2.046)	(1.451)	(1.035)	(2.528)
Control variables		Included	Included	Included	Included
Industry and year fixed effects		Included	Included	Included	Included
Observations		4,841	4,739	4,048	3,546
Pseudo/Adjusted R^2		0.412	0.610	0.092	0.156

Panel C: Exclude Tackle Football, Basketball, and Soccer from *SPORTS_RISK*

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_RISK	+	0.730***	0.127**	0.067*	0.038**
		(2.696)	(2.004)	(1.860)	(2.585)
Control variables		Included	Included	Included	Included
Industry and year fixed effects		Included	Included	Included	Included
Observations		4,078	3,993	3,386	2,946
Pseudo/Adjusted R^2		0.403	0.620	0.097	0.166

(continued on next page)

CEOs' sports hobby includes any of the 50 listed extreme sports in the sports magazine *XtremeGo,* and 0 otherwise.[34] This dichotomized measure also helps address some of the measurement errors inherent in *SPORTS_RISK* based on *ex post* realization of hospitalization data.[35]

Panel A of Table 10 reports the regression results using the extreme sports specification. We find the coefficients on *D_SPORTS_RISK* continue to be significantly positive across three of our four specifications. These results are qualitatively similar to those using the *SPORTS_RISK* measure.[36] Overall, the results are consistent with our hypothesis that firms run by CEOs with extreme sports hobbies are more likely to pursue aggressive tax planning.

We conduct a battery of additional tests redefining our *SPORTS_RISK* measure. First, in our main analyses, we exclude CEO firm-year observations when a CEO's sports hobby includes tackle football because we categorize it as a spectator game.

[34] *XtremeGo* organizes extreme sports competition every year. The list of adventurous and highly risky sports at *XtremeGo* is generally consistent with other extreme sports magazines such as *extremeinternational.com;* see https://www.extremeinternational.com/list-of-extreme-sports. In untabulated results we repeat all our analyses using *D_SPORTS_RISK* and our inferences are qualitatively similar.

[35] For example, scuba diving has been perceived as an extreme sport that is highly risky, yet the sports risk measure generated from the NEISS hospitalization data shows a relatively low risk for this sport.

[36] We note that the number of CEOs with an extreme sports hobby comprises only 2.6 percent (19/732) of the 732 CEOs represented in our sample; thus, we choose not to use the extreme sports specification as the main measure of CEO sports risk in the paper due to the small representation of the CEOs in the sample. Our results are weaker when removing these 19 CEOs with extreme sports.

TABLE 10 (continued)

Panel D: Exclude Tackle Football, Basketball, Soccer, Baseball, and Hockey from *SPORTS_RISK*

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_RISK	+	0.763***	0.110*	0.070**	0.034**
		(2.755)	(1.648)	(1.980)	(2.220)
Control variables		Included	Included	Included	Included
Industry and year fixed effects		Included	Included	Included	Included
Observations		3,124	3,543	3,009	2,647
Pseudo/Adjusted R^2		0.407	0.632	0.114	0.163

Panel E: Exclude Racing Cars and Flying Planes from *SPORTS_RISK*

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_RISK	+	1.155**	0.202**	−0.017	0.072***
		(1.984)	(2.130)	(−0.349)	(2.592)
Control variables		Included	Included	Included	Included
Industry and year fixed effects		Included	Included	Included	Included
Observations		3,836	4,249	3,626	3,165
Pseudo/Adjusted R^2		0.418	0.605	0.086	0.163

Panel F: Using Sports-Related Fatality Rate, *SPORTS_FATAL,* as the Alternative Measure

Independent Variables	Pred. Sign	*PRED_SHELTER*	*PRED_UTB*	*CV_CASHETR*	*ADJ_CASH_ETR*
SPORTS_FATAL	+	1.155**	0.202**	−0.017	0.072***
		(1.984)	(2.130)	(−0.349)	(2.592)
Control variables		Included	Included	Included	Included
Industry and year fixed effects		Included	Included	Included	Included
Observations		3,836	4,249	3,626	3,165
Pseudo/Adjusted R^2		0.418	0.605	0.086	0.163

***, **, * Denote statistical significance at the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels, respectively.
Two-tailed t-statistics are in parentheses based on standard deviations of the coefficient estimates clustered at the CEO level.
Table 10 presents regression results on the association between CEOs' sports risk (*SPORTS_RISK*) and firms' tax aggressiveness using alternative definitions of CEOs' sports risk. Panel A categorizes CEOs' sports risk using a dummy variable that equals 1 if a CEO's sports hobby includes an extreme sport based on the listed 50 extreme sports per sports magazine *XtremeGo,* and is 0 otherwise; Panel B includes tackle football in the *SPORTS_RISK* measure; Panel C excludes tackle football, basketball, and soccer as spectator games in the *SPORTS_RISK* measure; Panel D excludes tackle football, basketball, soccer, baseball, and hockey as spectator games in the *SPORTS_RISK* measure; Panel E excludes racing cars and flying planes in the *SPORTS_RISK* measure; and Panel F replaces *SPORTS_RISK* with the sport-related fatality rate based on the NEISS death counts for the sport.
Definitions for the variables are in Appendix A.

