

Taxes, Director Independence, and Firm Value: Evidence from Board Reforms Worldwide

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ABSTRACT

We examine whether variation in firms' corporate governance mechanisms arising from exogenous board reforms explains differences in the level of corporate tax avoidance and the corresponding relation between tax savings and firm value. Our inquiry is enabled by a database of major board reforms from Fauver, Hung, Li, and Taboada (2016) that captures exogenous, country-level changes in board independence for a sample of 72,102 public corporations in 29 countries. We find that corporate tax avoidance decreases significantly after major board reforms. In particular, major board reforms involving board, audit committee independence, and reforms involving separation of the board chairman and chief executive officer roles reduce tax avoidance. "Comply-or-explain" reforms result in a greater reduction in tax avoidance than "rule-based" reforms. Furthermore, reforms with high impact and high compliance speed reduce tax avoidance more than those with low impact and low compliance speed. We document that the impact of board reforms on managers' incentives to engage in tax avoidance is weaker for countries with stronger country-level investor protection mechanisms. We test the relation between tax avoidance and firm value associated with board reforms. We find that tax avoidance before (after) board reforms is negatively (positively) associated with firm value. This result is consistent with board reforms being associated with a reduction in agency conflicts associated with tax avoidance.

JEL Classification: H26; K42

Keywords: corporate taxation; tax avoidance; board reform; corporate governance

1. Introduction

We examine whether variation in firm-level board independence arising from major board reforms explains differences in the level and type of tax avoidance and the corresponding relation between tax avoidance and firm value. Our inquiry is enabled by a database of major board reforms from Fauver, Hung, Li, and Taboada (2016) that captures exogenous, country-level changes in board independence for a sample of 72,102 public corporations in 29 countries. Since the United Kingdom's 1992 Cadbury Report, many countries have launched corporate board reforms given the heightened recognition of good governance practices (Dahya and McConnell, 2007). These reforms, affecting developed and emerging economies, typically focus on the role and composition of the board, such as the appointment of independent directors on the board and on the audit committee, and the separation of the chairman and CEO positions, which directly enhance the independence of the board.

Understanding the role that board independence plays in tax avoidance and its relation with firm value is critical for at least two reasons. First, evidence on the impact of corporate governance on tax avoidance is mixed (see, e.g., Minnick and Noga, 2010; Armstrong, Blouin, Jagolinzer, and Larcker, 2015), possibly due to the endogenous nature of differences in firm-level governance practices. Second, corporate governance is potentially an important determinant of the effect of tax avoidance on firm value. Tax avoidance activities can be complex, opaque, and facilitate managerial opportunism (Robinson, Sikes, and Weaver, 2010). Similar to other investment decisions, managers may have personal incentives to engage in some tax avoidance that may not be in the best interest of shareholders, thereby giving rise to an agency problem. Corporate boards are a fundamental firm-level governance mechanism and, among the many corporate governance solutions that have been offered to mitigate agency issues, the most

common appears to be increased independence of the board of directors (Faleye, Hoitash, and Hoitash, 2011). While tax avoidance should increase after-tax cash flows (e.g. Graham and Tucker, 2006), the effect on firm value is potentially offset, particularly in poorly-governed firms, by the increased opportunities for rent diversion provided by tax avoidance activities (Chen and Chu, 2005, Crocker and Slemrod, 2005, Desai and Dharmapala, 2006, 2009). The exogenous nature of board reforms is a powerful setting in which to disentangle these countervailing incentives and their effect on firm value as well as reassess the mixed findings of prior work.¹

Following prior research, we argue that there are two types of exhaustive, but non-mutually exclusive, tax avoidance activities: opportunistic tax avoidance and value-enhancing tax avoidance. Regarding opportunism, similar to other investment decisions, managers may have personal incentives to engage in opportunistic tax avoidance that may not be in the best interest of shareholders, thereby giving rise to an agency problem (Desai and Dharmapala, 2006, 2009). Almost all major board reforms mandate that firms enhance board independence by appointing more independent directors to the board and/or to the audit committee, and/or separating the CEO/Chairman positions. Increased board independence enables board members to better monitor executives, which should mitigate agency issues and opportunistic tax avoidance.

Regarding the latter, prior work yields competing predictions on the association between board reforms and value-maximizing tax avoidance. On the one hand, board reforms may result in less value enhancing tax avoidance for the following two reasons. First, critics of board reforms argue that existing board practices are the equilibrium outcome of a market solution, reflecting the firm's optimal choice after considering all factors. Hence, board reforms that tilt firms away from this optimum may impose additional risks on managers. Tax avoidance is also

¹ Other taxation research uses reconstitution of the Russell Index to isolate exogenous shocks in institutional ownership to study tax avoidance behavior (e.g., Bird and Karolyi, 2016; Khan, Srinivasan, and Tan, 2016).

associated with risk. Prior research finds that firms engaging in tax avoidance strategies can have increased information risk (Balakrishnan, Blouin, and Guay, 2012), agency risk (Desai and Dharmapala, 2006), reputational risk (Hanlon and Slemrod, 2009), and regulatory risk (Mills, 1998).² Because managers, in part, bear the costs associated with failed tax avoidance (Hanlon and Slemrod, 2009), board reforms may result in below-optimal levels of value-maximizing tax avoidance. Second, because a common tool emphasized in board reforms is increased outsider membership, independent directors may further constrain value-maximizing tax avoidance because they are less familiar with companies' operations and their reputation and compensation depend less on firm profitability. Thus, board reforms may reduce value-enhancing tax avoidance, in addition to a reduction in opportunistic tax avoidance, leading to a net *overall* reduction of tax avoidance.

On the other hand, board reforms may, as previously discussed, reduce opportunistic tax avoidance, but also induce more value-maximizing tax avoidance. The quiet life hypothesis suggests that managers under insufficient discipline are more likely to shirk, or prefer a quiet life, and avoid costly effort.³ For example, they may forgo some positive net present value (NPV) projects in order to avoid private costs of effort and risk-taking, such as research and development investment (R&D), capital expenditures, and technological innovations (Bertrand and Mullainathan, 2003, Atanassov, 2013). Consequently, firm profitability and productivity deteriorate (Bertrand and Mullainathan, 2003). If board reforms impose more needed discipline on managers, managers will be encouraged to exert more effort and take more risks, resulting in

² The Commissioner of the Internal Revenue Service (IRS) asserts that aggressive tax strategies pose “a significant risk to corporate reputations” and “the general public has little tolerance for overly aggressive tax planning.” (Schulman, 2009). Consistent with this view, Hasan, Hoi, Wu, and Zhang (2014) find that banks perceive tax management as engendering significant risks, though other research finds little evidence of reputational harm from tax avoidance (Gallemore, Maydew, and Thornock, 2014).

³ Hicks (1935) first used the “quiet life” terminology, which states, “The best of all monopoly profits is a quiet life.”

more value-maximizing tax planning. In addition, independent board members may be able to draw on outside experience with other firms' tax positions and therefore be more likely to encourage more value-maximizing tax planning activities (Armstrong, Blouin, Jagolinzer, and Larcker, 2015). Thus, board reforms may induce value-enhancing tax avoidance, in addition to a reduction in opportunistic tax avoidance, leading to an *unclear* net effect on tax avoidance.

Following Fauver, Hung, Li, and Taboada (2016), we use the passage of board reforms worldwide to capture changes in board monitoring governance. In addition to their economic and regulatory significance, worldwide board reforms provide a unique setting to test the effect of board structures on firm performance. The shock is exogenous to individual firms, mitigating the endogeneity and self-selection concerns that are common in governance studies. As Armstrong, Blouin, Jagolinzer, and Larcker (2015) point out, the implications for an empirical study's usefulness can be substantial if it does not properly deal with endogeneity. In particular, one cannot ascertain if the causation is reversed (e.g., the choice of tax behavior drives the governance structure) or if governance is merely a symptom of an underlying unobservable factor, which also affects tax behavior (see Armstrong, Blouin, Jagolinzer, and Larcker, 2015, page 14 for detailed discussion).

We focus on major board reforms with a large impact on board independence.⁴ We find robust evidence that the level of tax avoidance significantly decreases following the passage of major board reform laws. In addition, board reforms involving board, audit committee independence, and reforms involving separation of the chairman and CEO positions reduce tax avoidance activities. The "comply-or-explain" reforms result in a greater reduction in tax avoidance activities than rule-based reforms. In addition, reforms with high impact and high

⁴To be considered as major reforms, the level of enforcement for the majority of new rules must be legal rules or comply-or-explain regulations, not purely proposed voluntary changes to governance practices.

compliance speed reduce tax avoidance activities more than those with low impact and low compliance speed. The results also suggest that the impact of board reforms on management incentives to engage in corporate tax avoidance varies with the strength of country-level investor protection mechanisms.

To further explore the impact of board reforms on opportunistic versus value-maximizing tax avoidance, we examine whether the association between tax avoidance and firm value changes after board reforms. If managers mainly engage in opportunistic tax avoidance that is not in the best interest of shareholders, we expect a negative association between firm value and tax avoidance (Chen and Chu 2005, Crocker and Slemrod 2005, Desai and Dharmapala 2006, 2009). In contrast, if managers mainly engage in value-maximizing tax avoidance, we expect a positive association between firm value and tax avoidance (e.g. Graham and Tucker, 2006). We find that prior to board reforms, the association between tax avoidance and firm value is negative but not significant. The association becomes significantly positive after board reforms. We interpret our results as indicating that board reform reduces opportunistic tax avoidance and, furthermore, that after board reforms managers are more likely to engage in value-maximizing tax avoidance.

Our study makes at least two contributions. First, our tests contribute to the emerging literature on the relation between corporate governance and corporate tax behavior. We show that corporate tax behavior varies systematically after national board reforms and provide robust evidence across a broad range of countries that country-level board reforms reduce opportunistic tax behavior. These findings are the first broad-based empirical evidence that government-induced board reforms affect firms' tax behavior. This finding is noteworthy for regulators and policy makers given the current focus on government-level crackdowns on tax avoidance. Our results suggest that country-level efforts to improve firm-level corporate governance can

indirectly reduce opportunistic-tax behavior. Few studies have directly examined the link between corporate governance and tax behavior. Prior studies have produced mixed results, an outcome potentially attributable to the endogeneity concerns previously discussed. For example, Minnick and Noga (2010) find little evidence that governance is associated with tax avoidance. Rego and Wilson (2012) find that firms at which managers have high risk-taking equity incentives engage in more tax avoidance. However, they find no evidence that governance mechanisms—other than executives' equity incentives—affect this relation. Robinson, Xue, and Zhang (2012) report that audit committee financial expertise is generally positively associated with tax planning, but that this association is negative in cases of aggressive tax planning. Armstrong, Blouin, Jagolinzer, and Larcker (2015) find that the impact of corporate governance on tax avoidance is most pronounced in the upper and lower tails of the tax avoidance distribution, but not at the mean or median of this distribution. Our use of the passage of board reforms worldwide to capture exogenous shocks to board independence helps obviate endogeneity matters that may have affected prior studies.

