# Title Page

**Title:**

Market segmentation, infrastructure construction and corporate tax avoidance in China

**Running Head:**

Market segmentation and corporate tax avoidance

**Abstract:**

Market segmentation driven by local government protectionism raises concerns regarding the tax avoidance practices of regional enterprises. We examine the effect of market segmentation on corporate tax burdens by analyzing Chinese A-share listed companies from 2007 to 2021. We show that market segmentation heightens information barriers for regional enterprises, thereby amplifying the tax avoidance motivations of listed companies. These findings remain robust even after addressing potential endogenous issues. The construction of a high-speed rail network and digital infrastructure help reduce corporate tax avoidance activities. Moreover, market segmentation more markedly boosts tax avoidance in firms with more non-local subsidiaries, where internal controls are weak, financing constraints bind, or management lacks overseas exposure. Overall, our results highlight the significant role of market segmentation in influencing corporate tax behavior and provide insights into policy interventions, such as infrastructure development, to mitigate its negative effects and promote a more transparent and efficient business environment.

**Keywords:**

Market segmentation; High-speed rail network; Digital infrastructure; Corporate tax avoidance; Non-local Subsidiaries

**JEL classification:** D82; L22

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**Conflict of Interest**

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# Market segmentation, infrastructure construction and corporate tax avoidance in China

**Abstract:** Market segmentation driven by local government protectionism raises concerns regarding the tax avoidance practices of regional enterprises. We examine how market segmentation among different provinces in China influences corporate tax avoidance under the construction of digital infrastructure at the provincial level and inter-regional high-speed rail. We show that market segmentation heightens information barriers for regional enterprises, thereby amplifying the tax avoidance motivations of listed companies. These findings remain robust even after addressing potential endogenous issues. The construction of a high-speed rail network and provincial digital infrastructure help inhibit corporate tax avoidance activities. Moreover, market segmentation more markedly boosts tax avoidance in firms with more non-local subsidiaries, where internal controls are weak, financing constraints bind, or management lacks overseas exposure. Overall, our results highlight the significant role of market segmentation in influencing corporate tax behavior and provide insights into policy interventions, such as infrastructure development, to mitigate its negative effects and promote a more transparent and efficient business environment.

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## 1. Introduction

The construction of a unified domestic market relies on the overarching goal of creating a cohesive market system and set of rules. By deepening reforms related to the market-oriented allocation of development factors, this initiative aims to eliminate key obstacles that impede the economic cycle and facilitate the smooth flow of commodities and factor resources on a broader scale. However, challenges persist in the distribution of economic and social resources between local and central governments, as well as among local governments themselves. These challenges result in resource-based conflicts centered around employment, taxation, and GDP indicators. To protect local enterprises with insufficient market competitiveness and to minimize the outflow of local capital, talent, technology, and other resources, local governments often resort to administrative restrictive measures. These measures elevate the cost threshold for the inter-regional flow of certain economic resources, thereby creating market segmentation. This phenomenon profoundly affects the relationships between governments and enterprises, as well as among enterprises themselves, through the "hand of the government" (Faccio et al., 2006; Wei et al., 2023). The negative economic impact of market segmentation is widely recognized, as it not only hinders the transformation and upgrading of regional industries but also inhibits the input and use efficiency of technological innovation resources. Additionally, it increases the transaction costs among market players (Hatheway et al., 2017; Braouezec, 2019), which in the long run impedes the construction of a high-quality, unified market nationwide. On April 10, 2020, at the 7th meeting of the Central Committee of Finance and Economics, President Xi Jinping emphasized the need to build a new development pattern with domestic circulation as the



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main body while domestic and international dual cycles promoting each other. This strategic concept laid a solid ideological foundation for improving the efficiency of inter-regional factor flow and allocation by addressing market segmentation. in 2022, the Central Committee of the Communist Party of China and the State Council promulgated and implemented the *Opinions on Accelerating the Construction of a Unified National Market*. This initiative focuses on creating a fair and transparent business environment across various regions while continuously promoting an efficient and smooth domestic market and expanding its scale. This effort aims to form a domestic circulation pattern in which supply and demand promote each other, production and marketing go hand in hand, and the market operates smoothly and efficiently.

The key obstacle to implementing the strategic concept of building a unified national market lies in overcoming the deeply rooted interest division and local protectionism in the administrative practices of local governments and their officials. Existing research shows that market segmentation adversely affects investment, financing, and production activities of enterprises, including hindering the establishment of subsidiaries in different locations, reducing the efficiency of mergers and acquisitions, causing imbalances in the regional allocation of credit resources, reducing production efficiency, and inhibiting the rise in commodity prices (Barwick et al., 2021). However, few studies focus on the economic consequences and impacts of market segmentation from the perspective of regional enterprise tax behavior.

From the perspective of tax avoidance motivation, the lack of enterprise resources and asymmetric information can enhance managers' tax avoidance motivation (Kim et al., 2011). Market segmentation hinders the transmission of information between enterprises and external investors, increasing information barriers and communication costs, weakening the market's role



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in resource allocation, and inhibiting the rational and effective allocation of resources needed for enterprise development (Luo et al., 2021). Therefore, studying whether the degree of market segmentation in different regions affects tax compliance behavior of local enterprises and its mechanisms is of great theoretical and practical significance.

Using a sample of Chinese listed firms from 2007 to 2021, this paper explores how regional market segmentation affects corporate tax avoidance. The empirical results show that market segmentation significantly increases corporate tax avoidance. This result remains valid after addressing potential endogenous problems and sample selectivity issues, using instrumental variables and the propensity score matching method. The mechanism analysis indicates that market segmentation enhances information barriers for local enterprises, and strengthens management's tax avoidance motivation. Additionally, the construction of high-speed rail networks and digital infrastructure help break the information barriers caused by market segmentation, thereby inhibiting tax avoidance activities under market segmentation. Further research shows that low financing constraints, effective internal control and management with overseas experience can effectively inhibit tax avoidance activities under market segmentation.

Compared to previous studies, the marginal contribution of this research lies in several key areas. First, this study makes a theoretical contribution by identifying market segmentation as a novel determinant of corporate tax avoidance — a factor previously overlooked in the extant literature. While prior research has predominantly examined macroeconomic and institutional drivers, including economic cycles (Xia et al., 2017; Kanagaretnam et al., 2018), industrial policies (Geng et al., 2021), and fiscal regimes (Zhang et al., 2023), we establish market-driven resource misallocation as a critical mechanism. By formalizing the tripartite



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"government-market-firm" institutional framework, we uncover how subnational market fragmentation interacts with corporate governance traits (e.g., internal control quality, managerial expertise) to systematically incentivize tax-avoidance strategies. This reconceptualization bridges institutional economics with corporate finance literature, offering a unified lens to analyze fiscal decision-making under market frictions.

Second, we introduce high-speed rail and regional digital infrastructure as exogenous shocks to identify causal pathways through which market integration affects tax behavior — a methodological advance in the tax avoidance literature. By exploiting infrastructure construction as the quasi-natural experiment, we demonstrate that reduced interregional transaction costs and regulatory costs significantly attenuate segmentation-induced tax avoidance. Crucially, infrastructure construction not only enhance factor mobility (capital, labor) but also accelerate information dissemination, thereby diminishing firms' opportunistic incentives in fragmented markets. This approach provides rigorous empirical evidence that transport infrastructure and digital infrastructure are scalable policy tools for mitigating market frictions, extending New Economic Geography models to corporate taxation contexts.

Third, our findings offer timely insights into China's "Dual Circulation" development paradigm. We prove that reducing spatial transaction costs via infrastructure investment (e.g., digital infrastructure) is Pareto-superior to administrative interventions for curbing tax avoidance in segmented markets. This underscores the necessity of deepening factor market reforms while deploying physical connectivity to achieve a unified national market — a prerequisite for sustainable growth under economic dualism. By quantifying how market integration realigns corporate fiscal incentives, we provide microfoundations for macro-level development strategies.



