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Tax Avoidance, Managerial Ability, and Investment Efficiency

In this paper, we examine the impact of managerial ability on the relation between corporate tax avoidance and investment efficiency. Using a sample of US firms from 1994–2015, we find that as tax avoidance increases, firms with high (low) managerial ability exhibit increased (reduced) investment efficiency, that is, smaller (greater) deviations from predicted levels of investment spending. Supplemental analysis also shows that as tax avoidance increases, strong (weak) corporate governance increases (decreases) investment efficiency. Overall, our findings shed light on whether corporate tax avoidance generates wealth for the firm's shareholders or simply exacerbates agency problems.

Key words: Corporate governance; Investment efficiency; Managerial ability; Residual investment; Tax avoidance.

Whether corporate tax avoidance generates wealth for the firm's shareholders or simply exacerbates agency problems is a subject of ongoing debate and therefore an important research question worthy of study (Hanlon and Heitzman, 2010). In the traditional view, tax avoidance lowers wealth transfers to the state, enabling firms to retain greater resources and increase shareholder value (Swenson, 1999; Graham and Tucker, 2006; Wilson, 2009). However, several studies, such as Desai and Dharmapala (2006, 2008, 2009) and Desai *et al.* (2007), suggest that managers of firms with higher levels of tax avoidance may undertake costly activities designed to hide tax avoidance behaviour from government authorities. As a consequence, managers of these firms may produce financial statements with reduced transparency that may facilitate rent extraction, otherwise known as opportunistic behaviour, by managers. Two examples of such managerial opportunistic behaviour involve the firm's management using the proceeds from increased levels of tax avoidance to increase firm investment beyond its optimal size (Balakrishnan *et al.*, 2011) or failing to use the proceeds from increased levels of tax avoidance to invest in positive net present value (NPV) projects (Bertrand and Mullainathan, 2003).

In a neoclassical setting, managers should invest in projects that generate positive NPV for the firm and increase shareholder wealth. As a result, there

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should be little or no association between a firm's internally generated cash flows and its investments (Biddle and Hilary, 2006; Biddle *et al*., 2009). However, in the presence of agency problems or weak corporate governance regimes that limit access to external financing, investment spending is likely to be sensitive to cash flows (e.g., Bhabra *et al*., 2018), including the cash flows generated by tax avoidance. In this paper, we examine whether the notion of firm managerial ability, as developed by Demerjian *et al.* (2012), affects the relationship between tax avoidance and investment efficiency.[1]

Prior research argues that more able managers can better evaluate investment opportunities facing a firm. For example, Demerjian *et al.* (2012) argues that more able managers can better gauge the timing and magnitude of economic returns from investments, as well as better assess the risks and returns associated with investments. Consistent with this argument, Garcia-Sanchez and Garcia-Meca (2018) find that managerial ability is an important determinant of investment efficiency, resulting in lower levels of under- or over-investment. To the extent that funds generated through tax avoidance activities are an important source of capital, especially for financially constrained firms (Edwards *et al*., 2016), we expect that compared to managers with lower ability, managers with higher ability use the proceeds from increased levels of tax avoidance to improve investment efficiency.

Prior research (e.g., Desai and Dharmapala, 2006, 2008, 2009; Desai *et al*., 2007) has also theorized that increases in tax avoidance may benefit shareholders only in firms with strong corporate governance. However, more recent studies have questioned this view. Lennox *et al.* (2013) argue that tax avoidance need not necessarily be associated with agency problems. Armstrong *et al.* (2015) find that strong corporate governance mitigates over-investment only at extreme levels. Instead of allowing managers to divert resources from tax avoidance activities for their personal use, Armstrong *et al.* (2015) argue that governance mechanisms, such as managers' incentive-compensation contracts, can discourage management from undertaking firm tax avoidance activities for personal benefit. Bhabra *et al.* (2018) find that firms with strong corporate governance are sensitive to available internal cash flows and are more likely to forgo positive NPV projects in order to build a cash cushion to shield against potential future economic downturns.

Seidman and Stomberg (2017) state that the inferences from studies that rely on the theoretical framework of Desai and Dharmapala (2006, 2008, 2009) and Desai *et al.* (2007) are open to multiple interpretations and subject to measurement errors. As a result, they argue that tax avoidance in the presence of specific levels of corporate governance may not necessarily facilitate rent extraction. Further supporting that notion, Blaylock (2016) presents evidence suggesting that increased levels of tax avoidance for firms with weak corporate governance do not

[1] Managerial ability relates to the relative efficiency of a firm's managers based on the relation between inputs and outputs using data envelopment analysis. We measure managerial ability using data from Professor Peter Demerjian's website: http://faculty.washington.edu/pdemerj/data.html. See the section on research design for more details.

have an effect on future firm performance or current period investment efficiency. In our study, we also re-examine the relation between tax avoidance and investment efficiency conditional on the strength of corporate governance.

To test the effect of managerial ability on the relationship between increased levels of tax avoidance and firm investment efficiency, we use a base sample of 20,675 firm-year observations from 1994 to 2015 to first estimate the firm's expected level of investment based on the model from Richardson (2006) and used by Blaylock (2016). As discussed in the prior literature (Biddle and Hilary, 2006; Biddle *et al.*, 2009), investment efficiency entails measuring how much the actual level of a firm's investment deviates from the predicted level of investment. Prior research suggests that a firm with a positive residual from the predicted level of investment is over-investing, implying that the firm is more likely to be undertaking negative NPV activities as a way of growing managerial power and prestige (Hope and Thomas, 2008). In contrast, a firm with a large negative residual from the predicted level of investment is categorized as an under-investing firm and is likely passing up on positive NPV projects because the firm management may prefer to pursue a 'quiet life' (Bertrand and Mullainathan, 2003). We compare actual and predicted levels of investment for our sample firms to derive the residual investment, then use the residual to determine whether a sample firm is either under-investing or over-investing.

We find that as tax avoidance increases, firms with low managerial ability report higher levels of over-investment. We also find some evidence that as tax avoidance increases, firms with low managerial ability under-invest more. In contrast, we find that as tax avoidance increases, firms with high managerial ability report reduced levels of over-investment and lower levels of under-investment. Overall, our results indicate that as firm tax avoidance increases, firms with high (low) managerial ability exhibit increased (reduced) investment efficiency.

Next, we replace the Demerjian *et al.* (2012) measure of managerial ability with three different measures of corporate governance: the Bebchuk *et al.* (2009) managerial entrenchment E-Index, the Gompers *et al.* (2003) G-Index, and an indicator variable if the firm reports multiple classes of stock. Using the Bebchuk *et al.* (2009) measure of managerial entrenchment, we find that as tax avoidance increases, firms with weak corporate governance or highly entrenched managers report greater investment inefficiency with greater levels of under-investment and over-investment. Using the Gompers *et al.* (2003) measure of corporate governance, we find evidence that as tax avoidance increases, firms with weak corporate governance report higher levels of over-investment, while firms with good corporate governance display greater investment efficiency, as evidenced by low levels of over-investment. Finally, our results indicate that firms that issue more than one class of stock, a feature of weak corporate governance, are more likely to report higher levels of over-investment as firm tax avoidance increases.

We contribute to the literature in two different ways. First, we add to the literature examining the effect of managerial ability on firm decision making. We show that firms with higher (lower) managerial ability exhibit smaller (greater) deviations from predicted investments as tax avoidance increases. In this respect,

we extend the work of Garcia-Sanchez and Garcia-Meca (2018), who show, using cross-country data, that managerial ability is an important determinant of investment efficiency. Our contribution stems from focusing on funds generated through tax avoidance activities and showing that the relation between corporate tax avoidance and investment efficiency is conditional on managerial ability.

Second, our findings contribute to the debate regarding whether increased levels of tax avoidance, in conjunction with alternative corporate governance regimes, influence firm management behaviour. Specifically, we show that as tax avoidance increases, good corporate governance promotes investment efficiency, while weak corporate governance perpetuates investment inefficiency. In this respect, our study offers an explanation for why Blaylock (2016) finds no evidence that weak corporate governance (or high managerial entrenchment) affects the relationship between tax avoidance and firm investment efficiency. Specifically, the differences between our results and those reported by Blaylock (2016) are likely due to sampling procedure.

First, Blaylock (2016) includes observations from regulated utilities in which firm investments are subject to outside regulatory approval, along with financial service firms, which generally report little or no capital expenditures, research and development expenditures, depreciation, and sales of property, plant, and equipment. As such, it is unlikely these types of observations are appropriate for the sample. Second, Blaylock (2016) deletes from his sample observations with average values for corporate governance variables. In a corporate governance study, it is difficult to justify examining only extreme value observations to the complete exclusion of average value observations. In our study, for completeness we retain observations with average values of corporate governance. Lastly, Blaylock (2016) deletes from his sample all observations with negative pretax accounting earnings, negative current tax expense, or net operating loss carryforwards based on the argument that loss firms do not have incentives to avoid taxes. However, recent evidence from McGuire *et al.* (2016) demonstrates that firm value increases for loss firms as these firms report higher net operating loss carryforwards for tax purposes. Hence, McGuire *et al.* (2016) suggest that even loss firms have incentives to pursue tax avoidance strategies in an effort to increase firm value. For this reason, our study retains observations with negative pretax accounting earnings, negative current tax expense, or net operating loss carryforwards. With these sample selection choices, we believe that we have a more appropriate sample for addressing the research question.[2]

Overall, our findings have both theoretical/academic implications as well as practitioner/policy implications. The results of our study suggest that two features of a firm—managerial ability and corporate governance—can promote investment efficiency for firms that increase cash flows by increasing their level of tax avoidance. In terms of practitioner or policy implications, our results suggest

[2] In untabulated tests, when we modify our sample to include regulated utilities and financial service firms while excluding firms with average corporate governance, we obtain results similar to those reported in Blaylock (2016).

corporate boards of directors need to be cognizant that managers can opportunistically channel cash flows from tax avoidance to over-investment rather than to the benefit of shareholders. Consequently, boards need to be aware of the role that managerial ability (and corporate governance) can play in constraining opportunistic behaviour in the context of tax avoidance.

