Whack-A-Mole Effect:

Social Insurance Policy and Tax Avoidance

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Abstract

This paper studies the relationship between social insurance policy and corporate tax avoidance behavior within the context of Chinese firms. Leveraging a comprehensive dataset spanning from 2007 to 2016, we find that firms with greater exposure to the 2011 social insurance law engaged in more tax avoidance activities following its promulgation. A one-standard-deviation increase in firms' labor intensity corresponds to a 2.67 times of the sample median of the tax avoidance metric. This impact is amplified for firms with financial constraints, higher government ownership, ESG engagement, and those located in lenient tax enforcement areas. Through channel analysis, we show that the policy increases firms' distress risk, stimulating them to use internally generated funds and adopt risky corporate strategies using tax avoidance. Our findings emphasize that legislation aimed at protecting employees unexpectedly results in corporate tax aggressiveness, which exemplifies the so-called *whack-a-mole* effect inherent in government regulations.

JEL: G30, H26, J32

Key Words: Social Insurance Law; Tax Avoidance; Financial Distress; Risk-shifting; Tax Enforcement

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1 Introduction

Social insurance systems, comprising pensions, health insurance, unemployment insurance, and disability insurance, play a vital role in providing people with a safeguard against life's inherent uncertainties (Giles et al., 2021). However, the extent of coverage varies significantly across countries, with rich nations achieving near universal systems of social welfare while many developing nations have more than 80% of their full-time workforce unprotected (International Labour Office, 2021). In recent years, many countries have substantially improved their social insurance systems. One way of achieving this has been to mandate employers to contribute insurance premiums on behalf of their employees, as exemplified in countries such as Ethiopia, China, Brazil, and Thailand (Gerard et al. 2020). As such regulations become increasingly prevalent, a pressing need arises to examine their impact on the operational and financial dynamics of businesses. While existing research has explored the impact of social insurance arrangements on corporate investment, capital structure and cash holdings (Bartram, 2016; Bartram, 2017; Liu et al., 2021; Almaghrabi, 2023), our study undertakes the first investigation of whether augmented social insurance contributions elicit a tax avoidance response from affected organizations.

Analyzing the nexus between social insurance interventions and corporate tax avoidance behavior is important due to its financial implications. Both social insurance contributions and corporate taxation constitute important streams of fiscal revenue (Feldstein, 2005b; Béland and Koreh, 2019).[4] The balance between these revenue streams shapes the overall fiscal landscape and determines the government's capacity to execute social welfare programs. In circumstances whereby augmented social insurance contributions are counterbalanced by reductions in corporate tax liabilities, the government's operational capabilities may be jeopardized, potentially resulting in a trade-off between the enhancement of social insurance coverage and the

[4] Social insurance contributions are typically considered a part of government revenue, specifically within the category of social security funds. In many countries, these funds are managed separately and are earmarked for specific social security purposes, such as pensions, healthcare, unemployment benefits, and other social insurance programs.

well-being of broader societal segments. This paper offers valuable guidance to policymakers, enabling them to forecast fluctuations in tax revenues and implement strategies to facilitate tax compliance.

However, it remains theoretically ambiguous whether firms might potentially resort to tax avoidance strategies to offset the increased costs arising from social insurance contributions. On the one hand, enhanced social insurance contributions may reduce tax avoidance because social insurance contributions are tax-deductible, providing firms with valuable tax benefits. Consequently, companies may opt to substitute insurance-related tax shields for non-insurance tax planning, such as profit shifting through offshore tax heavens, to mitigate their overall tax burden (Shivdasani and Stefanescu, 2010; Bartram, 2016; Col and Patel, 2019). As a result, firms may be less inclined to undertake costly tax avoidance strategies that involve greater risk. On the other hand, mounting social insurance contributions may potentially result in increased tax avoidance due to greater financial stress. As expenditure on insurance elevates corporate labor costs, firms are motivated to adopt more aggressive tax planning strategies to realize cash savings. At the moment, however, the evidence remains inconclusive, necessitating further investigation to resolve this uncertainty.

Our paper examines this question in the context of China, the largest emerging country, which is notable for having one of the world's most expensive social security systems. Employers face de jure contribution rates nearing 30% of total wage cost (Rickne, 2013). In July 2011, China initiated a social insurance reform, signified by the enactment of the Social Insurance Law mandating firms to provide social security benefits for their employees. For the first time, the law explicitly imposed penalties on firms that failed to conform to the requirements of the legislation, which significantly improved social insurance coverage among employees.

To establish a causal relationship, our identification strategy leverages the enactment of the Social Insurance Law as an exogenous regulatory shock. We conduct a difference-in-difference approach to examine the impact of social insurance policies on corporate tax avoidance. Specifically, we compare the change in tax

aggressiveness between more labor-intensive firms and less labor-intensive firms following the implementation of the Social Insurance Law. Our findings suggest that increases in social insurance contributions lead to greater tax aggressiveness, a phenomenon we term as the *whack-a-mole* effect.[5] Notably, a one-standard-deviation increase in labor intensity across firms leads to an increase of 0.83 percentage points in tax avoidance, measured by the difference between the statutory and effective tax rates. This effect is equivalent to 2.67 times that of the sample median. To validate the causal relationship, we perform several robustness tests, including (1) a dynamic DID approach to test the parallel pretrend for outcome variables; (2) alternative measures of tax avoidance; (3) alternative treatment variables; (4) the propensity score matching method (PSM) to address potential self-selection bias induced by unobserved firm-specific factors; (5) a permutation test dealing with omitted variables by randomly assigning treatment variables; and (6) ruling out the possibility of any potential mechanical effect, and 7) extending the sample period to 2023. In combination, these checks support the robustness of our baseline results.

We further explore the cross-sectional factors that strengthen or weaken the impact of social insurance regulations on tax avoidance. The heterogeneous analysis demonstrates that the impact of the introduction of the Social Insurance Law on corporate tax avoidance is stronger in firms with stringent financing constraints, higher government ownership, and greater ESG engagement, as well as in firms located in provinces with lax tax enforcement. Overall, the results of heterogeneous analyses support the contention that strengthening social insurance increases the likelihood of firms suffering financial distress, motivating them to engage in tax aggressive behavior.

We also examine potential channels for the observed effect of the introduction of the Social Insurance Law on tax avoidance. We first demonstrate that the policy leads to heightened financial distress among firms, hence driving up external financing

[5] This metaphor has been frequently used in public discussions to describe the situation where policy actions to solve problems in one market lead to new issues emerging in unexpected markets (e.g., Cai et al 2021).

costs and prompting them to use more internally generated funds, such as those obtained from tax avoidance (Bradley et al., 1984). Furthermore, the observed effect could also be attributed to motives related to risk-shifting. We show that labor-intensive firms exhibit stronger risk-taking propensities in corporate management following the implementation of the law. This finding aligns with risk-shifting theory and supports the contention that financially distressed firms are more inclined to adopt risky corporate policies such as tax avoidance (Jensen and Meckling, 1976; Eisdorfer, 2008). Finally, we eliminate the tax shield effect arising from social insurance contributions as an alternative explanation for these observed phenomena.

The main contribution of this study lies in providing the first causal evidence that social insurance regulations can have significant impacts on corporate tax avoidance behavior. This study is particularly relevant to developing economies that face the dual challenge of expanding social insurance coverage to protect workers while ensuring the provision of corporate taxation revenue, given the weak tax enforcement environment (Besley and Persson, 2014). Our findings can inform policymakers about the potential trade-offs when implementing social insurance reforms. Given the importance of the topic, the paucity of existing studies is remarkable. While a few studies have explored the effects of social insurance arrangements on corporate investment, capital structure and cash holdings (Bartram, 2016; Bartram, 2017; Liu et al., 2021; Almaghrabi, 2023), our study stands out as the first inquiry into whether increased social insurance contributions result in corporate tax avoidance. Our findings emphasize that labor-intensive firms engage in increased tax avoidance activities in response to heightened financial stress risk. Furthermore, our supplementary analysis indicates that monitoring mechanisms, reflected by tax enforcement, may partially mitigate the corporate tax avoidance response.

Our work relates to recent studies on the interaction of corporate tax planning and labor market policies. By focusing on social insurance regulation, our research provides a valuable extension to prior studies that have primarily focused on labor

unions (Chyz et al., 2013), wrongful discharge laws (Fairhurst et al., 2020), and minimum wages (Li et al., 2022; Xiang et al., 2023). Our examination is distinguished from these studies in several key aspects. First, our findings cannot be inferred from existing studies, given the contrasting impacts of labor protection measures on tax avoidance in the literature. Second, we differ from Chyz et al. (2013) and Fairhurst et al. (2020) in that labor union and wrongful discharge laws have been undertaken in developed countries, whereas we focus on the developing world, where there is a relatively weaker enforcement environment of social insurance and taxation laws due to economic, political and cultural factors (Besley and Persson, 2014). Third, while minimum wage policies affect only specific segments of the workforce (that is, low-skill workers), social insurance payments account for a significant proportion of the labor cost and have widespread implications for firms in general.

In addition, our research contributes to the expanding body of literature examining compliance spillover effects across various tax types (Rincke and Traxler, 2011; López-Luzuriaga and Scartascini, 2019; Li et al., 2021). Heightened enforcement measures targeting one tax may induce either the exacerbation or mitigation of tax noncompliance in other domains. Some studies have identified a positive compliance spillover effect, positing that intensified enforcement of one tax increases taxpayer awareness of penalties and detection mechanisms in other tax domains (López-Luzuriaga and Scartascini, 2019; Ortega and Scartascini, 2020; Sun et al., 2021). Conversely, others have documented a negative compliance spillover, particularly in contexts characterized by fragmented tax agencies or low correlation in detection probabilities across different forms of tax noncompliance (Li et al., 2021; Castro et al., 2022). We augment this literature by exploring how the enforcement of one special type of tax, social insurance contributions, causes avoidance of corporate income tax liabilities.

Our work also contributes to the debate on whether financial distress results in risk-shifting or risk-mitigation behavior. The risk-shifting theory posits that financially distressed firms are motivated to undertake more risky activities, as

shareholders enjoy the benefits of successful projects and debtholders bear the cost if a project fails (Jensen and Meckling, 1976; Eisdorfer, 2008). Nonetheless, a growing body of literature argues that risk-mitigation incentives prevail over risk-shifting when firms are approaching financial distress (Almeida et al. 2011; Gilje, 2016). In our investigation, we find that financial vulnerabilities arising from increased social insurance expenditures foster a greater inclination toward tax aggressiveness, supporting the risk-shifting theory.

The remainder of this paper proceeds as follows. Section 2 presents the institutional background and hypothesis development. Section 3 discusses methodological issues, including the data, sample, and variables. Section 4 describes our identification strategy. Section 5 reports the baseline results and the results of robustness tests and cross-sectional analysis. Section 6 investigates the underlying mechanisms. Section 7 concludes.

2 Institutional background, literature review, and hypothesis development

2.1 Institutional background: promulgation of the 2011 Social Insurance Law

The Chinese government developed a comprehensive social security system in the early 2000s, which includes five types of insurance: pension insurance, medical insurance, maternity insurance, employment injury insurance, and unemployment insurance. Employers in China are required to contribute to these insurance programs on behalf of their employees. In 2010, the employer contribution rates were approximately 20% for pension insurance, 6% for medical insurance, 1% for maternity insurance, 1% for employment injury insurance, and 1% for unemployment insurance, with regional variations. The total contribution rates amount to around 30% of total wage cost in China, making it one of the most expensive systems worldwide (Rickne, 2013). As a comparison, employers in India pay a 17.85 percentage share of social insurance, US employers 14.95, Norwegian employers 14.1, and United Kingdom employers 12.8 percent, according to statistics reported by the U.S. Social

Security Administration in 2010.[6]

As a result of the high contribution rates, less than one half of urban employees had comprehensive social insurance coverage (Giles et al., 2013). Most Chinese firms underreported their employees' salaries to avoid social security benefits costs, and many migrant workers opted to receive their pay in cash to avoid deductions of social security contributions.