While such a categorization is somewhat subjective, we validate our main results by first including tackle football and second by redefining tackle football, basketball, soccer, baseball, and hockey as spectator games and thus excluding CEO firm-year observations when the CEOs' sports hobbies include any of these sports. The abbreviated results for these tests are presented in Panels B, C, and D of Table 10 and show that the basic results remain, except that the main effects of *SPORTS_RISK* are weaker when we add in firm-year observations whose CEOs' sports hobbies include tackle football (possibly because of the noise included in the measure). We also exclude firm-year observations when the CEOs disclose racing cars and flying airplanes as their sports hobby to test whether our results are sensitive to these observations. Results in Panel E become weaker. Finally, we replace *SPORTS_RISK* with the actual fatality rates for each sport, *SPORTS_FATAL,* in the main specification. *SPORTS_FATAL* is defined as 1,000 times the number of death counts related to a sport based on whether the narratives of the disposition of the sport-related injury in the NEISS data include the word "died," "death," or "fatality," scaled by the total number of sport participants aged 25 to 85 years old. Results presented in Panel F of Table 10 show the coefficients on *SPORTS_FATAL* are significantly positive in three of the four specifications, and thus our inferences remain unchanged.

We use three other alternative measures for a CEO's risk preference based on (1) the mean injury rates across all of a CEO's sports hobbies that take into consideration CEOs having multiple sports as their hobbies, (2) the CEO age-group-adjusted sports risks measure by limiting both the number of injuries and sports participation to the CEO age group in our sample,[37] and (3) the relative sports risk adjusted by the average sports risk of all CEOs for firms in the same two-digit SIC code industry in the sample. We then re-run our main analyses using these three alternative measures. Untabulated results are consistent with our baseline findings.[38]

V. CONCLUSION

Despite extensive research on determinants of firms' tax aggressiveness based on firm characteristics and managerial characteristics, the effect of managers' personal risk preferences on corporate tax aggressiveness is relatively underexplored. We manually collect CEOs' sports hobby information and develop a novel measure of CEOs' innate risk preferences based on the riskiness of their sports hobbies and examine the association between CEO sports risk and firms' tax aggressiveness. We argue that CEOs who engage in risky sports are inherently more risk tolerant, and this risk attitude is reflected in the extent of their firms' tax aggressiveness. Using four different measures of corporate tax aggressiveness, we show a significant positive association between CEO risk preference, measured by the riskiness of that CEO's sports hobbies, and firms' tax aggressiveness. We also show that the association between the riskiness of CEOs' sports hobbies and their tax aggressiveness is more pronounced for CEOs who have greater financial incentives and greater corporate power in influencing firms' decision-making processes.

There are a few caveats that limit the generalizability of our results. First, our data requirement for the information about CEOs' sports hobby information results in a relatively small sample in Execucomp and tends to identify larger and better performing firms. We lose many firms that have engaged in aggressive tax planning, but lack various data required for our tests. Although we include controls for firm size and firm performance in our analyses, our results may not be representative of the more general population of publicly listed firms. Second, while we argue that our sports risk measure captures individuals' innate risk proclivity, our study does not provide a validity test on such a proclivity due to its unobservability. While we provide evidence that CEOs' sports risks are positively associated with firms' overall risks, future studies could provide further evidence on its effect on CEOs' personal decision-making processes.

REFERENCES

Abowd, J. M., F. Kramarz, and D. N. Margolis. 1999. High wage workers and high wage firms. *Econometrica* 67 (2): 251–333. https://doi.org/10.1111/1468-0262.00020

Adams, R. B., and P. Funk. 2012. Beyond the glass ceiling: Does gender matter? *Management Science* 58 (2): 219–235. https://doi.org/10.1287/mnsc.1110.1452

Ajinkya, B., S. Bhojraj, and P. Sengupta. 2005. The association between outside directors, institutional investors and the properties of management earnings forecasts. *Journal of Accounting Research* 43 (3): 343–376. https://doi.org/10.1111/j.1475-679x.2005.00174.x