PRIOR RESEARCH AND HYPOTHESIS DEVELOPMENT

Managerial Ability, Tax Avoidance, and Investment Efficiency

Jensen and Meckling (1976) argue that the separation of ownership and control creates agency problems and encourages managers to make decisions that may benefit them at the expense of the firm and its shareholders. One such managerial decision involves investment expenditures made by the firm during the year. Previous research indicates that firms with substantial free cash flow or substantial borrowing capacity may utilize those resources for capital expenditures or acquisitions that are not necessarily value-enhancing to the firm (Jensen, 1986). Instead of returning excess free cash flows to shareholders, firm managers may prefer to invest excess free cash flow in unprofitable projects for 'empire-building' purposes, increasing the size of the firm for personal reasons, such as maintaining managerial power and prestige (Hope and Thomas, 2008). Core *et al.* (1999) find a strong positive correlation between firm size and executive compensation, suggesting that managers may benefit from undertaking acquisitions to simply increase their compensation.

Consistent with Jensen and Meckling's (1976) agency theory, the empirical research in finance suggests that managers with increased levels of free cash flows are more likely to utilize those free cash flows for capital expenditures or acquisitions, as opposed to returning it to shareholders. Supporting this observation, Blanchard *et al.* (1994) find that the proceeds received by the firm from large cash windfalls are typically used to acquire other firms that often fail to generate value for shareholders. Harford (1999) reports similar findings, concluding that firms with high levels of cash and few investment opportunities are more likely to make acquisitions that reduce future firm performance. Along the same lines, Bates (2005) finds that firms receiving a positive cash flow shock from liquidating a subsidiary systematically over-invest relative to the industry benchmark instead of distributing the cash back to shareholders. Finally, Riddick and Whited (2009) demonstrate that firms with positive cash flow shocks exhibit increased investment spending and actually end up with lower cash flow reserves.

One opportunity to generate additional free cash flow under management control involves the firm undertaking higher levels of tax avoidance activities (Jiménez-Angueira, 2007). This method of generating additional cash flows through increased levels of tax avoidance is especially prevalent for financially constrained firms (Armstrong *et al.*, 2015). Theoretically, increased levels of tax avoidance create shareholder value by minimizing the cash outflow to taxing

authorities (Khurana and Moser, 2013), with the level of firm tax avoidance dependent upon management's tolerance for uncertainty, the tax expertise of the directors, performance-based remuneration for management personnel (Taylor and Richardson, 2014), and the firm's level of corporate social responsibility (Lanis and Richardson, 2015). Utilizing the agency theory framework of Jensen and Meckling (1976), studies such as Desai and Dharmapala (2006, 2008, 2009) and Desai *et al.* (2007) suggest that managers who increase free cash flow by undertaking higher levels of tax avoidance may also produce less transparent financial statements in an effort to hide their tax avoidance activities from taxing authorities. Less transparent financial statements, combined with increased levels of free cash flow, may allow managers to redirect tax savings for their own purposes at the expense of firm shareholders (Desai and Dharmapala, 2009). Therefore, Desai and Dharmapala (2009) conclude that increased levels of tax avoidance benefit only shareholders of firms with strong corporate governance. Weaker corporate governance may provide the opportunity for firm managers to redirect cash savings from tax avoidance activities into projects for personal gain rather than shareholder benefit. Supporting this finding, Kim *et al.* (2011) find evidence that tax avoidance facilitates managerial rent extraction and restricts the dissemination of bad news, which, once revealed, is more likely to lead to a crash in stock price. However, they show that the relationship between tax avoidance and rent extraction is attenuated when firms are subject to strong external monitoring in the form of high institutional ownership or high analyst coverage. Supporting this finding using a sample of Korean firms, Park *et al.* (2016) find that the negative relationship between tax avoidance and firm value is attenuated for firms that demonstrate superior management ability.

In examining the relationship between increased levels of tax avoidance and firm investment efficiency, previous research has primarily relied on the Gompers *et al.* (2003) corporate governance G-Index or the Bebchuk *et al.* (2009) managerial entrenchment E-Index (Blaylock, 2016). However, Armstrong *et al.* (2015) note that the G-index is primarily a measure of shareholder rights with respect to takeovers and, therefore, might not be the best assessment of the degree to which a board might monitor tax and investment policy. In our study, we use the Demerjian *et al.* (2012) measure of managerial ability as our primary conditioning variable of interest to identify firms more likely to use (or refrain from using) the proceeds from increased levels of tax avoidance to increase investment efficiency. Using cross-country data, Garcia-Sanchez and Garcia-Meca (2018) find that firms with higher managerial ability based on the Demerjian *et al.* (2012) measure generally display higher levels of investment efficiency.

The theory advanced by Desai and Dharmapala (2006, 2008, 2009) and Desai *et al.* (2007) suggests that the free cash flow generated by increased levels of tax avoidance benefits only firms with good corporate governance or higher managerial ability. In their framework, an increased level of tax avoidance is not likely to result in increased firm value for a firm with lower managerial ability or weak corporate governance; that is, in such cases, increased cash flow

from higher levels of tax avoidance may be diverted by firm managers to invest in projects that do not necessarily create shareholder value. One such activity may involve managers using the excess free cash flow from tax avoidance activities to undertake capital expenditures or firm acquisitions that may not necessarily align with shareholder interests. On the other hand, firms with lower managerial ability may actually forgo using the proceeds from tax avoidance activities to make further investments, even when presented with profitable opportunities, because they prefer to pursue the 'quiet life' (Bertrand and Mullainathan, 2003). This leads us to our first set of hypotheses (stated in the alternative form):

H1a: As tax avoidance increases, firms with lower managerial ability display reduced levels of investment efficiency.

H1b: As tax avoidance increases, firms with higher managerial ability display increased levels of investment efficiency.

Corporate Governance, Tax Avoidance, and Investment Efficiency

In addition to examining the relationship between tax avoidance and investment efficiency in the presence of higher or lower managerial ability, as measured by Demerjian *et al.* (2012), we also investigate the relationship between tax avoidance and investment efficiency using alternative measures of corporate governance. Using analytical modeling, several studies (Desai and Dharmapala, 2006, 2008, 2009; Desai *et al.*, 2007) predict that the level of a firm's corporate governance should affect the relationship between increased levels of tax avoidance and firm investment efficiency. However, Armstrong *et al.* (2015) suggest that even firms with weak corporate governance can mitigate potential agency problems by using manager incentive-compensation contracts to mitigate any problems associated with tax avoidance. In a similar vein, Seidman and Stomberg (2017) challenge the Desai and Dharmapala (2006, 2008, 2009) and Desai *et al.* (2007) theory that managers commonly use tax avoidance activities to facilitate rent extraction. They suggest that the findings using this theory are open to multiple interpretations and subject to measurement error. In addition, Blaylock (2016) fails to find any evidence that managers in firms with weak corporate governance use the proceeds from tax avoidance activities to extract rents in the form of over-investment. Using arguments analogous to those used for managerial ability, we state our second set of hypotheses (in the alternative form):

H2a: As tax avoidance increases, firms with weak corporate governance display lower levels of investment efficiency.

H2b: As tax avoidance increases, firms with strong corporate governance display higher levels of investment efficiency.

RESEARCH DESIGN

Measurement of Dependent Variables

To test our hypotheses, we identify over- and under-investment by comparing a firm's actual investment expenditures with its predicted level of investment. To measure over- and under-investment, we follow the approach of Richardson (2006) and Blaylock (2016). We first estimate the following OLS regression model:

$$\begin{aligned} Investment_{i,t} = {} & \alpha + \beta_1 MBRatio_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1} \\ & + \beta_5 Lev_{i,t-1} + \beta_6 LnAsset_{i,t-1} + \beta_7 Investment_{i,t-1} + Year\ fixed\ effect \\ & + Industry\ (2\ digit\ SIC)\ fixed\ effects + \varepsilon_{i,t} \end{aligned} \tag{1}$$

where all variables are defined in the Appendix. We then use the residuals from model (1) to measure the extent of over- and under-investment and define two variables for the test of H1: *ResidualInvest_Positive* and *ResidualInvest_Negative.* Both *ResidualInvest_Positive* and *ResidualInvest_Negative* are continuous variables bounded at zero. We define *ResidualInvest_Positive* (*ResidualInvest_Negative*) as the value of the residuals from model (1) with positive (negative) values and negative (positive) values excluded.