Another reason for relatively low insurance coverage is institutional fragmentation within the social security system. The social security system in China reflects diverse geographical approaches (Shen, 2018). Different municipal agencies administer the social insurance programs, eroding the credibility of their management. Fragmented management leads to different degrees of employee protection and management quality, resulting in employers paying insufficient contributions.

To address these issues, the Chinese government has recognized the need for reforms of the social security system. On October 28, 2010, the Chinese government passed the Social Insurance Law, which came into force on July 1, 2011. This law imposed a comprehensive national framework for social security regulation. It assigned a unified personal social security ID to each person; thus, the portability of social insurance benefits substantially increased. More importantly, it implemented enhanced enforcement measures for the collection of social insurance contributions. For example, if an employer does not purchase social insurance for an employee, then the company will be fined by the government agency between one and three times the amount of the social insurance payment avoided (Giles et al., 2021). Additionally, if the social insurance contribution remains unpaid for a certain period of time, the government agency has the right to transfer the corresponding payment directly from the bank account of the offender.

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[6] The numbers are taken from *Social Security Programs Throughout the World* released by Social Security Administration of the United States. See the link: https://www.ssa.gov/policy/docs/progdesc/ssptw/.

The implementation of the Social Insurance Law has intensified the monitoring and enforcement of social insurance contributions, greatly increasing firms' compliance with this mandate (Liu et al., 2021). To facilitate an understanding of the law's impact, we plot the pattern of social insurance contribution rates in Figure 1, based on the National Tax Survey Database.[7] Firm-level contribution rates are approximated as the ratio of social insurance contributions to gross payroll.[8] As illustrated by the solid line in Figure 1, the average social insurance contribution rate more than doubled after the implementation of the law, rising from 6.4% in 2010 to 14.9% in 2012. The dash line in Figure 1 reflects a similar trend when an alternative metric for the ratio of social insurance contributions is applied.

This is particularly striking, given that the employers' social insurance contributions in China account for a large proportion of labor costs, which is significantly higher than in other countries (Nielsen and Smyth, 2008; Rickne, 2013). By enforcing stricter payment of the mandatory social insurance contributions, the promulgation of the Social Insurance Law has greatly increased employers' labor expenses. Therefore, it provides us with a source of exogenous variation in corporate labor cost and financial stress, through which we can identify the causal impact of labor cost increases on corporate tax planning.

2.2 Literature review

Our paper contributes to two distinct strands of literature. The first centers on the micro-effects of social insurance policies, which mandate employers to provide benefits for their employees, such as healthcare, unemployment and pensions. Given the critical role of social insurance arrangements for both government and society,

[7] The National Tax Survey database is compiled jointly by the State Administration of Taxation and the Ministry of Finance of China, including approximately 700,000 firms annually, spanning all sectors and regions across the nation.

[8] Gross payroll generally includes pre-tax salaries paid to employees, bonuses, employer contributions to social insurance, and other welfare payments within a given year. The social insurance rate is typically determined as the ratio of social insurance contributions to pre-tax salaries. Since data on pre-tax salaries are unavailable, we use gross payroll as a proxy for the contribution base, which may lead to an overestimation of the actual contribution base and, consequently, an underestimation of the true social insurance contribution rate.

there has been growing interest in estimating their impact. Some research has explored their effect on corporate real investment, encompassing capital expenditures and research and development (Rauh, 2006; Phan and Hegde, 2013; Bartram, 2017). Concurrently, other studies have examined corporate responses in relation to financial policies, including cash holdings (Sasaki, 2015; Almaghrabi, 2023), capital structure (Shivdasani and Stefanescu, 2010; Bartram, 2016; Liu et al., 2021), and the structuring of bank loan contracts (Balachandran et al., 2019). However, to the best of our knowledge, limited attention has been paid to examining the impact of social insurance systems on corporate tax avoidance. Hence, our paper fills this gap.

The second body of literature investigates the determinants of tax aggressiveness. Understanding the drivers of tax aggressiveness is important for policymakers, regulators, and investors, facilitating their development of effective measures to promote tax compliance and ensure tax equity. Existing studies have found that tax aggressiveness is associated with multiple factors, such as corporate governance (Armstrong et al., 2015; Kim et al., 2022), supply chains (Cen et al., 2017; Houde and Wang, 2023), social and political capital (Hasan et al., 2017; Kanagaretnam et al., 2018; Wang et al., 2022), and environmental regulation (Geng et al., 2021). We contribute to this field of inquiry by investigating factors that influencing corporate tax aggressiveness from the perspective of labor market regulations.

2.3 Theoretical framework and hypothesis development

Examining the nexus between social insurance systems and corporate tax avoidance holds considerable significance, given the pivotal role of corporate taxes in the effective functioning of government and society (Payne and Raiborn, 2018). Firms, by fulfilling their tax obligations, actively contribute to the well-being of their community. The government, in turn, allocates these funds to critical areas such as infrastructure and healthcare benefits. Social insurance contributions serve as another indispensable part of fiscal revenue earmarked for specific social insurance distributions (Béland and Koreh, 2019), including pension disbursements and medical reimbursements. Any shortfall in social insurance funds necessitates the government

making up the deficiency by using revenue generated from tax collection (Feldstein, 2005a; Bairoliya and Miller, 2021). Should the augmented revenue resulting from social insurance regulations be offset by a reduction in tax collection, it would undermine the government's capacity for effective fiscal management. This interplay ultimately undermines the effectiveness of regulatory measures, calling into question the net social benefits derived from the enhanced social insurance framework.

A thorough investigation into the relationship between increased government administration of social insurance programs and corporate tax avoidance is crucial. Nonetheless, it is still uncertain whether firms will intensify their participation in tax avoidance strategies. In the subsequent sections, we employ a theoretical framework to examine how rising social insurance contributions influence corporate tax planning.

2.3.1 Financial distress, social insurance and tax avoidance

It is likely that companies may adopt tax avoidance measures to mitigate the financial pressures caused by stricter social insurance regulations. *Ceteris paribus*, the rise in labor costs tied to social insurance contributions can increase firms' operational expenses. Due to the rigidity of wage contracts, firms are unable to fully transfer these additional compliance costs to employees by reducing wages (Nielsen and Smyth, 2008; Liu et al., 2021). Additionally, in highly competitive markets, firms may find it difficult to fully pass on cost increases to consumers in order to maintain their profit margins (Chava et al., 2023). As a result, the bulk of the burden from higher social insurance contributions typically falls on employers, which enervates the firm's financial condition and raises the likelihood of financial distress (Serfling, 2016; Cui et al., 2018; Favilukis et al., 2020).

The trade-off theory explains how firms determine an optimal capital structure by balancing the advantages of debt financing against its costs, including those related to capital and bankruptcy (Kraus and Litzenberger, 1973; Fama and French, 2002). Since firms under financial constraints typically face higher debt costs (Van Binsbergen et al., 2010), they tend to favor internal financing over external sources. Broadly speaking, tax avoidance can function as an alternative method of internal

financing. According to trade-off theory, firms facing financial constraints may engage in more aggressive tax planning at the margin as a replacement for the more expensive external financing available from lenders or capital markets (Law and Mills, 2015).

Financially constrained firms favor reducing tax expenses over cutting other operational costs for at least two reasons (Edwards et al., 2016; Huston et al., 2023). First, many cost-cutting measures, such as decreasing spending on advertising, capital investments, or administrative functions, can negatively affect the firm's long-term performance. In contrast, lowering a firm's tax liabilities is unlikely to have similarly adverse effects, provided the tax strategies withstand audits. Second, tax planning offers a greater financial advantage because each dollar saved in taxes directly increases after-tax cash flow by one dollar, whereas reducing most other expenditures by a dollar yields less than a dollar in after-tax cash flow gains. Recent empirical research demonstrates that when external financing becomes more expensive, firms take steps to maximize internally generated funds through more aggressive tax strategies (Edwards et al., 2016; Luo et al., 2020; Hasan et al., 2021).

Risk-shifting theory also offers valuable insights into how social insurance reform can affect corporate tax planning, suggesting that as firms become more financially constrained, they may substitute safer investments with riskier ones (Jensen and Meckling, 1976; Eisdorfer, 2008). Shareholders of financially distressed companies are incentivized to engage in riskier activities because they benefit if the ventures succeed, while debtholders bear the consequences if they fail. Tax avoidance is inherently risky, given the potential penalties from tax authorities (Rego and Wilson, 2012; Lee et al., 2015; Ilaboya et al., 2021). Nevertheless, when a firm's financial health declines, its incentive to adopt more aggressive tax strategies increases, as the potential gains from tax avoidance may outweigh the risks involved (Richardson et al., 2015).

Altogether, the institution of China's Social Insurance Law provides incentives for firms to engage in increased tax avoidance. On the basis of this rationale, we

construct our first hypothesis as follows:

H1a: *The promulgation of the Social Insurance Law causes firms to engage in greater tax aggressiveness.*

2.3.2 Tax shields, social insurance and tax avoidance

Conversely, prior literature proposes that corporate tax avoidance might decline in the wake of more stringent social insurance regulations. Social insurance premiums, being tax-deductible, provide corporations with tax shields, which could reduce their incentives to undertake costly tax avoidance strategies. Several tax avoidance tactics, such as profit shifting through offshore tax havens, have the potential to generate substantial cost savings for corporations in the short-run but carry the long-term risks of legal repercussions, rigorous audits, and reputational damage (Desai and Dharmapala, 2006; Graham et al., 2014). In contrast, tax shields engendered by social insurance contributions offer firms a legitimate and more straightforward means of alleviating their tax burdens. Studies of off-balance sheet defined benefit (DB) pension plans indicate that tax savings derived from them are estimated to be around 1.5% of firm value and are equivalent to a significant proportion of the value of interest tax shields (Shivdasani and Stefanescu, 2010; Bartram, 2016). Consequently, the presence of tax shields resulting from social insurance contributions may diminish firms' motivation to engage in risky, yet potentially highly rewarding, tax avoidance activities.

Building on this rationale, we anticipate that the implementation of the Social Insurance Law may lead to reduced corporate tax aggressiveness. Therefore, we propose an alternative hypothesis as follows:

H1b: *The promulgation of the Social Insurance Law causes firms to engage in less tax aggressiveness.*

3 Data and key variables

3.1 Data and sample construction

Our dataset is sourced from the Wind database and CSMAR, both of which are widely

recognized data vendors for the Chinese financial market. To investigate the influence of the promulgation of the Social Insurance Law on corporate tax planning, our sample period spans a 10-year window from 2007 to 2016. We choose 2007 as the beginning of our sample period because China Accounting Standards, which have been closely aligned with the International Financial Reporting Standards, came into effect in that year. We choose 2016 as the end of our sample period, because the Chinese government issued a notice in May 2016 that granted firms a two-year period to temporarily reduce their social insurance contributions by a maximum of two percents of gross payroll. This policy adjustment may interact with the 2011 social insurance law and have a confounding influence on our main results. We exclude financial firms and eliminate firms with non-positive accounting profits. To control for the possible impact caused by outliers, all continuous variables are winsorized at the 1% and 99% levels. Following screening, the final sample comprises 16,656 firm-year observations of 2,240 non-financial firms for our empirical analysis.