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The rest of this paper is organized as follows: Section 2 presents the theoretical analysis and hypothesis development; Section 3 outlines the research design, including sample selection, data sources, model specification, and variable definitions; Section 4 discusses the empirical analysis and robustness tests; Section 5 explores avenues for further research. Finally, Section 6 concludes with the key findings and policy implications.

## 2. Theoretical analysis and hypothesis development

### *2.1 Market segmentation, information barriers and tax avoidance*

The relationship between government and enterprises has long been a focal point of theoretical research. This stems from the government's control over resources essential for the survival and development of enterprises, influencing or even determining the acquisition of these resources through various channels. Different viewpoints have emerged regarding the government's role in enterprise development: the “supporting hand” and the “hand of plunder” (Kornai et al., 2003; Faccio et al., 2006; Wei et al., 2023). The “supporting hand” is reflected in the industrial support policies and fiscal and tax preferential measures the government adopts for specific industries or enterprises (Shleifer & Vishny, 1994). Conversely, the "hand of plunder" refers to the government’s requirement for enterprises to transfer some resource interests through administrative regulation based on political or social goals, fulfilling the local government's employment, taxation, GDP, and other targets (Chen et al., 2021). Existing research typically interprets market segmentation from the perspective of government motivation, agreeing that local officials’ promotion championship in politics, economic local protectionism, and even cultural diversity and regional characteristics hinder information transmission, resource



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circulation, and labor mobility, thereby aggravating market segmentation. Moreover, the prevailing view is that information barriers and the resulting resource constraints drive management's tax avoidance activities (Gallemore & Labro, 2015; Chen & Lin, 2017; Luo et al., 2020). Therefore, this paper will elucidate the influence mechanism of market segmentation on management's tax avoidance motivation through the explanatory path of information barriers.

Corporate tax avoidance is subject to supervision by auditors, media, analysts, and government tax authorities (Chen et al., 2019; Lee, 2021). The cost of information collection and analysis becomes a key factor in determining whether external supervision can be effective, thereby influencing the tax avoidance motivation of corporate management. From the perspective of external stakeholders, market segmentation prevents them from obtaining company management information, increases the cost of information collection and analysis, reduces the regulatory penalty risk and opportunistic cost of tax avoidance operations, and enhances managers' motivation to seek tax avoidance and reduce resource outflow from enterprises. Regarding the market competition mechanism, Dhaliwal et al. (2014) argue that market competition is an effective external supervision mechanism. It can enhance market information transparency, strengthen the accounting conservatism of enterprises, and curb management's opportunistic motivations. To protect local industries from foreign competitors, local governments often establish institutional barriers for foreign capital to enter the local market, which weakens the incentive for external capital with competitive advantages to invest in different regions. This reduces the level of competition and transparency in the local market, thereby increasing managers' motivation to seek opportunistic ways for personal gain. Moreover, existing research indicates that enterprises naturally use "tax havens" and low-tax regions to



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transfer profits to achieve tax evasion (Coppola et al., 2021). Multinational companies, for example, may transfer taxable profits to overseas tax havens to reduce resource outflow (Egger et al., 2010; Dowd et al., 2017; Guvenen et al., 2022). When local governments obstruct local enterprises from establishing subsidiaries in different regions or foreign goods from entering the local market through administrative interventions, the ability of a company's management to adjust the company's surplus through actual economic activities, including related party transactions, is significantly limited under normal production and operation conditions. As a result, when enterprises aim to reduce resource outflow based on normal business development needs, tax avoidance motivation rises through the adjustment of manipulable accruals.

Existing studies generally suggest that resource constraints significantly motivate enterprise tax avoidance (Chen and Lai, 2012; Luo et al., 2020; Lei et al., 2021; Hasan et al., 2021). Market segmentation reduces the pricing efficiency of the capital market by increasing information barriers between regional markets, leading to an imbalance between regional credit supply and demand. This negatively impacts the acquisition and utilization efficiency of enterprise credit resources (Chernenko and Sunderam, 2012). Moreover, the sustainable development of enterprises relies on market scale support. Market segmentation restricts cross-regional investment, constrains the market size expansion of enterprise product sales, and reduces the profit margins from investments in different regions. As resource allocation efficiency declines and enterprises' profit margins are limited, they face reduced long-term financing, increased financing constraints, and greater dependence on short-term debt funds. This situation raises the risk of breaking the capital chain and falling into financial difficulties. Consequently, the tax avoidance activities of enterprises motivated by resource-saving needs will notably increase.



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In summary, from the perspective of information channels, market segmentation increases the cost for external stakeholders to collect and analyze information related to the company's operation and management, thereby providing a favorable environment for corporate management's tax avoidance activities. From the perspective of capital channels, market segmentation reduces the efficiency of market resource allocation and intensifies the resource constraints of local enterprises, further motivating management's tax avoidance. Overall, we puts forward the following research hypotheses.

***H1.*** *Ceteris paribus, market segmentation facilitates the tax avoidance of regional enterprises.*

### *2.2 The inhibitory effect of infrastructure construction on information barriers*

With the rise of new economic geography, increasing attention is being paid to the influence of time and space distance on transaction costs for enterprises. This has led to discussions on the micro-economic effects resulting from the accelerated circulation of talents, information, and other resources and regulatory efficiency following the infrastructure construction, including high-speed rail networks and regional digital infrastructure (Ahlfeldt and Feddersen, 2018; Du and Wang,2024).

From the informational standpoint, the establishment of a "four vertical and four horizontal" high-speed rail network in China can effectively dismantle barriers for external stakeholders seeking private information. It improves auditors' ability to obtain "soft information" and enhances communication efficiency, thereby increasing the reference value of audit reports and the effectiveness of external supervision (Zhang et al., 2020; Kuang et al., 2021). It also increases the frequency of analysts' field research on companies along the high-speed rail lines,



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enhancing the accuracy of financial forecasts and bolstering the information intermediary function (Kong et al., 2020; Chen et al., 2022). Additionally, the construction of high-speed rail network can exert an information governance effect on internal agents of the company by shortening the time and space distance between enterprises and external economic entities. This reduces information asymmetry and supervision costs, improves the external information environment faced by enterprise management, and effectively inhibits managers' ability and motivation to conceal negative news (Wu et al., 2022). At the same time, the reduction in information resource and communication costs brought about by the high-speed rail's opening will help improve internal financial decision-making quality. This includes enhancing the financing efficiency of local enterprises, reducing their financing costs (Wang et al., 2019), improving the dynamic adjustment speed of enterprise capital structure, and optimizing enterprise capital structure, thus improving their financial situation and leverage levels. Therefore, the construction of high-speed rail network helps break down regional information barriers caused by market segmentation. It enhances the supervision and governance capability of external information intermediaries and curbs management's motivation to manipulate information, thereby reducing tax avoidance activities of enterprises.

Higher levels of local digital infrastructure development enhance corporate operational autonomy and managerial efficiency (Chen et al., 2024), which mitigates decision-making failures and economic losses caused by inter-regional information asymmetry in segmented markets. Concurrently, it improves local governments' tax oversight and governance efficacy (Gordon and Li, 2009; Uyar et al., 2021), while effectively safeguarding the authenticity of fund transfers and financial disclosures in cross-regional operations of listed firms. Crucially, such



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infrastructure suppresses listed companies' tax avoidance incentives arising from manipulated transactional activities and accounting figures manipulation (Guo et al., 2024). Based on this, this paper further puts forward the following research hypotheses.

***H2a.*** *Ceteris paribus, the construction of high-speed rail network can help alleviate the information barriers caused by market segmentation, thereby inhibiting enterprises from engaging in tax avoidance.*

***H2b.*** *Ceteris paribus, the construction of digital infrastructure can help alleviate the information barriers caused by market segmentation, thereby inhibiting enterprises from engaging in tax avoidance.*

In conclusion, Figure 1 captures the operationalization of our conceptual framework, outlining the constructs of information asymmetry theory and institutional theory, which delineats the influence mechanism of market segmentation on corporate tax avoidance, including provincial digital infrastructure construction, high-speed rail network, as explained by our hypotheses. Moreover, this paper also incorporates heterogeneity at the firm level into the analysis framework, including non-local subsidiaries, internal control, managerial oversea experience and financial constrains.