Second, this study contributes to the literature on tax avoidance and firm value. Prior work has given rise to two alternative perspectives on the motivations for, and the effects of, this activity. Several studies view corporate tax avoidance as an extension of other firm value-enhancing activities. In particular, Graham and Tucker (2006) construct a sample of firms involved in 44 corporate tax shelter cases during 1975 to 2000 and identify characteristics, such as size and profitability, which are positively associated with tax shelter use. Other research emphasizes the interaction of tax avoidance activities and the agency problems inherent in publicly held firms. In this framework, obfuscating tax avoidance activities may create a shield for managerial opportunism and rent diversion. Desai and Dharmapala (2006), Desai, Dyck and

Zingales (2007), and Desai and Dharmapala (2009) emphasize such a linkage between firms' governance arrangements and their tax behavior. Thus, corporate tax avoidance not only entails distinct costs, but these costs may outweigh the benefits to shareholders, given the opportunities for diversion that these vehicles provide. We provide evidence on the interaction between tax avoidance and board reforms, suggesting that board reforms can effectively curb opportunistic, while also promoting value-enhancing, tax behavior.

This paper proceeds as follows. Section 2 describes the data, primary empirical measures, and provides descriptive statistics. Section 3 presents the methodology and empirical results to test the impact of board reforms on tax avoidance. Section 4 presents the empirical results related to board reforms, tax avoidance, and firm value. Section 5 reports all supplemental analyses. Section 6 concludes.

2. Sample and descriptive statistics

2.1. Sample

We obtain information on major corporate governance reforms from 1990 through 2012 from Fauver, Hung, Li, and Taboada (2016). We restrict the sample to all countries experiencing board reforms, which also have available corporate statutory tax rate data. We begin the sample in 1993, the first year for which statutory tax rate information is obtainable across our broad sample of countries. We exclude firm-year observations associated with the financial services industry. The primary sources for governance reforms are reports from the World Bank, European Corporate Governance Institute (ECGI), local stock exchange regulators, and prior studies (Kim and Lu, 2013). We hand-collect statutory corporate tax rates for all Organisation for Economic Co-operation and Development (OECD) countries in the sample from the OECD.⁵ We

⁵ OECD countries during the sample period are: Australia, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, UK, and US.

gather remaining sample country tax rate data from the KPMG LLP online summary.⁶ These statutory corporate tax rates include both the federal income tax rate and the average effects of state, provincial, and other local government income tax rates. We obtain firm-level descriptive data from the Thomson Financial WorldScope database. The availability of these data varies by country. We match the firm-level data with the country data. To minimize the potential influence of extreme observations, we winsorize all continuous variables at the 1st and 99th percentiles of their respective distributions in each year.

2.2. Key measures

We define tax avoidance broadly to encompass any reduction in a firm's taxes relative to its pretax income (Dyreng, Hanlon, and Maydew, 2008; Hanlon and Heitzman, 2010).⁷

Following Atwood, Drake, Myers, and Myers (2012), we measure the level of corporate tax avoidance, *TAXAVOID*, using a modification of the cash effective tax rate (ETR) from Dyreng, Hanlon, and Maydew (2008).^{8,9} Tax avoidance is calculated as the tax on pre-tax earnings computed at the home-country statutory corporate tax rate less the taxes actually paid, expressed as a percentage of pre-tax earnings. We sum each element in the computation over the last two years and the current year.¹⁰ Positive (negative) values of *TAXAVOID* indicate that the firm pays taxes at a rate below (above) the statutory tax rate. Appendix A contains variable definitions. We

⁶ <https://home.kpmg.com/xx/en/home/insights/2015/10/global-tax-rate-survey.html>.

⁷ Tax avoidance does not imply illegal behavior. Tax codes contain provisions that allow firms to legally reduce their taxes. Without access to private company data, it is difficult to determine which methods managers are using to lower a firm's taxes.

⁸ This measure is in the spirit of measuring tax avoidance using cash effective tax rates (ETRs, i.e., taxes actually paid divided by pre-tax income) for samples of U.S.-only firms (see Dyreng, Hanlon, and Maydew, 2008).

⁹ The conclusions are unaffected using an alternative measure of tax avoidance that is based on cash flow from operations. This measure is calculated as the corporate statutory tax rate in country *j* less a modified Cash ETR for firm *i* in country *j*, which is cash taxes paid divided by cash flow from operations [net cash flow from operations (WC04860) plus cash taxes paid]. It is set to missing if the denominator is less than or equal to zero.

¹⁰ Dyreng, Hanlon, and Maydew (2008) find that compared to long-run tax avoidance measures, one-year measures are highly variable and are not as predictive of long-run tax avoidance measures. Thus, following Atwood, Drake, Myers, and Myers (2012), we compute our tax avoidance measure over three years.

require three years of positive pre-tax earnings before exceptional items for our calculations of tax avoidance, and delete all firm-year observations from countries that do not have at least 50 firms with available data, and require that the firm exist before and after the board reform. This requirement allows a firm to serve as its own control vis-à-vis non-reform periods. We exclude the two years immediately following the reform year because for these two years, *TAXAVOID* will include the years prior to the board reforms. In untabulated tests, we find that including these two years, or calculating *TAXAVOID* with one year, rather than three years, of data do not affect the conclusions.

We use Tobin's q to measure firm value. This convention follows prior work studying the governance of institutions and corporate finance (e.g. Demsetz and Lehn, 1985; Morck, Shleifer and Vishny, 1988; Mehran, 1995). Following Desai and Dharmapala (2006), we use the definition of Tobin's q used in Kaplan and Zingales (1997) and Gompers, Ishii, and Metrick (2003) with one modification. Specifically, Kaplan and Zingales (1997) and Gompers, Ishii and Metrick (2003) define Tobin's q (*TOBINQ*) as the ratio of the market value of assets (the market value of equity plus the book value of total liabilities) to the book value of assets. Given the emphasis on the effects of tax avoidance activity on Tobin's q, Desai and Dharmapala (2006) exclude deferred tax liabilities from the calculation. Therefore, as an alternative measure of firm value, we also use a modified Tobin's q (*TOBINQDD*), measured as the ratio of the market value of equity plus the book value of liabilities to the book value of assets. The book value of liabilities in this case excludes the deferred tax liability.

2.3. Sample descriptive statistics

In Table 1 we report the number of firm-year observations, starting and ending year of board reforms by country, and key country-level metrics. We make the following observations.

Approximately 36% ($25,892 \div 72,102$) of the firm-year observations in the sample correspond to companies domiciled in the United States. To ensure that the results are not driven by U.S. firms, we repeat all empirical analyses excluding the U.S. and find that the conclusions are unaffected. The median highest marginal statutory tax rate by country, *TAXRATE*, varies from a low of 16.5% for Hong Kong to a high of 39.5% in Japan; *TAXRATE* in the United States is close to the maximum, and the average statutory *TAXRATE* in the sample is 39.3%.¹¹ The median value of *TAXAVOID* in Table 1 is positive, indicating that the typical firm pays taxes at a rate below the statutory tax rate. In the U.S., for example, the median of *TAXAVOID* is 12.7%. With a statutory tax rate of 39.3% in the sample period, this corresponds to an effective tax rate for the typical U.S. firm of approximately 26.6% ($39.3\% - 12.7\%$), similar to prior research (Dyreng, Hanlon, and Maydew, 2008 report the median annual cash effective rate as 25.6%).

Table 1 also contains the median values of the key country level variables. *EARNVOL*, country-level earnings volatility, shows considerable variation across countries. *LEGAL* measures the quality of a country's legal system. It is a survey-based summary assessment of the strength and impartiality of the legal system (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997). *COMMON* is an indicator variable that equals one if a country has a common law legal origin, and zero otherwise. 10 out of 29 sample countries have common law origin. *BTAXC* captures the degree of book-tax conformity, and is used in Atwood, Drake, Myers, and Myers (2012). Higher values of *BTAXC* indicating greater agreement between reported earnings and taxable income. Countries with strong book-tax conformity represent environments in which tax avoidance is costlier because larger reported differences between book income and taxable income may flag

¹¹The statutory tax rate for countries including Brazil, Canada, China, India, and U.S. includes indirect taxes, such as state, provincial, or municipal taxes, in addition to federal/national taxes.

possible tax manipulation (see, for example, Desai and Dharmapala, 2009). It is also costlier to avoid taxes in such countries because firms will also report lower financial accounting income.

For each board reform, we identify whether it covers three key components of board practices: board independence, audit committee and auditor independence, and the separation of the chairman and CEO positions. 27 out of 29 countries have at least one of the three components in their reforms. In addition, we identify whether a board reform coincides with non-board governance reforms. 22 out of 29 countries have reforms including board-related components in our sample period, 24 out of 29 countries have auditor related board reforms, 9 out of 29 countries have reforms related to the separation of the chairman and CEO positions, and 20 out of 29 countries have reforms related to non-board governance reforms.

We classify board reforms into two types: comply-or-explain reforms and rule-based reforms. The comply-or-explain reforms (codes of best practices) typically involve publication of governance codes where firms can choose to adopt the recommendations or explain why they do not comply. An example of comply-or-explain reforms is the U.K.'s 1998 Combined Code, which merged the recommendations contained in the 1992 Cadbury Report and the 1995 Greenbury Report and contains such provisions as the need to publicly justify a decision to combine the positions of chairman and CEO. Many Commonwealth countries and continental European countries follow the U.K.'s comply-or-explain approach. Rule-based reforms typically involve enactment of company laws or securities regulations that require firms to follow specified governance practices. Among our sample, 11 out of 29 countries have rule-based board reforms.

Table 2 provides summary statistics, with univariate statistics in Panel A and bivariate correlations in Panel B. We present the key variables *TAXAVOID*, *POST*, *TOBINQ* and *TOBINQDD*, and the control variables. *POST* is an indicator variable equal to one starting the

year in which the board reform becomes effective in the country and zero otherwise. As reflected in Panel A, the typical firm has a positive mean (median) value of *TAXAVOID* of 7.4% (8.1%), indicating its effective tax rate is less than the statutory rate in the country in which it is headquartered by 740 (810) basis points. The median tax avoidance measure is similar to the median 7.9% reported by Atwood, Drake, Myers, and Myers (2012). The median of Tobin's q including the deferred tax liability (*TOBINQ*) is 1.303, and the median Tobin's q excluding the deferred tax liability (*TOBINQDD*) is 1.288. The medians of return on assets (*ROA*) and sales growth (*SALESGR*) are both 8.0%. The mean (median) value for *TAXRATE*, the maximum corporate statutory rate is 30.8% (30.0%). The median values for *LEV*, firm leverage, and *R&D*, the expenditure for research and development deflated by assets, are 9.2% and 0.0%, respectively.

