How Does Tax Avoidance Affect Corporate Transparency?

Congcong Li
School of Accountancy
Singapore Management University
ccli@smu.edu.sg

Mark (Shuai) Ma
Kogod School of Business
American University
Shuaim@american.edu

Thomas C. Omer
School of Accountancy
University of Nebraska– Lincoln
thomas.omer@unl.edu

Kunpeng Sun
School of Economics and Management
Tsinghua University
Sunkp.15@sem.tsinghua.edu.cn

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ABSTRACT

This study examines how tax avoidance affects corporate transparency. Using a large sample of U.S. firms from 1995 to 2016, we find a significant non-linear effect of tax avoidance on transparency. That is, when a firm's tax avoidance is low, an increase in tax avoidance improves transparency; however, when a firm's tax avoidance is high, an increase in tax avoidance decreases transparency. These results are robust to using alternative measures of transparency and tax avoidance and in several additional tests. Overall, the findings suggest that the effect of tax avoidance on transparency depends on the aggressiveness of firms' tax avoidance behavior. Our study contributes to the literature on the economic consequences of tax avoidance.

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1. Introduction

This study examines how corporate tax avoidance affects corporate transparency. The mixed evidence from the prior literature on the effect of tax avoidance on financial reporting quality and corporate transparency motivates our examination of this association. On the one hand, several studies suggest that tax avoidance lowers corporate transparency because of agency problems or operational complexity. For example, the agency theory of tax avoidance suggests that firms manipulate financial statements to hide their rent extraction behavior using complex tax strategies (e.g., Desai 2005 ; Desai and Dharmapala 2006). Consistent with this agency view, Kim et al. (2011) find that tax avoidance increases stock price crash risk. However, on the other hand, tax avoidance creates cash savings and increases bottom line income, increasing returns to investment and reducing the need for managers to manipulate earnings to achieve earnings targets (e.g., Dhaliwal et al. 2004 and Cook et al. 2008). Also, because of career concerns and other incentives (e.g., Kothari et al. 2009), managers make forthright disclosures about the improved performance resulting from tax avoidance activities.[1] Thus, tax avoidance could improve corporate transparency.

We suggest that the effect of tax avoidance on corporate transparency depends on the aggressiveness of firms' tax avoidance behavior. Following Hanlon and Heitzman (2010), our definition of tax avoidance is the continuum of tax-planning activities intended to reduce firms' explicit tax burdens. Along this continuum, tax activities are more or less aggressive. Less aggressive tax avoidance activities (e.g., investment in municipal bonds, use of net loss carryover or incentive-based management compensation) are not complex and thus do not significantly

[1] Prior studies (e.g., Kothari et al. 2009) suggest that managers tend to withhold bad news about firm performance and disclose good news more promptly. Thus, when tax avoidance improves earnings and cash flows, managers are more likely to communicate with investors through enhanced disclosure, increasing transparency.

increase agency costs. However, more aggressive tax avoidance activities (e.g., tax sheltering) are inherently complex and could lead to managerial rent extractions potentially offsetting the cash tax savings. Therefore, we expect that when tax avoidance is low and less aggressive, tax avoidance increases corporate transparency because managers have incentives to disclose improved performance. However, when firms engage in more tax avoidance activities that are also more aggressive,[2] we expect that managers have greater incentives to obfuscate these activities to reduce scrutiny from tax authorities or to limit shareholder scrutiny of resource extraction for personal gain. In this setting, we expect that corporate transparency to decrease when managers use more aggressive tax avoidance activities.

We use a sample of U.S. firms from 1995 to 2016 to examine the association between tax avoidance and corporate transparency. We construct three measures representing the continuum of tax avoidance based on GAAP, current, and cash effective tax rates. GAAP effective tax rates represent firms' tax avoidance behavior that affects reported earnings. Current effective tax rates further represent the effect of tax deferral strategies beyond GAAP effective tax rates. Cash effective tax rates represent actual cash taxes paid. Consistent with the prior literature we multiply our effective tax rates by minus one. Thus, higher levels of these measures indicate greater tax avoidance. We also use several alternative measures of financial reporting quality and transparency. We proxy for high corporate transparency using low absolute value and standard deviation of discretionary accruals, a low probability of accounting restatements, small analyst forecast errors, low audit fees, low stock price synchronicity (a negative measure of stock price informativeness), small bid-ask spread, and low stock price crash risk. These different measures complement each

[2] Prior studies provide evidence that firms engage in more tax avoidance activities on the more aggressive end when the overall tax avoidance level increases. For example, Kim et al. (2011) show that a signficant positive correlation between tax sheltering probability and long run ETR.

other because they represent corporate transparency using accounting outcomes, third-party reactions, and stock price behavior.

Using our proxies for corporate transparency, we first examine the association between tax avoidance and corporate transparency assuming a linear association which is an assumption common to prior studies. After controlling for other determinants, we find associations between tax avoidance and higher absolute value and standard deviation of discretionary accruals, larger analyst forecast errors, higher audit fees, lower stock price informativeness, higher stock price synchronicity and higher stock price crash risk. These results are consistent with increased tax avoidance and lower corporate transparency. In contrast to results using our other transparency measures, we find an association between tax avoidance and a lower probability of restatements, which suggests higher corporate transparency. This result is consistent with Lennox et al. (2013).

We next examine whether the level of corporate transparency varies with the level of tax avoidance. If corporate transparency differs with the level of tax avoidance, we expect a non-linear association between tax avoidance and corporate transparency. We find evidence of a non-linear association between tax avoidance and corporate transparency across all the alternative transparency measures. Thus, for firms with low tax avoidance (which is likely less aggressive), corporate transparency increases with increases in tax avoidance. These results are consistent with managers disclosing information about additional cash tax savings and improved performance when they increase their avoidance from low levels. However, for firms with high tax avoidance (which is likely more aggressive), we find that increases in tax avoidance reduce corporate transparency consistent with managers obfuscating those activities from tax authorities and shareholders. Overall, these results suggest that corporate transparency varies with the level and likely aggressiveness of firms' tax avoidance activities.

We conduct several additional analyses to support our results. First, we include firm fixed effects to control for time-insensitive omitted variables. Second, the Sarbanes-Oxley Act of 2002 (SOX) constrained firms' ability to manipulate earnings using accruals. Our results are consistent using a subsample of observations after 2002. Third, we find consistent results using alternative measures of tax avoidance. Fourth, using change tests, we still find that increases in tax avoidance improve transparency when tax avoidance is low. When tax avoidance is high, increases in tax avoidance reduce transparency. Finally, tax avoidance also has a non-linear effect on corporate transparency of the next year.

We make several contributions to the literature. First, we contribute to the literature on the interaction of financial and tax reporting (e.g.,Hope et al. 2013 ; Law and Mills 2015 ; Kubick et al. 2016). Our results suggest that the relation between tax reporting and financial reporting depend on the aggressiveness of a firm's tax avoidance. Thus, our study presents implications of tax avoidance for analyzing firms' information risk. This study provides initial evidence on the point at which tax avoidance reduces corporate transparency and thus information available to investors. Second, our study contributes to the growing literature on the agency costs of tax avoidance (e.g.,Desai 2005 ; Desai and Dharmapala 2006). What is unknown in the literature is the point at which managers reduce information available to investors and tax authorities because of their tax avoidance activities. We also provide evidence on the level of tax avoidance at which agency problems or efforts to reduce tax authorities' scrutiny of tax activities increase. Future research on the agency costs of tax avoidance should focus on the subsample of firms with tax avoidance at least as high as that suggested in this study. Third, we contribute to the literature on consequences to shareholders and tax authorities of firms' tax avoidance activities. The last decade witnessed an increase in corporate tax avoidance, and the increase has attracted significant attention from

scholars and regulators. While most prior accounting studies focus on the determinants of tax avoidance, the consequences of tax avoidance are relatively under-explored (e.g., Hanlon and Heitzman 2010). Our results suggest that the increased tax avoidance has affected the quality of information available to shareholders and regulators. Our study relates to the literature examining tax avoidance and the cost of equity capital. The prior literature suggests that increased avoidance lowers the cost of equity capital (e.g., Goh et al. 2016) but increases costs of debt capital (e.g., Hasan et al. 2014 ; Shevlin et al. 2013). A recent study by Cook et al. (2014) finds a non-linear association between tax avoidance and the cost of equity. Given the effect of corporate transparency on the cost of equity, our findings are consistent with the non-linear effect noted in Cook et al. (2014).

We organize the remainder of the paper as follows. Section 2 provides relevant literature and develops our hypotheses. Section 3 describes the data and regression models. We provide results in Section 4, and Section 5 provides additional analyses. Section 6 concludes.

2. Literature Review and Hypothesis

2.1 Prior studies on tax avoidance

Corporate tax avoidance has increased over the last three decades; for example, Dyreng et al. (2017)find that cash effective tax rates have decreased by approximately 10 percent over a 25-year period from 1988 to 2012. This trend in tax avoidance has attracted attention from investors, regulators, and scholars. The prior tax avoidance literature focuses determinants of tax avoidance. Studies have examined ownership structure (Chen et al. 2010 ;Badertscher et al. 2013), individual managers (Dyreng et al. 2010), equity incentive compensation (Rego and Wilson 2012), foreign operation (Rego 2003 ;Dyreng and Lindsey 2009), business strategies and product market power (Higgins et al. 2015 ; Kubick et al. 2014) and regulatory scrutiny (Kubick et al. 2016).

Few studies have examined the consequences of tax avoidance until recently. Traditional views suggest that corporate tax avoidance increases after-tax cash flows thus increasing firm value (e.g., Graham and Tucker 2006 and Wilson 2009). However, Desai and Dharmapala (2009) find that corporate tax avoidance does not increase firm value. Desai and Dharmapala (2006), Desai et al. (2007), and Desai and Dharmapala (2011) propose an agency-based theory of corporate tax avoidance. Specifically, because of the separation of ownership and control, managers tax reporting decisions might not benefit shareholders (e.g., Chen and Chu 2005 ; Crocker and Slemrod 2005 ; Slemrod 2004). The agency-based theory argues that sophisticated tax avoidance transactions could create opportunities for managerial rent extraction. These agency costs could cancel out the positive effects of cash tax savings. Their findings have motivated recent research to examine the costs associated with tax avoidance.

Recent studies provide mixed results on the consequences of tax avoidance. For example, tax avoidance decreases the cost of equity capital (e.g., Goh et al. 2016) but increases the cost of debt capital (e.g., Hasan et al. 2014 , Shevlin et al. 2013). Cook et al. (2014) suggest that the effect of tax avoidance on the cost of equity is non-linear with the cost of equity decreasing for increased avoidance at low tax avoidance levels and increasing with increased tax avoidance at high levels of tax avoidance. In addition, Hanlon and Slemrod (2009) find that investors react negatively to news of firms using tax shelters. They suggest that revelation of aggressive tax avoidance could result in significant reputational costs. However, Gallemore et al. (2014) find that aggressive tax avoidance does not induce significant reputation costs to the firm or the top executives. All these studies use accounting information to measure tax avoidance and suggest that investors and regulators rely on a firm's accounting information to assess the value of firms' tax avoidance activities.

