Managerial Ability and Tax Avoidance

1. Introduction

We examine the relation between managerial ability and corporate tax avoidance. Recent studies show that tax avoidance practices are potentially value-enhancing but cost-engendering corporate activities (e.g., Rego and Wilson 2012; Hasan et al. 2013). In reality, there is substantial variation in the level of corporate tax avoidance (e.g., Weisbach 2002; Dyreng et al. 2008). Although over the past decade there has been a surge in research that examines the determinants of tax avoidance, Hanlon and Heitzman (2010, p.145) summarize that "overall, the field cannot explain the variation in tax avoidance very well" and suggest that more work needs to be done on this important topic. Recently, Dryeng et al. (2010) introduce the "upper echelons theory" into the tax avoidance literature and find that managerial fixed effects are important determinants of firms' tax avoidance. However, the paper further finds that common individual characteristics such as education, gender and age, cannot explain this variation. In this paper, we extend this line of research by focusing on one previously unexplored yet important managerial characteristic: managerial ability.

Prior studies show a significant relation between managerial talent and corporate policies (e.g., Harris and Holmstrom 1982; Rose and Shepard 1997; Bertrand and Schoar 2003). Dermerjian et al. (2012, 2013) quantify managerial talent by the measure of managerial ability. They define managerial ability as how efficiently managers generate revenues from given economic resources, and find that managerial ability is positively related to firm performance and earnings quality. However, given that there are both significant benefits and costs associated with tax avoidance activities and the mixed evidence on the relation between tax avoidance and firm value (e.g., Desai and Dharmapala 2009; Hanlon and Slemrod 2009; Kim et al. 2011), it is

unclear whether managers with superior abilities are associated with more or less tax avoidance activities.

As is the case with other investment opportunities, tax avoidance provides economic benefits, which in this case are primarily from tax savings. For example, Mills et al. (1998) find that an additional $1 investment in tax planning results in a $4 reduction in tax liabilities. Scholes et al. (2009) conclude that potential tax savings from aggressive avoidance strategies could be economically large. Dyreng et al. (2013) find that the use of Delaware subsidies as domestic tax havens, on average, increases net income by 1.0 - 1.5%. Thus, if more able managers are better at generating revenues from given economic resources, then by the same token, we should expect that superior managers are more knowledgeable at exploring tax avoidance opportunities to increase firm value.

However, tax avoidance also consumes valuable resources. Prior studies show that tax avoidance activities are necessarily complex, obfuscated, and opaque, and are associated with significant costs (e.g., Desai and Dharmapala 2006; Balakrishnan et al. 2012; Hasan et al. 2013). Direct costs include tax planning, litigation and other expenses of mounting a defense against tax authority challenges, back taxes, and potentially hefty penalties and fines imposed by tax authorities. Indirect costs include political costs, potential damage to the firm's reputation, and cost of debt capital (e.g., Hanlon and Slemrod 2009; Graham et al. 2013; Hasan et al. 2013). Another type of cost that is particularly important for this study is the opportunity cost of managerial efforts. Rational managers should devote their time to projects that offer the highest positive net present value. When a manager's opportunity cost increases, the incremental value added by tax avoidance is reduced and tax avoidance becomes a less attractive investment, given

other things equal. Therefore, we should expect that firms with more able managers to engage less in tax avoidance activities.

Using a sample of 42,340 firm-year observations for 7,001 U.S. firms over the period 1988 through 2009, we empirically examine the relation between managerial ability (as measured by Demerjian et al. (2012, 2013)) and tax avoidance. Given that we are interested in broad tax avoidance strategies that could reduce the firm's taxes relative to its pretax income, following Dyreng et al. (2008), Hope et al. (2013), among others, we use the effective tax rate (ETR) and the cash effective tax rate (CETR) as our primary measures of tax avoidance.

We find a *negative* and significant relation between managerial ability and tax avoidance after controlling for firm-level factors that have been shown to impact tax avoidance in the literature. Our results are robust to the inclusion of additional controls such as earnings quality, governance quality and equity incentives, and when we use alternative measures to proxy for managerial ability (i.e., historical stock returns) and tax avoidance (i.e., three book-tax difference based measures). Our results are also robust to the use of firm fixed-effect regressions to mitigate omitted variable bias, and when we use the Fama-MacBeth regression method to deal with possible cross-sectional dependence of regression errors.

Importantly, our findings are also economically meaningful. For instance, results from our baseline regressions show that a one standard deviation increase of managerial ability score, on average, is associated with about 0.32% increase of ETR or 0.59% increase of CETR, which translates to a $0.57 million increase in tax expense or $1.05 million increase in cash tax payment each year. Overall, our results show that firms with managers that have superior abilities are associated with lower levels of tax avoidance that are both statistically significant and economically meaningful.

To mitigate endogeneity concerns, we employ a difference-in-differences approach using information from CEO turnovers. Specifically, we identify a treatment sample of firms that prior to the turnover were managed by low-managerial ability CEOs but came under the management of high-managerial ability CEOs subsequent to the turnover. We also construct a control sample of firms that were managed by low-managerial ability CEOs and remained that way following the CEOs turnover. The difference-in-differences results show that a low-to-high managerial ability switch leads to a significant reduction in the level of tax avoidance compared to a low-to-low managerial ability switch. Using a similar identification strategy, we further find that a high-to-low managerial ability switch leads to a significant increase in the level of tax avoidance compared to a high-to-high managerial ability switch. Thus, our two sets of results provide strong evidence of a negative and causal effect of managerial ability on tax avoidance.

We further examine the relation between managerial ability and tax aggressiveness, the most extreme subset of tax avoidance that can be considered as "pushing the envelope of tax law" (Hanlon and Heitzman 2010, p. 137). We use tax sheltering probability (Wilson 2009), predicted tax reserve balance (Lisowsky et al. 2013), and the usage of international tax haven subsides (Dyreng et al. 2009) to capture tax aggressiveness that likely engenders greater risks and costs. We find consistent results that managerial ability is negatively and significantly associated with all these measures of tax aggressiveness.

Prior studies show that tax aggressiveness is associated with higher likelihood of stock price crash risk (Kim et al. 2011) and negative market reactions (Hanlon and Slemrod 2009). Our finding of the negative relation between managerial ability and tax aggressiveness suggests that more able managers engage less in such activities which could hurt shareholders' value. It is therefore, interesting to examine if those firms that do engage in tax aggressive activities such as

shelters, whether investors would value managerial ability when assessing the potential damages caused by such behaviors. Our results from the cross-sectional analysis of the market reactions to tax sheltering news indicate that investors consider managerial ability in a positive way when reacting to tax sheltering news.

Thus, our results provide support for the argument that because of their superior abilities to increase firm value through normal business operations, more able managers have less incentives to engage in tax avoidance activities than less able managers. If this is the case, we should observe that the negative relation is more evident for firms with lower managerial ability because the opportunity costs of those managers are lower. To test our conjecture, we separate the full sample into two groups: firms with high ability managers and those with low ability managers based on the median value of managerial ability score. Consistent with our expectations, we find that the negative relation between managerial ability and tax avoidance for firms with low managerial ability is more significant, both statistically and economically, than that for firms with high managerial ability.

Finally, we examine the impact of governance on a firm's tax avoidance behavior. Desai and Dharmapala (2009) find that, on average, the effect of tax avoidance on firm value is not significant, but is significantly positive in well-governed firms. We therefore examine whether the identified negative relation between managerial ability and tax avoidance is conditional on the quality of firm governance. Specifically, we separate the sample into two groups: firms with good corporate governance and firms with weak corporate governance based on the median values of various governance measures (e.g., G-index, institutional ownership, and analyst coverage). Our results show that there is no significantly different effect of managerial ability on tax avoidance between these two subsamples, indicating that managerial ability is an inherent

individual characteristic that affects tax avoidance, and that it is not affected by firms' governance environment.

Our paper contributes to the growing literature on corporate tax avoidance. We shed light on this topic by examining the impact of managerial ability on firm's tax avoidance. Given that managerial ability is shown to increase firm value and that tax avoidance does not necessarily increase firm value, it is not a priori apparent what the relation is between managerial ability and tax avoidance. We contend that it is important that firms' tax avoidance policies be viewed as investment decisions that provide economic benefits as well as consume resources. As such, we further contend that managers with greater ability are better able to convert firm resources into revenue and thus, tax avoidance becomes a less attractive option because of the significant costs associated with it. Our main result of a significant negative relation between managerial ability and tax avoidance (as well as tax aggressiveness) provides support for these arguments and therefore, furthers our understanding of the determinants of tax avoidance and extends the findings of Dyreng et al. (2010).

Our paper also contributes to the growing research on attributes of managers, particularly managerial ability. Recent studies find that managerial ability is an important factor which affects firm performance and corporate decisions such as earnings quality and management earnings forecast (Baik et al. 2011; Demerjian et al. 2012, 2013). Our finding of a negative relation between managerial ability and corporate tax avoidance is consistent with prior research (Baik et al. 2011; Demerjian et al. 2013) that shows a positive relation between managerial ability and accounting quality. Our paper complements and extends this stream of literature. Furthermore, our findings, especially results on tax aggressiveness, have important public policy implications for regulators, investors, and managerial labor markets.

The rest of the paper proceeds as follows. Section 2 reviews the relevant literature and develops our hypotheses. Section 3 describes the data and methodology. Section 4 presents the results. Section 5 concludes.

2. Literature review and hypothesis development

2.1 Manager-specific effects and managerial ability

Many studies of corporate decisions assume a neoclassical view of top managers as replaceable agents whose idiosyncratic differences do not affect corporate outcomes (Weintraub, 2002). Studies in strategic management come to a similar conclusion by arguing that managers are constrained to make homogenous decisions by the entrenched norms and culture (e.g., Lieberson and O'Connor 1972; Hannan and Freeman 1977) or by the propensity to conform to external expectations of rationality by imitating other managers (e.g., Spender 1989; Hambrick et al. 1993; Chalmers and Godfrey 2004). In addition, the selection processes of top managers further limit heterogeneity (Hitt and Tyler 1991; DiMaggio and Powell 1983; Hambrick 2007).

This homogeneity assumption, however, is not prevalent in the business press and among managers themselves. They are often perceived, at least, to have their own styles.[1] Furthermore, the empirical evidence shows that there is a large proportion of heterogeneity in corporate strategies that is left unexplained by firm- and industry-level factors (e.g., Bradley et al. 1984; Titman and Wessels 1988; and Smith and Watts 1992). In fact, managers are often faced with uncertain situations in which they have to make complicated decisions using complex information (Hambrick and Manson 1984; Hambrick 2007). They therefore interpret those

[1] For example, Bertrand and Schoar (2003) cite John Reed's quote on style "In the old days I would have said it was capital, history, the name of the bank. Garbage—it's about the guy at the top. I am very much a process person, a builder. Sandy [Weil] is an acquirer. Just totally different." Another article in a May 2001 issue of Business Week cited in their study is the so called "The Koszlowski Method," describing the aggressive acquisition style of Dennis Koszlowski, the CEO of Tyco.

situations and act on the basis of their experience, values and personalities, as suggested by bounded rationality (March and Simon 1958; Cyert and March 1963).

Since the development of the "upper echelons theory" by Hambrick and Manson (1984), studies have begun to examine the idiosyncratic differences of top managers in making corporate policies and their effects on corporate performance. For example, Johnson et al. (1985) find that there are abnormal stock price changes around unexpected deaths of senior corporate executives. Bertrand and Schoar (2003) find that managerial fixed effects matter for a wide range of corporate decisions and explain a significant portion of the heterogeneity in investment, financial and organizational practices of firms. They refer to managers' fixed effects as "style" and tie it back to managers' age and education. Bamber et al. (2010) track managers across firms over time and find that top executives have unique and significant influence on their firms' voluntary disclosure; they tie those idiosyncratic effects, or "style", to the managers' personal backgrounds and experiences such as finance, accounting, legal, age, and military experience.

