

## Institutional Quality, Tax Avoidance, and Analysts' Forecast: International Evidence

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**Abstract: Research Question:** This study examines the joint-effect of tax avoidance and institutional quality on analysts forecast. **Motivation:** The aspects of tax are important in the valuation by financial analysts in the capital markets, but the extent to which the analysts incorporate tax avoidance in their forecasts is uncertain. The complexity associated with tax avoidance may lead to more efforts for appropriate forecast, but such complexity may also reduce the ability of the analysts in forecasting. Further, when institutional theory is considered, the strength of country-level institutional environment may influence the role of the analysts in factoring tax avoidance in their forecast. **Idea:** This study hypothesized that tax avoidance is associated with analyst forecast, and the strength of institutional quality jointly affects the association between tax avoidance and analyst forecast. **Data:** The dataset consists of 22,690 firm-year observations from 36 countries over the period 2007-2016. Data were gathered from Institutional Brokers' Estimate System I/B/E/S, Thomson Reuters Fundamentals, the World Governance Indicators, OSIRIS and ownership data reported in La Porta *et al.* (2006). **Method/Tools:** The regression models employ two measures of analyst forecasts as the dependent variables; forecast dispersion and accuracy. The test variables are tax avoidance that is proxied by firms' effective tax rate, institutional quality that is an index from Kaufmann *et al.* (2009) to proxy for country-level institutional environment, and the interaction between tax avoidance and institutional quality. **Findings:** Findings indicate that high tax avoidance is associated with high forecast dispersion but more accurate forecast. There are evidence that the effect of tax avoidance on properties of analyst forecast is weakened for firms in high institutional quality countries. The results are robust even after employing the two-stage least square regression to address endogeneity issue, and the weighted least square in overcoming issue of differences in sample size between countries. **Contributions:** The findings corroborate evidence on tax avoidance and analyst forecast, and enrich the international accounting literature. This study provides insights to policy makers on the role of institutional quality in reducing information asymmetry, specifically on tax and forecast activities.

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**Keywords:** Tax avoidance, institutional quality, analyst forecast dispersion, analyst forecast accuracy.

**JEL classification:** G11, G14, G15

## 1. Introduction

Research on tax avoidance has been centred on the effect of tax avoidance on various aspects of performance based on the view that activities to reduce tax burden can maximize shareholders' wealth. Empirical evidence, however, point out that the effect of tax avoidance on corporate performance and value is conditional upon factors such as corporate governance quality of the companies (Desai and Dharmapala, 2009). These evidences indicate that strategies related to tax avoidance, which reflects all transactions that lead to reduction in explicit tax liability (Hanlon and Heitzman, 2010), are incorporated in identifying the worthiness of the companies. The aspects of tax, therefore, can be considered important in the valuation by financial analysts who serve as intermediaries in the capital markets. In this view, tax avoidance introduces complexity in a firm's information environment that will require more efforts by the analysts in making forecast. However, there is also a possibility that analyst would not be able to incorporate the complex nature of tax avoidance in their forecast. The concrete answer towards the role of tax avoidance on analyst forecast is yet unknown, leading to this research.

This study investigates the association between tax avoidance and analyst forecast, and whether the association is explained by the strength of country-level institutional quality. Despite the variations in tax systems across countries, tax avoidance is a matter of concern of regulators around the world due to two reasons. First, many tax avoidance tools involved cross-national borders activities. The case of Panama Papers, involving the formation of shell companies by a Panamanian law firm used by its clients to evade tax, has triggered investigations in about 82 countries including Hong Kong, Switzerland, and the United Kingdom. Second, modern technologies have enabled more sophisticated tax avoidance mechanisms, allowing substantial sums to be moved between multiple jurisdictions easily and at great speed, often taking advantage of those jurisdictions with weak local legislation. In analysis involving 46 OECD and G20 countries, Johansson (2017) shows that multinational enterprises shift profits to lower-tax rate countries and take advantages of the mismatches between tax systems and preferential tax treatment to reduce their tax burden. Due to the potential link between tax avoidance and financial crime, such as those on money laundering, taking the perspective of country-level institutional quality in understanding corporate tax avoidance activities are essential. Besides, there are variations in the risk of managerial rent diversion across countries that it is important to know whether there are differences in the way tax avoidance affects forecast worldwide.

We posit that tax avoidance is associated with analyst forecast, and the strength of institutional quality jointly affects the association between tax avoidance and analyst forecast. Tax avoidance is proxied by firms' effective tax rate while analyst forecast is proxied by dispersion and accuracy. Institutional quality is an index developed from six indicators in Kaufmann *et al.* (2009) to proxy for the strength of country-level institutional environment. The main results for forecast dispersion show a positive association between tax avoidance and forecast dispersion, and a negative association between institutional quality and forecast dispersion. There is also a significant and negative result for the joint effect of tax avoidance and institutional quality on forecast dispersion. The main results for forecast accuracy show a positive association between tax avoidance and forecast accuracy, and a negative association between institutional quality and forecast accuracy. The joint-effect of tax avoidance and institutional quality on forecast accuracy is significant and negative. Overall, our results indicate that firms with higher tax avoidance are more likely to have higher forecast dispersion

but more accurate forecast. However, country-level institutional quality moderates the relationship between tax avoidance and analysts forecast.

Additional analyses show that firms with high tax avoidance are those that had greater tendency to meet the consensus earnings forecast. In additional analysis, we replace institutional quality with continuous variable and find statistically similar results to the main tests. Our results remain the same when we exclude i) observations in year 2008-2010 as to control for global financial crisis period, and ii) observations from China, the highest number of observations, and Israel, the lowest number of observations. We also perform the two-stage least square regression to address the issue of endogeneity and the weighted least square regressions to address issue involving sample size variations across countries. Overall, our results remain robust to all these alternative specifications and analysis.

This study has several implications. First, evidence on the effect of tax avoidance on analyst forecast across firms in various countries enrich the literature on tax avoidance and analyst forecast, as well as the international accounting literature. Second, our findings provide an understanding on the implications of the institutional differences across countries on accounting environment, specifically on tax and forecast activities. Such understanding matters in the perspective of both tax avoidance, due to cross-border tax avoidance activities, and analyst forecast, due to growth in international investment. The findings also reinforce the need to incorporate institutional theory in analysing corporate practices. Third, the findings offer insights to the regulators in policy development to curb manipulative tax avoidance activities and promote more efficient analyst forecast activities in an endeavour towards better-governed companies and the capital market.

The remainder of our study is organized as follows: Section 2 reviews previous literature and develops hypotheses. Section 3 explains and illustrates the research design. Section 4 presents descriptive and empirical results and Section 5 concludes our study.

## **2. Literature Review and Hypothesis Development**

Tax expenses, which affect both profit and cash flow of companies, are directly related to corporate performance. The more the tax expenses, the lesser the ability that the firms have to pay high dividends that can attract or retain investors, venture into potential investment opportunities, finance future growth and avoid financial shock. However, being a mandatory contribution to the state or federal government, tax imposes both legal and moral obligations to the taxpayers. The risk of heavy penalty imposed on various aspects of tax non-compliance, even for misreporting, signifies the need to strategize on effective tax planning. According to Hanlon and Heitzman (2010), there is a continuum upon which tax planning strategies can be implemented with at one end being those that are perfectly legal, and at the other end are those considered to be totally aggressive and illegal. In general, tax planning strategies can be referred to as tax avoidance that aims towards the reduction of explicit taxes, either with aggressive or legal intent.