**[Insert Fig 1 about here]**

## 3. Research design

### *3.1 Sample selection and data sources*

We select Shanghai and Shenzhen non-financial A-share listed companies in China from 2007 to 2021 as the research samples. The ST, *ST, and PT companies were eliminated, as well as



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observations with missing values for variables in the baseline regression. Our final sample includes 30,613 firm-year observations. We collect market segmentation and corporate tax avoidance, as well as other financial data, from the CSMAR database. In our empirical analysis, all continuous variables are winsorised at the top 1% and bottom 99% levels to reduce the influence of outliers.

### *3.2 Research model and variable definition*

To test the impact of market segmentation on corporate tax avoidance, we adopt the model (1) as followed by controlling for firm's financial characteristics, corporate governance factors, and fixed effects at the provincial, industry, and year levels.

$$ETR_{i,t} = \alpha + \beta_1 \times SEGINDEX_{j,t} + \sum \gamma \times Controls_{i,t} + \sum Province + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (1)$$

Among these variables, *SEGINDEX* is the core explanatory variable of our paper, representing the inter-provincial market segmentation level following Liu et al. (2024). *SEGINDEX* is calculated by obtaining 69 pairs of neighboring provinces (excluding Hong Kong, Macao, and Taiwan) and using the price differences of 21 types of commodities[①] between these neighboring provinces[②].

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[①]These 21 categories of goods include: food, grains, meat and poultry products, eggs, aquatic products, vegetables, dried and fresh fruits, beverages, tobacco and alcohol, clothing, shoes and hats, textiles, household appliances and audiovisual equipment, cultural and office supplies, daily necessities, sports and entertainment products, transportation and communication supplies, furniture, cosmetics, Chinese and Western medicine and healthcare products, books, newspapers, magazines and electronic publications, fuel, building materials, and electrical materials.

[②]The data for the market segmentation indicator is sourced from the *CSMAR* database. Due to the small mean, we multiplies the indicator by 100 to eliminate dimensional differences. The specific calculation process is as follows: setting any two adjacent provinces as m and n, where k represents a certain type of commodity, p represents the retail price index of the commodity, and t represents a certain year. The variance of the relative price of a certain type of commodity in two adjacent provinces in a given year is expressed as follows: $/\Delta Q^k_{mnt}/ = /ln(\frac{P^k_{mt}}{P^k_{nt}}) - ln(\frac{P^k_{mt-1}}{P^k_{nt-1}})/ = /ln(\frac{P^k_{mt}}{P^k_{mt-1}}) - ln(\frac{P^k_{nt}}{P^k_{nt-1}})/$。Then, divide the calculation into four steps: first, calculate the average value ($\overline{\Delta Q^k_m}$) of k products ($/\Delta Q^k_{mnt}$); Next, calculate the relative price change of



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The key explained variable is the corporate tax avoidance (*ETR*). According to Chen et al. (2010), the specific calculation method for the *ETR* is as follows: "nominal income tax rate-(total income tax expense-deferred income tax expense)/total profit". When the nominal income tax rate of an enterprise is higher than the actual income tax rate, a higher value of the *ETR* indicates a greater degree of tax avoidance by the enterprise. Our results are still robust when book-tax difference (*BTD*) is used as an alternative measure in the robustness test. Book-tax difference (*BTD*) captures the difference between an enterprise's total profit and its current taxable income, divided by the enterprise's current asset size①.

In addition, we further control for other factors that may affect the firm's tax avoidance. Specifically, we include enterprise size (*Size*, measured by the natural logarithmic value of total assets at the end of the year), debt level (*LEV*, measured by the total asset-liability ratio), profitability (*ROA*, measured by the total asset profit rate), investment opportunities (*TQ*, measured by the ratio of the total stock market value at the end of the year to the total assets at the end of the period), operational ability (*Circle*, measured by the total asset turnover rate), manager power (*Dual*, a dummy variable where 1 indicates the general manager and chairman are the same person, and 0 otherwise), and the proportion of independent directors on the board (*INDRATE*). Additional factors include the average age of directors and supervisors (*AGE*), management shareholding (*MNHLD*, measured by the proportion of shares held by senior managers), major shareholders' shareholding ratio (*SHRCR1*, measured by the proportion of

product type k: $q_{mnt}^{k} = /q_{mnt}^{k} / - \overline{\Delta Q_{m}^{k}}$; Next, calculate the variance (var($q_{mnt}$)) for each of the 21 product categories ($q_{mnt}^{k}$) once again; Finally, the market segmentation degree is determined based on the average variance of the relative price changes for 21 commodity categories across adjacent provinces: $SEGINDEX = [\sum_{m \neq n} \mathrm{var}(q_{mnt})]/N$.

① *BTD*= (total profit-(income tax expense-deferred income tax expense)/nominal income tax rate)/total assets at the end of the period.



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shares held by the largest tradable shareholder), equity checks and balances (*SHRZ*, measured by the ratio of shares held by the largest tradable shareholder to the second largest tradable shareholder), and property-rights attributes (*SOE*, a dummy variable where 1 indicates state-owned enterprises and 0 indicates non-state-owned enterprises). This paper also controls for fixed effects at the provincial, industry, and year levels.

To test whether the infrastructure construction (e.g. high-speed rail network, or digital infrastructure) as proposed in Hypothesis 2, can mitigate the negative impact of market segmentation, we design the following model (2).

$$ETR_{i,t} = \alpha + \delta_0 \times Infrastructure_{j,t} + \delta_1 \times SEGINDEX_{j,t} + \delta_2 \times Infrastructure_{j,t} \times SEGINDEX_{j,t} + \sum \gamma \times Controls_{i,t} + \sum Province + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (2)$$

In model (2), among the moderating factor is the infrastructure construction ($Infrastructure_{j,t}$), including high-speed rail network and digital infrastructure. High-speed rail network is measured by two indicators in this paper. The first one, $DUM\_High_{j,t}$ is a dummy variable that reflects whether the city has opened the high-speed rail. If city *j* has opened the high-speed rail in year *t*, it is assigned a value of 1 in year *t* and in subsequent years, 0 otherwise. The second one, $NUM\_High_{j,t}$ is a continuous variable measured by the number of high-speed rail lines opened in the city where the enterprise *i* is located. We expect the coefficient of the interaction term *DUM_High*×*SEGINDEX* or *NUM_High*×*SEGINDEX* in model (2) to be significantly negative. Digital infrastructure is also measured by two indicators in this paper. The first one, *INTBR* is measured through the natural logarithm of the number of internet broadband subscribers in the province. The second one, *INTBR2* is measured through the natural logarithm of the number of internet broadband access ports in the province. We expect the coefficient of the interaction term



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*INTBR*×*SEGINDEX* or *INTBR2*×*SEGINDEX* in model (2) to be significantly positive. This suggests that the development of high-speed rail network, or the construction of digital infrastructure in the city where firms are located, can more effectively reduce information barriers caused by market segmentation, thereby significantly curbing firm's tax avoidance behavior.

Table 1 in Appendix shows the definition of all variables in model (1)-(2).