While prior research suggests that managerial-specific features (experience, education, age or style) significantly impact firm behavior and performance, few attempts to quantify managerial ability or talent. Ultimately, it can be thought of as how efficiently managers can turn resources (assets) into profits. One notable exception is the recent study by Demerjian et al. (2012). These authors propose a measure of managerial ability based on their efficiency in generating revenues and find that this manager-specific efficiency measure is strongly associated with manager fixed effects. Using this measure, Demerjian et al. (2013) examine its relation with earning quality and find that managerial ability is positively associated with earnings quality. They explain the finding as "superior managers are more knowledgeable of their business,

leading to better judgments and estimates and, thus, higher quality earnings." (Demerjian et al. 2013, p. 463)

Given that corporate tax policies could be very complex decisions, due in part to the increasingly complex nature of large and diversified businesses and the likelihood of being detected, manager-specific effects could be important factors in understanding the variation of corporate tax decisions. In the next sub-section, we review related literatures in both the tax avoidance and managerial ability areas and propose our hypothesis.

2.2 Managerial ability and tax avoidance

While the issue of tax avoidance has been studied extensively for individuals in public economics (Slemrod and Yitzhaki 2002), the literature on corporate tax avoidance is relatively young (e.g., Shevlin and Shackelford 2001; Shevlin 2007; Hanlon and Heitzman 2010). In particular, a few recent studies indicate that top managers influence firms' decisions about tax policies (e.g., Dyreng et al. 2010; Armstrong et al. 2012; Rego and Wilson 2012; Chyz 2013). Among these studies, Dryeng et al. (2010) focus on the individual impact of top managers. Examining a group of executives that switch firms, they find that the top management team plays a significant role in determining tax avoidance that cannot be explained by firm characteristics. Although this study is an important first step in examining individual managers' effects on tax avoidance, the authors are not able to explain the variation among managers' individual effects in that they find that common observable characteristics such as education, gender, age, and tenure are not associated with executives' propensities to reduce taxes.

We believe that studying the effect of managerial ability on their firms' tax avoidance could yield meaningful insights. Viewing tax avoidance decisions as investment options (e.g.,

Mills et al. 1998), a rational manager should decide on the level of tax avoidance depending on whether this particular investment generates positive incremental NPVs and how it compares with their firms' other investment opportunities.

The conjecture that tax avoidance provides direct benefits is based on the intuition that tax avoidance produces tax savings. For instance, with a statutory tax rate of 35 percent, the firm's tax bill could be up to one-third of its firm's pre-tax profits. Thus, potential tax savings from aggressive avoidance strategies could be economically large. For example, Mills et al. (1998) find that an additional $1 investment in tax planning results in a $4 reduction in tax liabilities. Dyreng et al. (2013) find that the use of Delaware subsidizes as domestic tax havens, on average, increases net income of 1-1.5%. While, Bloomberg News reported that Google avoided $2 billion in worldwide income taxes in 2011 by channeling $10 billion of revenue into a Bermuda shell company.

However, as with other investments, tax avoidance entails consumption of resources or at times liabilities. Direct costs include tax planning costs, litigation and other expenses of mounting a defense against tax authority challenges, back taxes, potentially hefty penalties and fines imposed by tax authorities, and more rigorous scrutiny from tax authorities in the long run (e.g., blacklisted by the IRS). Anecdotal evidence indicates that the direct costs alone could be quite substantial.[2] There are indirect costs that include political costs, potential damage to the firm's reputation and significant agency costs. For example, Hanlon and Slemrod (2009) argue that firms engaging in tax sheltering activities are being labeled as "poor corporate citizens." In responding to the survey by Graham et al. (2013), 69% of top executives agree that potential

[2] For example, GlaxoSmithKline P.L.C. settled with the IRS with a $3.4 billion payment for transfer pricing practices that seek to avoid taxes (Wall Street Journal, 2006). AstraZeneca P.L.C. paid $1.1 billion to settle a similar dispute with the IRS in 2011. Merck & Co. settled several disputed tax issues including its use of minority equity interest financing transactions with the IRS in 2007 by paying a settlement amount of $2.3 billion including back taxes, penalties, and interest.

harm to their firms' reputations is very important when deciding what tax planning strategies to implement. Chen et al. (2010) find that family firms have lower levels of tax avoidance when compared to their non-family counterparts, indicating that family owner-managers are willing to forego tax benefits to avoid the potential price discount. Khurana and Moser (2013) argue that if long-term institutional investors anticipate a strong positive feedback effect between corporate tax avoidance and rent diversion, they might seek to constrain managers' ability to avoid taxes. Hasan et al. (2013) find corporate tax avoidance is positively related to the cost of both public and private debt.

In sum, it is therefore possible that the combined costs could potentially offset the tax savings from tax avoidance, and the substantial costs related with tax avoidance could explain the mixed results of the relation between tax avoidance and firm value. For instance, Desai and Dharmapala (2009) find a positive relation between tax avoidance and firm value for well-governed firms. Desai and Hines (2002) find a positive market reaction to announcements of corporate investment decisions. In contrast, Hanlon and Slemrod (2009) find a negative stock market reaction to news concerning company involvement in tax shelters. Kim et al. (2011) find a positive relation between tax avoidance and stock price crash risk.

In the decision-making models of managers, there is also opportunity cost of their efforts. Rational managers should devote their time in projects that offer the highest positive net present value. For example, more able managers who can turn resources into revenues more efficiently may invest more of their effort in operations than in designing tax avoidance plans, all else equal. Aggressive tax planning could be complicated given that it could involve corporation with a foreign municipality, transfer pricing with a foreign subsidiary, management of corporate life insurance, or cross-border dividend capture, as pointed out by Graham and Tucker (2005). In

sum, we contend that although there are benefits to tax avoidance, because of the significant costs associated with it both directly and indirectly, managers with superior ability will be less likely to pursue all potential tax avoidance strategies. The following equation summarizes how managerial ability impacts the net present value from tax planning of avoidance activities, including the other costs discussed above.

$$NPV(TA)_{j.\,t}=PV(\sum_{t=0}^{N}(TA)_{j,\,t})-PV(\sum_{t=0}^{K}(Costs)_{j,t})-PV(\sum_{t=0}^{P}(CF\ of\ alt.projects)_{\,j,t}) \qquad (1)$$

Where $NPV(TA)_{j.t}$ is the incremental value added by tax avoidance by firm j at time t; $PV(\sum_{t=0}^{N}(TA)_{j,t})$ is the present value of all the tax savings as a consequence of today's tax policies; $PV(\sum_{t=0}^{K}(Costs)_{j,t})$ is the present value of all the costs including litigation costs and fines if detected, and reputation loss; lastly, $PV(\sum_{t=0}^{P}(CF\ of\ alt.projects)_{\,j,t})$ measures the present value of the managerial opportunity cost which is the potential value given up when managers devote time and resources on tax avoidance. The last term of Equation (1) suggests that when a manager's opportunity cost increases, the incremental value added by tax avoidance reduces and tax avoidance becomes a less attractive investment, given other things equal.

In sum, Equation (1) suggests a negative relationship between managerial ability and tax avoidance, where firms with more able managers are likely to engage in less tax avoidance because they could devote their time to other investments which could lead to greater benefits. Our prediction on how managerial ability impacts tax avoidance should even hold when managers are self-interested. The proposed negative relation between managerial ability and tax avoidance, therefore, should be robust even after we control for corporate governance and

managerial equity incentives. Based on the discussion above, we formalize our main hypothesis as follows:

H1: *Managerial ability is negatively related to the level of corporate tax avoidance.*

3. Research design, sample selection and summary statistics

3.1. Measures of managerial ability

Following Demerjian et al. (2013), we use Demerjian et al. (2012) measures as our primary proxies for managerial ability. Their estimation of managerial ability is a two-stage process that begins with the estimation of total firm efficiency using data envelopment analysis (DEA). According to Demerjian et al. (2012, p. 4), "DEA is a statistical procedure used to evaluate the relative efficiency of separable entities, termed 'decision-making units (DMUs)', where each DMU converts certain inputs (labor, capital, etc.) into outputs (revenue, income, etc.)."

In their model, individual firms serve as the DMUs. Revenues represent outputs, and seven financial items (net property, plant, and equipment; net operating leases; net research and development costs; purchased goodwill; other intangible assets; cost of inventory; and selling, general, and administrative expenses) represent inputs. In the first stage, total firm efficiency is estimated through an optimization procedure that allows varying weights for each of the inputs and outputs. In the second stage, by regressing total firm efficiency on various company characteristics (i.e., size, market share, cash availability, life cycle, operational complexity, and foreign operations), total firm efficiency is decomposed into firm and managerial parts.[3]

Demerjian et al. (2012) point out the DEA approach to calculate efficiency allows efficiency to be calculated based on the practical optimum level rather than average performance.

[3] Please see Demerjian et al. (2012) for more details.

As such they contend that it is superior to other proxies (e.g., abnormal returns or performance, compensation, tenure, and media coverage) with respect to its association with managerial fixed effects, price reactions to CEO turnover announcements, and subsequent performance of companies with new CEOs. Nonetheless, we acknowledge that it is still subject to measurement errors, mainly because the residuals from the second stage model may still contain omitted factors that affect firm efficiency which cannot be attributed to management. In our robustness checks, we also use historical stock returns as an alternative measure of managerial ability.

Demerjian et al. (2012) provide two measures of managerial ability. One is a continuous score for managerial ability for each firm/year (MA score), the other is industry/year deciles ranking for each firm/year (MA rank). In our empirical tests, we use both to triangulate our findings.

3.2. Measures of tax avoidance

Hanlon and Heitzman (2010, p.137) state that "if tax avoidance represents a continuum of tax planning strategies where something like municipal bond investments are at one end, then terms such as 'noncompliance,' 'evasion,' 'aggressiveness,' and 'sheltering' would be closer to the other end of the continuum." Given our conceptual framework, we are interested in broad tax avoidance strategies that could reduce the firm's taxes relative to its pretax income. Following Dyreng et al. (2008) and Hope et al. (2013), we use two standard measures to capture broad tax avoidance. The first is the firm's effective tax rate (ETR), the ratio of total tax expenses (total current tax expense plus deferred tax expense) over pretax income adjusted for special items. The second one is the firm's cash effective tax rate (CETR), the ratio of cash tax paid over pretax

income adjusted for special items. By definition, both measures imply that higher values imply less tax avoidance.

Dyreng et al. (2008) point out that these two measures are appropriate measures of tax avoidance because they capture various objectives managers could have with regard to tax avoidance. To the extent that managers are concerned with reducing tax expenses for financial reporting purposes, ETR captures the executive's incentives to affect this metric. While CETR captures managerial incentives to reduce the actual taxes paid. Therefore, we use ETR and CETR as our primary measures of tax avoidance.

However, it should be noted that measures of corporate tax avoidance are necessarily complicated and there is no single measure that could satisfy all research purposes. Hanlon and Heitzman (2010) discuss the usage and limitations of each tax avoidance measure in the literature in detail. In our supplemental analyses, we also use three book-tax difference based measures (Manzon and Plesko 2002; Desai and Dharmapala 2006; Frank et al. 2009) to capture tax avoidance. Additionally, we use tax sheltering probability, predicted uncertain tax positions (UTB) (Wilson 2009; Rego and Wilson 2012), the usage of international tax haven subsides (Dyreng et al. 2009) to capture more aggressive tax avoidance. Appendix A provides detailed description of these tax avoidance/tax aggressiveness measures. If results across all measures are consistent, one can be more confident that our results are robust.

3.3. Baseline regression model

We use the following empirical model to test our hypothesis:

$$\text{Tax avoidance}_t = f(\text{Managerial ability}_{t-1}, \text{Firm attributes}_{t-1}, \text{Industry effects, and Year effects}); \quad (2)$$

where Tax avoidance$_t$ and Managerial ability$_{t-1}$ are as discussed above. We compute managerial ability measures and firm attributes using *lagged* information from the year immediately prior to the tax avoidance measure to partially mitigate potential endogeneity issues.

Following Rego (2003), Chen et al. (2010), Hope et al. (2013), and Hoi et al. (2013), we include the following firm attributes in our model. Size is the natural logarithm of the market value of equity (PRCC_F × CSHO); M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ); Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT); Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT); NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive; ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT); ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT); Foreign income is foreign income (PIFO) scaled by lagged assets (AT); Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT); PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT); Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). Lastly, we include dummy variables to control for year and industry (two-digit SIC codes) fixed effects.