The effectiveness of tax avoidance is determined based on various firm-level factors such as the strength of corporate governance (Armstrong *et al.*, 2015; Minnick and Noga, 2010) as well as external factors such as the function involving institutional ownership (Khurana and Moser, 2013) and tax enforcement (Hoopes *et al.*, 2012). Effective tax avoidance activities may work towards enhancing corporate performance and value. From the perspective of synergy-motivated tax planning, tax avoidance activities that intend to reduce the transfers from shareholders to the government generally enhance the wealth of shareholders (Ariff and Hashim, 2014). However, complex tax avoidance transactions can provide management with the tools and justifications to engage in opportunistic managerial behaviours (Desai and Dharmapala, 2006). From the perspective of the agency cost, evidences have shown that tax avoidance negatively affects the shareholders (Abdul Wahab and Holland 2012; Kim *et al.*,

2011).

Tax planning and strategies directly affect the financial statements as tax savings increases both profit and cash holding, and therefore are part of financial reporting decision. Accordingly, tax related activities are deemed to be incorporated by investors in their decision making. Prior studies indicate that investors consider tax information in their investment decisions (Amir and Sougiannis, 1999; Bauman and Shaw, 2008; Kumar and Visvanathan 2003). Yet, findings on the capital market reactions on tax strategies are not as conclusive (Hanlon and Slemrod, 2009; Gallemore *et al.*, 2014; He *et al.*, 2019), and thus brings into question of whether tax avoidance activities matters to investors. Based on the suggestion towards more research on users of tax-based information in the financial statements (Graham, *et al.*, 2012), this paper focuses on the way tax avoidance is incorporated by financial analysts in their valuation.

## 2.1 Tax Avoidance and Analyst Forecast

As compared to some other financial statement items, information related to tax is not easily incorporated into capital market valuation due to several reasons. First, there are high uncertainties on the effect of tax avoidance activities. While tax savings increase profit and cash holdings, tax avoidance activities may expose firms to high legitimacy risk associated with the costs of being penalized upon tax-related misconducts. The costs include both the penalties as well as the reputational costs that are described by Gallemore *et al.* (2014) in the sense of advertising costs to counter reputational damage, increased effective tax rate from heightened scrutiny by the tax regulators, and increased auditor turnover. The mixed findings on the effect of tax avoidance on corporate performance and value signify the need to consider the trade-off between the benefits and costs of tax avoidance in identifying on how tax-related information is incorporated by the capital market. Secondly, from the lenses of the agency theory, tax avoidance activities may be tailored to benefit shareholders but may also be channelled as financial manipulations tools (Frank *et al.*, 2009; Lennox *et al.*, 2013). Tax avoidance can be done by shifting income across periods by discretionarily managing the recognition of good news (bad news) as economic gains (losses) in the income statement (Lara *et al.*, 2009). Tax avoidance that is meant for, or to cover up for, earnings management and manipulation introduces 'disturbance' in the financial statements that will distort the way tax information is incorporated into capital market valuation. Accordingly, He *et al.* (2019) infer that analysts are less likely to follow firms that have more involvement in tax avoidance due to that being earnings management tools.

In short, tax avoidance activities may increase the financial complexity of firms leading to transparency problem that exacerbate information asymmetry (Balakrishnan *et al.*, 2019). In bridging the information gap between firms and the investors, Clatworthy and Lee (2018) assert that the roles of financial analysts are essential. As capital market intermediaries who assist investment decisions through their valuation and monitoring activities, tax avoidance activities can be expected to be incorporated into the analysts' forecast and report. For example, analysts work to resolve tax policy uncertainties for firms highly impacted by the proposed policy (Howard and Sinha, 2019). Mauler (2019) asserts that analysts' tax forecasts are informative to investors. Yet, due to complexity such as those associated with tax avoidance, analysts may have lesser abilities to assimilate specific information in their forecasts, or they may choose not to assimilate specific information if the cost exceeds the benefit (Plumlee, 2003). He *et al.* (2019) indicate that tax avoiding firms are those with high financial opacity that analysts may have less incentive to cover due to the high costs to acquire and process information.

The link between tax avoidance and analyst forecast, therefore, are two folds. On the one hand, there are views that financial analysts increase their efforts for companies with high tax

avoidance activities, resulting in high quality forecast. There are evidence supporting the view that financial analysts incorporate tax related information in their forecast. In Bratten *et al.* (2017), the evidence is indicative of the view that analysts pay attention to taxes since analysts are more accurate in terms of EPS accuracy and dispersion as complexity related to tax increases. On the other hand, financial analysts, whether intentionally or not intentionally, may not be able to accurately forecast companies with high tax avoidance due to reasons such as lack of skills and knowledge, or associated costs. An abundance of prior studies associating between tax avoidance and analyst forecast came to conclude that analysts do not accurately incorporate tax related information. Due to greater complexity arising from tax avoidance, there will be lesser use of those information by analysts. Relying on analyst forecast error as one of their measure for corporate transparency, Balakrishnan *et al.* (2019) show a negative association between tax aggressiveness and the forecast errors. Francis *et al.* (2019) find that firms that spend more on tax planning have i) lower accuracy of analysts' forecasts of earnings and tax expense, and ii) greater year-to-year volatility in effective tax rates and earnings, and iii) lower persistence of effective tax rates and earnings. Hsu *et al.* (2019) show that firms with more investees in tax havens, presumably with high opacity of tax avoidance activities, are those with lower analyst forecast accuracy and higher forecast dispersion. They find that firms with higher tax avoidance, measured based on tax risks, have lesser analyst coverage.

A more recent finding from He *et al.* (2019) indicate that there are no evidence associating between tax avoidance and informativeness, or errors, in analyst forecast. Further, there is a line of studies identifying that the way analysts incorporate tax-related information are explained by various factors. Plumlee (2003) find that analysts assimilate the less complex tax-law changes, but not the more complex changes, in their forecast of ETRs. In Kim *et al.* (2019), evidence indicate that there are differences in analysts' mis-reaction to tax-based earnings information as compared to other (non-tax) accounting information but only when firms have weak information environments. In summary, prior studies seem to suggest that analysts have difficulties in making forecast associated with tax-based earnings information mostly due to increased firm complexity from tax avoidance that has mainly caused the firm attributes to be less representative of expected earnings. Additionally, some variations are noticeable such as those related to access to appropriate information and resources that enable analysts to better process tax information. We hypothesized that tax avoidance is associated with the properties of analysts' earnings forecast, particularly forecast dispersion and accuracy. Thus, the hypothesis is set as follows:

*H<sub>1</sub>: There is an association between tax avoidance and the properties of analysts' earnings forecast.*

## **2.2 The Joint Effect of Institutional Quality and Tax Avoidance on Analyst Forecast**

The institutional theory asserts that the various aspects of institutional quality influence organizations as well as the behaviour of corporate executives, investors, regulators, and other market participants (Bushman and Piotroski, 2006). Examples include the legal systems, rules and regulations of the capital market, as well as culture and social norms (Kostova, 1997). In the context of our study, the variations in institutional environment have implications to practices, incentives and behaviours related to both tax and analyst forecast. In the aspect of tax, there are worldwide differences in tax systems originating from the tax regulations of the countries. For example, countries may use worldwide or territorial approach in determining whether the foreign source income shall be taxed or not, and there are variations in tax rates across countries. In the aspect of forecast, there are incentives that influence the likelihood and the extent to which analysts may put their efforts in following companies. DeFond and Hung (2007) identify that analysts are more likely to make forecasts

in countries with weak investor protection in line with their view that analysts respond to market-based incentives that can assist investors in minimizing the adverse effects of institutional factors on the quality of earnings. Empirical evidence associating between i) institutional environment and tax avoidance, and ii) institutional environment and analyst forecast are looked into in the development of our second hypothesis.