The correlations in Panel B are generally of the expected sign and consistent with prior work. *TAXAVOID* has a negative and significant Pearson correlation with *POST*, as well as *ROA*, *LEV*, *SALESGR*, *LEGAL*, and *TAXRATE*. Inferences based on Spearman correlations are unchanged. When comparisons are possible, the correlations we document mirror the signs in Atwood, Drake, Myers, and Myers (2012) except that we find a positive correlation between *TAXRATE* and *TAXAVOID*, consistent with firms subject to higher statutory rates associated with greater tax avoidance. Atwood, Drake, Myers, and Myers (2012) find a negative, but insignificant, correlation. Consistent with Atwood, Drake, Myers, and Myers (2012), we find negative Pearson correlations between *TAXAVOID* and *EARNVOL* and *TAXAVOID* and *BTAXC*.

3. Empirical tests: the impact of board reforms on tax avoidance

3.1. Primary test

We first examine the association between board reforms and tax avoidance. To test the

average effect of board reforms on tax avoidance we use a difference-in-differences (DID) research design and regress *TAXAVOID* on *POST*.¹² *POST* is an indicator variable that assumes the value of one in the post-reform period and zero before the reform. We estimate Eq. (1) using ordinary least squares regression and cluster standard errors by country (Petersen, 2009) because board reforms are a country-level outcome.

$$TAXAVOID_{i,j,t} = \beta_0 + \beta_1 POST_{j,t} + \beta_k X_{i,j,t} + \varepsilon_{i,j,t} \quad (1)$$

Subscripts *i*, *j*, and *t* correspond to firm, country, and year, respectively. $X_{i,j,t}$ represents the set of control variables, some of which are measured at the firm-level and some are measured at the country-level depending upon data availability. β_k is the vector of coefficient estimates.

Because our setting involves multiple treatment groups and periods (Wooldridge, 2007), we include a full set of group effects (i.e., country and industry fixed effects), and a full set of time effects (i.e., year fixed effects). The country, industry, and year fixed effects help identify the within-country, within-industry, and within-year change in firm tax avoidance between the treatment and benchmark firms when countries conduct reforms. This approach implicitly takes as the benchmark group all firms from countries without reforms as of a particular time and is commonly used in prior literature (Bertrand and Mullainathan, 2003).

We also control for the possible confounding effects of reforms concurrent with those related to corporate boards. The two most prevalent concurrent reforms are those related to insider trading and anti-takeover provisions. Thus, we also include in the regression model *AFTER_INSIDER*, an indicator variable identifying the post-period of insider trading law

¹² Measuring *TAXAVOID* using the cash flow ETR, which is cash taxes paid deflated by cash flow from operations, does not affect the conclusions.

enforcement and *AFTER_TAKEOVER*, an indicator variable reflecting the post-period of takeover regulatory reforms. The regression models also control for other time-varying firm-level and country-level variables used in prior research to explain tax avoidance (*TAXAVOID*).

For firm-level control variables, profitable firms (*ROA*) and firms with greater leverage or complex financing arrangements (*LEV*) have greater incentives and opportunities to avoid taxes. The natural log of total assets (*SIZE*) controls for the influence of firm size. Some prior research suggests that larger firms are more sophisticated at tax planning, but they also may face higher political costs (Zimmerman, 1983). Thus, we make no sign prediction for *SIZE*. We include sales growth (*SALESGR*) because prior research (for example, Atwood, Drake, Myers, and Myers, 2012) finds that revenue growth is positively associated with the amount of tax avoidance. We include research and development, *R&D*, which we expect to be positively associated with *TAXAVOID* because prior research suggests that income attributable to intangible assets is relatively easy to shift to low-tax jurisdictions (Dyreng and Lindsey, 2009). We include *FOREIGN*, an indicator variable equal to one for companies with non-missing and non-zero foreign income, to capture the presence of operations in foreign jurisdictions. Prior research provides mixed evidence on the relation between foreign income and tax avoidance. Rego (2003) finds that the more extensive a multinational's foreign operations, the higher its ETR, suggesting lower tax avoidance, but Wilson (2009) finds that firms with foreign income are more likely to be tax-shelter participants and Cazier, Rego, Tian, and Wilson (2009) find that U.S. firms with more extensive foreign operations have more uncertain tax benefits. Therefore, we do not make a prediction regarding the direction of the association between *FOREIGN* and *TAXAVOID*. We control for financial reporting aggressiveness and include the performance-adjusted discretionary accruals variable *DACCRUAL* using the Kothari, Leone, and Wasley (2005) discretionary accrual

model. Frank, Lynch, and Rego (2009) suggest financial reporting aggressiveness and tax aggressiveness are positively related, which suggests a positive association between *DACCRUAL* and *TAXAVOID*.

For country-level control variables, we include the level of required book-tax conformity in the firm's home country, *BTAXC*. Atwood, Drake, Myers, and Myers (2012) find a negative relation between tax avoidance and book-tax conformity; this finding is consistent with greater book-tax conformity being associated with less tax avoidance, either because managers have fewer opportunities to reduce taxes without also reducing reported book income and/or wide variance in book and taxable income is more likely to come to the attention of taxing authorities (see Desai, 2005 for discussion). Following Atwood, Drake, and Myers (2010), we use country-year regressions to obtain *RMSE* and use descending ranks divided by $n-1$ to obtain the level of *BTAXC*. Atwood, Drake, and Myers (2010) find that book-tax conformity is positively associated with pre-tax country-level earnings volatility. Therefore, we include earnings volatility (*EARNVOL*) to reduce the possibility of a correlated omitted variable confounding the results for book-tax conformity, but do not make a prediction regarding the direction of its association with *TAXAVOID*. We include the statutory corporate tax rate, *TAXRATE*. Atwood, Drake, Myers, and Myers (2012) find a positive relation between tax avoidance and statutory tax rates. We include *LEGAL*, a measure of the strength of the country's judicial system. We expect that firms domiciled in countries with stronger judicial systems avoid less taxation. Therefore, we expect that *LEGAL* will be negatively associated with *TAXAVOID*. Finally, we include two metrics to capture economic development, *FINDEV*, a measure of financial development that captures an estimate of domestic credit provided by local financial institutions, and *PERCAPITA*, a measure of GDP per capita. Given Beck, Lin, and Ma (2014) we expect these measures to be negatively

associated with *TAXAVOID*. Coefficient sign predictions are summarized in Table 3 Panel A.

A positive (negative) coefficient on β_I is consistent with an increase (a decrease) in tax avoidance after major board reforms. Table 3 Panel A contains the Eq. (1) estimation results. Column (1) is the baseline model including only the variable of interest, firm, and country-level control variables and the country, industry, and year fixed effects. Column (2) is the full regression model including all control variables plus other country-level reforms during the sample periods and the country, industry, and year fixed effects. Column (3) is the full regression model including all control variables plus other country-level reforms during the sample periods and the firm and year fixed effects. We find that the coefficient on *POST* is significantly negative in all estimations (two-tailed p-values <0.05 for all tests), suggesting that tax avoidance decreases following board reforms. Focusing on column (3), the coefficient estimate associated with *POST* is equivalent to a 4.2% increase in the firm's cash effective tax rate after board reforms controlling for firm- and country-level factors associated with tax avoidance.

The signs of the coefficient estimates associated with the control variables are generally consistent with predictions. Consistent with Atwood, Drake, Myers, and Myers (2012), we find that tax avoidance is positively associated with the statutory corporate tax rate (*TAXRATE*). Tax avoidance is associated with more profitable firms, measured by *ROA*, higher leverage, greater sales growth, R&D intensity, country-level required book tax conformity, and country-level tax rates. The strength of the judicial system is associated with less tax avoidance. We also find that tax avoidance is lower for large firms (*SIZE*), consistent with Atwood, Drake, Myers, and Myers (2012), who find that, for a broad sample of international firms, tax avoidance is inversely associated with firm size. These results are consistent with larger firms engaging in less tax avoidance, as well as with prior literature suggesting that larger firms may act to reduce potential

political costs (Zimmerman, 1983; Omer, Molloy and Ziebart, 1993). Contrary to prior research that finds a positive relation between sales growth (*SALEGR*) and tax avoidance (Atwood, Drake, Myers, and Myers, 2012), we find a negative association between tax avoidance and sales growth (*SALEGR*). Consistent with prior research, however, we find a positive association between tax avoidance and leverage (Dyregang, Hanlon, and Maydew, 2008; Crazier, Rego, Tian, and Wilson, 2009). We find no association between tax avoidance and research and development (*R&D*), consistent with Atwood, Drake, Myers, and Myers (2012). We find that *FOREIGN* is statistically negative, consistent with Rego (2003), suggesting that multinationals engage in less tax avoidance than solely domestic firms do. Taken together, we conclude that firms reduce their tax avoidance activities after major country-level board reforms.¹³

In Panel B of Table 3, we re-examine the main results by using four alternative samples. First, to mitigate the concern of confounding events, we further restrict our sample period to five years before and after the reform in our primary analysis in column 1. This additional restriction results in a sample using a [-5, +5] year window, which we term “[-5, +5] sample,” consisting of 52,344 firm-years (7,613 firms) from 29 countries. Second, we exclude the largest sample country, the U.S., and report the results in column 2. Third, we exclude all firms with political connections and report the results in column 3.¹⁴ Last, we include an additional control variable *TAXENF*, to control for country-level tax enforcement. We obtain *TAXENF* from IMD World Competitiveness Online. Higher values of *TAXENF* indicate greater country-level tax enforcement. Not all sample countries have tax enforcement data; thus, adding this control

¹³ To be considered as major reforms, the level of enforcement for the majority of new rules must be legal rules or comply-or-explain regulations, not purely voluntary. Instead of examining major board reforms, we also focus on the earliest identified broad board reform for each country during our sample period. We find no evidence that tax management decreases following the first reforms, which suggests that major reforms drive our results.

¹⁴ The politically connected firms data is collected from Faccio (2006).

variable reduces the sample to 66,888 firm year observations. We report the results in column 4. The results for all four alternative samples are qualitatively unchanged. Again, we conclude that board reforms are associated with less tax avoidance.

