How Does Corporate Governance Affect Tax Avoidance?

Evidence from China

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Abstract

Stronger corporate governance reduces diversion of corporate resources and increases the incentive to engage in tax avoidance. However, reducing diversion may have a negative effect on tax avoidance if diversion and tax avoidance are complementary as argued in prior studies. To investigate which of the two opposite effects prevails, we use an exogenous shock on corporate governance in China and find robust evidence that stronger governance increases the overall level of tax avoidance. The increase is greater when controlling shareholders own more shares and when diversion is less complementary to tax avoidance. In addition, the increase in tax avoidance is driven by legal tax shelters. Data suggest diversion is complementary mainly to tax evasion, and stronger governance does not increase tax evasion. These findings help reconcile/explain the mixed evidence on the relation between governance and tax avoidance documented in prior studies.

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1. Introduction

Better corporate governance reduces diversion of corporate profits for private benefits. Less diversion makes profits previously free from corporate income taxes taxable, increasing the incentive to avoid taxes. However, Desai and Dharmapala (2006) argue diversion is complementary to tax avoidance. The complementarity arises because, as Desai, Dyck, and Zingales (2007) succinctly put it, "Most transactions aimed at diverting corporate value toward controlling shareholders also reduce corporate tax liabilities. Similarly, many procedures aimed at enforcing a corporate tax liability make it more difficult for controlling shareholders to divert corporate value to their own advantage" (p. 592). The complementary relation implies reducing diversion will reduce tax avoidance. It is not obvious, therefore, which of the two effects dominates and whether the net effect of stronger governance on tax avoidance is positive or negative.

In this paper, we revisit how governance affects tax avoidance. Although tax avoidance usually refers to activities using legal means to lower tax liabilities, we use the term in the literal sense to include both legally permitted tax shelters and illegal tax evasion. Our theoretical framework is similar to that of Desai et al. (2007): Controlling shareholders decide how much corporate resources to divert for private benefits and how much taxes to avoid, weighing their personal benefits against personal costs associated with each decision. Stronger governance reduces diversion, which has two opposite effects on tax avoidance. On one hand, reducing diversion subjects more pre-diversion profits to corporate income tax because diversion is not taxed at the firm; hence, the incentive to reduce tax liabilities increases. When the controlling shareholder diverts less, she derives more benefits from cash flow rights. Thus, the incentive to avoid tax will increase more, the greater the controlling shareholder's cash flow rights. On the other hand, reducing diversion may decrease tax avoidance due to the complementary relation between diversion and tax avoidance. The net effect of stronger governance then depends on which effect dominates, the positive or the negative effect. If the effect of the complementarity is smaller than the effect through controlling shareholder's cash flow rights, stronger governance will increase the overall tax avoidance; otherwise, the tax avoidance will decrease.

As noted, our definition of tax avoidance includes both legal tax shelters and illegal tax evasion.

However, there are important differences. Legally permitted tax shelters are less costly to plan and execute than tax evasion, which is subject to the risk of litigation, penalties, and unfavorable publicity (Hanlon and Slemrod, 2009). In addition, diversion often requires transactions that are illegal (stealing and tunneling) or at the boundaries of the law (occasional use of corporate resources for personal convenience); thus, diversion is likely to be complementary mainly to tax evasion. Distinguishing legal and illegal tax avoidance on these dimensions leads to the prediction that stronger governance increases tax avoidance using legal, low-risk tax shelters, but the effect on tax evasion depends on the level of controlling shareholders' cash flow rights and the complementarity between diversion and tax evasion.

To test these predictions, we employ a difference-in-differences (DID) approach using an exogenous shock on corporate governance. We compare a firm's tax avoidance after the shock with the same firm's tax avoidance prior to the shock, with the cross-sectional variation in the degree to which a firm is treated by the shock as the second difference. The external shock is the Split-Share Structure Reform (the Reform hereafter) undertaken by the Chinese government in 2005. The Reform made it mandatory for all publicly-listed firms to convert non-tradable shares (NTS) to publicly tradable shares (TS). At the time of the Reform, roughly two-thirds of all Chinese A-shares were NTS. When they became freely tradable following the Reform, the liquidity of publicly-listed shares increased dramatically, making stock prices more informative and enhancing the public's ability to monitor firm performance. Importantly, prior to the Reform, most NTS (71% as of the end of 2004) were held by controlling shareholders, which made the firms immune from any threats of takeovers from the market for corporate control. By making NTS tradable, the Reform exposed the controlling shareholders to the external pressure for good governance that arises with takeover threats. In addition, the Reform improved controlling shareholders' ability to monetize their NTS, which may have reduced their incentive to divert corporate value for private benefits. When controlling shareholders cannot sell shares, their ability to realize gains is limited, which may induce them to opt for alternative means to realize gains such as stealing and tunneling. Section 3.1 provides further discussion and a summary of evidence of how the Reform strengthened governance of publicly-listed firms in China.

Our sample includes all nonfinancial A-share firms traded on the Shanghai or Shenzhen Stock Exchange at any point during 2002 (three years before the Reform) through 2008 (three years after the

Reform).[1] We employ four different measures of tax avoidance that have been used in the literature: the effective tax rate, the book-tax difference, and each adjusted for differences in size and industry. Regardless of the measure used, we find the Reform significantly increased the overall level of tax avoidance. According to our model, this finding suggests that the positive effect of strengthening governance on tax avoidance dominates the negative effect.

To test this inference, we relate the effects of the Reform to the controlling shareholder's cash flow rights and to the complementarity between diversion and tax avoidance. Consistent with the predictions of the model, we find the greater the controlling shareholder ownership, the greater the positive impact of the Reform on tax avoidance. We also find the more complementary diversion is to tax avoidance, the smaller the positive impact of the Reform on tax avoidance. Diversion is proxied by loans to controlling shareholders and the number of parties involved in related party transactions. (See Section 4.3.) These results illustrate the presence of both the positive and negative effects of stronger governance on tax avoidance.

Our model also predicts the Reform will increase legal tax avoidance more than tax evasion. We use two approaches to test this prediction. First, we assume higher levels of tax avoidance are more likely to contain tax evasion and employ the quantile regressions approach used in Armstrong, Blouin, Jagolinzer, and Larcker (2015). Firms may be able to shelter the first ten percent of their incomes to reduce tax payments with relatively low risk of violating law. Sheltering the next ten percent may cross some legal boundaries, and sheltering most of their incomes may require some tax evasion.

We find the impact of the Reform is concentrated at a lower level of tax avoidance. For all four measures of tax avoidance, the positive impact is the largest at the 10^{th} decile and decreases monotonically, becoming the smallest at the 90^{th} percentile. The impacts are significant at low levels of tax avoidance, but become insignificant at high levels. Furthermore, our proxies for diversion are more positively and more significantly related to tax avoidance at higher deciles, suggesting diversion is more complementary to higher levels of tax avoidance that are more likely to contain tax evasion. Taken

[1] Stock markets in China offer two types of stocks: A and B shares. We restrict our sample to the A-share market because B-shares are tradable. The total market capitalization of the A-share market is about 122 times that of the B-share market as of the end of 2013.

together, these results support the prediction that strengthening governance will increase legal tax avoidance more than illegal tax evasion.

To provide a more direct estimate of how the Reform affects tax evasion, we rely on a sample of tax frauds. We are mindful that we observe only detected tax fraud, not the population of tax frauds. To mitigate the partial observability problem, we follow Wang, Winton, and Yu (2010) and Khanna, Kim, and Lu (2015) and rely on the bivariate probit model. Our estimates show the Reform had insignificant impact on the likelihood of committing tax fraud, corroborating the inference drawn from the quantile regression results that strengthening governance has no significant effect on tax evasion.

The impacts that the Reform had on tax avoidance may vary across firms with different characteristics. For example, financially constrained firms have greater needs for cash and hence greater incentives to engage in tax avoidance (Edwards, Schwab, and Shevlin, 2016; Richardson, Lanis, and Taylor, 2015). Using two alternative indicators for financially constrained firms, we find the Reform led to more tax avoidance by financially constrained firms. We also compare state owned enterprises (SOEs) to non-SOEs. They differ in multiple dimensions in how the controlling shareholder benefits from tax avoidance, allowing for multiple channels through which the Reform could affect tax avoidance. The net effects of the Reform on SOEs' tax avoidance are not statistically different from non-SOEs.[2]

We check the robustness of our main findings using an exhaustive set of tests: (1) re-estimation using a propensity-score matched sample; (2) the 2SLS estimation with an instrument to address a potential endogeneity issue in the treatment variable; (3) two placebo tests on the assumption of parallel time trends; (4) permutation tests for whether our results are driven by some random factors; (5) two alternative specifications regarding control variables; (6) several tests to check the influence of possible confounding effects; and (7) alternative definitions of dependent and independent variables. Our

[2] Li, Liu, and Ni (2017) make a simple comparison of tax avoidance before and after the conversion of NTS to TS and conclude the effective tax rate did not change for the average firm or for the average non-SOE, but did decline for the average SOE. This conclusion is suspect for two reasons. First, their specification does not allow for different levels of treatment, i.e., it assumes all firms are equally affected by the conversion, which is clearly false. Table 2 shows substantial variation in the treatment effect. Second, the comparison is anchored at the completion of the conversion, the timing of which is not specified in the Reform and therefore endogenous. A correct comparison should be anchored at a time prior to the Reform. In Section 6.2, we improve the identification strategy and investigate whether and how the Reform differentially affected tax avoidance of SOEs and non-SOEs.

baseline results are robust to all these tests.

The main contribution of this paper is integrating separate streams of research that have led to the controversy over how corporate governance affects tax avoidance. On the theoretical front, we allow simultaneous interplay of the two main channels through which governance affects tax avoidance—the incentive alignment as in Armstrong, Blouin, and Larcker (2012) and the complementary relation between diversion and tax avoidance as in Desai and Dharmapala (2006) and Desai et al. (2007). By so doing, we illustrate that the effect of stronger governance on tax avoidance is not necessarily one-directional; instead, whether the effect is positive or negative depends on the relative strength of the incentive alignment vis-à-vis the complementarity between diversion and tax avoidance.

On the empirical front, we identify the effects of governance by using an exogenous shock on the strength of governance and provide new insights into the ways in which governance affects tax avoidance. Prior evidence on the relation between governance, managerial incentives, and tax avoidance is mixed. Desai and Dharmapala (2006) find a negative relation between incentive compensation and tax avoidance among firms with relatively weak governance structure; Seidman and Stomberg (2012) also find a negative relation between equity compensation and tax avoidance. In contrast, Rego and Wilson (2012) and Armstrong et al. (2012) find a positive relation between equity incentives and tax avoidance. On the relation between governance and tax avoidance, Minnick and Noga (2010) find weak relations between several measures of governance and a number of proxies for tax avoidance, while Armstrong et al. (2015) find the strength of governance, as proxied by board independence and financial expertise, is positively related to low-levels of tax avoidance and negatively related to high-levels of tax avoidance.[3]

[3] Numerous studies provide insights into how other aspects of corporate governance or firm characteristics are related to tax avoidance: Chen, Chen, Cheng, and Shevlin (2010) find family firms are less aggressive in tax avoidance than non-family firms, suggesting that family owners are more concerned with potential penalties imposed by the tax authorities, the potential damage to the reputation of the family, and other costs arising from agency conflicts. Kim, Li, and Zhang (2011) document a positive association between corporate tax avoidance and stock price crash risk and suggest that complicated tax shelters enhance managers' ability to conceal negative firm specific information. Badertscher, Katz, and Rego (2013) find that firms with greater concentrations of ownership and control are less income tax avoidant. Hasan, Hoi, Wu, and Zhang (2014) find corporate tax avoidance is associated with a higher cost of bank loans and more stringent covenants. Beck, Lin, and Ma (2014) find that firms in countries with better credit information-sharing systems and higher branch penetration evade taxes to a lesser degree. Gallemore and Labro (2015) find that the ability to avoid taxes is affected by the quality of the internal information environment, with high internal information quality leading to lower effective tax rates. DeBacker, Heim, and Tran (2015) find corporations with owners from countries with higher corruption norms

These studies provide important, controversial empirical regularities that provide impetus for further research. Their estimated relations, however, are between endogenous variables without exogenous variation.[4] We add to their contributions by identifying the causal effects of governance on tax avoidance by employing an external shock on corporate governance. The external shock strengthened governance by exposing controlling shareholders to takeover threats from the market for corporate control and to higher quality monitoring by investors, improving controlling shareholders' incentives to increase shareholder value. With this natural experiment, we identify a positive causal effect of governance on the overall tax avoidance. We also establish the positive effects are confined mostly to low levels of tax avoidance. At high levels of tax avoidance, the effect is neutral, suggesting that the positive and negative effects cancel each other.

The rest of the paper is organized as follows. Section 2 provides a simple model of how governance affects tax avoidance. Section 3 outlines our empirical strategy and sample construction. Section 4 presents estimation results on the overall level of tax avoidance; Section 5 distinguishes low-risk legal tax shelters from tax evasion; Section 6 investigates the heterogeneous effects across financial constraints and state ownership. Section 7 conducts a battery of robustness tests. Section 8 concludes.