In relation to tax avoidance, prior studies identify that there are cross-national differences in tax avoidance that can be explained by institutional, demographic and attitudinal factors (Richardson, 2006). An earlier study on cross-country variations in tax avoidance is Riahi-Belkaoui (2004), who finds that competition laws, economic freedom, importance of equity market and incidence of violent crimes explain tax compliance behaviour across 30 countries. Also looking at formal institutions, Atwood *et al.* (2012) find lesser tax avoidance when required book-tax conformity is higher, a worldwide approach is used, and tax enforcement is perceived to be stronger. Taking the perspective of the governance role of the auditor, Kanagaretnam *et al.* (2016) find that there is a negative association between auditor quality and the likelihood of tax aggressiveness, and that the association is more pronounced in countries with stronger investor protection, auditor litigation risk, audit environment, and capital market pressure. Another line of research focus on the informal institutions that shape the tax evasion behaviours and practices. Evidence indicate that cultural values predict tax evasion behaviour between countries (Bame-Aldred *et al.*, 2013; Tsakumis *et al.*, 2007). In Richardson (2006), complexity is identified as the most important determinant of tax evasion, along with other determinants i.e. education, income source, and tax morale. Kanagaretnam *et al.* (2018) identify that the level of societal trust is negatively associated with tax avoidance, but the relation is less pronounced for countries with strong legal institutions and more pronounced in countries with stronger capital market pressure. Referring to tax evasion, an extreme and illegal form of tax avoidance, they show a negative relation between societal trust and tax evasion that is less pronounced when legal institutions are stronger. Abdixhiku *et al.* (2017) find that corporate tax evasion is positively influenced by low trust in government and in the judicial system as well as by higher perceptions of corruption and higher compliance costs.

In relation to analyst forecast, there are evidence of the cross-national variances in the quality of analyst forecasts. Earlier studies (Allen *et al.*, 1997; Riahi-Belkaoui, 1998) mainly identify macroeconomic factors, such as the level of development, as the determinants of forecast quality. More related to our study are evidence linking forecast to the institutional environment of the countries, referring to legal systems and regulations related to the capital market. Black and Carnes (2006) utilize the data from 13 Asian-Pacific countries and find that more accurate forecasts are shown in countries with more developed technological bases, more open economies, and lower levels of book-tax conformity. Hope (2003b) shows that the degree of enforcement of accounting standards is associated with higher forecast accuracy, supporting the view that stricter enforcement that encourage managers to follow the accounting standards can reduce analysts' uncertainty about future earnings.

There are limited evidence incorporating the perspective of tax avoidance in capital market by utilising international setting. In Tang (2017), the value implications of tax avoidance is examined to understand how investors perceive tax-avoidance behaviour. The study concludes that the value of tax avoidance is explained by the heterogeneous agency costs associated with different institutions. A positive association is documented between tax avoidance and firm value, but the association is mitigated in countries with little control over self-dealing, weak corporate governance, and high levels of corruption. In this study, we attempt to explore the link between tax avoidance and analyst forecast by incorporating the perspective of the institutional differences affecting firms from various countries. Given prior theoretical and empirical work, we hypothesized that the association between tax avoidance

and analyst forecast of firms is influenced by the strength of country-level institutional environment. If complementary perspective applies, the positive (negative) association between tax avoidance and analyst forecast would be more (less) pronounced in countries with strong institutional environment than in countries with weak institutional environment. In this perspective, the strength of institutional environment is effective in providing incentives to analysts to minimize agency problems associated with tax avoidance, thereby improving analyst forecast. If supplementary perspective applies, the association between tax avoidance and analyst forecast is not different between firms in strong or weak institutional environment. Analysts' incentives to follow firms and provide high quality forecast is mainly influenced by firm-level tax avoidance activities, which results in more (less) accurate forecast. Thus, the hypothesis is set as follows:

*H<sub>2</sub>: The strength of institutional quality affects the association between tax avoidance and the properties of analysts' earnings forecast.*

### 3. Research Design

#### 3.1 Measurement for Variables

##### 3.1.1 Tax Avoidance

We measure tax avoidance based on the effective tax rate (ETR), calculated by the percentage of current-year tax expense to the total income before tax. ETR reflects the tax deferral strategies of a firm by using the current income tax against the total tax expense. ETR helps to estimate the effectiveness in companies' tax planning activities (Mills *et al.*, 1998; Phillips, 2003). We follow Dyreng *et al.* (2008) by removing loss-making firms from our analysis because increases in tax avoidance are likely to be less valuable to loss-making firms with no current tax liability. Then, ETR is truncated so that the largest observation is one (1) and the smallest is zero (0).

##### 3.1.2 Institutional Quality

Our primary measure for institutional quality (IQ) is derived from the World Governance Indicators (WGI). Following Kaufmann *et al.* (2009), institutional quality is measured using six indicators: rule of law, regulatory quality, governance effectiveness, political stability, voice and accountability, and control of corruption. We construct an IQ index (IQ\_INDEX) calculated on a simple average of the six Kaufmann *et al.*'s (2009) indicators. To measure the interaction between tax avoidance and institutional quality, we create a dummy variable (DUM\_IQ) which takes the value of one (1) if IQ\_INDEX is equal or higher than median, otherwise zero (0).

##### 3.1.3 Forecast Dispersion and Accuracy

Following prior studies (for example, Liu, 2017; Hope, 2003a, 2003b; Kanagaretnam *et al.*, 2012; Weiss, 2010), we examine two analysts' forecast variables. They are forecast dispersion (DISPERSION) and forecast accuracy (ACCURACY). We determine DISPERSION as the absolute value for the difference between the highest estimate and the lowest estimate contained in consensus forecasts scaled by the stock price at the end of year  $t-1$ . Similar to measures used in prior research (Lang and Lundholm, 1996; Duru and Reeb, 2002), ACCURACY is computed as negative one times the absolute value of consensus earnings forecast, less actual earnings per share, scaled by actual earnings per share. The following formula illustrates analysts' forecast accuracy and analysts' forecast dispersion:

$$DISPERSION_{t,i} = |Forecast_{H,t,i} - Forecast_{L,t,i}| / Price_{t-1,i} \quad (1)$$

$$ACCURACY_{it} = (-1) * |FEPS_{i,t-1} - AEPS_{it}| / Price_{i,t-1} * 100\% \quad (2)$$

where:  $Forecast_{H,t,i}$  is the highest estimate contained in consensus forecasts;  $Forecast_{L,t,i}$  is the lowest estimate contained in consensus forecasts;  $FEPS_{i,t-1}$  is the mean earnings per share (EPS) forecast one year ahead for year t;  $AEPS_{it}$  is the actual EPS for year t; and  $Price_{i,t-1}$  is the stock price at the beginning of year t.