Measures of Tax Avoidance

Hanlon and Heitzman (2010) define tax avoidance broadly as the reduction of explicit taxes, representing a continuum of tax planning strategies from perfectly legal business transactions to investing in illegal tax shelters. They provide anecdotal evidence suggesting that transfer pricing disputes have resulted in some of the largest tax settlements with the IRS in history. This argument is supported by data hand-collected by Taylor and Richardson (2012), who show that transfer pricing represents the primary driver of tax avoidance among Australian firms. Similar to Hanlon and Heitzman (2010), Taylor *et al.* (2015) report that Australian firms in their sample utilize tax havens to increase the level of tax avoidance.

Following prior research (Blaylock, 2016), we use three proxies for tax avoidance, which include a firm's book-tax differences (*BTD*) as calculated by Desai and Dharmapala (2006), a measure of the firm's discretionary permanent book-tax differences (*DTAX*) as measured by Frank *et al.* (2009), and the probability that the firm has invested in a corporate tax shelter (*TSScore*) as calculated by Wilson (2009). Consistent with prior research (and because of the limitations inherent in any one tax avoidance measure), we examine multiple metrics to demonstrate the robustness of the findings. Each tax avoidance measure is explained below.

Our first proxy for estimating tax avoidance focuses on a firm's book-tax differences. Following Desai and Dharmapala (2006), we estimate a firm's

book-tax differences as the residuals obtained by regressing the difference between financial accounting income minus estimated taxable income on a firm's total accruals. Note that higher values of *BTD* indicate a higher level of tax avoidance. For example, Mills (1998) finds that firms with large book-tax differences are more likely to be audited by the IRS. Wilson (2009) finds that firms involved in actual tax shelters tend to have large book-tax differences. However, as Khurana and Moser (2013) point out, a limitation of the *BTD* measure for tax avoidance is that book-tax differences can be a result of both earnings management and tax planning (Manzon and Plesko, 2002; Phillips *et al.*, 2003). Moreover, several firm characteristics, such as large depreciation deductions and municipal bond interest, do not necessarily reflect tax avoidance, but they may drive the book-tax differences (Manzon and Plesko, 2002; Hanlon, 2003).

Our second measure of tax avoidance is the firm's estimated discretionary permanent book-tax differences (*DTAX*). We follow Frank *et al.* (2009) and estimate the firm's permanent book-tax differences as a function of the firm's reported intangible assets, income or loss reported under the equity method, income (loss) attributable to the minority interest, current state tax expense, change in net operating loss carryforward, and prior year permanent book-tax differences.

$$\begin{aligned} PERM\_BTD_{it} = {} & \alpha_0 + \alpha_1 (1/AT_{it-1}) + \alpha_2 INTANG_{it} + \alpha_3 UNCON_{it} + \alpha_4 MI_{it} \\ & + \alpha_5 CSTE_{it} + \alpha_6 NOL_{it} + \alpha_7 LAGPERM_{it} + \varepsilon_{it} \end{aligned} \tag{2}$$

The variables in equation (2) are defined in the Appendix. The residuals (ε) from equation (2) are our estimates of discretionary permanent differences (*DTAX*). The higher the value of the residual (*DTAX*), the greater the level of tax avoidance. As Hanlon and Heitzman (2010) indicate, the variable *DTAX* relies on discretionary measures that are similar to the Jones (1991) model of discretionary accruals. Like the Jones (1991) model, regression-based estimates such as *DTAX* are only as good as the model used and the validity of the proxies employed for the known determinants.

Our third measure of tax avoidance (*TSScore*) is the probability that the firm undertook a transaction classified as a tax shelter. Following Wilson (2009), we calculate the probability that the firm is involved in a tax shelter as follows:

$$\begin{aligned} Shelter\_Hat = {} & -4.86 + (5.2^{*} BTD) + (4.08^{*} DAP) + (-1.41^{*} Leverage) \\ & + (0.76^{*} Size) + (3.51^{*} ROA) + (1.72^{*} Foreign) + (2.42^{*} RD) \end{aligned} \tag{3}$$

The variables in equation (3) are defined in the Appendix. We use the results from equation (3) to calculate *TSScore* using equation (4) below to calculate the probability that the firm undertook a transaction classified as a tax shelter:[3]

[3] We thank Ryan Wilson for sharing with us the file for calculating the probability that a firm is involved in a corporate tax shelter.

$$TSScore = e^{(\text{Shelter\_Hat})} / \left(1 + e^{(\text{Shelter\_Hat})}\right) \quad (4)$$

As mentioned by Hanlon and Heitzman (2010), the probability that the firm was involved in a tax shelter is the most extreme measure of tax avoidance. A limitation of using this measure as a proxy for the level of a firm's tax avoidance is that tax shelters are single transactions and may not capture the firm's overall avoidance behaviour.

Managerial Ability

To measure managerial ability, we rely on Demerjian *et al.*'s (2012) statistical procedure to evaluate the relative efficiency of firm managers in generating revenues. Demerjian *et al.* (2012) defines managerial efficiency as the ratio of output, measured by revenues, over input, such as net property, plant and equipment, net operating leases, net R&D, goodwill, intangible assets, cost of inventory, and general selling and administrative expenses. The ratios are then sorted into groups by industries, scaled by optimal weights, then scaled by the highest efficiency score within each industry. We obtained the values for each firm's managerial ability from WRDS. In addition to using the raw managerial ability score as calculated by Demerjian *et al.* (2012) downloaded from WRDS, we also create an indicator variable *LowMgmtAbility* if the observation is in the bottom quartile of managerial ability scores and the indicator variable *HighMgmtAbility* if the observation is in the top quartile of managerial ability scores. Demerjian *et al.* (2012) confirm the validity of this measure of managerial ability by documenting that it exhibits an economically significant manager-specific component and that it contains less noise than other proxies of managerial ability.

Corporate Governance

Following Blaylock (2016), we use three proxies for corporate governance. Our first measure of corporate governance is the Bebchuk *et al.* (2009) managerial entrenchment E-Index. Data pertinent to the firm's managerial entrenchment E-Index are compiled by the Investors Responsibility Research Center (IRRC). The Bebchuk *et al.* (2009) E-Index examines the top six corporate governance provisions that have the greatest impact on firm value. According to Bebchuk *et al.* (2009), larger values of E-Index result from the firm having attributes in its corporate charter that allow managers to become more entrenched. For our study, we create an indicator variable *GoodGov_E* equal to 1 if the firm has an E-Index of 0 or 1, which represents the bottom quartile of our sample. For firms with an E-Index of 2 or more, variable *GoodGov_E* is equal to 0. By contrast, the indicator variable *WeakGov_E* is equal to 1 if the firm has an E-Index of 4 or more, which roughly represents the top quartile for firms in the sample with a value *for*

WeakGov_E. If the firm reports a value for the E-Index at 3 or less, we set the value of *WeakGov_E* equal to 0.

Our second measure of corporate governance is from the Gompers *et al.* (2003) anti-takeover protection G-Index. Data pertinent to the firm's anti-takeover provisions are compiled by the Investors Responsibility Research Center (IRRC), with the index measuring the number of anti-takeover provisions in the firm's corporate charter along with the number of anti-takeover provisions in the legal code in the firm's state of incorporation. Thus, lower values of the G-Index indicate better corporate governance, while higher values of the index indicate that management is more insulated from takeovers and thus less shareholder-friendly. Following Armstrong *et al.* (2015), Bodnaruk *et al.* (2013), Desai and Dharmapala (2006), and Harford *et al.* (2008), we create an indicator variable *GoodGov_G* equal to 1 if the firm reports a G-Index of 7 or less, representing the bottom quartile of our sample. For firms with a G-Index of 8 or more, *GoodGov_G* is equal to 0. In addition, we follow Harford *et al.* (2008) and create an indicator variable *WeakGov_G* equal to 1 if the firm reports a G-Index of 11 or more, representing the top quartile of our sample. For firms with a G-Index of 10 or less, the indicator variable *WeakGov_G* is equal to 0.

Finally, we create an indicator variable, *DualClass,* equal to 1 if the firm had dual class stock during the year, that is, stock that granted a specific group of shareholders additional rights or voting shares relative to other shareholders. Prior literature suggests that dual class stocks weaken corporate governance (Blaylock, 2016).

Empirical Model for Test of H1: Managerial Ability

We begin by separately estimating the following model using Ordinary Least Squares (OLS) estimation for over-investing and under-investing firms:

$$Y_{i,t} = \alpha_0 + \beta_1 TaxAV_{i,t} + \beta_2 MA_{i,t} + \beta_3 TaxAV_{i,t}{}^{*} MA_{i,t} + \Sigma\beta_{j+1} C_{i,t} + Year + Industry + \varepsilon_{i,t}, \quad (5a)$$

where Y is either *ResidualInvest_Positive* or *ResidualInvest_Negative*, *MA* is a measure of managerial ability, *TaxAV* is a measure of tax avoidance, and C is a vector of control variables. All variables are defined in the Appendix. We draw on past literature (Blaylock, 2016; Biddle *et al.*, 2009) to identify several firm-level control variables, which include free cash flow *(FCF),* firm size (*LnAsset*), market-to-book ratio (*MarketBook*), debt-to-assets ratio (*Leverage*), and performance (*ROA*). We also include indicator variables for year and industry. All of the continuous variables are winsorized at the 1st and 99th percentiles. We expect the coefficient on *TaxAV*MA* in model (5a) to be (negative) positive for under-investing (over-investing) firms. We calculate *t*-statistics based on standard errors that are corrected for firm-level clustering and heteroscedasticity for this and all subsequent models.