2. Theoretical Considerations

In this section, we provide a simple model to analyze how governance affects tax avoidance. As in Desai and Dharmapala (2006) and Desai et al. (2007), we allow for a complementary relation between diversion and tax avoidance. We take the corporate tax system as given and examine how the strength of corporate governance affects tax avoidance. Stronger governance reduces diversion, which has two opposite effects on tax avoidance: a positive effect by subjecting more pre-diversion profits to corporate income tax and increasing the incentive to reduce tax liabilities, and a negative effect by

evade more taxes. Cen, Maydew, Zhang, and Zuo (2017) find that firms in closer customer-client relationships are better able to identify and implement tax avoidance strategies via supply chains. Chernykh and Mityakov (2017) document that the involvement of banks/companies in offshore activities is positively related to tax evasion and that managers of banks engaging in more offshore activities are more likely to face criminal investigation for fraudulent behaviors. Chen, Huang, Li, and Shevlin (2018) find that higher quasi-indexer ownership leads to greater tax savings.

[4] The lone exception is Bird and Karolyi (2017), retracted by the publisher because "the authors were unable to provide the original data and code requested by the publisher that reproduce the findings, as shown in the article's tables, supporting this assertion." (*The Accounting Review* In-Press)

increasing the marginal cost of tax avoidance due to the complementary relation between diversion and tax avoidance. Our initial focus is on the overall corporate tax avoidance. Then, we distinguish legal tax avoidance and illegal tax evasion.

2.1 Overall Tax Avoidance

We assume the controlling shareholder decides how much corporate profit to divert for private benefits and how much tax to avoid. In making these decisions s/he trades off personal benefits against personal costs. Consider a firm that has one unit of profit. The controlling shareholder has α fraction of cashflow rights and diverts d fraction of the profit. Diversion occurs first and the remaining profit is reported to the tax department (Desai et al., 2007). The reported income, $1-d$, is taxed at a rate t. Tax avoidance reduces the effective tax rate to $t-x$. The controlling shareholder receives $\alpha(1-d)(1-t+x)+d$ through the cashflow rights and diversion, and incurs personal costs $C(d,x,G)$ for engaging in diversion and tax avoidance, where G denotes the strength of governance. The controlling shareholder's objective function is

$$\underset{\{d,x\}}{\text{Max}}\ \alpha(1-d)(1-t+x)+d-C(d,x,G).$$

Critical in solving this maximization problem is how the cost is related to d, x, and G. Following Desai and Dharmapala (2006), we assume $C_d>0$, $C_x>0$, $C_{dd}>0$, and $C_{xx}>0$: the marginal costs of both diversion and tax avoidance are positive and increase faster at higher levels. The functional form for the controlling shareholder's personal costs of diversion is in line with prior studies on diversion (e.g., Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 2002; Shleifer and Wolfenzon, 2002; Doidge, Karolyi, and Stulz, 2004; Durnev and Kim, 2005). The rationale is that hiding diversion becomes increasingly complex and difficult as the level of diversion increases.

A similar case can be made for tax avoidance. The controlling shareholder's personal costs of avoiding taxes through legal means are α of the firm's after-tax costs incurred to set up and execute the tax shelter plans. These costs are likely to increase faster at a higher level because tax planning becomes more complex, requiring higher incremental costs. Beyond a certain threshold, further tax avoidance may reach the boundaries of the law, exposing the firm to the risk of evading taxes. Tax evasion

increases the controlling shareholder's personal costs faster at a higher level. Setting up and executing unlawful tax evasion activities requires cooperation and coordination with others, as well as acquiescence from others who are not actively involved but aware of the illegality. Obtaining the cooperation, coordination, and acquiescence is likely to require side payments in the form of cash and/or future favors. Also important, when tax evasion is detected, the controlling shareholder suffers more than the minority shareholder. For example, if tax authorities decide to pursue criminal prosecution and someone has to go to jail, that person is likely to be the controlling shareholder or his proxy rather than a minority shareholder.

For the effects of governance on the controlling shareholder's personal costs we assume (1) $C_{dG} > 0$, stronger governance increases marginal costs of diversion; (2) $C_{dx} < 0$, more diversion (tax avoidance) reduces the marginal cost of tax avoidance (diversion)—i.e., diversion and tax avoidance are complementary; and (3) $C_{xG} = 0$, the strength of governance does not directly affect marginal costs of tax avoidance. The last assumption (3) curbs *a priori* bias on how governance affects tax avoidance and allows governance to indirectly affect tax avoidance through its impact on diversion.

Solving the maximization problem, we obtain the following. See Appendix 1 for the derivations.

$$\frac{\partial d^*}{\partial G} = \frac{C_{dG}C_{xx}}{(\alpha+C_{dx})^2-C_{dd}C_{xx}} < 0. \quad (1)$$

$$\frac{\partial x^*}{\partial G} = \frac{-(\alpha+C_{dx})C_{dG}}{(\alpha+C_{dx})^2-C_{dd}C_{xx}}. \quad (2)$$

Eq. (1) states the obvious: strengthening governance decreases the controlling shareholder's optimal level of diversion by increasing the cost of diversion. In Eq. (2), $\frac{-C_{dG}}{(\alpha+C_{dx})^2-C_{dd}C_{xx}}$ is strictly positive (see Appendix 1). Therefore, $\frac{\partial x^*}{\partial G} > 0$ if $\alpha > -C_{dx}$ and $\frac{\partial x^*}{\partial G} < 0$ if $\alpha < -C_{dx}$.

Prediction 1. Stronger governance increases (decreases) the overall tax avoidance if the controlling shareholder's cash flow right is greater (smaller) than the complementarity between diversion and tax avoidance.

***Proof*:** Shown above.

The intuition underlying this prediction is as follows: Stronger governance decreases the optimal

diversion, with two opposite effects. On one hand, because diversion is not taxed at the firm, reducing diversion makes more pre-diversion profits subject to corporate income tax and increases the incentive to avoid tax. When the controlling shareholder diverts less, she derives more benefits from cash flow rights. Thus, the incentive to avoid tax increases more, the greater the controlling shareholder's cash flow rights. On the other hand, decreasing diversion increases the marginal cost of tax avoidance because diversion is complementary to tax avoidance; hence, lower diversion has a negative effect on tax avoidance. Which effect dominates depends on the relative magnitude of the controlling shareholder's cash flow right vs. the complementarity between diversion and tax avoidance: If $\alpha > -C_{dx}$ (the complementary relation between diversion and tax avoidance means $C_{dx} < 0$), stronger governance induces the controlling shareholder to reduce more taxes for all shareholders. If $\alpha < -C_{dx}$, the positive effect is dominated by the negative effect through the complementary relation between diversion and tax avoidance.

2.2. Legal Tax Shelters vs. Tax Evasion

In the baseline model, tax avoidance includes both tax planning for legal shelters and illegal tax evasion, which have different legal implications and impose different types of costs on the controlling shareholder. Diversion also complements tax evasion more than it complements legal tax shelters. Planning and executing legal tax shelters are carried out by tax accountants and lawyers, and their tasks are within the boundaries of law. Illegal tax evasion requires tasks extending beyond the boundaries of the law, such as transferring the firm's resources to related parties with lower tax rates or illegally hiding taxable income, which also help diversion for private benefits. Diversion often requires illegal transactions, such as stealing and tunneling, or activities at the boundaries of the law. Thus, if we assume for simplicity that diversion is complementary only to tax evasion, we obtain

Prediction 2. Stronger governance increases legal tax avoidance more than tax evasion. The effect on tax evasion is positive (negative) if the controlling shareholder's cash flow right is greater (smaller) than the complementarity between diversion and tax avoidance.

Proof: See Appendix 1.

The key point of these theoretical exercises is that how corporate governance affects the overall tax avoidance and illegal tax evasion depends on the relative strength of complementarity between

diversion and tax avoidance vis-à-vis the alignment of incentives to increase shareholder value. The relative strength of the two determinants is clearly an empirical issue, as are the questions of whether stronger governance increases or decreases the overall tax avoidance, and whether and how governance differentially affects legal tax avoidance and tax evasion. In the next section we describe identification strategies and sample construction to investigate these empirical issues.

3. Empirical Strategy and Data

Our empirical investigation relies on Chinese data because of the availability of an exogenous regulatory shock specifically aimed at strengthening corporate governance, the Split-Share Structure Reform described below. We employ a DID approach using the Reform. We compare a firm's corporate tax avoidance after the Reform with its tax avoidance prior to the Reform. By so doing, we account for any unobserved time invariant determinants of corporate tax avoidance. The second difference is the cross-sectional variation in the degree to which a firm is affected by the Reform.

3.1 The Split-Share Structure Reform

Prior to 2005, Chinese A-shares had a split-share structure consisting of tradable and non-tradable shares, with identical cash flow and voting rights. In this two-tier share structure, tradable shares (TS) were issued to investors, typically minority shareholders, through equity offerings. Non-tradable shares (NTS) were issued to the state in the case of state owned enterprises (SOEs) or to the founders in the case of non-SOEs. Initially, most NTS holders were the central or local governments and their affiliates. During China's transition to the market-oriented economy the prevailing communist ideology was that state control of enterprises should be maintained, and a way to achieve that goal was to make state-owned shares non-tradable.[5] When private firms went public, they also followed the practice of the two-tier share structure by making the shares held by founders' families non-tradable. This implicit rule appears to be rather binding: only five publicly traded firms in our sample did not have any non-tradable shares as of the end of 2004.[6]

[5] NTS were occasionally allowed to be traded through negotiations between designated parties. However, the negotiations were subject to the approval of the relevant regulatory authorities, and state-owned NTS could only be sold to other SOEs or to the government.

[6] The five companies without NTS were Dazhou Xingye Holding Co., Founder Technology Group Co., Shanghai Feilo Acoustics Co., Shanghai Shenhua Holdings Co., and Shanghai U9 Game Co.

In 2005, the government undertook a reform to dismantle the two-tier share structure. On April 29, 2005, the State Council issued a document titled, "*The Notice of the China Securities Regulatory Commission on Piloting the Share-Trading Reform of Publicly Traded Companies*", which marked the beginning of the Split-Share Structure Reform. The China Securities Regulatory Commission (CSRC) formalized the procedure of the Reform on September 5, 2005, and made the conversion of NTS to TS mandatory.[7] The actual timing of the conversion varied across firms, as NTS holders were required to negotiate a compensation plan with their TS holders, obtain the approval of the state-owned assets authorities, and implement the plan before NTS could be traded on the stock market. The majority of the firms complied fairly quickly with the Reform. By the end of 2006 (2008), 84.4% (96.21%) of publicly traded firms had completed the conversion. Because of the endogenous timing of the compliance with the Reform, we define treatment based on the share structure in place at the end of 2004.

The Reform has been considered a milestone of the new era of Chinese financial market. Prior to the Reform, about two-thirds of publicly-listed firms' shares were NTS, seriously limiting the liquidity of TS and the ability of stock price to reflect company fundamentals. The two-tier share structure had led to a number of serious corporate governance problems (Liao, Liu, and Wang, 2014). Soon after the State Council's announcement of the Reform, the chairman of the CSRC stated that the Reform would help mitigate inside trading problems exacerbated by the split-share structure.[8] With only a small fraction of shares being traded, it was relatively easy to manipulate stock price and profit from insider trading.

Perhaps the most important impact of the Reform on corporate governance is that it made firms vulnerable to threats from the market for corporate control. Prior to the Reform (as of the end of December 2004), virtually all (98.75%) publicly-listed firms had at least 30% of their shares classified as non-tradable, and NTS represented the majority of shares outstanding for 84% of public firms. This ownership structure protected controlling shareholders from takeover threats. By making NTS tradable,

[7] Two pilot programs were conducted prior to the formalization of the Reform. Four companies were selected for the first round of the Reform experiment on May 9, 2005, and 42 more were involved in the second round, which kicked off on June 19, 2005.
[8] See http://www.china-embassy.org/eng/xw/t201442.htm.

the Reform exposed the controlling shareholders to the external pressure for good governance that arises with takeover threats.

In addition, with about two-thirds of outstanding shares converted from non-tradable to tradable, the liquidity of listed stocks increased dramatically. Consequently, the stock price became more informative and more sensitive to changes in firms' fundamentals, bringing greater pressure on management to improve performance.

Finally, the Reform reduced controlling shareholders' incentive to divert corporate resources for private benefits. When controlling shareholders cannot sell shares, their ability to monetize their shares is limited, which may induce more reliance on alternative means such as stealing or diverting corporate resources by tunneling. By enabling controlling shareholders to sell previously non-tradable shares, the Reform may have enhanced the incentive to increase shareholder value.