### 3.2 Regression Models

We regress the following models to investigate the effect of tax avoidance and institutional quality on analyst forecast. In the models, the variables of interest are ETR, which is expected to be significant to support  $H_1$ , and  $DUM\_IQ*ETR$ , which is expected to be significant to support  $H_2$ . In the regression where  $DISPERSION$  is the dependent variable, lesser dispersion is translated into a better forecast quality as compared to higher dispersion. Thus, a negative coefficient for ETR shows that high tax avoidance leads to less dispersion, while a positive coefficient shows that high tax avoidance leads to more dispersion of the forecast. For  $DUM\_IQ*ETR$ , a negative coefficient means that tax avoidance leads to better forecast quality for firms in high institutional quality countries as compared to their counterparts. In the regression where  $ACCURACY$  is the dependent variable, higher accuracy represents better forecast quality as compared to lesser accuracy. Therefore, a positive coefficient for ETR suggests that high tax avoidance leads to more accurate forecast, while a negative coefficient suggests that high tax avoidance leads to less accurate forecast. For  $DUM\_IQ*ETR$ , a positive coefficient indicates that tax avoidance leads to better forecast quality for firms in high institutional quality countries as compared to their counterparts. The multivariate regressions are presented below:

$$\begin{aligned} DISPERSION_{it} = & \beta_0 + \beta_1 ETR_{it} + \beta_2 DUM\_IQ + \beta_3 DUM\_IQ*ETR_{it} + \beta_4 SIZE_{it-1} \\ & + \beta_5 FOLLOWING_{it} + \beta_6 MKTBK_{it} + \beta_7 VOLATILITY_{it} \\ & + \beta_8 SURPRISE_{it} + \beta_9 IFRS_{it} + \beta_{10} LGDP_{ct} + \beta_{11} OWN_{ct} \\ & + Fixed\ effects + e_{it} \end{aligned} \quad (3)$$

$$\begin{aligned} ACCURACY_{it} = & \beta_0 + \beta_1 ETR_{it} + \beta_2 DUM\_IQ + \beta_3 DUM\_IQ*ETR_{it} + \beta_4 SIZE_{it-1} \\ & + \beta_5 FOLLOWING_{it} + \beta_6 MKTBK_{it} + \beta_7 VOLATILITY_{it} \\ & + \beta_8 SURPRISE_{it} + \beta_9 IFRS_{it} + \beta_{10} LGDP_{ct} + \beta_{11} OWN_{ct} \\ & + Fixed\ effects + e_{it} \end{aligned} \quad (4)$$

where  $DISPERSION_{it}$  is the absolute value for the difference between the highest estimate and the lowest estimate contained in consensus forecasts scaled by the stock price at the end of year t-1;  $ACCURACY_{it}$  is computed as negative one times the absolute value of consensus earnings forecast, less actual earnings per share, scaled by actual earnings per share; ETR is the percentage of tax expense of pre-tax income multiplied by negative one;  $DUM\_IQ$  is a dummy variable that takes value of one (1) if the value of  $IQ\_INDEX$  is equal or higher than median, otherwise zero (0).  $SIZE_{it-1}$  is the logarithm of firm i's total assets at the beginning of year t;  $FOLLOWING_{it}$  is the number of analyst followings for firm i in year t;  $MKTBK$  is the ratio of market-to-book value;  $VOLATILITY$  is the standard deviation of return on assets for the previous 5-year period;  $SURPRISE_{it}$  is the earnings surprises which are the differences of the earnings per share at the beginning of year t and at the end of year t;  $IFRS$  is a dummy variable that takes value of one (1) if the financial statements are prepared using IFRS standards, otherwise zero (0);  $LGDP$  is the natural logarithm of gross domestic product per capita in US Dollar;  $OWN$  is an ownership concentration as reported in La Porta *et al.* (2006); and Fixed effects are vectors for industry and year fixed effects.



In Equation (3) and (4), the control variables that we incorporate are variables that explain analysts' forecast dispersion and accuracy, in a similar vein as prior studies (for example Brown, 1997; Bhat *et al.*, 2006; Almeida and Dalmácio, 2015; Jaggi and Jain, 1998; Lang *et al.*, 2003; Lang and Lundholm, 1996; Lys and Soo, 1995; Wiedman, 1996; Garcia-Meca and Sanchez-Ballesta, 2007). First, we include firms' size (SIZE) as large firms are likely to be more transparent, disclosing more reliable information and providing financial analysts with access to some private information hence leads to more accurate and less dispersed forecasts. Second, the number of analyst forecasts (FOLLOWING) captures the overall oversight of firm by the analyst community and competition to forecast accurately which contribute to high analysts' forecast accuracy. Third, we include firm growth (MKTBK) as firms with higher growth prospects are likely to have different forecasting outcomes than firms with lower growth prospects. Fourth, variability of earnings (VOLATILITY) is associated with the difficulty in predicting future period earnings and analysts' incentives to collect information. Sixth, large earnings surprise (SURPRISE) are associated with less accurate forecasts. We also include country-level control variables; IFRS, LGDP and OWN. Finally, we include industry and year fixed effects to control for phenomena at the industry and time levels that may affect overall estimation.

### 3.3 Sample Selection

The data cover the period 2007–2016 and were obtained from various sources. The earnings forecast variables were obtained from the Institutional Brokers' Estimate System I/B/E/S database while financial data were extracted from Thomson Reuters Fundamentals. We also use data from World Governance Indicators (WGI) to determine the institutional quality index based on Kaufmann *et al.* (2009). For ownership concentration, we use data reported in La Porta *et al.* (2006).

After merging all data, we delete all missing observations. In determining the forecast analyses, we deleted any market consensus estimates made by less than three analysts to further control the impact of individual analyst's personal attribute. Following Dyreng *et al.* (2008) we truncate all observations with ETR value less than zero (0) and greater than one (1). To mitigate the influence of outliers, we winsorize the observations that fell in the top and bottom one percent of all continuous variables. Our final sample consists of 22,690 firm-year observations from 36 countries.

## 4. Discussion of Results

### 4.1 Descriptive Statistics

Panel A of Table 1 presents descriptive statistics for firm-level variables, while Panel B summarises descriptive statistics for country-level variables. Panel A shows that the average forecast dispersion is 0.021 with a minimum value of 0.000 and a maximum value of 0.223. For forecast accuracy, the average value is -0.200, ranging from -0.5901 to -0.001. The mean value for ETR is -0.255 and is ranged between -0.999 to -0.004. For the control variables, the mean for SIZE is 14.212 with a range between 11.013 and 18.041. FOLLOWING has a mean value of 10.509 with a minimum of 3 and a maximum of 34 analyst followings. The MKTBK has a mean value of 2.838 with values ranging from 0.279 and 17.973. For VOLATILITY and SURPRISE, the mean values are 6.822 and 0.009 respectively. The mean value for IFRS, which is a dummy for accounting standards, is 0.489. The result indicates that 48.9 per cent of the sample use IFRS accounting standards. Panel A also reports descriptive statistics for variables to be used in alternative analyses. The mean values for LEV, ROA, and GROWTH are 0.224, 0.067, and 0.111 respectively. A dummy variable for LITIGATION has a mean value of 0.174 indicating that 17.4 per cent of the observations are from high litigation industries. For PPEINT, the mean value is 0.480.

Panel B of Table 1 reports that the mean for the dummy variable for institutional quality (DUM\_IQ) is 0.448 indicating that 44.8 per cent of the total sample are from countries with high institutional quality. The mean for institutional quality index (IQ\_INDEX) is 0.482. The mean value for LGDP is 9.906 and is ranged between 6.899 to 11.689. While for OWN, the mean value is 0.343 and is ranged between 0.180 to 0.670.