To provide direct evidence on the test of H1a and H1b, we estimate the following two OLS models by first using *ResidualInvest_Positive* as a dependent variable and then using *ResidualInvest_Negative* as a dependent variable:

$$Y_{i,t} = \alpha_0 + \beta_1 TaxAV_{i,t} + \beta_2 LowMgmtAbility_{i,t} + \beta_3 TaxAV_{i,t}{}^{*} LowMgmtAbility_{i,t} + \Sigma\beta_{j+1} C_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (5b)$$

$$Y_{i,t} = \alpha_0 + \beta_1 TaxAV_{i,t} + \beta_2 HighMgmtAbility_{i,t} + \beta_3 TaxAV_{i,t}{}^{*} HighMgmtAbility_{i,t}{}^{*} + \Sigma\beta_{j+1} C_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (5c)$$

Under H1a, as tax avoidance increases, firms with low managerial ability are expected to display reduced investment efficiency, that is, higher levels of over-investment and under-investment. In an OLS regression for equation (5b) for the over-investment observations, in which the dependent variable is *ResidualInvest_Positive,* we expect a positive coefficient for $\beta_{3;}$ for the under-investment sample in which the dependent variable is *ResidualInvest_Negative,* we expect a negative and significant coefficient for β_3. In contrast, under H1b, as tax avoidance increases, firms with high managerial ability are expected to display increased levels of investment efficiency. In an OLS regression for equation (5c) for the over-investment observations in which the dependent variable is *ResidualInvest_Positive,* we expect a negative coefficient for $\beta_{3'}$ and for the under-investment sample in which the dependent variable is *ResidualInvest_Negative,* we expect a positive coefficient for β_3.

Empirical Model for Test of H2: Corporate Governance

As a test of H2a and H2b, we re-estimate equations models (5b) and (5c) by substituting our measure for managerial ability with three different measures for corporate governance. Specifically, we estimate the following two OLS models by first using *ResidualInvest_Positive* as a dependent variable and then using *ResidualInvest_Negative* as a dependent variable:

$$Y_{i,t} = \alpha_0 + \beta_1 TaxAV_{i,t} + \beta_2 WeakGov_{i,t} + \beta_3 TaxAV_{i,t}{}^{*} WeakGov_{i,t}{}^{*} + \Sigma\beta_{j+1} C_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (6a)$$

$$Y_{i,t} = \alpha_0 + \beta_1 TaxAV_{i,t} + \beta_2 GoodGov_{i,t} + \beta_3 TaxAV_{i,t}{}^{*} GoodGov_{i,t}{}^{*} + \Sigma\beta_{j+1} C_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (6b)$$

We expect the coefficient on *TaxAV*WeakGov* to be positive for model (6a) and the coefficient on *TaxAV*GoodGov* to be negative for model (6b) when the dependent variable is *ResidualInvest_Positive.* In contrast, when the dependent

variable is *ResidualInvest_Negative,* we expect a negative coefficient on *TaxAV*WeakGov* and a positive coefficient on *TaxAV*GoodGov.*

Sample Selection

Table 1 summarizes the sample selection process. The initial sample consists of 214,030 firm-year observations with positive book value for assets in Compustat between 1994 and 2015. We then delete all observations for firms that do not have a managerial ability score as calculated by Demerjian *et al.* (2012), a Bebchuk *et al.* (2009) E-Index, and a Gompers *et al.* (2003) G-Index. We also delete observations without sufficient data to calculate the residual investment variable based on the Richardson (2006) model as used by Blaylock (2016), and the firm's free cash flow (*FCF*) as measured by Blaylock (2016). Next, we delete all firm-year observations for regulated utilities (SIC codes 4900–4999) and financial services organizations (SIC codes 6000–6999), since prior research suggests that firms in these industries do not have the same investment opportunities or strategies as other firms (Richardson, 2006). We also delete observations that do not have sufficient data to calculate a positive value for a firm's market-to-book ratio (*MarketBook*), which included deleting all observations with a negative book value of equity, debt to asset ratio (*DebtAsset*), and return on assets (*ROA*), leaving a sample size of 20,675 firm-year observations. Next, we delete observations that do not have sufficient data for calculating the three measures of tax avoidance: book-tax differences (*BTD*), permanent book-tax differences (*DTAX*), or the probability that the firm has invested in a tax shelter (*TSScore*).

TABLE 1

SAMPLE SELECTION AND RECONCILIATION[a]

	Sample Observations
Observations in the Compustat Database with positive total assets between 1994–2015	214,030
Less observations that did not report managerial ability (MA), G-Index or E-Index	–183,632
Less observations with missing data to calculate residual investment	–2,331
Less observations with data missing to calculate free cash flow	–1,407
Less observations from regulated utilities or financial services	–2,801
Less observations with missing data to calculate control variables	–3,184
Base observations available for OLS analysis	20,675
Base observations available for OLS analysis	20,675
Less observations missing data to calculate BTD	–2,547
Sample with BTD tax avoidance available	18,128
Base observations available for OLS analysis	20,675
Less observations missing data to calculate DTAX	–2,413
Sample with DTAX tax avoidance available	18,262
Base observations available for OLS analysis	20,675
Less observations missing data to calculate TSScore	–2,933
Sample with TSScore available	17,742

[a]BTD = book-tax difference, DTAX = permanent book-tax differences, TSScore = probability that the firm has invested in a corporate tax shelter

As a result, sample sizes for the *BTD, DTAX*, and *TSSCORE* measures are 18,128, 18,26,2 and 17,742 firm-year observations, respectively. Note that for some of the tests, there are fewer observations due to additional data limitations.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 presents summary statistics for the variables used in the regression models. We find a positive median value for *BTD,* which suggest that, on average, firms report more book income than taxable income. Specifically, the median firm with $1.598 billion in assets reports about $108.84 million (1.598 billion * 0.066) of book-tax differences (*BTD*). Since discretionary permanent book-tax differences (*DTAX*) represent residuals from cross-sectional regressions, the mean for this variable is close to zero. The summary univariate statistics for *DTAX* are similar to those reported in prior research (Frank *et al*., 2009). In addition, we find a mean (median) probability of the firm investing in a tax shelter (*TSScore*) to be 83.502.64% (91.90%), which is consistent with prior literature (Wilson, 2009).

TABLE 2

DESCRIPTIVE STATISTICS FOR MAIN VARIABLES IN THE MODELS

Variable[a, b]	N	Mean	Std Dev	25th Pctl	50th Pctl	75th Pctl
Measures of Tax Avoidance						
BTD	18,128	0.068	0.119	0.037	0.066	0.098
DTAX	18,262	0.005	0.100	–0.014	0.003	0.029
TSScore	17,742	0.835	0.201	0.773	0.919	0.974
Measures of Managerial Ability						
MA	20,675	0.011	0.139	–0.073	–0.021	0.052
LowMgmtAbility	20,675	0.250	0.433	0.000	0.000	1.000
HighMgmtAbility	20,675	0.250	0.433	0.000	0.000	1.000
Measures of Corporate Governance						
GScore	20,675	9.181	2.648	7.000	9.000	11.000
WeakGov_G	20,675	0.296	0.457	0.000	0.000	1.000
GoodGov_G	20,675	0.297	0.457	0.000	0.000	1.000
EScore	20,675	2.398	1.272	1.000	2.000	3.000
WeakGov_E	20,675	0.197	0.398	0.000	0.000	0.000
GoodGov_E	20,675	0.282	0.450	0.000	0.000	1.000
DualClass	20,675	0.104	0.306	0.000	0.000	0.000
Control Variables						
FCF	20,675	0.099	0.117	0.036	0.083	0.146
LnAssets	20,675	7.377	1.529	6.312	7.245	8.331
MB	20,675	3.495	5.293	1.494	2.292	3.672
Leverage	20,675	0.185	0.159	0.033	0.169	0.287
ROA	20,675	0.047	0.118	0.017	0.056	0.097

[a]See the Appendix for definitions of the variables.
[b]All continuous variables are winsorized at 1% and 99%.

The mean (median) value for measures of managerial ability (*MA*) is 0.011 (–0.021), similar to the univariate statistics reported by Demerjian *et al.* (2012). We then classify firms in the bottom quartile of managerial ability as firms with low managerial ability (*LowMgmtAbility*), while we classify firms in the top quartile of managerial ability as firms with high managerial ability *(HighMgmtAbility).*

In terms of the measures for corporate governance, the mean (median) E-Index and G-Index for our sample observations are 2.4 (2.0) and 9.2 (9.0), respectively. Once again, this is consistent with prior research. As discussed previously (and following prior research), we classify firms with an E-Index between 0 and 1, and G-Index between 0 and 7, in the bottom quartile as firms with good corporate governance. By the same token, firms with an E-Index between 4 and 6, or G-Index between 11 and 24, in the top quartile, are classified as firms with weak corporate governance. We find that approximately 10.40% of the firms in our sample have dual classes of stock.