**[Insert Table 1 about here]**

### *3.3 Descriptive statistics*

Table 2 presents the descriptive statistical results of the main variables. The average value of the enterprise tax avoidance index (*ETR*) is -0.02, indicating that the nominal income tax rate of enterprises in the research sample is slightly lower than the actual income tax rate, resulting in a relatively heavy actual tax burden. The mean value of the regional market segmentation index (*SEGINDEX*) is 0.033, with minimum and maximum values of 0.012 and 0.079, respectively, highlighting some differences in the degree of market segmentation among different provinces. 77.7% of the cities in the sample have opened high-speed rail (*DUM_High*), on average, each city has 3.946 high-speed rail lines (*Num_High*). The average number of internet broadband subscribers in the province (*INTBR*) is 12506.27 thousand people, and there are 24737.61 internet broadband access ports in the province on average. The average asset-liability ratio (*LEV*) in the research sample is 41.7%, the average return on assets (*ROA*) is 4.2%, and 28.3% of the company's CEO and chairman positions are held by the same person. The average proportion of independent directors on the board (*INDRATE*) is 37.42%, and the average age of the management team (*AGE*) is 48.97 years.



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**[Insert Table 2 about here]**

### *3.4 Univariate test*

Table 3 presents the univariate test results. Based on the intensity of market segmentation in the region where the enterprise *i* is located, it is divided into strong and weak groups using the average value as the boundary. This table compares the differences in related indicators, such as corporate finance and governance, including tax avoidance indicator, between the strong and weak market segmentation groups. It is evident that the degree of tax avoidance (*ETR*) is higher in areas with strong market segmentation, preliminarily verifying the research hypothesis of this paper. The proportion of high-speed rail lines opened in regions with higher market segmentation (*DUM_High*) is relatively lower, but in cities that have already opened, there are more lines (*Num_High*). This is because in central and western China, provincial capitals or key node cities often pass through more high-speed rail lines. Regions with high market segmentation have lower levels of digital infrastructure construction (*INTBR*, *INTBR2*). Additionally, in areas with higher level of market segmentation, enterprises tend to be smaller in size, have higher debt levels (*LEV*), weaker profitability (*ROA*), faster asset turnover, more dispersed management power (*Dual*), lower ratios of independent directors (*INDRATE*), younger management teams (*AGE*), and lower management shareholding ratios (*MNHLD*).

**[Insert Table 3 about here]**

## 3. The empirical results and analysis

### *4.1 Baseline regression results*

Table 4 presents the empirical test results of the main regression analysis in this paper. By



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gradually adding control variables, it is found that regional market segmentation significantly enhances the tax avoidance motivation of local enterprises at the 1% level, thereby proving the validity of Hypothesis 1 in this study. However, whether the mechanism of regional market segmentation affecting corporate tax avoidance holds true also remains to be further tested. Additionally, from the significance of the control variable coefficients, we observe that private enterprises with larger scale, lower debt ratio, worse profitability, more investment opportunities, and lower management shareholding ratios exhibit higher degrees of tax avoidance.

**[Insert Table 4 about here]**

### *4.2 Robustness test*

#### *4.2.1 Instrumental variable method*

This paper selects the provincial-level market segmentation index to study its specific impact on micro-enterprises' tax behavior and finds that inter-regional market segmentation enhances local enterprises' tax avoidance motivation. However, during the same period, there are numerous provincial factors affecting corporate tax behavior, some of which are not included in the main regression model. This omission could lead to endogenous problems caused by missing variables in the research process. To address this, the paper further uses instrumental variables for causal identification. Considering that instrumental variables directly affect the explanatory variables without directly influencing the explained variables (*ETR*), the concept of the "unified big market" is employed. This concept, first proposed by the State Council in August 2015 and the Fourth Plenary Session of the 19th CPC Central Committee in November 2019, introduces the dual-cycle strategic concept based on the unified big market as exogenous policy shocks[①].

[①]The proposal of the "Unified Big Market" and "Dual Circulation" strategies can break down trade barriers



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Two indicators, *Year_2015* and *Year_2019*[①], are constructed and included in the two-stage least squares regression model as instrumental variables. The test results are shown in Table 5. The F statistic (585.163) reported in the first stage of regression results is far greater than 10. Thereby, the original hypothesis of "weak instrumental variables" is rejected, which means that using the "unified big market" policy (*Year_2015*) and the dual-cycle strategy (*Year_2019*) as instrumental variables poses no problem of weak instrumental variables in the two-stage estimation. The statistical significance and magnitude of the coefficient of market segmentation intensity (*SEGINDEX*) in the first-stage regression results are much higher than those in the main regression results in Table 4. After being tested by the instrumental variable method, the main finding of this paper remains robust.

**[Insert Table 5 about here]**

*4.2.2 Propensity Score Matching Method (PSM)*

Because the cost of tax avoidance is relatively low in an environment with opaque information, enterprises with higher motivation for tax avoidance may prefer to register in areas with relatively closed information resources. Therefore, the issue of market segmentation affecting corporate tax avoidance in this paper may present a sample self-selection problem. Thus a 1:1 nearest neighbor matching method is adopted. In the first stage, the market segmentation intensity in the research sample is divided into high and low groups, creating a treatment group (high-degree market segmentation) and a control group (low-degree market segmentation). The covariates for 1:1 nearest neighbor matching include enterprise size (*Size*), debt level (*LEV*),

between regions, promote the flow of goods, information, and labor, and directly weaken the existing market segmentation between regions.

[①]Among them, *Year_2015* is a dummy variable, assigning a value of 1 after year 2016, otherwise it is 0; *Year_2019* is a dummy variable that assigns a value of 1 after year 2020, otherwise it is 0.



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profitability (*ROA*), cash flow level (*CASH*), total asset turnover rate (*Circle*), the shareholding ratio of the largest shareholder (*SHRCR1*), equity balance (*SHRZ*), the proportion of independent directors on the board (*INDRATE*), the number of years on the market (*AGE*), and management shareholding ratio (*MNHLD*). This process results in 10965 matching samples.

**[Insert Fig 2 about here]**

Figure 2 presents the density plot before and after matching. Initially, there are some characteristic differences between the treatment group and the control group, but after matching, the density curves of the two groups almost coincide. In the second stage, after re-testing according to paired samples, the results are shown in Table 6. Even after gradually adding control variables, the coefficient of *SEGINDEX* remains significant at the 1% level. This indicates that the main conclusions of this paper are still valid after addressing the potential bias that enterprises with a higher motivation for tax avoidance may actively choose regions with higher market segmentation intensity.

**[Insert Table 6 about here]**

*4.2.3 Variable replacement*

Considering that there are various methods to measure the corporate tax avoidance index in the existing literature, and to eliminate the interference of variable measurement on the research results, this paper adopts the book-tax difference (*BTD*) to measure corporate tax avoidance. A larger value of *BTD* indicates a higher degree of tax avoidance. This variable is substituted into model (1) to replace the effective tax rate (*ETR*) used as the explanatory variable in the primary regression. The re-test results, shown in Table 7, reveal that the regional market segmentation intensity (*SEGINDEX*) still significantly enhances the tax avoidance motivation of local



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enterprises. This finding confirms the reliability of the study.

**[Insert Table 7 about here]**

## 5. Further research

### *5.1 The inhibitory effect of infrastructure construction*

This paper argues that the infrastructure construction, including the high-speed rail network and regional digital infrastructure, can shorten the time and space distance between enterprises and external economic entities. High-speed rail network and digital infrastructure effectively dismantle the barriers for external stakeholders to obtain private information, exert an information governance effect on internal agents, reduce information asymmetry and supervision costs, and thereby effectively restrain managers' opportunistic motivations. The empirical results of model (2) are shown in Table 8. The coefficient of *SEGINDEX × DUM_High* in column (1) is significantly negative at the 1% level, reflecting that the management's tax avoidance motivation in local enterprises under market segmentation is notably inhibited after the high-speed rail was opened in the city. Furthermore, the coefficient of *SEGINDEX × Number_High* in column (2) is significantly negative at the 10% level, indicating that the more high-speed rail lines are opened in the city where enterprises located, the more information barriers are dismantled, and the management's tax avoidance activities are significantly inhibited. This verification supports Research Hypothesis 2a. Further more, the coefficient of *SEGINDEX × INTBR* and *SEGINDEX × INTBR2* in column (3)-(4) are both significantly negative at the 1% level, consistent with the argument that regional digital infrastructure can improve local governments' tax oversight and governance efficacy, and help alleviate the information barriers caused by market segmentation,



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thereby inhibiting enterprises from engaging in tax avoidance, which supports Research Hypothesis 2b.