**Table 1:** Descriptive statistics

Variable	Mean	SD	Min	Max
<i>Panel A: Firm-level</i>				
DISPERSION	0.021	0.029	0.000	0.223
ACCURACY	-0.200	0.553	-5.901	-0.001
ETR	-0.255	0.137	-0.999	-0.004
SIZE	14.212	1.433	11.013	17.973
FOLLOWING	10.509	7.360	3.000	34.000
MKTBK	2.838	2.717	0.279	18.041
VOLATILITY	6.822	12.003	0.267	130.089
SURPRISE	0.009	0.062	-0.337	0.471
IFRS	0.489	0.500	0.000	1.000
LEV	0.224	0.159	0.000	0.641
ROA	0.067	0.055	0.000	0.298
GROWTH	0.111	0.253	-0.373	1.283
LITIGATION	0.174	0.380	0.000	1.000
PPEINT	0.480	0.366	0.002	1.587
<i>Panel B: Country-level</i>				
DUM_IQ	0.448	0.497	0.000	1.000
IQ_INDEX	0.482	0.500	0.000	1.000
LGDP	9.906	1.116	6.899	11.689
OWN	0.343	0.147	0.180	0.670

Table 2 presents the correlations among the variables. Correlations among the independent variables are relatively low, except for the correlation of 0.707 between FOLLOWING and SIZE. Low correlations involving other variables indicate that multicollinearity is unlikely an issue in the multivariate regression analyses.

We find DISPERSION is positively correlated with ETR, indicating that forecasts dispersions are higher in high tax avoidance firms. IQ\_INDEX and DUM\_IQ have negative correlations with DISPERSION, showing that forecast dispersion is smaller in firms in countries with high institutional quality. We observe that DISPERSION is negatively correlated with SIZE, MKTBK, ROA, LITIGATION and LGDP, but positively correlated with FOLLOWING, VOLATILITY, SURPRISE, LEV, GROWTH, PPEINT, IFRS, and OWN.

The results in Table 2 show that ACCURACY is positively correlated with ETR, indicating that analyst forecasts are more accurate in high tax avoidance firms. ACCURACY is also positively correlated with IQ\_INDEX and DUM\_IQ, showing that forecast accuracy is higher in firms in countries with high institutional quality. ACCURACY is shown to be negatively correlated with VOLATILITY, LEV, PPEINT, and OWN, indicating that analysts' forecasts are more accurate for firms with lower volatility of earnings, leverage, property, plant and equipment intensity, and ownership concentration. We observe that ACCURACY is positively correlated with SIZE, FOLLOWING, MKTBK, SURPRISE, ROA, LITIGATION, IFRS and LGDP.

## Institutional Quality, Tax Avoidance, and Analysts' Forecast: International Evidence

**Table 2:** Correlation matrix

	DISPERSION	ACCURACY	ETR	DUM_IQ	IQ_INDEX	SIZE	FOLLOWING	MKTBK	VOLATILITY
DISPERSION	1.000								
ACCURACY	-0.160***	1.000							
ETR	0.034***	0.190***	1.000						
DUM_IQ	-0.062***	0.067***	0.067***	1.000					
IQ_INDEX	-0.071***	0.055***	0.006	0.923***	1.000				
SIZE	-0.102***	0.095***	0.014	0.040***	0.040***	1.000			
FOLLOWING	0.090***	0.071***	0.040***	-0.031***	-0.052***	0.707***	1.000		
MKTBK	-0.176***	0.100***	0.059***	-0.011	-0.045***	0.149***	0.149***	1.000	
VOLATILITY	0.108***	-0.038***	0.040***	0.036***	0.028***	-0.055***	0.016*	0.335***	1.000
SURPRISE	0.205***	0.060***	0.064***	0.010	0.007	-0.105***	-0.047***	0.014*	0.073***
LEV	0.181***	-0.086***	0.052***	-0.076***	-0.096***	0.051***	0.064***	-0.052***	0.085***
ROA	-0.091***	0.166***	0.244***	0.020**	-0.012	0.022**	0.054***	0.557***	0.160***
GROWTH	0.055***	0.01	0.054***	-0.036***	-0.030***	-0.104***	-0.075***	0.090***	0.069***
LITIGATION	-0.066***	0.025***	-0.041***	0.012	0.028***	0.007	0.025***	0.073***	-0.029***
PPEINT	0.026***	-0.020**	-0.081***	-0.044***	-0.019**	0.100***	0.044***	-0.035***	0.023**
IFRS	0.020**	0.056***	0.241***	0.400***	0.324***	0.035***	0.059***	0.055***	0.056***
LGDP	-0.085***	0.030***	-0.073***	0.643***	0.689***	0.091***	-0.046***	-0.104***	0.006
OWN	0.125***	-0.020**	0.215***	-0.267***	-0.351***	-0.020**	0.056***	0.054***	-0.011

  

	SURPRISE	LEV	ROA	GROWTH	LITIGATION	PPEINT	IFRS	LGDP	OWN
SURPRISE	1.000								
LEV	0.001	1.000							
ROA	0.108***	-0.329***	1.000						
GROWTH	0.195***	0.020**	0.130***	1.000					
LITIGATION	-0.005	-0.152***	0.066***	-0.008	1.000				
PPEINT	0.021**	0.123***	-0.048***	-0.093***	-0.046***	1.000			
IFRS	-0.018*	0.097***	0.063***	-0.012	-0.075***	-0.145***	1.000		
LGDP	-0.002	-0.085***	-0.093***	-0.048***	0.041***	-0.006	0.393***	1.000	
OWN	-0.003	0.145***	0.086***	0.026***	-0.077***	-0.061***	0.364***	-0.361***	1.000

Notes: \* p &lt; 0.05, \*\* p &lt; 0.01, \*\*\* p &lt; 0.001.

## 4.2 Empirical Regression Results

Table 3 presents the regression estimates for the effect of tax avoidance and institutional quality on analyst forecast dispersion and accuracy. Column (1) and (2) of Table 3 report the results of estimation on analyst forecast dispersion (DISPERSION) using both without and with fixed effects. The results in both columns show that the coefficients for ETR are significantly positive suggesting that high tax avoidance is associated with high forecast dispersions. We find, in column (2), the coefficient for DUM\_IQ is negatively significant, showing that high institutional quality countries have less dispersed earnings forecast. The results of the joint-effect of institutional quality and tax avoidance suggest that institutional quality moderates the effect of ETR on DISPERSION, exhibited by the negatively significant coefficient for DUM\_IQ\*ETR. The results suggest that high tax avoidance would lead to greater forecast dispersion, but the effect of tax avoidance on forecast dispersion turns out to be lesser for firms in high institutional quality countries.