2.2 Mixed evidence on the association between tax avoidance and transparency

Several studies in the prior literature have examined the effect of tax avoidance on financial reporting quality and corporate transparency with mixed results. The agency theory framework in Desai (2005) and Desai and Dharmapala (2006)implies that tax avoidance could help managers mislead investors by hiding their rent extraction behavior and withholding bad news (e.g., Desai 2005 ; Desai and Dharmapala 2006). Anecdotal evidence based on recent tax scandals is consistent with this view. For example, in an attempt to mitigate investors' concerns that energy trading firms' earnings lacked the support of operating cash flows, Dynegy misclassified cash flows created by using tax shelters as operating cash flows from 2000. This form of tax avoidance overstated the company's operating cash flows by 300 million dollars. Similarly, another energy trading firm, Enron used 12 large structured tax shelters to cover its poor operating performance and significantly overstated its earnings until the company's collapse in 2001 (See Kim et al. 2011 for a summary of Enron's tax scandal). Tyco International used the complexity created by tax sheltering to mask their rent extraction behavior (See Desai 2005 for a summary of the tax scandal). The revelation of the rent extraction in 2002 resulted in the firm's stock price crash (Kim et al. 2011). At the aggregate level, the frequency of firms restating earnings increased significantly during the last two decades (e.g., Lennox et al. 2013). Contemporaneous with the upward trend in restatements is a significant drop in the average corporate effective tax rates in the U.S. (e.g., Dyreng et al. 2017).

Several recent empirical studies also provide evidence of associations between aggressive tax avoidance and a more opaque corporate information environment. Frank et al. (2009) find a positive association between tax aggressiveness and accrual management, suggesting that accounting standards and tax laws allow firms to manage book income and tax income in the

opposite directions. Balakrishnan et al. (2018) further examine the association between tax avoidance and multiple proxies for corporate transparency, including information asymmetry, analyst forecast errors and earnings quality. They argue that tax avoidance increases the complexity of firms' operations and the manager's difficulty communicating with investors. Consistent with their expectations, tax avoidance lowers corporate transparency. Donohoe and Knechel (2014) also find that more complex tax activities increase financial reporting risk and lead to higher audit fees and presumably higher audit effort.[3]

However, on the other hand, the prior literature also provides evidence suggesting that tax avoidance could improve corporate transparency. Early studies emphasize managers' trade-offs in making tax and financial reporting decisions (Shackelford and Shevlin 2001). Although upward manipulation of book income and downward manipulation of taxable income is common, upward manipulation of book income could also result in higher tax expense. Similarly, underreporting taxable income could decrease book-income for financial reporting. Thus, tax avoidance can limit managements' reporting of both book and taxable incomes. Erickson et al. (2004) find that firms engaged in accounting frauds pay more taxes to support inflated earnings. Lennox et al. (2013) find an association between tax avoidance and a lower probability of committing accounting fraud. Thus, these prior results do not support an association between tax avoidance and lower corporate transparency.

2.3 Hypothesis

As discussed above, tax avoidance has two countervailing effects on corporate transparency: a positive effect related to informing investors of the additional cash savings from tax avoidance

[3] In a related study, Hanlon et al. (2012) find that large book-tax differences are associated with higher audit fees. Large book-tax difference could be due to either earnings management or tax avoidance. The authors suggest that their findings are due to earnings management rather than tax avoidance.

and a negative effect from obfuscation of tax avoidance that misleads investors about managements' actions. Most prior studies discussed above use numerous measures of tax avoidance based on ETRs (See Appendix B for a summary). These measures represent the continuum of tax planning activities intended to reduce explicit tax burdens (Hanlon and Heitzman 2010). We suggest that the evidence indicating countervailing effects of tax avoidance also indicates that the effect of tax avoidance on corporate transparency on the less aggressive end of the continuum is different from that of tax avoidance on the more aggressive end.

On the less aggressive end of the continuum, firms can lower tax expense by investing in municipal bonds and earnings tax-free interest. Another less aggressive tax avoidance decision is the provision of incentive-based compensation rather than cash salaries to management. Section 162(m) of the Internal Revenue Code, restricts public firms' deduction of "non-performance-based" executive compensation to $1 million. However, there are no such limits to qualified performance-based compensation. While creating cash savings, these less aggressive tax avoidance strategies are usually not sophisticated and thus do not decrease corporate transparency.

However, on the more aggressive end of the continuum, firms can use tax shelters or evade taxes by not reporting their taxable income (e.g., Wilson 2009). These more aggressive tax avoidance strategies (e.g., tax sheltering) are more complex and riskier (Hanlon and Heitzman 2010). Thus, the complexity provides more opportunities for managerial rent extractions, which mitigates the positive effect of cash tax savings. The complexity of these activities likely reduces corporate transparency.

Therefore, we predict that the positive effect of additional tax avoidance on corporate transparency dominates when a firm's tax avoidance is low, and the negative effect of additional

tax avoidance dominates when a firm's tax avoidance is high. In other words, we predict a non-linear between tax avoidance and corporate transparency. Thus, we state our hypothesis as follows:

Hypothesis: Additional tax avoidance increases corporate transparency when tax avoidance is low, but additional tax avoidance decreases corporate transparency when tax avoidance is high.

3. Research Design and Variable Measurement

3.1 Measures of Tax Avoidance

We use three alternative tax avoidance measures based on effective tax rates (ETRs).[4] Specifically, *GAAP ETR* is income tax expense divided by pretax income. *GAAP ETR* reflects firms' tax avoidance behavior affecting reported earnings. *Current ETR* is current income tax expense divided by pretax income. This measure represents the effect of deferral strategies beyond *GAAP ETR. Cash ETR* is cash taxes paid divided by pretax income. To be consistent with the prior literature we multiply each measure by negative one so that higher values indicate more tax avoidance. Thus, we have three measures of *Tax Avoidance* (*TA GAAP*, *TA Cash*, and *TA Current*) corresponding to the three ETR measures (*GAAP ETR*, *Cash ETR*, and *Current ETR*).

3.2 Measures of Transparency

We measure corporate transparency from three perspectives: accounting earnings attributes, third-party reactions, and stock-market reactions. Our accounting earnings attributes are proxied by three measures, the absolute values of discretionary accruals (*AbsDA*), [5] standard deviations of discretionary accruals (*StdDA*), and the incidence of accounting restatements (*Restate*). We

[4] We remove observations with negative pretax income, because ETRs calculated using negative pretax income is not meaningful.

[5] Frank et al. (2009) use signed discretionary accruals as their dependent variable. To be comparable to prior literature, we also use this measure in untabulated. Results are similar.

calculate discretionary accruals using the modified Jones model (see Appendix A).[6] We use the standard deviation of annual discretionary accruals over a five-year rolling window, to calculate *StdDA*.[7] Because measures based on discretionary accruals are subject to potential measurement errors (e.g., Lennox et al. 2013), we also use accounting restatements to indicate earnings management. Accounting restatements represent low accounting quality (e.g., Defond 2010). We use OLS regressions for the first two dependent variables and Probit regression for the probability of accounting restatements. Higher values of each measure (i.e., *AbsDA*, *StdDA*, and *Restate*) indicate lower corporate transparency.

The behavior of analysts and auditors also relate to the level of corporate transparency. We use analyst forecast errors (*AFError*) and audit fees (*AuditFee*) to represent the extent of corporate transparency in our second set of tests. *AFError* is the absolute difference between median analyst EPS forecasts and actual EPS.[8,9] *AuditFee* is the natural log of total audit fees paid by the firm. Low corporate transparency makes earnings forecast more difficult and increases analyst forecast errors, and auditors likely charge higher fees for the information risk created by low corporate transparency. Higher values of *AFError* and *AuditFee* indicate lower corporate transparency.

We use three measures of stock market reactions to proxy for corporate transparency. These measures are stock price synchronicity (*Synch*), bid-ask spread (*Spread*), and stock price crash risk (*Ncskew*). Stock price synchronicity is the extent to which market and industry returns explain a firm's weekly returns.[10] Higher values of *Synch* indicate lower corporate transparency. Bid-ask spread is the average monthly bid-ask spread with higher values indicating more

[6] We require at least 10 observations for each 2 digit SIC-industry-year.
[7] We require all the five years to have discretionary accruals data. We use the residuals from modified Jones model to construct *StdDA*. Results are similar if we use the residuals from the Dechow-Dichev model augmented with fundamental variables from the Jones model as in Francis et al. (2005) and Balakrishnan et al. (2018).
[8] Results are similar if we use the mean EPS forecast.
[9] Results are also similar if we scale the forecast errors by beginning stock price.
[10] We require the firm to have data for at least ten weeks of return for the year.

information asymmetry between the firm and investors. Stock price crash risk is the negative skewness in firms' weekly stock returns. Following prior research (Kim et al. 2011), we use the stock price crash risk (*Ncskew*) in year *t+1* as the dependent variable. Greater skewness (*Ncskew*) indicates higher crash risk and lower corporate transparency as managers avoid disclosing bad news.

3.3 Tests Using Accounting Earnings Attributes as Dependent Variables

To test our hypothesis using the three accounting earnings proxies for corporate transparency, we estimate Models 1-3. Specifically, we use the absolute values of discretionary accruals (*AbsDA*) in Model 1, the standard deviation of discretionary accruals (*StdDA*) in Model 2, and the incidence of accounting restatements (*Restate*) in Model 3. We suppress firm and time subscripts in all the models in the manuscript for convenience.

$$\begin{aligned} AbsDA = {} & \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV \\ & + \alpha_5 ForInc + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 PTCFO + \alpha_{10} NOL \\ & + \alpha_{11} MB + \alpha_{12} BigN + \alpha_{13} TradeVol + \alpha_{14} AnlstCover \\ & + Year\ fixed\ effect + Industry\ fixed\ effect + \varepsilon \end{aligned}$$

(Model 1)

$$\begin{aligned} StdDA = {} & \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV + \alpha_5 ForInc \\ & + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 PTCFO + \alpha_{10} NOL + \alpha_{11} MB \\ & + \alpha_{12} BigN + \alpha_{13} TradeVol + \alpha_{14} AnlstCover + Year\ fixed\ effect \\ & + Industry\ fixed\ effect + \varepsilon \end{aligned}$$

(Model 2)

$$\begin{aligned} Probit\ (Restate = 1) & \\ = {} & \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV \\ & + \alpha_5 ForInc + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 PTCFO + \alpha_{10} NOL \\ & + \alpha_{11} MB + \alpha_{12} BigN + \alpha_{13} TradeVol + \alpha_{14} AnlstCover \\ & + Year\ fixed\ effect + Industry\ fixed\ effect + e \end{aligned}$$

(Model 3)

Our hypothesis suggests a non-linear association between tax avoidance and corporate transparency. We expect that increases in tax avoidance at the upper end of the continuum decrease

corporate transparency and that increases in tax avoidance at the lower end of the continuum increase corporate transparency. As discussed above, higher values of *AbsDA*, *StdDA,* and *Restate* indicate lower corporate transparency. Thus, as *Tax Avoidance* increases from its minimum, we expect *AbsDA*, *StdDA,* and *Restate* to decrease, indicating higher corporate transparency. From the inflection point, increases in *Tax Avoidance* should increase *AbsDA*, *StdDA,* and *Restate* indicating lower corporate transparency. The inflection point for the non-linear relation equals -$\alpha_1/(2\times\alpha_2)$.[11] Because our measure of tax avoidance ranges from -1 to 0, the inflection point should be negative. Thus, we expect the coefficients on *Tax Avoidance* and the squared term of *Tax Avoidance* to be positive. [12]

Following prior studies (e.g., Frank et al. 2009), we include control variables correlated with both tax avoidance and the dependent variables. The controls include firm size (*LnTA*), leverage (*LEV*), foreign pretax income (*ForInc*), property, plant and equipment (*PPE*), intangible assets (*Intang*), pretax return on assets (*PTROA*), change in pretax operating cash flow (*d_PTCFO*), net loss carryover (*NOL*), and market to book ratio (*MB*). Following Lennox et al. (2013), we control for firms with a Big N auditor (*BigN*). Trading volume (*TradeVol*) controls for managers' incentives to influence the stock market. We also control for analyst coverage (*AnlstCover*), because firms followed by more analysts manage their earnings less (Yu 2008). We include fixed effects for Year and Industry to control the time and industry factors affecting corporate transparency.[13] We provide detailed definitions of all variables in Appendix A.