Amihud, Y. 2002. Illiquidity and stock returns: Cross-section and time series effects. *Journal of Financial Markets* 5 (1): 31–56. https://doi.org/10.1016/S1386-4181(01)00024-6

Armstrong, C. S., J. L. Blouin, and D. F. Larcker. 2012. The incentives for tax planning. *Journal of Accounting and Economics* 53 (1/2): 391–411. https://doi.org/10.1016/j.jacceco.2011.04.001

Arya, A., and B. Mittendorf. 2005. Offering stock options to gauge managerial talent. *Journal of Accounting and Economics* 40 (1/3): 189–210. https://doi.org/10.1016/j.jacceco.2005.02.001

Balakrishnan, K., J. Blouin, and W. Guay. 2019. Tax aggressiveness and corporate transparency. *The Accounting Review* 94 (1): 45–69. https://doi.org/10.2308/accr-52130

Bebchuk, L. A., K. M. Cremers, and U. C. Peyer. 2011. The CEO pay slice. *Journal of Financial Economics* 102 (1): 199–221. https://doi.org/10.1016/j.jfineco.2011.05.006

[37] We do not use the age-adjusted sports risk measure in our main analyses due to an inherent data limitation on CEOs' sports information. In particular, the construction of the age-adjusted sports risk measure requires time series information on changes of a CEO's sports hobby as years pass. However, this is infeasible because our information on the sports hobbies of the sample CEOs is collected based on a snapshot at the time of our data collection. We thus interpolate our observed CEOs' sports hobby to all firm-years when our sample CEOs are in office, with the assumption that the same CEO has the same sports hobbies over time.

[38] The qualitatively similar results are likely due to the high correlations for the maximum, average, and relative CEO sport risk measures (the minimum correlation among these three measures is 0.76, and the maximum correlation is 0.90).

Bergman, N. K., and D. Jenter. 2007. Employee sentiment and stock option compensation. *Journal of Financial Economics* 84 (3): 667–712. https://doi.org/10.1016/j.jfineco.2006.01.008

Bertrand, M., and A. Schoar. 2003. Managing with style: The effect of managers on firm policies. *The Quarterly Journal of Economics* 118 (4): 1169–1208. https://doi.org/10.1162/003355303322552775

Beutel, A. M., and M. M. Marini. 1995. Gender and values. *American Sociological Review* 60 (3): 436–448. https://doi.org/10.2307/2096423

Blouin, J. 2014. Defining and measuring tax planning aggressiveness. *National Tax Journal* 67 (4): 875–899. https://doi.org/10.17310/ntj.2014.4.06

Boivie, S., S. D. Graffin, and T. G. Pollock. 2012. Time for me to fly: Predicting director exit at large firms. *Academy of Management Journal* 55 (6): 1334–1359. https://doi.org/10.5465/amj.2010.1083

Boone, J., I. Khurana, and K. Raman. 2013. Religiosity and tax avoidance. *The Journal of the American Taxation Association* 35 (1): 53–84. https://doi.org/10.2308/atax-50341

Brymer, E., and L. G. Oades. 2009. Extreme sports: A positive transformation in courage and humility. *Journal of Humanistic Psychology* 49 (1): 114–126. https://doi.org/10.1177/0022167808326199

Cain, M. D., and S. B. McKeon. 2016. CEO personal risk-taking and corporate policies. *Journal of Financial and Quantitative Analysis* 51 (1): 139–164. https://doi.org/10.1017/S0022109016000041

Castanier, C., C. L. Scanff, and T. Woodman. 2010. Who takes risks in high-risk sports? A typological personality approach. *Research Quarterly for Exercise and Sport* 81 (4): 478–484. https://doi.org/10.1080/02701367.2010.10599709

Chen, S., X. Chen, Q. Cheng, and T. Shevlin. 2010. Are family firms more tax aggressive than non-family firms? *Journal of Financial Economics* 95 (1): 41–61. https://doi.org/10.1016/j.jfineco.2009.02.003

Cheng, C. A., H. H. Huang, Y. Li, and J. Stanfield. 2012. The effect of hedge fund activism on corporate tax avoidance. *The Accounting Review* 87 (5): 1493–1526. https://doi.org/10.2308/accr-50195

Chow, T., B. Ke, H.Q. Yuan, and Y. Zhang. 2018. *What types of publicly listed firms evade taxes? Evidence from China*. Working paper, Singapore Management University, National University of Singapore, Fudan University, and Tongji University.