3.4. Sample selection, summary statistics and correlation coefficients

We estimate the baseline regression model in Equation (2) using data from two sources. We obtain managerial ability data from Sarah McVay's website and the corresponding financial information from Standard and Poor's Compustat database. We then merge the two datasets.

After removing firms with incomplete information, we obtain a final sample of 42,340 firm-year observations for 7,001 unique firms for the period 1988-2009.[4]

Table 1, Panel A reports sample statistics. The mean value of ETR is 0.304, and the mean value of CETR is 0.267. These values are similar to those reported in prior studies. For example, Hope et al. (2013) report the mean values of ETR and CETR as 0.29 and 0.27. Chyz et al. (2013) report the mean values of ETR and CETR as 0.33 and 0.27. We find that the mean value of MA Score is 0.017, and the mean value of MA Rank is 0.599. Other sample firm-year statistics are in the range of those reported in earlier studies.

[Insert Table 1 here]

Panel B reports Pearson correlations. Not surprisingly, the two measures of managerial ability are positively and significantly correlated. The correlation coefficient between ETR and CETR is 0.324, which is consistent with prior studies, such as Chen et al. (2010). We also find that the two measures of managerial ability are significantly and positively correlated with the two measures of tax rate, suggesting a negative relation between managerial ability and tax avoidance. As expected, most control variables are systematically associated with the tax avoidance measures as well.

In summary, Panel B of Table 1 provides preliminary results that support our hypothesis that there is a negative correlation between managerial ability and tax avoidance. In the next section, we use multivariate analyses to further investigate the relationship between managerial ability and tax avoidance.

[4] To mitigate the influence of outliers, all control variables are winsorized at the 1% and 99%.

4. The relation between managerial ability and tax avoidance

In the ensuing analyses, we use the regression model in Equation (2)—hereafter the baseline model—as the main empirical model. The full sample contains 42,340 firm-year observations. We use ETR and CETR to measure tax avoidance. A positive coefficient on each of the two managerial ability measures would indicate that higher levels of managerial ability are associated with lower levels of tax avoidance, thus, providing support for hypothesis.

4.1. Baseline regression results

Table 2 presents the results of the baseline model using ordinary least squares (OLS) regressions with firm-clustered, heteroskedasticity-robust standard errors. We use the MA score as the test variable in Columns 1 and 3 and the MA rank as the test variable in columns 2 and 4. Column 1 results show that the coefficient on the MA score is 0.078 and is significant at the 1% level (t value=8.09) when we use ETR as the measure of tax avoidance. In Column 3, the coefficient on the MA score is 0.142 and is significant at the 1% level (t value=12.39) when we use CETR as the measure of tax avoidance. We also find that the results are consistent when we use the MA rank as the measure of managerial ability. Overall, these results show that firms with higher managerial ability are associated with lower tax avoidance after controlling for firm characteristics, industry and year effects.

[Insert Table 2 here]

The results are also economically meaningful. For example, a one-percentage-point increase in the MA score is associated with 0.078 percentage-point increase in ETR. Similarly,

given that the average ETR of the sample firms is 30.41%, a one standard deviation increase of the MA score (about 13.57 percentage-points) is associated with around 0.32% (0.32%=0.00087×30.41%×13.57) increase of ETR. Because the mean sample pretax income is about $178 million, a one-standard-deviation increase in the MA score is associated with about $0.57 million (0.57 = 178×0.0032) additional tax expenses each year. The results for CETR as our tax avoidance measure are even more economically important. Specifically, we find that a one-standard-deviation increase in the MA score is associated with an approximately 0.59% increase of CETR, and consequently is associated with about $1.05 million additional cash tax paid each year.

The coefficients on the control variables are generally consistent with those reported in the extant literature (e.g., Chen et al. 2010; Hope et al. 2013; Hoi et al. 2013). Small firms, those with high M/B, leverage, NOL, cash holdings and a low change of NOL are more likely to avoid taxes.

Overall, the results from the baseline regressions show that firms with higher managerial ability are associated with lower levels of tax avoidance compared to firms with lower managerial ability. These results are supportive of our hypothesis.

4.2. Sensitivity tests and robustness checks

4.2.1. Additional controls

There is evidence that earnings quality is positively related to managerial ability (Demerjian et al. 2012) and negatively related to tax avoidance (Frank et al. 2009). Therefore, we include Discretionary accruals as an additional control in the baseline regression models to ensure that the association between managerial ability and tax avoidance is not driven by

earnings quality. We use the performance-adjusted modified cross-sectional Jones model to measure Discretionary accruals. Furthermore, various monitoring mechanisms could affect tax avoidance. We use the following three variables to capture both internal and external monitoring mechanisms. First, following Hartzell and Starks (2003), we use a Herfindahl Index of institutional investor ownership concentration to capture the intensity of internal monitoring by institutional investors. Institutional ownership (13f) data are from Thomson Reuters Ownership Database. Second, we use Auditor industry expertise and Big N to control for external auditor quality. Following Casterella et al. (2004) and Dunn and Mayhew (2004), we define Auditor industry expertise as an indicator variable equal to one if the client's audit-firm audits at least 20% of sales in the client's two-digit SIC-code industry, and zero otherwise. Big N is an indicator variable which equals one if a firm is audited by a Big N auditor, and zero otherwise. The auditor quality data is obtained from Compustat database. Third, we use Analyst coverage to control for the intensity of external monitoring from analysts. Analyst coverage is measured as the number of analyst following the firm. We obtain the information from the Institutional Brokers' Estimate System (I/B/E/S).

We report the results in Panel A of Table 3. Our sample size is reduced by more than one-half after adding those additional controls. Nonetheless, we find that the coefficients on all measures of managerial ability remain positive and statistically significant at the 1% level. Thus, our main finding is not driven by earnings quality and the intensity of monitoring mechanisms. With regard to their impact on ETR and CETR, we find, consistent with Kim et al. (2011), that Analyst coverage is negatively related, indicating that high analyst coverage is associated with higher tax avoidance. One possible explanation could be the higher market pressures from financial analysts which lead managers to engage in more aggressive tax avoidance as a means

of meeting their forecasts. This type of behavior is also documented by Malmendier and Tate (2009) who find that CEOs who receive substantial press coverage conduct more earnings management. In contrast, consistent with the findings of Khurana and Moser (2013), there is some evidence that firms with higher institutional ownership are less likely to avoid taxes. Specifically, the coefficients on Institutional ownership concentration are positive and significant when ETR is the dependent variable. Lastly, we do not find significant coefficients on earnings quality and auditor quality measures.

Finally, we also estimated additional regressions where we used the CEO's Vega to control for managerial equity incentives and a corporate governance index (G-Index) to control for managerial entrenchment. All our results hold and for brevity, we do not tabulate the results.

[Insert Table 3 here]

4.2.2. Omitted variable bias

We include common determinants of tax avoidance in our baseline model. In Section 4.2.1, we also include earnings quality and various monitoring mechanisms. However, our model specifications could still be omitting unknown firm characteristics which could lead to alternative explanations of our findings. To ease this concern, we run firm fixed-effect regressions to control for the influence of unknown firm-level factors. We report the results in Table 3, Panel B. The firm fixed-effect regression results are similar to those from the baseline model. In particular, all coefficients on managerial ability measures are positive and significant at the 1% level, indicating that that baseline regression results are not plagued by serious omitted variable problems.

4.2.3. Fama-MacBeth regression results

To mitigate statistical concerns arising from serial dependence of regression errors, we estimate the baseline model of Equation (2) using the Fama-MacBeth (1973) method. More specifically, we drop the year dummies from the specification, estimate the revised models by year, and then test the statistical significance of the average coefficients using a *t*-test. The results are reported in Panel C of Table 3. Overall, the Fama-MacBeth regression results are consistent with the baseline regression results. That is, the coefficients on all managerial ability measures are positive and statistically significant at the 1% level.

4.2.4. Difference-in-differences analyses

To mitigate the endogenous concern, we apply a difference-in-differences approach. We focus on two types of CEO turnovers made by firms initially run by low-managerial ability CEOs. In the first type, firms make a lateral change by switching to another low-managerial ability CEOs (the control sample). In the second type, firms increase managerial ability by switching to a high-managerial ability CEOs (the treatment sample). We use Dummy (Low-to-high firms) to define whether a firm is a treatment firm or a control firm. This variable (Low-to-high firms) equals one if a firm has an average MA rank below 0.5 for the pre-transition period and an average MA rank above 0.5 for the post-transition period, and it equals zero if a firm has an average MA rank below 0.5 for the pre-transition period and an average MA rank still below 0.5 for the whole post-transition period.[5] We use the dummy variable Post to denote observations following CEO turnovers. We estimate the following specification:

[5] Alternatively, we define that Dummy (Low-to-high firms) equals one if a firm has MA rank below 0.5 *each year* for the pre-transition period and MA rank above 0.5 each year for the post-transition period, and it equals zero if a

$$\text{Tax avoidance}_t = f\,(\text{Dummy(Low-to-high firms), Post, Dummy(Low-to-high firms)*Post, Firm attributes}_{t-1}\text{, Industry effects, and Year effects}); \quad (3)$$

If managerial ability has a causal effect on tax avoidance, then firms that switch from a low-managerial ability to a high-managerial ability (the treatment sample) should have a significant decrease in tax avoidance following the switch compared to firms that switch from a low-managerial ability to a low-managerial ability (the control sample).

We obtain CEO turnover information from ExecuComp. We construct our CEO turnover samples using the following filters: (1) Both pre- and post-transition CEOs have to be CEOs for three consecutive years excluding the transition year; (2) To avoid the confounding effect of multiple CEO turnovers on our results, if a firm changes its CEO more than once, we only count the first CEO turnover and discard subsequent CEO turnovers in our sample period. The resulting sample is then merged with our tax avoidance sample. Defining our data in this manner, our treatment sample consists of 38 low-to-high firms and our control sample consists of 110 low-to-low firms.

Panel A of Table 4 reports the difference-in-differences test results. Columns 1 and 2 contain results where ETR and CETR are the dependent variables. We find that for both models, the coefficients on Dummy(Low-to-high firms)*Post are significantly positive. The results suggest that if a firm switches from a low-managerial ability CEO to a high-managerial ability CEO, its tax avoidance is significantly reduced compared to a firm that switches from a low-managerial ability CEO to a low-managerial ability CEO. These results show that managerial ability has a negative causal effect on tax avoidance and they further mitigate the endogeneity concern.

---

firm has MA rank below 0.5 each year for the pre-transition period and MA rank still below 0.5 each year for the post-transition period. All our results in the difference-in-difference analyses hold.

[Insert Table 4 here]

To the extent that managerial ability is a factor that drives tax avoidance changes following CEO turnovers, we would expect an increase in the degree of tax avoidance if firms change their CEOs from high-managerial ability to low-managerial ability. To examine if this is the case, we construct a treatment sample of firms switching from high-managerial ability to low-managerial ability using the same criteria as described above. We also construct a control sample of firms switching from high-managerial ability to high-managerial ability. Our final sample includes 50 high-to-low transition firms (the treatment sample) and 228 high-to-high transition firms (the control sample). We run difference-in-difference regressions using a specification similar to Equation (3).

The results are reported in Panel B of Table 4. Again, we use ETR and CETR as the dependent variables in columns 1 and 2, respectively. For brevity, we do not report results on control variables. We find that for both models, the coefficients on Dummy(High-to-low firms)*Post are significantly negative, indicating that if a firm switches from a high-managerial ability CEO to a low-managerial ability CEO, its tax avoidance level is significantly increased compared to a firm that switches from a high-managerial ability CEO to a high-managerial ability CEO. These results triangulate the findings from the high-to-low transition sample and they mitigate endogeneity concerns.

4.2.5. Alternative measures of tax avoidance

Prior studies find that book-tax differences could reflect tax avoidance practices. Mills (1998) finds that firms with large book-tax differences are more likely to be audited by the IRS and have larger proposed audit adjustments. Wilson (2009) finds that book-tax differences are larger for firms accused of engaging in tax shelters than for a matched sample of non-accused firms. These findings indicate that book-tax differences reflect tax avoidance activities. In this section, we use three commonly used measures based on book-tax differences to capture tax avoidance. We use the Manzon and Plesko (2002) book-tax difference, BT, as the first measure of tax avoidance. Appendix A provides detailed information of all tax avoidance measures, including BT and those we discuss below.