[11] For example, if we take the first derivative of the Model 1 to $Tax\ Avoidance$, then we get $\alpha_1 + 2 \times \alpha_2 \times Tax\ Avoidance = 0$. Thus, the inflection point of tax avoidance for the non-linear relation is -$\alpha_1/(2\times\alpha_2)$.

[12] Quadratic regression models with square terms are widely used in prior studies to examine non-linear effects (e.g.,Das and Lev 1994 ;Beneish and Harvey 1998 ; Gul et al. 2010).

[13] Industries are defined based on 2-digit SIC code.

3.4 Tests Using Third-Party Reaction as Dependent Variables

$$AFError = \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV + \alpha_5 ForInc + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 TACC + \alpha_{10} Sum\_Forecast + \alpha_{11} CashDV + \alpha_{12} TradeVol + \alpha_{13} InstHolding + Year\ fixed\ effect + Industry\ fixed\ effect + \varepsilon$$

(Model 4)

$$AuditFee = \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV + \alpha_5 ForInc + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 TACC + \alpha_{10} BigN + \alpha_{11} AccRec + \alpha_{12} MAO + \alpha_{13} Tenure + Year\ fixed\ effect + Industry\ fixed\ effect + \varepsilon$$

(Model 5)

We test our third-party reactions proxies for corporate transparency by estimating Models 4-5. In Model 4, *AFError* is the absolute difference between median analyst EPS forecasts and actual EPS. In Model 5, *AuditFee* is the natural log of total audit fees paid by the firm. We expect that tax avoidance increases analysts forecast errors and audit fees when tax avoidance is high because firms' reporting and tax activities become more complex. When tax avoidance is low, increases in tax avoidance lowers analysts forecast errors and audit fees. Similar to the tests using earnings attributes we expect a positive sign for *Tax Avoidance* and the squared terms of *Tax Avoidance*.

Consistent with Gu et al. (2013) and Balakrishnan et al. (2018), in Model 4 we use the total number of analyst forecasts (*Sum_Forecast*), cash dividends (*CashDV*), and stock trading volume (*TradeVol*) as determinants of analyst forecast errors (*AFError*). Because institutional investors have incentives to bias sell-side analyst forecast (Gu et al. 2013), we also control the percentage of institutional investor ownership (*InstHolding*). In Model 5, we follow prior studies (Donohoe and Knechel 2014 ; Hanlon et al. 2012) and control for Big N clients (*BigN*), receivables (*AccRec*), firms receiving a modified audit opinion (*MAO*), and the auditor's first year to audit the firm (*Tenure*). We also include the following control variables from the earnings attributes tests. The controls include firm size (*LnTA*), leverage (*LEV*), foreign pretax income (*ForInc*), property, plant,

and equipment (*PPE*), intangible assets (*Intang*), and pretax return on assets (*PTROA*). In addition, we control for the effect of total accruals (*TACC*) on analyst forecast errors and auditor behavior (e.g., Bradshaw et al. 1998). Fixed effects for year and Industry are included to control the time and industry factors affecting auditor and analyst behavior. We provide detailed definitions of these variables in Appendix A.

3.5 Tests Using Stock Price Behavior as Dependent Variables

$$\begin{aligned} Synch = {} & \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV + \alpha_5 ForInc \\ & + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 TACC + \alpha_{10} AnlstCover \\ & + \alpha_{11} InstHolding + \alpha_{12} Price + Year\ fixed\ effect \\ & + Industry\ fixed\ effect + \varepsilon \end{aligned}$$

(Model 6)

$$\begin{aligned} Spread = {} & \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV + \alpha_5 ForInc \\ & + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 TACC + \alpha_{10} AnlstCover \\ & + \alpha_{11} InstHolding + \alpha_{12} Price + \alpha_{13} TradeVol + Year\ fixed\ effect \\ & + Industry\ fixed\ effect + \varepsilon \end{aligned}$$

(Model 7)

$$\begin{aligned} Ncskew_{it+1} = {} & \alpha_0 + \alpha_1 Tax\ Avoidance + \alpha_2 Tax\ Avoidance^2 + \alpha_3 LnTA + \alpha_4 LEV \\ & + \alpha_5 ForInc + \alpha_6 PPE + \alpha_7 Intang + \alpha_8 PTROA + \alpha_9 TACC + \alpha_{10} AnlstCover \\ & + \alpha_{11} InstHolding + \alpha_{12} Price + \alpha_{13} d\_Turn + \alpha_{14} Ret + \alpha_{15} Ncskew_{it} \\ & + Year\ fixed\ effect + Industry\ fixed\ effect + \varepsilon \end{aligned}$$

(Model 8)

We test our three stock market reactions proxies for corporate transparency by estimating Models 6-8 we use as dependent variables in Models 6 to 8. Higher values of stock price synchronicity (*Synch*), bid-ask spread (*Spread*), and stock price crash risk (*Ncskew*) indicate lower corporate transparency. Thus, similar to the prior two sets of tests, we also expect the coefficients on *Tax Avoidance* and the squared terms of *Tax Avoidance* to be positive.

For the tests of *Synch*, we control for analyst coverage (*AnlstCover*), institutional ownership (*InstHolding*) (e.g., Piotroski and Roulstone 2004), and the natural logarithm of stock price (*Price*). We also control for stock trading volume (*TradeVol*) when using *Spread* as the

dependent variable (e.g., Balakrishnan et al. 2018). For the tests of *Ncskew*, we use analyst coverage (*AnlstCover*) and institutional ownership (*InstHolding*), the natural logarithm of stock price (*Price*), change in stock turnover rate (*d_Turn*), sample mean of firm-specific weekly returns (*Ret*), and stock price crash risk in year t-1 ($Ncskew_t$) as independent variables consistent with Kim et al. (2011). We also control for other common control variables included in previous regressions. They include firm size (*LnTA*), leverage (*LEV*), foreign pretax income (*ForInc*), property, plant, and equipment (*PPE*), intangible assets (*Intang*), pretax return on assets (*PTROA*), and total accruals (*TACC*). We include fixed effects for year and industry to control the time and industry factors affecting stock price behavior. We also provide detailed definitions of variables in Appendix A.

4. Empirical Results

4.1 Sample Selection and Descriptives

We obtain data from several publicly available databases. We obtain financial, and stock return data from *Compustat_CRSP Merged* dataset. Audit fee and accounting restatement data are from *AuditAnalytics.* Analyst forecast data are from *I/B/E/S*. Institutional ownership data are from *Thomson-Reuters*.

We provide the sample selection in Table 1. Our original sample includes observations of all the US firms in the *Compustat_CRSP Merged* dataset. We delete 2,769 observations with missing CIK code or Ticker used to merge *AuditAnalytics, I/B/E/S,* and *Thomson-Reuters*. We delete 41,474 observations of financial and utility firms (i.e., firms with SIC 4900-4999 or 6000-6999). We also delete 33,060 observations with missing or negative pretax income because positive pretax income is required to calculate a meaningful, effective tax rate. We also delete 8,068 observations with missing data necessary to calculate discretionary accruals and other

financial variables. Thus, our final sample is 42,840 firm-year observations for the test of the effect of tax avoidance on earnings quality, when we use *GAAP ETR* and *Cash ETR* to construct measures of tax avoidance. When we use *Current ETR*, the sample reduces to 41,579. For other tests, we also delete observations with data missing for proxies of corporate transparency or the responding control variables. When restatement is the dependent variable, we use the sample before 2014 to allow adequate time for reporting restatements. For the tests using stock price behavior as dependent variables, we also delete observations where the stock price is smaller than 1$ or book value is negative following Kim et al. (2011). When we use *StdDA*, *Restate, AFError*, *AuditFee*, *Synch*, *Spread* and $Ncskew_{t+1}$ as dependent variables, the sample size further reduces to 33,766 observations, 38,488 observations, 26,691 observations, 28,242 observations, 31,523 observations, 31,632 observations, and 30,640 observations respectively.

We report sample descriptions in Panel A, Table 2. We winsorize ETRs to the range [0,1][14]. We winsorize all other continuous variables at 1% and 99%. The sample means of *GAAP ETR*, *Cash ETR*, and *Current ETR* are 32.3 percent, 27.1 percent, and 29.9 percent. These are higher than the average of similar measures reported in recent studies (e.g., Balakrishnan et al. 2018) because our sample covers an earlier period (1995 to 2016).[15] Statistics of the other variables are comparable to those reported in recent studies. For example, the average size (*LnTA*) is 6.131, which is close to the average size (6.350) in Balakrishnan et al. (2018). The average market to book ratio (*MB*) is 2.965, which is close to the mean *MB* (2.761) reported in Kim et al. (2011). New auditors audit 14.4 percent of our sample. Donohoe and Knechel (2014) report 10.6 percent for a similar measure. Big N auditors (*BigN*) audit 52.5 percent of our sample compared to 67.3

[14] Results in this paper are similar if we truncate ETRs to [0,1].
[15] As shown in Panel B, ETRs are lower in the latter years of the period due to higher tax avoidance.

percent of observations in Donohoe and Knechel (2014). The average institutional ownership is 57.0 percent.

Table 2, Panel B indicates the sample distribution and the mean of alternative tax avoidance measures by year (when earnings quality is the dependent variable). The number of observations dropped after the financial market crashes in 2001 and 2008, consistent with the delisting of firms after the crashes. In addition, we find that the average of all three effective tax rate measures dropped significantly from 1995 to 2016, consistent with increased tax avoidance by U.S. firms. For example, the average *GAAP ETR* is 33.1% in 1995 but 29.7% in 2016. For *Current ETR* and *Cash ETR*, we also observe 4-5% decreases for our sample period.

4.2 Regression Results

The first eight columns of Table 3 present results for Models (1) and (2). We cluster all standard errors by firm. $AbsDA$ is the dependent variable in the first four columns; *StdDA* is the dependent variable in the second four columns. In columns (1) and (5), we first replicate prior studies results and test the linear relation between tax avoidance and corporate transparency. For brevity, we only report results using *TA GAAP* in these tests. [16] Results are similar if we use *TA Current* or *TA Cash*. Specifically, we estimate Models (1) and (2) without the squared term of *TA GAAP*. We find that the coefficients on *TA GAAP* are all positive in columns (1) and (5). These findings suggest that firms with higher *TA GAAP* are associated with higher absolute discretionary accruals and a higher standard deviation of discretionary accruals, indicating a negative association between tax avoidance and corporate transparency. These results are consistent with prior studies (e.g., Frank et al. 2009 ; Balakrishnan et al. 2018).

[16] For other measures of transparency, we also only report the results using *TA GAAP* in these tests. Results are similar if we use *TA Current* or *TA Cash*.

To test the non-linear association between tax avoidance and corporate transparency, we include the square terms of the tax avoidance measures in the models. Our hypothesis suggests that the association between tax avoidance and corporate transparency differs between low tax avoidance and high tax avoidance. Across all the three proxies for tax avoidance (i.e., *TA GAAP*, *TA Current* and *TA Cash*), we find evidence of a non-linear effect. Specifically, we find positive coefficients on the three tax avoidance measures and their squared terms. To help with interpretation of these results, we provide a visualization in Figure 1 Panel A.[17] When the *Tax Avoidance* is low (i.e., firms with tax avoidance lower than the inflection point), corporate transparency is higher than at the mean of tax avoidance (i.e., lower absolute value and smaller standard deviation of discretionary accruals). However, after the inflection point of *Tax Avoidance*, we find higher absolute values and higher standard deviations of discretionary accruals indicating lower corporate transparency.