3.2 Variable construction

3.2.1 Dependent variable: tax avoidance

We use the difference between statutory and effective tax rates (thereafter, DTR) as a proxy for corporate tax avoidance, a widely used measure in prior studies (Inger, 2014; Chan et al., 2016). A low effective tax rate can arise from either a preferential tax rate that is applicable to a particular region or industry, or from tax avoidance practices employed by firms (Shevlin et al., 2012). This DTR metric allows us to capture a firm's tax avoidance behavior by teasing out the effect of preferential tax rates facing firms. A positive value of the measure suggests potential tax avoidance behavior, with higher values indicating a greater level of tax aggressiveness.

3.2.2 Independent variables: labor intensity

We define exposure to the Social Insurance Law based on a firm's average labor intensity from 2007 to 2010, prior to the law's implementation. The labor intensity is measured by the natural logarithm of the ratio of the number of employees to the firm's fixed assets (in 10 thousands of yuan). Labor-intensive firms are more likely to

be affected by the social insurance regulations, as they have more employees relative to fixed assets. This labor-over-capital metric is commonly used in the literature to measure corporate labor intensity (e.g., Cui et al., 2018; Li et al., 2019).

3.2.3 Control variables

We include control variables that could influence firms' tax planning. To control for the differences in firm size, we include a firm's total assets (*Size*) (Chyz et al., 2013; Fairhurst, et al., 2020; Wang, 2023). We also control for financial leverage (*Lev*), as tax shields are an important driving factor for corporate tax avoidance (Omer et al., 1993). We further control for firm profitability (*ROA*), as corporate earnings may motivate companies to become tax aggressive. To capture the difference in the treatment between accounting and taxable profits, we include fixed assets (*PPE*), intangible assets (*Intangibles*), and research and development expenses (*R&D*) as control variables (Laplante et al., 2019). We add cash flow (*Flow*) to capture the motivations behind tax planning because cash-abundant firms are less likely to have tax deferrals (Atawnah et al., 2020). We use sales growth (*Growth*) to proxy firms' growth opportunities. To account for the effect of foreign operations on tax planning (Dyreng and Lindsey, 2009; De Waegenaere et al., 2012; Liu, 2013), we add a dummy variable that indicates whether a firm generates foreign income (*FI*). We also include equity income in earnings (*EQINC*) to capture the difference between accounting and taxable profits caused by income earned by unconsolidated entities (Dyreng et al., 2010). We summarize detailed definitions of our key variables in Appendix A.

3.3 Summary statistics

Table 1 presents summary statistics of variables used in our paper. The tax avoidance measure DTR has a mean value of 0.04% with its median value at 0.31%. This implies that tax avoidance behavior is quite prevalent among Chinese firms, in line with the findings of previous studies (Li et al., 2022). The table shows that our measure of labor intensity exhibits considerable variation across firms, as in Cui et al. (2018). The average labor intensity of firms between 2007 and 2010 has a mean value of -2.87 with a standard deviation of 1.04.

Table 1 also provides summary statistics for control variables. Firm size, measured as the logarithm of total assets, has a mean value of 7.87. The mean value for firm leverage is 0.43, indicating that, on average, firms' total debt accounts for 43% of book assets. *PPE* has a mean value of 0.21, suggesting that fixed assets account for 21% of book assets on average. The mean values for *Intangibles* and *R&D* expenses are 0.04 and 0.02, respectively, showing that these items account for only a small fraction of book assets. Most firms have a double-digit growth rate in revenue (mean *Growth*=0.19). Furthermore, the majority of firms are profitable (median *ROA*=6%) and have positive cash flow rates (mean *Flow*=5.6%). Fifty-seven percent of the sampled firms have income from foreign operations (mean *FI*=0.57), and 33% of them have equity income from unconsolidated entities.

4 Identification strategy

To address potential endogeneity issues, we apply a difference-in-differences method to mitigate selection bias arising from firm-related characteristics and bias related to functional misspecifications (Roberts and Whited, 2013).[9] The strong enforcement of social insurance contributions by the 2011 law created a substantial labor cost increase for firms, especially for labor-intensive firms (please see the discussions in Section 6). We examine the change in tax avoidance activities for firms before and after the policy as a function of their labor intensity, controlling for firm, province, industry, and year fixed effects, as well as firm characteristics. The identification assumption is that without the implementation of the Social Insurance Law, the extent of tax avoidance across firms with different labor intensities would follow the same trend. As individual firms could not easily predict the precise timing of the 2011 Social Insurance Law, it is unlikely that they systematically adjusted their labor intensity prior to 2011 in an attempt to prevent potential expenditures after the policy was enacted. Even if firms were aware of the timing, adjusting the size of their

[9] Our model does not bear the concern on multiple timing of the treatment, because the 2011 law was implemented in the same year across all provinces and firms (Callaway and Sant'Anna, 2021).

employee pools could not have been achieved in the short-term. Therefore, a firm's labor intensity before the policy is arguably exogenous to potential firm outcomes. We later show that this common trend assumption is supported by our data.

The specification of the regression is as follows:

$$DTR_{it} = \alpha_0 + \alpha_1 LaborIntensity_i \times Post_t + \beta X_{it} + \kappa_i + \delta_{st} + \varphi_{pt} + \varepsilon_{it} \quad (1)$$

where DTR_{it} proxies for tax avoidance, defined as the difference between statutory and effective tax rates, for firm i in year t. $LaborIntensity_i$ is the average labor intensity for firm i between 2007 and 2010, in which labor intensity is measured by the natural logarithm of the ratio of employment size to fixed assets (in 10 thousands of yuan). $Post_t$ is a dummy variable which equals one for observations made during 2011-2016 and zero for those during 2007-2010. X_{it} represents the set of control variables, including firm size, financial leverage, *PPE*, intangibles asset, *R&D*, *ROA*, cash flow, revenue growth, foreign income and equity income. The firm-fixed effect, κ_i, controls for time-invariant firm characteristics. We also include industry-year fixed effect, δ_{st}, to capture the industry-specific shock in each period, and include province-year fixed effect, φ_{pt}, to capture the province-specific shock in each year. ε_{it} is the error term with standard errors clustered at the firm level.

5 Empirical results and discussion

5.1 Baseline results

Table 2 reports the estimated effect of the Social Insurance Law on firms' tax aggressiveness. Columns 1-3 differ by the inclusion of different fixed effects. Column 3 presents the preferred specification with firm-level controls and a complete set of fixed effects. Our variable of interest is the interaction between labor intensity and the policy indicator, which captures the impact of the introduction of the law on the firm's tax avoidance behavior. The results consistently demonstrate that the interaction term is positively significant at the 1% level across all specifications, indicating that labor-intensive firms substantially engage in extensive tax avoidance. Our results are

also economically meaningful. The standard deviation of the *Labor Intensity* measure is equivalent to 1.039 (see Table 1). In column 3, the coefficient of the interaction term is 0.799, demonstrating that a one-standard-deviation increase in labor intensity across firms results in a 0.83 percentage point (0.799*1.039) increase in firms' tax aggressiveness. This is 2.67 (0.83/0.311) times the sample median of the dependent variable, which is 0.311, as in Table 1. The estimated coefficients are highly stable across all specifications. Overall, the empirical evidence provides strong support for our hypothesis (H1a) that the implementation of the Social Insurance Law led to increased tax avoidance.

In addition, Table 2 shows that control variables have significant and meaningful impacts on corporate tax avoidance. For instance, the coefficient on firm size is significantly positive, indicating that larger firms take aggressive tax positions to a greater extent. The coefficient on profitability (*ROA*) is statistically positive, indicating that profitable firms have higher incentives to increase their tax avoidance activities. The coefficients on firm leverage and cash flow are both negatively significant, indicating that firms with more debt and larger realized cash flows have reduced tax sheltering activities, consistent with Omer et al. (1993) and Atawnah et al. (2020). The coefficient on *EQINC* is significantly positive, implying that firms with equity income are associated with more aggressive tax planning. This suggests that equity investment in unconsolidated entities may be used as a popular means of pursuing tax aggressiveness (Dyreng et al., 2010).

5.2 Robustness analysis

In this subsection, we conduct various sensitivity analyses to test the robustness of our baseline results, including 1) a dynamic model specification, 2) alternative measures for tax avoidance, 3) alternative definitions of exposure to the Social Insurance Law, 4) a propensity score matched analysis, 5) a permutation test, 6) ruling out the possibility of any potential mechanical effect, and 7) extending the sample period to 2023.

5.2.1 Dynamic effects of Social Insurance Law on tax avoidance

A key concern regarding the difference-in-differences model is that some trend differentials that pre-exist between the high-shock group and low-shock group may drive our results. Another concern is that there may be lead or lag effects caused by the implementation of the Social Insurance Law on corporate tax aggressiveness. On the one hand, as it took years for China's legislative authority to approve the Social Insurance Law, firms may have had expectations regarding its enactment and thus could have engaged in tax avoidance activities before 2011. On the other hand, it may have taken firms some time to respond to the Social Insurance Law and adjust their tax schedules. To eliminate these concerns, we explore the dynamic effects of the Social Insurance Law. We adopt an event study method by including lags and leads of the labor intensity measure, as suggested in Jacobson et al. (1993) and Graham et al. (2023). Specifically, we estimate the following specification.

$$DTR_{it} = \alpha_0 + \sum_{t=2007}^{2016} \theta_t LaborIntensity_i \times Year_t + \beta X_{it} + \kappa_i + \delta_{st} + \varphi_{pt} + \varepsilon_{it} \quad (2)$$

where we set the year 2010 as the baseline year occurring just before the Social Insurance Law was promulgated and exclude it from the regression. $Year_t$ is an indicator for each year. The other terms are the same as those in Equation (1). The time varying coefficient θ_t captures the dynamic effects of labor intensity on tax avoidance from 2007 to 2016 relative to the baseline year. If tax avoidance activities in firms with different labor intensities follow a similar trend as they did before the law, then θ_t should be insignificant for each year before 2010. The coefficient θ_{2011} measures the immediate impact of the law on tax planning. The coefficients θ_{2012} (θ_{2013}, θ_{2014}, …) measure the estimated effect one year (two years, three years …) after the introduction of the law.

Figure 2 plots all the estimated coefficients of the interaction term *Labor Intensity*×*Year* with a 95% confidence interval. The results show that the estimated effects are not significantly different from zero in the pretreatment periods. This supports our assumption of a parallel trend, meaning that tax aggressiveness in firms with different labor intensities followed the same trend prior to the promulgation of

the Social Insurance Law in 2011. On the contrary, many of the coefficients are statistically significantly positive after 2011. Together, these results confirm that the Social Insurance Law greatly increased tax aggressiveness in labor-intensive firms following its implementation.

5.2.2 Alternative measures for tax avoidance

In the previous analyses, we used the DTR as a measure of corporate tax avoidance. Here, we employ two alternative measures to confirm the robustness of our findings. The first alternative measure for tax aggressiveness is book-tax difference (thereafter, BTD), which is calculated as the difference between pretax accounting profit and taxable income as a ratio of total assets (Desai and Dharmapala, 2006, 2009; Wilson, 2009). Higher levels of BTD indicate more tax aggressiveness. The second alternative measure is the effective tax rate (ETR), calculated as income tax expenses divided by pretax accounting profit (Hanlon and Heitzman, 2010; Kim et al., 2022). This measure reflects a firm's actual tax burden. Lower values of ETR indicate higher levels of tax avoidance.