The univariate statistics suggest that the mean (median) sample firm has positive free cash flow (*FCF*) of 0.099 (0.083) as a percentage of beginning total assets. Also, the mean firm has a book value of assets of $1.187 billion, demonstrates growth potential with a *MarketBook* ratio of 3.50, is moderately leveraged with a *Leverage* ratio of 0.185, and is profitable with 0.047 *ROA*.

Correlations

Table 3 presents Pearson correlations among the variables used in our regression models. Of the three measures of tax avoidance, only *BTD* is positively and significantly correlated with 'excess' investment (*XInvestment*). In contrast, the correlations between excess investment and our other two measures of tax avoidance, *DTAX* and *TSScore,* are not statistically significant. The pairwise correlations need to be interpreted with caution because they do not take into account the effects of the other (control) variables in the model that may affect the relation between tax avoidance and capital spending. In terms of the control variables, 'excess' capital spending has a significant and positive correlation with free cash flow (*FCF*), size *(LnAssets*), and firm leverage (*Leverage*). In contrast, we find a statistically significant negative correlation between 'excess' investment (*XInvestment*) and return on assets (*ROA*). The correlations among the control variables used in model (2) range from –0.289 to 0.490, which suggests that multicollinearity is not likely to be an issue in our multivariate tests.

Predicted Investment

Table 4, Panel A presents the univariate statistics we used to predict each firm's level of investment in the current year based on variables measured in the previous year. Table 4, Panel B presents the regression results from estimating model (1). For several independent variables (e.g., MB_{t-1}, ROA_{t-1}, $Cash_{t-1}$, and $Investment_{t-1}$), the coefficients generally have the same sign and level of significance as in Blaylock (2016).

TABLE 3

CORRELATIONS AMONG SELECTED VARIABLES[a,b]

	Xinvestment	*BTD*	*DTAX*	*TSScore*	*HighMgmt Ability*	*LowMgmt Ability*	*Good Gov_G*	*Weak Gov_G*	*Good Gov_E*	*Weak Gov_E*	*Dual Class*	*FCF*	*LnAssets*	*MBRatio*	*Leverage*	*ROA*
BTD	**0.036**	1.000														
DTAX	–0.002	**0.280**	1.000													
TSScore	–0.009	**0.184**	**0.247**	1.000												
HighMgmtAbility	**0.050**	0.013	**0.0267**	**0.155**	1.000											
LowMgmtAbility	**–0.024**	**–0.020**	**–0.053**	**–0.025**	**–0.334**	1.000										
GoodGov_G	**–0.023**	–0.005	**–0.027**	**–0.122**	**0.031**	**–0.025**	1.000									
WeakGov_G	0.009	0.012	**0.024**	**0.132**	**–0.041**	**0.020**	**–0.422**	1.000								
GoodGov_E	**–0.023**	–0.006	–0.011	**–0.054**	**0.088**	**–0.035**	**0.576**	**–0.370**	1.000							
WeakGov_E	0.006	–0.009	0.005	**0.054**	**–0.067**	**0.043**	**–0.317**	**0.532**	**–0.311**	1.000						
DualClass	**–0.027**	–0.012	–0.000	**–0.037**	**–0.023**	**0.041**	**0.141**	**–0.122**	**0.186**	**–0.078**	1.000					
FCF	**0.143**	**0.203**	**0.165**	**0.326**	**0.275**	**–0.213**	–0.008	**–0.046**	**0.027**	**–0.055**	**–0.056**	1.000				
LnAssets	**0.069**	**0.062**	**0.107**	**0.597**	**0.223**	**0.067**	**–0.120**	**0.142**	**0.024**	0.017	–0.003	**0.040**	1.000			
MBRatio	0.010	**0.058**	–0.005	**0.043**	**0.139**	**–0.059**	–0.009	**–0.028**	**0.031**	**–0.028**	–0.008	**0.211**	**0.060**	1.000		
Leverage	**0.142**	–0.006	0.008	**–0.099**	**–0.125**	**0.242**	**–0.050**	**0.079**	**–0.053**	**0.083**	**0.052**	**–0.289**	**0.232**	**0.132**	1.000	
ROA	**–0.073**	**0.273**	**0.466**	**0.469**	**0.174**	**–0.163**	**–0.032**	**0.038**	**0.020**	–0.001	–0.010	**0.501**	**0.170**	**0.097**	**–0.159**	1.000

[a]All variables are defined in the Appendix.
[b]Bolded values indicate significance at 1%.

TABLE 4

STATISTICS FOR PREDICTING FIRM INVESTMENT[a, b]

Panel A: Univariate statistics

$Invest_{t-0}$	20,675	0.184	0.164	0.090	0.144	0.225
MB_{t-1}	20,675	3.375	4.584	1.520	2.309	3.661
ROA_{t-1}	20,675	0.049	0.123	0.018	0.057	0.099
$Cash_{t-1}$	20,675	0.170	0.234	0.028	0.087	0.230
Age_{t-1}	20,675	26.151	16.006	12.000	23.000	39.000
$Leverage_{t-1}$	20,675	0.183	0.159	0.031	0.166	0.284
$LnAssets_{t-1}$	20,675	7.306	1.522	6.232	7.153	8.257
$Invest_{t-1}$	20,675	0.190	0.172	0.092	0.148	0.231
$Xinvestment_{t-0}$	20,675	0.000	0.144	–0.066	–0.022	0.030

Panel B: OLS regression predicted investment

Dependent Variable – $Investment_t$

Variables	Coefficients
MB_{t-1}	0.003***
	(13.75)
ROA_{t-1}	0.064***
	(7.36)
$CASH_{t-1}$	0.010*
	(1.96)
AGE_{t-1}	–0.001***
	(–8.78)
$Leverage_{t-1}$	–0.075***
	(–10.19)
$LnAssets_{t-1}$	–0.008***
	(–9.72)
$Investment_{t-1}$	0.261***
	(41.09)
Constant	0.182***
	(25.45)
Observations	20,675
R-squared	0.213

[a]All variables are defined in the Appendix.
[b]Bolded values indicate significance at 1%.

Results: Hypothesis – Managerial Ability (MA)

Table 5 reports the results for model (5a) with either *ResidualInvest_Positive* or *ResidualInvest_Negative* as the dependent variable. In all estimations, we include both year and industry (based on two-digit SIC codes) fixed effects, but do not report their coefficients for brevity.[4] We are interested in the coefficient for the interaction term *TaxAV*MA*. For the firms in the sample that are over-investing, the coefficient for *TaxAV*MA* is negative and significant for each of our three measures of tax avoidance, indicating that as tax avoidance increases, firms with higher managerial ability over-invest less. In contrast, for under-investing firms,

[4] We also tested our results for the presence of heteroscedasticity using White's test or autocorrelation Durbin-Watson *d* statistic. Our diagnostic (unreported) tests suggest that heteroscedasticity or autocorrelation is not a problem in our estimations.

TABLE 5

ESTIMATES OF OLS REGRESSION MANAGERIAL ABILITY AND INVESTMENT EFFICIENCY[a, b]

	Over-invested Firm Observations			Under-invested Firm Observations[c]		
	BTD	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.123***	0.225***	–0.054**	–0.001	0.005	0.002
	(4.03)	(5.55)	(–2.21)	(–0.11)	(0.40)	(0.40)
MA	0.073***	0.049***	0.189***	–0.004**	–0.001	–0.016**
	(9.03)	(6.86)	(5.99)	(–2.06)	(–0.72)	(–2.05)
TaxAV * MA	**–0.163*****	**–0.129****	**–0.157*****	**0.026**#**	**–0.013**	**0.016***
	(–3.48)	**(–2.24)**	**(–4.42)**	**(1.49)**	**(–0.70)**	**(1.81)**
FCF	0.357***	0.415***	0.385***	0.060***	0.066***	0.060***
	(17.32)	(20.41)	(18.61)	(8.63)	(9.64)	(8.47)
LnAssets	–0.008***	–0.008***	0.002	0.007***	0.007***	0.006***
	(–5.29)	(–5.58)	(1.14)	(19.07)	(18.19)	(12.52)
MarketBook	–0.001***	–0.002***	–0.002***	–0.001***	–0.001***	–0.001***
	(–2.87)	(–3.22)	(–3.14)	(–10.84)	(–10.01)	(–10.47)
Leverage	0.311***	0.308***	0.287***	–0.003	–0.002	–0.002
	(20.17)	(20.51)	(18.30)	(–0.98)	(–0.49)	(–0.51)
ROA	–0.300***	–0.378***	–0.198***	–0.042***	–0.037***	–0.044***
	(–14.56)	(–16.74)	(–9.01)	(–6.24)	(–5.17)	(–6.28)
Constant	0.068***	0.079***	0.050**	–0.107***	–0.107***	–0.102***
	(3.91)	(4.62)	(1.98)	(–26.70)	(–27.02)	(–17.63)
Observations	6,859	6,860	6,729	11,269	11,402	11,013
R-squared	0.136	0.150	0.146	0.125	0.126	0.123

[a]All variables are defined in the Appendix.
[b]*T*-statistics using robust standard errors clustered by firm are in parentheses.
[c]For the first (last) three columns of Table 5, the dependent variable is *ResidualInvest_Positive*, (*ResidualInvest_Negative*). The independent variables of interest were *BTD, DTAX,* and *TSScore.* In the last three columns of Table 5, the dependent variable was *ResidualInvest_Negative*, the amount by which under-invested firms were below their predicted level of investment.
***indicates significance at 1%, **indicates significance at 5%, *indicates significance at 10%, and
#indicates significance at 10% with a signed prediction.

there is some evidence that as tax avoidance increases, firms with higher ability management display higher levels of investment efficiency, with a positive and significant coefficient for the interaction of *TSScore*MA* and a positive and marginally significant coefficient for the interaction of *BTD*MA*.