Prior studies relate the Reform to issues closely associated with corporate governance and provide supporting evidence for our argument that the Reform strengthened governance of publicly listed firms. Lin (2009) finds a decline in related party transactions after the Reform. Liao et al. (2014) show non-SOEs reduced related party transactions and loans to controlling shareholders after the Reform. Chen, Chen, Schipper, Xu, and Xue (2012) find the Reform significantly decreased the average cash holdings while significantly increasing the market valuation of corporate cash holdings. Li, Wang, Cheung, and Jiang (2011) provide evidence that the Reform yielded efficiency gains in risk sharing.

In addition, Beltratti, Bortolotti, and Caccavaio (2012) report the stock market rose upon the announcement of the Reform, particularly stocks issued by companies with low transparency, weak governance, and less liquid stocks. In Appendix 2, we relate stock price reactions to the degree of treatments by the Reform. Using a standard event study centered on the date the State Council issued the notice of the Reform (April 29, 2005), we find stock prices reacted more favorably to the announcement, the greater the fraction of NTS at the end of 2004; that is, firms more affected by the Reform received more positive reaction from investors.[9] Since improving governance should help

[9] The stock market reaction as a whole was positive to the announcement of the Reform. The cumulative abnormal return was 2%, 1.4%, and 0.8% over the window of -10 to 10, -5 to 5, and -1 to 1 days relative to the day of announcement, respectively.

enhance shareholder value, this finding further buttresses evidence provided in prior studies that the Reform strengthened governance of Chinese firms.

3.2 The Baseline Specification

Our baseline DID model is

$$\text{Tax\_Avoidance}_{it} = \beta_0 + \beta_1 \text{Post}_t \times \text{NonTradable2004}_i + \beta_2 X_{it} + \text{Firm}_i + \text{Year}_t + \varepsilon_{it}. \quad (3)$$

Tax Avoidance is measured in four ways, described below. The variable of main interest is the interaction of *Post* with *NonTradable2004. Post* is an indicator equal to zero for 2002, 2003, or 2004, the pre-reform period, and one for 2006, 2007, or 2008, the post-reform period. We omit observations in 2005 because it is the transition period. *NonTradable2004* is the ratio of NTS to the total number of shares outstanding as of the end of 2004. This is the treatment variable; the higher *NonTradable2004*, the greater is the expected impact of the Reform. Because the Reform meant to eliminate NTS, firms with a higher ratio of NTS prior to the Reform were affected more by the Reform. Although the government implemented the full scale Reform in September, 2005, we choose the end of 2004 to measure variation in treatment to minimize concerns about the endogenous timing of the compliance with the Reform. *X* is a vector of time-varying control variables. *Firm* and *Year* are firm- and year fixed effects. Firm fixed effects control for time invariant omitted variables. Because of firm- and year fixed effects, we do not include standalone *NonTradable2004* or *Post.* To address the concerns of autocorrelation among observations associated with a given firm, we cluster standard errors at the firm level.

3.3. Tax Avoidance Variables

We use four tax avoidance variables offered in prior studies: the effective tax rate, the book-tax difference, and each adjusted for differences in size and industry. We follow Rego (2003); Dyreng, Hanlon, and Maydew (2010); and Robinson, Sikes, and Weaver (2010) and define the effective tax rate as a firm's total tax expense divided by the pre-tax book income. The underlying presumption is that, to the extent that tax avoidance is effective in reducing the tax burden, the effective tax rate (ETR) will be lower. For the ease of interpretation, we use one minus effective tax rate because a higher value of *1-ETR* implies more tax avoidance. We also follow Dyreng et al. (2010), Brown and Drake (2013), and

Li et al. (2017) and exclude firm-year observations with negative pre-tax book income or total tax expense greater than pre-tax book income.

To measure the book-tax difference (BTD), we follow Mills (1998), Plesko (2003), Desai and Dharmapala (2006), and Wilson (2009) and define it as the difference between the book income reported to the shareholders and the income reported to the tax authorities. Since we do not have access to individual corporate tax filings, we follow prior studies (e.g., Manzon and Plesko, 2002) and estimate the tax income by dividing the total tax expense by the nominal statutory income tax rate applicable to the firm. *BTD* is the book-tax difference scaled by the firm's total assets. The larger the *BTD*, the greater is tax avoidance.

To account for possible differences in tax avoidance across industry and firm size, we follow Balakrishnan, Blouin, and Guay (2012) and Armstrong et al. (2015) and construct industry- and size-adjusted tax avoidance variables. Specifically, *1-ETR_Adjusted* or *BTD_Adjusted* is defined as the difference between a firm's three-year average *1-ETR* or *BTD* and the three-year average *1-ETR* or *BTD* of the other firms in the same quantile in terms of total assets in the same industry as defined by the CSRC. This adjustment helps to capture the incremental tax avoidance relative to peer firms with similar size in the same industry.

3.4 Control Variables

To control for time-varying firm characteristics likely to be related to tax avoidance, we follow prior studies (e.g., Mills, 1998; Plesko, 2003; Desai and Dharmapala, 2006; Wilson, 2009; Rego, 2003; Dyreng et al., 2010; Robinson et al., 2010; Armstrong et al., 2015). We control for *TaxRate*, statutory corporate income tax rates. Until the last year of our sample period, firms with taxable income less than 30,000RMB were subject to an 18% corporate income tax rate, and all other domestic firms were subject to a 33% tax rate. Most foreign firms were subjected to a lower corporate income tax rate of 15%, and often received a number of favorable tax credits, exemptions, and reductions.[10] These tax rates were in effect until 2007. In 2008, the statutory corporate income tax rate became 25% for all domestic and

[10] The tax law defines foreign firms as those of which foreign shareholders own 25% or more equity stake. Our sample includes only a handful of foreign firms. Our results are robust to excluding foreign firms from the sample.

foreign firms.[11] Other control variables include *ControlOwnership*, fraction of shares held by the controlling shareholder; *Size,* log of total assets; *Lev,* total debt divided by total assets; *ROA,* net income divided by total assets; *OCF,* net operating cash flow divided by total assets; *Inventory,* total inventory divided by total assets; *PPE,* property, plant, and equipment divided by total assets; *GovernmentOwnership,* fraction of state-owned shares; *FractionOutsideDirectors,* fraction of outside directors. All accounting variables are winsorized at the 1st and 99th percentiles.

3.5 Sample Construction and Summary Statistics

Our sample is based on all non-financial A-share firms traded on the Shanghai or Shenzhen Stock Exchange at any point during 2002 (three years before the Reform) through 2008 (three years after the Reform). The data sources are the WIND and CSMAR databases. Inclusion in the sample require that firm-year observations have no missing variables and show an effective tax rate greater than 0 and less than 1. We also require that firms have data available for at least one year each in the pre- and post-reform periods. Table 1 summarizes the sample selection process and tabulates sample distribution by year. The final sample includes 5,375 firm-year observations for 1,150 unique firms.

Table 2 presents descriptive statistics for key variables. Variable definitions are provided in Appendix 3. The mean *1-ETR* is 0.774, suggesting that the average effective tax rate during our sample period is about 22.6%, which is lower than the mean nominal statutory income tax rate of 23.4% reported by CSMAR. The mean of *BTD* is 0.004, suggesting that the average book income reported to shareholders exceeds the average income reported for tax purposes by 14.4 million RMB.[12] All monetary variables are normalized to 2001 RMB.

Our sample firms exhibit a fair amount of variation in tax avoidance. To illustrate, Figure 1 tabulates ETRs adjusted by the annual industry mean for our sample firms and for a comparable sample of US listed firms over 2002 through 2008.[13]

[11] The corporate income tax rate applicable to foreign firms had been scheduled to increase progressively over the five-year period starting in 2008 until the 25% rate was reached.

[12] 14.4 Million RMB = 0.004 x 3,603,688,744 , where 3,603,688,744 RMB is the mean of total assets.

[13] The data source to calculate ETRs for US listed firms is the annual fundamental database in Compustat. To make US firms comparable to our sample firms, we include only non-financial US firms listed in NYSE, AMEX, and NASDAQ during 2002 to 2008 and firm-year observations showing an effective tax rate greater than 0 and less than 1. ETR for US firms is defined as the total tax expense (*TXT*) divided by the pre-tax book income (*PI*). For the US firms, industry classification is based on the four-digit SIC Code; for the Chinese firms, the 2001 industry classification by the CSRC. The mean ETR of the US listed firms is 32%, higher than that of our sample

The average fraction of NTS in 2004 (60.4%) is lower than that at the time of initial public offering (IPO) (70.5%), suggesting a decline over time in NTS prior to the Reform. This decline is due to the issuance of TS subsequent to IPOs or selling NTS to other entities through negotiation.[14] Our results are robust to the 2SLS estimation with an IV constructed using the fraction of non-tradable shares at the time of IPO.

Observations are evenly distributed between the pre- and post-Reform periods; 48.1% were in the post-reform years. The average firm in our sample has a controlling ownership of 40%, a leverage ratio of 48.4%, an ROA of 4.5%, and an operating cash flow ratio of 5.8%. One-third of the directors are classified as outside directors and the fraction of state-owned shares is about 30%. The average inventory ratio is about 16.5% and the average PPE ratio is about 29.8%.

4. The Overall Tax Avoidance

4.1 Baseline Results

Our investigation begins with estimation of the average effect of the Reform on the overall tax avoidance. Table 3 provides the results for the full panel of observations. The estimated coefficients of *Post×NonTradable2004* are positive and statistically significant for all four measures of tax avoidance, indicating stronger governance increases overall tax avoidance. The coefficient in Column (1) indicates the Reform lowered the effective tax rate of a firm with a one-standard deviation higher *NonTradable2004* by 1.24 percentage points (0.119 × 0.104).

4.2 Controlling Shareholders' Cash Flow Rights

According to our model, the increase in tax avoidance will be greater, the larger the controlling cash flow rights. To test this prediction, we divide the sample into two groups by the median of the fraction of shares held by controlling shareholders at the end of 2004, *ControlShare2004*. Then we estimate the baseline specification for the high- and low controlling shareholder ownership subsamples. For brevity, Table 4 reports results only for the first measure of tax avoidance, *1-ETR*. Columns (1) and (2) show the positive impact is driven by firms with high controlling shareholder ownership. As an

firms due to higher nominal statutory corporate income tax rates in the U.S.

[14] As noted earlier, negotiations were subject to the approval of the relevant regulatory authorities, and state-owned NTS could only be sold to other SOEs or to the government.

alternative specification, we include the triple interaction between *ControlShare2004* and *Post×NonTradable2004* (together with relevant double interactions).[15] Column (3) shows that the coefficient of the triple interaction term is positive and significant, supporting the prediction that stronger governance increases tax avoidance more when the controlling share ownership is greater.

4.3 Complementary Relation between Diversion and Tax Avoidance

We assume diversion is complementary to tax avoidance as in Desai and Dharmapala (2006) and Desai et al. (2007). In this section, we first check the validity of this assumption by estimating the relation between diversion and tax avoidance. Then we test the prediction that the complementarity reduces the positive impact of the Reform on tax avoidance.

We construct two proxies for diversion using related party transactions (RPTs). When RPTs are used for diversion, they may also reduce corporate taxes. Cheung, Rau, and Stouraitis (2006) point out that not all RPTs are used for diversion: some RPTs can benefit minority shareholders and can be strategic transactions unrelated to tunneling. To capture RPTs that are more likely to be used for diversion, we use (1) loans to controlling shareholders as in Liao et al. (2014), which are often made interest-free or at a very low rate. We define *LendingtoControl* as the total amount of loans to controlling shareholders divided by total assets at the end of the year. (2) The log of the number of related parties involved in the firm's RPTs, *NumRelatedParty.* This variable relies on the fact that, as in any money laundering, having more external parties involved in transactions helps hide the diversion. The data source for RPTs is CSMAR.

Table 5, Panel A reports OLS estimates of the relation between tax avoidance and the two proxies for diversion with firm- and year fixed effects. For brevity, we report results only for the first measure of tax avoidance, *1-ETR*. The explanatory variable is *LendingtoControl* or *NumRelatedParty*. Both proxies of diversion are positively related to tax avoidance, consistent with the assumption that diversion is complementary to tax avoidance; however, the relations are significant only at the ten percent level.

[15] The correlation between *NonTradable2004* and *ControlShare2004 is* 0.421.

The estimated relations reflect average correlations, which might vary across industries. We repeat the OLS estimation between *1-ETR* and each proxy for each industry over a pre-Reform period of 2002-2004. We then divide the sample into two industry groups by the median of the coefficients of all industries to form high (above the median) and low (below the median) complementarity subsamples. Table 5, Panel B reports re-estimation result for each subsample. The coefficient of *Post×NonTradable2004* is positive and statistically significant for the low complementarity subsample (Columns (1) and (4)), and is insignificant for the high complementarity subsample (Columns (2) and (5)). The positive impact of the Reform on tax avoidance is driven by industries with low complementary relations between diversion and tax avoidance. As an alternative specification, we interact the estimated complementary relation, *Coef_DiverTax,* with *Post×NonTradable2004* (together with the relevant double interactions). Columns (3) and (6) in panel B show a negative and significant coefficient for the triple interaction term. These results support the prediction that the negative impact due to the complementary relation offsets the positive impact of stronger governance on tax avoidance.