As shown in Table 3, the estimates based on the new measures confirm our main results across all columns, e.g., labor-intensive firms engage in more tax avoidance after the promulgation of the Social Insurance Law. In column 1, with BTD as the dependent variable, the result indicates that a one standard deviation increase in labor intensity leads to 0.15 (0.145*1.039) percentage points higher in the magnitude of tax aggressiveness during the posttreatment period. Given that the mean value of BTD is 0.37 percent, the results indicate an approximately 41% increase relative to the sample mean of tax avoidance. Likewise, in column 2, with ETR as the dependent variable, we find that a one-standard-deviation increase in labor intensity causes the magnitude of effective tax rates to be 0.81 percentage points (0.777*1.039) lower in the posttreatment period. The magnitudes of the estimated coefficients from these new measures are generally consistent with our baseline results in Table 2. Taken together, our results clearly show a positive relationship between increases in social insurance contributions and tax aggressiveness, supporting our baseline findings.

5.2.3 Alternative measures for reform exposures

In our baseline estimation, we define firms' exposure to the Social Insurance Law by the level of average labor intensity from 2007 to 2010. To investigate whether our results are robust to alternative treatment variables, we implement three additional checks. We first construct an indicator based on the labor intensity variable used in the baseline analysis. This indicator equals one if a firm's average labor intensity during 2007-2010 is above the sample median, and zero otherwise. Second, we create a treatment variable in a similar way to that in the main analysis but using firms' labor intensity at the end of 2010 (one year before the Social Insurance Law was enacted). Third, we measure firms' exposure to the law by their initial social insurance contribution rates, which is defined as the ratio of social insurance contributions over gross payroll at the end of 2010 (Liu et al. 2021). Firms with a lower initial social insurance contribution rate experience a larger increase in social security expenditure after the law was enacted, thus having greater exposure to the law. The results in Table 4 support our baseline findings that greater exposure to the reform leads to more tax aggressiveness.

5.2.4 PSM-DiD

Despite the common pre-existing trend established in the dynamic model analysis, there may still be a concern that the systematic differences between the treatment and control groups could be driving these results. A firm is classified into the treatment (control) group if its average labor intensity between 2007 and 2010 is above (below) the sample median. To alleviate this anxiety, we use a matched difference-in-differences method to verify the robustness of our results. We first apply Propensity Score Matching (PSM) to create the most comparable treatment and control groups and then conduct a difference-in-difference regression based on this matched subsample.

In applying PSM, we first employ a probit estimation. The dependent variable, *treated*, equals one if a firm is classified into the treatment group, and zero otherwise. We include all control variables from Equation (1) in the probit model. Using

propensity scores estimated from the probit model and nearest-neighbor matching, we create matches between treatment and control groups, following the method of Smith and Todd (2005). To fortify the robustness of our findings, we employ varying matching ratios, specifically 1:5, 1:7, and 1:9, in constructing the matched samples.

Next, we assess the effectiveness of the matching process through a balance test. For instance, Figure B1 shows the propensity score distributions before and after matching for the 1:5 nearest-neighbor case. A visual comparison indicates that PSM effectively reduces the bias between the treatment and control groups. Additionally, Figure B2 highlights the differences in covariates before and after matching, demonstrating that the deviations in all variables decrease to less than 6%, confirming that the balance hypothesis holds. Similar results are observed for the 1:7 and 1:9 matching scenarios.

Finally, we conduct a difference-in-difference regression, as outlined in Equation (1), to evaluate the causal impact of the Social Insurance Law on corporate tax avoidance. The results, presented in Table 5, confirm a positive relationship between the Social Insurance Law and increased corporate tax avoidance.

Note that the estimated coefficient in Table 5 is not directly comparable to our baseline results, as the reform exposure in the matched DID analysis is an indicator for high labor intensity as opposed to a continuous measure. To facilitate the comparison, we perform a conversion of the estimate. Specifically, column 1 shows that the coefficient of the interaction term is 0.545. Given that the gap in average labor intensity between firms in the treatment group and control group is 1.607, this coefficient implies that a one-standard-deviation increase in labor intensity resulted in a 0.35 percentage point (1.039/1.607*0.545) increase in the tax avoidance measure relative to that before the law took effect. The results of these exercises are largely comparable with the baseline results. This further confirms that our main results are not driven by unobserved firm-level factors between the treatment and control groups.

5.2.5 A permutation test

One might argue that firm-level unobservables could drive the results. To alleviate

these concerns, we implement a falsification test as in Chetty et al. (2009) and Mastrobuoni and Pinotti (2015). We randomly assign the labor intensity values from the sample to firms and construct the false treatment variable *Labor_False*. Then, we re-estimate Equation (1). Given the randomization of our data-generating process, the interaction between the new treatment variable and the policy dummy, *Labor_False*×*Post,* is supposed to have no impact on corporate tax aggressiveness. Following Mastrobuoni and Pinotti (2015), we repeat the data-generating process and re-estimate the model 1000 times to reduce noise contamination. Figure 3 plots the estimated results. The blue hollow circles are a scatter plot, with each circle showing the point estimate on the x-axis and the associated *p* value on the y-axis. The solid line plots the density distribution of the point estimates. If our baseline results are determined by coincidence or firm-level unobservables, then the estimates from the randomization check should be close to the estimate based on the real data (reflected by the vertical dashed line). However, none of the estimates from the randomization check is close to the estimate from the true data. In fact, the estimates center around zero, with the majority of their p-values being greater than 10%. This suggests that the increase in tax aggressiveness after the promulgation of the law is not a coincidence. These results verify that our main findings are not determined by firm-level unobserved factors.

5.2.6 Ruling out the possibility of any potential mechanical effect

The proposition that an increase in social insurance contributions may influence corporate tax avoidance warrants a nuanced analysis. Firms that pay higher social insurance contributions are incurring greater labor expense, potentially dampening profitability and subsequently influencing the effective tax rate. Given our primary tax avoidance measure, DTR, is calculated by using the difference between the statutory rate and the effective rate, a legitimate concern arises that heightened social insurance contributions may exert a mechanical influence on the DTR.

The fact that the labor expense is reducing both the numerator and the denominator of the effective tax rate helps mitigate this concern to some extent.

However, to disentangle the mechanical effects and ascertain whether firms engage in additional tax avoidance maneuvers beyond the anticipated tax savings stemming from augmented labor expenses, a robustness check is essential. In the spirit of prior studies on isolating certain components of tax savings (Inger, 2014; Austin, 2019), we introduce an adjusted measure for DTR, pseudo-DTR, as the dependent variable. The pseudo-DTR is the difference between the statutory tax rate and pseudo-ETR, where the pseudo-ETR is an adjusted ETR by removing tax saving from the increase in social insurance contributions from cash taxes paid, divided by pretax accounting profit adjusted for additional social insurance contributions. The pseudo-ETR is formulated as follows: pseudo-ETR=[(income tax expense + {statutory tax rate × additional social insurance contributions})/(pretax accounting profit + additional social insurance contributions)].[10]

The regression results using the pseudo-DTR as the dependent variable are presented in Table 6. The estimated coefficients derived from the pseudo-DTR analyses are largely consistent with those from our baseline analyses shown in Table 2, reinforcing the robustness of our results. These findings unequivocally indicate that firms are avoiding extra taxes beyond the tax savings attributable to increased social insurance contributions following the introduction of the Social Insurance Law.

5.2.7 Extending the sample period

We extend our sample period to 2023 to assess the robustness of our main results. Table 7 presents these findings. Columns 1 through 3 indicate that the coefficients on the interaction term are all statistically significant at the 1% level. Moreover, the magnitude of these coefficients closely mirrors our baseline results, suggesting that the impact of the Social Insurance Law on corporate tax aggressiveness remains largely consistent across different sample periods.

5.3 Heterogeneous analysis

[10] The additional social insurance contributions are calculated by subtracting social insurance contributions paid in last year from social insurance contributions paid in current year.

Thus far, we have analyzed the impact of social insurance policies on corporate tax avoidance. In this subsection, we extend our investigation by examining whether the tax avoidance effects differ across the characteristics of firms. We employ several heterogeneous analyses as follows: (1) financial constraints, (2) government ownership, (3) ESG engagement, and (4) the tax enforcement environment.

5.3.1 Financial constraints

Studies have shown that financial constraint is one of the factors that determine firms' tax aggressiveness, as constrained firms tend to use cash savings obtained from tax avoidance to invest in the future (Law and Mills, 2015; Edwards et al., 2016; Kim et al., 2022). In the face of negative shocks, financially unconstrained firms have extra cash to prevent financial distress; however, it is difficult for financially constrained firms to accumulate cash reserves. Therefore, we investigate how tax aggressiveness varies among firms facing different financial difficulties. We expect that firms with stringent financial constraints are more vulnerable to the implementation of the Social Insurance Law, and hence take more aggressive tax positions.

We classify firms into two groups based on the extent of their financial difficulties, proxied by the KZ index created by Kaplan and Zingales (1997). We calculate the KZ index using data at the end of 2010. Larger values of the index indicate a greater level of financial constraint. A firm is placed in the high (low) constrained group if its KZ index is above (below) the sample average. We re-estimate the DID Equation (1) for each group of firms. Panel A of Table 8 shows that the impact of the Social Insurance Law on tax aggressiveness is more pronounced in firms with stringent financial constraints, because the coefficient in column 1 is larger relative to that in column 2 and their difference is statistically significant at the 1% level (p-value=0.001). This indicates that firms with stringent financial constraints take more aggressive tax positions as a result of the implementation of the Social Insurance Law.

5.3.2 Government ownership

A unique feature of the Chinese capital market is its prevalence of connections and

concentration of government ownership, with state-owned enterprises (SOEs) constituting a large proportion of listed firms in China (Tang, 2020; Wang, 2024). SOEs have competing incentives for tax aggressiveness. On the one hand, SOEs often have better social welfare practices and could be less affected by the policy due to lesser increases in labor costs, therefore they have a lower incentive to avoid taxes. On the other hand, the pressure to meet profit expectations from both government and private investors may drive SOEs to adopt aggressive tax strategies, especially in the context of rising operational costs. Moreover, SOEs often benefit from rooted political connections and are typically subject to more lenient penalties for tax avoidance compared to non-SOEs (Chan et al., 2010; Tang, 2016). This dynamic suggests that, following the implementation of insurance laws, SOEs are more likely to adopt tax avoidance practices. Finally, whether SOEs exhibit more or less tax aggressiveness than non-SOEs after the policy is under debate and depends on which incentive is dominant. Therefore, we examine the differential impact of social insurance policies on tax avoidance between SOEs and non-SOEs.

We split the full sample into two groups, namely, the SOE group and the non-SOE group. Panel B of Table 8 reports the estimation results. The coefficient of the interaction term between *Labor Intensity* and *Post* is significantly larger for the SOEs than for non-SOEs. The difference is statistically significant at the 10% level. This suggests that the Social Insurance Law has a greater influence on tax planning for firms with higher levels of government ownership. Our results align with the findings of Chan et al. (2010) and Tang (2016), who report that SOEs demonstrate lower tax compliance. Due to their strong political connections, SOEs are able to avoid stringent oversight and benefit from reduced regulatory penalties for tax noncompliance. To mitigate the adverse effects of the Social Insurance Law and satisfy shareholder expectations, SOEs are more inclined to adopt aggressive tax planning strategies compared to non-SOEs.