The coefficients on the control variables are generally consistent with expectations and findings from prior research. Consistent with both Richardson (2006) and Blaylock (2016), we find a positive and significant coefficient for *FCF,* which indicates that higher levels of free cash flow are generally associated with over-investment. For the over-invested firms, the coefficient on *LnAsset* is negative, indicating that firms with higher book value of assets are associated with smaller positive residuals from predicted investment. In contrast, for the under-invested firms, the coefficient on *LnAssets* is positive, indicating that under-invested firms are more likely to have investment residuals close to 0. The coefficients for the variable measuring the firm's market to book ratio (*MarketBook*) and the variable return on assets (*ROA*) are negative and

significant, indicating that increases in these two variables are likely to result in less over-investment but greater under-investment. Finally, we find a positive and significant coefficient for the variable *Leverage*, which indicates that firms with higher leverage are more likely to have greater values for over-investment.

Results: Low and High Managerial Ability

Table 6, Panel A reports the results for model (2b) with *ResidualInvest_Positive* as the dependent variable. Once again, we include both year and industry (based on two-digit SIC codes) fixed effects. In terms of the hypothesis, we are primarily interested in the coefficient for the interaction term *TaxAV*LowMgmtAbility*, along with the results for *TaxAV*HighMgmtAbility.* We find positive and significant coefficients for *TaxAV*LowMgmtAbility* for each of the three measures of tax avoidance, indicating that firms with low managerial ability (based on Demerjian *et al.*'s [2012] managerial ability score) will report greater levels of over-investment as tax avoidance increases. In contrast, for two of the three tax avoidance measures, as tax avoidance increases, firms with high managerial ability report lower levels of over-investment.

Table 6, Panel B reports the results for the under-investing sample using *ResidualInvest_Negative* as the dependent variable. The coefficient for *TaxAV*LowMgmtAbility* is negative and significant when *BTD* is used as the measure of tax avoidance (coefficient = –0.030 with *t*-value = –2.86**).** In addition, we find a negative and marginally significant coefficient when *TSScore* is used as the measure of tax avoidance (coefficient = –0.008 with *t*-value = –1.44). These results indicate that as these two different measures of tax avoidance increase, firms with low managerial ability, as measured by Demerjian *et al.* (2012), will have greater deviations from the predicted investment. For the firms with high managerial ability as measured by Demerjian *et al.* (2012), we only find a positive and significant coefficient when *TSScore* is the measure of tax avoidance.

Results – Corporate Governance

In this section, we report the regression results for the test of H2. Table 7, Panel A reports results for the OLS regression with *ResidualInvest_Positive* as the dependent variable and *TaxAV*Weak_Gov_E* along with *TaxAV*Good_Gov_E* as the primary variables of interest. In this table, we find moderate support for the hypothesis that as tax avoidance increases, firms with weak corporate governance will generally report higher levels of over-investment. Specifically, when *DTAX* is the proxy for tax avoidance, we find a positive and significant coefficient for the interaction term *TaxAV* Weak_Gov_E* (coefficient = 0.104 with *t*-value = 2.24). We also find a positive and marginally significant coefficient for the interaction term *TaxAV*Weak_Gov_E* when *BTD* is the proxy for tax avoidance (coefficient = 0.075 and *t*-value = 1.64). In contrast, we find little evidence that as tax avoidance increases, firms with good corporate governance and low managerial entrenchment display reduced levels of over-investment. Here, only the coefficient for *TaxAV*Good_Gov_E* is negative when *BTD* is the proxy for tax avoidance.

TABLE 6

ESTIMATES OF OLS REGRESSION LOW AND HIGH MANAGERIAL ABILITY AND INVESTMENT EFFICIENCY[a, b]

Panel A: Over-invested[c]	*BTD*	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.010	0.128***	–0.163***	0.062***	0.153***	–0.133***
	(0.58)	(5.54)	(–9.41)	(3.48)	(6.10)	(–7.94)
LowMgmtAbility	–0.039***	–0.025***	–0.098***			
	(–6.74)	(–5.10)	(–4.79)			
TaxAV*LowMgmtAbility	**0.072****	**0.086***	**0.080*****			
	(2.10)	**(1.93)**	**(3.40)**			
HighMgmtAbility				0.038***	0.023***	0.063***
				(6.78)	(4.52)	(2.81)
TaxAV*HighMgmtAbility				**–0.117*****	**–0.014**	**–0.043***
				(–3.68)	**(–0.36)**	**(–1.72)**
Control Variables	YES	YES	YES	YES	YES	YES
Observations	6,859	6,860	6,729	6,859	6,860	6,729
R-squared	0.132	0.147	0.143	0.132	0.146	0.140
Panel B: Under-invested[c]	*BTD*	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.021***	–0.001	0.013***	–0.009***	–0.007***	–0.028***
	(3.72)	(–0.22)	(3.28)	(–5.84)	(–5.69)	(–4.69)
LowMgmtAbility	0.001	–0.002*	0.005			
	(0.41)	(–1.78)	(1.09)			
TaxAV*LowMgmtAbility	**–0.030*****	**–0.003**	**–0.008**[#]			
	(–2.86)	**(–0.25)**	**(–1.44)**			
HighMgmtAbility				0.011**	0.000	0.006
				(2.00)	(0.03)	(1.63)
TaxAV*HighMgmtAbility				**0.005**	**–0.014**	**0.023*****
				(0.40)	**(–1.14)**	**(3.35)**
Control Variables	YES	YES	YES	YES	YES	YES
Observations	11,269	11,402	11,013	11,269	11,402	11,013
R-squared	0.125	0.127	0.123	0.128	0.129	0.127

[a]All variables are defined in the Appendix.
[b]*T*-statistics using robust standard errors clustered by firm are in parentheses.
[c]In Table 6, Panel A (Panel B), the dependent variable is *ResidualInvest_Positive* (*ResidualInvest_Negative)*. The independent variables of interest are the interaction of *TaxAV*LowMgmtAbility* and *TaxAV*HighMgmtAbility*.
***indicates significance at 1%, **indicates significance at 5%, *indicates significance at 10%, and
[#]indicates significance at 10% with a signed prediction.

In Table 7, Panel B, where the dependent variable is *Negative_ResidualInvest*, and which comprises a sample of under-investing firms, we find moderate support for the hypothesis that as tax avoidance increases, firms with weak corporate governance, in the form of high managerial entrenchment, will report lower levels of investment efficiency. Specifically, for the interaction term *TaxAV* Weak_Gov_E,* we find a negative and statistically significant coefficient when *DTAX* is the proxy for tax avoidance (coefficient = –0.038 with t-value = –2.67), along with a negative and marginally significant coefficient when *TSScore* is the proxy for tax avoidance (coefficient = –0.10 with t-value = –1.56). In contrast, the results from Table 6, Panel B indicate relatively strong support that as tax avoidance increases, firms with good corporate governance in the form of lower managerial entrenchment increase their

TABLE 7

ESTIMATES OF OLS REGRESSION FOR BEBCHUK MANAGERIAL ENTRENCHMENT AND INVESTMENT EFFICIENCY[a, b]