Book-tax differences could reflect earnings management. Desai and Dharmapala (2006) use a regression method to remove the influence of earnings management on book-tax differences. They argue that the residual from this regression method is a more precise measure of tax avoidance activities. We use the Desai and Dharmapala (2006) measure, DD_BT, as our second alternative measure of tax avoidance.

Frank et al. (2009) argue that book-tax differences have a temporary and a permanent component, and it is the permanent book-tax differences, DTAX, that captures a firm's aggressive tax planning strategies. Frank et al. (2009) find that DTAX is significantly related to actual cases of tax sheltering. Recent studies have used DTAX to capture tax avoidance practices (Balakrishnan et al. 2012; Rego and Wilson 2012). Following this practice, we use DTAX as the third alternative measure of tax avoidance.

Table 5 presents the regression results using OLS with clustered standard errors at the firm level. The dependent variables are BT (Columns 1 and 2), DD_BT (Columns 3 and 4), and DTAX (Columns 5 and 6). In Columns 1, 3 and 5, we use the MA score as the measure of

managerial ability, and in Columns 2, 4 and 6, we use the MA rank as the measure of managerial ability. Table 6 shows that all six coefficients on managerial ability measures are negative and statistically significant at the 1% level. These estimates indicate that, based on all three measures of book-tax differences, firms with higher managerial abilities have a significantly lower level of tax avoidance., The results triangulate results from ETR and CETR and they lend further support to our hypothesis.

[Insert Table 5 here]

4.2.6. Alternative measures of managerial ability

Our main managerial ability measure is the managerial efficiency metric developed by Demerjian et al. (2012). As we discussed earlier, although it is a better measure of managerial ability compared to other measures, it is still possibly measured with error. In this section, following Fee and Hadlock (2003), we further use the historical stock returns as an alternative measure of managerial ability. We define R as the five-year stock returns (year t-5, t-1) using monthly CRSP data. We also create Adjusted R as the five-year value-weighted industry-adjusted stock returns (year t-5, t-1). Similar to Demerjian et al. (2013), we find that the spearman correlation coefficient between MA score and R is 0.187, consistent with these two variables measuring different aspects of managerial ability (Demerjian et al. 2013).

In Table 6, we report results using R and Adjusted R as alternative measures of managerial ability. We find that the coefficients on R are positive and statistically significant at the 1% level, and those on Adjusted R are also positive and statistically significant at the 5% level. The results triangulate our prior findings using MA score as the measure of managerial

ability, and further support our hypothesis that managerial ability is negatively related to tax avoidance.

[Insert Table 6 here]

4.2.7. Using different samples

We use three alternate samples to assess the sensitivity of our findings with respect to sampling methods. For brevity, we do not tabulate these results. Our baseline regressions are based on a sample of non-utility and non-finance firm-years. We first expand the sample by including utility and finance firm-years. Second, there were two important regulatory events in 1993 which could affect the consistent measurement of our tax avoidance variables. First, *FAS109*, accounting for income taxes was enacted. Second, the statutory corporate income tax rate increased from 34% to 35%. Therefore, we use a reduced sample excluding observations before 1994. Third, our sample period contains a major financial crisis during 2008-2009. To purge the impact of the financial crisis on our results, we construct a reduced sample using only firm-year observations during the pre-crisis period. Our results remain unchanged in all three samples; the estimates on the managerial ability variables retain the same signs and statistical significance in all empirical models.

4.3. Managerial ability and tax aggressiveness

So far our results provide strong evidence that managerial ability is negatively related to tax avoidance. Our measures of tax avoidance (ETR, CETR, BT, DD_BT and DTAX) are more likely to capture broad tax avoidance including both certain and uncertain tax positions. It is

important, especially from a policy implication perspective, to establish a more direct association between managerial ability and more aggressive tax avoidance practices (hereafter tax aggressiveness) such as tax sheltering and tax noncompliance. Hanlon and Heitzman (2010, p. 137) refer to tax aggressiveness as the most extreme subset of tax planning activities that are "pushing the envelope of tax law". In this section, we provide empirical evidence on the relation between managerial ability and tax aggressiveness.

4.3.1. Using Wilson's (2009) tax sheltering probability to capture tax aggressiveness

Prior studies use the incidences of a tax audit adjustment from the IRS as a proxy for noncompliance (Mills 1998; Mills and Sansing 2000). Likewise, incidences of a tax shelter position disclosed in the firm's tax return on Form 8886 or IRS Schedule M-3 (Lisowsky 2010; Lisowsky et al. 2012) and public disclosures of large tax shelter cases (Graham and Tucker 2006) have been used as proxies for tax sheltering activities. However, empirical analyses based on these measures may be subject to selection bias and endogeneity issues (Hanlon and Heitzman 2010). Moreover, data requirements for cases of tax sheltering and IRS audit adjustment have limited prior studies to analyzing small samples that require access to confidential IRS data.

Using actual sheltering cases, Wilson (2009) develops a model to predict the likelihood that a firm engages in tax sheltering activities. Kim et al. (2011) and Rego and Wilson (2012) find that Wilson's (2009) sheltering probabilities have construct validity. Recent studies find that sheltering probabilities are associated with the stock price crash risk (Kim et al. 2011), the sensitivity of a manager's wealth to stock return volatility (Rego and Wilson 2012), and irresponsible corporate social activities (Hoi et al. 2013). Following these studies, we use

Wilson's tax sheltering probability to capture incidence of the most aggressive avoidance practices as follows. The tax sheltering probability equation is:

$$\text{Shelter} = -4.86 + 5.20 \times \text{BT} + 4.08 \times |\text{Discretional accruals}| - 0.41 \times \text{Leverage} + 0.76 \times \text{AT} + 3.51 \times \text{ROA} + 1.72 \times \text{Foreign income} + 2.43 \times \text{R\&D}, \quad (4)$$

where Shelter is the tax sheltering probability; AT is the log of total assets; R&D is the research and development expenses divided by total assets; and other variables are as defined before. We use Shelter as the dependent variable and estimate the baseline model again using OLS regressions with robust standard errors clustered at the firm level.

[Insert Table 7 here]

Columns 1 and 2 of Table 7 report results when we use Shelter as the dependent variable to measure tax aggressiveness. We find that the coefficient on MA score is negative and statistically significant at the 1% level, indicating that firms with higher managerial ability are associated with lower probabilities of engaging in tax sheltering activities. We find consistent result when we use MA rank as the measure of managerial ability. Overall, the results show that managerial ability is negatively related to tax aggressiveness.

4.3.2. Using Rego and Wilson (2013) predicted UTB to capture tax aggressiveness

FIN 48 was enacted in June 2006 and became effective for all publicly listed companies with fiscal year beginning after December 15, 2006. It represents a dramatic and abrupt change in the accounting and the disclosure of the tax reserve for uncertain tax positions. Uncertain tax positions are tax positions that may or may not be sustained upon IRS audit. The tax reserves

associated with a firm's uncertain tax positions are termed uncertain tax benefits, henceforth UTB.

Prior studies suggest that FIN 48 tax reserves could provide incremental information concerning the aggressiveness of a firm's tax planning strategies. There is evidence of a positive association between the UTB level and aggressive tax avoidance practices (Frischmann et al. 2008; Cazier et al. 2009). Moreover, Lisowsky et al. (2013) find that the UTB level is positively associated with tax sheltering activities.

As actual UTBs are only available after 2006, Rego and Wilson (2013) develop a model to predict UTB levels of firms. They find that the predicted UTB is positively related to executives' risk-incentives. Following Rego and Wilson (2013), we use the following model to estimate the predicted UTB level for each firm/year;

$$\text{PredictedUTB}=0.004+0.011\times\text{ROA}+0.001\times\text{AT}+0.01\times\text{Foreign\_income}+0.092\times\text{R\&D}+0.002\times\text{Discretionary\_accruals}+0.003\times\text{Leverage}+(0.001)\times\text{M/B}+0.014\times\text{SG\&A}-0.018\times\text{Sale\_growth}, \quad (5)$$

where SG&A is selling, general & administrative expenses divided by beginning of year total assets; Sale growth is the three-year average sales growth rate; and other variables are as defined before.

Columns 3 and 4 of Table 7 report results when we use predicted UTB as the dependent variable to measure tax aggressiveness. We find that the both coefficients on managerial ability measures are negative and statistically significant at the 1% level, indicating firms with higher managerial ability is associated with lower levels of predicted UTB. The results further confirm the negative relation between managerial ability and tax aggressiveness.

4.3.3. Using International tax haven subsidies to capture tax aggressiveness

We next examine whether our results still hold if we use an alternative measure of tax aggressiveness- namely the usage of international tax haven subsidies. Prior studies (e.g., Hines and Rice 1994; Dyreng and Lindsay 2009) find that firms with the usage of tax haven countries for financial and operating activities have extensive transfer pricing activities and lower effective tax rates. We expect that firms with higher managerial abilities have lower incentives to use international tax haven subsidies to avoid taxes.

We obtain tax haven data from Scott Dyreng personal webpage.[6] Scott Dyreng provides data on the number of haven countries reported in firms' Exhibit 21 in their10-K. Exhibit 21 is a required element of a firm's 10-K and includes a listing of all of the firms subsidiaries with material operations. We create an indicator variable Tax haven which equals one if a firm has at least one tax haven country subsidy, and zero otherwise. The tax haven countries are defined in Table 1 in Dyreng and Lindsay (2009).

We use Tax haven as the dependent variable and estimate Logit regressions with robust standard errors clustered at the firm level. The results are reported in Columns 5 and 6 of Table 7. We find that both coefficients on managerial ability measures are negative and statistically significant, indicating that firms with higher managerial ability are less likely to use international tax haven subsidies to avoid taxes.[7]

4.3.4. Cross-sectional analysis on the market reactions to tax sheltering news

News of company involvement in tax shelters could convey incremental information about the firm's tax aggressiveness. Hanlon and Slemrod (2009) find a small but negative stock market reaction when there is news about a firm's involvement in tax shelters. In this section, we

[6] The website link is https://sites.google.com/site/scottdyreng/Home/data-and-code.
[7] Following Donohoe and Knechel (2013), we also use dummy variables of industry adjusted top quintile of ETR and CETR to capture tax aggressiveness and we find consistent results.

further investigate the cross-sectional relation between managerial ability and the tax shelter event window returns. We expect a positive relation between managerial ability and cumulative abnormal returns (CAR) if investors consider managerial ability when reacting to tax shelter news.

Hanlon and Slemrod (2009) identify a comprehensive sample of 108 news-events concerning company involvement in tax shelters during the period 1990-2004. We use this sample for our tax-shelter news analysis.[8] We run event studies to get the three-day CAR (-1, 1) and one-day CAR (0, 0). We run OLS regressions using CAR (-1, 1) and CAR (0, 0) as dependent variables. Our test variables and control variables are those used in the baseline regression model. Due to the missing information of independent variables, our final simple size is 47 observations.

Table 8 reports the results. When we use CAR (-1, 1) as the dependent variable, both coefficients on managerial ability measures are positive and statistically significant at the 5% level. When we use CAR (0, 0) as the dependent variable, both coefficients on managerial ability measures are positive and statistically significant at the 1% level. Overall, the results indicate that investors do consider managerial ability in a positive way when reacting to tax sheltering news.

[Insert Table 8 here]

4.4. Subsample tests

In this paper, we hypothesize that because of their superior abilities to increase firm value, higher ability managers have less incentives to engage in tax avoidance activities than lower ability managers. To justify our conjecture, we provide subsample tests to directly test it.

[8] We thank Michelle Hanlon and Joel Slemrod for providing the data.

We separate the full sample into two groups: high ability firms and low ability firms based on the median value of MA score. We then run the baseline regression model for each subsample. We are interested in comparing coefficients on tax avoidance measures between these two groups. We expect that if managerial ability is the underlying driver of tax avoidance, we should observe higher coefficient on low ability firms compared to that on high ability firms.