Christensen, D. M., D. S. Dhaliwal, S. Boivie, and S. D. Graffin. 2015. Top management conservatism and corporate risk strategies: Evidence from managers' personal political orientation and corporate tax avoidance. *Strategic Management Journal* 36 (12): 1918–1938. https://doi.org/10.1002/smj.2313

Chyz, J. A. 2013. Personally tax aggressive executives and corporate tax sheltering. *Journal of Accounting and Economics* 56 (2/3): 311–328. https://doi.org/10.1016/j.jacceco.2013.09.003

Chyz, J., F. B. Gaertner, A. Kausar, and L. Watson. 2019. Overconfidence and aggressive corporate tax policy. *Review of Accounting Studies* 24 (3): 1114–1145. https://doi.org/10.1007/s11142-019-09494-z

Ciconte, W., M. Donahoe, P. Lisowsky, and M. Mayberry. 2014. *Predictable uncertainty: The relation between unrecognized tax benefits and future income tax cash outflows*. Working paper, University of Illinois at Urbana–Champaign and University of Florida.

Cressey, D. R. 1953. *Other People's Money: A Study of the Social Psychology of Embezzlement*. Glencoe, IL: Free Press.

Crocker, K. J., and J. Slemrod. 2005. Corporate tax evasion with agency costs. *Journal of Public Economics* 89 (9/10): 1593–1610. https://doi.org/10.1016/j.jpubeco.2004.08.003

Cronqvist, H., A. Makhija, and S. Yonker. 2012. Behavioral consistency in corporate finance: CEO personal and corporate leverage. *Journal of Financial Economics* 103 (1): 20–40. https://doi.org/10.1016/j.jfineco.2011.08.005

Davidson, R., A. Dey, and A. Smith. 2015. Executives' "off-the-job" behavior, corporate culture, and financial reporting risk. *Journal of Financial Economics* 117 (1): 5–28. https://doi.org/10.1016/j.jfineco.2013.07.004

Davis, J. S., and H. L. Pesch. 2013. Fraud dynamics and controls in organizations. *Accounting, Organizations and Society* 38 (6/7): 469–483. https://doi.org/10.1016/j.aos.2012.07.005

De Simone, L., J. Nickerson, J. Seidman, and B. Stomberg. 2020. How reliably do empirical tests identify tax avoidance? *Contemporary Accounting Research* 37 (3): 1536–1561. https://doi.org/10.1111/1911-3846.12573

Deci, E., and R. Ryan. 1980. The empirical exploration of intrinsic motivational processes. In *Advances in Experimental Social Psychology*, 39–80. New York, NY: Elsevier.

Demerjian, P. R., B. Lev, M. F. Lewis, and S. E. McVay. 2013. Managerial ability and earnings quality. *The Accounting Review* 88 (2): 463–498. https://doi.org/10.2308/accr-50318

Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp, and G. Wagner. 2011. Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association* 9 (3): 522–550. https://doi.org/10.1111/j.1542-4774.2011.01015.x

Dyreng, S. D. M. Hanlon, and E. L. Maydew. 2010. The effects of executives on corporate tax avoidance. *The Accounting Review* 85 (4): 1163–1189. https://doi.org/10.2308/accr.2010.85.4.1163

Dyreng, S. D., M. Hanlon, and E. L. Maydew. 2008. Long-run corporate tax avoidance. *The Accounting Review* 83 (1): 61–82. https://doi.org/10.2308/accr.2008.83.1.61

Dyreng, S. D., M. Hanlon, E. L. Maydew, and J. R. Thornock. 2017. Changes in corporate effective tax rates over the past 25 years. *Journal of Financial Economics* 124 (3): 441–463. https://doi.org/10.1016/j.jfineco.2017.04.001

Eysenck, H. J., D. K. Nias, and D. Cox. 1982. Sport and personality. *Advances in Behaviour Research and Therapy* 4 (1): 1–56. https://doi.org/10.1016/0146-6402(82)90004-2

Fama, E. F., and K. R. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43 (2): 153–193. https://doi.org/10.1016/S0304-405X(96)00896-3

Feng, M., C. Li, and S. McVay. 2009. Internal control and management guidance. *Journal of Accounting and Economics* 48 (2/3): 190–209. https://doi.org/10.1016/j.jacceco.2009.09.004

Feng, M., W. Ge, S. Luo, and T. Shevlin. 2011. Why do CFOs become involved in material accounting manipulations? *Journal of Accounting and Economics* 51 (1/2): 21–36. https://doi.org/10.1016/j.jacceco.2010.09.005

Francis, B., I. Hasan, Q. Wu, and M. Yan. 2014. Are female CFOs less tax aggressive? Evidence from tax aggressiveness. *The Journal of the American Taxation Association* 36 (2): 171–202. https://doi.org/10.2308/atax-50819

