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Fiscal incentives, competition, and investment in China

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Abstract

This paper explores how fiscal incentives offered to local governments in China affect investment rates in their jurisdictions. Theoretically, we build a simple fiscal competition model to establish the linkage between local fiscal incentives and expenditure policy and consequently, capital movement. The key prediction of the model, borne out by data from Chinese provinces spanning 2004–2013, is that an increase in the local corporate income tax-sharing ratio, which proxies fiscal incentives offered to local governments, motivates local governments to compete for capital investment through increased public expenditures. Our results contribute to the fiscal federalism literature by showing that local fiscal incentives significantly shape policy choices and local economic performance. In addition, by exploring fiscal incentives offered to local governments, we offer a novel explanation for the unusually high investment rate in China that has been sustained over a prolonged period of time.

Keywords: fiscal incentives; local tax competition; investment; China
JEL codes: H72; H77; O16; R53

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1 Introduction

The investment rate in China has remained at an unusually high level since the start of the country's market reforms in 1978. Gross fixed capital formation averaged 35.4% of GDP between 1980 and 2015, compared to 23.1% in OECD countries and 22.6% in other developing countries for the same period (see Figure 1).[1] What is the explanation for this high investment rate in China? A significant amount of research has been devoted to understanding this and the country's remarkable economic growth over the past decades. In particular, early studies have identified several important contributors, including the attractive return on investment (e.g., Bai et al., 2006), the high saving rate in the economy (e.g., Barnett and Brookes, 2006), the vast labor surplus in rural areas, the relatively low cost of credit provided by the state banking system (e.g., Gong and Lin, 2008), the expansion of non-state sectors (e.g., Barnett and Brooks, 2006), and high expectation and investment confidence (e.g., Knight and Ding, 2010). Recent studies have emphasized the importance of Chinese political and fiscal institutions, which successfully foster strong incentives for local governments to aid business and thus compete for capital investment for promoting local economic development (e.g., Gordon and Li, 2011; Xu, 2010).[2]

Politically, since local government officials in China are appointed by the upper level government, the central authority maintains absolute control in the promotion or dismissal of local officials based on criteria strongly associated with improved economic performance. As a result, motivated by their aspiration to progress within the government hierarchy, local officials have had strong political incentives to promote the local economy in order to stay ahead in terms of the professional career ladder. Beyond political incentives, strong fiscal incentives significantly affect local governments' policy choices and, as a result, investment and economic performance in their jurisdictions. This is largely attributed to Chinese fiscal institutions. Starting from the early-1980s, the previous fiscal system of "unified revenue collection and unified spending" (*tongshou tongzhi*) was replaced by the so-called "fiscal contracting system" (*caizheng chengbao zhi*), in which each province was assigned an independent responsibility to collect tax revenues in its domain and was entitled to retain a significant portion of the revenues, that is, any residual "fiscal profits," after they fulfilled the predetermined sharing schemes. Local officials were therefore motivated by incentive contracts to promote local business development, which eventually increased their residual "fiscal profits" (Oi, 1992). After over a decade of the "fiscal contracting system," in 1994 the central government launched a new round of fiscal reforms featuring a tax-sharing scheme between the central

[1] The data are from the 2017 World Development Indicators of the World Bank.
[2] For instance, Cull et al. (2017) document that local governments in China help firms in their region obtain loans from banks and provide local firms with information about products, technologies, and market opportunities.

and local governments that is still in effect today. These reforms largely recentralized revenue assignments, while keeping the assignment of expenditure responsibilities virtually unchanged. As a consequence, local officials experienced mounting fiscal pressures regarding financing their expenditure needs. This added to the increase of local incentives to support business development to increase local and shared revenues.[3]

This paper aims to explore this latter (fiscal) mechanism, that is, the strong fiscal incentives implied by the tax-sharing system (TSS) for local governments to promote investment in their jurisdictions. In particular, we build a simple theoretical model under the fiscal competition framework to establish the linkage between the corporate income tax (CIT) sharing ratio at the sub-provincial level (a proxy of fiscal incentives offered to local governments) and the investment rate in the provinces. In the model we highlight government expenditures as a competitive tool for local fiscal incentives to demonstrate the impact on capital investment in the provinces. Relying on a provincial-level panel dataset, we use both fixed effects estimation and instrumental variables estimation to test the theoretical predictions empirically. We find supporting evidence that the CIT sharing ratio at the sub-provincial level is positively associated with the level of investment in the provinces; we then show that the effect is heterogeneous across investments by firms with different ownerships. In particular, the CIT sharing ratio at the sub-provincial level and the fiscal incentives offered to local governments have a larger quantitative effect on promoting investment by state-owned enterprises (SOEs) than investment by non-state-owned enterprises (non-SOEs). Finally, we shed light on the argument that government expenditure potentially acts as an important conduit for local fiscal incentives to affect investment rates in their domains.