5. Legal Tax Shelters vs. Tax Evasion

The estimation results on the overall tax avoidance mask differential impacts that strengthening governance has on legal tax shelters versus tax evasion. Although they all reduce taxes, legal tax shelters and tax evasion incur different operational costs and expected penalties. Tax shelters permitted by law incur lower costs because they are more straightforward and easier to implement than tax evasion. Legal tax shelters do not pose the risk of prosecution for criminal or financial misconduct, whereas tax evasion does. In addition, tax evasion is more complementary to diversion of corporate profits. For these reasons Prediction 2 states: Stronger governance increases legal tax avoidance more than tax evasion. The effect on tax evasion is positive (negative) if the controlling shareholder's cash flow right is greater (smaller) than the complementarity between diversion and tax avoidance.

Testing these predictions requires data on tax evasion; however, we observe only detected tax fraud, not the population of tax evasion. To circumvent this data problem, we employ two strategies. First, we use the level of tax avoidance to proxy for the likelihood of containing tax evasion and estimate the impacts of the Reform at different levels of tax avoidance. Second, we use detected tax fraud and

estimate the impacts of the Reform on the likelihood of committing tax fraud using the bivariate probit model.

5.1 Low vs. High Levels of Tax Avoidance

To estimate the effects of the Reform at different levels of tax avoidance, we follow Armstrong et al. (2015) and employ the quantile regressions. Quantile regressions, introduced by Koenker and Bassett (1978), represent an extension of the OLS model used in Table 3. Unlike the traditional OLS methods, which detect only a shift in central location, quantile regressions describe the relation between the independent variables and any specified quantile of the conditional distribution of the dependent variable. As a result, we can infer whether the relation between the Reform and tax avoidance varies across the tax avoidance distribution. We assume those in higher deciles of corporate tax avoidance contain more tax evasion.

Table 6 summarizes the quantile regression results for the variable of main interest, *Post×NonTradable2004*. The dependent variable in Panels A through D is *1-ETR, BTD, 1-ETR_Adjusted*, and *BTD_Adjusted*, respectively. Each panel reports nine distinct quantile regression estimates for the 10^{th} through the 90^{th} percentile. The point estimates can be interpreted as the impact of a one-unit change in the variable of interest on corporate tax avoidance at different percentiles, holding the control variables fixed.

Regardless of how we measure tax avoidance, the impact of the Reform is considerably larger at a lower decile. For all four measures of tax avoidance, the coefficient of *Post×NonTradable2004* is the largest at the 10^{th} decile and decreases monotonically, becoming the smallest at the 90^{th} percentile. The coefficients are significant at low levels of tax avoidance, and become insignificant at high levels. These results are consistent with the prediction that stronger governance has a more positive effect on low-risk legal tax shelters than on high-risk tax evasion activities.

According to our model, the differential impacts on legal tax shelters versus tax evasion arise because diversion is more complementary to tax evasion than to legal tax shelters. Thus, the insignificant effects of the Reform on higher levels of tax avoidance suggest that the complementary relation between diversion and tax evasion negates the positive effect that stronger governance could have had on tax evasion. As a way to check the validity of this assertion, we relate the likelihood of tax

evasion (as proxied by the level of tax avoidance) to diversion using the quantile regression approach. Specifically, we estimate the same set of quantile regressions with each proxy of diversion, *LendingtoControl* or *NumRelatedParty*, as the explanatory variable.

For brevity, Table 7 reports the results only for the first measure of tax Avoidance, *1-ETR*. The coefficients of both proxies for diversion are positive for all deciles. Across the nine deciles, the coefficients are the smallest at the 10th decile and increase monotonically, becoming the largest at the 90th percentile. The level of statistical significance shows the same pattern. The coefficients are insignificant up to the 40^{th} decile and become significant from the 50^{th} decile. These results are consistent with our conjecture that diversion is more complementary to tax evasion than to legal tax avoidance.

5.2 Corporate Tax Fraud

The level of tax avoidance is a noisy measure for the likelihood of containing illegal tax evasion. A less noisy indicator is detected tax fraud. In this section, we estimate the effects of the Reform on the likelihood of committing tax fraud. Data on tax-related corporate fraud are available from CSMAR. Over the sample period 2002 to 2008 excluding 2005, there are 40 cases of corporate tax fraud (67 firm-year observations) committed by our sample firms. They are detected by stock exchanges, the CSRC, the Ministry of Finance, or the Tax Bureau. We define a variable, *Tax_Fraud*, equal to 1 if a tax-related fraudulent activity is detected in a firm-year, and zero otherwise.

Inherent in any fraud sample is the partial observability problem: We only observe detected frauds, not the population of frauds. Since observed fraud depends on two distinct but latent processes—commitment of fraud and detection of fraud—we follow Wang et al. (2010) and Khanna et al. (2015) and estimate the bivariate probit model to investigate the impacts that the Reform had on tax-related fraudulent activities. In the bivariate probit model, we estimate the fraud determinant regression and the detection determinant regression together. The bivariate probit model requires that the two regression models do not contain the same set of independent variables. Thus, while the fraud determinant regression includes the same set of control variables as in Table 3, the detection determinant regression excludes *Inventory* because there is no reason to expect this variable to affect the likelihood of detection. We cannot include firm fixed effects in the bivariate probit estimation due to model convergence issues,

so we add standalone *NonTradable2004* as a control variable. To address the concerns on autocorrelation we cluster the standard errors at the firm level.

Table 8 provides the estimation results, which show insignificant coefficients on *Post×NonTradable2004* in both fraud and detection regressions. These results buttress the inference drawn from the quantile regression results that the Reform had insignificant effects on tax evasion.

6. Heterogeneous Effects

How strengthening governance affects tax avoidance is likely to vary across some firm characteristics. In this section, we explore two firm characteristics: financial constraints and state ownership.

6.1 Financial Constraints

Financially constrained firms have greater needs for cash. One way to save cash is to reduce tax payments, which provides greater incentive to engage in tax avoidance (Edwards et al., 2016; Richardson, et al., 2015). To investigate whether and how financial constraints are related to the Reform's impacts on tax avoidance, we use two proxies for financial constraints: the Kaplan and Zingales (KZ) (1997) index and the Whited and Wu's (WW) (2006) index. These indices have been questioned and other measures have been proffered. It is not our intent to take a stand on which measures are better; rather, our choice simply reflects the fact that the two indices can be constructed with our Chinese data.[16]

We classify a firm-year as financially constrained and turn on an indicator, *High_KZ_Index* or *High_WW_Index* if the KZ index or the WW index in that firm-year is in the highest quartile in 2004. We then re-estimate the effects of the Reform on tax avoidance while interacting the financial constraint indicator with *Post×NonTradable2004.* Table 9 reports the re-estimation results. The coefficients of the triple interaction term are all positive and significant for three of the four measures of tax avoidance for

[16] Studies using U.S. data (e.g., Almeida, Campello, and Weisbach, 2004; Faulkender and Wang, 2006) also use credit ratings and dividends to infer financial constraints (rated firms and dividend-paying firms are considered less financially constrained). We cannot use credit ratings or dividends because, in China, only a few domestic publicly-traded firms had credit ratings before the Reform and because the CSRC requires publicly traded firms to pay dividends as a condition for issuing additional equity.

both the KZ index and the WW index. These results support our conjecture that the Reform led to more tax avoidance by financially constrained firms.

6.2 State-owned Enterprises

China has a large number of SOEs. Because they differ from non-SOEs in multiple dimensions, we are agnostic about whether the net effect of stronger governance on SOEs' tax avoidance differs from that of non-SOEs. For example, the incentive to minimize tax is weaker for SOEs than for non-SOEs (Bradshaw, Liao, and Ma, 2018).[17] This is because reducing SOEs' tax liabilities can also reduce tax revenues to the government that owns SOEs and government entities controlling SOEs may be less focused on after-tax profits than controlling shareholders of non-SOEs. On the other hand, the Reform had weaker effects on strengthening SOEs' governance (Liao et al., 2014; Chen et al., 2012).[18] The weaker effects on governance imply a smaller reduction in diversions and a smaller negative effect on tax avoidance due to complementary relation between diversion and tax avoidance.

To compare the Reform's impacts on SOEs' tax avoidance to those on non-SOEs', we construct a dummy variable, *SOE2004*, equal to one if the controlling shareholder in 2004 is a government entity, and zero otherwise.[19] We then re-estimate the baseline regression while interacting *SOE2004* with *Post*×*NonTradable2004* (together with the relevant double interactions). Table 10 presents the results. The coefficient of the triple interaction term is insignificant for all four measures of tax avoidance. It appears the Reform had no noticeably different impacts on tax avoidance between SOEs and non-SOEs.

7. Robustness Tests

In this section, we conduct an exhaustive set of robustness checks: (1) re-estimation using a propensity-score matched sample; (2) estimation of the 2SLS regressions with an instrumental variable to address potential endogeneity issues in the treatment variable; (3) two placebo tests on parallel time

[17] Bradshaw et al. (2018) study publicly listed firms in China and find significantly lower tax avoidance by SOEs in comparison to non-SOEs.

[18] Liao et al. (2014) document that the Reform had a weaker impact on reducing related party transactions for SOEs, and Chen et al. (2012) document that the Reform had a weaker impact on SOEs' cash holdings than those of non-SOEs. The Reform had a weaker effect on the governance of SOEs because after the Reform acquisitions of SOE shares required permission from the government, giving the controlling shareholder (a government entity) leeway to lessen the external pressure from the market for corporate control.

[19] Publicly listed firms in China are required to disclose their controlling shareholders in their annual report. CSMAR is the data source.

trends; (4) permutation tests; (5) alternative specifications regarding control variables; (6) various tests on confounding effects; and (7) alternative definitions of key variables. Again for brevity, we report the results only for the first measure of tax avoidance, *1-ETR*. Table 11 summarizes the results.

7.1 Propensity- Score Matching

The key assumption of a DID approach is that the treatment and control groups are comparable without the treatment. To improve comparability between the treated and control firms, we construct a propensity-score matched (PSM) sample following Rosenbaum and Rubin (1983) and estimate the effects of the Reform on tax avoidance.[20] Because the treatment and control samples after the matching are virtually indistinguishable in terms of observable characteristics, the propensity-score analysis mitigates the concern that the effect in question might be occurring through a channel caused by some omitted factors. Since we hold firm characteristics constant across the samples being compared, it is unlikely that the results reflect different responses by firms with different characteristics. The only observable characteristic that differs is the change caused by the Reform.

First, we define a new treatment variable, *NonTradable2004_Dum*, which is equal to one if the fraction of non-tradable shares in 2004 is greater than the median value, and zero otherwise. We construct the propensity scores by regressing *NonTradable2004_Dum* on the observable firm characteristics using a Probit model. The Probit model results are shown in Appendix 4, Column (1). We use a one-to-one matching method and propensity scores to form pairs of firms from the treatment (*NonTradable2004_Dum*=1) and control (*NonTradable2004_Dum*=0) groups. Then we re-estimate the DID after replacing *NonTradable2004* with *NonTradable2004_Dum.* Table 11, Panel A, Column (1) reports the re-estimation result. The coefficient of the interaction term *Post*×*NonTradable2004_Dum* is positive and statistically significant.

7.2 Instrumental Variable Approach

An important assumption of our DID approach is that *NonTradable2004* is exogenously determined. This assumption may be too strong. We argue that the ownership structures are likely exogenous to the Reform because the NTS were introduced at the time of IPO. The fraction of non-

[20] Rosenbaum (2005) demonstrates that propensity-score matching can mitigate the impact of unobservable effects on estimated treatment effects because the matching procedure reduces sample heterogeneity.

tradable shares at the time of IPO precedes the Reform, possibly by many years; hence, firms could have endogenously chosen to issue TS in the interim, affecting the fraction of NTS in 2004.

To account for this possibility, we employ a 2SLS approach with an instrumental variable. In the first stage we use the fraction of NTS at the time of the IPO, *NonTradable_IPO*, interacted with *Post* as the IV to predict *Post*×*NonTradable2004*. It is unlikely that the fraction of NTS in place at the time of IPO directly affected the post-Reform tax avoidance behavior other than its impact on the fraction of NTS in 2004. The first-stage result, reported in Appendix 4, Column (2), indicates that the relevance condition is satisfied.[21] The second column in Table 11, Panel A reports the second-stage result. The coefficient of the predicted *Post*×*NonTradable2004* is significant.

7.3 Parallel Time Trends

Our identification strategy compares changes in tax avoidance before and after the Reform across firms with different treatment. This strategy assumes observed changes in tax avoidance would not have occurred if the Reform had not taken place. We check the validity of this assumption with placebo tests. We make a false assumption that the Reform occurred in 2003 (instead of 2005) to create a false post-reform indicator, *PostPlaceboYear*, equal to one for year 2004 and zero for years 2002 and 2003. We then re-estimate the DID for the 2002-2004 sub-sample, replacing *Post* with the false indicator, *PostPlaceboYear*. The first column in Panel B reports the result. The coefficient of the interaction term with *PostPlaceboYear* is statistically zero.