**Table 3:** Main regression estimates

	DISPERSION		ACCURACY	
	(1)	(2)	(3)	(4)
Intercept	0.075*** (23.684)	0.080*** (24.663)	-0.306*** (-5.327)	-0.272*** (-4.505)
ETR	0.004** (2.054)	0.005*** (2.612)	0.805*** (21.698)	0.844*** (22.528)
DUM_IQ	-0.001 (-1.543)	-0.002** (-2.081)	-0.047*** (-2.714)	-0.041** (-2.368)
DUM_IQ*ETR	-0.006** (-2.127)	-0.008*** (-3.124)	-0.261*** (-5.422)	-0.274*** (-5.653)
SIZE	-0.004*** (-24.916)	-0.004*** (-24.658)	0.026*** (8.528)	0.029*** (9.118)
FOLLOWING	0.001*** (31.962)	0.001*** (30.860)	-0.000 (-0.133)	-0.000 (-0.283)
MKTBK	-0.003*** (-38.585)	(-0.003*** (-34.216)	0.020*** (15.224)	0.018*** (13.569)
VOLATILITY	0.000*** (26.216)	0.000*** (24.134)	-0.003*** (-11.915)	-0.003*** (-11.741)
SURPRISE	0.079*** (29.222)	0.080*** (29.684)	0.427*** (8.650)	0.423*** (8.475)
IFRS	-0.001 (-1.107)	-0.001** (-2.133)	0.014 (1.479)	0.011 (1.169)
LGDP	-0.001** (-2.344)	-0.000 (-0.886)	-0.001 (-0.129)	-0.006 (-1.195)
OWN	0.021*** (12.941)	0.020*** (11.909)	-0.214*** (-7.082)	-0.197*** (-6.466)
Fixed effects	No	Yes	No	Yes
Adj.R2	0.16	0.19	0.06	0.07
N	22690	22690	22690	22690
F-stat	397.474	185.438	134.176	57.407

Notes: *t*-statistics are shown in parentheses, \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Column (3) and (4) report the estimation results for analyst forecast accuracy using the basic model and a model with fixed effects. In both models, the results show that ETR has significant positive coefficients. The results show that firms with high tax avoidance would have a high accuracy of analyst earnings forecast. We also find a relationship between institutional quality and forecast accuracy, as shown in the significantly negative coefficient of DUM\_IQ. The coefficient for DUM\_IQ\*ETR is negatively significant, showing that the positive relationship is weakened in high institutional quality countries. This result suggests

that the strength of institutional quality reduces the positive relationship between ETR and ACCURACY, implying that the benefit of tax avoidance on analyst forecast accuracy is reduced for firms in countries with strong institutional quality. The plausible reason is while tax avoidance is used as a mechanism by managers in achieving the earnings level target as predicted by the analysts, the phenomenon is not as important for firms in high-IQ countries.

For the control variables, the estimations in column (1) and (2) show DISPERSION to be negatively associated with firm size (SIZE) and firm growth (MKTBK), but positively associated with the number of analysts following a firm (FOLLOWING), loss firm (LOSS), volatility (VOLATILITY), earnings surprise (SURPRISE), and IFRS accounting standards (IFRS). The estimations in column (3) and (4) indicate that ACCURACY is positively associated with firm size (SIZE), the number of analysts following a firm (FOLLOWING), firm growth (MKTBK), and earnings surprise (SURPRISE), while variability of earnings (VOLATILITY) has a negative association with forecast accuracy. These results are consistent with prior studies (Lang and Lundholm, 1996; Lys and Soo, 1995; Wiedman, 1996; Garcia-Meca and Sanchez-Ballesta, 2007).

Overall, these results show that tax avoidance affects the properties of analysts' earnings forecast, but differently for the two measures of analyst forecast i.e. forecasts dispersion and accuracy. The evidence also supports the notion that the strength of institutional quality moderates the relationship between tax avoidance and the properties of analysts' earnings forecast. The results suggest that while tax avoidance leads to poor information environment, as portrayed by high dispersion of analysts' earnings forecast, the impact becomes weaker for firms in high institutional quality. Also, while tax avoidance leads to more accurate forecasts, the impact does not hold for firms in strong institutional quality as the interaction effect shows that the impact of tax avoidance diminishes. In other word, the effect of tax avoidance and country-level institutional quality on analyst forecast is not conclusive to warrant a strong conclusion. This is justified by the fact that studies on analyst forecast that touch on the aspects of tax avoidance or institutional quality were generally shown to be inconclusive with mixed findings shown by prior literature (Bratten *et al.*, 2017; Balakrishnan *et al.*, 2019). Our study, however, is an attempt to provide evidence on the variations of the effect of tax avoidance on analyst forecast when the variations in the institutional quality of countries are considered.

#### 4.2.1 Additional Test: Meeting Consensus Earnings Forecast

In the main analysis, tax avoidance is shown to be associated with higher forecast accuracy, evidenced by the low differences between the actual earnings and the consensus earnings forecast by the analysts. We posit that the high accuracy is linked to managers' ability to meet the forecasted earnings. Hence, we estimate the logit model on MEET in equation (5):

$$\begin{aligned}
 MEET_{it} = & \beta_0 + \beta_1 ETR_{it} + \beta_4 SIZE_{it-1} + \beta_5 FOLLOWING_{it} + \beta_6 MKTBK_{it} \\
 & + \beta_7 VOLATILITY_{it} + \beta_8 SURPRISE_{it} + \beta_9 IFRS_{it} + \beta_{10} LGDP_{ct} \\
 & + \beta_{11} OWN_{ct} + Fixed\ effects + e_{it}
 \end{aligned} \tag{5}$$

where MEET is equal to one if the actual earnings is equal or higher than the consensus earnings forecast, otherwise zero. Other variables are as defined earlier in regression (3) and (4) above.

The results in Table 4 show the logit regression estimations for the pooled sample and subsamples of a low- and high-IQ countries. The results for all the sample, as reported in column (1), (2), and (3), show that ETR has significant positive coefficients, implying that firms with high tax avoidance have a greater tendency to meet the consensus forecast earnings, supporting the notion that firms involved in tax avoidance also have strong motive

**Table 4:** Logistic regression estimates on meeting earnings targets

	POOLED (1)	LOW (2)	HIGH (3)
Intercept	-0.008 (-0.034)	-0.176 (-0.475)	4.742*** (4.872)
ETR	1.386*** (12.770)	1.502*** (8.868)	1.419*** (9.658)
SIZE	(0.075*** (5.544)	0.068*** (3.393)	0.024 (1.206)
FOLLOWING	-0.007** (-2.570)	-0.002 (-0.484)	0.003 (0.708)
MKTBK	-0.014** (-2.529)	-0.017* (-1.909)	-0.011 (-1.431)
VOLATILITY	-0.000 (-0.046)	-0.003 (-1.560)	0.000 (0.274)
SURPRISE	5.906*** (21.383)	5.738*** (14.401)	6.005*** (15.656)
IFRS	0.301*** (7.702)	0.269*** (4.024)	0.185*** (3.282)
LGDP	-0.014 (-0.799)	-0.022 (-0.865)	-0.383*** (-4.389)
OWN	-1.025*** (-8.188)	0.104 (0.447)	-1.297*** (-7.940)
Fixed effects	Yes	Yes	Yes
Pseudo R2	0.0367	0.0477	0.0328
N	22690	9434	13256
LR chi2	1154.13	621.86	598.54

Notes: *t*-statistics are shown in parentheses, \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

to achieve the forecasted earnings. The plausible reason is tax avoidance might be used as a mechanism by managers in achieving the earnings level target as predicted by the analysts. For the control variables, we find firm size (SIZE), earnings surprise (SURPRISE), and IFRS accounting standards (IFRS) to be associated with a greater tendency to meet earnings forecast. We also find firms with a high number of following (FOLLOWING) and growth (MKTBK), and less ownership concentration (OWN) have a lower tendency to meet the earnings forecast. We found qualitatively similar findings for the samples of low- and high-IQ countries indicating that there is robust evidence on the positive link between tax avoidance and meeting earnings forecast.