5.3.3 ESG Engagement

ESG (Environment, Social, Governance) engagement may also influence a firm's tax

planning decisions. Existing studies on the relationship between ESG and tax aggressiveness reach mixed conclusions. From one standpoint, firms with greater ESG involvement could take less aggressive tax positions, as they regard paying more taxes as a means of achieving their social responsibility goals (Hoi et al., 2013; He et al., 2022). However, from another standpoint, high-ESG firms may take more aggressive tax positions, as they might use excessive ESG engagement to conceal their improper behavior, which could increase the likelihood of tax avoidance (Davis et al., 2015). In addition, these firms might take advantage of tax avoidance to generate cash savings in order to mitigate their cost of overinvestment in ESG. With increasing costs caused by enhanced social insurance contributions, high-ESG firms face a greater probability of distress risk. Therefore, we examine whether firms with different degrees of ESG engagement exhibit differential levels of tax aggressiveness after the Social Insurance Law is introduced.

We obtain the ESG rating data from the Sino-Securities ESG Index of the Wind database. Each ESG rating is assigned a score from 1 to 9. If the ESG index is C, then the ESG score is 1; if the ESG index is AAA, then the ESG score is 9. Larger ESG scores indicate higher levels of ESG engagement. A firm is classified into the high (low) ESG group if its ESG score is above (below) the sample average at the end of 2010. Panel C of Table 8 reports the estimation results. The interaction term between *Labor Intensity* and *Post* has a significant and larger coefficient for firms with higher ESG scores. The difference in the coefficients is also significant (p-value=0.042). This indicates that firms with greater levels of ESG engagement display a stronger reaction to the Social Insurance Law. The rationale is that socially responsible firms may use cash savings generated from a tax avoidance strategy to compensate for their expenditures in ESG activities (Davis et al., 2015). To attenuate the rising labor costs imposed by the promulgation of the law, high ESG performers prefer to avoid more taxes than do low ESG firms.

5.3.4 Tax enforcement

We investigate how the impact of the Social Insurance Law on corporate tax

avoidance varies with the strictness of tax enforcement. In areas with strict enforcement of tax laws, firms are subject to greater legal risk, hence a higher marginal cost of avoiding tax payments (Atwood et al., 2012; Hoopes et al., 2012). Therefore, we anticipate a lesser effect of the Social Insurance Law on corporate tax planning for firms located in areas with stricter tax enforcement.

We divide the firms into two groups based on the legal environmental index for the year 2010 created by Fan et al. (2011). This index describes the judicial quality of each province. A higher legal environmental index score indicates stricter tax enforcement (Cui et al., 2018). Firms located in provinces with an above-median legal environmental index score are classified as the strict enforcement group, whereas the remainder falls into the lax enforcement group. The findings reported in Panel D of Table 8 reveal that the impact of the Social Insurance Law on tax avoidance is larger and statistically significant for firms in regions with lax tax enforcement compared to those in areas with strict tax enforcement. The difference in the coefficients for the subsamples is statistically significant (p-value = 0.025). This demonstrates the important role of tax enforcement in alleviating firms' tendency to engage in tax avoidance. This result underscores the significance of effective tax enforcement and monitoring measures in mitigating firms' propensity to participate in tax avoidance practices.

6 Mechanism analysis

Thus far, we have presented robust evidence that the introduction of the Social Insurance Law leads to increased corporate tax aggressiveness. Now, we explore the potential channels that could explain this effect. We first examine the financing cost channel. We find that the implementation of the Social Insurance Law increases firms' labor costs and their probability of experiencing financial distress, which drives up their external financing costs and motivates them to leverage internally generated funds through tax planning. We also examine changes in firms' risk-taking behavior as a second channel, and the results support risk-shifting as another mechanism. Finally, we do not find that tax shield effects play a crucial role in determining the relationship between social insurance contributions and tax avoidance.

6.1 Financing cost channel

Based on existing studies, we predict that a firm's financial status could determine its relative cost of external versus internal financing, which further affects its tax avoidance activities. If a firm becomes financially vulnerable due to rising costs, it generally faces higher external financing costs (Edwards et al., 2016). According to the trade-off theory, a firm's external financing cost affects its decision on target debt-to-value ratios; that is, a higher external financing cost impels firms to use internally generated funds (such as cash savings from tax avoidance), rather than searching for external funds (Kraus and Litzenberger, 1973; Bradley et al., 1984). Therefore, firms experiencing greater financial distress are expected to take more aggressive tax positions.

We first examine whether the introduction of the Social Insurance Law increased firms' labor expense. We use two proxies for labor expenses. One is social insurance contribution per capita, measured as the total expenses on social insurance divided by the number of employees. The other is labor expense per capita, measured as the ratio of total payroll over the number of employees. Columns 1 and 2 of Table C1 in Appendix C report the estimation results. The interaction terms between labor intensity and the policy indicator are positive and statistically significant. The results suggest that relative to otherwise similar firms, labor-intensive firms experienced a significant labor expense increase following the enactment of the law. This finding supports our fundamental assumption that firms cannot fully transfer the cost of mandated social insurance contributions to workers, which leads to higher labor costs. Furthermore, we investigate whether firms become more financially distressed as a result of rising labor costs after the implementation of the law. Following Serfling (2016) and Cui et al. (2018), we measure firms' financial distress risk by using operating leverage, which is the elasticity of a firm's operating income with respect to its sales. The model is estimated as follows:

$$\Delta Ln(EBIT)_{it} = \gamma_0 + \gamma_1 \Delta Ln(Sales_{it}) \times Post_t + \gamma_2 \Delta Ln(Sales_{it}) + \gamma_3 X_{it} + \kappa_i + \delta_{st} + \varphi_{pt} + \varepsilon_{it}$$

(3)

where $\Delta Ln(EBIT)$ is the first difference in the logarithm of earnings before interest and taxes, $\Delta Ln(Sales)$ is the first difference in the logarithm of sales, and the other variables use the same measures as in Equation (1). The coefficient γ_1 estimates the effect of the introduction of the Social Insurance Law on firms' operating leverage.

Column 1 of Table 9 reports the estimation results. The results show that the elasticity of earnings to sales, or the average operating leverage, was 0.929 before the introduction of the Social Insurance Law. However, after the enactment of the law, the operating leverage rises by 0.152. Therefore, the firms' operating leverage has increased by 16% (0.152/0.929), which is of a similar magnitude to the estimates by Sterfling (2016) and Liu et al. (2021). This is clear evidence that the Social Insurance Law results in a greater probability of distress risk for firms.

In addition, we examine if labor-intensive firms experience a stronger increase in distress risk, as these firms are more affected by the introduction of the law. Columns 2 and 3 provide the subsample estimates for the treatment (more labor-intensive) and control (less labor-intensive) groups. The coefficient on the interaction term is positive and statistically significant for the treatment group (column 2), while it is insignificant for the control group (column 3). This indicates that labor-intensive firms experienced a greater increase in operating leverage after the introduction of the Law. As higher financial distress predicts tax avoidance, this result suggests that higher financial distress risk is a possible mechanism driving the impact of the Social Insurance Law on tax avoidance.

To ensure the robustness of our results, we incorporate two more proxies for distress risk. The first is the distance-to-default measure based on Bharath and Shumway (2008), in which a lower distance-to-default ratio indicates a higher distress risk. The second is crash risk, measured as the down-to-up volatility of firm-specific daily return (*DUVOL*), constructed following Callen and Fang (2015). A higher value of *DUVOL* corresponds to a stock being more crash prone, which can be priced in corporate debt contracting (Ni et al., 2022). The regression results are presented in

Columns 4 and 5 of Table 9. Both results suggest that labor-intensive firms encountered a more pronounced increase in distress risk after the law was enacted.

In particular, Column 4 shows that a one standard deviation increase in labor intensity corresponds to an approximate 0.51 (0.492*1.039) decrease in the distance-to-default during the post-treatment period, which is equivalent to 4.45% (0.51/11.459) of the average distance-to-default value according to Bharath and Shumway (2008). This result, when combined with the trade-off theory discussed earlier in this section, supports the notion that increased financing costs serve as a channel for our main finding. Specifically, as firms face financial distress following the Social Insurance Law's introduction, they become more likely to engage in tax avoidance as a means of generating internal funds, rather than relying on external financing.

6.2 Risk-shifting channel

Firms' risk-taking preferences could also serve as a potential channel for the observed effect. Tax avoidance is a risky investment activity, as there is a potential cost of being penalized by the tax authority (Lee et al., 2015; Ilaboya et al., 2021). Firms' risk-taking preference is a strong predictor of tax avoidance behavior, with risk-loving firms demonstrating a greater propensity to engage in tax avoidance compared to their risk-averse counterparts. However, the role of firms' risk-taking preference as a mediator of our primary effect remains uncertain due to conflicting theories concerning financial stress and corporate risk-taking behavior. While the risk-shifting theory predicts that distressed firms are more inclined to undertake greater risk (Jensen and Meckling, 1976; Eisdorfer, 2008), the risk-mitigation theory suggests that distressed firms prefer safer investments (Almeida et al., 2011; Gilje, 2016). Therefore, we probe the role of risk-taking proclivity as a possible mediator of the tax avoidance effect we observe in the main results.

To understand the potential role played by the risk-taking preference, we examine the impact of the introduction of the Social Insurance Law on firms' risk-taking behavior. Following existing studies, we use two metrics to proxy for corporate

risk-taking. The first measure, cash flow volatility, is defined as the three-year standard deviation of the ratio of operating cash flow divided by assets (from year *t* to year *t+2*). This metric reflects a firm's risk-taking preference, as riskier projects cause more volatile cash flows (Han and Qiu, 2007; Koirala et al., 2020). The second measure, stock volatility, represents the annualized total volatility of monthly stock returns. Stronger values of the measure indicate a greater risk-taking preference among firms (Adams, 2005; Bernile et al., 2018).

Table 10 presents the regression results. The interaction term between labor intensity and the policy indicator has a positive and statistically positive coefficient. The results indicate that there is a significant increase in the risk-taking tendency in firms with higher labor intensity following the introduction of the Social Insurance Law. As shown in Section 6.1, labor-intensive firms became more financially distressed after the introduction of the law. The increase in financial distress thus drives firms to transition into riskier corporate strategies such as tax avoidance. Our findings indicate that a risk-shifting motivation serves as a potential channel for greater tax aggressiveness after the enactment of the law.

The channel revealed by our analysis contrasts with that of Fairhurst et al. (2020), who use the implementation of U.S. Wrongful Discharge Laws as a quasi-natural experiment and find that strengthened employment protection decreases firms' tax avoidance. They argue that risk-mitigating incentives are at play and motivate employers to reduce their risky tax positions. To the contrary, our work finds that risk-shifting channels dominate risk-mitigating incentives when firms are confronted with strengthened social insurance regulations. In fact, the literature embodies an ongoing debate regarding whether elevated distress risk results in risk mitigation or risk shifting (Almeida et al., 2011; Gijle, 2016). The reason that our empirical results support the risk-shifting channel may be because China's Social Insurance Law exerts substantially greater effects on firms' labor costs than Wrongful Discharge Laws do on U.S. firms. A higher increase in fixed cost in our context leads to even greater

distress risk, causing risk-shifting motives to outweigh risk-mitigating incentives; thus, distressed firms have a higher likelihood of seeking to avoid paying more taxes.