In Panel C of Table 3, we conduct additional tests to assess the validity of the research design. First, to assess the parallel trends assumption underlying the DID design, we conduct two placebo tests using pseudo reform years during both the pre- and post-reform periods. The first placebo test restricts the analyses to the pre-reform periods and sets the pseudo reform effective year as five years prior to the actual reform effective year. The second placebo test restricts the analyses to the post-reform periods and sets the pseudo reform effective year as five years after the actual reform effective year. Columns 1 and 2 of Table 3 Panel C report the results. We find no evidence of changes in firm value subsequent to the pseudo reform years, as indicated by insignificant coefficients on *POST* for all tests.

Next, we use alternative DID specifications by restricting the sample period to begin in 2000 and benchmarking with a propensity-score-matched (PSM) firms in the U.K., the major country passing board reforms before 2000. We then assign the pseudo reform year to the benchmark PSM-U.K. firms based on the reform year of the matched firm. The regression model is:

$$TAXAVOID_{i,j,t} = \beta_0 + \beta_1 POST_{j,t} + \beta_2 POST_{j,t} * TREAT + \beta_k X_{i,j,t} + \varepsilon_{i,j,t} \quad (2)$$

Where *POST* is a dummy variable indicating whether the period is post-reform, *TREAT* is a dummy variable indicating treatment firms. We include the same set of control variables as in Eq. (1). The coefficient on *POST*_{*j,t*} * *TREAT*, β_2 , indicates the changes for the treatment group relative to the change for the benchmark group. If board reforms lead to lower tax avoidance, we expect β_2 to be negative. The results of PSM tests are reported in column 3 of Table 3, Panel C. Consistent with our prediction, the coefficient of *POST*_{*j,t*} * *TREAT* is significantly negative (two-

tailed p-value <0.01). Therefore, the conclusions for the PSM test are identical to the base model tests.

Last, following Bertrand and Mullainathan (2003), we replace the *POST* indicator with indicator variables that track the effect of the reforms before and after they become effective. We include the following indicator variables: (1) Year 1 (Year 0, Year -1), which equals one for the year in which the reform becomes effective (the year before the reform becomes effective, and the two years before the reform becomes effective respectively); and (2) Year 2+, which equals one for the year and subsequent years after the reform becomes effective, and zero otherwise. If the reforms are passed in response to changes in economic conditions, we expect an effect prior to the reform. As indicated in column 1, we do not find such a spurious effect. That is, the results show an insignificant coefficient on the Year -1 and Year 0 indicator variables, and a significantly negative coefficient on the Year 1 and Year 2+ indicator variables (two-tailed p-values <0.10 and 0.05 for both variables respectively). The insignificant coefficients on the Year -1 and Year 0 indicator variables suggests that the reforms are unlikely to be a drastic response to economic difficulty or to corporate scandals. Importantly, the significant coefficients on the Year 1 and Year 2+ indicator variables suggest that the decrease in tax avoidance materializes on or after the board reform becomes effective in the firm's country.

3.2. Additional tests: type of tax avoidance behavior

We provide evidence that firms appear to engage in less overall tax avoidance after major board reforms. We seek to better understand the type of tax avoidance by studying nonconforming and conforming tax avoidance after reforms. The proxy for nonconforming tax avoidance is *NONCONFORMAVOID*, the change in the deferred taxes liability (WC03263) deflated by the corporate statutory tax rate at year t divided by total assets at year t-1. We expect

that firms will report positive changes in their deferred tax accounts if they engage in nonconforming tax planning that generates a temporary book-tax difference such that taxable income is lower than book income. Larger *NONCONFORMAVOID* is consistent with greater nonconforming tax avoidance.

We use *CONFORMAVOID*, the conforming tax avoidance measure in Badertscher, Katz, Rego, and Wilson (2016) to capture conforming tax avoidance. Following Badertscher, Katz, Rego, and Wilson (2016), Firm *i*'s conforming tax avoidance in year *t* is derived from regressing the ratio of cash taxes paid to lagged total assets on total book-tax differences (*BTD*), which equals pre-tax income less cash taxes paid divided by the statutory tax rate. This difference is scaled by lagged total assets. To estimate conforming tax avoidance, the regression is $TAXAVOID_{it} = \alpha_0 + \alpha_1 BTD_{it} + e_{it}$. We extract the residual (e_{it}), our measure of conforming tax avoidance, by estimating the model across country. To estimate the model annually by three-digit SIC industry and country, we require that at least six observations be available. The adjusted R^2 from this model is 39.9 percent (results not tabulated). Larger *CONFORMAVOID* is consistent with greater conforming tax avoidance.¹⁵

Table 3 Panel D reports the Eq. (1) regression results after replacing *TAXAVOID*, the dependent variable, with either *NONCONFORMAVOID* or *CONFORMAVOID*. We estimate equation (1) using ordinary least squares regression techniques and cluster standard errors by country (Petersen, 2009). Column 1 of Panel D reports the results for *NONCONFORMAVOID*;

¹⁵ To assess the robustness of our conclusions, we also use *SPREAD_CF* as the measure for conforming tax avoidance. *SPREAD_CF* is defined as the corporate statutory tax rate in country *j*, *TAXRATE*, less cash taxes paid divided by pre-tax cash flows, where pre-tax cash flows are defined as cash flow from operations plus cash taxes paid less extraordinary items and discontinued operations. If cash flow from operations is missing, it is computed indirectly by subtracting the accrual component from earnings following Leuz, Nanda, and Wysocki (2003). This alternative measure yields statistically stronger results (not tabulated for brevity).

column 2 reports the results for *CONFORMAVOID*. The coefficients on *POST* is significantly positive for *NONCONFORMAVOID* and significantly negative for *CONFORMAVOID* estimations (two-tailed p-values <0.05 for both tests), suggesting that firms reduce conforming while increasing nonconforming tax avoidance activities after board reforms.

3.4. Additional tests: analysis of board reform characteristics and tax avoidance

Board reforms may affect firm-level tax avoidance differently depending on their characteristics. We explore the heterogeneity of board reform characteristics and their association with tax avoidance. We start by examining the effect of the major components of reforms. For each board reform, we identify whether it covers three key components of board practices: 1) board independence, 2) audit committee and auditor independence, and 3) the separation of the chairman and CEO positions. To avoid benchmarking with countries that may involve other components of reforms, we re-estimate Eq. (1) after restricting the sample to countries with reforms involving the individual component that is being examined. We then set *POST* equal to one starting in the year when the reform involving the individual component becomes effective. Table 4 Panel A columns 1 through 3 report the findings. The coefficients on *POST* are significantly negative for all estimations (two-tailed p-values <0.01 for all estimations). Our analyses suggest that reforms involving board independence, audit committee independence, and those involving the separation of the chairman and CEO positions are associated with less tax avoidance. In the column 4 of Panel A, we conduct an analysis to control for the effect of concurrent non-board governance reforms by adding *POST_NBOARD*, a dummy variable indicating periods subsequent to the reforms with additional non-board components. We find no evidence that reforms involving additional non-board components have incremental effects, and we find that our inferences remain unchanged after further controlling for the effect of concurrent

non-board governance reforms.

Next, different countries use different approaches to reform the corporate boards in their countries. Some reforms such as the U.K. Cadbury recommendations adopt a “comply-or-explain” approach in which firms can choose to explain why they do not comply, but other reforms such as the U.S. Sarbanes-Oxley Act (SOX) use a rule-based approach that makes compliance mandatory. While the one-size-fits-all rule-based reforms risk being burdensome, comply-or-explain reforms may be ineffective because they are voluntary. Although Fauver, Hung, Li, and Taboada (2016) show that that comply-or-explain reforms have a greater effect on firm value than the rule-based reforms, the impact of different reform approaches on tax avoidance is an empirical question.

We explore whether comply-or-explain reforms or rule-based reforms will lead to a greater decrease in firm value. We perform this analysis by estimating Eq. (1) and further interacting *POST*, the dummy variable indicating the post-reform period, with *COMPLY-OR-EXPLAIN*, a dummy variable indicating a reform using the comply-or-explain approach. We do not include the variable *COMPLY-OR-EXPLAIN* because there is no within-country variation in this variable and our model includes country fixed effects. We perform this analysis for all major reforms sample, and only for reforms involving board independence components. Table 4 Panel B reports the findings. Our results indicate that comply-or-explain reforms are not different from rule-based reforms if we examine all major reforms. However, for reforms involving board independence components, comply-or-explain reforms are associated with a smaller decrease in tax planning activities than rule-based reforms, as indicated by the significant positive coefficient of *POST* COMPLY-OR-EXPLAIN* (two-tailed p-value <0.10).

Last, we explore the difference in impact and compliance speed of board reforms. We start by examining changes for firms that are expected to be most impacted by the reforms (Chhaochharia and Grinstein, 2007). Following Fauver, Hung, Li, and Taboada (2016), we focus this analysis on major reforms involving board independence, because it appears to be the most important board reform. Fauver, Hung, Li, and Taboada (2016) argue that reforms involving provisions related to board independence are unlikely to affect firms as much if they had majority board independence prior to the reform¹⁶. Therefore, we expect that board reforms should affect tax avoidance most in firms without major board independence. To perform the test, we estimate Eq. (1) and further interact *POST* with *MIMPACT*, a dummy variable equal to one for firms without more than 50 percent independent directors in the year prior to the reform, and zero otherwise. We obtain firm-level governance attributes from RiskMetrics. Due to the data limitation, we focus our tests for U.S. sample only. The results are reported in column 1 of Table 4 Panel C. Our results indicate that reforms with high impact are associated with a larger decrease in tax planning activities than low impact reforms, as indicated by the significantly negative coefficient of *POST*MIMPACT* (two-tailed p-value <0.01).

Reforms are more likely to affect firms with faster compliance speed, compared to those with slower compliance speed. We examine this question by coding a firm as having a high speed of compliance (*HSPCOMP*) if it does not have majority board independence in the pre-period and adopts this practice in Year 1, the year in which the board reform becomes effective. That is, the speed of compliance captures whether firms without majority board independence in the pre-period change to a majority independent board in the year that the reform becomes effective. We

¹⁶ If some firms without majority board independence do not change board independence after the reform and some firms with majority board independence before reforms further increase board independence after the reforms, this occurrence should bias against our finding.

then estimate Eq. (1) and further interacting *POST*, the dummy variable indicating the post-reform period, with *HSPCOMP*. The results are reported in column 2 of Table 4 Panel C. Our results indicate that reforms with a quicker speed of compliance are associated with a larger decrease in tax planning activities than those with a slower speed of compliance, as indicated by the significant negative coefficient of *POST* HSPCOMP* (two-tailed p-value <0.01).