**[Insert Table 8 about here]**

### *5.2 Heterogeneity analysis*

#### *5.2.1 Non-local Subsidiaries*

Under market segmentation, firms must comply with spatially differentiated local tax policies. Such segmentation constrains corporate operational autonomy, reduces market information efficiency, and creates institutional arbitrage opportunities for tax avoidance. To mitigate tax burdens, listed companies can establish geographically dispersed subsidiaries—enhancing operational flexibility while tactically leveraging regional tax policy variations (Coppola et al.,2021; Laffitte and Toubal,2022; Langenmayr and Liu,2023). Thus far, our findings have suggested that enterprises tend to shelter their tax payable under the background of market segmentation. If this argument holds, it is reasonable to expect this effect to be more pronounced for firms with with numerous non-local subsidiaries. To test this conjecture, we use the dummy variable (*IS_SUB*, where 1 indicates firm *i* in the city *j* has non-local subsidiaries, and 0 otherwise) and continuous variable (*NUM_SUB*, which indicates the number of non-local subsidiaries) to capture the positive effect of non-local subsidiaries[①] on tax avoidance under inter-regional market segmentation. The results are presented in column (1)-(2) of Table 9. Here, we find that the coefficient of *SEGINDEX* × *IS_SUB* and *SEGINDEX* × *NUM_SUB* are significantly positive at the 10% and 1% level, respectively. This findings indicate that listed companies would utilize subsidiaries located in different regions to achieve tax avoidance

① This evaluation is sourced from the the CSMAR database.



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purposes under market segmentation.

### *5.3.2 Internal control*

It is found that the quality of financial status and earnings information is relatively worse in companies with defects in internal control (Altamuro and Beatty, 2010). High-quality internal control can promote the realization of compliance objectives and reduce the risk of violations caused by aggressive tax avoidance. This paper further investigates the influence of market segmentation on corporate tax avoidance activities under different internal control quality levels. An internal control quality variable (*IC_Dum*) is constructed for the sample enterprises by evaluating whether the internal control of listed companies is effective, assigning a value of 1 for effective internal control and 0 otherwise. This evaluation is sourced from the internal control effectiveness index in the CNRDS database. The results shown in column (3) of Table 9 indicate that the coefficient of *SEGINDEX* × *IC_Dum* is significantly negative at the 5% level. This finding suggests that effective internal control can inhibit management's tax avoidance motivation under market segmentation by improving governance and reducing enterprise violations.

### *5.3.3 Corporate financial constraints*

Some studies have found that financing constraints worsen the external financing environment for enterprises and increase financing costs, thereby enhancing managers' motivation to reduce enterprise resource outflow through tax avoidance. This paper examines whether corporate financing constraints further enhance management’s tax avoidance motivation under conditions of market segmentation. The *KZ* index is constructed to measure the degree of corporate financing constraints (*KZ*), where a larger index value indicates higher financing constraints.



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This measurement is based on the index of corporate financing constraints in the "Business Dilemma" sub-database of the CSMAR database. The empirical results are presented in column (4) of Table 9. The coefficient of the interaction term (*SEGINDEX* × *KZ*) is significantly positive at the 1% level. This finding indicates that financing constraints further enhance management's motivation to reduce resource outflow through tax avoidance in the context of information barriers caused by market segmentation.

### *5.3.4 Overseas experience in management*

Wen et al. (2020) found that managers' overseas experience enhances their reputation awareness and social responsibility, thereby improving corporate social responsibility (Zhang et al., 2018) and effectively inhibiting their tax avoidance motivation. Based on this, this paper examines whether the overseas experience of enterprise management affects tax avoidance activities under market segmentation. The personal characteristics data of directors and supervisors are sourced from the "Characters of Listed Companies" sub-database in the CSMAR database. An overseas experience index (*OVERSEA*) is constructed, where a value of 1 is assigned if the listed company's directors and supervisors have overseas employment or study experience, and 0 otherwise. The empirical results, shown in column (5) of Table 9, indicate that the coefficient of *SEGINDEX* × *OVERSEA* is significantly negative at the 10% level. This finding demonstrates that the overseas experience of enterprise management improves tax compliance and effectively inhibits the increase in tax avoidance caused by market segmentation.



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**[Insert Table 9 about here]**

## 6. Conclusions and policy enlightenment

In recent years, the major policies in China have repeatedly emphasized that economic system reform is the focus of comprehensively deepening reform, with the core issue being the relationship between the government and the market. In November 2013, the Third Plenary Session of the Eighteenth Central Committee of the Communist Party of China adopted the *Decision of the Central Committee of the Communist Party of China on Several Major Issues Concerning Comprehensively Deepening Reform*. This decision systematically designed the reform of the relationship between the government and the market, proposing that the market plays a decisive role in resource allocation and reduces the government's administrative intervention in the market. However, in practice, under the pressure of political promotions, local governments often restrict the outflow of local capital through administrative regulations based on employment, taxation, and GDP demands. Simultaneously, to protect local enterprises, they raise the threshold and costs for foreign goods entering the local market, creating market segmentation rooted in local protectionism. This segmentation constitutes a key obstacle to the realization of the "unified national market" and "double circulation" strategy. Although market segmentation may bring short-term economic benefits to local areas, it ultimately damages the market competitiveness and value enhancement of local enterprises, causes inefficient allocation of market resources, and leads to widening regional disparities. This paper focuses on the impact of market segmentation on corporate tax behavior. Using data from Chinese A-share non-financial listed companies in Shanghai and Shenzhen from 2007 to 2021, empirical tests reveal that market segmentation significantly enhances local enterprises' tax avoidance



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motivation. This result remains valid after re-testing with instrumental variable and propensity score matching methods. Further analysis shows that the construction of a high-speed rail network and regional digital infrastructure help inhibit tax avoidance activities under market segmentation. Heterogeneity analysis indicates that non-local subsidiaries and financing constraint exacerbates the enhancement effect of market segmentation on corporate tax avoidance, while effective internal control and managers' overseas experience can effectively inhibit tax avoidance activities in segmented markets.

Presently, local governments in China are striving to implement the strategy of "unifying the national market" and "dual circulation". Therefore, this paper has theoretical and practical significance in discussing the micro-economic impacts of market segmentation and governance methods. From a theoretical perspective, previous research has generally focused on the impact of resources and resource allocation systems on corporate tax behavior (Chen and Lai, 2012; Luo et al., 2020; Lei et al., 2021; Hasan et al., 2021). Few studies have considered the impact of the market itself, as a resource allocation scenario, on corporate tax behavior. Given the market's decisive role in resource allocation, this paper explores how the phenomenon of market segmentation, driven by local governments' competition for resources and tax protection, affects the functioning of market mechanisms. It explains the mechanism by which market segmentation impacts corporate tax avoidance behavior through the information channel, and further analyzes how the opening of high-speed rail impacts this information channel. This approach enriches and expands the research on the influence of market mechanisms on business activities. From a practical perspective, addressing the issue of market segmentation is essential for achieving regional coordinated development and narrowing the gap between rich and poor. By



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incorporating transportation and digital infrastructure elements into the solution to market segmentation, this paper provides insights for reducing the negative impacts of market segmentation and improving the standardized operation of enterprises.

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## Appendix A.