We calculate the ETRs corresponding to the inflection points where the absolute values and standard deviations of discretionary accruals are the lowest. Importantly, the results indicate that all the inflection points are in the range of our tax avoidance measures, suggesting that the non-linear effect exists in our sample. These ETR levels at the inflection points are higher than the sample average ETRs. Thus, at the sample average ETR level, the marginal effects of tax avoidance on absolute discretionary accruals and the standard deviation of discretionary accruals is negative. These results are consistent with our hypothesis that the association between tax avoidance and corporate transparency is different at high and low levels of tax avoidance. The results for the inflection points also suggest at what level of tax avoidance issues related to managements' obfuscation are more likely, a result not provided in prior studies. Also, we report

[17] In figure 1, we only use *TA GAAP.* The figures should look similar if we use *TA Current* or *TA Cash*.

the proportion of each corresponding sample with ETRs greater than the inflection point. For example, using absolute discretionary accruals, 27.7 percent of the sample has a *Current ETR* greater than the inflection point.

The coefficients on control variables are consistent with expectations. We find negative coefficients on firm size (*LnTA*) across all the twelve columns, suggesting large firms have lower absolute discretionary accruals and lower earnings opacity. Further, the coefficients on pretax operating cash flows (*PTCFO*) are negative across all the columns, consistent with firms being less likely to manipulate earnings when there are abundant cash flows. The R-squares of all the regressions range from 22.0 percent to 23.4 percent.

The last four columns of Table 3 report the results of estimating a Probit model using accounting restatements as the proxy for lower corporate transparency. Consistent with earlier estimations, we first estimate the model without the squared term for *TA GAAP* in Column (9) of Table 3. We find a negative association between *TA GAAP* and the probability of accounting restatement, consistent with Lennox et al. (2013). We then incorporate the squared terms of the tax avoidance measures in columns (10) to (12). We find significant positive coefficient on the three measures of tax avoidance and their squared terms. We also visualize these results in Figure 1. These results again suggest that when tax avoidance is low (i.e., tax avoidance lower than the inflection point), there is a negative association between *Tax Avoidance* and the probability of restatement. When tax avoidance is high (i.e., tax avoidance higher than the inflection point), there is a positive association between *Tax Avoidance* and the probability of restatement. Therefore, these results are also consistent with the differential effect of more or less aggressive tax avoidance on corporate transparency.

We also report the ETRs corresponding to the inflection points where the probability of restatements is the lowest. All the inflection points are in the range of our tax avoidance measures. Also, the ETR level at the inflections point is close to the sample average when using *GAAP ETR.* Coefficients on control variables are also consistent with expectations. For example, we find negative coefficients on *LnTA* and *PTROA* (i.e., large firms and firms with higher pretax income are less likely to have a restatement).

Table 4 examines the effect of tax avoidance on corporate transparency based on analyst and auditor behavior. Auditors charge higher audit fees for firms with higher information risk, and we expect analysts forecast to be more accurate when firms are more transparent. Therefore, higher audit fees and larger analyst forecast errors proxy for lower corporate transparency. Again, we first estimate our model without the *Tax Avoidance* squared term in Column (1) of Table 4. We find positive associations between *TA GAAP* and audit fees and analyst forecast errors. The coefficients on *TA GAAP* are significant at the 5% level. These results are consistent with prior research indicating positive associations between tax avoidance and audit fees and analyst forecast errors (e.g., Donohoe and Knechel 2014 ; Balakrishnan et al. 2018). Next, we incorporate the *Tax Avoidance* squared term in columns (2) to (4) and columns (6) to (8). The coefficients on the linear and squared tax avoidance terms (except for column 7) are positive and significant. Figure 1, Panel B also visualizes these findings. These results again lend support to the hypothesis that more aggressive tax avoidance decreases corporate transparency and that less aggressive tax avoidance increases corporate transparency.

Table 5 further examines the effect of tax avoidance on transparency based on stock price behavior. Similar to results in Tables 3 and Table 4, we first run the regression without the squared term of *TA GAAP* in Columns (1), (5) and (9) of Table 5. We find positive associations between

TA GAAP and stock price synchronicity and stock price crash risk. The association between *TA GAAP* and bid-ask spread is also positive but insignificant. These results are consistent with prior studies (e.g., Kim et al. 2011 ; Balakrishnan et al. 2018). We then incorporate the tax avoidance squared terms in columns (2) to (4), columns (6) to (8), and columns (10) to (12). We find positive and significant coefficients on the tax avoidance squared terms. Panel C of Figure 1 visualizes these results. Consistent with the hypothesis, these results suggest that tax avoidance at the more aggressive end of the continuum decreases market-based proxies of corporate transparency and that tax avoidance at the less aggressive end of the continuum increases market-based proxies for corporate transparency.

5. Additional Analyses

We provide several additional tests of the robustness of our findings. Table 6 Panel A further controls for firm-fixed effects. Again, we only report the results using *TA GAAP* in these tests, and results are similar if we use *TA Current* or *TA Cash*. Tests in six out of the eight columns still find significant results consistent with our hypothesis. For columns (6) and (7), the results become insignificant. These tests mitigate concerns about omitted time-invariant variables, such as corporate governance and management style.

Table 6 Panel B re-estimates all the tests using *TA GAAP* in a subsample after 2002. Sarbanes-Oxley act of 2002 (SOX) reduced firms' ability to manipulate financial reporting. Again, results are similar if we use *TA Current* or *TA Cash*. Tests in seven out of the eight columns provide significant results consistent with our hypothesis. For columns (6), the results are insignificant. Therefore, our conclusions remain robust after SOX.

Panel C re-estimates all the regressions using a three-year long-term tax avoidance measure (*TA LT3*) as a proxy for tax avoidance. Long-term tax avoidance measures better reflect the long-

term tax planning strategies and helps mitigate the effects of temporary fluctuations in tax rates. Specifically, we calculate *TA LT3* as the three-year *GAAP ETR* (see appendix for details about the definition of this variable). We find positive coefficients on *TA LT3* and its squared term. These results are consistent with our hypothesis. We also use long-term tax avoidance measures based on three-year *Current ETR* and three-year *Cash ETR* as alternative measures of long-term tax avoidance in untabulated tests. Results are similar.

In addition, we use alternative measures of tax avoidance, including the discretionary permanent book-tax difference measure (*DTAX*) in Frank et al. (2009), the book-tax difference measure (*Total BTD*) in Hanlon and Heitzman (2010), and the accruals-adjusted book-tax difference measure (*DDBTD*) in Desai and Dharmapala (2006). Untabulated tests using these three additional test avoidance measures provide results consistent with our hypothesis.

Panel D uses change tests to examine the effect of tax avoidance on transparency. Specifically, we calculate the one-year changes of all the variables used in the primary analyses. Then, we further include *TA GAAP* and interact *TA GAAP* with Δ *TA GAAP* in the regression models. For the first 5 columns , we find signficant posirtive coefficients on Δ *TA GAAP* and also signficant posirtive coefficients on the interaction of Δ *TA GAAP* and *TA GAAP*. Because *TA GAAP* ranges from -1 to 0, the coefficient on Δ *TA GAAP* is the net effect of Δ *TA GAAP* when *TA GAAP* is the highest (0). Further, the difference between the coefficient on Δ *TA GAAP* and that on *TA GAAP*× Δ *TA GAAP* is the net effect of Δ *TA GAAP* when *TA GAAP* is the lowest (-1). We find that the difference between the coefficient on Δ *TA GAAP* and that on *TA GAAP*× Δ *TA GAAP* is significantly negative for the first 4 columns. These findings are consistent with our hypothesis that increases in tax avoidance improve transparency when tax avoidance is low, but increases in tax avoidance decrease transparency when tax avoidance is high.

Finally, Panel E uses the tranprency measures from year t+1 as the dependent variables. Across all the 7 columns, we still find results consistent with our primary results. These findings further mitigate concerns about effects of omitted variables.

6. Conclusion

U.S. firms have significantly increased tax avoidance during the last three decades. This increase has attracted attention from politicians, news media, regulators, and scholars. Most prior research has focused on the determinants of tax avoidance, and the consequences of tax avoidance are relatively under-explored (Hanlon and Heitzman 2010). Recent studies (e.g., Balakrishnan et al. 2018) have examined the implications of tax avoidance for corporate financial reporting and transparency. However, empirical evidence is mixed. Specifically, prior studies suggest that tax avoidance has two countervailing effects on corporate transparency: a positive effect of additional cash flows created by tax avoidance and a negative effect because sophisticated tax transactions create complexity and opportunities for rent extractions.

This study further examines how tax avoidance affects corporate transparency. We argue that the effect of tax avoidance on transparency depends on the level and potential aggressiveness of the tax avoidance behavior. Specifically, less aggressive tax avoidance (e.g., investment in municipal bonds, use of net loss carryover or incentive-based management compensation) are usually not sophisticated and thus should not increase corporate transparency. However, more aggressive tax avoidance (e.g., tax sheltering) is more complex and could lead to more managerial rent extractions, which mitigates the positive effect of cash tax savings. Therefore, the positive effect of tax avoidance should dominate over the less aggressive end of the tax avoidance continuum, and the negative effect should dominate over the more aggressive end of the continuum. Thus, we predict a non-linear association between tax avoidance and corporate transparency.

Using eight alternative proxies for corporate transparency and three alternative measures of tax avoidance, we find evidence consistent with our expectation.

This study makes several contributions to the literature. First, we contribute to a better understanding of the consequences of tax avoidance. Our findings suggest that future studies should separately consider the nature and aggressiveness of tax avoidance behavior in examining the consequences of tax avoidance. Second, we also contribute to the literature on the interaction of financial and tax reporting. Our findings lend further support to the idea that tax-reporting behavior affects financial reporting. Third, our study contributes to the growing literature on agency costs of tax avoidance (e.g.,Desai 2005 ; Desai and Dharmapala 2006_). What is unknown in the literature is at what point managers reduce information available to investors and tax authorities because of their tax avoidance activities. We provide evidence on the levels of tax avoidance that potentially increases obfuscation. Future research on the agency costs of tax avoidance should focus on the subsample of firms with tax avoidance at least as high as those estimated in this study. Finally, our study is important for investors in understanding the implications of tax avoidance for analyzing the information risk. This study provides initial evidence of the point at which tax avoidance reduces corporate transparency and thus information available to investors.

Overall, our study supports the association between tax avoidance and corporate transparency. However, the direction of the transparency effect of tax avoidance depends on the aggressiveness of the tax avoidance behavior. Future studies in the line of literature should more carefully consider potentially different predictions for different tax avoidance strategies.