The results are reported in Panel A of Table 9. For brevity, we do not report results on the control variables. We first use ETR as the dependent variable and the results are in Columns 1 and 2. We find that the coefficient on ETR for high ability firms is 0.049 while it is 0.099 for low ability firms. We conduct an F-test and find that the difference (0.049-0.099 = -0.050) is statistically significant at the 10% level. In Columns 3 and 4, we report results when we use CETR as the dependent variable. We find that the coefficient for high ability firms is 0.098 while it is 0.221 for low ability firms, and the coefficient difference between the two subsamples is statistically significant at the 1% level. Overall, our results from the subsample tests support our hypothesis and show that firms with lower managerial ability have stronger incentives to avoid tax compared to firms with higher managerial ability.

[Insert Table 9 here]

Desai and Dharmapala (2009) find that there is a positive impact of tax avoidance on firm value for firms with good governance. They explain the results from the agency cost (managerial rent extraction) perspective. In our earlier tests, we controlled for both internal and external governance mechanisms and find that our results hold. In this subsection, we further explore whether the negative relation between managerial ability and tax avoidance varies with the level of corporate governance.

Following Desai and Dharmapala (2006, 2009), we use the Gompers et al. (2003) G-index to capture the quality of corporate governance. In particular, we separate the full sample into two subsamples based on the median value of G-indxe (= 9). A higher G-index value indicates lower corporate governance. We run the baseline regressions for the two subsamples separately and then compare the two coefficients on the MA score for the two samples.

The results are reported in Panel B of Table 9. Again, for brevity, we do not report results on the control variables. We first use ETR as the dependent variable and the results are in Columns 1 and 2. We find that the coefficient on ETR for good governance firms is 0.057. Although the coefficient (= 0.068) on ETR for bad governance firms is slightly higher, there is no statistically difference between the two subsample coefficients. In columns 3 and 4, we report results when we use CETR as the dependent variable. We find that the coefficient for good governance firms is 0.054 and it is 0.071 for bad governance firms, and the coefficient difference between two subsamples is statistically insignificant. We further use institutional ownership and analyst coverage as alternative proxies for corporate governance. Again, we do not find any significant differences between firms with good governance and firms with bad governance. For brevity, we do not tabulate the results. Overall, our results from these subsample tests indicate that as managerial ability is an inherent individual characteristic, the impact of managerial ability on tax avoidance is not conditional on the level of corporate governance.

5. Conclusion

We examine the relation between managerial ability and corporate tax avoidance. Although managerial ability is shown to increase firm value, tax avoidance is not necessarily a value enhancing strategy. Therefore, it is not theoretically clear whether more able managers are associated with more tax avoidance. We argue that the optimal level of tax avoidance should be

determined by the incremental value of tax avoidance policies but not the amount of tax savings alone. Rational managers should devote their time in projects that offer the highest positive value. When manager's opportunity cost increases, the incremental value added by tax avoidance is reduced and tax avoidance becomes a less attractive investment, given other things equal.

Using a sample of 42,340 firm-year observations for 7,001 U.S. firms between 1988 and 2009, we find that firms with more able managers are associated with significantly lower level of tax avoidance after controlling for firm characteristics, industry effect and year effect. Our results hold for a series of robustness checks used to mitigate measurement error bias, omitted variable bias, and endogeneity concerns of our results.

Our study makes several contributions to the literature. First, we provide strong evidence regarding the role of managers in corporate decisions by showing that the ability of managers matters in corporate tax avoidance. Second, we extend the work by Dyreng et al. (2010) by providing a potential explanation (managerial ability) of managerial fixed effects on tax avoidance. Third, our paper also relates to Demerjian et al. (2013). Along with Demerjian et al. (2013), we show that higher ability managers are associated with higher accounting qualities, including both financial reporting quality and tax reporting quality. Thus, our findings have important public policy implications.

References

Armstrong, C., Blouin, J., Larcker, D., 2012. The Incentives for Tax Planning. Journal of Accounting and Economics 53, 391-411.

Baik, B., D. Farber, and S. Lee. 2011. CEO ability and management earnings forecasts. Contemporary Accounting Research 28, 1645–1668.

Balakrishnan, K., Blouin, J., Guay, W., 2012. Does tax aggressiveness reduce financial reporting transparency? Working paper, University of Pennsylvania.

Bamber, L. S., J. Jiang, and I. Y. Wang. 2010. What's my style? The influence of top managers on voluntary corporate financial disclosure. *The Accounting Review* 85 (4): 1131-1162.

Bertrand, M., Schoar, A., 2003. Managing with Style: The Effects of Managers on Firm Policies. The Quarterly Journal of Economics 118, 1169-1208.

Bradley, M., Jarrell, G. A., Kim, E. H., 1984. On the Existence of an Optimal Capital Structure. Journal of Finance 34 (1984), 857–878.

Casterella, J.R., Francis, J. R., Lewis, P. L., Walker, P. L., 2004. Auditor Industry Specialization, Client Bargaining Power, and Audit Pricing, Auditing: A Journal of Theory and Practice 23, 123-140.

Cazier, R., S. Rego, X. Tian, and R. Wilson. 2009. Early evidence on the determinants of unrecognized tax benefits. Working paper, University of Iowa.

Chalmers, K., Godfrey, G., 2004. Reputation Costs: The Impetus for Voluntary Derivative Financial Instrument Reporting. Accounting, Organizations and Society 29, 95–125.

Chen, S., Chen, X., Cheng, Q., Shevlin, T., 2010. Are Family Firms More Tax Aggressive than non-family firms? Journal of Financial Economics 95, 41-61.

Chyz, J.A., Leung, W.S., Li, O.Z., Rui, O.M., 2013. Labor unions and tax aggressiveness. Journal of Financial Economics 108, 675–698.

Chyz, J.A., 2013. Personally Tax aggressive Executives and Corporate Tax Sheltering. Journal of Accounting Economics 56, 311-328.

Cloyd, C.B., Mills, L., Weaver, C., 2003. Firm Valuation Effects of the Expatriation of U.S. Corporations to Tax-haven Countries. Journal of the American Taxation Association 25, 87-109.

Cyert, R. M., March, J. G., 1963. A Behavioral Theory of the Firm. Englewood Cliffs, NJ: Prentice-Hall.

DiMaggio, P., Powell, W., 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. American Sociological Review 48, 147–160.

Demerjian, P., Lev, B., McVay, S., 2012. Quantifying Managerial Ability: A New Measure and Validation Tests. Managerial Science 58, 1229-1248.

Demerjian, P., Lev, B., McVay, S., 2013. Managerial Ability and Earning Quality. The Accounting Review 88, 463-498.

Desai, M., Dharmapala D., 2006. Corporate Tax Avoidance and High-powered Incentives. Journal of Financial Economics 79, 145-179.

Desai, M., Dharmapala, D., 2009. Corporate Tax Avoidance and Firm Value. The Review of Economics and Statistics 91, 537-546.

Desai, M., Hines, J., 2002. Expectations and Expatriations: Tracing the Causes and Consequences of Corporate inversions. National Tax Journal 55, 409-440.

Donohoe, M., Knechel, W.R., 2013. Does corporate tax aggressiveness influence audit pricing. Contemporary Accounting Research, forthcoming.

Dyreng, S., Lindsay, B., 2009. Using Financial Accounting Data to Examine the Effect of Foreign Operations Located in Tax Havens and other Countries on US Multinational Firms' Tax Rates. Journal of Accounting Research47, 1283-1316.

Dyreng, S., Hanlon, M., Maydew, E., 2010. The effects of executives on corporate tax avoidance. The Accounting Review, Forthcoming.

Dunn, K., Mayhew, B. W., 2004. Audit Firm Industry Specialization and Client Disclosure Quality. Review of Accounting Studies 9, 35-58.

Fama, E. F., MacBeth, J. D., 1973. Risk, Return, and Equilibrium: Empirical Tests. The Journal of Political Economy 81, 607-636.

Fazzari, S., Hubbard, R. G., Petersen, B., 1988. Financing Constraints and Corporate Investment. Brookings Papers on Economic Activity 1, 141–195.

Fee C., Hadlock, C., 2003. Raids, Rewards, and Reputations in the Market for Managerial Talent. Review of Financial Studies 16, 1315–1357.

Frank, M., Lynch, L., Rego, S., 2009. Tax reporting aggressiveness and its relation to aggressive financial reporting. The Accounting Review 84, 467-496.

Frischmann, P., Shevlin, T., Wilson, R., 2008. Economic Consequences of Increasing the Conformity in Accounting for Uncertain Tax Benefits. Journal of Accounting and Economics 46, 261-278.

Gompers, P., Ishii, J., Metrick, A., 2003. Corporate governance and equity prices. The Quarterly Journal of Economics 118, 107–155.

Graham, J., Tucker, A., 2006. Tax Shelters and Corporate Debt Policy. Journal of Financial Economics 81, 563-594.

Graham, J. R., M. Hanlon, T. J. Shevlin, and N. Shroff. 2013. *Incentives for Tax Planning and Avoidance: Evidence from the Field.* The Accounting Review, Forthcoming.

Hambrick, D., 2007. Upper Echelons Theory: An Update. Academy of Management Review 32, 334–343.

Hambrick, D. C., Mason, P. A., 1984. Upper Echelons: The Organization as a Reflection of its Top Managers. Academy of Management Review 9, 193–206.

Hambrick, D., Geletkanycz, M., Fredrickson, J., 1993. Top Executive Commitment to the Status Quo: Some Tests of Its Determinants. Strategic Management Journal 14, 401–418.

Hanlon, M., Slemrod. J., 2009. What Does Tax Aggressiveness Signal? Evidence from Stock Price Reactions to News about Tax Shelter Involvement. Journal of Public Economics 93, 126-141.

Hanlon, M., Heitzman, S., 2010. A Review of Tax Research. Journal of Accounting and Economics 50, 127-178.

Hannan, M., Freeman, J., 1977. The Population Ecology of Organizations. American Journal of Sociology 82, 929–964.

Harris, M., Holmstrom, B., 1987. A Theory of Wage Dynamics. The Review of Economic Studies 49, 315-333.

Hartzell, J. C., Starks, L. T., 2003. Institutional Investors and Executive Compensation. Journal of Finance 58, 2351-2374.

Hasan, I., S. Hoi, Q. Wu, and H., Zhang. 2013. Beauty Is in the Eye of the Beholder: The Effect of Corporate Tax Avoidance on the Cost of Bank Loans. Journal of Financial Economics, forthcoming.

Hines, J., Rice, E., 1994. Fiscal paradise: foreign tax havens and American business. Quarterly Journal of Economics 109, 149-182.

Hitt, M., Tyler, B., 1991. Strategic Decision Models: Integrating Different Perspectives. Strategic Management Journal 12, 327–351.

Hoi, C. K., Wu, Q., Zhang, H., 2013. Is Corporate Social Responsibility (CSR) Associated with Tax Avoidance? Evidence from Irresponsible CSR Activities. The Accounting Review 88, 2025-2059

Hope, O., Ma, M., Thomas, W. B., 2013. Tax Avoidance and Geographic Earnings Disclosure, Journal of Accounting and Economics 56, 170-189.

Johnson, B., Magee, R., Nagarajan, N., Newman, H., 1985. An Analysis of the Stock Price Reaction to Sudden Executive Deaths: Implications for the Managerial Labor Market, Journal of Accounting Economics 7, 151-174.

Kaplan, S., Zingales, L., 1997. Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints? Quarterly Journal of Economics 112, 169–215.

Kim, J., Li, Y., Zhang, L., 2011. Corporate Tax Avoidance and Stock Price Crash Risk: Firm-Level Analysis. Journal of Financial Economics 100, 639-662.

Khurana, I. K., Moser, W. J., 2013. Institutional Shareholders' Investment Horizons and Tax Avoidance. The Journal of the American Taxation Association35, 111-134.

Lieberson, S., O'Connor, J., 1972. Leadership and Organizational Performance: A Study of Large Corporations. American Sociological Review 37, 117–130.

Lisowsky, P., 2010. Seeking Shelter: Empirically Modeling Tax Shelters using Financial Statement Information. The Accounting Review 85, 1693-1720.

Lisowsky, P., Robinson, L., Schmidt, A., 2010. An examination of FIN 48: Tax Shelters, auditor independence, and corporate governance. Working paper, University of Illinois.