**Table 1**

Definition of variables.

| Variable | Definition |
|---|---|
| *ETR* | Nominal income tax rate-(total income tax expense-deferred income tax expense)/total profit |
| *SEGINDEX* | The inter-provincial market segmentation level, which is calculated by obtaining 69 pairs of neighboring provinces (excluding Hong Kong, Macao, and Taiwan) and using the price differences of 21 types of commodities between these neighboring provinces |
| *DUM_High* | The dummy variable, if the city has opened the high-speed rail in the year *t*, it is assigned a value of 1 in year *t* and in subsequent years, 0 otherwise |
| *Num_High* | The number of high-speed rail lines opened in the city where the enterprise is located |
| *INTBR* | The natural logarithm of the number of internet broadband subscribers in the province |
| *INTBR2* | The natural logarithm of the number of internet broadband access ports in the province |
| *Size* | Natural logarithm of firm's total assets at the end of each year |
| *LEV* | The ratio of Debt/Assets at the end of each year |
| *ROA* | The ratio of Return/Assets at the end of each year |
| *TQ* | The ratio of the total stock market value to the total assets at the end of each year |
| *Circle* | The ratio of operating revenue to total assets |
| *Dual* | A dummy variable where 1 indicates CEO and chairman are the same person, and 0 otherwise |
| *INDRATE* | The proportion of independent directors on the board |
| *AGE* | The average age of directors and supervisors |
| *MNHLD* | The proportion of shareholding ratio held by senior managers |
| *SHRCR1* | The percentage of shareholding held by the largest shareholder |
| *SHRZ* | The ratio of shares held by the largest shareholder to the second largest shareholder |
| *SOE* | A dummy variable where 1 indicates state-owned enterprises and 0 indicates non-state-owned enterprises |

**Table 2**

Descriptive statistical results of main variables.

| Variables | N | Mean | SD | P50 | Min | Max |
|---|---|---|---|---|---|---|
| *ETR* | 30,962 | -0.020 | 0.167 | -0.032 | -0.932 | 0.339 |
| *SEGINDEX* | 30,962 | 0.028 | 0.013 | 0.027 | 0.012 | 0.079 |
| *DUM_High* | 30,962 | 0.777 | 0.416 | 1 | 0 | 1 |
| *Num_High* | 30,962 | 3.946 | 2.474 | 4 | 0 | 9 |
| *INTBR* | 30,962 | 7.131 | 0.852 | 7.188 | 4.709 | 8.361 |
| *INTBR2* | 30,962 | 7.813 | 0.912 | 7.839 | 5.101 | 9.141 |
| *Size* | 30,962 | 22.070 | 1.272 | 21.890 | 19.740 | 26.070 |
| *LEV* | 30,962 | 0.417 | 0.208 | 0.406 | 0.051 | 0.924 |
| *ROA* | 30,962 | 0.042 | 0.063 | 0.043 | -0.261 | 0.198 |
| *TQ* | 30,962 | 2.244 | 10.540 | 1.653 | 0.641 | 1753 |
| *Circle* | 30,962 | 0.628 | 0.423 | 0.532 | 0.079 | 2.533 |
| *Dual* | 30,962 | 0.283 | 0.450 | 0 | 0 | 1 |
| *INDRATE* | 30,962 | 37.420 | 5.218 | 33.330 | 33.330 | 57.140 |
| *AGE* | 30,962 | 48.970 | 3.204 | 49.050 | 41.150 | 56.410 |
| *MNHLD* | 30,962 | 13.980 | 20.110 | 0.623 | 0 | 69 |
| *SHRCR1* | 30,962 | 20.200 | 17.740 | 15.560 | 0.152 | 67.370 |
| *SHRZ* | 30,962 | 7.849 | 14.380 | 2.491 | 1 | 94.040 |
| *SOE* | 30,962 | 0.354 | 0.478 | 0 | 0 | 1 |
| *INSRATE* | 30,962 | 45.480 | 25.450 | 46.850 | 0.340 | 96.030 |

Note: This table presents the summary statistics of the variables used in the main analyses. Variable definitions

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are presented in Table 1.

**Table 3**

Univariate test results.

| Variables | Low degree of market segmentation | | High degree of market segmentation | | Mean Difference |
|---|---|---|---|---|---|
| | *N* | *Mean1* | *N* | *Mean2* | (*Mean1-Mean2*) |
| *ETR* | 17,580 | -0.027 | 13,382 | -0.011 | -0.016*** |
| *DUM_High* | 17,580 | 0.819 | 13,382 | 0.722 | 0.097*** |
| *Num_High* | 17,580 | 3.873 | 13,382 | 4.042 | -0.169*** |
| *INTBR* | 17,580 | 7.333 | 13382 | 6.864 | 0.469*** |
| *INTBR2* | 17,580 | 8.065 | 13382 | 7.483 | 0.583*** |
| *Size* | 17,580 | 22.140 | 13,382 | 21.990 | 0.145*** |
| *LEV* | 17,580 | 0.413 | 13,382 | 0.421 | -0.008*** |
| *ROA* | 17,580 | 0.040 | 13,382 | 0.045 | -0.005*** |
| *TQ* | 17,580 | 2.157 | 13,382 | 2.360 | -0.203* |
| *Circle* | 17,580 | 0.620 | 13,382 | 0.639 | -0.019*** |
| *Dual* | 17,580 | 0.292 | 13,382 | 0.271 | 0.020*** |
| *INDRATE* | 17,580 | 37.500 | 13,382 | 37.320 | 0.175*** |
| *AGE* | 17,580 | 49.200 | 13,382 | 48.660 | 0.547*** |
| *MNHLD* | 17,580 | 14.580 | 13,382 | 13.190 | 1.395*** |
| *SHRCR1* | 17,580 | 21.300 | 13,382 | 18.750 | 2.557*** |
| *SHRZ* | 17,580 | 7.811 | 13,382 | 7.899 | -0.088 |
| *SOE* | 17,580 | 0.323 | 13,382 | 0.394 | -0.071*** |
| *INSRATE* | 17,580 | 43.68 | 13,382 | 47.85 | -4.176*** |

Note: This table reports the univariate comparison between samples with high degree and low degree of market segmentation. A sample is defined as high(low) degree of market segmentation if the value of market segmentation is above (below) the sample mean. Definitions of variables are provided in the Table 1. *T*-test is conducted to test for differences in mean values of the two groups. The *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 4**

Market segmentation and corporate tax avoidance.

| | (1) *ETR* | (2) *ETR* | (3) *ETR* |
|---|---|---|---|
| *SEGINDEX* | 0.663*** | 0.752*** | 0.749*** |
| | (7.12) | (8.06) | (8.02) |
| *Size* | | 0.001 | -0.001 |
| | | (0.62) | (-0.48) |
| *LEV* | | -0.048*** | -0.046*** |
| | | (-6.53) | (-6.26) |
| *ROA* | | -0.190*** | -0.204*** |
| | | (-10.46) | (-11.03) |
| *TQ* | | 0.000* | 0.000* |
| | | (1.92) | (1.91) |
| *Circle* | | 0.001 | 0.001 |
| | | (0.32) | (0.16) |
| *Dual* | | | -0.001 |
| | | | (-0.40) |
| *INDRATE* | | | 0.000 |
| | | | (0.68) |
| *AGE* | | | 0.000 |

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| | | | |
|---|---|---|---|
| | | | (0.05) |
| *MNHLD* | | | 0.000 |
| | | | (0.09) |
| *SHRCR1* | | | 0.000 |
| | | | (1.10) |
| *SHRZ* | | | -0.000 |
| | | | (-1.45) |
| *SOE* | | | -0.009*** |
| | | | (-2.99) |
| *INSRATE* | | | 0.000*** |
| | | | (4.18) |
| Constant | -0.010 | 0.001 | 0.016 |
| | (-0.55) | (0.05) | (0.50) |
| *Province FE* | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes |
| *N* | 30962 | 30962 | 30962 |
| adj. $R^2$ | 0.024 | 0.029 | 0.030 |

Note: This table reports regression results on the effect of market segmentation on corporate tax avoidance. Model (1) uses *ETR* as the dependent variable, which includes province, industry and year fixed effects. Definitions of variables are provided in the Table 1. Column (1) presents the univariate estimates without firm level control variables, and columns (2)–(3) report the multivariate estimates with firm level control variables. Province, industry and year fixed effects are controlled in columns (1)-(3). All tests are two-tailed with robust standard errors, and the *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 5**