6.3 Accounting for tax shield effects and other channels

Our findings indicate that higher social insurance contributions are associated with increased tax aggressiveness; however, several alternative mechanisms may disrupt this relationship. One potential factor is the tax shield effect, whereby firms can deduct social insurance payments from pre-tax earnings, thus providing a legitimate and transparent means of reducing tax liabilities. This mechanism could diminish the motivation to engage in more complex and costly tax avoidance strategies, such as shifting profits to offshore tax havens (Graham et al., 2014). Furthermore, firms may implement strategic responses to mitigate the adverse impact of elevated social insurance contributions on their operating performance, which, in turn, could influence their tax avoidance behavior. For instance, companies may adopt flexible labor arrangements or outsource labor to minimize social insurance obligations, thereby reducing the need for aggressive tax planning. Alternatively, firms might respond to rising labor costs by increasing product prices rather than pursuing high-risk tax strategies. In this section, we evaluate the robustness of our results by incorporating the potential effects of tax shields and firms' strategic responses.

We first examine the influence of the tax shield effect. It is presumed that the tax shield effect is more pronounced for firms with relatively high levels of social insurance contributions, as they could benefit from making greater deductions. Therefore, we assess the tax shield effect in determining the overall impact of social insurance contributions on tax avoidance by including the intensity of social insurance contributions as a covariate in the baseline model. If the tax shield effect is strong, the inclusion of this variable is expected to change the estimated effect of social insurance contributions on tax avoidance. In practice, we use two variables to proxy the intensity of social insurance contributions (following Liu et al 2021). One is the ratio of social insurance contributions over gross payroll (designated *Insurance Ratio*), and the other is measured by the ratio of the change in social insurance contributions to

the lagged social insurance contributions (designated *Insurance Change*). The results reported in Columns 1 and 2 of Table 11 show that the inclusion of social insurance contributions as covariates has minimal impact on the estimated effect in the main results. This implies that the tax shield effect is too subtle to affect the connection between social insurance contributions and tax avoidance.

We next investigate whether firms adopt strategic measures to mitigate the effects of social insurance reforms and how such measures influence corporate tax planning. Table C1 in Appendix C provides evidence on firms' operating performance post-reform and their strategic responses. Column 3 of Table C1 shows a significant increase in firms' administrative costs following the implementation of the law, as social insurance contributions are recorded within general and administrative expenses on financial reports. Column 4 reveals that this increase in administrative costs eroded firms' return on assets, leading to a decline in profitability. In response to this deteriorating performance, firms adjusted both labor employment and product pricing strategies. Specifically, Column 5 reports a marked slowdown in employment growth, calculated as the change in the natural logarithm of the number of employees, after the policy took effect. Column 6 indicates a significant increase in the price-cost margin, suggesting that firms raised product prices in an effort to offset rising labor costs.

Despite these adjustments, firms were unable to fully absorb the increased costs associated with enhanced social insurance contributions (Nielsen and Smyth, 2008; Chava et al., 2023). To further examine the implications of these strategic responses for corporate tax planning, we incorporate employment growth and the price-cost margin into our baseline regression model. Columns 3 and 4 of Table 11 present the estimation results for these variables. The interaction term remains significantly positive, indicating that the observed rise in corporate tax avoidance persists even when accounting for firms' responses to increased labor costs.

In conclusion, the positive effect of heightened social insurance contributions on corporate tax aggressiveness appears to operate primarily through the financing cost and risk-shifting channels.

7 Conclusion

This study provides the first evidence in examining the impact of enhanced social security benefits on corporate tax planning. Exploiting the introduction of China's Social Insurance Law as a quasi-natural experiment, we find that a rise in the level of social insurance contributions results in greater corporate tax aggressiveness. Cross-sectional analysis suggests that this impact is more pronounced in firms with stringent financial constraints, a higher proportion of government ownership, and greater ESG engagement, as well as in firms located in areas with lenient tax enforcement. We further explore the underlying mechanism through which the Social Insurance Law impacts corporate tax aggressiveness. Our findings support the hypothesis that strengthened social security imposed by the Social Insurance Law increases firms' distress risk, which motivates them to use internally generated funds through tax avoidance as opposed to external financing. This channel aligns with the trade-off theory proposed by Kraus and Litzenberger (1973) and Fama and French (2002). Additionally, we observe that labor-intensive firms adopted riskier corporate strategies after the policy was enacted, which is consistent with the risk-shifting theory (Jensen and Meckling, 1976; Eisdorfer, 2008).

Our study contributes to the studies on the interplay between social insurance regulations and tax avoidance. Both social insurance contributions and corporate taxation represent critical sources of fiscal revenue. If increased social insurance contributions are offset by reduced corporate tax obligations, a phenomenon we refer to as the "*whack-a-mole* effect", it could hinder the government's fiscal capacity and operational effectiveness. With social security programs implemented in over 170 countries globally, our results may have broader applicability to other nations with elevated social insurance contributions.

Our investigation raises three important policy implications. First, policymakers should evaluate the overall effects of social insurance regulations. Our findings suggest that legislation aimed at protecting employees may have unforeseen effects on firms and cause unintended consequences in corporate tax planning. Therefore, policymakers should account for these dynamics and adjust their regulations accordingly. Second, the government might increase the monitoring of tax compliance to ensure that companies are not resorting to tax avoidance practices in response to increased social insurance contributions. Effective monitoring can help identify and address potential loopholes that lead to unintended outcomes, thereby promoting a more equitable and transparent tax system. Third, measures alleviating a firm's labor cost may be used to mitigate corporate tax avoidance. For example, a temporary reduction in social insurance contributions may incentivize firms to take less aggressive tax positions, thus increasing government revenue.

Future research may benefit from identifying the causal effects of social insurance policies across other dimensions of firm choices. As an increase in social insurance contributions raises a firms' labor costs substantially, managers may have incentives to undertake diverse measures to mitigate their distress risk. For example, they may reduce share buybacks to save cash flow, apply more conservative accounting practices to minimize their total risk, or engage in fewer pollution emission reduction activities to alleviate negative shocks (see Dang et al., 2021; Gao et al., 2022). Future research could expand in these directions and broaden our understanding of the impact of social insurance regulations on corporate decision-making.

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Figures and Tables

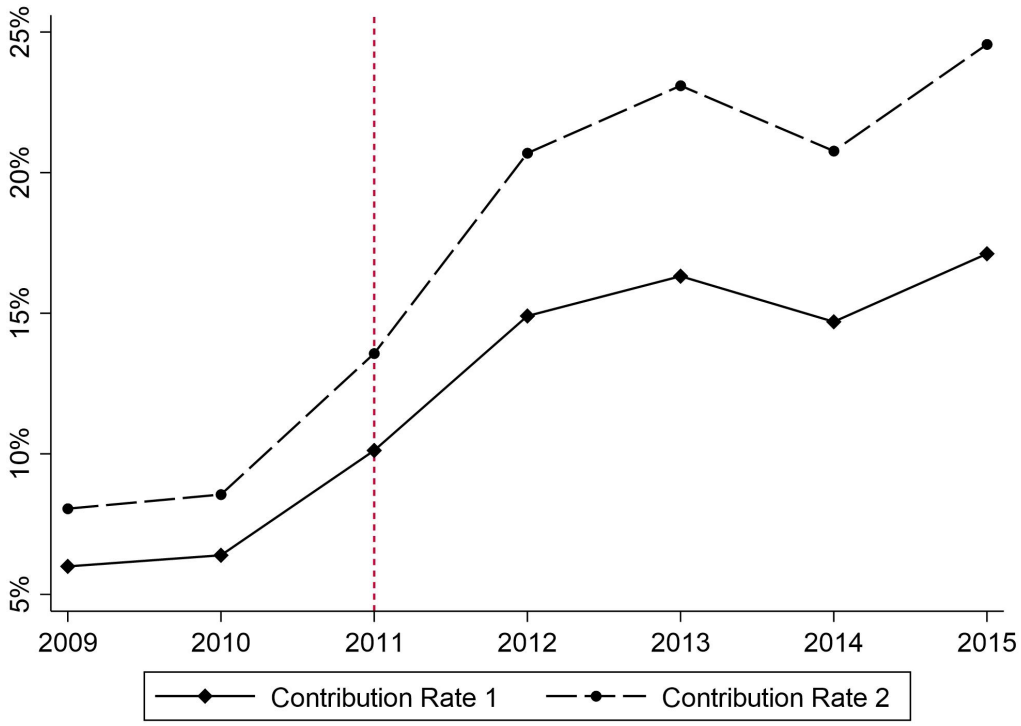

Figure 1 The Patterns of Social Insurance Contribution Rates

Note: We derive social insurance contribution rates using data from the National Tax Survey Database. Contribution Rate 1 is determined by dividing a firm's social insurance contributions by its gross payroll expense. Contribution Rate 2 is calculated as the ratio of social insurance contributions to the gross payroll expense, excluding social insurance contributions. Each data point reflects the average social insurance contribution rates across firms for each year.

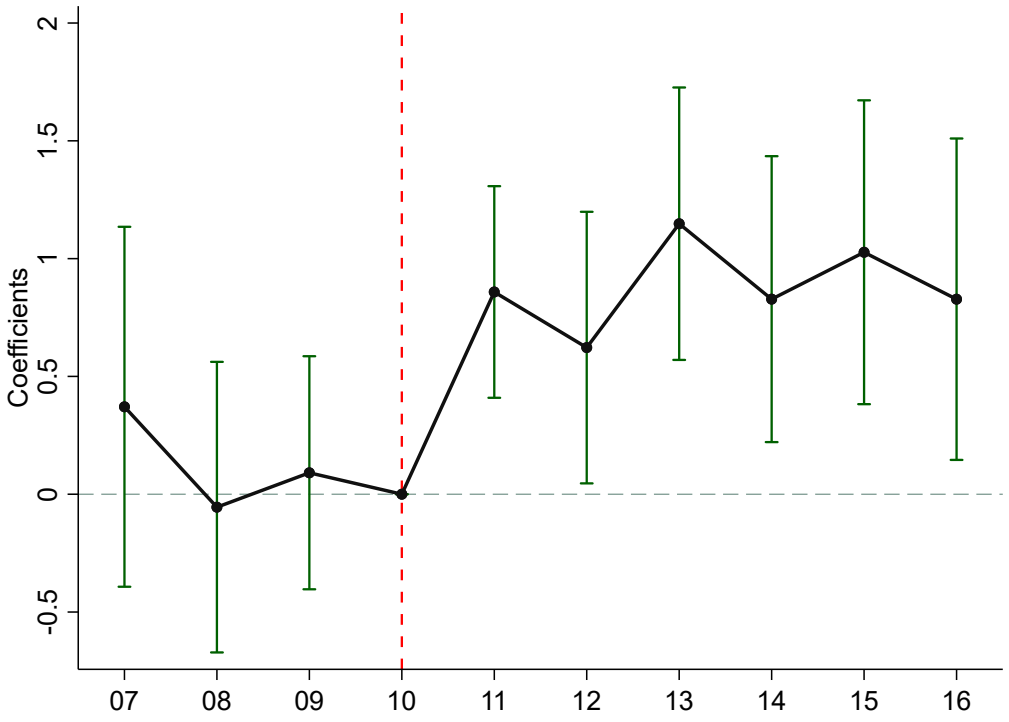

Figure 2 Dynamic effects of the promulgation of Social Insurance Law

Note: This figure shows the dynamic effects of the introduction of Social Insurance Law on corporate tax avoidance.