Freixanet, M. G. 1991. Personality profile of subjects engaged in high physical risk sports. *Personality and Individual Differences* 12 (10): 1087–1093. https://doi.org/10.1016/0191-8869(91)90038-D

Gaertner, F. B. 2014. CEO after-tax compensation incentives and corporate tax avoidance. *Contemporary Accounting Research* 31 (4): 1077–1102. https://doi.org/10.1111/1911-3846.12058

Gallemore, J., E. L. Maydew, and J. R. Thornock. 2014. The reputational costs of tax avoidance. *Contemporary Accounting Research* 31 (4): 1103–1133. https://doi.org/10.1111/1911-3846.12055

Gow, I. D., A. Wahid, and G. Yu. 2018. Managing reputation: Evidence from biographies of corporate directors. *Journal of Accounting and Economics* 66 (2/3): 448–469. https://doi.org/10.1016/j.jacceco.2018.08.009

Graham, J. R., and A. L. Tucker. 2006. Tax shelters and corporate debt policy. *Journal of Financial Economics* 81 (3): 563–594. https://doi.org/10.1016/j.jfineco.2005.09.002

Graham, J. R., S. Li, and J. Qiu. 2012. Managerial attributes and executive compensation. *Review of Financial Studies* 25 (1): 144–186. https://doi.org/10.1093/rfs/hhr076

Graham, J. R., M. Hanlon, T. Shevlin, and N. Shroff. 2014. Incentives for tax planning and avoidance: Evidence from the field. *The Accounting Review* 89 (3): 991–1023. https://doi.org/10.2308/accr-50678

Guay, W. R. 1999. The sensitivity of CEO wealth to equity risk: An analysis of the magnitude and determinants. *Journal of Financial Economics* 53 (1): 43–71. https://doi.org/10.1016/S0304-405X(99)00016-1

Guenther, D. A., S. R. Matsunaga, and B. M. Williams. 2017. Is tax avoidance related to firm risk? *The Accounting Review* 92 (1): 115–136. https://doi.org/10.2308/accr-51408

Hanlon, M., and S. Heitzman. 2010. A review of tax research. *Journal of Accounting and Economics* 50 (2/3): 127–178. https://doi.org/10.1016/j.jacceco.2010.09.002

Heckman, J. J. 1979. Sample bias as a specification error. *Econometrica* 47 (1): 153–162. https://doi.org/10.2307/1912352

Hodge, F. D., S. Rajgopal, and T. Shevlin. 2009. Do managers value stock options and restricted stock consistent with economic theory? *Contemporary Accounting Research* 26 (3): 899–932. https://doi.org/10.1506/car.26.3.11

Hribar, P., and D. Collins. 2002. Errors in estimating accruals: Implications for empirical research. *Journal of Accounting Research* 40 (1): 105–134. https://doi.org/10.1111/1475-679X.00041

Jack, S., and K. R. Ronan. 1998. Sensation seeking among high- and low-risk sports participants. *Personality and Individual Differences* 25 (6): 1063–1083. https://doi.org/10.1016/S0191-8869(98)00081-6

Jia, Y., L. V. Lent, and Y. Zeng. 2014. Masculinity, testosterone, and financial misreporting. *Journal of Accounting Research* 52 (5): 1195–1246. https://doi.org/10.1111/1475-679X.12065

Kirkcaldy, B., and C. L. Cooper. 1992. Work attitudes and leisure preferences: Sex differences. *Personality and Individual Differences* 13 (3): 329–334. https://doi.org/10.1016/0191-8869(92)90110-B

Kleinbard, E. 2011. Stateless income. *Florida Law Review* 11: 699–774.

Koester, A., T. Shevlin, and D. Wangerin. 2016. The role of managerial ability in corporate tax avoidance. *Management Science* 63 (10): 3285–3310. https://doi.org/10.1287/mnsc.2016.2510

Law, K. K., and L. F. Mills. 2017. Military experience and corporate tax avoidance. *Review of Accounting Studies* 22 (1): 141–184. https://doi.org/10.1007/s11142-016-9373-z

Lennox, C. S., J. R. Francis, and Z. Wang. 2012. Selection models in accounting research. *The Accounting Review* 87 (2): 589–616. https://doi.org/10.2308/accr-10195

McGuire, S. T., S. S. Neuman, and T. C. Omer. 2013. *Sustainable tax strategies and earnings persistence*. Working paper, Texas A&M University, University of Missouri, and University of Nebraska–Lincoln.

Mills, L., M. M. Erickson, and E. L. Maydew. 1998. Investments in tax planning. *The Journal of the American Taxation Association* 20 (1): 1–20.