Instrument Approach.

| | First stage<br>*SEGINDEX* | Second stage<br>*ETR* |
|---|---|---|
| *Year_2015* | -0.012*** | |
| | (-32.58) | |
| *Year_2019* | -0.002*** | |
| | (-6.92) | |
| *SEGINDEX* | | 1.334*** |
| | | (10.13) |
| *Size* | 0.000** | 0.002* |
| | (2.10) | (1.70) |
| *LEV* | -0.001** | -0.051*** |
| | (-2.03) | (-7.04) |
| *ROA* | 0.014*** | -0.227*** |
| | (14.49) | (-12.37) |
| *TQ* | 0.000 | 0.000* |
| | (0.86) | (1.77) |
| *Circle* | 0.000 | 0.004 |
| | (0.78) | (1.36) |
| *Dual* | 0.000 | 0.001 |
| | (0.58) | (0.28) |
| *INDRATE* | -0.000 | 0.000 |
| | (-0.38) | (1.18) |
| *AGE* | 0.000 | 0.000 |
| | (0.91) | (0.63) |
| *MNHLD* | 0.000 | -0.000 |

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| | | |
|---|---|---|
| | (0.10) | (-0.43) |
| *SHRCR1* | 0.000 | 0.000*** |
| | (0.54) | (2.76) |
| *SHRZ* | -0.000 | -0.000 |
| | (-1.63) | (-1.44) |
| *SOE* | 0.000 | -0.010*** |
| | (0.24) | (-3.62) |
| *INSRATE* | 0.000 | 0.000*** |
| | (0.89) | (2.88) |
| *Constant* | 0.042*** | -0.052* |
| | (30.15) | (-1.76) |
| *Province FE* | Yes | Yes |
| *Industry FE* | Yes | Yes |
| *Year FE* | Yes | Yes |
| *N* | 30962 | 30962 |
| adj. $R^2$ | 0.534 | 0.021 |
| F | 462.224 | 10.163 |

Note: This table shows the results of instrument variable tests. column (1) reports the first stage result. We run OLS regression on our main independent variable, *SEGINDEX*. We adopt two instrument variables. The first IV is Year_2015, which is the dummy variable of the "unified big market" policy proposed by the State Council in August 2015. The second IV is the dummy variable of the dual-cycle strategy proposed by the Fourth Plenary Session of the 19th CPC Central Committee in November 2019, which could break domestic market segmentation situation. column (2) reports the second stage results. The dependent variable includes the effective tax rate (*ETR*). The test variables are market segmentation (*SEGINDEX*). The definitions of variables are presented in the Appendix. Province, industry and year fixed effects are controlled in columns (1)-(2). All tests are two-tailed with robust standard errors, and the *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 6**

Propensity Score Matching.

| | (1)<br>*ETR* | (2)<br>*ETR* | (3)<br>*ETR* |
|---|---|---|---|
| *SEGINDEX* | 0.835*** | 0.887*** | 0.879*** |
| | (7.49) | (8.06) | (8.01) |
| *Size* | | 0.003 | 0.002 |
| | | (1.55) | (1.14) |
| *LEV* | | -0.047*** | -0.048*** |
| | | (-4.02) | (-4.04) |
| *ROA* | | -0.343*** | -0.350*** |
| | | (-12.47) | (-12.39) |
| *TQ* | | 0.000 | 0.000 |
| | | (0.44) | (0.36) |
| *Circle* | | -0.003 | -0.003 |
| | | (-0.65) | (-0.62) |
| *Dual* | | | -0.002 |
| | | | (-0.43) |
| *INDRATE* | | | -0.000 |
| | | | (-0.40) |
| *AGE* | | | -0.001 |
| | | | (-1.58) |
| *MNHLD* | | | -0.000 |
| | | | (-1.54) |
| *SHRCR1* | | | 0.000 |

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| | | | |
|---|---|---|---|
| | | | (1.34) |
| *SHRZ* | | | -0.000* |
| | | | (-1.69) |
| *SOE* | | | -0.010** |
| | | | (-2.13) |
| *INSRATE* | | | 0.000 |
| | | | (1.43) |
| *Constant* | 0.002 | -0.020 | 0.039 |
| | (0.09) | (-0.53) | (0.87) |
| *Province FE* | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes |
| *N* | 10965 | 10965 | 10965 |
| adj. $R^2$ | 0.028 | 0.041 | 0.042 |
| F | 6.304 | 8.908 | 8.289 |

Note: This table reports regression results on the effect of market segmentation on corporate tax avoidance using propensity score matched samples through model (1). Definitions of variables are provided in the Table 1. Column (1) presents the univariate estimates without firm level control variables, and columns (2)–(3) report the multivariate estimates with firm level control variables. Province, industry and year fixed effects are controlled in columns (1)-(3). All tests are two-tailed with robust standard errors, and the *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 7**

Alternative measure of corporate tax avoidance.

| | (1)<br>*BTD* | (2)<br>*BTD* | (3)<br>*BTD* |
|---|---|---|---|
| *SEGINDEX* | 0.785*** | 0.284*** | 0.283*** |
| | (23.19) | (15.49) | (15.49) |
| *Size* | | 0.001*** | 0.000 |
| | | (3.92) | (0.78) |
| *LEV* | | -0.004** | -0.005*** |
| | | (-2.50) | (-3.13) |
| *ROA* | | 0.704*** | 0.706*** |
| | | (81.48) | (78.71) |
| *TQ* | | 0.000 | 0.000 |
| | | (0.84) | (0.78) |
| *Circle* | | 0.003*** | 0.003*** |
| | | (5.70) | (4.93) |
| *Dual* | | | -0.001* |
| | | | (-1.79) |
| *INDRATE* | | | -0.000 |
| | | | (-0.18) |
| *AGE* | | | 0.000 |
| | | | (0.19) |
| *MNHLD* | | | -0.000*** |
| | | | (-5.64) |
| *SHRCR1* | | | 0.000*** |
| | | | (8.87) |
| *SHRZ* | | | -0.000*** |
| | | | (-4.84) |
| *SOE* | | | -0.003*** |
| | | | (-6.13) |
| *INSRATE* | | | 0.000 |
| | | | (1.59) |

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| | | | |
|---|---|---|---|
| *Constant* | 0.034*** | -0.003 | 0.012* |
| | (8.25) | (-0.49) | (1.86) |
| *Province FE* | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes |
| *N* | 30962 | 30962 | 30962 |
| adj. $R^2$ | 0.072 | 0.690 | 0.692 |

Note: This table reports the result of alternative measures of tax avoidance. First, following Armstrong et al.(2015) and Amin et al.(2023), we use *BTD* as proxy for tax avoidance. *BTD* in columns (1)-(3) equals the difference between an enterprise's total profit and its current taxable income, divided by the enterprise's current asset size. Definitions of other variables are provided in the Table 1. Column (1) presents the univariate estimates without firm level control variables, and columns (2)–(3) report the multivariate estimates with firm level control variables. Province, industry and year fixed effects are controlled in columns (1)-(3). All tests are two-tailed with robust standard errors, and the *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 8**

Market segmentation and corporate tax avoidance under the construction of high-speed rail network and digital infrastructure.