The insignificant result of this placebo test could be due to the short sample period and/or to the anticipation and adjustments made prior to the Reform. To account for these possibilities, we replace the post-reform indicator with indicators for the years 2003, 2004, 2006, 2007, and 2008, then re-estimate the DID. The second column of Panel B reports the result. All changes occurred after 2005, with no evidence of firms changing tax avoidance prior to the Reform.

7.4. Permutation Tests

To check whether our estimated results are driven by some random factors, we conduct a permutation test following Chetty, Looney, and Kroft (2009) and La Ferrara, Chong, and Duryea (2012).

[21] The correlation between *NonTradable2004* and *NonTradable_IPO* is 0.461, significant at the 1% level.

Specifically, we randomly assign the treatment variable to construct a ratio of NTS *NonTradable2004_Random*. We then replicate the regressions in Table 3 after replacing *Post*×*NonTradable2004* with *Post*×*NonTradable2004_Random*. This exercise is conducted 500 times to mitigate the impact of rare events and increase the power of the test.

Figure 2 plots the probability density function of the 500 estimated coefficients of *Post*×*NonTradable2004_Random*. Since *NonTradable2004_Random* is randomly assigned to firms, it is expected to have no impact on the dependent variable. However, if the results in Table 3 were driven by some random factors, or were spurious, they should show up again in the repeated placebo tests. We find that the distribution of the coefficient is centered around zero for all four measures of tax avoidance. The "true" coefficients, tabulated in Table 3 and denoted with vertical lines in the plots, clearly lay in the far right end of the probability density functions. It seems unlikely that our results are driven by random factors.

7.5 Alternative Specifications

The baseline regression forces all control variables to have the same effects on tax avoidance over the entire sample period. However, the effects of the control variables may change after the Reform. To address this concern, we add interaction of each control variable with the *Post* reform indicator in estimating the DID in Panel C, Column (1). In addition, firms' pre-Reform characteristics might affect both *NonTradable 2004* and changes in tax avoidance behavior over time. To allow for this possibility, we replace the time-varying control variables with the interaction of the average value of each control variable over 2002-2004 with the *Post* reform indicator in Column (2). Results are robust to both specifications.

7.6 Confounding Effects

As noted earlier, China changed the tax law in 2008, reducing the nominal statutory income tax rate from 33% to 25% for all domestic firms. The new tax law also eliminated tax benefits to foreign firms and began to increase their nominal statutory income tax rate from 18% to 25%. To check potential biases of our estimates due to these tax law changes, we drop all observations in 2008. The re-estimation result, reported in Panel D, Column (1), is robust.

Another confounding event is a 2006 regulation on the equity incentives for managers of publicly traded firms. This regulation allows firms to use equity incentive plans if they complete the conversion of NTS to TS. The equity incentives also may have affected tax avoidance through closer alignment of decision makers' incentives to enhance shareholder value. In our sample, sixty-nine unique firms (352 firm-year observations) adopted the incentive plans. We drop the 352 observations and re-estimate the DID. The result, reported in Panel D, Column (2), remains robust.

Chinese firms, as in the U.S., are allowed loss carryovers to reduce the current year's tax payment. If, for any reason, firms with higher NTS prior to the reform are more (or less) likely to suffer losses after the Reform, our estimates could be biased upward (downward). To investigate this possibility, we conduct two robustness tests. First, we control for a loss in the previous year by an indicator, *Lag_Loss,* equal to 1 if the pre-tax income in the previous year is negative and 0 otherwise. Column (3) in Panel D shows that the coefficient of *Post×NonTradable2004* changes little in both magnitude and statistical significance. Second, we drop the 373 unique firms (1,471 firm-year observations) with losses in any year and re-estimate the regression. The result, reported in Column (4), remains robust.

When NTS become publicly tradable, management is likely to pay more attention to stock price, and may be more tempted to boost reported income via earnings management (Erickson, Hanlon, and Maydew, 2004). If they engage in such earnings management, the denominator of ETR will increase, increasing 1-ETR. To address this concern, we construct a variable for earnings management, *DA_Adjust,* the discretionary accruals estimated using the Dechow, Sloan, and Sweeney (1995) model. Specifically, *DA_Adjust* is the residual estimated by Equation (4) below for each industry (based on the 2001 industry classification by the CSRC) with at least 20 observations in a given year.

$$TACA_{it} = \beta_0 \left(\frac{1}{Asset_{it-1}}\right) + \beta_1(\triangle REVA_{it} - \triangle RECA_{it}) + \beta_2 PPEA_{it} + u_{it} \qquad (4)$$

TACA is the change in non-cash current assets minus the change in current non-interest bearing liabilities, minus depreciation and amortization expense for firm *i* in year *t,* scaled by lagged total assets. *Asset* is the total assets; $\triangle REVA$ is the annual change in revenues scaled by lagged total assets; $\triangle RECA$ is the annual change in receivables scaled by lagged total assets; *PPEA* is property, plant, and equipment

for firm *i* in year *t* scaled by lagged total assets. A higher value of *DA_Adjust* implies more upward earnings management. We include *DA_Adjust* as an additional control to the baseline regression. Panel D, Column (5) reports the re-estimation result. The coefficient of *Post×NonTradable2004* changes little in both magnitude and statistical significance.

7.7 Alternative Definitions of the Key Variables

In China, the controlling shareholder is typically the ultimate decision maker and enjoys private benefits of control. Thus, we construct an alternative treatment variable, *Control_NonTradable2004*, equal to the percentage of NTS held by the controlling shareholder in 2004. We re-estimate the DID with this alternative treatment variable and report the result in Panel E, Column (1). Again, the result is robust.

The annual ETR measure can be distorted when pre-tax income is negative, and the tax expense includes both current and deferred income taxes. Dyreng, Hanlon, and Maydew (2008) suggest a long-run effective tax rate to mitigate such problems. Thus, we follow Armstrong et al. (2015) and use a three-year effective tax rate, the sum of total income tax expenses over year *t* - 2 to year *t* divided by the sum of pre-tax incomes over *t* - 2 to *t*. We use three years to calculate the long-run ETR because our sample period covers three years before and after the Reform. We re-estimate the regression using one minus the three-year effective tax rate, *1-ETR_3YMean,* as the dependent variable. The result, reported in Panel E, Column (2) is robust.

Changes in financial leverage affect taxes because interest payments are tax deductible. To avoid this leverage effect on tax payments, we compute the tax rate as the ratio of taxes over earnings before interest and taxes (EBIT). As with the effective tax rate, we drop firm-years when the tax/EBIT ratio is negative or greater than 1. In Panel E, Column (3), we use *1-Tax/EBIT* instead of *1-ETR* as the dependent variable. The result is robust.

Finally, Desai and Dharmapala (2006) propose adjusting the book-tax difference to account for the possibility that earnings management might contribute to the gap between book income and tax income. Following Desai and Dharmapala, we compute the total accruals for each firm-year. We then regress the book-tax difference on total accruals (scaled by total assets). We use the residual of this regression as a proxy of the book-tax difference that cannot be explained by earnings management.

Panel E, Column (4) reports the re-estimation result using this modified variable as the dependent variable. Our conclusion remains unchanged.

8. Conclusions

This paper provides a simple model allowing the interplay of two simultaneous impacts that strengthening corporate governance has on tax avoidance: the positive effect by enhancing decision makers' incentive to spend resources to reduce tax liabilities, and the negative effect by reducing diversion that complements tax avoidance. Consistent with the model's prediction, we find the impact of strengthening governance on tax avoidance is more positive, the greater the controlling share ownership. And the impact is less positive, the more complementary diversion is to tax avoidance. On the whole, strengthening governance significantly increases the overall tax avoidance, suggesting the positive effect dominates the negative effect. We identify these effects of stronger governance using China's Split-Share Structure Reform, a financial market reform specifically aimed at strengthening corporate governance of publicly listed firms.

In addition, we find the increase in tax avoidance following the Reform is driven by legal tax avoidance. The Reform had no significant impact on tax evasion. These differential impacts, according to our model, suggest that the complementary relation between diversion and tax avoidance applies mainly to tax evasion, a conjecture consistent with quantile regression results relating diversion to tax avoidance at different levels of tax avoidance.

Our findings have policy implications. Tax avoidance activities have become increasingly salient as firms compete in a global marketplace, and governments often face a trade-off between raising tax revenue and stimulating economic growth. Presumably, policy makers allow tax shelters because they are either beneficial or benign but disallow certain tax schemes deemed harmful. To the extent that this presumption holds, the positive effect of stronger governance on legal tax shelters and the insignificant effect on tax evasion suggest stronger governance also helps policy makers achieve the goal to guide the economy through proper tax policies.

Appendix 1. Proofs of Predictions 1 and 2

1. Derivation of Equations (1) and (2) and Proof of Prediction 1.

Solving the maximization problem,

$$\max_{\{d,x\}} \alpha(1-d)(1-t+x)+d-C(d,x,G),$$

we obtain the following first-order conditions:

$$-\alpha(1-t+x^*)+1-C_d=0$$

$$\alpha(1-d^*)-C_x=0$$

Taking full derivatives with respect to G yields

$$-C_{dd}\frac{\partial d^*}{\partial G}-(\alpha+C_{dx})\frac{\partial x^*}{\partial G}=C_{dG} \quad \text{(A-1)}$$

$$(-\alpha-C_{dx})\frac{\partial d^*}{\partial G}-C_{xx}\frac{\partial x^*}{\partial G}=0 \quad \text{(A-2)}$$

Solving for $\frac{\partial d^*}{\partial G}$ and $\frac{\partial x^*}{\partial G}$ in Eqs. (A-1) and (A-2), we obtain

$$\frac{\partial d^*}{\partial G}=\frac{C_{dG}C_{xx}}{(\alpha+C_{dx})^2-C_{dd}C_{xx}} \quad (1)$$

$$\frac{\partial x^*}{\partial G}=\frac{-(\alpha+C_{dx})C_{dG}}{(\alpha+C_{dx})^2-C_{dd}C_{xx}} \quad (2)$$

To guarantee that this maximization problem has a solution, we need the determinant of Hessian matrix, $\begin{bmatrix} -C_{dd} & -\alpha-C_{dx} \\ -\alpha-C_{dx} & -C_{xx} \end{bmatrix}$, to be positive. That is, $C_{dd}C_{xx}-(\alpha+C_{dx})^2>0$ or $(\alpha+C_{dx})^2-C_{dd}C_{xx}<0$. In other words, the denominator of Equations (1) and (2) is negative. Since $C_{dG}>0$ and $C_{xx}>0$, it follows that $\frac{\partial d^*}{\partial G}<0$; that is, strengthening governance reduces the controlling shareholder's optimal level of diversion. In addition, because $(\alpha+C_{dx})^2-C_{dd}C_{xx}<0$ and $C_{dG}>0$, it follows from Equation (2) that $\frac{\partial x^*}{\partial G}>0$ if $\alpha>-C_{dx}$ and $\frac{\partial x^*}{\partial G}<0$ if $\alpha<-C_{dx}$.

2. Proof of Prediction 2.

To analyze whether and how governance differentially affects legal tax avoidance and tax evasion, we denote x_1 the result of legal tax shelters and x_2 the result of tax evasion. Then the controlling shareholder's after-tax cash flow is $\alpha(1-d)(1-t+x_1+x_2)+d$ and his personal cost is $C(d,x_1,x_2,G)$. As in the baseline model, $C_d>0$, $C_{x_1}>0$, $C_{x_2}>0$, $C_{dd}>0$, $C_{x_1x_1}>0$,

$C_{x_2x_2} > 0$. In addition, we assume $C_{x_1} < C_{x_2}$ and $C_{x_1x_1} < C_{x_2x_2}$. As noted earlier, illegal tax evasion imposes on the controlling shareholder coordination costs and expected costs associated with possible penalties and punishment. These extra costs make the costs of tax evasion greater and increase at a faster rate than the costs of legal tax avoidance.

Since we assume the complementary relation to diversion applies only to tax evasion, $C_{dx_2} < 0$, $C_{dx_1} = 0$, and $C_{x_1x_2} = 0$. Our assumption on the effects of G are the same as before: $C_{dG} > 0$ and $C_{x_{1G}} = C_{x_2G} = 0$.