Olsen, K. J., and J. Stekelberg. 2016. CEO narcissism and corporate tax sheltering. *The Journal of the American Taxation Association* 38 (1): 1–22. https://doi.org/10.2308/atax-51251

Phillips, J. D. 2003. Corporate tax-planning effectiveness: The role of compensation-based incentives. *The Accounting Review* 78 (3): 847–874. https://doi.org/10.2308/accr.2003.78.3.847

Powers, K., J. R. Robinson, and B. Stomberg. 2016. How do CEO incentives affect corporate tax planning and financial reporting of income taxes? *Review of Accounting Studies* 21 (2): 672–710. https://doi.org/10.1007/s11142-016-9350-6

Rajgopal, S., and T. Shevlin. 2002. Empirical evidence on the relation between stock option compensation and risk taking. *Journal of Accounting and Economics* 33 (2): 145–171. https://doi.org/10.1016/S0165-4101(02)00042-3

Rego, S. O., and R. Wilson. 2012. Equity risk incentives and corporate tax aggressiveness. *Journal of Accounting Research* 50 (3): 775–810. https://doi.org/10.1111/j.1475-679X.2012.00438.x

Rowland C. 2013. Tax lobbyists help businesses reap windfalls. *Boston Globe* (March 17). Available at: https://www.bostonglobe.com/news/politics/2013/03/16/corporations-record-huge-returns-from-tax-lobbying-gridlock-congress-stalls-reform/omgZvDPa37DNlSqi0G95YK/story.html

Schrand, C. M., and S. L. Zechman. 2012. Executive overconfidence and the slippery slope to financial misreporting. *Journal of Accounting and Economics* 53 (1/2): 311–329. https://doi.org/10.1016/j.jacceco.2011.09.001

Segan, S. 2013. T-Mobile and Dish's worst problem: Charlie Ergen. *PC Magazine* (December 19). Available at: http://www.pcmag.com/article2/0,2817,2428574,00.asp

Shi, W., B. L. Connelly, and R. E. Hoskisson. 2017. External corporate governance and financial fraud: Cognitive evaluation theory insights on agency theory prescriptions. *Strategic Management Journal* 38 (6): 1268–1286. https://doi.org/10.1002/smj.2560

Staw, B. M. 1989. Intrinsic and extrinsic motivation. In *Readings in Managerial Psychology*, 4th edition, edited by H. Leavitt, L. Pondy, and D. Boje, 36–71. Chicago, IL: University of Chicago Press.

Titmuss, R. 2018. *The Gift Relationship (Reissue): From Human Blood to Social Policy*. Chicago, IL: Policy Press.

Westphal, J. D., and D. L. Deephouse. 2011. Avoiding bad press: Interpersonal influence in relations between CEOs and journalists and the consequences for press reporting about firms and their leadership. *Organization Science* 22 (4): 1061–1086. https://doi.org/10.1287/orsc.1100.0563

Wilson, R. J. 2009. An examination of corporate tax shelter participants. *The Accounting Review* 84 (3): 969–999. https://doi.org/10.2308/accr.2009.84.3.969

Zuckerman, M. 1983. Sensation seeking and sports. *Personality and Individual Differences* 4 (3): 285–292. https://doi.org/10.1016/0191-8869(83)90150-2

Zuckerman, M. 1994. *Behavioural Expressions of Biosocial Bases of Sensation Seeking*. Cambridge, U.K.: Cambridge University Press.

Zuckerman, M. 2007. The sensation seeking scale V (SSS-V): Still reliable and valid. *Personality and Individual Differences* 43 (5): 1303–1305. https://doi.org/10.1016/j.paid.2007.03.021