| | (1) *ETR* | (2) *ETR* | (3) *ETR* | (4) *ETR* |
|---|---|---|---|---|
| *SEGINDEX* | 1.111*** | 0.957*** | 2.227*** | 2.143*** |
| | (6.72) | (5.91) | (4.17) | (3.92) |
| *DUM_High* | 0.007 | | | |
| | (1.20) | | | |
| *SEGINDEX×DUM_High* | -0.462*** | | | |
| | (-2.83) | | | |
| *Num_High* | | 0.001 | | |
| | | (0.80) | | |
| *SEGINDEX×Num_High* | | -0.049* | | |
| | | (-1.69) | | |
| *INTBR* | | | 0.015** | |
| | | | (2.29) | |
| *SEGINDEX×INTBR* | | | -0.228*** | |
| | | | (-2.87) | |
| *INTBR2* | | | | 0.018** |
| | | | | (2.21) |
| *SEGINDEX×INTBR2* | | | | -0.194*** |
| | | | | (-2.65) |
| *Constant* | 0.004 | 0.011 | -0.072 | -0.094* |
| | (0.12) | (0.34) | (-1.53) | (-1.66) |
| Control variables | Yes | Yes | Yes | Yes |
| *Province FE* | Yes | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes | Yes |
| *N* | 30962 | 30962 | 30962 | 30962 |
| adj. $R^2$ | 0.030 | 0.030 | 0.030 | 0.030 |

Note: This table reports regression results on the moderating effect of infrastructure construction in model (2), which is measured by two indicators in this paper. The first one, high-speed rail network would be measured in two specific ways. *DUM_High* is a dummy variable that reflects whether the city has opened the high-speed rail. If city *j* has opened the high-speed rail in year t, it is assigned a value of 1 in year t and in subsequent years, 0

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otherwise. *Num_High* is a continuous variable measured by the number of high-speed rail lines opened in the city where the enterprise *i* is located. The second one, level of digital infrastructure construction would be also measured in two specific ways. *INTBR* (*INTBR2*) is measured by the natural logarithm of the number of internet broadband subscribers (access ports) in the province. The higher value indicates a better digital foundation in the province where the target enterprise is located. All tests are two-tailed with robust standard errors, and the *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

**Table 9**

Heterogeneity analysis.

| | (1) *ETR* | (2) *ETR* | (3) *ETR* | (4) *ETR* | (5) *ETR* |
|---|---|---|---|---|---|
| *SEGINDEX* | 0.460** | 0.611*** | 0.980*** | 0.644*** | 0.896*** |
| | (2.56) | (5.78) | (6.29) | (7.27) | (7.06) |
| *IS_SUB* | -0.015** | | | | |
| | (-2.28) | | | | |
| *SEGINDEX×IS_SUB* | 0.342* | | | | |
| | (1.91) | | | | |
| *NUM_SUB* | | -0.000*** | | | |
| | | (-3.18) | | | |
| SEGINDEX×*NUM_SUB* | | 0.008*** | | | |
| | | (2.66) | | | |
| *IC_Dum* | | | 0.013** | | |
| | | | (2.27) | | |
| *SEGINDEX×IC_Dum* | | | -0.320** | | |
| | | | (-2.01) | | |
| *KZ* | | | | -0.011*** | |
| | | | | (-11.18) | |
| *SEGINDEX×KZ* | | | | 0.143*** | |
| | | | | (5.30) | |
| *OVERSEA* | | | | | 0.006 |
| | | | | | (1.45) |
| *SEGINDEX×OVERSEA* | | | | | -0.248* |
| | | | | | (-1.87) |
| *Constant* | 0.024 | -0.003 | 0.008 | 0.062* | 0.009 |
| | (0.76) | (-0.09) | (0.26) | (1.95) | (0.30) |
| Control variables | Yes | Yes | Yes | Yes | Yes |
| *Province FE* | Yes | Yes | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes | Yes | Yes |
| *N* | 30962 | 30962 | 30962 | 30962 | 30962 |
| adj. $R^2$ | 0.030 | 0.030 | 0.030 | 0.034 | 0.030 |

Note: This table reports regression results of heterogeneity analysis in the firm level, which includes non-local subsidiaries(*IS_SUB*, *NUM_SUB*) internal control quality (*IC_Dum*), financial constraints (*KZ*) and oversea experience within management team (*OVERSEA*). For brevity, we do not present the coefficients of control variables. Province, industry and year fixed effects are controlled in columns (1)-(3). All tests are two-tailed with robust standard errors, and the *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

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## Appendix B.

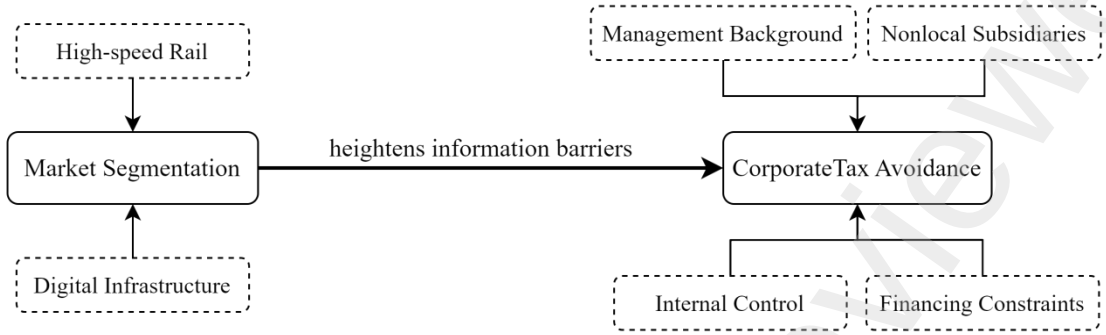


Fig. 1. Theoretical analysis framework.

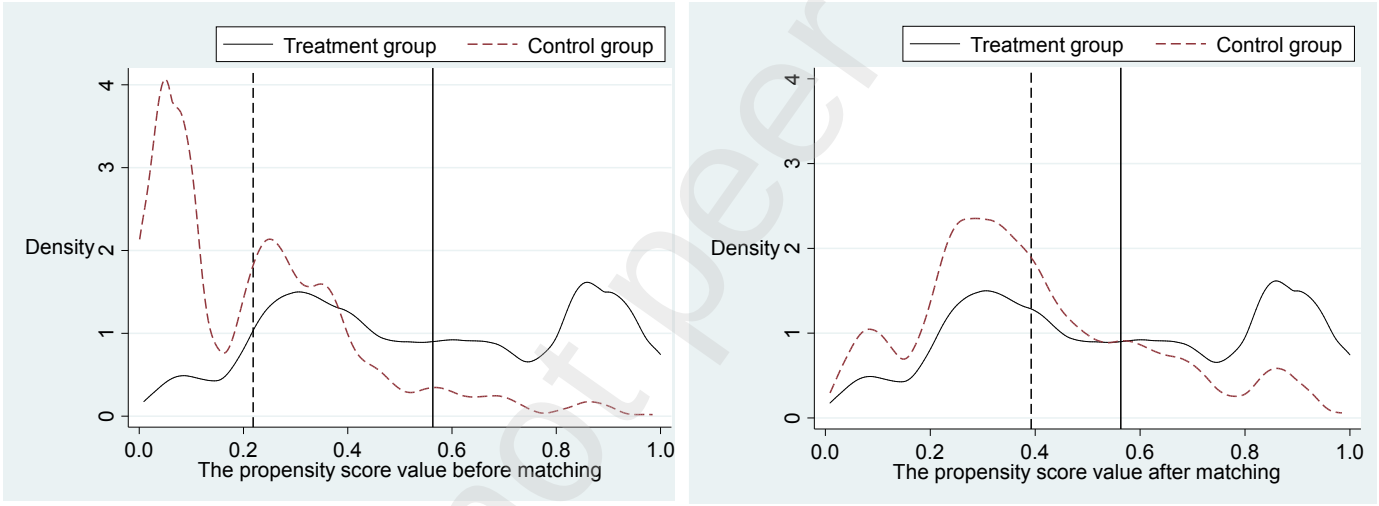


Fig. 2. Kernel density distribution of sample data before and after matching

Note: Figure 1 presents the density plot before and after matching. which is used to verify whether it meets the common support conditions of propensity score matching method. It can ensure that the matched samples have good comparability, thus significantly improving the quality of sample matching and increasing the effectiveness of propensity score matching method estimation. Specifically, by observing the probability distribution differences and overlapping regions (common support domains) of propensity score value between the treatment group and the control group samples before and after matching.

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