3.5. Analysis of country-level institutional environments and tax avoidance

We evaluate the role of initial countries' institutional environments on the effects of board reforms. We begin by examining the country-level investor protection level. We use two primary measures to capture a country's institutional environment. The first measure is a dummy variable (*COMMONLAW*) indicating whether the country has a common law (*COMMONLAW* = 1) or a code law legal origin (*COMMONLAW* = 0). As legal origin is related to several institutional outcomes, we use it as a summary measure of a country's institutional framework. Countries with a common law legal origin are associated with greater protection for outside shareholders as compared to those with a code law legal origin (LaPorta, Lopez-de-Silanes, Shleifer and Vishny, 1998). The second is the "anti-self-dealing" index (*ANTIDIR*) constructed by Djankov, LaPorta, Lopez-de-Silanes, and Shleifer (2008), which captures the extent to which minority shareholders are protected against expropriation by corporate insiders. We then estimate Eq. (1) after further interacting *POST*, the dummy variable indicating the post-reform period, with *COMMONLAW* or *ANTIDIR*. We do not include *COMMONLAW* or *ANTIDIR* in the regression model because there is no within-country variation in these variables when the model includes country fixed effects. Table 5 reports the findings. We find that the board reform effect on tax avoidance is less pronounced in common law countries, as indicated by the significant positive coefficient of *POST* COMMONLAW* (two-tailed p-value <0.01), and in countries less amenable to self-

dealing, as indicated by the significantly negative coefficient of $POST*ANTIDIR$ (two-tailed p-value <0.05). This result suggests that, in countries where investor protection is stronger, board reforms have less effect on curbing tax avoidance activities.

4. Board reforms, tax avoidance, and firm value

Firm governance is potentially an important determinant of the valuation of corporate tax avoidance. While the direct effect of tax avoidance should increase the firm's after-tax cash flow and, hence, firm value, this effect is potentially offset, particularly in poorly governed firms, by the increased opportunities for rent diversion provided by tax shelters (Chen and Chu, 2005, Crocker and Slemrod, 2005, Desai and Dharmapala, 2006, 2009). Specifically, when governance is weak and management is entrenched, tax avoidance activities can be used to mask rent extraction and reduce firm value. When governance is strong and manager-shareholder interests are aligned, tax avoidance activities can be used to reduce costs and increase firm value. We predict the net effect on firm value should be greater for firms after board reforms.

To test this prediction, we use a DID design by regressing $TOBINQ$ on $POST$, $TAXAVOID$ and $POST* TAXAVOID$. We estimate Eq. (3) using ordinary least squares regression and, as before, clustering standard errors by country (Petersen, 2009).

$$TOBINQ_{i,j,t} = \beta_0 + \beta_1 POST_{j,t} + \beta_2 TAXAVOID_{j,t} + \beta_3 POST_{j,t} * TAXAVOID_{j,t} + \beta_k X_{i,j,t} + \varepsilon_{i,j,t} \quad (3)$$

Subscripts i, j , and t correspond to firm, country, and year, respectively. $X_{i,j,t}$ represents the set of control variables, some of which are measured at the firm-level and some are measured at the country-level depending upon data availability. β_k is the vector of coefficient estimates. We expect that $\beta_3 > 0$, consistent with a positive impact of tax avoidance on firm value after board reforms.

We include the variables to control for firm size, pre-tax return on assets, leverage, age, cash holdings, *R&D*, capital expenditure, *PP&E* and industry-level Tobin's q .¹⁷ We use *TOBINQ* or *TOBINQDD* to measure firm value. The results are reported in Table 6 (column 1 for *TOBINQ* and column 2 for *TOBINQDD*). We find that the coefficient on *TAXAVOID* is negative but not significant in both columns. In addition, we find that the coefficient on $POST_{j,t}^*$ *TAXAVOID* is significantly positive in all estimations (two-tailed p -value <0.05), which suggests that the impact of tax avoidance on firm value becomes positive after board reforms. This result is consistent with board reforms reducing agency conflicts and motivating value-maximizing tax avoidance.

5. Supplemental analyses

5.1. The extreme tails of the tax avoidance distribution

Armstrong, Blouin, Jagolinzer, and Larcker (2015) find a positive (negative) relation between board independence and tax avoidance in the lower (upper) tail of the tax avoidance distribution. Their interpretation is that independent directors recognize the potential costs associated with extreme tax positions and, consequently, attempt to mitigate extreme tax avoidance. However, due to research design limitations, they caution the reader that, “our inferences are inherently descriptive” (Page 14, Armstrong, Blouin, Jagolinzer, and Larcker, 2015).

Using board reforms as an exogenous shock to board independence, we reexamine whether board reforms have stronger impact on extreme tax avoidance. Following Armstrong, Blouin, Jagolinzer, and Larcker (2015), we use quantile regressions. The quantile regressions

¹⁷ In untabulated tests, we control for insider trading law enforcement, takeover regulatory reforms, the annual maximum statutory dividend tax rate, and the annual maximum statutory capital gains tax rate. Conclusions are unaffected.

allow us to draw more complete inferences beyond those that can be drawn from traditional ordinary least squares (OLS) regressions, which only describe the relation between independent variables and the conditional mean of the dependent variable of interest. Quantile regression is more general and describes the relation between the independent variables and any specified percentile of the conditional distribution of the dependent variable.

Quantile regression allows us to determine whether the relation between board reforms and tax avoidance varies across the tax avoidance distribution. We have no prediction how the relation between board reforms and tax avoidance may vary across the avoidance distribution but check to see if there is a difference. Table 7 reports the results for the quantile regressions. We find that the coefficient estimates associated with *POST* are negative and significant across all percentiles of the tax avoidance distributions. Tests of coefficient differences across quantiles indicate that the coefficient at the 90th percentile (t-statistic = -1.9) is significantly less negative than the coefficient at the 10th percentile (t-statistic = -2.89, difference p-value of 0.012) and significantly less negative than the 50th percentiles (t-statistic = -3.23, difference p-value of 0.010). However, the coefficient at the 50th percentile is not significantly different from the coefficient at the 10th percentile (difference p-value of 0.279). The results suggest that board reforms are associated with tax avoidance at all levels of the tax avoidance distribution.

6. Conclusion

We examine whether variation in firms' corporate governance mechanisms arising from board reforms explains differences in the level of tax avoidance and the corresponding association between tax avoidance savings and firm value. We find corporate tax avoidance decreases significantly after major board reforms. We also find that major board reforms involving board and audit committee independence, as well as reforms involving separation of

the board chairman and chief executive officer roles, reduce tax avoidance activities. “Comply-or-explain” reforms result in a greater reduction in tax avoidance activities than “rule-based” reforms. Furthermore, reforms with high impact and high compliance speed reduce tax avoidance activities more than those with low impact and low compliance speed. We document that the impact of board reforms on managers’ incentives to engage in tax avoidance varies with the strength of country-level investor protection mechanisms. In addition, we also examine the relation between tax avoidance and firm value associated with board reforms. We find that tax avoidance before (after) board reforms is negatively (positively) associated with firm value. This result is consistent with board reforms reducing tax-avoidance related agency conflicts and motivating value-maximizing tax avoidance.

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Table 1: Sample Composition and Median Characteristics by Country (N = 72,102 firm-year observations)

Country	Reform year	Starting year	N	TAXRATE	TAXAVOID	EARNVOL	BTAXC	LEGAL	FINDEV	PERCAPITA	COMMON LAW	BOARD	AUDIT	DUAL	NON-BOARD	REFORM TYPE
AUSTRALIA	2004	1993	1,961	30.0%	4.8%	0.131	0.202	1.792	1.098	0.854	1	1	1	1	1	Comply-or-explain
BRAZIL	2002	1997	80	34.0%	27.3%	0.707	0.162	0.693	0.725	-0.995	0	0	0	0	1	Rule-based
CANADA	2004	1993	1,739	34.4%	17.7%	0.131	0.061	1.792	1.776	0.914	1	1	1	1	0	Rule-based
CHILE	2001	2000	233	17.0%	4.4%	0.364	0.737	1.609	0.795	-0.480	0	0	1	0	1	Rule-based
CHINA	2001	1997	2,529	33.0%	-2.2%	0.909	0.970	1.504	1.343	-1.807	0	1	1	0	1	Rule-based
DENMARK	2001	1993	329	30.0%	6.0%	0.535	0.505	1.792	1.525	1.101	0	1	0	0	1	Comply-or-explain
FINLAND	2004	1995	215	28.0%	2.5%	0.566	0.586	1.792	0.695	0.947	0	1	1	1	1	Comply-or-explain
FRANCE	2003	1993	217	34.4%	15.0%	0.636	0.434	1.609	1.151	0.822	0	0	1	0	1	Rule-based
GERMANY	2002	1994	990	38.9%	16.1%	0.535	0.162	1.609	1.331	0.891	0	1	1	0	1	Comply-or-explain
GREECE	2002	2000	219	32.0%	10.7%	0.737	0.768	1.504	1.066	0.297	0	1	1	0	0	Rule-based
HONG KONG	2005	1997	3,456	16.5%	5.3%	0.263	0.838	1.609	1.439	1.131	1	1	1	1	0	Comply-or-explain
INDIA	2002	1997	2,710	34.0%	10.7%	0.333	0.505	1.386	0.608	-2.778	1	1	1	0	1	Rule-based
INDONESIA	2007	1997	915	30.0%	7.2%	0.333	0.434	1.099	0.427	-2.350	0	1	1	0	0	Rule-based
ITALY	2006	1995	187	27.5%	0.5%	0.838	0.606	1.386	1.416	0.662	0	1	1	0	1	Rule-based
JAPAN	2002	1993	12,893	39.5%	0.6%	0.970	0.707	1.609	3.040	1.369	0	0	1	0	0	Rule-based
MALAYSIA	2001	1997	2,964	28.0%	4.4%	0.707	0.808	1.386	1.275	-0.756	1	1	1	0	0	Comply-or-explain
NETHERLANDS	2004	1993	174	34.5%	7.7%	0.434	0.263	1.792	1.602	0.894	0	1	1	1	0	Comply-or-explain
NORWAY	2005	1993	249	28.0%	21.0%	0.505	0.263	1.792	0.808	1.349	0	1	1	1	1	Comply-or-explain
PAKISTAN	2002	1997	163	35.0%	15.5%	0.101	0.465	1.099	0.458	-2.780	1	0	1	0	0	Comply-or-explain
PERU	2005	1998	53	30.0%	2.2%	0.030	0.465	1.099	0.187	-1.438	0	0	1	0	0	Comply-or-explain
PHILIPPINES	2002	1997	329	32.0%	14.1%	0.465	0.636	0.916	0.492	-2.053	0	1	1	0	1	Comply-or-explain
POLAND	2002	1997	101	19.0%	5.5%	0.768	0.667	1.504	0.599	-0.472	0	1	0	0	1	Comply-or-explain
SINGAPORE	2003	1997	1,984	20.0%	4.5%	0.737	0.909	1.609	0.823	1.096	1	1	1	0	1	Comply-or-explain
SWEDEN	2006	1993	600	28.0%	6.5%	0.364	0.202	1.792	1.175	1.128	0	1	1	1	1	Comply-or-explain
SWITZERLAND	2002	1993	661	21.3%	5.7%	0.768	0.566	1.609	1.745	1.301	0	0	0	0	1	Comply-or-explain
THAILAND	2002	1997	1,771	30.0%	10.7%	0.667	0.838	0.916	1.316	-1.403	1	1	1	0	1	Comply-or-explain
TURKEY	2002	2000	232	20.0%	3.9%	0.333	0.505	1.386	0.529	-0.699	0	1	0	1	1	Comply-or-explain
UK	1998	1993	8,256	30.0%	6.3%	0.404	0.434	1.792	1.417	0.964	1	1	1	1	1	Comply-or-explain
US	2003	1993	25,892	39.3%	12.7%	0.131	0.101	1.705	2.090	1.265	1	1	1	0	1	Rule-based