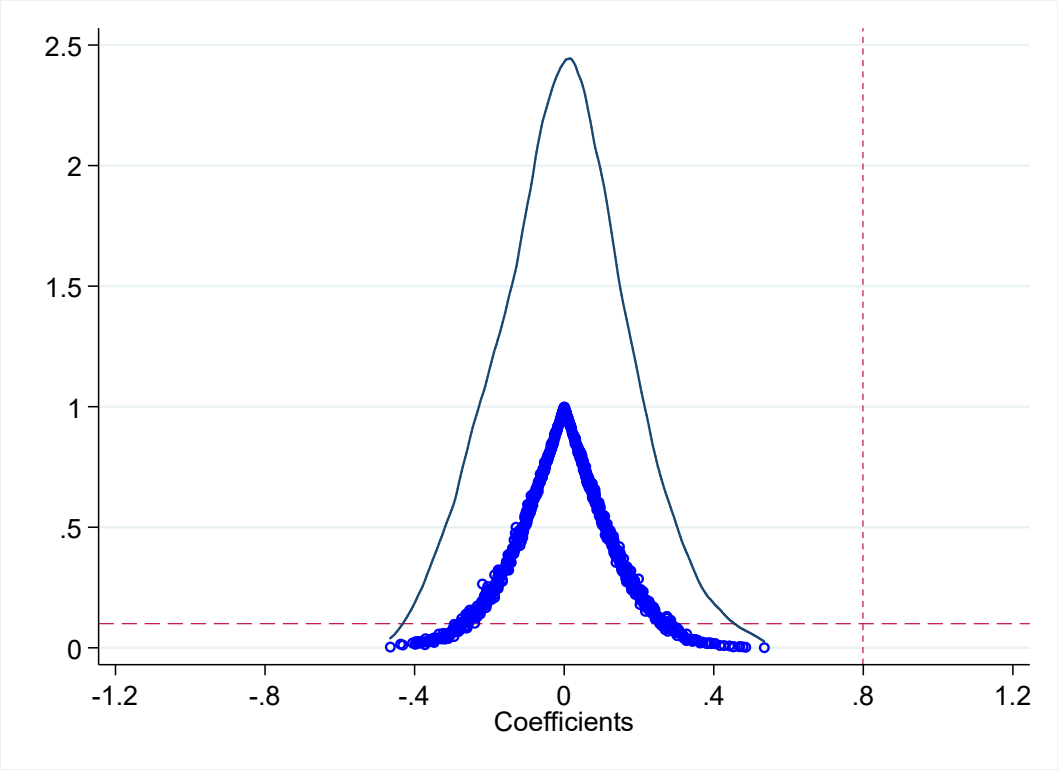

Figure 3 A Permutation Test

Note: This figure shows the results from a permutation test that randomly assigns labor intensities to firms and re-estimates Equation (1) 1000 times. The blue hollow circles are a scatter plot, with each circle showing the point estimate on the x-axis and the associated *p* value on the *y*-axis. The solid line plots the density distribution of the point estimates.

Table 1 Summary Statistics

Variables	Mean	SD	P25	Median	P75
DTR (%)	0.038	9.427	-2.627	0.311	4.007
BTD (%)	0.366	2.273	-0.735	0.105	1.179
ETR (%)	18.897	10.201	13.067	16.354	24.044
Labor intensity	-2.866	1.039	-3.476	-2.824	-2.194
Firm Size	7.865	1.277	6.992	7.789	8.641
Leverage	0.431	0.199	0.275	0.431	0.586
PPE	0.212	0.16	0.084	0.184	0.311
Intangible Asset	0.044	0.04	0.016	0.033	0.058
R&D	0.021	0.025	0	0.014	0.032
ROA	0.06	0.049	0.025	0.049	0.082
Cash Flow	0.056	0.076	0.011	0.052	0.099
Firm Growth	0.185	0.286	0.014	0.141	0.303
Foreign Income	0.574	0.494	0	1	1
EQINC	0.329	0.47	0	0	1
DDBhsh	11.459	28.099	7.652	10.132	14.098
DUVOL	-0.321	0.475	-0.628	-0.319	-0.016

Notes: This table presents the descriptive statistics of the key variables for the full sample, including the mean and standard deviation, among many others. *Labor Intensity* denotes a firm's average labor intensity from 2007 to 2010. All variable definitions are shown in Appendix A.

Table 2 Baseline Results

VARIABLES	DTR	DTR	DTR
	(1)	(2)	(3)
Labor Intensity × *Post*	0.824***	0.527***	0.799***
	(0.195)	(0.181)	(0.201)
Size	1.044***	1.098***	1.109***
	(0.272)	(0.270)	(0.270)
Leverage	-6.413***	-6.106***	-6.486***
	(0.802)	(0.786)	(0.801)
ROA	50.482***	51.422***	50.871***
	(3.033)	(3.048)	(3.057)
PPE	-0.359	-0.675	-0.683
	(0.967)	(0.964)	(0.968)
Intangibles	0.064	-0.118	0.037
	(3.353)	(3.311)	(3.322)
R&D	-8.761*	-9.591*	-6.880
	(5.100)	(5.106)	(5.118)
Flow	-6.570***	-6.614***	-6.508***
	(1.282)	(1.269)	(1.288)
Growth	0.840***	0.882***	0.837***
	(0.285)	(0.285)	(0.285)
FI	0.934***	0.961***	0.972***
	(0.361)	(0.346)	(0.352)
EQINC	1.128***	1.131***	1.130***
	(0.222)	(0.221)	(0.220)
Constant	-7.408***	-8.488***	-7.955***
	(2.373)	(2.353)	(2.349)
Firm FE	Yes	Yes	Yes
Industry-year FE	Yes	No	Yes
Province-year FE	No	Yes	Yes
Observations	16,656	16,656	16,656
Adj R-squared	0.327	0.332	0.334

Notes: The dependent variable is DTR, measured as the difference between the statutory tax rate and effective tax rate. *Labor Intensity* denotes a firm's average labor intensity from 2007 to 2010, in which labor intensity is measured by the natural logarithm of the ratio of the number of employees to fixed assets. "*Post*" is an indicator that equals zero in 2007-2010 and one in 2011-2016. See Appendix A for more details of the variable constructions. Standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3 Robustness Checks: Alternative Measures for Tax Avoidance

VARIABLES	BTD	ETR
	(1)	(2)
Labor Intensity × *Post*	0.145***	-0.777***
	(0.050)	(0.197)
Controls	Yes	Yes
Firm FE	Yes	Yes
Industry-year FE	Yes	Yes
Province-year FE	Yes	Yes
Observations	16,656	16,656
Adj R-squared	0.385	0.444

Notes: In column 1, the dependent variable is BTD, which is measured as the difference between pretax accounting profit and taxable income divided by firms' total assets. In column 2, the dependent variable is ETR, which is measured by the effective tax rate. *Labor Intensity* denotes a firm's average labor intensity from 2007 to 2010, in which labor intensity is measured by the natural logarithm of the ratio of the number of employees to fixed assets. "*Post*" is an indicator that equals zero in 2007-2010 and one in 2011-2016. See Appendix A for more details of the variable constructions. Standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4　Robustness Checks：Alternative Definitions of Reform Exposure

VARIABLES	DTR	DTR	DTR
	(1)	(2)	(3)
High Labor Intensity Indicator × *Post*	1.056***		
	(0.366)		
Labor Intensity in 2010 × *Post*		0.626***	
		(0.191)	
Initial Social Insurance Contribution × *Post*			-0.007***
			(0.001)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes
Province-year FE	Yes	Yes	Yes
Observations	16,290	14,320	11,886
Adj R-squared	0.333	0.319	0.330

Notes: The dependent variable is DTR, which is measured as the difference between the statutory tax rate and effective tax rate. *High Labor Intensity Indicator* is an indicator variable that equals one if the firm's average labor intensities from 2007 to 2010 is above the sample median, and zero otherwise. *Labor Intensity in 2010* is a continuous variable, which indicates the firm's labor intensity at the end of 2010. *Initial Social Insurance Contribution* is a continuous variable, defined as the ratio of social insurance contributions over gross payroll in 2010. "*Post*" is an indicator that equals zero in 2007-2010 and one in 2011-2016. See Appendix A for more details of the variable constructions. Standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5 Results From a Matched Difference-in-differences Model

VARIABLES	DTR	DTR	DTR
	(1)	(2)	(3)
High Labor Intensity Indicator × *Post*	0.545**	0.540**	0.562***
	(0.229)	(0.219)	(0.213)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes
Province-year FE	Yes	Yes	Yes
Observations	13,266	14,143	14,690
Adj R-squared	0.341	0.341	0.342

Notes: This table reports the result of the difference-in-difference regression on the basis of the propensity score matched subsample. Columns (1)-(3) respectively employ nearest neighbor matching algorithms with ratios of 1:5, 1:7, and 1:9. The dependent variable is DTR, which is measured as the difference between the statutory tax rate and the effective tax rate. *High Labor Intensity Indicator* is an indicator variable that equals one if the firm's average labor intensity from 2007 to 2010 is above the sample median, and zero otherwise. "*Post*" is an indicator that equals zero in 2007-2010 and one in 2011-2016. See the appendix for more details of the variable constructions. Standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6 Results Using Pseudo-DTR as the Dependent Variable

VARIABLES	pseudo-DTR	pseudo-DTR	Pseudo-DTR
	(1)	(2)	(3)
Labor Intensity × *Post*	0.919***	0.559**	0.859***
	(0.250)	(0.220)	(0.253)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Industry-year FE	Yes	No	Yes
Province-year FE	No	Yes	Yes
Observations	12,211	12,211	12,211
Adj R-squared	0.357	0.356	0.356

Notes: This table reports the result of the difference-in-differences regression by using pseudo-DTR as the dependent variable. Pseudo-DTR is the difference between statutory tax rate and pseudo-ETR, where pseudo-ETR is calculated as [(income tax expense + {statutory tax rate × additional social insurance contributions })/(pretax accounting profit + additional social insurance contributions)]. *Labor Intensity* denotes a firm's average labor intensity from 2007 to 2010, in which labor intensity is measured by the natural logarithm of the ratio of the number of employees to fixed assets. "*Post*" is an indicator that equals zero in 2007-2010 and one in 2011-2016. See Appendix A for more details of the variable constructions. Standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7 Extending the Sample Period

VARIABLES	DTR	DTR	DTR
	(1)	(2)	(3)
Labor Intensity × *Post*	0.865***	0.783***	0.846***
	(0.188)	(0.173)	(0.194)
Firm FE	Yes	Yes	Yes
Industry-year FE	Yes	No	Yes
Province-year FE	No	Yes	Yes
Observations	27,031	27,031	27,031
Adj R-squared	0.311	0.308	0.317

Notes: The dependent variable is DTR, measured as the difference between the statutory tax rate and effective tax rate. *Labor Intensity* denotes a firm's average labor intensity from 2007 to 2010, in which labor intensity is measured by the natural logarithm of the ratio of the number of employees to fixed assets. "*Post*" is an indicator that equals zero in 2007-2010 and one in 2011-2023. See Appendix A for more details of the variable constructions. Standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8 Heterogeneous Impacts

	Panel A: Financial Constraint		Panel B: Ownership		Panel C: ESG		Panel D: Tax Enforcement	
	High	Low	SOE	Non-SOE	High	Low	Strict	Lax
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Labor Intensity								
× *Post*	1.453***	0.174	1.171***	0.519**	1.064***	0.245	0.560**	1.126***
	(0.360)	(0.228)	(0.379)	(0.239)	(0.257)	(0.317)	(0.249)	(0.319)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,623	11,024	5,403	8,896	8,748	7,893	7,635	9,011
Adj R-squared	0.347	0.341	0.367	0.278	0.320	0.353	0.314	0.342
P-value	0.001		0.062		0.042		0.025	

Notes: The dependent variable is DTR, which is measured as the difference between the statutory tax rate and effective tax rate. In Panel A, we measure financial constraint by using the KZ index, which is proposed by Kaplan and Zingales (1997). A firm is included in the high (low) constrained group if its KZ index is above (below) the sample median at the end of 2010. In Panel B, we divide the full sample into two subsamples, namely, an SOE subsample and a non-SOE subsample. In Panel C, we use the ESG rating provided by the Sino-Securities ESG Index of the Wind database and transfer the rating from C to AAA to numbers 1 to 9. A firm is included in the high (low) ESG group if its ESG score is above (below) the sample median at the end of 2010. In Panel D, we measure the strictness of tax enforcement by using the legal environmental index developed by Fan et al. (2011). A firm is included in the strict (lax) enforcement group if the region has a legal environmental index above (below) the sample median at the end of 2010. All standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a one-tailed test when a prediction is indicated.