APPENDIX A

Variable Definitions

Variables	Definitions
Tax Aggressiveness and Tax/Firm Risks Measures	
PRED_SHELTER	Following Wilson (2009), predicted tax shelter is an indicator variable set equal to 1 for firms in the top quintile of the estimated probability of having a tax shelter based on the prediction model: $PRED\_SHELTER = -4.86 + 5.2 \times BTD + 4.08 \times DAP - 1.41 \times LEV + 0.76 \times \log ASSETS + 3.51 \times ROA + 1.72 \times FOREIGN\_INCOME + 2.43 \times RD\_RATIO$; where *BTD* is total book-tax difference following Wilson (2009); *DAP* is discretionary accruals from the performance-adjusted modified Jones model, where total accruals are measured using the cash flow method of Hribar and Collins (2002); *LEV* is long-term debt scaled by total assets; log*ASSETS* is the log of total assets; *ROA* is pretax income scaled by total assets; *FOREIGN_INCOME* is an indicator variable equal to 1 if a firm reports non-zero foreign income, and 0 for other observations; and *RD_RATIO* is research and development expense divided by total assets.
PRED_UTB	Predicted uncertain tax position calculated following Rego and Wilson (2012): $PRED\_UTB = -0.004 + 0.011 \times PT\_ROA + 0.001 \times \log ASSETS + 0.01 \times FOR\_SALE + 0.092 \times RD\_RATIO - 0.002 \times DISC\_ACCR + 0.003 \times LEV + 0.000 \times MB + 0.014 \times SG\&A - 0.018 \times SALE\_GR$; where *PT_ROA* is pretax income scaled by total assets; log*ASSETS* is the log of total assets; *FOR_SALE* is foreign sales divided by total assets; *RD_RATIO* is research and development expense divided by total assets; *DISC_ACCR* is discretionary accruals calculated from the performance-adjusted modified Jones model; *LEV* is long-term debt scaled by total assets; *MB* is the market-to-book ratio; *SG&A* is selling, general and administrative expenses divided by total assets; and *SALE_GR* is the three-year average sales growth rate. The final value of *PRED_UTB* is multiplied by 100.
CV_CASHETR	The coefficient of variation in *CASH_ETR* is the standard deviation of the annual *CASH_ETR* from year *t* to year *t*+3 divided by the mean of the annual *CASH_ETR* over the same period (McGuire et al. 2013).
ADJ_CASH_ETR	Industry- and size-adjusted long-term cash effective tax rate, calculated as the negative of a firm's *CASH_ETR* less the mean value of *CASH_ETR* for all firms in the same industry and same quintile of firm size in the year. *CASH_ETR* is the sum of cash paid for taxes over years *t* to *t*+3 divided by the sum of pretax income over years *t* to *t*+3.
CEO Sports Risks	
SPORTS_RISK	Maximum of the injury rates of the sports hobbies for a CEO. Sports injury rate is measured as the injury number of one particular sport reported by NEISS divided by the total number of participants in the sport aged 25–85 based on the statistics from the U.S. Census Bureau's Statistical Compendia Branch. As the numerator and the denominator in calculating *SPORTS_RISK* come from two different sources with the participation data based on survey samples, the value of the measure is not bounded between [0,1].
D_SPORTS_RISK	A dummy variable indicating a CEO discloses at least one of the following extreme sports as his/her hobbies: using firearms, flying airplanes (flying engine airplanes), ice climbing, riding motorcycle/motor bikes, mountain/rock climbing, racing cars, scuba diving, ski racing, and windsurfing, and 0 otherwise.
SPORTS_FATAL	Sports-related fatality rate, measured by 1,000 times the sports fatality rate, defined as the number of death counts related to a sport based on whether the narratives of the disposition of the sport-related injury in NEISS include the word "died," "death," or "fatality," divided by the total number of participants in the sport aged 25–85 years old based on the statistics from the U.S. Census Bureau's Statistical Compendia Branch.
CEO Characteristics	
DISCLOSURE	An indicator variable that equals 1 if the CEO discloses his/her sports hobbies, and 0 otherwise.
PAY_SLICE	Percentage of a CEO's total pay in the year, including salary, bonus, other annual pay, and the total value of restricted stock granted, the Black-Scholes value of stock options granted, long-term incentive payouts, and all other total compensation, divided by the aggregated total pay for the top five executives in Execucomp. In cases where there are fewer than five executives disclosed, the pay slice measure is adjusted accordingly. For example, if Execucomp only discloses four executives, then we assume the fifth executive is paid the same as the fourth executive.
log*DELTA*	Natural logarithm of 1 plus the pay sensitivity of the CEO's equity portfolio based on a 1 percent change in the share price of the firm. The CEO's equity portfolio includes stock options, restricted shares, and shares held by the CEO.
log*VEGA*	Natural logarithm of 1 plus pay sensitivity of the CEO's equity portfolio based on a 1 percent change in the volatility of the firm's stock price.
MILITARY	An indicator variable that equals 1 if the CEO has previous military experience based on Who's Who search results, and 0 otherwise.
CEO_DUALITY	An indicator variable that equals 1 if the CEO is also the chairman of the board, and 0 otherwise.