Notes to Table 1: Median values for variables used in the cross-sectional tests. Variables measured at the country-level and defined in Appendix A. We obtain information on major corporate governance reforms from 1990 through 2012 from Fauver, Hung, Li, and Taboada (2016). We restrict the sample to all countries with available stock price and financial data in the Thomson Financial DataStream and WorldScope databases. We exclude firm-year observations associated with the financial services industry. The primary sources for governance reforms are reports from the World Bank, European Corporate Governance Institute (ECGI), local stock exchange regulators, and prior studies (Kim and Lu, 2013). We hand-collect statutory corporate tax rates for all Organisation for Economic Co-operation and Development (OECD) countries in the sample from the OECD. We gather remaining sample country tax rate data from the KPMG LLP online summary (<https://home.kpmg.com/xx/en/home/insights/2015/10/global-tax-rate-survey.html>). These statutory corporate tax rates include both the federal income tax rate and the average effects of state, provincial, and other local government income tax rates. We obtain firm-level descriptive data from the Thomson Financial WorldScope database, which contains firm-level financial data for public firms beginning in 1993. The availability of these data varies by country. We match the firm-level data with the country data. To minimize the potential influence of extreme observations, we winsorize all continuous variables at the 1st and 99th percentiles of their respective distributions in each year

Table 2: Summary Statistics and Correlations

Panel A: Descriptive Statistics

	N	10%	25%	Mean	Median	75%	90%	STD
Key variables								
TAXAVOID	72,102	-0.125	-0.012	0.074	0.081	0.192	0.297	0.187
POST	72,102	0.000	0.000	0.530	1.000	1.000	1.000	0.499
ATAXAVOID	84,401	-0.279	-0.042	0.043	0.078	0.204	0.320	0.246
NONCONFORMAVOID	88,760	-0.055	-0.018	-0.006	0.000	0.010	0.041	0.060
CONFORMAVOID	85,070	-0.024	-0.014	0.001	-0.004	0.009	0.031	0.025
TOBINQ	69,397	0.817	1.012	1.581	1.303	1.868	2.886	0.843
TOBINQDD	69,397	0.805	0.996	1.570	1.288	1.858	2.881	0.848
Control variables (measured at firm-year level)								
ROA	72,102	0.016	0.039	0.106	0.080	0.141	0.225	0.096
LEV	72,102	0.000	0.004	0.135	0.092	0.223	0.344	0.145
SIZE	72,102	11.082	12.511	14.653	14.327	16.717	18.704	2.885
PPE	72,102	0.047	0.133	0.315	0.272	0.453	0.666	0.228
INTANG	72,102	0.000	0.000	0.086	0.014	0.106	0.293	0.145
SALEGR	72,102	-0.120	-0.006	1.195	0.080	0.202	0.444	9.110
R&D	72,102	0.000	0.000	0.015	0.000	0.012	0.053	0.035
FOREIGN	72,102	0.000	0.000	0.515	1.000	1.000	1.000	0.500
DACCRUAL	72,102	-0.113	-0.049	0.001	-0.001	0.046	0.113	0.104
CAPEX	69,397	0.008	0.020	0.055	0.041	0.073	0.118	0.052
INDTOBINQ	69,397	0.932	1.078	1.397	1.297	1.590	1.905	0.475
INDTOBINQDD	69,397	0.930	1.070	1.390	1.287	1.581	1.909	0.477
Control variables (measured at country-year level)								
EARNVOL	445	0.131	0.263	0.509	0.505	0.747	0.903	0.281
BTAXC	445	0.101	0.263	0.493	0.485	0.737	0.869	0.278
TAXRATE	445	0.200	0.263	0.308	0.300	0.350	0.395	0.076
LEGAL	445	1.099	1.386	1.535	1.609	1.792	1.792	0.306
FINDEV	445	0.483	0.687	1.186	1.108	1.495	2.043	0.637
PERCAPITA	445	-2.279	-0.899	0.075	0.778	1.071	1.311	1.349

**Table 2: Summary Statistics and Correlations
(CONTINUED)**

Panel B: Pearson (above) and Spearman (below) Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1)TAXAVOID	1	-0.149	0.135	0.115	-0.172	0.073	0.045	-0.070	0.108	0.010	0.026	-0.267	-0.285	0.144	0.077	-0.059	0.072
(2)POST	-0.156	1	-0.098	-0.112	0.166	-0.138	0.092	0.099	-0.058	0.067	-0.002	0.266	0.256	-0.193	-0.312	0.202	-0.011
(3)ROA	0.118	-0.090	1	-0.182	-0.251	-0.100	0.014	-0.007	0.184	0.002	0.023	-0.254	-0.205	0.010	0.073	-0.143	-0.007
(4)LEV	0.117	-0.116	-0.203	1	0.106	0.339	0.206	-0.004	-0.146	-0.026	0.021	-0.198	-0.231	0.147	0.100	-0.015	0.051
(5)SIZE	-0.160	0.177	-0.267	0.169	1	0.075	-0.131	0.182	-0.089	0.040	-0.021	0.523	0.355	0.180	-0.277	0.375	-0.113
(6)PPE	0.070	-0.153	-0.052	0.331	0.090	1	-0.301	0.013	-0.219	-0.182	-0.069	-0.012	0.009	-0.005	-0.027	-0.122	-0.125
(7)INTANG	-0.002	0.169	0.036	0.177	-0.008	-0.272	1	-0.041	0.055	0.155	-0.041	-0.280	-0.307	0.060	0.145	0.028	0.190
(8)SALEGR	0.097	-0.061	0.343	0.036	-0.082	0.037	0.030	1	0.001	-0.003	-0.002	0.117	0.044	0.016	-0.061	0.110	-0.011
(9)R&D	0.033	0.003	0.059	-0.112	0.115	-0.191	0.146	-0.008	1	0.227	0.010	-0.096	-0.189	0.180	0.149	0.125	0.172
(10)FOREIGN	-0.007	0.067	0.023	0.012	0.040	-0.156	0.222	-0.025	0.302	1	-0.013	-0.038	-0.022	-0.107	0.158	0.029	0.226
(11)DACCRUAL	0.030	0.007	-0.034	0.025	-0.019	-0.067	-0.050	0.013	-0.034	-0.021	1	-0.029	-0.013	-0.025	0.001	-0.023	0.001
(12)EARNVOL	-0.259	0.310	-0.257	-0.173	0.465	0.021	-0.186	-0.105	0.053	-0.018	-0.031	1	0.777	-0.032	-0.253	0.313	-0.114
(13)BTAXC	-0.266	0.241	-0.230	-0.204	0.330	0.024	-0.251	-0.087	-0.099	-0.015	-0.013	0.764	1	-0.463	-0.389	-0.059	-0.329
(14)TAXRATE	0.083	-0.255	-0.051	0.103	0.281	0.004	0.044	-0.032	0.296	-0.102	-0.041	0.015	-0.321	1	0.266	0.568	0.271
(15)LEGAL	0.081	-0.470	0.129	0.140	-0.329	0.016	0.090	0.024	0.082	0.112	0.005	-0.346	-0.433	0.277	1	0.238	0.668
(16)FINDEV	-0.039	0.217	-0.136	0.015	0.317	-0.128	0.199	-0.121	0.281	0.030	-0.027	0.128	-0.155	0.661	0.037	1	0.622
(17)PERCAPITA	-0.015	0.266	-0.087	0.016	0.227	-0.168	0.231	-0.104	0.269	0.103	-0.020	0.062	-0.196	0.534	0.079	0.877	1

Notes to Table 2:

Panel A provides descriptive statistics for key variables in the study. The 10th, 25th, 75th, and 90th distribution percentiles are provided with the mean, median, and standard deviation (STD). All variables are measured at the firm-level and are defined in Appendix A. Panel B contains Pearson (Spearman) bivariate correlations above (below) the diagonal. All reported correlations in bold in Panel B are statistically significant at two-tailed $p \leq 0.05$.

Table 3 Board Reforms and Tax Avoidance

Panel A: Main tests

Dependent Variable		TAXAVOID					
		(1)		(2)		(3)	
INTERCEPT		0.315	**	0.347	*	0.372	**
		(2.18)		(1.94)		(2.07)	
POST	?	-0.049	***	-0.049	***	-0.042	**
		(-3.27)		(-3.22)		(-2.49)	
AFTER_INSIDER	?			0.078		0.073	
				(1.57)		(1.33)	
AFTER TAKEOVER	?			-0.038		-0.023	
				(-1.05)		(-0.57)	
ROA	+	0.145	**	0.145	**	0.260	***
		(2.35)		(2.34)		(3.21)	
LEV	+	0.087	***	0.087	***	0.033	**
		(6.73)		(6.75)		(2.07)	
SIZE	?	-0.005	***	-0.005	***	-0.015	***
		(-3.97)		(-3.98)		(-3.53)	
PPE	?	0.046	***	0.046	***	0.001	
		(5.16)		(5.22)		(0.01)	
INTANG	?	-0.027	*	-0.026	*	0.007	
		(-1.82)		(-1.80)		(0.47)	
SALEGR	+	-0.001	***	-0.001	***	-0.001	***
		(-4.43)		(-4.36)		(-4.31)	
R&D	+	0.270	**	0.271	**	-0.061	
		(2.46)		(2.47)		(-1.23)	
FOREIGN	?	0.001		0.001		-0.005	*
		(0.18)		(0.17)		(-1.66)	
DACCRUAL	+	0.041	***	0.041	***	0.008	
		(4.14)		(4.13)		(0.73)	
BTAXC	-	0.017		0.019		0.022	
		(0.89)		(0.98)		(1.17)	
EARNVOL	?	-0.041		-0.034		-0.031	
		(-1.30)		(-0.99)		(-0.94)	
TAXRATE	+	0.734	***	0.690	***	0.762	***
		(4.08)		(4.27)		(4.51)	
LEGAL	-	-0.106	*	-0.130	**	-0.120	*
		(-1.93)		(-2.04)		(-1.84)	
FINDEV	-	-0.056	**	-0.062	***	-0.050	*
		(-2.54)		(-2.66)		(-1.94)	
PERCAPITA	-	-0.171	*	-0.179	*	-0.136	
		(-1.79)		(-1.87)		(-1.49)	
FIXED EFFECTS		C, I, Y		C, I, Y		F, Y	
N		72,102		72,102		72,102	
ADJUSTED R ² (%)		18.7		18.8		44.7	