Panel A: Over-invested	*BTD*	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.026*	0.121***	–0.139***	0.063***	0.139***	–0.143***
	(1.80)	(5.42)	(–8.51)	(3.47)	(5.91)	(–8.48)
Weak_Gov_E	–0.011*	–0.007	0.003			
	(–1.83)	(–1.45)	(0.10)			
TaxAV * Weak_Gov_E	**0.075#**	**0.104****	**–0.006**			
	(1.64)	**(2.24)**	**(–0.21)**			
Good_Gov_E				0.013**	0.006	–0.009
				(2.47)	(1.24)	(–0.48)
TaxAV * Good_Gov_E				**–0.072*****	**0.000**	**0.013**
				(–2.61)	**(0.01)**	**(0.63)**
FCF	0.376***	0.438***	0.404***	0.375***	0.437***	0.404***
	(18.83)	(22.31)	(20.06)	(18.81)	(22.22)	(20.07)
LnAssets	–0.005***	–0.006***	0.004*	–0.006***	–0.006***	0.003*
	(–3.76)	(–4.32)	(1.92)	(–3.86)	(–4.47)	(1.85)
MarketBook	–0.001**	–0.002***	–0.001***	–0.001**	–0.002***	–0.001***
	(–2.31)	(–3.22)	(–2.91)	(–2.40)	(–3.22)	(–2.89)
Leverage	0.276***	0.283***	0.256***	0.277***	0.283***	0.256***
	(18.74)	(19.67)	(17.04)	(18.81)	(19.65)	(17.04)
ROA	–0.308***	–0.375***	–0.196***	–0.304***	–0.374***	–0.197***
	(–15.74)	(–17.24)	(–9.30)	(–15.66)	(–17.19)	(–9.32)
Constant	0.082***	0.075***	0.132***	0.077***	0.074***	0.136***
	(4.74)	(4.32)	(7.20)	(4.45)	(4.26)	(7.12)
Observations	7,198	7,178	7,060	7,198	7,178	7,060
R-squared	0.125	0.143	0.134	0.125	0.142	0.134
Panel B: Under-invested	*BTD*	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.014***	0.004	0.012***	0.009*	–0.011*	0.004
	(2.94)	(0.63)	(3.12)	(1.69)	(–1.69)	(1.14)
Weak_Gov_E	0.004**	0.004***	0.012**			
	(2.54)	(3.30)	(2.06)			
TaxAV * Weak_Gov_E	**–0.008**	**–0.038*****	**–0.010#**			
	(–0.51)	**(–2.67)**	**(–1.56)**			
Good_Gov_E				–0.006***	–0.006***	–0.017***
				(–4.83)	(–5.44)	(–4.04)
TaxAV * Good_Gov_E				**0.013#**	**0.033*****	**0.015*****
				(1.35)	**(2.98)**	**(2.98)**
FCF	0.061***	0.064***	0.059***	0.062***	0.065***	0.059***
	(9.64)	(10.14)	(8.68)	(9.66)	(10.20)	(8.70)
LnAssets	0.007***	0.007***	0.006***	0.007***	0.007***	0.006***
	(19.77)	(18.87)	(13.29)	(19.85)	(19.05)	(13.37)
MarketBook	–0.001***	–0.001***	–0.001***	–0.001***	–0.001***	–0.001***
	(–13.60)	(–12.54)	(–13.09)	(–13.61)	(–12.52)	(–13.12)
Leverage	–0.003	–0.002	–0.001	–0.003	–0.002	–0.001
	(–0.76)	(–0.53)	(–0.29)	(–0.87)	(–0.69)	(–0.39)
ROA	–0.044***	–0.038***	–0.045***	–0.044***	–0.038***	–0.044***
	(–6.94)	(–5.48)	(–6.69)	(–6.91)	(–5.50)	(–6.52)

TABLE 7

CONTINUED

Panel B: Under-invested	*BTD*	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
Constant	–0.114***	–0.115***	–0.117***	–0.111***	–0.113***	–0.109***
	(–28.58)	(–27.95)	(–27.84)	(–27.99)	(–27.47)	(–24.73)
Observations	11,841	11,932	11,557	11,841	11,932	11,557
R-squared	0.129	0.130	0.127	0.130	0.132	0.128

[a]All variables are defined in the Appendix.
[b]*T*-statistics using robust standard errors clustered by firm are in parentheses.
***indicates significance at 1%, **indicates significance at 5%, *indicates significance at 10%, and
#indicates significance at 10% with a signed prediction.

level of investment closer to predicted levels. The interaction term for *TaxAV* Good_Gov_E* is positive and significant when *DTAX* and *TSScore* are the proxies for tax avoidance, while the interaction term *TaxAV* Good_Gov_E* is positive and marginally significant when *BTD* is the proxy for tax avoidance.

In Table 8, Panels A and B, we replace the Bebchuk *et al.* (2009) measure of corporate governance based on managerial entrenchment with the Gompers *et al.* (2003) measure of corporate governance based on a wider variety of corporate governance attributes. Once again, the variables of interest are the interaction terms, *TaxAV*Weak_Gov_G* and *TaxAV*Good_Gov_G*. Table 8, Panel A consists of the observations from the over-investment sample. The results indicate that as tax avoidance measured by *BTD* or *DTAX* increases, firms with weak corporate governance are more likely to over-invest. In contrast, in the over-investment sample, we find negative coefficients for *TaxAV*Good_Gov_G* when *BTD* or *DTAX* are the proxies for tax avoidance. The results from Table 8, Panel B suggest that for the under-investing sample, as tax avoidance increases, weak or good corporate governance does not affect the level of the firm's under-investment or investment efficiency.

In Table 9, we replace the indicator variables for *Weak_Gov* or *Good_Gov* with an indicator variable if the firm reported a dual class of stock during the year. The results from the interaction term *DualClass*TaxAV* are generally consistent with the other governance proxies used in this study. Specifically, in examining the over-invested sample, as tax avoidance in the form of *BTD* or *DTAX* increase and the firm has a dual class of stock, over-investment also increases. In contrast, for the under-invested sample, as tax avoidance in the form of *DTAX* increases, the firm reports larger negative residuals from predicted levels of investment.

CONCLUSION

To our knowledge, our paper is the first to examine the impact of managerial ability on the relation between tax avoidance and investment efficiency.

TABLE 8

ESTIMATES OF OLS REGRESSION FOR GOMPERS *ET AL.* METRIC OF QUALITY OF CORPORATE GOVERNANCE AND INVESTMENT EFFICIENCY[a, b]

Panel A: Over-investment	*BTD*	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.024	0.117***	–0.126***	0.081***	0.164***	–0.138***
	(1.64)	(5.08)	(–7.71)	(4.15)	(6.80)	(–7.87)
Weak_Gov_G	–0.016***	–0.009**	0.071***			
	(–2.81)	(–2.03)	(2.89)			
TaxAV * Weak_Gov_G	**0.110****	**0.099****	**–0.085*****			
	(2.38)	**(2.26)**	**(–3.13)**			
Good_Gov_G				0.016***	0.010**	0.007
				(3.14)	(2.32)	(0.41)
TaxAV * Good_Gov_G				**–0.096*****	**–0.076****	**–0.003**
				(–3.55)	**(–2.11)**	**(–0.12)**
Control Variables	YES	YES	YES	YES	YES	YES
Observations	7,198	7,178	7,060	7,198	7,178	7,060
R-squared	0.125	0.143	0.135	0.126	0.143	0.134
Panel B: Under-investment	*BTD*	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.011**	0.001	0.009**	0.012**	–0.006	0.004
	(2.16)	(0.15)	(2.35)	(2.14)	(–0.94)	(1.08)
Weak_Gov_G	0.006***	0.008***	0.006			
	(4.66)	(7.40)	(1.09)			
Weak_Gov_G * TaxAV	**0.013**	**–0.011**	**0.001**			
	(1.16)	**(–0.91)**	**(0.20)**			
Strong_Gov_G				–0.006***	–0.007***	–0.017***
				(–5.34)	(–6.34)	(–4.08)
TaxAV * Good_Gov_G				**0.003**	**0.013**	**0.013*****
				(0.31)	**(1.24)**	**(2.74)**
Control Variables	YES	YES	YES	YES	YES	YES
Observations	11,841	11,932	11,557	11,841	11,932	11,557
R-squared	0.132	0.133	0.129	0.131	0.132	0.129

[a]All variables are defined in the Appendix.
[b]*T*-statistics using robust standard errors clustered by firm are in parentheses.
***indicates significance at 1%, **indicates significance at 5%, *indicates significance at 10%, and
#indicates significance at 10% with a signed prediction.

Specifically, we examine the conditioning effects of managerial ability and corporate governance on the relation between tax avoidance and investment efficiency. We document that as tax avoidance increases, firms with low (high) managerial ability exhibit greater (smaller) deviations from predicted levels of investment. In other words, we show that as tax avoidance increases, high managerial ability promotes investment efficiency, while low managerial ability exacerbates investment *in*efficiency. Similarly, we show that as tax avoidance increases, corporate governance is associated with investment efficiency; that is, strong (weak) corporate governance increases (decreases) investment efficiency. Nevertheless, we acknowledge that the statistical associations we document are contingent on our ability to measure the constructs of investment efficiency, tax avoidance, and managerial ability.