The new maximization problem is

$$\max_{\{d,x_1,x_2\}} \alpha(1-d)(1-t+x_1+x_2) + d - C(d,x_1,x_2,G).$$

Solving the modified maximization problem, we obtain the following first-order conditions:

$$-\alpha(1-t+x_1^*+x_2^*) + 1 - C_1 = 0$$
$$\alpha(1-d^*) - C_{x_1} = 0$$
$$\alpha(1-d^*) - C_{x_2} = 0$$

Taking full derivatives with respect to G yields

$$C_{dd}\frac{\partial d^*}{\partial G} + \alpha\frac{\partial x_1^*}{\partial G} + \left(\alpha + C_{dx_2}\right)\frac{\partial x_2^*}{\partial G} = -C_{dG} \tag{A-3}$$

$$\alpha\frac{\partial d^*}{\partial G} + C_{x_1x_1}\frac{\partial x_1^*}{\partial G} = 0 \tag{A-4}$$

$$\left(\alpha + C_{dx_2}\right)\frac{\partial d^*}{\partial G} + C_{x_2x_2}\frac{\partial x_2^*}{\partial G} = 0 \tag{A-5}$$

Solving for $\frac{\partial d^*}{\partial G}$, $\frac{\partial x_1^*}{\partial G}$ and $\frac{\partial x_2^*}{\partial G}$ in Eqs. (A-3) – (A-5) we obtain

$$\frac{\partial d^*}{\partial G} = \frac{-C_{dG}C_{x_1x_1}C_{x_2x_2}}{C_{dd}C_{x_1x_1}C_{x_2x_2} - C_{x_1x_1}\left(\alpha+C_{dx_2}\right)^2 - C_{x_2x_2}\left(\alpha+C_{dx_1}\right)^2} > 0 \tag{A-6}$$

$$\frac{\partial x_1^*}{\partial G} = \frac{\alpha C_{dG}C_{x_2x_2}}{C_{dd}C_{x_1x_1}C_{x_2x_2} - C_{x_1x_1}\left(\alpha+C_{dx_2}\right)^2 - C_{x_2x_2}\left(\alpha+C_{dx_1}\right)^2} > 0 \tag{A-7}$$

$$\frac{\partial x_2^*}{\partial G} = \frac{C_{dG}C_{x_1x_1}(\alpha+C_{dx_2})}{C_{dd}C_{x_1x_1}C_{x_2x_2} - C_{x_1x_1}\left(\alpha+C_{dx_2}\right)^2 - C_{x_2x_2}\left(\alpha+C_{dx_1}\right)^2} \tag{A-8}$$

To guarantee that there is a solution for the maximization problem, we need the Hessian matrix, $\begin{bmatrix} -C_{dd} & -\alpha - C_{dx_1} & -\alpha - C_{dx_2} \\ -\alpha - C_{dx_1} & -C_{x_1x_1} & 0 \\ -\alpha - C_{dx_2} & 0 & -C_{x_2x_2} \end{bmatrix}$, to have a negative determinant. That is, $C_{dd}C_{x_1x_1}C_{x_2x_2} - C_{x_1x_1}\left(\alpha + C_{dx_2}\right)^2 - C_{x_2x_2}\left(\alpha + C_{dx_1}\right)^2 > 0$. In other words, the denominator in Equations (3), (4) and (5) is positive.

In addition, $C_{dG} > 0$, $C_{x_1x_1} > 0$, and $C_{x_2x_2} > 0$. Therefore, it follows from Equation (A-6) that $\frac{\partial d^*}{\partial G} < 0$; the controlling shareholder diverts less when governance is stronger.

Equation (A-7) states that when governance is stronger, the controlling shareholder conducts more legal tax sheltering, i.e., $\frac{\partial x_1^*}{\partial G} > 0$. This is because the denominator is positive and $\alpha > 0$, $C_{dG} > 0$, and $C_{x_2x_2} > 0$.

To compare Eq. (A-7) to Eq. (A-8), note $C_{x_2x_2} > C_{x_1x_1}$ and $C_{dx_2} < 0$; therefore, $\frac{\partial x_1^*}{\partial G} > \frac{\partial x_2^*}{\partial G}$. Stronger governance increases legal tax avoidance more than tax evasion.

Finally, whether stronger governance increases or decreases tax evasion, i.e., the sign of $\frac{\partial x_2^*}{\partial G}$, depends on whether $\alpha + C_{dx_2}$ is positive or negative because $C_{dG} > 0$ and $C_{x_1x_1} > 0$. If the complementarity between diversion and tax evasion is not so strong that $-C_{dx_2} < \alpha$, then $\frac{\partial x_2^*}{\partial G} > 0$. If the complementarity between diversion and tax evasion is so strong that $-C_{dx_2} > \alpha$, then $\frac{\partial x_2^*}{\partial G} < 0$.

Appendix 2. Stock Market Reaction to the Notice of the Split-Share Structure Reform

This table reports the results of a standard event study around April 29, 2005, which marked the beginning of the Split-Share Structure Reform. Cumulative abnormal returns are computed (*CAR*) over three different event windows to check whether conclusions are specific to the choice of event windows. We estimate the CAPM parameters starting 300 trading days prior to the event, and ending 50 trading days prior to April 29, 2005. All independent variables are as of the end of 2004. Appendix 3 provides variable definitions. T-statistics based on robust standard errors are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)
	CAR(-1,1)	*CAR(-5,5)*	*CAR(-10,10)*
NonTradable2004	0.037***	0.080***	0.081**
	(2.61)	(2.77)	(2.56)
ControlOwnership2004	-0.026**	-0.056**	-0.037
	(-2.30)	(-2.49)	(-1.50)
Size2004	0.008***	0.009**	0.017***
	(3.66)	(2.30)	(3.72)
Lev2004	-0.009	-0.058***	-0.072***
	(-0.87)	(-2.92)	(-3.36)
ROA2004	-0.100	-0.621***	-0.435***
	(-1.56)	(-5.13)	(-3.47)
OCF2004	0.013	0.054	0.059
	(0.57)	(1.10)	(1.13)
Inventory2004	0.011	0.044	0.041
	(0.71)	(1.29)	(1.13)
PPE2004	-0.005	-0.020	-0.030
	(-0.44)	(-0.97)	(-1.15)
TaxRate2004	-0.010	-0.039	-0.030
	(-0.61)	(-1.22)	(-0.81)
GovernmentOwnership2004	-0.005	-0.003	-0.012
	(-0.80)	(-0.25)	(-0.83)
FractionOutsideDirectors2004	0.016	0.001	0.001
	(0.46)	(0.02)	(0.01)
Industry Fixed Effects	√	√	√
Number of Observations	978	978	978
Adjusted R^2	0.04	0.12	0.08

Appendix 3. Variable Definitions

Variable	*Definition*
1-ETR	One minus the effective tax rate, the firm's total tax expense in a given year divided by its pre-tax book income in the same year, as in Rego (2003), Dyreng et al. (2010), and Robinson et al. (2010).
BTD	The difference between book income and tax income, scaled by total assets at the end of the year, as in Mills (1998), Desai and Dharmapala (2006), and Wilson (2009).
1-ETR_Adjusted	The difference between the firm's three-year average *1-ETR* and the three-year average *1-ETR* of other firms in the same quintile of total assets and in the same industry, as in Balakrishnan et al. (2012) and Armstrong et al. (2015).
BTD_Adjusted	The difference between the firm's three-year average *BTD* and the three-year average *BTD* of other firms in the same quantile of total assets and in the same industry, as in Balakrishnan et al. (2012) and Armstrong et al. (2015).
Tax_Fraud	Equal to 1 if tax fraud is detected in a given year and zero otherwise. The data is from the CSRC's Enforcement Actions Research Database, which encompasses all tax frauds detected by the stock exchanges, the CSRC, the Ministry of Finance, and the Tax Bureau.
BTD_Residuals	A proxy of BTD that cannot be explained by earnings management. We follow Desai and Dharmapala (2006) and compute the total accruals for each firm-year. Then we regress the BTD on total accruals (scaled by total assets). *BTD_Residuals* is the residual of this regression.
1-ETR_3YMean	One minus the three-year mean effective tax rate, the sum of total income tax expenses from year *t-2* to *t* divided by the sum of pre-tax incomes from year *t-2* to *t*.
1-Tax/EBIT	One minus the ratio of taxes to earnings before interest and taxes (EBIT).
NonTradable2004	The ratio of non-tradable shares to total shares outstanding in 2004.
NonTradable2004_Dum	An indicator equal to one if the ratio of non-tradable shares to total outstanding shares in 2004 is greater than the median value, and zero otherwise.
Control_NonTradable2004	The ratio of non-tradable shares held by the controlling shareholder to total shares outstanding in 2004.
NonTradable_IPO	The ratio of non-tradable shares to total shares outstanding at the time of the firm's initial public offering.
Post	An indicator equal to one in 2006, 2007, and 2008, and zero in 2002, 2003, and 2004.
PostPlaceboYear	An indicator equal to one in 2004, and zero in 2002 and 2003.
ControlOwnership	The ratio of shares held by the controlling shareholder to total shares outstanding.
Size	The logged value of total assets at the end of the year.
Lev	Total debt divided by total assets at the end of the year.
ROA	Net income divided by total assets at the end of the year.

OCF	Net operating cash flow divided by total assets at the end of the year.
Inventory	Total inventories divided by total assets at the end of the year.
PPE	Net property, plant, and equipment divided by total assets at the end of the year.
TaxRate	Nominal statutory income tax rate applicable to a firm-year.
GovernmentOwnership	The ratio of state-owned shares to total shares outstanding at the end of the year.
FractionOutsideDirectors	The fraction of outside directors on the board. Outside directors are defined as those who have no significant relation with the firm or with the controlling shareholder of the firm.
LendingtoControl	The total amount of the firm's outstanding loan to controlling shareholders divided by total assets at the end of the year.
NumRelatedParty	The natural logarithm of the number of related parties.
ControlShare2004	The fraction of shares held by controlling shareholders at the end of 2004.
SOE2004	Equal to one if the controlling shareholder in 2004 is a government entity, and zero otherwise.
Coef_DiverTax	*1-ETR* is regressed on *LendingtoControl* or *NumRelatedParty* after controlling firm and year fixed effects. *Coef_DiverTax* is the coefficient on *LendingtoControl* or *NumRelatedParty*.
High_KZ_Index	Equal to one if a fim-year is in the top quartile of the distribution of the Kaplan and Zingales (1997) index in 2004, and zero otherwise. The KZ index is: $KZ = -1.002*(CF/TA) - 39.368*(DIV/TA) - 1.315*(CA/TA) + 3.129*Lev + 0.283*Q$ *CF* is the income before depreciation and amortization; *TA,* the total assets; *DIV*, total cash dividends; *CA,* cash balances; *Lev,* the leverage ratio; and *Q*, the market-to-book value of the firm's assets. We sort all firms into quartiles according to the value of their KZ index in 2004.
High_WW_Index	Equal to one if a fim-year is in the top quartile of the distribution of the Whited and Wu (2006) index in 2004, and zero otherwise. The WW index is: $WW = -0.091*(CF/TA) - 0.062*DIVDUM + 0.021*(LTD/TA) - 0.044*Size + 0.102*INDSG - 0.035*SG$ *DIVDUM* is an indicator equal to one if the firm pays cash dividends and zero otherwise; *LTD*, the long term debt; *Size*, the logged value of total assets; *INDSG,* the industry sales growth; and *SG,* the firm's sales growth.
Lag_Loss	Equal to 1 if the pre-tax income in the previous year is negative, and zero otherwise.
DA_Adjust	Discretionary accruals using the Dechow et al. (1995) model. A higher value of discretionary accruals implies more upward earnings management. It is the residual estimated by Equation (4) in Section 7.6.
Year200T	An indicator equal to 1 if the year is *200T* and zero otherwise.

Appendix 4. Probit Regression for Propensity-score Matching and the First-stage of the 2SLS Regressions

Column (1) reports the probit regression results used for the propensity-score matching. Column (2) reports the first-stage regression result of the IV regression estimation with an instrument Post×NonTradable_IPO. Z-statistics and T-statistics based on standard errors are reported in parentheses in Columns (1) and (2), respectively. Column (1) includes industry dummies and Column (2) includes firm and year fixed effects. Variable definitions are provided in Appendix 3. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
	Probit regression for propensity-score matching	*First-stage of the IV model*
	NonTradable2004_Dum	*Post×NonTradable2004*
Post×NonTradable_IPO		0.643***
		(23.55)
ControlOwnership	3.227***	-0.052***
	(11.13)	(-3.16)
Size	-0.289***	0.019***
	(-5.60)	(6.54)
Lev	0.388	0.021**
	(1.28)	(2.51)
ROA	4.747***	-0.017
	(2.74)	(-0.48)
CFO	-0.609	0.027**
	(-0.96)	(2.06)
Inventory	0.283	0.045***
	(0.63)	(3.27)
PPE	-0.687**	0.042***
	(-2.15)	(4.04)
TaxRate	0.357	0.007
	(0.78)	(0.41)
GovernmentOwnership	0.034	-0.005
	(0.18)	(-0.88)
FractionOutsideDirectors	0.194	-0.015
	(0.22)	(-0.79)
Industry Dummies	√	
Firm and Year Fixed Effects		√
Number of Observations	996	5345
Pseudo R^2	0.14	
Adjusted R^2		0.97
Cragg-Donald Wald F Statistic for Weak IV		1204.47

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Table 1. Sample Selection and Distribution

This table summarizes the sample selection process and tabulates the sample distribution by year. The sample begins with all non-financial A-share firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year each in the pre- and post-Reform periods, 2002-2004 and 2006-2008.