Lisowsky, P., Robinson, L., Schmidt, A., 2013. Do Publicly Disclosed Tax Reserves Tell Us About Privately Disclose d Tax Shelter Activity? Journal of Accounting Research, Forthcoming.

Malmendier, I., Tate, G., 2009. Superstar CEOs. The Quarterly Journal of Economics 124, 1593-1638.

Manzon, J. B., Plesko, G. A., 2002. The Relation Between Financial and Tax Reporting Measures of Income. Tax Law Review 55, 175-214.

March, J. G., Simon, H. A., 1958. Organizations. New York: Wiley.

Mills, L., 1998. Book-tax Differences and Internal Revenue Service adjustments. Journal of Accounting Research 36, 343-356.

Mills, L., Erickson, M.M., Maydew, E.L., 1998. Investments in tax planning. Journal of the American Taxation Association 20, 1–20.

Mills, L. F., Sansing, R. C., 2000. Strategic Tax and Financial Reporting Decisions: Theory and Evidence. Contemporary Accounting Research 17, 85–106.

Pérez-González, F., 2006. Inherited Control and Firm Performance. American Economic Review 96, 1559-1588.

Rego, S. O., 2003. Tax-Avoidance Activities of U.S. Multinational Corporations. Contemporary Accounting Research 20, 805-833.

Rego, S. O., Wilson, R. J., 2012. Equity Risk Incentives and Corporate Tax Aggressiveness. Journal of Accounting Research 50, 775-810.

Rose, N. L., Shepard, A., 1997. Firm Diversification and CEO Compensation: Managerial Ability or Executive Entrenchment. The RAND Journal of Economics 28, 489-514.

Shackelford, D., Shevlin,T., 2001. Empirical Tax Research in Accounting, Journal of Accounting and Economics 31, 321-387.

Scholes, M., Wolfson, M., Erickson, M., Maydew, E., Shevlin, T., 2009. Taxes and Business Strategy: A Planning Approach (4th edition), Pearson Prentice Hall, Upper Saddle River, NJ.

Shevlin, T., 2007. The Future of Tax Research: From an Accounting Professor's Perspective. Journal of the American Taxation Association 29, 87-93.

Shevlin, T., Shackelford, D. A., 2001. Empirical Tax Research in Accounting. Journal of Accounting and Economics 31, 321-387.

Slemrod, J., Yitzhaki, S. 2002. Tax avoidance, evasion, and administration. In: Auerbach, A., Feldstein, M., (Eds.). Handbook of Public Economics, Vol. 3. Amsterdam: Elsevier Science. 1423-1470.

Slemrod, J., 2004. The Economics of corporate tax selfishness. National Tax Journal 57, 877-899.

Smith, C. W., Watts, R. L., 1992. The Investment Opportunity Set and Corporate Financing, Dividend and Compensation Policies. Journal of Financial Economics 32, 263–292.

Spender, J., 1989. Industry Recipes: An Enquiry into the Nature and Sources of Managerial Judgment. Oxford, U.K.: Blackwell.

Titman, S., Wessels, R., 1988. The Determinants of Capital Structure. Journal of Finance 43, 1–19.

Weintraub, E. 2002. Neoclassical Economics. In The Concise Encyclopedia of Economics, edited by D. Henderson. Indiannapolis, IN: Liberty Fund, Inc. Available from http://www.econlib.org/Library/Encl/NeoclassicalEconomics.html.

Wilson, R., 2009. An Examination of Corporate Tax Shelter Participants. The Accounting Review 84, 969-999.

Table 1: summary statistics and correlation coefficients

Panel A presents the firm-year level descriptive statistics for tax avoidance variables, managerial ability variables and firm attribute variables. Panel B reports Pearson correlation table (p-values are in parentheses). ETR is the ratio of total tax expenses (total current tax expense plus deferred tax expense) over pretax income adjusted for special items. CETR is the ratio of cash tax paid over pretax income adjusted for special items. MA score is a continuous score for managerial ability for each firm/year from Demerjian et al. (2012). MA rank is industry/year deciles ranking for managerial ability for each firm/year from Demerjian et al. (2012). Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT).

Panel A: Summary statistics

Variables	N	Mean	S.D.	P25	P50	P75
ETR	42,340	0.304	0.183	0.212	0.344	0.389
CETR	42,340	0.267	0.230	0.080	0.247	0.373
MA score	42,340	0.017	0.136	-0.070	0.007	0.092
MA rank	42,340	0.600	0.269	0.400	0.600	0.800
Size	42,340	5.359	1.965	3.966	5.299	6.691
M/B	42,340	2.693	3.036	1.187	1.960	3.261
Leverage	42,340	0.211	0.191	0.029	0.182	0.334
Cash holding	42,340	0.146	0.173	0.021	0.075	0.214
NOL	42,340	0.287	0.453	0.000	0.000	1.000
Change NOL	42,340	0.008	0.291	0.000	0.000	0.000
ROA	42,340	0.077	0.087	0.028	0.063	0.111
Foreign income	42,340	0.011	0.037	0.000	0.000	0.005
Equity income	42,340	0.001	0.047	0.000	0.000	0.000
PPE	42,340	0.322	0.268	0.119	0.247	0.446
Intangible assets	42,340	0.147	0.214	0.000	0.055	0.210

Panel B: Pearson correlation table

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1ETR	1.000													
2CETR	0.324	1.000												
	(0.000)													
3MA score	0.062	0.079	1.000											
	(0.000)	(0.000)												
4MA rank	0.060	0.079	0.903	1.000										
	(0.000)	(0.000)	(0.000)											
5Size	0.076	0.048	0.002	-0.015	1.000									
	(0.000)	(0.000)	(0.643)	(0.002)										
6M/B	-0.018	-0.048	0.151	0.145	0.087	1.000								
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)									
7Leverage	0.010	-0.025	-0.088	-0.095	0.212	-0.100	1.000							
	(0.043)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)								
8Cash holding	-0.079	-0.060	0.093	0.083	-0.195	0.167	-0.466	1.000						
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)							
9NOL	-0.112	-0.166	-0.049	-0.063	0.013	0.008	0.055	0.029	1.000					
	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.117)	(0.000)	(0.000)						
10Change NOL	-0.001	-0.039	-0.007	-0.007	0.043	-0.003	0.020	-0.018	0.334	1.000				
	(0.836)	(0.000)	(0.149)	(0.128)	(0.000)	(0.536)	(0.000)	(0.000)	(0.000)					
11ROA	-0.001	-0.106	0.186	0.189	-0.112	0.284	-0.278	0.278	-0.054	-0.037	1.000			
	(0.909)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
12Foreign income	-0.002	-0.025	0.030	0.032	0.191	0.116	-0.060	0.064	0.062	0.010	0.165	1.000		
	(0.659)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.052)	(0.000)			
13Equity income	-0.008	-0.011	-0.007	-0.007	-0.001	-0.001	-0.005	0.013	0.003	(0.000)	0.043	0.001	1.000	
	(0.125)	(0.020)	(0.142)	(0.147)	(0.786)	(0.788)	(0.313)	(0.009)	(0.527)	(0.946)	(0.000)	(0.838)		
14PPE	0.025	-0.076	-0.138	-0.136	0.148	-0.023	0.276	-0.318	-0.085	(0.000)	0.003	-0.031	-0.004	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.987)	(0.520)	(0.000)	(0.438)	
15Intangible assets	0.042	0.000	0.035	0.024	0.237	0.061	0.191	-0.181	0.092	0.018	-0.056	0.019	-0.011	-0.180
	(0.000)	(0.942)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.019)	(0.000)

Table 2: Managerial ability and tax avoidance: Baseline regression results

The table presents the OLS regression results of the baseline model using the full sample of 42,340 firm-year observations for the period 1988–2009. The dependent variables are ETR and CETR. ETR is the ratio of total tax expenses (total current tax expense plus deferred tax expense) over pretax income adjusted for special items. CETR is the ratio of cash tax paid over pretax income adjusted for special items. MA score is a continuous score for managerial ability for each firm/year from Demerjian et al. (2012). MA rank is industry/year deciles ranking for managerial ability for each firm/year from Demerjian et al. (2012). Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). We also control for industry effect and year effect in the regressions. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

VARIABLES	(1) ETR	(2) ETR	(3) CETR	(4) CETR
MA score	0.078***		0.142***	
	(8.09)		(12.39)	
MA rank		0.038***		0.071***
		(8.29)		(12.85)
Size	0.008***	0.008***	0.009***	0.009***
	(9.56)	(9.65)	(9.82)	(9.94)
M/B	-0.002***	-0.002***	-0.002***	-0.002***
	(-3.89)	(-3.86)	(-4.75)	(-4.71)
Leverage	-0.051***	-0.051***	-0.091***	-0.090***
	(-6.08)	(-6.00)	(-9.28)	(-9.16)
Cash holding	-0.051***	-0.050***	-0.062***	-0.060***
	(-5.76)	(-5.67)	(-5.82)	(-5.66)
NOL	-0.038***	-0.038***	-0.076***	-0.076***
	(-12.14)	(-12.07)	(-20.70)	(-20.56)
Change NOL	0.020***	0.020***	0.008**	0.008*
	(5.72)	(5.68)	(1.98)	(1.91)
ROA	0.017	0.017	-0.311***	-0.311***
	(0.90)	(0.93)	(-16.92)	(-16.92)
Foreign income	0.051	0.049	0.012	0.009
	(1.32)	(1.26)	(0.25)	(0.17)
Equity income	-0.016	-0.016	-0.016	-0.016
	(-1.36)	(-1.37)	(-0.87)	(-0.85)
PPE	0.014**	0.014**	-0.057***	-0.058***
	(2.07)	(1.97)	(-6.96)	(-7.07)
Intangible assets	0.040***	0.040***	-0.006	-0.006
	(5.94)	(5.94)	(-0.84)	(-0.83)
Industry and year effects	Y	Y	Y	Y
Observations	42,340	42,340	42,340	42,340
Adjusted R-squared	0.058	0.058	0.097	0.097

Table 3: Managerial ability and tax avoidance: Robustness checks

Panel A presents the OLS regression results with additional controls. Panel B presents results using firm-fixed effect regressions. Panel C presents results using Fama and MacBeth regressions. The dependent variables are ETR and CETR. ETR is the ratio of total tax expenses (total current tax expense plus deferred tax expense) over pretax income adjusted for special items. CETR is the ratio of cash tax paid over pretax income adjusted for special items. MA score is a continuous score for managerial ability for each firm/year from Demerjian et al. (2012). MA rank is industry/year deciles ranking for managerial ability for each firm/year from Demerjian et al. (2012).Discretionary accruals are calculated based on the performance-adjusted modified cross-sectional Jones model. Institutional ownership concentration is Herfindahl Index of institutional investor ownership concentration. Auditor industry expertise is an indicator variable equal to one if the client's audit-firm audits at least 20% of sales in the client's two-digit SIC-code industry, and zero otherwise. Big N is an indicator variable equal one if a firm is audited by a Big N auditor, and zero otherwise. The auditor quality data is obtained from Compustat database. Analyst coverage is the number of analyst followings. All other controls are the same as the controls in baseline regression model. Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). In Panel A, we control for industry effect and year effect. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Panel A: Additional controls

VARIABLES	(1) ETR	(2) ETR	(3) CETR	(4) CETR
MA score	0.079***		0.140***	
	(6.68)		(9.63)	
MA rank		0.036***		0.071***
		(6.37)		(10.11)
Discretionary accruals	-0.004	-0.004	0.011	0.011
	(-1.50)	(-1.54)	(1.57)	(1.55)
Institutional ownership concentration	0.133***	0.134***	0.066	0.065
	(2.80)	(2.79)	(1.18)	(1.16)
Auditor industry expertise	0.011	0.011	0.015	0.014
	(0.96)	(0.90)	(0.99)	(0.94)
BIG N	-0.001	-0.000	0.001	0.001
	(-0.10)	(-0.08)	(0.07)	(0.12)
Analyst coverage	-0.001***	-0.001***	-0.001*	-0.001*
	(-2.82)	(-2.82)	(-1.82)	(-1.87)
All other controls	Y	Y	Y	Y
Industry and year effects	Y	Y	Y	Y
Observations	20,058	20,058	20,058	20,058
Adjusted R-squared	0.071	0.070	0.111	0.111