TABLE 9

ESTIMATES OF OLS REGRESSION FOR DUAL CLASS OF STOCK AND INVESTMENT EFFICIENCY[a, b]

	Over-invested Firm Observations			Under-invested Firm Observations		
	BTD	*DTAX*	*TSScore*	*BTD*	*DTAX*	*TSScore*
TaxAV	0.024*	0.128***	–0.140***	0.012***	0.002	0.010***
	(1.68)	(5.96)	(–8.71)	(2.64)	(0.28)	(2.75)
DualClass	–0.008	0.005	0.002	–0.005***	–0.004***	–0.010
	(–1.02)	(0.76)	(0.07)	(–2.75)	(–2.87)	(–1.53)
TaxAV * DualClass	**0.168*****	**0.166****	**0.001**	**0.016**	**–0.035****	**0.007**
	(2.88)	**(2.36)**	**(0.03)**	**(0.86)**	**(–2.07)**	**(0.85)**
FCF	0.376***	0.437***	0.404***	0.060***	0.063***	0.058***
	(18.86)	(22.27)	(20.09)	(9.46)	(9.99)	(8.55)
LnAssets	–0.006***	–0.006***	0.004*	0.007***	0.007***	0.006***
	(–3.79)	(–4.36)	(1.95)	(19.66)	(18.81)	(13.14)
MarketBook	–0.001**	–0.001***	–0.001***	–0.001***	–0.001***	–0.001***
	(–2.22)	(–3.08)	(–2.87)	(–13.70)	(–12.69)	(–13.22)
Leverage	0.276***	0.282***	0.256***	–0.002	–0.001	0.000
	(18.71)	(19.60)	(17.03)	(–0.51)	(–0.22)	(0.11)
ROA	–0.308***	–0.375***	–0.196***	–0.043***	–0.037***	–0.045***
	(–15.81)	(–17.24)	(–9.29)	(–6.85)	(–5.33)	(–6.60)
Constant	0.081***	0.074***	0.133***	–0.112***	–0.114***	–0.112***
	(4.68)	(4.26)	(8.69)	(–28.29)	(–27.74)	(–33.00)
Observations	7,198	7,178	7,060	11,841	11,932	11,557
R-squared	0.125	0.143	0.133	0.129	0.130	0.127

[a]All variables are defined in the Appendix.
[b]*T*-statistics using robust standard errors clustered by firm are in parentheses.
***indicates significance at 1%, **indicates significance at 5%, *indicates significance at 10%, and # indicates significance at 10% with a signed prediction.

Collectively, our findings are consistent with the notion posited by Desai and Dharmapala (2006, 2008, 2009) and Desai *et al.* (2007) that tax avoidance represents more than a simple transfer of resources from the state to shareholders. Rather, we show that tax avoidance may be expected to benefit shareholders only under conditions of high managerial ability and/or good governance. By contrast, under conditions of low managerial ability and/or poor governance, managers are more likely to use tax avoidance not to increase shareholder value but to facilitate rent extraction, broadly defined as managerial opportunism, including empire building. Overall, our study contributes to the ongoing debate about the consequences of tax avoidance for shareholders as well as to the growing literature on the role of managerial ability and corporate governance in the relation between tax avoidance, managerial opportunism, and firm performance.

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APPENDIX

VARIABLE DEFINITIONS

Name	Definition
ResidualInvest	Residuals from predicted investment regression using the model from Richardson (2006) along with Blaylock (2016) and estimated by industry and year. $Investment_{i,t} = \alpha + \beta_1 MBRatio_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1} + \beta_5 Leverage_{i,t-1} + \beta_6 LnAsset_{i,t-1} + \beta_7 Investment_{i,t-1} + Year\ fixed\ effect + Industry\ fixed\ effects + \varepsilon_{i,t}$ (1) *Investment* = Capital Expenditures (*CAPX*) + Acquisitions (*AQC*) + Research and Development Expenditures (*XRD*) – Cash Proceeds from the Sale of Property Plant and Equipment (*SPPE*) + Depreciation (*DPC*). This value is scaled by the book value of assets in year $t - 1$. Missing values for CAPX, AQC, XRD, SPPE, or DPC are set equal to 0. *ResidualInvest* is calculated as the error term from this regression equation. In this equation, *Investment* is the firm's investment in the current year (see definition above). *MBRatio* is the firm's prior year market-to-book ratio. *ROA* is return on assets. *Cash* is cash and cash equivalents, scaled by book value of assets from two years ago. *Age* is the number of years the firm has reported data in Compustat. *Leverage* is long-term debt scaled by book value of assets. *LnAssets* is log of book value of assets. *Year Fixed Effect* is an indicator variable for the year of the observation. *Industry Fixed Effect* is an indicator variable for the industry of the observation based on 2-digit SIC codes.
ResidualInvest_Positive	The positive value from the error term in the *ResidualInvest* equation. Higher positive values indicate the firm is undertaking greater levels of over-investment. Negative values of *ResidualInvest_Positive* are eliminated.
ResidualInvest_Negative	The negative value from the error term in the *ResidualInvest* equation. More negative values (values further from 0) indicate that the firm is undertaking greater levels of under-investment. Positive values of *ResidualInvest_Negative* are eliminated.
XInvestment	Residuals from predicted levels of investment.
Tax Avoidance Variables	
TaxAV	Tax avoidance operationalized by three measures: book-tax differences (*BTD*), discretionary permanent book-tax differences (*DTAX*), and likelihood of participating in a tax shelter (*TSScore*).
BTD	Book income less taxable income defined as in Desai and Dharmapala (1996). Higher values of BTD indicate greater levels of tax avoidance. We winsorize this measure at the 1st and 99th percentiles.
DTAX	Discretionary permanent book-tax differences (DTAX). Higher values of DTAX indicate the firm has higher estimated values for permanent book-tax differences. DTAX is calculated as the residual from the following regression, estimated by year and two-digit (SIC) code: $PERM\_BTD_{it} = \alpha_0 + \alpha_1(1/AT_{it-1}) + \alpha_2 INTANG_{it} + \alpha_3 UNCON_{it} + \alpha_4 MI_{it} + \alpha_5 CSTE_{it} + \alpha_6 NOL_{it} + \alpha_7 LAGPERM_{it} + \varepsilon_{it}$, where *PERM_BTD* = book income minus estimated taxable income, minus deferred tax expenses, scaled by beginning book value of assets;

APPENDIX (Continued)

	AT = total assets at year *t*–1; INTANG = goodwill and other intangibles divided by total assets at year *t*–1; UNCON = income (loss) reported under the equity method, divided by total assets at year *t*–1; MI = income (loss) attributable to minority interest, scaled by beginning-of-year assets; CSTE = current state tax expense scaled by beginning-of-year assets; NOL = change in net operating loss carryforwards scaled by beginning-of-year assets; LAGPERM = PERM_BTD in year *t*–1.
TSScore	Firm-year likelihood of the company being involved in a tax shelter (Wilson, 2009): $Shelter\_Hat = 4.86 + 5.20*BTD + 4.08*DAP - 1.41*Leverage + 0.76*Size + 3.51*ROA + 1.72*Foreign\ Income + 2.42*R\&D + \varepsilon$, where: *BTD* = the firm's estimated book-tax differences; *DAP* = a measure of performance-adjusted discretionary accruals calculated using a cross-sectional modified Jones (1991) model; *Leverage* = long-term debt divided by total assets; *Size* = log of total assets; *ROA* = net income divided by total assets; *Foreign* = an indicator variable equal to 1 for firms with foreign income, 0 otherwise; *RD* = a firm's research and development expenses scaled by total assets. Following Wilson (2009), we then calculated the probability that the firm invested in a tax shelter as = $e^{(Shelter\_Hat)} / (1 + e^{(Shelter\_Hat)})$.
Corporate Governance Variables	
MA	Managerial ability as defined by Demerjian *et al.* (2012).
LowMgmtAbility	Indicator value equal to 1 if the firms reports a value for managerial ability (MA) in the lowest quartile. Otherwise, this variable is set equal to 0.
HighMgmtAbility	Indicator value equal to 1 if the firms reports a value for managerial ability (MA) in the highest quartile. Otherwise, this variable is set equal to 0.
GoodGov_G	Indicator variable equal to 1 if the firm reported a Gompers *et al.* (2003) corporate governance index (G-Index) of 7 or less. If firm reported a G-Index greater than or equal to 8 and less than 24, the variable is set equal to 0.
WeakGov_G	Indicator variable equal to 1 if the firm reported a G-Index greater than or equal to 11 and less than 24. If firm reported an index greater than or equal to 0 and less than or equal to 10, the variable is set equal to 0.
GoodGov_E	Indicator variable equal to 1 if the firm reported a Bebchuk *et al.* (2009) managerial entrenchment E-Index of 0 or 1. If firm reported an E-Index greater or equal to 2 and less than or equal to 6, the variable is set equal to 0.
WeakGov_E	Indicator variable equal to 1 if the firm reported a Bebchuk *et al.* (2009) managerial entrenchment E-Index greater than or equal to 3 and less than 6. If firm reported an E-index less than or equal to 2 and greater than or equal to 0, the variable is set equal to 0.
DualClass	Indicator variable equal to 1 if the firm had dual classes of stock outstanding during the year. Otherwise, the value of this variable is set equal to 0.
Control Variables	
FCF	Free cash flow, defined as cash flow from operations (*OANCF*) plus research and development expenditures (*XRD*), minus depreciation (*DP*), and scaled by beginning-of-year assets minus predicted investment.

APPENDIX (Continued)

LnAsset	The log of the book value of the firm's total assets.
MarketBook	Market value of equity (*PRCC_F*CSHO*) divided by book value of equity (*CEQ*). Observations with negative values for *CEQ* are deleted.
DebtAsset	Ratio of long-term debt (*DLTT*) to book value of assets (*AT*) at the beginning of the year.
ROA	Current year net income (*IB*) scaled by beginning-of-year book value of assets.
Additional Definitions	
Age	Age of firm proxied by number of years the firm has been covered by Compustat.
Year Fixed Effects	Indicator variable set equal to 1 if the observation occurred in a particular year, otherwise 0.
Industry Fixed Effects	Indicator variable set equal to 1 if the observation occurred in a particular (2-digit) SIC industry code, otherwise 0.