Year	Total firm-year observations	Firm-year observations with missing variables	Firm-year observations with effective tax rate greater than 1 or less than 0	Firm-year observations with data unavailable in either the pre- or post-reform period	Final Sample
2002	1182	89	176	67	850
2003	1249	88	161	74	926
2004	1335	63	203	56	1013
2006	1410	130	206	63	1011
2007	1544	297	163	228	856
2008	1614	398	259	238	719
Total	8334	1065	1168	726	5375

Table 2. Summary Statistics

This table reports the summary statistics for key variables. The summary statistics are computed for the panel of observations. Variable definitions are provided in Appendix 3.

Variables	(1)	(2)	(3)	(4)
	N	*Mean*	*Median*	*S.D.*
1-ETR	5375	0.774	0.805	0.161
BTD	5298	0.004	0.002	0.033
1-ETR_Adjusted	4925	0.979	0.994	0.129
BTD_Adjusted	4154	0.000	0.000	0.026
Tax_Fraud	5375	0.006	0.000	0.077
Post	5375	0.481	0.000	0.500
NonTradable2004	5375	0.604	0.625	0.119
NonTradable_IPO	5345	0.705	0.716	0.087
ControlOwnership	5375	0.400	0.386	0.162
Size	5375	21.370	21.270	1.017
Lev	5375	0.484	0.486	0.195
ROA	5375	0.045	0.036	0.038
OCF	5375	0.058	0.057	0.078
Inventory	5375	0.165	0.131	0.143
PPE	5375	0.298	0.272	0.181
TaxRate	5375	0.234	0.250	0.091
GovernmentOwnership	5375	0.300	0.362	0.237
FractionOutsideDirectors	5375	0.331	0.333	0.068
High_KZ_Index	5375	0.178	0.000	0.382
High_WW_Index	5375	0.167	0.000	0.373
SOE2004	5375	0.671	1.000	0.470
1-Tax/EBIT	5375	0.833	0.850	0.113
BTD_Residuals	5104	0.000	-0.002	0.033
1-ETR_3YMean	4925	0.801	0.816	0.115

Table 3. The Split-Share Structure Reform and Overall Tax Avoidance

This table reports the panel regression results for the full sample. The dependent variable is *1-ETR*, *BTD*, *1-ETR_Adjusted, or BTD_Adjusted*. The key independent variable of interest is *Post×NonTradable2004*. Variable definitions are provided in Appendix 3. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. All regressions include firm and year fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	1-ETR	*BTD*	*1-ETR_Adjusted*	*BTD_Adjusted*
Post×NonTradable2004	0.104**	0.014*	0.092**	0.014**
	(2.52)	(1.79)	(2.30)	(2.27)
ControlOwnership	-0.039	-0.017**	0.004	0.004
	(-0.81)	(-2.00)	(0.10)	(0.97)
Size	0.010	0.005**	0.004	0.001
	(1.05)	(2.11)	(0.46)	(1.05)
Lev	0.089***	0.015*	0.094***	-0.008**
	(2.91)	(1.71)	(4.57)	(-2.12)
ROA	1.219***	0.416***	0.477***	0.215***
	(10.94)	(10.53)	(6.41)	(9.06)
OCF	-0.020	-0.017*	-0.038	-0.041***
	(-0.49)	(-1.85)	(-1.30)	(-5.71)
Inventory	-0.160***	-0.031***	-0.080**	-0.030***
	(-3.50)	(-3.35)	(-2.01)	(-5.34)
PPE	-0.032	0.003	-0.007	-0.005
	(-1.08)	(0.41)	(-0.30)	(-1.30)
TaxRate	-0.276***	0.154***	-0.118***	0.047***
	(-4.98)	(10.63)	(-3.13)	(6.93)
GovernmentOwnership	-0.012	0.000	-0.008	-0.008***
	(-0.56)	(0.05)	(-0.52)	(-2.87)
FractionOutsideDirectors	0.108*	0.007	-0.016	0.010
	(1.82)	(0.67)	(-0.39)	(1.06)
Firm & Year FE	√	√	√	√
Number of Observations	5375	5298	4925	4154
Adjusted R^2	0.40	0.44	0.57	0.60

Table 4. Interactive Effects of the Reform and Controlling Shareholders' Cash Flow Rights

This table estimates the interactive effects of the Reform and the pre-Reform controlling share ownership on tax avoidance. The dependent variable is *1-ETR*. The key independent variables of interest are *Post×NonTradable2004*, and *Post×NonTradable2004×ControlShare2004*. Variable definitions are provided in Appendix 3. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. All regressions include firm and year fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Variables	Above Median *ControlShare 2004*	Below Median *ControlShare 2004*	Full Sample
	1-ETR	*1-ETR*	*1-ETR*
Post×NonTradable2004	0.181***	0.050	-0.097
	(2.64)	(0.94)	(-1.05)
Post×ControlShare2004			-0.189
			(-1.38)
Post×NonTradable2004×ControlShare2004			0.429**
			(2.03)
ControlOwnership	0.027	-0.054	-0.012
	(0.49)	(-0.52)	(-0.32)
Size	-0.013	0.034**	0.007
	(-1.05)	(2.21)	(0.86)
Lev	0.118***	0.065	0.091***
	(2.75)	(1.45)	(3.79)
ROA	1.074***	1.416***	1.219***
	(8.67)	(7.70)	(14.08)
OCF	-0.020	-0.021	-0.018
	(-0.39)	(-0.33)	(-0.52)
Inventory	-0.160***	-0.154**	-0.159***
	(-2.62)	(-2.32)	(-4.36)
PPE	-0.007	-0.054	-0.030
	(-0.21)	(-1.03)	(-1.26)
TaxRate	-0.349***	-0.211**	-0.280***
	(-4.64)	(-2.54)	(-6.16)
GovernmentOwnership	-0.011	-0.019	-0.015
	(-0.47)	(-0.47)	(-0.91)
FractionOutsideDirectors	0.018	0.215**	0.110**
	(0.27)	(2.18)	(2.26)
Firm & Year FE	√	√	√
Number of Observations	2682	2693	5375
Adjusted R^2	0.42	0.39	0.41

Table 5. Diversion and Tax Avoidance

Panel A of this table estimates the relation between diversion and tax avoidance; Panel B, the interactive effects of the Reform and the complementary relation (between diversion and tax avoidance) on tax avoidance. The dependent variable is *1-ETR* in both Panels A and B. The key independent variable of interest in Panel A is *LendingtoControl* or *NumRelatedParty*; in Panel B, *Post×NonTradable2004* and *Post×NonTradable2004×Coef_DiverTax*. Variable definitions are provided in Appendix 3. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. All regressions include firm and year fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Relation between Diversion and Tax Avoidance

Variables	(1)	(2)
	1-ETR	*1-ETR*
LendingtoControl	0.105*	
	(1.92)	
NumRelatedParty		0.005*
		(1.72)
Firm & Year FE	√	√
Number of Observations	5375	5375
Adjusted R^2	0.35	0.35

Panel B: Interactive Effects of the Reform and Complementarity between Diversion and Tax Avoidance on Tax Avoidance

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Complementarity between *LendingtoControl* and *1-ETR*			Complementarity between *NumRelatedParty* and *1-ETR*		
	Below Median	Above Median	Full Sample	Below Median	Above Median	Full Sample
	1-ETR	*1-ETR*	*1-ETR*	*1-ETR*	*1-ETR*	*1-ETR*
Post×NonTradable2004	0.160***	0.036	0.102***	0.145**	0.078	0.127***
	(3.11)	(0.56)	(3.46)	(2.36)	(1.46)	(4.10)
Post×Coef_DiverTax			0.027**			1.817**
			(2.08)			(2.32)
Post×NonTradable2004×Coef_DiverTax			-0.044**			-2.729**
			(-2.17)			(-2.12)
ControlOwnership	0.033	-0.106*	-0.038	-0.038	-0.039	-0.038
	(0.46)	(-1.70)	(-1.12)	(-0.52)	(-0.62)	(-1.12)
Size	-0.002	0.028*	0.011*	0.006	0.015	0.010
	(-0.19)	(1.73)	(1.72)	(0.49)	(1.00)	(1.57)
Lev	0.114***	0.052	0.088***	0.053	0.123***	0.088***
	(2.73)	(1.20)	(4.62)	(1.32)	(2.61)	(4.63)
ROA	1.162***	1.293***	1.215***	1.031***	1.445***	1.217***
	(7.59)	(7.92)	(16.28)	(7.49)	(8.01)	(16.31)
OCF	-0.009	-0.037	-0.021	0.076	-0.091*	-0.018
	(-0.15)	(-0.64)	(-0.73)	(1.12)	(-1.84)	(-0.60)
Inventory	-0.100	-0.172***	-0.159***	-0.051	-0.205***	-0.157***
	(-1.60)	(-2.81)	(-5.67)	(-0.80)	(-3.51)	(-5.57)
PPE	-0.102**	0.037	-0.031	-0.075*	0.008	-0.030
	(-2.38)	(0.91)	(-1.35)	(-1.93)	(0.18)	(-1.35)
TaxRate	-0.290***	-0.257***	-0.279***	-0.271***	-0.284***	-0.277***
	(-3.50)	(-3.53)	(-6.87)	(-3.42)	(-3.76)	(-6.82)
GovernmentOwnership	-0.003	-0.022	-0.012	-0.009	-0.024	-0.011
	(-0.10)	(-0.68)	(-0.79)	(-0.34)	(-0.66)	(-0.75)
FractionOutsideDirectors	0.069	0.143	0.108***	-0.007	0.243***	0.108***
	(0.88)	(1.58)	(2.58)	(-0.09)	(2.62)	(2.60)
Firm & Year FE	√	√	√	√	√	√
Number of Observations	2719	2656	5375	2969	2406	5375
Adjusted R^2	0.42	0.39	0.40	0.36	0.43	0.40

Table 6. The Reform and Tax Avoidance: Quantile Regressions

This table reports the quantile regression results. The dependent variable is *1-ETR*, *BTD*, *1-ETR_Adjusted,* or *BTD_Adjusted*. The key independent variable is *Post×NonTradable2004*. Variable definitions are provided in Appendix 3. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. All regressions include firm and year fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Dependent Variable: *1-ETR*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Quantile								
	0.10	*0.20*	*0.30*	*0.40*	*0.50*	*0.60*	*0.70*	*0.80*	*0.90*
Post×NonTradable2004	0.118*	0.106***	0.065***	0.053**	0.041*	0.030	0.030	0.031	0.033
	(1.87)	(3.01)	(2.61)	(2.35)	(1.67)	(1.10)	(0.96)	(0.93)	(0.94)
Controls	√	√	√	√	√	√	√	√	√
Firm & Year FE	√	√	√	√	√	√	√	√	√
Number of Observations	5375	5375	5375	5375	5375	5375	5375	5375	5375

Panel B: Dependent Variable: *BTD*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Quantile								
	0.10	*0.20*	*0.30*	*0.40*	*0.50*	*0.60*	*0.70*	*0.80*	*0.90*
Post×NonTradable2004	0.032***	0.021***	0.017***	0.008*	0.008*	0.008	0.004	0.003	0.001
	(3.08)	(3.16)	(3.26)	(1.92)	(1.64)	(1.49)	(0.75)	(0.46)	(0.17)
Controls	√	√	√	√	√	√	√	√	√
Firm & Year FE	√	√	√	√	√	√	√	√	√
Number of Observations	5298	5298	5298	5298	5298	5298	5298	5298	5298

Panel C: Dependent Variable: *1-ETR_Adjusted*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Quantile								
	0.10	*0.20*	*0.30*	*0.40*	*0.50*	*0.60*	*0.70*	*0.80*	*0.90*
Post×NonTradable2004	0.142***	0.093***	0.057**	0.043*	0.035	-0.002	-0.014	-0.023	0.004
	(3.01)	(3.44)	(2.33)	(1.81)	(1.60)	(-0.09)	(-0.56)	(-0.85)	(0.15)
Controls	√	√	√	√	√	√	√	√	√
Firm & Year FE	√	√	√	√	√	√	√	√	√
Number of Observations	4925	4925	4925	4925	4925	4925	4925	4925	4925

Panel D: Dependent Variable: *BTD_Adjusted*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Quantile								
	0.10	*0.20*	*0.30*	*0.40*	*0.50*	*0.60*	*0.70*	*0.80*	*0.90*
Post×NonTradable2004	0.028**	0.018***	0.016***	0.015***	0.014***	0.010**	0.004	0.007	0.000
	(2.56)	(2.65)	(3.41)	(3.46)	(3.14)	(2.40)	(0.78)	(1.16)	(0.00)
Controls	√	√	√	√	√	√	√	√	√
Firm & Year FE	√	√	√	√	√	√	√	√	√
Number of Observations	4154	4154	4154	4154	4154	4154	4154	4154	4154