Panel B: Firm fixed effect

VARIABLES	(1) ETR	(2) ETR	(3) CETR	(4) CETR
MA score	0.035***		0.147***	
	(3.70)		(12.28)	
MA rank		0.016***		0.072***
		(3.42)		(12.36)
All other controls	Y	Y	Y	Y
year effects	Y	Y	Y	Y
Observations	42,340	42,340	42,340	42,340
Adjusted R-squared	0.270	0.270	0.262	0.262

Panel C: Fama and MacBeth regression

VARIABLES	(1) ETR	(2) ETR	(3) CETR	(4) CETR
MA score	0.076***		0.128***	
	(6.93)		(17.04)	
MA rank		0.037***		0.066***
		(6.44)		(15.74)
All other controls	Y	Y	Y	Y
Observations	42,340	42,340	42,340	42,340
R-squared	0.052	0.052	0.085	0.085

Table 4: Managerial ability and tax avoidance: Difference-in-differences analyses

The table presents difference-in-difference regression results. In Panel A, we compare tax avoidance for firms that switch from a low-managerial ability to a high-managerial ability (the treatment sample) and firms that switch from a low-managerial ability to a low-managerial ability (the control sample). In Panel B, we compare tax avoidance for firms that switch from a high-managerial ability to a low-managerial ability (the treatment sample) and firms that switch from a high-managerial ability to a high-managerial ability (the control sample). The dependent variables are ETR and CETR. ETR is the ratio of total tax expenses (total current tax expense plus deferred tax expense) over pretax income adjusted for special items. CETR is the ratio of cash tax paid over pretax income adjusted for special items. Dummy (Low-to-high firms) equals one if a firm has an average MA rank below 0.5 for the whole pre-transition period and an average MA rank above 0.5 for the whole post-transition period, and it equals zero if a firm has an average MA rank below 0.5 for the whole pre-transition period and an average MA rank still below 0.5 for the whole post-transition period. Dummy (High-to-low firms) equals one if a firm has an average MA rank above 0.5 for the whole pre-transition period and an average MA rank below 0.5 for the whole post-transition period, and it equals zero if a firm has an average MA rank above 0.5 for the whole pre-transition period and an average MA rank still above 0.5 for the whole post-transition period. Post is a dummy variable denoting observations following CEO turnovers. Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). We also control for industry effect and year effect in the regressions. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Panel A: Low-to-high CEO turnovers

VARIABLES	(1) ETR	(2) CETR
Dummy (Low-to-high firm)	-0.013	-0.021
	(-0.77)	(-1.08)
Post	-0.050***	0.001
	(-2.66)	(0.04)
Dummy (Low-to-high firm)*Post	0.051**	0.057***
	(2.40)	(2.88)
Size	-0.005	0.019**
	(-0.98)	(2.59)
M/B	-0.000	-0.000
	(-0.04)	(-0.15)
Leverage	0.020	-0.023
	(0.40)	(-0.38)
Cash holding	-0.107*	-0.168***
	(-1.74)	(-2.67)
NOL	0.011	-0.041**
	(0.75)	(-2.16)
Change NOL	0.015	0.019
	(0.68)	(1.07)
ROA	0.328**	-0.026
	(2.10)	(-0.18)
Foreign income	0.031	-0.674**
	(0.16)	(-2.34)
Equity income	-1.660**	-0.852

	(-2.10)	(-0.57)
PPE	0.040	-0.097*
	(0.98)	(-1.68)
Intangible assets	0.068	-0.021
	(1.61)	(-0.43)
Industry and year effects	Y	Y
Observations	1,052	1,052
Adjusted R-squared	0.152	0.163

Panel B: High-to-low CEO turnovers

VARIABLES	(1) ETR	(2) CETR
Dummy (High-to-low firm)	-0.015	-0.014
	(-1.62)	(-1.23)
Post	-0.014	0.019
	(-1.43)	(1.52)
Dummy (High-to-low firm)*Post	-0.027**	-0.028*
	(-2.05)	(-1.77)
All controls	Y	Y
Industry and year effects	Y	Y
Observations	2,422	2,422
Adjusted R-squared	0.101	0.121

Table 5: Managerial ability and tax avoidance: Alternative measures of tax avoidance

The table presents the OLS regression results on the relation between managerial ability and tax avoidance using book-tax difference based measures of tax avoidance. The dependent variables are BT (Manzon and Plesko, 2002), DD_BT (Desai and Dharmapala, 2006) and DTAX (Frank et al. 2009). More detail definitions of these variables are in Appendix A. MA score is a continuous score for managerial ability for each firm/year from Demerjian et al. (2012). MA rank is industry/year deciles ranking for managerial ability for each firm/year from Demerjian et al. (2012). Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). We also control for industry effect and year effect in the regressions. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

VARIABLES	(1) BT	(2) BT	(3) DD_BT	(4) DD_BT	(5) DTAX	(6) DTAX
MA score	-0.018***		-0.019***		-0.044***	
	(-5.37)		(-4.81)		(-7.43)	
MA rank		-0.011***		-0.010***		-0.022***
		(-7.03)		(-5.76)		(-8.41)
Size	-0.004***	-0.004***	-0.003***	-0.003***	-0.005***	-0.005***
	(-15.85)	(-15.93)	(-9.26)	(-9.32)	(-10.71)	(-10.82)
M/B	-0.000	-0.000	-0.000	-0.000	-0.001*	-0.001*
	(-1.23)	(-1.15)	(-1.52)	(-1.49)	(-1.68)	(-1.68)
Leverage	0.027***	0.027***	0.023***	0.023***	0.035***	0.035***
	(10.24)	(10.21)	(6.98)	(6.96)	(6.80)	(6.74)
Cash holding	0.001	0.001	-0.010***	-0.011***	-0.009	-0.010
	(0.42)	(0.36)	(-2.80)	(-2.86)	(-1.60)	(-1.64)
NOL	0.019***	0.018***	0.016***	0.016***	0.014***	0.014***
	(17.82)	(17.67)	(13.61)	(13.50)	(8.17)	(8.06)
Change NOL	-0.006***	-0.006***	-0.006***	-0.006***	0.000	0.000
	(-5.55)	(-5.49)	(-5.00)	(-4.94)	(0.12)	(0.14)
ROA	0.288***	0.289***	0.282***	0.282***	0.187***	0.187***
	(32.27)	(32.40)	(25.08)	(25.16)	(12.63)	(12.60)
Foreign income	-0.332***	-0.331***	-0.313***	-0.312***	0.085**	0.086**
	(-17.68)	(-17.72)	(-15.56)	(-15.53)	(2.35)	(2.39)
Equity income	-0.049	-0.049	-0.210**	-0.210**	-0.009	-0.009
	(-1.47)	(-1.48)	(-2.11)	(-2.11)	(-0.33)	(-0.34)
PPE	0.016***	0.016***	0.016***	0.016***	-0.011***	-0.011***
	(6.15)	(6.05)	(5.38)	(5.36)	(-2.70)	(-2.60)
Intangible assets	0.005**	0.005**	0.006**	0.006**	0.050***	0.050***
	(2.07)	(2.09)	(1.97)	(1.98)	(9.28)	(9.33)
Industry and year effects	Y	Y	Y	Y	Y	Y

Observations	35,326	35,326	30,877	30,877	25,058	25,058
Adjusted R-squared	0.254	0.255	0.187	0.187	0.068	0.068

Table 6: Managerial ability and tax avoidance: Alternative measures of managerial ability

The table presents the OLS regression results on the relation between managerial ability and tax avoidance using historical stock returns to measure managerial ability. The dependent variables are ETR and CETR. ETR is the ratio of total tax expenses (total current tax expense plus deferred tax expense) over pretax income adjusted for special items. CETR is the ratio of cash tax paid over pretax income adjusted for special items. R is the five-year stock returns (year t-5, t-1) using monthly CRSP data. Adjusted R is the five-year value-weighted industry-adjusted stock returns (year t-5, t-1). Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). We also control for industry effect and year effect in the regressions. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

VARIABLES	(1) ETR	(2) ETR	(3) CETR	(4) CETR
R	0.032***		0.040***	
	(3.90)		(3.89)	
Adjusted R		0.021**		0.026**
		(2.49)		(2.43)
Size	0.002	0.001	0.005***	0.005***
	(1.40)	(1.34)	(3.94)	(3.88)
M/B	-0.006***	-0.005***	-0.005***	-0.005***
	(-6.78)	(-6.48)	(-5.83)	(-5.49)
Leverage	-0.003	-0.004	-0.086***	-0.088***
	(-0.27)	(-0.34)	(-5.72)	(-5.79)
Cash holding	-0.055***	-0.054***	-0.091***	-0.090***
	(-4.23)	(-4.18)	(-5.63)	(-5.57)
NOL	-0.032***	-0.033***	-0.066***	-0.066***
	(-7.71)	(-7.75)	(-12.87)	(-12.92)
Change NOL	0.020***	0.019***	0.007	0.007
	(3.94)	(3.90)	(1.23)	(1.20)
ROA	0.220***	0.226***	-0.190***	-0.183***
	(6.77)	(6.97)	(-5.63)	(-5.43)
Foreign income	-0.036	-0.037	-0.065	-0.067
	(-0.61)	(-0.63)	(-0.97)	(-1.01)
Equity income	-0.043	-0.044	-0.115	-0.116
	(-0.56)	(-0.56)	(-1.26)	(-1.25)
PPE	-0.007	-0.006	-0.097***	-0.096***
	(-0.77)	(-0.65)	(-8.13)	(-8.01)
Intangible assets	0.037***	0.038***	-0.019	-0.017
	(3.49)	(3.59)	(-1.57)	(-1.45)
Industry and year effects	Y	Y	Y	Y
Observations	20,843	20,843	20,843	20,843
Adjusted R-squared	0.052	0.052	0.078	0.078

Table 7: Managerial ability and tax aggressiveness

The table presents the OLS and Logit regression results on the relation between managerial ability and tax aggressiveness. The dependent variables are Shelter (Wilson, 2009), predicted UTB (Rego and Wilson, 2012) and tax haven (Dyreng et al. 2009). More detail definitions of these variables are in Appendix A. MA score is a continuous score for managerial ability for each firm/year from Demerjian et al. (2012). MA rank is industry/year deciles ranking for managerial ability for each firm/year from Demerjian et al. (2012). Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). We also control for industry effect and year effect in the regressions. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics/z-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(1)	(2)
	OLS	OLS	OLS	OLS	Logit	Logit
VARIABLES	Shelter	Shelter	Predicted UTB	Predicted UTB	Tax haven	Tax haven
MA score	-0.254***		-0.005***		-0.582***	
	(-3.15)		(-6.00)		(-2.66)	
MA rank		-0.089**		-0.002***		-0.211*
		(-2.40)		(-5.84)		(-1.88)
Size	0.908***	0.908***	0.001***	0.001***	0.755***	0.753***
	(121.38)	(121.37)	(10.80)	(10.74)	(28.32)	(28.35)
M/B	0.011**	0.011**	0.000*	0.000	0.011	0.010
	(2.52)	(2.42)	(1.68)	(1.56)	(1.33)	(1.24)
Leverage	-1.573***	-1.575***	-0.001	-0.001*	-0.320*	-0.322*
	(-20.40)	(-20.41)	(-1.60)	(-1.65)	(-1.75)	(-1.76)
Cash holding	0.080	0.078	0.002**	0.002**	0.037	0.039
	(1.05)	(1.02)	(2.51)	(2.45)	(0.19)	(0.20)
NOL	0.190***	0.192***	0.000*	0.000*	0.271***	0.273***
	(8.05)	(8.12)	(1.94)	(1.95)	(4.12)	(4.16)
Change NOL	0.002	0.001	0.000	0.000	0.020	0.021
	(0.06)	(0.03)	(0.53)	(0.54)	(0.39)	(0.40)
ROA	3.739***	3.716***	0.014***	0.014***	-1.679***	-1.719***
	(20.77)	(20.59)	(10.38)	(10.21)	(-5.70)	(-5.81)
Foreign income	7.570***	7.580***	0.010**	0.010***	8.801***	8.839***
	(11.54)	(11.53)	(2.56)	(2.58)	(8.19)	(8.20)
Equity income	0.235***	0.237***	-0.012***	-0.012***	-2.891	-2.787
	(3.79)	(3.81)	(-4.03)	(-4.01)	(-1.41)	(-1.36)
PPE	-0.061	-0.050	-0.006***	-0.006***	-1.230***	-1.203***
	(-1.05)	(-0.85)	(-11.50)	(-11.29)	(-6.74)	(-6.61)
Intangible assets	-0.228***	-0.228***	-0.008***	-0.008***	-0.371***	-0.371***
	(-3.72)	(-3.72)	(-12.96)	(-12.97)	(-2.77)	(-2.77)
Industry and year effects	Y	Y	Y	Y	Y	Y
Observations	27,967	27,967	37,891	37,891	35,984	35,984
Adjusted/ Pseudo R-squared	0.766	0.766	0.166	0.166	0.321	0.320