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Appendix A: Variable Definition

Variable	Description
AbsDA	The absolute value of discretionary accrual. We calculate discretionary accruals using the Modified-Jones model. Specifically, we estimate the following regression equation for each industry and fiscal year combination: $\frac{\text{TA}_{jt}}{\text{Assets}_{jt-1}} = \alpha\left(\frac{1}{\text{Assets}_{jt-1}}\right) + \beta_1\left(\frac{\Delta Sales_{jt}}{\text{Assets}_{jt-1}}\right) + \beta_2\left(\frac{PPE_{jt}}{\text{Assets}_{jt-1}}\right) + \varepsilon_{jt}$. TA_{jt} denotes total accruals for firm *j* during year *t* (IBC-OANCF). Assets_{jt-1} is total assets (AT) at the end of year *t*. $\Delta Sales_{jt}$ is change of sales (SALE). PPE_{jt} denotes Property, plant and equipment (PPE). Then we calculate *DisA*C by $\text{DisAC}_{jt} = \frac{\text{TA}_{jt}}{\text{Assets}_{jt-1}} - \hat{\alpha}\left(\frac{1}{\text{Assets}_{jt-1}}\right) - \widehat{\beta_1}\left(\frac{\Delta Sales_{jt} - \Delta Receivables_{jt}}{\text{Assets}_{jt-1}}\right) - \widehat{\beta_2}\left(\frac{PPE_{jt}}{\text{Assets}_{jt-1}}\right)$. $\Delta Receivables_{jt}$ is the change of receivables (RECCH). Please refer to Dechow et al. (1995). We require each two-digit SIC code and year combination to have at least ten firm-year observations when calculating discretionary accrual.
StdDA	Accruals quality. The standard deviation of annual discretionary accruals over a five-year rolling window. We estimate discretionary accruals using the Modified-Jones model.
Restate	Restatement indicator. It equals 1 if firms restate the financial reports of the fiscal year in a subsequent year including fraud restatements and the other types of restatements. Restatement data come from *AuditAnalytics*.
AFError	Analyst forecast error. It is the absolute difference of EPS between median value of annual analyst forecast and the actual value. Analyst-forecast data come from *I/B/E/S*.
AuditFee	Audit Fees. The natural log of the fees paid to auditors. Audit-fee data come from *AuditAnalytics*.
Synch	Stock price synchronicity. For each firm-fiscal year, we regress the weekly stock return on the weekly market return, the weighted-average weekly industry return, and a constant. The weight is the proportion of the market value of each firm in the industry. Then we get the R^2 of each regression, and compute $Synch = Ln\left(\frac{R^2}{1-R^2}\right)$ as stock price synchronicity. Please refer to Morck et al. (2000) and Durnev et al. (2003).
Spread	Bid-ask spread. For each stock, we first find the absolute difference between monthly bid (BID) and ask (ASK) in CRSP monthly stock price file. Then we calculate the sample mean of this difference for each fiscal year as bid-ask spread.
Ncskew	Stock price crash risk. For each firm-fiscal year, we regress the stock return in week *t* on a constant and the CRSP value-weighted market return in week *t-2*, *t-1*, *t*, *t+1* and *t+2*, and get the residual. Then we calculate firm-specific weekly return (w_{jt}) by the natural log of one plus the residual. We get *Ncskew* of firm *j* in year τ by: $Ncskew_{j\tau} = -\frac{[n(n-1)^{3/2}\sum w_{jt}^3]}{[(n-1)(n-2)(\sum w_{jt}^2)^{\frac{3}{2}}]}$. Please refer to Kim et al. (2011).

GAAP ETR	GAAP effective tax rate. Total income tax (TXT) divided by pre-tax income (PI). We set all ETRs to missing if pretax income is negative or missing. Following Lennox et al. (2013), we winsorize all ETRs to the range of [0,1].
Current ETR	Current tax expense (TXT - TXDI) divided by pretax income (PI).
Cash ETR	Cash tax paid (TXPD) divided by pretax income (PI).
LT3ETR	Three-years long-term *GAAP* ETR, which is the sum of cash tax paid (TXPD) in the last 3 years divided by the sum of pretax income (PI) in the last 3 years. We set *LT3ETR* to missing if the sum of pretax income (PI) in the last 3 years is missing or negative, and winsorized to the range of [0,1].
TA GAAP	Negative one multiplied by *GAAP ETR*.
TA Current	Negative one multiplied by *Current ETR*.
TA Cash	Negative one multiplied by *Cash ETR*.
TA LT3	Negative one multiplied by *LT3ETR*.
LnTA	Firm size. The natural log of total assets (AT).
LEV	Leverage. Total liabilities (LT) divided by total assets (AT).
ForInc	Foreign pretax income. Foreign pretax income (PIFO) scaled by lagged total assets (AT). If foreign pretax income (PIFO) is missing, foreign pretax income, we set (PIFO) to zero.
PPE	Property, plant, and equipment. Property, plant, and equipment (PPE) scaled by lagged total assets (AT).
Intang	Intangible asset (INTAN) scaled by lagged total assets (AT). Set to 0 if the intangible asset (INTAN) is missing.
PTROA	Pretax return on assets. Pretax income (PI) scaled by lagged total assets (AT).
PTCFO	Pretax operating cash flow (OANCF+TXPD-XIDOC) scaled by lagged total assets (AT).
NOL	An indicator for net loss carryover. Set to 1 if the firm has net loss carryover (TLCF) at the beginning of the year, 0 otherwise.
MB	Market to book value. The ratio of market value of equity (PRCC_F*CSHO) to book value of common equity (CEQ).
BigN	Indicator if the company's auditor is an international name-brand audit firm, which refers to the big 5 auditors before 2002 and big 4 auditors except for Arthur Anderson after 2002. Audit-choice data come from *AuditAnalytics*.
TACC	Total accruals (IBC-OANCF) scaled by beginning total assets.
Sum_Forecast	Natural log of the total number of analyst forecasts in *I/B/E/S*.
CashDV	Lagged dividends per share (DVPSP_F) scaled by lagged stock price (PRCC_F).
TradeVol	Natural log of common share traded (CSHTR_F).
InstHolding	The percentage of institutional investor ownership. This dataset comes from *Thomson-Reuters Stock Ownership (13-F)*.
AccRec	Receivables (RECT) scaled by lagged total assets (AT).
MAO	An indicator for whether a company has received a modified audit opinion (going-concern opinion). Audit-opinion data come from *AuditAnalytics*.
Tenure	Indicator for whether it is in an auditor's first year to audit the company. Tenure data come from *AuditAnalytics*.
AnlstCover	An indicator for whether there is analysts' following. It equals 1 if there is at least one earnings forecast recorded in *I/B/E/S*.

Price	The average of the stock price at the beginning and the end of a fiscal year. We include the natural logarithm of the stock price in regressions following Balakrishnan et al. (2018).
d_Turn	An indicator for the change of stock turnover rate. It equals 1 if the stock turnover rate is larger than last year. The stock turnover rate is common shares traded (CSHTR_F) scaled by common shares outstanding (CSHO).
Ret	Sample mean of firm-specific weekly returns (w_{jt}) for each fiscal year. Please refer to Kim et al. (2011).
Year effect	Fiscal year dummy.
Industry effect	Dummy of two-digits SIC code.

Appendix B: Summary of Tax Avoidance Measures used in Prior Studies

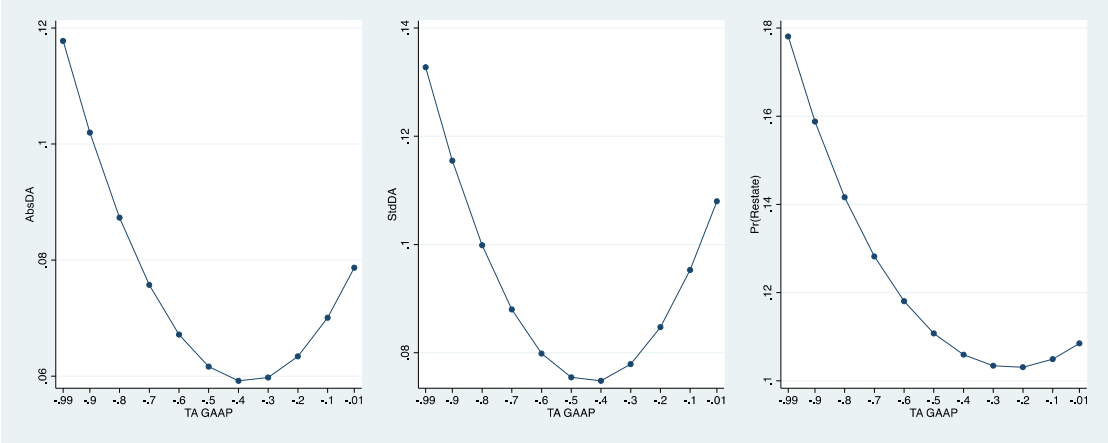
List of Studies	Measures of Transparency (Variable names from these studies are in the parentheses)	Measures of Tax Avoidance as described in the original studies (Variable names from these studies are in the parentheses)
Dhaliwal et al. (2004)	1. The I/B/E/S consensus forecast estimate less earnings absent tax expense management [pre-tax income (#170) × (1 − EtrQ3)*I/B/E/S split factor/ common shares to compute basic EPS (#54)]. (Miss_Amount) 2. A dummy variable that equals 1 if Miss_Amount > 0, and 0 otherwise. (Miss)	The fourth-quarter ETR (EtrQ4) less the third-quarter ETR (EtrQ3), where the ETR is year-to-date tax expense (#6) divided by accumulated pre-tax income (#23). (Etr4_Etr3)
Erickson et al. (2004)	Overstated earnings.	Tax paid.
Cook et al. (2008)	A dummy variable that equals 1 if Miss_Amount exceeds $0, and 0 otherwise. (Miss)	Fourth-quarter ETR less third-quarter ETR. (ETR4_ETR3)
Frank et al. (2009)	Financial report aggressiveness, which is performance-matched discretionary accruals. (DFIN)	Discretionary permanent book-tax difference, which is the error term of $PERMDIFF_{it} = a_0 + a_1 * Intang_{it} + a_2 * UNCON_{it} + a_3 * MI_{it} + a_4 * CSTE_{it} + a_5 * \Delta NOL_{it} + a_6 * LAGPERM_{it} + \varepsilon$. $PERMDIFF_{it}$ is total book-tax differences less temporary book-tax differences for firm i in year t, which is PI-((TXFED+TXFO)/US Statutory tax rate) - (TXDI/US Statutory tax rate). $Intang_{it}$ is the value of INTAN, $UNCON_{it}$ is ESUBC, MI_{it} is MII, ΔNOL_{it} is the change of TLCF, and $CSTE_{it}$ is TXS. $LAGPERM_{it}$ is lagged $PERMDIFF_{it}$. (DTAX)
Kim et al. (2011)	1. Stock price crash risk. (NCSKEW) 2. An indicator variable that takes the value one for a firm-year that experiences one or more firm-specific weekly returns falling 3.2 standard deviations below the mean firm-specific weekly returns over the fiscal year. (CRASH)	1. Long-run cash effective tax rate, computed as the sum of income tax paid (#317) over the previous five years divided by the sum of a firm's pre-tax income (#170) less special items (#17). (LRETR) 2. Estimated sheltering probability, based on Wilson's (2009) tax sheltering model. (SHELTER) 3. Common factor extracted from three different book-tax difference measures: BTD, ETR Differential, and DD_BTD. BTD is total book-tax difference, which equals book income less taxable income scaled by lagged assets (#6). Book income is pre-tax income (#170) in year t. Taxable income is calculated by summing the current federal tax expense (#63) and current foreign tax expense (#64) and dividing by the statutory tax rate (STR) and then subtracting the change in net operating loss (NOL) carryforwards (#52) in year t. ETR Differential is permanent book-tax difference based on Frank et al. (2009), DD_BTD is residual of $BTD_{it} = \beta_1 TACC + \mu_i + \varepsilon_{it}$, where TACC is total accruals measured using the cash flow method. (BTDFACTOR)