(continued on next page)

APPENDIX A (continued)

Variables	Definitions
CEO_ABILITY	CEO ability measure based on Demerjian, Lev, Lewis, and McVay (2013). The data are available at https://peterdemerjian.weebly.com/managerialability.html
MALE	An indicator variable that equals 1 if the CEO is male, and 0 otherwise.
MARRIED	An indicator variable that equals 1 if the CEO is married at the time of the data collection time in 2015, and 0 otherwise.
BORN_DEPRESSION	An indicator variable that equals 1 if the CEO was born between 1920 and 1929, and 0 otherwise.
OC	An indicator variable that equals 1 if a CEO is categorized as being overconfident, and 0 otherwise. A CEO is overconfident if his/her firm meets the requirements of at least two of the following four criteria: (1) $AD\_XSINVEST > 0$, where *AD_XSINVEST* is the residual from a regression of total asset growth on sales growth, adjusted for the industry median; (2) $AD\_ACQUIRE > 0$, where *AD_ACQUIRE* is the net acquisitions from the statement of cash flows, adjusted by the industry median; (3) $AD\_DERATIO > 0$, where *AD_DERATIO* is the debt-to-equity ratio defined as long-term debt plus short-term debt, scaled by the total market value of the firm adjusted by the industry median; and (4) $RISKYDT = 0$, where *RISKYDT* is an indicator variable that equals 1 if either convertible debt or preferred stock is greater than 0; and 0 otherwise.
log*CEO_AGE*	Natural logarithm of the CEO's current age (in years).
log*CEO_TENURE*	Natural logarithm of the CEO's tenure in the firm (in years).
Instrumental Variables	
PUBLICITY	Number of Google results from keyword searches for each CEO's publicly available biographical data, using the keyword combinations "CEO Name" and "Company Name" and "Biography or Biographical."
Control Variables	
RD_RATIO	Research and development expense ratio, calculated as the total research and development expense (*XRD*) divided by total sales (*SALE*). *RD_RATIO* equals 0 if the value of *XRD* is missing.
INTAN	Intangible assets ratio, calculated as the total value of intangible assets (*INTAN*) scaled by total assets (*AT*).
PPE	Total property, plant, and equipment ratio, calculated as the total value of net property, plant, and equipment (*PPENT*) divided by total assets (*AT*).
CAPX	Capital expenditure ratio, calculated as the total capital expenditure (*CAPX*) scaled by the net value of property, plant, and equipment *(PPENT*).
LEV	Leverage, calculated as the ratio of total debt ($DLTT + DLC$) scaled by total assets (*AT*).
SPI	Special items ratio, calculated as the total special items (*SPI*) scaled by average total assets. The value of *SPI* equals 0 if the data item is missing from Compustat.
MNE	An indicator variable that equals 1 if pretax foreign income (*PIFO*) is non-zero or foreign tax expense is non-zero, following Dyreng et al. (2017), and 0 otherwise.
NOL	An indicator variable that equals 1 if tax loss carryforward (*TLCF*) is a positive number at the beginning of the current year, and 0 otherwise. The measure is constructed following Cheng, Huang, Li, and Stanfield (2012).
ΔNOL	The change in net operating loss, calculated as the difference between current and lag tax loss carryforward (*TLCF*) scaled by lagged total assets (*AT*).
MB	Market-to-book ratio, calculated as market value of equity ($PRCC\_F * CSHO$) divided by book value of equity (*CEQ*).
log*ASSETS*	Firm size, calculated as the natural logarithm of total assets (*AT*).
ROA	Return on assets, calculated as net income (*NI*) minus extraordinary items (*XI*) scaled by average assets (*AT*).
log*MV*	Natural log of the market value of a firm's common equity ($PRCC\_F * CSHO$).
BIG4	An indicator variable that equals 1 if the company is audited by one of the Big 4 auditors, and 0 otherwise.
log*ANALYSTS*	Natural log of the number of analysts following the firm.
LITIGATE	An indicator variable that equals 1 for all firms in the biotechnology (2833–2836 and 8731–8734), computers (3570–3577 and 7370–7374), electronics (3600–3674), and retail (5200–5961) industries, and 0 otherwise.
LOSS	An indicator variable that equals 1 if the firm reported losses (*NI*) in the current period, and 0 otherwise.
NEWS	An indicator variable that equals 1 if the current-period EPS (*EPSFI*) is greater than or equal to the previous-period EPS (*EPSFI*), and 0 otherwise.
$\sigma EARN$	The standard deviation of quarterly earnings (*IBQ*) over 12 quarters ending in the current fiscal year, divided by median asset value (*ATQ*) for the period.
BETA	The equity beta of the market model for the past 36 months using CRSP monthly stock returns.
FD	An indicator variable that equals 1 if the observation is related to the post-Reg FD period (after October 2000), and 0 otherwise.
INST	The percentage of the company's aggregate common stock held by institutions at fiscal year-end.