Table 8: Cross-sectional analyses on the market reactions to tax shelter news

The table presents the OLS regression results on the relation between managerial ability and tax shelter event window returns. The dependent variables are CAR (-1, 1) and CAR (0, 0). CAR (-1, 1) is the three-day cumulative abnormal returns surrounding tax sheltering news events. CAR (0, 0) is the one-day abnormal returns surrounding tax sheltering news events. MA score is a continuous score for managerial ability for each firm/year from Demerjian et al. (2012). MA rank is industry/year deciles ranking for managerial ability for each firm/year from Demerjian et al. (2012). Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). We also control for industry effect and year effect in the regressions. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

VARIABLES	(1) CAR (-1,1)	(2) CAR (-1,1)	(3) CAR (0,0)	(4) CAR (0,0)
MA score	0.145**		0.102***	
	(2.53)		(5.26)	
MA rank		0.063**		0.037***
		(3.02)		(3.95)
Size	-0.007*	-0.007*	-0.004**	-0.004**
	(-2.01)	(-2.24)	(-3.28)	(-2.67)
M/B	0.001	0.002	0.001	0.001
	(0.56)	(0.74)	(1.46)	(1.22)
Leverage	-0.074	-0.067	-0.012	-0.008
	(-1.54)	(-1.52)	(-0.71)	(-0.37)
Cash holding	0.120*	0.088	0.051**	0.029
	(2.17)	(1.77)	(2.69)	(1.27)
NOL	-0.057***	-0.053***	-0.036***	-0.032***
	(-3.44)	(-3.54)	(-6.38)	(-4.77)
Change NOL	-0.024	-0.026	-0.001	-0.001
	(-1.06)	(-1.22)	(-0.07)	(-0.06)
ROA	-0.235	-0.239	-0.067	-0.063
	(-1.64)	(-1.81)	(-1.38)	(-1.06)
Foreign income	0.102	0.093	0.027	0.023
	(0.50)	(0.49)	(0.39)	(0.27)
Equity income	-0.942	-0.240	-0.712	-0.146
	(-0.66)	(-0.20)	(-1.48)	(-0.26)
PPE	0.075	0.049	0.054***	0.034*
	(1.65)	(1.27)	(3.51)	(1.91)
Intangible assets	0.133**	0.114**	0.097***	0.081***
	(2.39)	(2.34)	(5.16)	(3.64)
Industry and year effects	Y	Y	Y	Y
Observations	47	47	47	47
Adjusted R-squared	0.709	0.756	0.893	0.838

Table 9: Managerial ability and tax avoidance: Subsample tests

The table presents the OLS regression results of subsample tests. In Panel A, we bisect the full sample into high ability firms and low ability firms based on the median value of MA Score. In Panel B, we bisect the full sample into good governance firms and bad governance firms based on the median value of G-index. The dependent variables are ETR and CETR. ETR is the ratio of total tax expenses (total current tax expense plus deferred tax expense) over pretax income adjusted for special items. CETR is the ratio of cash tax paid over pretax income adjusted for special items. MA score is a continuous score for managerial ability for each firm/year from Demerjian et al. (2012). All control variables are the same as in the baseline model. Size is the natural logarithm of the market value of equity (PRCC_F × CSHO). M/B is the market-to-book ratio measured as market value of equity (PRCC_F × CSHO) scaled by book value of equity (CEQ). Leverage is leverage measured as long-term debt (DLTT) scaled by lagged assets (AT). Cash holding is cash ratio measured as Cash and Short-Term Investments (CHE) scaled by lagged assets (AT). NOL is a dummy variable coded as one if loss carry forward (TLCF) is positive. ΔNOL is the change in loss carry forward (TLCF) scaled by lagged assets (AT). ROA is the return on assets measured as operating income (PI – XI) scaled by lagged assets (AT). Foreign income is foreign income (PIFO) scaled by lagged assets (AT). Equity income is the equity income in earnings (ESUB) scaled by lagged assets (AT). PPE is the property, plant, and equipment (PPENT) scaled by lagged assets (AT). Intangible assets is the intangible assets (INTAN) scaled by lagged assets (AT). We also control for industry effect and year effect in the regressions. Standard errors are adjusted for heteroskedasticity and within firm clustering. *T*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Panel A: High managerial ability vs. low managerial ability

	(1)	(2)	(3)	(4)
	High ability	Low ability	High ability	Low ability
VARIABLES	ETR	ETR	CETR	CETR
MA score	0.049***	0.099***	0.098***	0.221***
	(3.62)	(4.69)	(5.74)	(9.49)
F test (High-Low)	-0.050*		-0.123***	
All control variables	Y	Y	Y	Y
Industry and year effects	Y	Y	Y	Y
Observations	21,170	21,170	21,170	21,170
Adjusted R-squared	0.061	0.053	0.096	0.092

Panel B: Good corporate governance vs. bad corporate governance

	(1)	(2)	(3)	(4)
	Good governance	Bad governance	Good governance	Bad governance
VARIABLES	ETR	ETR	CETR	CETR
MA score	0.057***	0.068***	0.054**	0.071**
	(2.65)	(2.90)	(2.13)	(2.43)
F test (Good-Bad)	-0.011		-0.017	
All control variables	Y	Y	Y	Y
Industry and year effects	Y	Y	Y	Y
Observations	4,208	3,287	4,208	3,287
Adjusted R-squared	0.11	0.09	0.13	0.11

Appendix A: Measure of tax avoidance/tax aggressiveness

$ETR_{i,t}$	Effective tax rate (ETR) is total tax expense (TXT) divided by pretax income, which is measured as the difference between pre-tax book income (PI) before special items (SPI). ETR is set as missing when the denominator is zero or negative. We truncate ETR to the range [0,1].
CETRi,t	Cash effective tax rate (CETR) is defined as cash tax paid (TXPD) divided by pretax income, which is measured as the difference between pre-tax book income (PI) before special items (SPI). CETR is set as missing when the denominator is zero or negative. We truncate CETR to the range [0,1].
BTi,t	Manzon-Plesko (2002) book-tax difference (BT) is defined as (US domestic financial income – US domestic taxable income – Income taxes (State) – Income taxes (Other) – Equity in Earnings)/lagged assets = (PIDOM – TXFED/Statutory tax rate – TXS – TXO – ESUB)/ATt-1 . Firms with zero or negative taxable income are presumed to have attenuated incentives, at the margin, to engage in tax sheltering activity. We follow prior literature, e.g., Desai and Dharmapala (2006), and include only observations with positive TXFED in our analysis.
DD_BTi,t	DD_BT is the discretionary book-tax difference proposed by Desai and Dharmapala (2006). DD_BT is equal to $\mu i + \varepsilon i,t$, from the following firm fixed-effect regression: $BTi,t = \beta 1 TAi,t + \mu i + \varepsilon i,t$, where BT is the Manzon-Plesko (2002) book-tax difference measure (described above); TAi,t is Dechow (1995) total accruals measure for firm i in year t, scaled by the lagged value of assets; μi is the average value of the residual for firm i over the sample period; and $\varepsilon i,t$ is the deviation of the residual in year t from firm i's average residual.
DTAXi,t	DTAX is equal to firm i's residual from the following regression estimated by two-digit SIC code and fiscal year: $PERMDIFF\ i,t = \beta 0 + \beta 1\ INTANGi,t + \beta 2\ UNCONi,t + \beta 3\ MIi,t + \beta 4\ CSTEi,t + \beta 5\ \Delta NOLi,t + \beta 6\ LAGPERMi,t + \varepsilon i,t;$ Where: PERMDIFFi,t = BIi,t – [(CFTE i,t + CFORi,t) / STRi,t] – (DTEi,t / STRi,t), BIi,t = pre-tax book income (PI) for firm i in year t; CFTEi,t = current federal tax expense (TXFED) for firm i in year t; CFORi,t = current foreign tax expense (TXFO) for firm i in year t; DTEi,t = deferred tax expense (TXDI) for firm i in year t; STRi,t = statutory tax rate in year t; INTANGi,t = goodwill and other intangibles (INTAN) for firm i in year t; UNCONi,t = income (loss) reported under the equity method (ESUB) for firm i in year t; MIi,t = income (loss) attributable to minority interest (MII) for firm i in year t; CSTEi,t = current state income tax expense (TXS) for firm i in year t; ΔNOLi,t = change in net operating loss carryforwards (TLCF) for firm i in year t; LAGPERMi,t = one-year lagged PERMDIFF for firm i in year t; and $\varepsilon i,t$ = discretionary permanent difference (DTAXi,t) for firm i in year t.

	We follow the method in Frank, Lynch, and Rego (2009) to handle the missing value problems in estimating DTAX. If minority interest (MII), current foreign tax expense (TXFO), income from unconsolidated entities (ESUB), or current state tax expense (TXS) is missing on Compustat, then we set MI, CFOR, UNCON, or CSTE, respectively, to zero. If current federal tax expense (TXFED) is missing on Compustat, then we set the value of CFTE to: total tax expense (TXT) less current foreign tax expense (TXFO) less current state tax expense (TXS) less deferred tax expense (TXDI). If goodwill and other intangibles (INTAN) is missing on Compustat, then we set the value for INTANG to 0. If INTAN = C, then we set the value of INTANG to that for goodwill (GDWL). The variables in this regression model are winsorized at 1% and 99% level to mitigate the impact of extreme observations and possible data errors.
Shelter	Tax shelter probability The tax sheltering model is based on Wilson (2009): Sheltering = -4.86 + 5.20 × BT + 4.08 × |DAP| - 1.41 × LEV + 0.76 × SIZE + 3.51 × ROE + 1.72 × Foreign Income + 2.43 × R&D, where BT is defined as above; |DAP| is the absolute value of discretionary accruals from the performance-adjusted modified cross-sectional Jones model; LEV is long-term debt divided by beginning of year total assets; SIZE is the log of total assets; ROE is pre-tax return on equity; Foreign Income is an indicator variable set equal to 1 for firm observations reporting foreign income, and zero otherwise; R&D is R&D expense divided by lagged total assets.
Predicted UTB	Predicted uncertain tax positions Predicted UTB is calculated based on the estimated coefficient from Rego and Wilson (2012): Predicted UTB=-0.004+0.011×PT_ROA+0.001×SIZE+0.01×FOR_SALE+0.092×R&D0.002×DISC_ACCR+0.003×LEV+0.001×MTB+0.014×SG&A-0.018×SALE_GR, where PT_ROA is pre-tax return on assets; SIZE is the log of total assets; FOR_SALE is the ratio of foreign sales to total assets; R&D is research and development expense scaled by beginning of year total assets; DISC_ACCR is discretionary accruals from the performance-adjusted modified cross-sectional Jones model; LEV is long-term debt divided by beginning of year total assets; MTB is market to book ratio; SG&A is selling, general & administrative expenses divided by beginning of year total assets; SALE_GR is three-year average sales growth rate.
Tax haven	An indicator variable Tax haven which equals one if a firm has at least one tax haven country subsidy, and zero other. We obtain tax haven data from Scott Dyreng personal webpage. Scott Dyreng provides data on the number of haven countries reported in firms' Exhibit 21 in their10-K. Exhibit 21 is a required element of a firm's 10-K and includes a listing of all of the firms subsidiaries with material operations. The tax haven countries are defined in Table 1 in Dyreng and Lindsay (2009).