Hanlon et al. (2012)	Log of audit fees. (Ln(AUDIT FEE))	Log of absolute value the total book-tax differences income (data #170 – ((data #16 – data #50)/.35 – Δdata#52). (Ln(ABSBTD))
Lennox et al. (2013)	Accounting Fraud. (Fraud)	1. Total tax expense (#16) / Pretax income (#170). (ETR1) 2. Current federal tax expense (#63) / (Income before extraordinary items (#18) + Current federal tax expense (#63) + Minority interest (#49) – Extraordinary items (#48) – Equity in earnings (#55)). (ETR2) 3. Total tax expense (#16) – Change in deferred tax (#35) / Operating cash flows (#308). (ETR3) 4. Cash taxes paid (#317) / Pretax income (#170). (ETR4) 5. Cash taxes paid (#317) / (Pretax income (#170) – Special items (#17)). (ETR5) 6. Pretax income (#170) – ((Current federal tax expense (#63) + foreign tax expense (#64)) / statutory marginal tax rate). (BTD1) 7. BTD1 – (Total deferred tax expense (#50) / statutory marginal tax rate). (BTD2) 8. Discretionary permanent book-tax differences based on Frank et al. (2009). (BTD3)
Donohoe and Knechel (2014)	Log of audit fees. (LNFEE)	1. Cash effective tax rate, defined as the six-year sum (t to t-5) of cash taxes paid (txpd) divided by the six-year sum of pre-tax book income (pi) less special items (spi). We drop observations with negative. ETRs are reset to 1 (0) if greater (less) than 1 (0). (CASH6) 2. Current effective tax rate, defined as the six-year sum (t to t-5) of current tax expense (txfed) divided by the six-year sum pre-tax book income (pi) less minority interest (mii). If current tax expense is missing, we use total tax expense (txt) less the sum of current foreign tax expense (txfo), state tax expense (txs), deferred tax expense (txdi), and other tax expense (txo). ETRs are reset to 1 (0) if greater (less) than 1 (0). (CURR6) 3. Indicator variable equal to 1 if the firm is tax aggressive; 0 otherwise. Tax aggressiveness is a firm with either a CASH6 or CURR6 in lowest quintile by year and two-digit SIC industry membership. (TA)
Balakrishnan et al. (2018)	1. The absolute analysts' forecast errors. (AFError)	1. The firm's mean industry size GAAP ETR less the firm's GAAP ETR, where GAAP_ETR is the sum of current tax expense over years

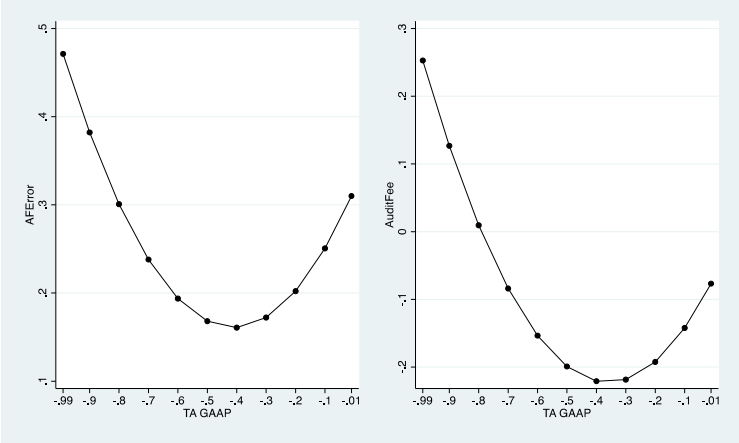
	2. The average dispersion of analyst earnings forecasts. (AFDisp) 3. An estimate of the adverse selection component of the bid-ask spread. (Spread) 4. Accruals quality. The standard deviation of residuals over the five-year rolling window from an industry-year level Dechow-Dichev model augmented with fundamental variables from Jones model (Francis et al. 2004, 2005). (AQ) and other measures based on these variables.	t, t-1 and t-2 divided by the sum of pre-tax income for years t, t-1 and t-2. (TA_GAAP) 2. The firm's mean industry size CASH ETR less the firm's CASH ETR, where CASH_ETR is the sum of cash paid for taxes for years t, t-1 and t-2 divided by the sum of pre-tax income for years t, t-1 and t-2. (TA_CASH) 3. The number of times one of the tax haven locations described in Dyreng and Lindsey (2009) are mentioned in Exhibit 21of the current year 10K. (TAX_HAVENS) 4. Discretionary permanent book-tax differences based on Frank et al. (2009). (DTAX) 5. Tax shelter predicted value as described in Wilson (2009). (SHELTER) 6. The ending FIN48 balance scaled by average assets. (FIN48)

Figure 1: Relationship between Transparency and Tax avoidance

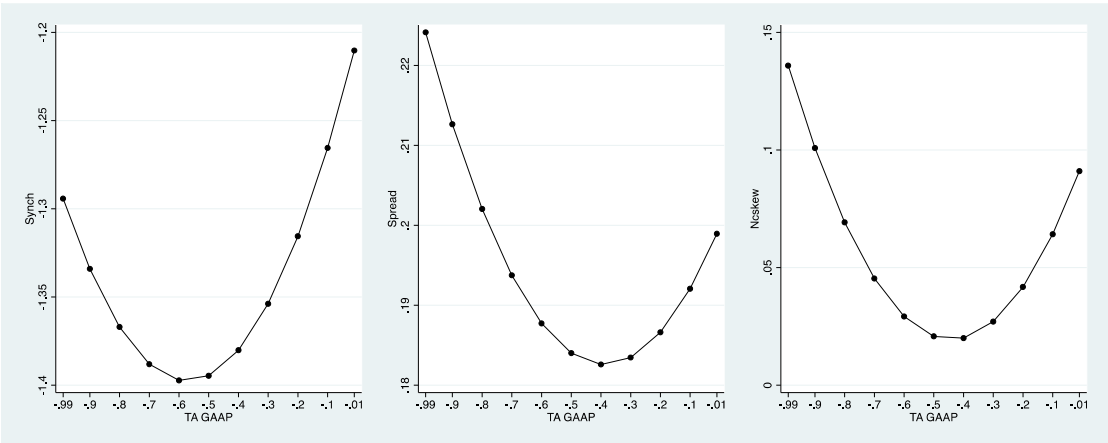
Panel A: Effect on Absolute Discretionary Accruals, Standard Deviation of Discretionary Accruals, and the probability of Restatement.



Panel B: Effect on Analysts Forecast Errors and Audit Fees



Panel C: Effect on Stock Price Synchronicity, Bid-Ask Spread, And Stock Price Crash Risk



Note: This figure visualizes our empirical regression results. The horizontal axes represent our measure of tax avoidance, TA GAAP. The vertical axes represent different measures in different panels. In Panel A, the vertical axes represent absolute discretionary accruals, earnings opacity, and the probability of accounting restatements from left to right, respectively. The vertical axes represent analyst forecast errors, and audit fees from left to right in Panel B. The vertical axes represent stock price synchronicity, bid-ask spread, and stock price crash risk from left to right in Panel C, respectively. All the other controls are set to mean in the figure.

Table 1 Sample Selection Procedure

Sample Requirement	**# of Obs.**
Observations of all the US firms from 1995 to 2016 in *Compustat_CRSP Merged* dataset.	128,211
Delete observations with missing CIK code or Ticker, which are used to merge AuditAnalytics, I/B/E/S, and Thomson-Reuters.	(2,769)
Delete observations of financial and utility firms (i.e., firms with SIC 4900-4999 or 6000-6999).	(41,474)
Delete observations with missing or negative pretax income.	(33,060)
Delete observations with missing data or information to calculate discretionary accrual and other financial variables.	(8,068)
The final sample of firm-year observations for testing the effect of tax avoidance constructed based on GAAP ETR on earnings quality.	**42,840**

Note: This table provides the selection process for the sample used to test the effect of tax avoidance on earnings quality when GAAP ETR is used to capture tax avoidance. For tests using other tax avoidance measures and other alternative measures of transparency, we remove the observations with missing values for these alternative measures from the sample.

Table 2
Panel A Descriptive Statistics

Variable	# of Obs.	Mean	Std. Dev.	10%	90%
GAAP ETR	42,840	0.323	0.167	0.022	0.430
Cash ETR	42,840	0.271	0.226	0.010	0.513
Current ETR	41,579	0.299	0.211	0.010	0.501
TA GAAP	42,840	-0.323	0.167	-0.430	-0.022
TA Cash	42,840	-0.272	0.226	-0.513	-0.010
TA Current	41,579	-0.299	0.211	-0.500	-0.010
AbsDA	42,840	0.069	0.091	0.007	0.155
StdDA	33,766	0.082	0.088	0.021	0.163
Restate	38,488	0.120	0.325	0	1
AFError	26,691	0.152	0.261	0.010	0.363
AuditFee	28,242	-0.212	1.344	-2.025	1.512
Synch	31,523	-1.359	1.570	-3.460	0.503
Spread	31,632	0.177	0.245	0.013	0.469
Ncskew	30,640	0.032	0.847	-0.922	1.022
LnTA	42,840	6.131	1.925	3.585	8.751
LEV	42,840	0.476	0.229	0.184	0.763
ForInc	42,840	0.017	0.034	0	0.060
PPE	42,840	0.301	0.262	0.049	0.713
Intang	42,840	0.183	0.237	0	0.502
PTROA	42,840	0.122	0.097	0.022	0.251
PTCFO	42,840	0.152	0.120	0.033	0.300
NOL	42,840	0.710	0.454	0	1
MB	42,840	2.965	3.886	0.862	5.930
BigN	42,840	0.525	0.499	0	1
TradeVol	42,840	17.312	2.021	14.551	19.921
AnlstCover	42,840	0.986	0.115	1	1
TACC	31,632	-0.040	0.087	-0.127	0.049
Sum_Forecast	26,691	3.238	1.175	1.609	4.682
CashDV	26,691	0.009	0.016	0	0.028
AccRec	28,242	0.180	0.138	0.036	0.402
MAO	28,242	0.055	0.229	0	0
Tenure	28,242	0.144	0.351	0	1
InstHolding	31,632	0.570	0.285	0.113	0.908
Price	31,632	2.973	0.954	1.389	4.032
d_Turn	30,640	0.545	0.498	0	1
Ret	30,640	-0.002	0.002	-0.004	0.000

Table 2
Panel B Sample Distribution by fiscal year

Year	# of *GAAP ETR*	Mean of *GAAP ETR*	# of *Cash ETR*	Mean of *Cash ETR*	# of *Current ETR*	Mean of *Current ETR*
1995	2,637	0.331	2,637	0.308	2,546	0.325
1996	2,757	0.334	2,757	0.291	2,653	0.326
1997	2,821	0.349	2,821	0.294	2,693	0.330
1998	2,633	0.357	2,633	0.312	2,539	0.339
1999	2,466	0.346	2,466	0.290	2,387	0.324
2000	2,205	0.351	2,205	0.289	2,134	0.323
2001	1,793	0.353	1,793	0.288	1,722	0.322
2002	1,860	0.325	1,860	0.236	1,784	0.264
2003	1,942	0.319	1,942	0.219	1,869	0.265
2004	2,062	0.301	2,062	0.214	1,991	0.260
2005	2,026	0.311	2,026	0.250	1,970	0.294
2006	1,963	0.312	1,963	0.267	1,903	0.300
2007	1,845	0.313	1,845	0.280	1,794	0.307
2008	1,548	0.327	1,548	0.302	1,504	0.310
2009	1,483	0.310	1,483	0.274	1,452	0.285
2010	1,715	0.291	1,715	0.237	1,678	0.257
2011	1,693	0.292	1,693	0.231	1,664	0.249
2012	1,584	0.308	1,584	0.260	1,562	0.276
2013	1,525	0.297	1,525	0.273	1,507	0.280
2014	1,541	0.300	1,541	0.270	1,515	0.284
2015	1,401	0.303	1,401	0.271	1,385	0.288
2016	1,340	0.297	1,340	0.258	1,327	0.276
Total	42,840	0.323	42,840	0.271	41,579	0.299

Note: This table provides the sample descriptive statistics in Panel A and the sample distribution and the mean of the ETRs by year in Panel B.