Table 9 Mechanism Tests: the Financing Cost Channel

	Operating leverage			Distance-to-default	Crash Risk
VARIABLES	(1)	(2)	(3)	(4)	(5)
ΔLn(Sales) × Post	0.152***	0.226***	0.102		
	(0.053)	(0.078)	(0.071)		
ΔLn(Sales)	0.929***	0.865***	0.992***		
	(0.073)	(0.125)	(0.088)		
Labor Intensity × Post				-0.492***	0.032***
				(0.075)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes
Province-year FE	Yes	Yes	Yes	Yes	Yes
Observations	14,927	7,500	7,168	14,182	13,506
Adj R-squared	0.331	0.370	0.300	0.508	0.074

Notes: This table investigates whether the firms' distress risk increased after the introduction of the Social Insurance Law. In columns 1 - 3, the dependent variable is the first difference in the natural logarithm of earnings before interest and taxes (ΔLn(EBIT)). In column 4, the dependent variable is the distance-to-default ratio (*DDBhsh*), constructed following Bharath and Shumway (2008). In column 5, the dependent variable is stock price crash risk, measured as the down-to-up volatility of firm-specific daily returns (*DUVOL*) constructed following Callen and Fang (2015). All standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 10 Mechanism Tests: the Risk-shifting Channel

VARIABLES	Cash Flow Volatility (1)	Stock Volatility (2)
Labor Intensity × *Post*	0.002**	0.111**
	(0.001)	(0.046)
Controls	Yes	Yes
Firm FE	Yes	Yes
Industry-year FE	Yes	Yes
Province-year FE	Yes	Yes
Observations	14,235	14,115
Adj R-squared	0.398	0.416

Notes: This table investigates firms' risk-shifting incentives after the introduction of the Social Insurance Law. In column 1, the dependent variable is cash flow volatility, measured as three-year standard deviation of the ratio of operating cash flow to assets (from year *t* to year *t+2*). In column 2, the dependent variable is the stock volatility, measured as the annualized volatility of monthly stock returns. All standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 11 Mechanism Tests: Excluding Other Channels

VARIABLES	DTR (1)	DTR (2)	DTR (3)	DTR (4)
Labor Intensity × *Post*	0.821***	0.940***	0.757***	0.920***
	(0.245)	(0.266)	(0.214)	(0.207)
Insurance Ratio	0.009			
	(0.030)			
Insurance Change		-0.395*		
		(0.226)		
Δ*Employ*			0.282	
			(0.354)	
Price-cost Margin				-4.491**
				(1.763)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes
Province-year FE	Yes	Yes	Yes	Yes
Observations	14,103	12,215	15,630	15,802
Adj R-squared	0.342	0.370	0.340	0.334

Notes: The dependent variable is DTR, which is measured as the difference between the statutory tax rate and effective tax rate. Column 1 includes *Insurance Ratio*, measured by the ratio of social insurance contributions to gross payroll. Column 2 includes *Insurance Change*, measured by the ratio of the change in social insurance contributions to the lagged social insurance contributions. Column 3 includes employment growth (Δ*Employ*), measured as the change in the natural logarithm of a firm's employee number. Column 4 includes price-cost margin, calculated as the difference between sales and cost of goods sold (COGS) divided by sales. All standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendix A: Description and definition of key variables

DTR = the difference between statutory and effective tax rates.

BTD = the ratio of the difference between pretax book income and taxable income to firms' total assets.

ETR = ratio of income tax expenses to pretax accounting profit.

Labor Intensity = natural logarithm of the ratio of the number of employees to fixed assets.

Size = logarithm of firm's total asset.

Lev = total liabilities divided by total assets.

ROA = ratio of net profits over total assets.

PPE = fixed assets divided by total assets

Intangibles = intangible asset divided by total assets

R&D = research and development expenses divided by lagged total assets

Flow = operating cash flow divided by total assets

Growth = growth rate of sales revenue

FI = equals one if the firm generates foreign income, and zero otherwise.

EQINC = equals one if the firm has equity income received from unconsolidated entities, and zero otherwise.

DDBhsh= the distance-to-default ratio calculated following Bharath and Shumway (2008).

DUVOL = the down-to-up volatility of firm-specific daily returns constructed following Callen and Fang (2015)

Appendix B: Additional figures for PSM-DID

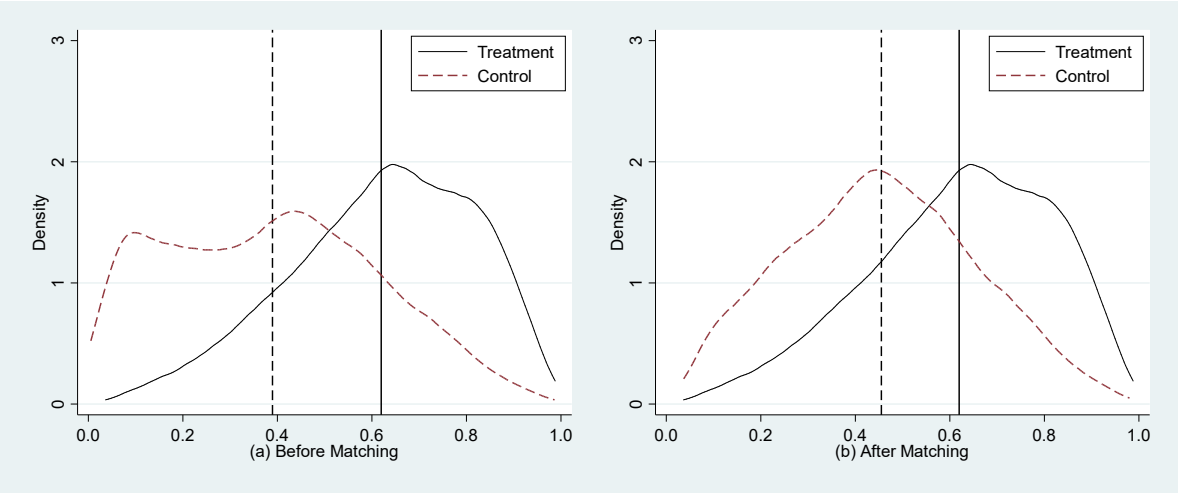

Figure B1 Propensity Score Distribution before and after Matching

Note: The left-hand figure shows the propensity score distribution prior to matching, while the right-hand figure displays the distribution after matching. In each figure, the horizontal axis represents the propensity scores, and the vertical axis indicates the kernel density. The solid vertical line marks the mean distribution value for the treatment group, and the dashed vertical line represents the mean distribution value for the control group.

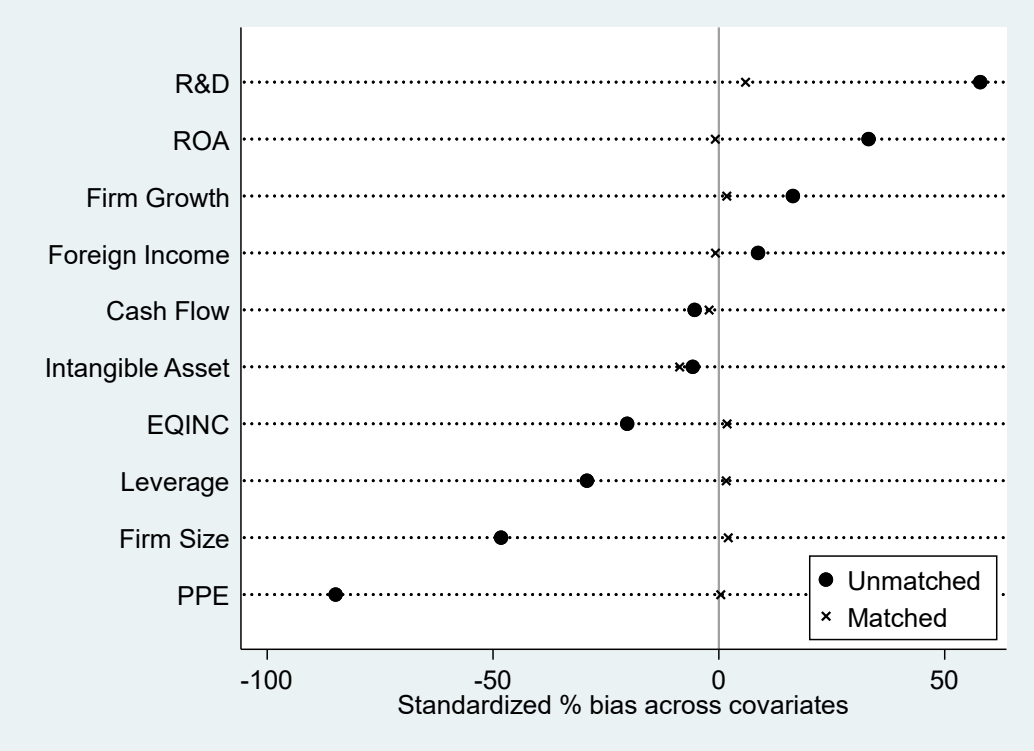

Figure B2 Comparison of Covariate Differences before and after Matching

Appendix C: Additional tables

Table C1 Impact of the Law on Corporate Labor Cost and Performance

VARIABLES	Insurance Contributions	Labor Expense	Admin Cost	Profitability	ΔEmploy	Price-cost Margin
	(1)	(2)	(3)	(4)	(5)	(6)
Labor Intensity × *Post*	0.109***	0.131***	0.002***	-0.002**	-0.032***	0.004**
	(0.015)	(0.032)	(0.001)	(0.001)	(0.005)	(0.002)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,218	15,799	15,806	16,656	15,630	15,802
Adj R-squared	0.747	0.705	0.840	0.675	0.163	0.888

Notes: This table reports the effect of the implementation of the Social Insurance Law on corporate labor cost, profitability, employment growth and price-cost margin. Column 1 is social insurance contributions per capita, defined as expenditure on social insurance contributions divided by the number of employees. Column 2 is labor cost, defined as total payroll divided by the number of employees. Column 3 is administrative cost, calculated as general and administrative (G&A) expenses divided by sales. Column 4 is profitability, measured as return on assets. Column 5 is employment growth, measured as the change in the natural logarithm of employee number. Column 6 is price-cost margin, calculated as the difference between sales and cost of goods sold (COGS) divided by sales. Standard errors in parentheses are clustered at the firm level. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.