Table 7. Diversion and Tax Avoidance: Quantile Regressions

This table reports quantile regression results for the relation between diversion and tax avoidance. The dependent variable is *1-ETR*. The key independent variable is *LendingtoControl* or *NumRelatedParty.* Variable definitions are provided in Appendix 3. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. All regressions include firm and year fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Quantile Regression Results with *LendingtoControl* as the Explanatory Variable for *1-ETR*

Variables	*Quantile*								
	0.10	*0.20*	*0.30*	*0.40*	*0.50*	*0.60*	*0.70*	*0.80*	*0.90*
LendingtoControl	0.034	0.054	0.072	0.090	0.109**	0.127**	0.140**	0.152**	0.174*
	(0.34)	(0.66)	(1.07)	(1.60)	(2.10)	(2.25)	(2.20)	(2.11)	(1.90)
Firm & Year FE	√	√	√	√	√	√	√	√	√
Number of Observations	5375	5375	5375	5375	5375	5375	5375	5375	5375

Panel B: Quantile Regression Results with *NumRelatedParty* as the Explanatory Variable for *1-ETR*

Variables	*Quantile*								
	0.10	*0.20*	*0.30*	*0.40*	*0.50*	*0.60*	*0.70*	*0.80*	*0.90*
NumRelatedParty	0.002	0.003	0.004	0.005	0.006*	0.006**	0.007*	0.008*	0.009*
	(0.35)	(0.64)	(1.02)	(1.48)	(1.87)	(1.98)	(1.92)	(1.81)	(1.64)
Firm & Year FE	√	√	√	√	√	√	√	√	√
Number of Observations	5375	5375	5375	5375	5375	5375	5375	5375	5375

Table 8. The Reform and Tax Fraud

This table reports the bivariate probit model estimation results of the effects of the Split-Share Structure Reform on tax related fraud. The dependent variable is *Tax_Fraud* or *Detection | Tax_Fraud*. The key independent variable of interest is *Post×NonTradable2004*. Variable definitions are provided in Appendix 3. Column (1) reports the estimated relation between the Reform and the incidence of fraud, and Column (2) reports the estimated relation between the Reform and the likelihood of detection, given fraud. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. Both regressions include industry and year dummies. Robust standard errors clustered at the firm level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Variables	*Tax_Fraud*	*Detection | Tax_Fraud*
	(1)	(2)
Post×NonTradable2004	-0.416	-1.299
	(-0.46)	(-0.73)
NonTradable2004	0.502	0.631
	(0.65)	(0.66)
ControlOwnership	-1.232**	-1.165*
	(-2.46)	(-1.92)
Size	-0.080	0.023
	(-0.87)	(0.15)
Lev	0.644**	0.446*
	(2.45)	(1.70)
ROA	-0.331	2.258
	(-0.27)	(0.72)
OCF	0.624	-0.334
	(0.88)	(-0.31)
Inventory	0.234	
	(0.86)	
PPE	-0.061	-0.781
	(-0.15)	(-1.51)
TaxRate	0.262	1.078
	(0.38)	(1.21)
GovernmentOwnership	-0.011	-0.226
	(-0.04)	(-0.52)
FractionOutsideDirectors	-0.941	-1.849
	(-0.97)	(-1.47)
Industry and Year Dummies	√	√
Number of Observations	5375	5375
Prob> Chi2	0.000	0.000
log likelihood	-350.98	-350.98

Table 9. Interactive Effects of the Reform and Financial Constraints on Tax Avoidance

This table estimates how the impact of the Split-Share Structure Reform on tax avoidance is related to financial constraint. The dependent variable is *1-ETR*, *BTD*, *1-ETR_Adjusted, or BTD_Adjusted*. Financial constraints are measured by the Kaplan-Zingales (KZ) Index or the Whited-Wu (WW) Index. The independent variable of interest is *Post×NonTradable2004×High_KZ_Index* or *Post×NonTradable2004×High_WW_Index*. Variable definitions are provided in Appendix 3. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. All regressions include the same set of control variables as in Table 3. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: The Kaplan-Zingales Index as a Proxy for Financial Constraints

Variables	(1) *1-ETR*	(2) *BTD*	(3) *1-ETR_Adjusted*	(4) *BTD_Adjusted*
Post×NonTradable2004	-0.073	-0.013	-0.085*	-0.008
	(-1.01)	(-0.89)	(-1.67)	(-0.51)
Post×NonTradable2004×High_KZ_Index	0.213***	0.032**	0.214***	0.024
	(2.69)	(2.02)	(3.81)	(1.46)
Post×High_KZ_Index	-0.127***	-0.020**	-0.132***	-0.021**
	(-2.59)	(-2.03)	(-3.82)	(-2.08)
Controls	√	√	√	√
Firm & Year FE	√	√	√	√
Number of Observations	5375	5298	4925	4154
Adjusted R^2	0.41	0.44	0.57	0.60

Panel B: The Whited-Wu Index as a Proxy for Financial Constraints

Variables	(1) *1-ETR*	(2) *BTD*	(3) *1-ETR_Adjusted*	(4) *BTD_Adjusted*
Post×NonTradable2004	0.022	-0.026	-0.086	-0.018
	(0.26)	(-1.61)	(-1.46)	(-0.94)
Post×NonTradable2004×High_WW_Index	0.095	0.046***	0.203***	0.034*
	(1.07)	(2.63)	(3.21)	(1.74)
Post×High_WW_Index	-0.049	-0.025**	-0.131***	-0.026**
	(-0.89)	(-2.30)	(-3.37)	(-2.10)
Controls	√	√	√	√
Firm & Year FE	√	√	√	√
Number of Observations	5375	5298	4925	4154
Adjusted R^2	0.40	0.44	0.57	0.60

Table 10. The Reform and Tax Avoidance: State Owned Enterprises (SOEs) vs. Non-SOEs.

This table investigates whether the impact of the Reform on tax avoidance differs between state-owned enterprises (SOEs) and non-SOEs. The dependent variable is *1-ETR*, *BTD*, *1-ETR_Adjusted,* or *BTD_Adjusted*. The independent variable of interest is *Post×NonTradable2004×SOE2004*. Variable definitions are provided in Appendix 3. The sample includes all non-financial firms publicly traded on the Shanghai or Shenzhen Stock Exchange at some point during 2002-2008. To be included in the sample, firms must have data available for at least one year in both the pre-reform and post-reform periods. All regressions include the same set of control variables as in Table 3. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	1-ETR	*BTD*	*1-ETR_Adjusted*	*BTD_Adjusted*
Post×NonTradable2004	0.077	0.017**	0.120***	0.016*
	(1.56)	(2.07)	(3.24)	(1.89)
Post×NonTradable2004×SOE2004	0.042	-0.001	-0.038	-0.003
	(0.68)	(-0.11)	(-0.84)	(-0.26)
Post×SOE2004	-0.003	0.001	0.006	-0.001
	(-0.08)	(0.13)	(0.22)	(-0.11)
Controls	√	√	√	√
Firm & Year FE	√	√	√	√
Number of Observations	5375	5298	4925	4154
Adjusted R^2	0.41	0.43	0.57	0.60

Table 11. Robustness Tests

This table reports the results of all robustness tests mentioned in Section 7. All regressions, except those in Panel C, include the same set of control variables as in Table 3. T-statistics based on standard errors clustered at the firm level are reported in parentheses. Variable definitions are provided in Appendix 3. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Propensity-score Matching Sample Result and the 2SLS Regression Result

Variables	(1)	(2)
	PSM sample	Second stage of the IV model
	1-ETR	*1-ETR*
Post×NonTradable2004	0.018*	0.160**
	(1.82)	(2.55)
Controls	√	√
Firm & Year FE	√	√
Number of Observations	4839	5345
Adjusted R^2	0.41	0.40

Panel B: Placebo Tests

Variables	(1)	(2)
	2002-2004	Full sample
	1-ETR	*1-ETR*
PostPlaceboYear×NonTradable2004	0.016	
	(0.32)	
Year2003×NonTradable2004		0.058
		(1.16)
Year2004×NonTradable2004		0.057
		(1.13)
Year2006×NonTradable2004		0.124**
		(2.49)
Year2007×NonTradable2004		0.190***
		(3.59)
Year2008×NonTradable2004		0.124**
		(2.25)
Controls	√	√
Firm & Year FE	√	√
Number of Observations	2789	5375
Adjusted R^2	0.56	0.40

Panel C: Alternative Specifications regarding Control Variables

Variables	(1)	(2)
	1-ETR	*1-ETR*
Post×NonTradable2004	0.098**	0.124***
	(2.06)	(2.81)
Controls	√	
Post×Controls	√	
Post×Average Value of Controls in 2002-2004		√
Firm & Year FE	√	√
Number of Observations	5375	5375
Adjusted R^2	0.41	0.37

Panel D: Confounding Effects

Variables	(1) Exclude 2008	(2) No firm-years with equity incentive plans	(3) Control for loss carryovers	(4) No negative earnings in any year	(5) Control for earnings management
	1-ETR	*1-ETR*	*1-ETR*	*1-ETR*	*1-ETR*
Post×NonTradable2004	0.118**	0.110**	0.104**	0.084**	0.104**
	(2.55)	(2.46)	(2.52)	(2.09)	(2.43)
Lag_Loss			0.017		
			(1.23)		
DA_Adjust					0.020
					(0.68)
Controls	√	√	√	√	√
Firm & Year FE	√	√	√	√	√
Number of Observations	4656	5023	5375	3904	5174
Adjusted R^2	0.42	0.40	0.40	0.49	0.40

Panel E: Alternative Variables

Variables	(1) Alternative explanatory variables	(2) Alternative dependent variables	(3)	(4)
	1-ETR	*1-ETR_3YMean*	*1-Tax/EBIT*	*BTD_Residuals*
Post×NonTradable2004		0.078**	0.073***	0.010*
		(2.39)	(2.87)	(1.85)
Post×Control_NonTradable2004	0.090***			
	(2.85)			
Controls	√	√	√	√
Firm & Year FE	√	√	√	√
Number of Observations	5281	4925	5375	5104
Adjusted R^2	0.41	0.61	0.50	0.47

Figure 1: The Distribution of the Annual Industry Mean-adjusted ETRs for Chinese and US Listed Firms during 2002 to 2008.

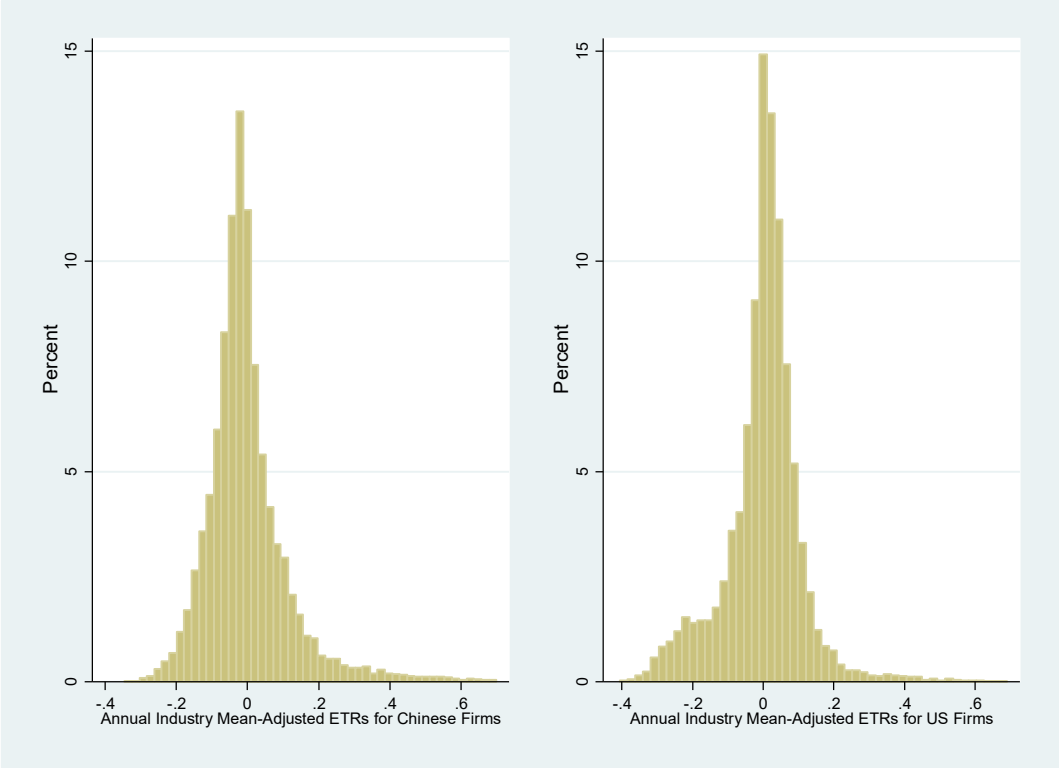

Figure 2: Empirical Probability Density Functions for Permutation Tests