Table 3 Effect of Tax Avoidance on Absolute Accruals Management, Uncertainty in Accruals, and Restatement

Dependent Variable=	(1) *AbsDA*	(2) *AbsDA*	(3) *AbsDA*	(4) *AbsDA*	(5) *StdDA*	(6) *StdDA*	(7) *StdDA*	(8) *StdDA*	(9) *Restate*	(10) *Restate*	(11) *Restate*	(12) *Restate*
TA GAAP	0.025***	0.160***			0.030***	0.142***			-0.016*	0.043*		
	(7.34)	(19.88)			(7.43)	(13.55)			(-1.65)	(1.67)		
TA GAAP²		0.179***				0.144***				0.074***		
		(20.07)				(13.06)				(2.66)		
TA Cash			0.084***				0.108***				0.078***	
			(13.20)				(13.15)				(3.17)	
TA Cash²			0.112***				0.113***				0.109***	
			(16.29)				(13.77)				(4.44)	
TA Current				0.103***				0.134***				0.064**
				(14.63)				(13.43)				(2.51)
TA Current²				0.135***				0.135***				0.098***
				(17.27)				(13.62)				(3.84)
LnTA	-0.015***	-0.013***	-0.014***	-0.014***	-0.022***	-0.020***	-0.020***	-0.020***	-0.010***	-0.009***	-0.008***	-0.009***
	(-26.58)	(-23.04)	(-24.32)	(-24.01)	(-25.57)	(-23.37)	(-24.15)	(-23.74)	(-3.64)	(-3.18)	(-2.90)	(-3.11)
LEV	0.036***	0.032***	0.034***	0.033***	0.040***	0.036***	0.037***	0.036***	0.025**	0.023*	0.022*	0.028**
	(12.70)	(11.44)	(12.02)	(11.40)	(9.21)	(8.47)	(8.40)	(8.28)	(2.04)	(1.88)	(1.86)	(2.24)
ForInc	-0.073***	-0.084***	-0.060***	-0.055***	-0.126***	-0.138***	-0.114***	-0.104***	-0.114	-0.118	-0.116	-0.088
	(-4.36)	(-5.10)	(-3.62)	(-3.32)	(-5.35)	(-5.94)	(-4.96)	(-4.51)	(-1.44)	(-1.50)	(-1.48)	(-1.12)
PPE	0.046***	0.047***	0.045***	0.043***	-0.000	0.001	-0.003	-0.006	0.017	0.018	0.016	0.020
	(11.45)	(11.71)	(11.30)	(10.65)	(-0.04)	(0.27)	(-0.71)	(-1.26)	(1.30)	(1.34)	(1.22)	(1.43)
Intang	-0.002	-0.002	-0.002	-0.003	-0.011***	-0.010***	-0.011***	-0.011***	-0.006	-0.006	-0.004	-0.004
	(-0.89)	(-0.78)	(-0.90)	(-0.98)	(-2.88)	(-2.76)	(-2.82)	(-2.86)	(-0.51)	(-0.51)	(-0.37)	(-0.37)
PTROA	0.365***	0.399***	0.401***	0.398***	0.149***	0.177***	0.173***	0.172***	-0.089***	-0.074**	-0.054*	-0.046
	(26.03)	(28.15)	(27.96)	(26.81)	(9.94)	(11.46)	(11.05)	(10.98)	(-2.83)	(-2.31)	(-1.68)	(-1.42)
PTCFO	-0.285***	-0.283***	-0.288***	-0.278***	-0.114***	-0.113***	-0.110***	-0.100***	-0.099***	-0.098***	-0.098***	-0.107***
	(-22.45)	(-22.60)	(-22.69)	(-21.34)	(-9.64)	(-9.76)	(-9.26)	(-8.52)	(-4.45)	(-4.43)	(-4.38)	(-4.66)
NOL	-0.002**	-0.001	-0.002**	-0.002*	-0.002	-0.001	-0.001	-0.001	-0.002	-0.002	-0.002	-0.004
	(-2.34)	(-1.36)	(-2.12)	(-1.66)	(-1.23)	(-0.77)	(-0.81)	(-0.91)	(-0.47)	(-0.40)	(-0.35)	(-0.67)
MB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(1.52)	(1.12)	(1.31)	(1.20)	(0.38)	(0.13)	(0.14)	(0.25)	(0.53)	(0.48)	(0.44)	(0.21)
BigN	-0.006***	-0.006***	-0.005***	-0.006***	-0.012***	-0.011***	-0.011***	-0.011***	0.029***	0.030***	0.030***	0.031***
	(-3.61)	(-3.36)	(-3.20)	(-3.40)	(-4.23)	(-4.20)	(-4.00)	(-4.02)	(4.31)	(4.35)	(4.40)	(4.49)

TradeVol	0.006***	0.005***	0.005***	0.005***	0.012***	0.010***	0.011***	0.011***	0.014***	0.013***	0.012***	0.012***
	(12.93)	(9.64)	(11.08)	(10.90)	(15.03)	(13.28)	(13.85)	(13.63)	(5.57)	(5.20)	(5.04)	(4.95)
AnlstCover	-0.007*	-0.005	-0.007*	-0.008**	-0.006	-0.005	-0.006*	-0.006	-0.029**	-0.028**	-0.029**	-0.029**
	(-1.80)	(-1.48)	(-1.88)	(-2.03)	(-1.61)	(-1.28)	(-1.68)	(-1.59)	(-2.38)	(-2.31)	(-2.35)	(-2.28)
Intercept	-0.016*	0.017*	-0.009	-0.002	-0.018	0.008	-0.002	0.008				
	(-1.68)	(1.71)	(-0.89)	(-0.19)	(-1.18)	(0.52)	(-0.10)	(0.51)				
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ETRs at the Inflection point		0.447	0.375	0.381		0.493	0.478	0.496		0.291	0.358	0.327
Percentage of observations with ETRs > Inflection point		9.1%	24.7%	27.7%		6.3%	11.5%	10.4%		72.5%	27.1%	44.1%
N	42,840	42,840	42,840	41,579	33,766	33,766	33,766	32,840	38,488	38,488	38,488	37,286
R^2	0.220	0.234	0.227	0.222	0.220	0.229	0.226	0.229	0.080	0.081	0.082	0.083

Note: Column (1) to column (8) of his table uses OLS regression analyses to test the effect of tax avoidance on accruals management and uncertainty in accruals. The last four columns use logit regression analyses to test the effect of tax avoidance on accounting restatement. We report the marginal effect at the mean and pseudo-R2 for the last four columns. We cluster all standard errors by firm. We report *t*-statistics in parentheses. ***, **, and * refer to significance (two-tailed) at the 1%, 5%, and 10% level, respectively. See the appendix for variable definitions.

Table 4 Effect of Tax Avoidance on Analysts Forecast Errors and Audit Fees

Dependent Variable=	(1) *AFError*	(2) *AFError*	(3) *AFError*	(4) *AFError*	(5) *AuditFee*	(6) *AuditFee*	(7) *AuditFee*	(8) *AuditFee*
TA GAAP	0.030**	0.403***			0.049*	0.626***		
	(2.00)	(10.66)			(1.67)	(8.51)		
TA GAAP²		0.469***				0.743***		
		(11.34)				(9.67)		
TA Cash			0.263***				-0.049	
			(8.57)				(-0.75)	
TA Cash²			0.405***				0.107	
			(11.91)				(1.63)	
TA Current				0.315***				0.119*
				(9.19)				(1.70)
TA Current²				0.407***				0.259***
				(11.06)				(3.65)
LnTA	0.017***	0.023***	0.024***	0.023***	0.524***	0.528***	0.526***	0.524***
	(3.43)	(4.66)	(4.73)	(4.47)	(88.85)	(89.71)	(87.89)	(88.01)
LEV	0.068***	0.060***	0.060***	0.061***	0.383***	0.368***	0.383***	0.371***
	(4.77)	(4.27)	(4.22)	(4.24)	(10.75)	(10.33)	(10.55)	(10.09)
ForInc	-0.150*	-0.176**	-0.091	-0.095	2.832***	2.784***	2.872***	2.830***
	(-1.84)	(-2.21)	(-1.15)	(-1.20)	(13.31)	(13.05)	(13.48)	(13.20)
PPE	0.013	0.011	0.009	0.003	-0.544***	-0.540***	-0.555***	-0.533***
	(0.71)	(0.61)	(0.54)	(0.15)	(-13.10)	(-13.10)	(-13.28)	(-12.70)
Intang	-0.093***	-0.092***	-0.093***	-0.092***	-0.046	-0.042	-0.052	-0.040
	(-7.41)	(-7.52)	(-7.92)	(-7.35)	(-1.42)	(-1.32)	(-1.58)	(-1.20)
PTROA	-0.013	0.085**	0.111***	0.105***	-0.728***	-0.596***	-0.693***	-0.689***
	(-0.35)	(2.22)	(2.86)	(2.68)	(-9.47)	(-7.59)	(-8.57)	(-8.53)
TACC	0.187***	0.165***	0.184***	0.189***	-0.135**	-0.189***	-0.119*	-0.090
	(5.34)	(4.77)	(5.43)	(5.49)	(-2.13)	(-2.98)	(-1.85)	(-1.39)
Sum_Forecast	-0.005	-0.003	-0.004	-0.003				
	(-1.08)	(-0.76)	(-0.84)	(-0.63)				
CashDV	-0.282	-0.344*	-0.392**	-0.331*				
	(-1.45)	(-1.79)	(-2.07)	(-1.67)				
TradeVol	-0.012**	-0.019***	-0.019***	-0.018***				
	(-2.49)	(-3.87)	(-3.89)	(-3.63)				
InstHolding	-0.014	-0.004	-0.005	-0.008				
	(-0.91)	(-0.25)	(-0.35)	(-0.52)				
BigN					0.324***	0.321***	0.322***	0.327***
					(14.38)	(14.34)	(13.96)	(14.23)

AccRec					0.340***	0.352***	0.328***	0.343***
					(5.09)	(5.32)	(4.82)	(5.03)
MAO					0.057*	0.039	0.053	0.065**
					(1.80)	(1.21)	(1.58)	(2.00)
Tenure					-0.025***	-0.026***	-0.028***	-0.026***
					(-2.63)	(-2.68)	(-2.92)	(-2.66)
Intercept	0.250***	0.377***	0.322***	0.311***	-4.415***	-4.348***	-4.450***	-4.448***
	(3.19)	(4.82)	(4.08)	(4.11)	(-17.51)	(-17.51)	(-17.03)	(-17.46)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ETRs at Inflection point		0.428	0.325	0.387		0.421	N/A	0.230
Percentage of observations with ETRs >Inflection point		10.3%	35.5%	24.3%		10.2%	N/A	60.4%
N	26,691	26,691	26,077	26,036	28,242	28,242	27,453	27,433
R^2	0.081	0.091	0.099	0.093	0.824	0.826	0.825	0.825

Note: This table uses OLS regression analyses to test the effect of tax avoidance on analysts forecast errors and audit fees. We cluster standard errors by firm. We report *t*-statistics in parentheses. ***, **, and * refer to significance (two-tailed) at the 1%, 5%, and 10% level, respectively. See the appendix for variable definitions.