**Table 3 Board Reforms and Tax Avoidance
(CONTINUED)**

Panel B: Alternative samples

Dependent Variable	TAXAVOID			
	Restricted [-5, +5] sample	Excluding U.S.	No political connection firms	Controlling for tax enforcement
INTERCEPT	(1) 0.244 (1.32)	(2) 0.171 (1.33)	(3) 0.321 (2.19)	(4) 0.365 (2.16)
POST	-0.064 (-4.78)	-0.048 (-2.58)	-0.047 (-3.18)	-0.051 (-3.17)
CONTROLS	YES	YES	YES	YES
FIXED EFFECTS	C, I, Y	C, I, Y	C, I, Y	C, I, Y
N	52,344	46,210	70,754	66,888
ADJ. R ² (%)	15.1	18.2	18.8	18.5

Panel C: Other robust tests

Dependent Variable	TAXAVOID			
	Placebo test, pre-reform	Placebo test, post-reform	PSM-U.K. firms as benchmark	Reform timing
INTERCEPT	(1) 0.353 (2.59)	(2) 0.349 (2.46)	(3) 0.290 (1.47)	(4) 0.265 (2.16)
POST	0.015 (1.27)	0.007 (0.41)	0.030 (1.50)	
POST*TREAT			-0.081 (-4.33)	
Year -1				0.017 (1.48)
Year 0				0.015 (1.49)
Year +1 (first effective year)				-0.028 (-1.92)
Year +2				-0.034 (-2.36)
CONTROLS	YES	YES	YES	YES
FIXED EFFECTS	C, I, Y	C, I, Y	C, I, Y	C, I, Y
N	72,102	72,102	51,491	72,102
ADJ. R ² (%)				

**Table 3 Board Reforms and Tax Avoidance
(CONTINUED)**

Panel D: Board Reforms, Nonconforming and Conforming Tax Avoidance

Dependent Variable	NONCONFORMAVOID		CONFORMAVOID	
INTERCEPT	-0.060	***	-0.005	
	(-3.22)		(-0.77)	
POST	0.006	**	-0.002	***
	(2.16)		(-3.31)	
FIXED EFFECTS	C, I, Y		C, I, Y	
N	88,760		85,070	
ADJUSTED R ² (%)	4.6		20.7	

Notes to Table 3:

Panel A reports Eq. (1) regression results on the association between tax avoidance and board reforms. Panel B reports the robustness checks using three alternative samples: a restricted [-5,+5] sample that requires a firm to appear at least one year in the pre-period and one year in the post-period during the [-5,+5] window, excluding the U.S., and dropping political connection firms as well as adding country-level tax enforcement. Panel C reports results using pseudo adoption years, using U.K. PSM matching sample, as well as using models with reform timing variables. Panel D reports Eq. (1) regression results on the association between nonconforming and conforming tax avoidance and board reforms pooled across years. We estimate equation (1) using ordinary least squares regression techniques and clustering standard errors by country (Petersen, 2009). Variables are defined in the Appendix. *, **, and *** represent two-tailed significance levels at 10%, 5%, and 1%, respectively. Fixed effects are included as identified: C = country fixed effects; F = firm fixed effects; I = industry fixed effects; Y = year fixed effects. Coefficient estimates (t-statistics) are reported in the top row (parentheses).

Table 4 Board reforms characteristics and tax avoidance

Panel A: Analysis of major components of major board reforms and tax avoidance

Dependent Variable	TAXAVOID			
	Board independence	Audit committee or auditor	Chairman and CEO role	Full sample
	(1)	(2)	(3)	(4)
INTERCEPT	0.158 (1.24)	0.323 ** (2.23)	0.302 *** (2.39)	0.313 ** (2.23)
POST	-0.065 *** (-5.61)	-0.050 *** (-3.26)	-0.062 *** (-5.52)	-0.052 ** (-2.34)
POST_NBOARD				0.005 (0.23)
CONTROLS	YES	YES	YES	YES
FIXED EFFECTS	C, I, Y	C, I, Y	C, I, Y	C, I, Y
N	57,802	70,699	16,882	72,102
ADJ. R ² (%)	19.8	18.7	15.7	18.7
Number of countries	22	24	9	29

Panel B: Analysis of approaches of major board reforms and tax avoidance

	TAXAVOID	
	All reforms	Reforms involving board independence
	(1)	(2)
INTERCEPT	0.312 ** (2.07)	0.134 (1.20)
POST	-0.068 *** (-3.64)	-0.089 *** (-4.91)
POST*COMPLY-OR-EXPLAIN	0.030 (1.48)	0.034 * (1.94)
CONTROLS	YES	YES
FIXED EFFECTS	C, I, Y	C, I, Y
N	72,102	57,802
ADJ. R ² (%)	18.8	19.9

**Table 4 Board reforms characteristics and tax avoidance
(CONTINUED)**

Panel C: Analysis of the impact and compliance of major board reforms and tax avoidance (U.S. sample only)

	TAXAVOID	
	Most impacted firms	High speed of compliance
	(1)	(2)
INTERCEPT	0.151 ***	0.147 ***
	(3.21)	(3.15)
POST	-0.036 ***	-0.040 ***
	(-3.35)	(-3.77)
MIMPACT	0.002	
	(0.23)	
POST*MIMPACT	-0.030 ***	
	(-2.94)	
HSPCOMP		0.006
		(0.61)
POST*HSPCOMP		-0.043 ***
		(-3.31)
FIRM-LEVEL CONTROLS	YES	YES
FIXED EFFECTS	I, Y	I, Y
N	9,090	9,090
ADJ. R ² (%)	11.2	11.3

Notes to Table 4:

Panel A reports eq. (1) regression the analysis of major reform components. We estimate equation (1) using ordinary least squares regression techniques and clustering standard errors by firm (Petersen, 2009). Panel B reports regression results on the effect of major reform approaches on tax avoidance. We estimate eq. (1) using ordinary least squares regression techniques and clustering standard errors by country (Petersen, 2009). Panel C reports regression results on the effect of major reform approaches on tax avoidance conditional on pre-reform firm-level board attributes and the effect of speed of compliance. We estimate equation (1) using ordinary least squares regression techniques and clustering standard errors by firm (Petersen, 2009). Variables are defined in the Appendix. *, **, and *** represent two-tailed significance levels at 10%, 5%, and 1%, respectively. Fixed effects are included as identified in the body of each panel: C = country fixed effects; I = industry fixed effects; Y = year fixed effects. Coefficient estimates (t-statistics) are reported in the top row (parentheses).

Table 5 Governance Environment, Major Board reforms and Tax avoidance

	TAXAVOID	
	Common Law	Anti-director Rights Index
	(1)	(2)
INTERCEPT	0.358	0.346
	(2.44)	(2.79)
POST	-0.106	-0.155
	(-3.93)	(-2.98)
POST*COMMONLAW	0.072	
	(3.22)	
POST*ANTIDIR		0.026
		(2.15)
CONTROLS	YES	YES
FIXED EFFECTS	C, I, Y	C, I, Y
N	72,102	72,102
ADJ. R ² (%)	19.2	19.0

Notes to Table 5:

Table 5 reports regression results on the association between tax avoidance and board reforms pooled across years, conditional on country-level governance environment. We estimate equation (1) using ordinary least squares regression techniques and clustering standard errors by country (Petersen, 2009). Variables are defined in the Appendix. *, **, and *** represent two-tailed significance levels at 10%, 5%, and 1%, respectively. Fixed effects are included as identified in the body of each panel: C = country fixed effects; I = industry fixed effects; Y = year fixed effects. Coefficient estimates (t-statistics) are reported in the top row (parentheses).

Table 6 Board reforms, Tax Avoidance and Firm Valuation

	TOBINQDD		TOBINQ	
	(1)		(2)	
<i>INTERCEPT</i>	2.519	***	2.374	***
	(13.43)		(12.87)	
<i>TAXVOID</i>	-0.011		-0.009	
	(-0.36)		(-0.30)	
<i>POST</i>	-0.018		-0.018	
	(-0.81)		(-0.86)	
<i>POST* TAXAVOID</i>	0.090	**	0.096	**
	(2.08)		(2.23)	
<i>ROA</i>	2.953	***	2.958	***
	(35.41)		(35.76)	
<i>LEV</i>	-0.179	***	-0.197	***
	(-3.97)		(-4.27)	
<i>SIZE</i>	-0.131	***	-0.122	***
	(-14.75)		(-14.23)	
<i>R&D</i>	0.968	***	0.886	***
	(3.95)		(3.55)	
<i>FOREIGN</i>	0.006		0.005	
	(0.68)		(0.53)	
<i>DACCRUAL</i>	-0.135	***	-0.133	***
	(-4.23)		(-4.12)	
<i>PPE</i>	-0.216	***	-0.192	***
	(-7.48)		(-6.74)	
<i>CAPEX</i>	1.072	***	1.049	***
	(12.31)		(12.06)	
<i>FINDEV</i>	-0.014		-0.017	
	(-0.47)		(-0.58)	
<i>LAW</i>	-0.054		-0.041	
	(-0.69)		(-0.52)	
<i>PERCAPITA</i>	0.484		0.480	***
	(5.27)		(5.27)	
<i>INDUSTRY Q</i>	0.367	***	0.368	***
	(10.05)		(9.99)	
FIXED EFFECTS	F, Y		F, Y	
N	69,397		69,397	
ADJ. R ² (%)	0.723		0.721	
F joint test				
TAXVOID+ POST*TAXVOID	4.42** (p= 0.036)		5.45** (p= 0.020)	

Notes to Table 6:

This table reports regression results on the association among tax avoidance, major board reforms and firm value. We estimate equation (1) using ordinary least squares regression techniques and clustering standard errors by country (Petersen, 2009). Variables are defined in the Appendix. *, **, and *** represent two-tailed significance levels at 10%, 5%, and 1%, respectively. Fixed effects are included as identified in the body of each panel: F= firm fixed effects; Y = year fixed effects. Coefficient estimates (t-statistics) are reported in the top row (parentheses).