### 4.3 Robustness Tests

To ensure the robustness of our main results, we perform several robustness tests. First, we perform the two-stage least-squares regression (2SLS) procedures to address the endogeneity issues. Second, we also employ the Weighted Least Square regression, exclude the global crisis period, use alternative measurements for institutional quality, and isolate the effect of countries with extremely high and low observations.

#### 4.3.1 Self-Selection and Endogeneity

This study addresses the issue of endogeneity by performing the 2SLS procedure to obtain consistent and efficient estimators. If tax avoidance and analysts forecast are endogenously determined, i.e., firms with lower dispersion/higher accuracy might have greater incentives to pursue more tax avoidance strategy or firms involved in more tax avoidance strategy are more likely to have lower dispersion/higher accuracy. In the first stage, we estimate equation (6) to obtain the predicted value of ETR (PREDETR), which was then used in the second

stage regression.

$$ETR_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 ROA_{it} + \beta_4 GROWTH_{it} + \beta_5 LITIGATION_{it} + \beta_6 PPEINT_{it} + \beta_7 IFRS_{it} + \beta_8 LGDP_{ct} + \beta_9 OWN_{ct} + Fixed\ effects + e_{it} \quad (6)$$

where ETR is the percentage of tax expense of pre-tax income multiplied by negative one; SIZE is the natural logarithm of total assets; LEV is the ratio of total debts to total assets; ETR is the percentage of tax expense of pre-tax income multiplied by negative one; ROA is the earnings before interest and taxes divided by total assets; GROWTH is measured by the changes in sales compared to previous year; LITIGATION was the dummy variable of one (1) if the firm is operating in a high-litigation industry with SIC codes of 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370–7370, and zero (0) otherwise (Ashbaugh *et al.*, 2003); PPEINT is the ratio of property, plant and equipment to total assets; LGDP is the natural logarithm of gross domestic product per capita in US Dollar; OWN is an ownership concentration as reported in La Porta *et al.* (2006); and Fixed effects are vectors for industry and year fixed effects.

The above prediction model includes various variables that were likely to be associated with tax avoidance. First, we include SIZE as an important determinant of tax avoidance, as larger firms can engage in more tax avoidance activities by leveraging their resources (Khurana and Moser, 2013). Second, LEV is included because firms with higher leverage can adequately take advantage of deductible interests, thus, reducing taxable income (Huang *et al.*, 2016). Third, we follow Rego (2003) and Chen *et al.* (2010) to control for profitability (ROA) as more profitable firms tend to have stronger incentives to engage in tax avoidance. Fourth, the model includes a proxy for potential growth and growth options (GROWTH), where prior studies have ascertained that firms with growth potentiality and additional growing options invest more in assets and have more opportunities to conduct tax avoidance (Huang *et al.*, 2016; Lanis and Richardson, 2015). Fifth, we also include industry litigation risk (LITIGATION) where companies from the industries mentioned above are considered to have high litigation risks, and this inherent nature affects conditional conservatism; hence, high litigation firms are controlled (Francis *et al.*, 2019). Sixth, the model includes PPE intensity (PPEINT) which is closely correlated to tax avoidance since firms can make use of the amortization and depreciation of these assets to minimize tax burdens (Lara *et al.*, 2009; Chen *et al.*, 2010). Finally, following a suggestion by Larcker and Rusticus (2010), we also include other control variables in the basic equations namely IFRS, LGDP, OWN and the vectors for industry and year fixed effects. However, the sample for this model dropped to 19,125 observations because of additional data requirements.

The results for both first and second stage regression are presented in Table 5. The results for the first stage estimation, reported in column (1), show that ETR is positive and significantly associated with LEV, ROA, GROWTH, LITIGATION, IFRS and OWN. We also find ETR is negatively associated with PPEINT and LGDP. In addition, the results show that F is 154.986, which is statistically significant, suggesting that the model was unlikely to be subjected to weak instrument problems (see Larcker and Rusticus, 2010).

The results for the second stage as reported in column (2) and (3) exhibit qualitatively similar results as the main empirical findings. In column (2), the results show that the coefficient for PREDETR is significantly positive, suggesting that high tax avoidance is associated with high forecast dispersions. The coefficient for DUM\_IQ is negatively significant, showing that high institutional quality countries have less dispersed earnings forecast. We also find that institutional quality moderates the association between PREDETR

**Table 5:** Regression estimates using the two-stage least-squares regression procedures

	FIRST (1)	DISPERSION (2)	ACCURACY (3)
Intercept	-0.277*** (-17.483)	0.094*** (27.963)	-0.505*** (-8.107)
PREDETR		0.034*** (5.286)	0.573*** (4.764)
DUM_IQ		-0.006*** (-3.032)	-0.053 (-1.462)
DUM_IQ*PREDETR		-0.014** (-2.072)	-0.398*** (-3.083)
SIZE	0.000 (0.336)	-0.005*** (-25.284)	0.030*** (8.710)
LEV	0.064*** (9.773)	0.026*** (17.495)	-0.132*** (-4.703)
ROA	0.630*** (33.764)	0.006 (0.983)	1.061*** (8.762)
GROWTH	0.022*** (5.127)	0.002** (2.209)	-0.036** (-2.144)
LITIGATION	0.007** (2.305)	-0.000 (-0.545)	-0.011 (-1.028)
PPEINT	-0.007*** (-2.598)	0.001 (1.378)	-0.016 (-1.505)
IFRS	0.072*** (26.608)		
LGDP	-0.015*** (-12.644)		
OWN	0.028*** (3.315)		
FOLLOWING		0.001*** (29.431)	0.000 (0.537)
MKTBK		-0.003*** (-26.905)	0.004* (1.945)
VOLATILITY		0.000*** (18.398)	-0.002*** (-8.427)
SURPRISE		0.081*** (26.725)	0.466*** (8.306)
Fixed effects	Yes	Yes	Yes
Adj.R2	0.17	0.20	0.05
N	19125	19125	19125
F-stat	154.986	163.998	35.148

Notes: *t*-statistics are shown in parentheses, \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

and DISPERSION, exhibited by the negatively significant coefficient for DUM\_IQ\*PREDETR. The results suggest that high tax avoidance would lead to greater forecast dispersion, but the effect is reduced for firms in high institutional quality countries.

The results in column (3) exhibit that high tax avoidance would result in high accuracy of analyst earnings forecast, shown by the significant positive coefficient of PREDETR. We also find the coefficient for DUM\_IQ\*PREDETR is negatively significant, suggesting that institutional quality reduces the positive relationship between PREDETR and ACCURACY. These results imply that tax avoidance leads to higher analyst forecast accuracy, but not for firms in strong institutional quality countries.



### 4.3.2 Other Robustness Tests

We perform several sensitivity tests to ensure the estimations produced earlier are robust. The results are presented in Table 6. First, as our number of observations varied substantially across countries, there is a concern that the results are biased by countries that are more heavily represented. To eliminate the concern, we employed a series of Weighted Least Squares (WLS) regression using the inverse of the number of observations in each country as a weight so that each country received equal weight in the estimation. This methodology has been used in earlier studies (e.g., Lang and Sul, 2014; Jaggi and Low, 2011; Hope *et al.*, 2009). From the results in column (1) and (2), we observe that the WLS analysis yields similar results as compared to those in the main analyses.