Table 5 Effect of Tax Avoidance on Stock Price Behavior

Dependent Variable=	(1) *Synch*	(2) *Synch*	(3) *Synch*	(4) *Synch*	(5) *Spread*	(6) *Spread*	(7) *Spread*	(8) *Spread*	(9) $Ncskew_{t+1}$	(10) $Ncskew_{t+1}$	(11) $Ncskew_{t+1}$	(12) $Ncskew_{t+1}$
TA GAAP	0.142***	0.487***			0.006	0.079***			0.061*	0.268***		
	(3.07)	(4.53)			(0.72)	(3.75)			(1.85)	(3.77)		
TA GAAP²		0.449***				0.098***				0.270***		
		(3.89)				(4.62)				(3.26)		
TA Cash			0.283***				0.054***				0.235***	
			(3.00)				(2.95)				(3.72)	
TA Cash²			0.301***				0.063***				0.242***	
			(3.04)				(3.45)				(3.06)	
TA Current				0.138				0.070***				0.289***
				(1.39)				(3.75)				(4.43)
TA Current²				0.202*				0.076***				0.296***
				(1.93)				(4.04)				(3.81)
LnTA	0.409***	0.409***	0.410***	0.410***	0.036***	0.037***	0.037***	0.037***	-0.002	-0.002	0.001	-0.001
	(37.02)	(37.06)	(36.70)	(36.76)	(8.95)	(8.98)	(8.81)	(8.84)	(-0.37)	(-0.39)	(0.13)	(-0.24)
LEV	-0.487***	-0.488***	-0.487***	-0.488***	-0.020	-0.022	-0.023*	-0.021	-0.068**	-0.068**	-0.082***	-0.068**
	(-8.72)	(-8.74)	(-8.53)	(-8.59)	(-1.55)	(-1.64)	(-1.68)	(-1.55)	(-2.23)	(-2.23)	(-2.61)	(-2.19)
ForInc	0.534*	0.515*	0.631**	0.655**	-0.046	-0.050	-0.037	-0.043	-0.066	-0.077	-0.040	-0.064
	(1.80)	(1.74)	(2.12)	(2.21)	(-0.93)	(-1.01)	(-0.76)	(-0.87)	(-0.40)	(-0.47)	(-0.24)	(-0.39)
PPE	-0.053	-0.051	-0.048	-0.056	-0.026**	-0.026***	-0.024**	-0.028***	0.060**	0.061**	0.055**	0.040
	(-0.97)	(-0.95)	(-0.86)	(-0.99)	(-2.55)	(-2.58)	(-2.33)	(-2.71)	(2.26)	(2.30)	(2.02)	(1.48)
Intang	-0.242***	-0.240***	-0.239***	-0.248***	-0.033***	-0.032***	-0.030***	-0.033***	0.062**	0.064**	0.066**	0.054**
	(-5.72)	(-5.68)	(-5.57)	(-5.76)	(-3.78)	(-3.77)	(-3.46)	(-3.79)	(2.33)	(2.39)	(2.41)	(1.99)
PTROA	1.261***	1.323***	1.333***	1.305***	0.152***	0.170***	0.166***	0.171***	0.416***	0.455***	0.454***	0.486***
	(12.05)	(12.37)	(12.06)	(11.85)	(7.06)	(7.42)	(7.04)	(7.30)	(6.93)	(7.42)	(7.21)	(7.77)
TACC	0.178*	0.159*	0.212**	0.226**	0.016	0.012	0.016	0.021	0.155**	0.145**	0.206***	0.170***
	(1.92)	(1.72)	(2.24)	(2.40)	(0.97)	(0.71)	(0.93)	(1.21)	(2.47)	(2.30)	(3.21)	(2.65)
AnlstCover	0.114**	0.117**	0.152***	0.110**	0.008	0.009	0.008	0.009	0.062*	0.063*	0.058	0.059
	(2.11)	(2.18)	(2.80)	(2.02)	(0.90)	(1.01)	(0.88)	(0.95)	(1.66)	(1.69)	(1.53)	(1.53)
InstHolding	0.871***	0.871***	0.870***	0.871***	-0.032***	-0.030***	-0.033***	-0.033***	0.200***	0.200***	0.198***	0.198***
	(15.45)	(15.45)	(15.12)	(15.13)	(-2.80)	(-2.65)	(-2.83)	(-2.85)	(8.32)	(8.34)	(8.03)	(8.16)
Price	0.064***	0.069***	0.068***	0.069***	0.059***	0.059***	0.060***	0.060***	0.078***	0.081***	0.078***	0.082***
	(4.16)	(4.48)	(4.33)	(4.41)	(12.64)	(12.67)	(12.34)	(12.45)	(9.37)	(9.70)	(8.99)	(9.62)
TradeVol					-0.069***	-0.070***	-0.070***	-0.070***				
					(-15.51)	(-15.36)	(-15.12)	(-15.24)				
d_Turn									0.029***	0.028***	0.026***	0.028***

									(2.92)	(2.84)	(2.61)	(2.79)
Ret									-9.081***	-8.193***	-8.791***	-8.263***
									(-3.52)	(-3.19)	(-3.19)	(-3.13)
$Ncskew_t$									0.033***	0.033***	0.032***	0.032***
									(4.96)	(4.97)	(4.77)	(4.76)
Intercept	-5.046***	-5.013***	-5.136***	-5.144***	1.238***	1.257***	1.256***	1.250***	-0.710***	-0.687***	-0.690***	-0.689***
	(-21.45)	(-21.22)	(-22.57)	(-22.27)	(22.59)	(22.13)	(22.26)	(22.34)	(-6.32)	(-6.11)	(-6.01)	(-5.79)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ETRs at Inflection point		0.542	0.470	0.342		0.403	0.429	0.461		0.496	0.485	0.488
Percentage of observations with ETRs >Inflection point		5.1%	11.4%	37.8%		14.4%	14.7%	12.1%		6.2%	10.6%	10.1%
N	31,523	31,523	30,683	30,691	31,632	31,632	30,790	30,796	30,640	30,640	29,815	29,814
R^2	0.538	0.539	0.538	0.539	0.576	0.576	0.578	0.577	0.036	0.037	0.036	0.037

Note: This table uses OLS regression analyses to test the effect of tax avoidance on stock price informativeness, stock price spread and crash risk. We cluster standard errors by firm. We report *t*-statistics in parentheses. ***, **, and * refer to significance (two-tailed) at the 1%, 5%, and 10% level, respectively. See the appendix for variable definitions.

Table 6 Robust Tests

Panel A: Firm fixed effect

Dependent Variable=	(1) *AbsDA*	(2) *StdDA*	(3) *Restate*	(4) *AFError*	(5) *AuditFee*	(6) *Synch*	(7) *Spread*	(8) $Ncskew_{t+1}$
TA GAAP	0.138***	0.043***	0.041	0.350***	0.246***	0.033	-0.012	0.184**
	(20.56)	(6.83)	(0.77)	(11.18)	(5.71)	(0.32)	(-0.84)	(2.09)
TA GAAP²	0.151***	0.049***	0.069*	0.398***	0.250***	0.023	0.001	0.150
	(20.70)	(7.17)	(1.72)	(11.80)	(5.33)	(0.20)	(0.08)	(1.55)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	42,840	33,766	16,340	26,691	28,242	31,523	31,632	30,640
Within R^2	0.124	0.060		0.0441	0.626	0.263	0.552	0.039
Between R^2	0.362	0.243		0.007	0.791	0.574	0.591	0.012
Overall R^2	0.175	0.145		0.008	0.777	0.494	0.556	0.019
Pseudo R^2			0.224					

Panel B: Subsample after Sarbanes-Oxley Act (2002)

Dependent Variable=	(1) *AbsDA*	(2) *StdDA*	(3) *Restate*	(4) *AFError*	(5) *AuditFee*	(6) *Synch*	(7) *Spread*	(8) $Ncskew_{t+1}$
TA GAAP	0.170***	0.136***	0.101**	0.593***	0.546***	0.137	0.081***	0.260***
	(16.20)	(10.06)	(2.40)	(9.37)	(6.99)	(1.14)	(3.63)	(2.93)
TA GAAP²	0.177***	0.135***	0.135***	0.659***	0.683***	0.114	0.081***	0.202*
	(16.13)	(9.62)	(3.04)	(9.70)	(8.29)	(0.87)	(3.79)	(1.95)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	23,668	20,098	19,367	17,676	23,393	20,225	20,292	19,345
R^2	0.201	0.237	0.0404	0.093	0.812	0.545	0.350	0.024

Panel C: Long-term measures of tax avoidance

DependentVariable=	(1) *AbsDA*	(2) *StdDA*	(3) *Restate*	(4) *AFError*	(5) *AuditFee*	(6) *Synch*	(7) *Spread*	(8) $Ncskew_{t+1}$
TALT3	0.120***	0.172***	0.039	0.260***	0.475***	0.395***	0.086***	0.300***
	(13.49)	(13.63)	(1.32)	(4.81)	(5.47)	(3.22)	(3.74)	(3.58)
TALT3²	0.108***	0.165***	0.056*	0.267***	0.680***	0.308**	0.101***	0.310***
	(12.19)	(13.34)	(1.84)	(4.81)	(7.77)	(2.33)	(4.35)	(3.19)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	36,702	30,697	36,612	23,663	24,300	27,689	27,780	26,856
R^2	0.193	0.218	0.0808	0.073	0.832	0.545	0.582	0.033

Panel D: Change Analyses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Δ*AbsDA*	Δ*AQ*	Δ*Restate*	Δ*AFError*	Δ*AuditFee*	Δ*Synch*	Δ*Spread*	Δ*FNcskew*
Δ*TA GAAP*	0.046***	0.005**	0.057***	0.122***	0.095***	-0.131	-0.005	-0.063
	(6.84)	(2.03)	(3.67)	(4.94)	(3.35)	(-1.33)	(-0.88)	(-0.82)
TA GAAP	0.011***	0.002	-0.003	0.003	-0.062***	0.033	0.013***	0.114***
	(3.53)	(1.40)	(-0.21)	(0.30)	(-3.73)	(0.69)	(3.23)	(2.69)
Δ*TA GAAP*TA GAAP*	0.102***	0.015***	0.113***	0.284***	0.122**	-0.143	0.004	-0.086
	(8.79)	(3.13)	(4.02)	(5.92)	(2.11)	(-0.78)	(0.31)	(-0.59)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Δ*TAGAAP* - Δ*TAGAAP*TAGAA*	-0.056	-0.010	-0.056	-0.162	-0.027	0.012	-0.009	0.023
F-test	43.00***	8.75***	7.51***	21.17***	1.98	0.00	1.27	0.04
N	34,596	26,125	30,952	21,536	21,448	26,047	26,141	25,268
R^2	0.073	0.029	0.0541	0.025	0.189	0.100	0.087	0.245

Panel E: The Effect of Tax Avoidance on Transparency of year t+1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$AbsDA_{t+1}$	$StdDA_{t+1}$	$Restate_{t+1}$	$AFError_{t+1}$	$AuditFee_{t+1}$	$Synch_{t+1}$	$Spread_{t+1}$
TA GAAP	0.078***	0.151***	0.052*	0.279***	0.507***	0.941***	0.084***
	(9.15)	(12.23)	(1.67)	(5.24)	(5.88)	(7.48)	(3.36)
$TA\ GAAP^2$	0.066***	0.151***	0.060*	0.313***	0.645***	0.920***	0.094***
	(7.27)	(11.54)	(1.65)	(4.98)	(6.92)	(6.57)	(3.85)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	32,679	27,841	30,539	21,078	21,712	25,376	25,420
R^2	0.137	0.224	0.064	0.083	0.822	0.541	0.570

Note: This table reports all the additional tests. Control variables are included in the regressions but not reported. Panel A controls for firm fixed effects. Panel B uses a subsample of years after 2002. Panel C uses long-term tax avoidance measures. Panel D provides the change analyses. Δ is used to take the first diference of a variable. Panel E reruns the primary tests using transparency measures from year t+1. Control variables are all included in these tests but not reported. We cluster standard errors by firm in Panels B, and C. We report *t*-statistics in parentheses. ***, **, and * refer to significance (two-tailed) at the 1%, 5%, and 10% level, respectively. See the appendix for variable definitions.