Table 7 Quantile Regression: The Impact of Major Board Reforms on Tax Avoidance

	<i>Coefficient</i>		T Value	<i>Adj (Pseudo) R²</i>
OLS	-0.049	***	-3.27	18.7%
<i>Quantile</i>				
0.10	-0.050	***	-2.89	13.1%
0.20	-0.042	***	-2.87	14.6%
0.30	-0.046	***	-3.34	17.2%
0.40	-0.042	***	-3.19	18.1%
0.50	-0.044	***	-3.23	17.2%
0.60	-0.049	***	-3.15	15.7%
0.70	-0.048	***	-3.23	14.1%
0.80	-0.040	**	-2.48	11.1%
0.90	-0.030	*	-1.90	12.5%
Avg Pseudo R ²			11%	14.8%
Q(0.80)=Q(0.20)	0.15 (p=0.702)			
Q(0.90)=Q(0.10)	6.32** (p=0.012)			
Q(0.90)=Q(0.50)	6.67*** (p=0.010)			
Q(0.10)=Q(0.50)	1.17 (p=0.279)			

Notes to Table 7:

This table reports quantile regression results on the association among tax avoidance and major board reforms. Variables are defined in the Appendix. *, **, and *** represent two-tailed significance levels at 10%, 5%, and 1%, respectively. Firm and Year Fixed effects are included. Standard errors are clustered by country (Petersen, 2009). Two-sided p-values are reported for the tests of coefficient differences between quintiles 0.80 vs. 0.20, 0.90 vs. 0.10, 0.90 vs. 0.50, and 0.10 vs. 0.50. Coefficients and t-stats that are statistically significant at the 5% level are in bold.

Appendix A: Variable Definitions

<i>Variable</i>	<i>Description</i>	<i>Details and Sources</i>
<u><i>Tax Avoidance Measures</i></u>		
<i>TAXAVOID</i>	Long-run tax avoidance	Measure of tax avoidance, defined as: $\left[\sum_{t-2}^t (PTEBX * \tau)_{it} - \sum_{t-2}^t CTP_{it} \right] / \sum_{t-2}^t PTEBX_{it}$ where PTEBX is pre-tax earnings before exceptional items, τ is home-country statutory corporate tax rate, and CTP is current taxes paid. The extent of tax avoidance is increasing in this measure. Expressed as a percentage.
<i>ATAXAVOID</i>	Annual tax avoidance	The corporate statutory tax rate in country j, TAXRATE, less the annual income-based Cash ETR value for firm i in country j, where annual Cash ETR is calculated as taxes paid (WC04150) divided by [pre-tax income (WC01401) less discontinued operations (WC04054) & extraordinary items (WC04225)]. Set to missing if denominator ≤ 0 . Source: WorldScope (WC)
<i>NONCONFORMAVOID</i>	Nonconforming tax avoidance	The change in deferred taxes (WC03263) deflated by the corporate statutory tax rate in country j, TAXRATE at year t divided by total assets at year t-1 for firm i. Positive values for NONCONFORMAVOID indicate an decrease in a deferred tax asset or an increase in tax expense. Source: WorldScope (WC)
<i>CONFORMAVOID</i>	Conforming tax avoidance	Following Badertscher, Katz, Rego and Wilson (2016), firm i's conforming tax avoidance in year t derived from regressing the ratio of cash taxes paid (CTP) to lagged total assets (AT) on total book-tax differences (BTD), by country, three-digit SIC industry and year, where BTD equal book income less taxable income scaled by lagged total assets. Book income is pre-tax income in year t. Taxable income is calculated by cash taxes paid dividing by the statutory tax rate in year t. To estimate the model annually by three-digit SIC industry and country, we require that at least 6 observations be available. Specifically, $CTP_{it} = a_0 + a_1 * BTD_{it} + r_{it}$. We extract the residual (r_{it}) from the equation as our measure of conforming tax avoidance. Source: WorldScope (WC)
<i>TAXRATE_{j,t}</i>	Corporate statutory tax rate	Hand collected from OECD and KPMG LLP online.
<u><i>Board reform Measure</i></u>		
<i>POST_{j,t}</i>	Board reforms indicator	An indicator variable equal to one starting the year in which the board reform becomes effective in the country and zero otherwise.
<i>POST_NBOARD_{j,t}</i>	Board reforms involving non-board items indicator	An indicator variable equal to one starting the year in which the reforms with additional non-board components becomes effective in the country and zero otherwise.

Appendix A: Variable Definitions (CONTINUED)

<i>Variable</i>	<i>Description</i>	<i>Variable</i>
<i>Firm valuation Measure</i>		
<i>TOBINQ</i>	<i>Tobin's Q</i>	Ratio of market value of equity (WC08001) plus the book value of liabilities to the book value of total assets (WC02999). The book value of liabilities is the book value of total assets (WC02999) less the book value of equity (WC03995). Source: WorldScope (WC)
<i>TOBINQDD</i>	<i>Tobin's Q adjusted</i>	Ratio of market value of equity (WC08001) plus the book value of liabilities to the book value of total assets (WC02999). The book value of liabilities is the book value of total assets (WC02999) less the book value of equity (WC03995) less the deferred tax liability (WC03263). Source: WorldScope (WC)
<i>Firm-Level Control Variables</i>		
<i>ROA</i>	Return on assets	Pre-tax income less extraordinary items divided by lagged total assets (WC02999). Source: WorldScope (WC)
<i>LEV</i>	Firm leverage	Sum of long-term debt (WC03251) and short-term debt & current portion of long-term debt (WC18232) divided by lagged total assets. Source: WorldScope (WC)
<i>SIZE</i>	Firm size	The natural logarithm of total assets. Source: WorldScope (WC)
<i>FOREIGN</i>	Indicator variable for foreign operations	Equals one if foreign income (WC07126) is non-missing and non-zero and zero if missing or zero. Source: WorldScope (WC)
<i>SALEGR</i>	Sales growth	Net Sales (WC01001) at t divided by Net Sales at t-1, minus 1. Source: WorldScope (WC)
<i>R&D</i>	R&D intensity	R&D expense (WC01201) divided by lagged total assets (WC02999). Source: WorldScope (WC)
<i>DACCRUAL</i>	Performance-adjusted discretionary accruals	The residual of the Kothari, Leone, and Wasley (2005) discretionary accrual model. Source: WorldScope (WC)
<i>PPE</i>	Capital intensity	Property, plant and equipment (WC02501) divided by total assets (WC02999). Source: WorldScope (WC)
<i>INTANG</i>	Intangible asset intensity	Intangible asset (WC02649) divided by total assets. Source: WorldScope (WC)
<i>CAPEX</i>	Capital expenditure	Capital expenditure (WC04601) scaled by total assets (WC02999). Source: WorldScope (WC)
<i>CASH</i>	Cash holding	Cash (WC02003) divided by total assets (WC02999). Source: WorldScope (WC)
<i>AGE</i>	Firm age	Natural log of the number of years since the firm was incorporated. When the date of incorporation is unavailable, firm age is calculated as the number of years since the firm first appeared on the DataStream and WorldScope databases. Source: WorldScope (WC) and DataStream(DS)
<i>CHS</i>	Percentage of closely held	Percentage of closely held shares (WC08021). Source:

shares

WorldScope (WC)

Appendix A: Variable Definitions (CONTINUED)

<i>Variable</i>	<i>Description</i>	<i>Details and Sources</i>
<i>Country-level conditional variables</i>		
<i>COMMONLAW</i>	Common law	An indicator variable that equals one if the origin of the commercial law of a country is English Common Law, and zero otherwise. Source: La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998).
<i>COMPLY-OR-EXPLAIN</i>	Comply-or-explain indicator	An indicator variable that equals one for countries adopting a comply-or explain reform approach. Source: Fauver, Hung, Li and Taboada (2016)
<i>ANTIDIR</i>	Anti-director Rights Index	Aggregate index of shareholder rights. The index is formed by summing: (1) vote by mail; (2) shares not blocked or deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital. Source: Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008)
<i>Time-trend control variables</i>		
<i>INDUSTRY Q</i>	Industry Tobin Q	The median Tobin's q for firms in the same country-industry-year, based on the two-digit WorldScope industries.
<i>Country-Level Control Variables</i>		
<i>LEGAL</i>	Law and order strength index	The natural logarithm of Law and Order, an assessment of the strength and impartiality of the legal system. Higher values indicate stronger judicial systems. Source: International Country Risk Guide (ICRG), produced by Political Risk Services
<i>BTAXC</i>	Required book-tax conformity	A measure of the country level of required book-tax conformity. We use Atwood, Drake, and Myers (2010) by country-year regressions to obtain RMSE and then calculate descending ranks divided by n-1 to obtain BTAXC.
<i>EARNVOL</i>	Country-level earnings volatility	The scaled descending rank of the standard deviation of return on assets for a specific country-year divided by n-1. Source: WorldScope (WC)
<i>PERCAPITA</i>	GDP per capita (current U.S.\$)	GDP per capita is the logarithm of gross domestic product divided by the midyear population* 10,000. Larger values correspond to higher economic development. Source: World Development Indicators 2013.
<i>FINDEV</i>	Financial development	Domestic credit provided by banking sector/GDP. Source: World Development Indicators 2013.
<i>TAXENF</i>	Country-level tax enforcement index	The natural logarithm of the country-level tax enforcement. Higher values indicate stronger tax enforcement. Source: IMD World Competitiveness.

Appendix A: Variable Definitions (CONTINUED)

<i>Variable</i>	<i>Variable</i>	<i>Variable</i>
<u><i>Other reform control variables</i></u>		
<i>AFTER_INSIDER</i>	Insider trading enforcement indicator	Indicator variable that is equal to one following the first year in which insider-trading laws were enforced in the country and zero otherwise. Source: Bhattacharya and Daouk (2002).
<i>AFTER_TAKEOVER</i> <i>R</i>	M&A law enactment indicator	An indicator variable that is equal to one for the post M&A law enactment period in the country and zero otherwise. Source: EU (2004), Lel and Miller (2015), and OECD (2010).
<u><i>Firm-level conditional variables</i></u>		
<i>MIMPACT</i>	Most impacted firms	An indicator variable equal to one for firms with less than 50 percent independent board members in the year prior to the reform involving board independence, and zero otherwise.
<i>HSPCOMP</i>	High speed of compliance	An indicator variable equal to one if a firm without majority independence in the pre-period adopts majority board independence in Year 1, the year in which the board reform becomes effective.