Second, we control for the effect of the global financial crisis by excluding observations from the financial year 2008-2010, hence our sample size reduces to 17,027 firm-year observations. We posit that analysts would have been exposed to high uncertainties that affect their forecast within these periods. We observe that the results reported in column (3) and (4) yield a qualitatively similar conclusion related to the hypotheses on the effect of tax avoidance on the properties of analysts' earnings forecast, as well as on the moderating role of institutional quality.

Third, we use alternative measure for institutional quality by using a continuous variable, IQ-Index, to replace DUM\_IQ. The results in column (5) and (6) are similar to those of the main results. The coefficient for ETR is positive, while coefficients for ETR\*IQ-Index are negative, for both dispersion and accuracy models. These results suggest that institutional quality moderates the relationship between tax avoidance and analyst forecast, particularly forecast dispersion and accuracy.

Finally, alternative analyses were performed to overcome the possibility that extremely low or high observations affect our result. We remove China, a country with the highest number of observations, from the analysis. The results for dispersion and accuracy models, as reported in column (7) and (8), show qualitatively similar findings. The coefficients for ETR are positive while the coefficients for DUM\_IQ and the interaction variable (DUM\_IQ\*ETR) are negative. A similar effect was found when we remove Israel, a country with the lowest number of observations, as shown in column (9) and (10).

## 5. Conclusions

Our study provides empirical evidence on the joint-effect of tax avoidance and institutional quality on analysts forecast dispersion and accuracy. We posit that tax avoidance introduces complexity that would result in either more efforts by the analysts or the inability of the analysts to incorporate such complex details into their forecast. We also posit that variations in country-level institutional quality may explain the variations in the way tax avoidance relates to analyst forecast. In doing so, we extend prior research by investigating how tax avoidance relates to analyst forecast by utilizing data of firms from various countries. Further, we add to the existing literature by investigating whether institutional quality moderates the relationship between tax avoidance and analyst forecast. The results support the view that tax avoidance affects the properties of analysts' earnings forecast. The findings highlight that firms with higher tax avoidance are those with higher forecast dispersion but also with higher forecast accuracy. For both measures of analyst forecast, the joint-effect of country-level institutional quality moderates the association between tax avoidance and forecast. The empirical results show that the interaction variables of tax avoidance and institutional quality are negatively significant. Both results conclude that tax avoidance is reflected in analyst forecast, but there are uncertainties on which tax avoidance is incorporated by analysts especially when the country-level institutional context is considered.

**Table 6:** Regression estimates using additional robustness rests

	Weighted Least Squares		Exclude Global Financial Crisis		IQ-Index		Exclude China		Exclude Israel	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	DISPERSION	ACCURACY	DISPERSION	ACCURACY	DISPERSION	ACCURACY	DISPERSION	ACCURACY	DISPERSION	ACCURACY
Intercept	0.081*** (24.988)	-0.271*** (-4.499)	0.064*** (17.560)	-0.232*** (-3.333)	0.078*** (23.300)	-0.245*** (-3.972)	0.080*** (24.663)	-0.272*** (-4.505)	0.080*** (24.218)	-0.260*** (-4.270)
ETR	0.005*** (2.619)	0.837*** (22.293)	0.005** (2.196)	0.909*** (20.097)	0.004* (1.789)	0.911*** (2.612)	0.005*** (2.612)	0.844*** (22.528)	0.006*** (2.731)	0.849*** (22.455)
DUM_IQ	-0.002 (-1.642)	-0.040** (-2.296)	-0.004*** (-4.339)	-0.047** (-2.362)	-0.002** (-2.564)		-0.002** (-2.081)	-0.041** (-2.368)	-0.002** (-2.189)	-0.041** (-2.323)
DUM_IQ*ETR	-0.008*** (-2.891)	-0.270*** (-5.555)	-0.010*** (-3.285)	-0.372*** (-6.557)	-0.005* (-1.780)		-0.008*** (-3.124)	-0.274*** (-5.653)	-0.008*** (-3.164)	-0.278*** (-5.700)
IQ_INDEX						(22.798)				
						-0.066***				
IQ_INDEX*ETR						(-3.734)				
						-0.349***				
SIZE	-0.004*** (-24.564)	0.029*** (9.110)	-0.004*** (-19.244)	0.036*** (9.790)	-0.004*** (-24.650)	0.028*** (8.833)	-0.004*** (-24.658)	0.029*** (9.118)	-0.004*** (-24.786)	0.029*** (9.071)
FOLLOWING	0.001*** (31.012)	-0.000 (-0.366)	0.001*** (24.936)	-0.001 (-0.896)	0.001*** (30.710)	0.000 (0.015)	0.001*** (30.860)	-0.000 (-0.283)	0.001*** (30.971)	-0.000 (-0.254)
MKTBK	-0.003*** (-34.119)	0.018*** (13.513)	-0.002*** (-31.297)	0.017*** (11.471)	-0.003*** (-34.128)	0.019*** (13.725)	-0.003*** (-34.216)	0.018*** (13.569)	-0.003*** (-34.136)	0.019*** (13.515)
VOLATILITY	0.000*** (24.205)	-0.003*** (-11.770)	0.000*** (22.685)	-0.003*** (-10.635)	0.000*** (24.153)	-0.003*** (-11.751)	0.000*** (24.134)	-0.003*** (-11.741)	0.000*** (24.205)	-0.003*** (-11.945)
SURPRISE	0.076*** (28.413)	0.423*** (8.478)	0.088*** (25.534)	0.749*** (11.420)	0.080*** (29.721)	0.429*** (8.594)	0.080*** (29.684)	0.423*** (8.475)	0.080*** (29.568)	0.426*** (8.497)
IFRS	-0.001*** (-2.633)	0.012 (1.231)	-0.001*** (-2.645)	0.032*** (2.986)	-0.001 (-1.535)	0.018* (1.895)	-0.001** (-2.133)	0.011 (1.169)	-0.001*** (-2.709)	0.012 (1.219)
LGDP	-0.000 (-1.307)	-0.006 (-1.196)	0.001*** (3.049)	-0.018*** (-3.244)	0.000 (0.299)	-0.005 (-1.103)	-0.000 (-0.886)	-0.006 (-1.195)	-0.000 (-0.370)	-0.007 (-1.355)
OWN	0.019*** (11.496)	-0.196*** (-6.430)	0.018*** (9.958)	-0.204*** (-5.869)	0.018*** (11.080)	-0.194*** (-6.297)	0.020*** (11.909)	-0.197*** (-6.466)	0.020*** (12.362)	-0.201*** (-6.578)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R2	0.18	0.06	0.18	0.07	0.19	0.07	0.19	0.07	0.19	0.07
N	22690	22690	17027	17027	22690	22690	22690	22690	22591	22591
F-stat	182.025	56.850	150.600	55.276	185.265	57.821	185.438	57.407	186.005	57.525

Notes: *t*-statistics are shown in parentheses, \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

Our results should be interpreted with several caveats. First, although we employ a large dataset of firm-year observations from 36 countries, the dataset is still restricted by the availability of forecast accuracy data from I/B/E/S database. Second, we mainly employ ETR as our measure of tax avoidance. Future research may attempt employing other measures of tax avoidance while acknowledging that not all measures are equally appropriate for every research question (Hanlon and Heitzman, 2010). Despite these limitations, our study provides useful insights to investors and policymakers in the development of strong institutional environments that can provide incentives and governance mechanisms at both the firm- and country-levels. Going forward, we encourage more research on the impact of tax avoidance at regional levels and incorporate other institutional variables such as politics and culture.

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