The paper contributes to the literature in four aspects. First, we provide evidence that fiscal incentives offered to local governments significantly shape their policy choices, which has been the central argument of the "second generation fiscal federalism" literature (see Weingast (2009) for a review). China provides a unique institutional setting in which to study this issue. This is because provincial governments in China have been granted substantial discretion in determining their own tax-sharing rules within their borders, which has given rise to a high level of variation in sub-provincial treatments. This variation is so substantial that it creates wide-ranging incentive effort for local governments to attract investment. Second, we add to the literature on the impact of China's fiscal decentralization policy. Over the past decade, there has been growing interest in China's fiscal

[3] Weingast (2009) also highlights that whatever the goals of subnational officials, greater revenue relaxes their budget constraint, allowing them to further their goals. Political officials of all ranks are therefore biased toward policies that increase their revenue, allowing them to finance more activities.

decentralization policy, especially with respect to its potential impact on economic growth and regional inequality (e.g., Zhang and Zou, 1998; Lin and Liu, 2000; Zhang, 2006; Song, 2013; Liu et al., 2017). However, the role of fiscal decentralization in providing incentives for local officials to compete for capital investment has not been directly tested. In this respect, our paper is among the first to explicitly establish the causal relationship between provincial tax-sharing rules and investment rate in the provinces. Third, we propose a more accurate measure to capture fiscal incentives offered to local governments. We calculate the actual tax-sharing ratio at the *sub-provincial* level for each province, which fully reflects the discretionary policy across the provinces. Lastly, by exploring fiscal incentives offered to local governments, we offer a novel explanation for the unusually high investment rate in China, which has been maintained for a prolonged period of time.

The rest of the paper is organized as follows. Section 2 provides a brief background on the fiscal institutions in China and builds a simple theoretical model to establish the linkage between local fiscal incentives and investment rates in the regions. Section 3 describes the empirical strategy and data. Section 4 presents the main empirical results, the effect of heterogeneity, and the potential mechanism of impact. Section 5 concludes the paper.

2 Institutional background and theoretical considerations

2.1 Institutional background

China has maintained a hierarchical structure of governance since the formation of its current system in 1949. There are currently five levels of government in China. Starting with the highest, these levels are the center, provinces, prefecture-level cities (hereafter, cities), counties, and townships. Under the hierarchical system, each subnational level of government is wholly subordinate to the next higher order of government. Thus, intergovernmental fiscal relationships are typically defined and implemented between the government at the corresponding level and its immediate upper level of government, such as center-managing-province and province-managing-others. In the meantime, general fiscal arrangements are only clearly defined between the central and province levels, while sub-provincial fiscal arrangements are not formalized by any laws or regulations. Instead, the central government grants provincial governments the discretion to set up their own intergovernmental fiscal relationships within the provinces. Practically, provincial governments have mostly followed the hierarchical system to determine their fiscal relationships within provinces (Martinez-Vazquez et al., 2008). Thus, this institutional setup implies many different fiscal arrangements at the sub-provincial level that depend on the specific province.

More specifically, the Chinese government implemented the TSS reform in 1994. During the reform, all taxes were categorized into three categories: central taxes, local taxes, and shared taxes between the central and provincial governments. While central taxes are retained by the central government, local governments exclusively retain local taxes within the provinces. Being the most important sources of revenue for the Chinese governments, value-added taxes (VAT) and income taxes (including personal and corporate income taxes) are shared proportionally between the central and provincial governments. In particular, the TSS reform defined the VAT sharing ratio as 75% to the central government and 25% to provincial governments. The income tax-sharing rule has undergone two adjustments, one in 2002 and one in 2003. Before 2002, the central government assigned 50% of income taxes to itself and in 2003, it raised this ratio to 60%, with the rest allocated to provincial governments. Furthermore, the 1994 TSS reform only explicitly stipulated the tax-sharing rules between the central and provincial governments, leaving provincial governments the discretion to specify their own sharing rules for revenue retained at the sub-provincial level (including city, county, and township governments). In practice, the retained shared taxes (including 25% of the total VAT and 40% of total income tax) are usually shared via ad hoc negotiation ratios between provincial and sub-provincial governments across different provinces.[4] As shown in Table 1, the mean of the corporate income tax (CIT) sharing ratio at the sub-provincial level across provinces for the sample period 2004–2013 is 0.231, with a minimum value of 0.056 and a maximum value of 0.381. Thus, the significant variation in tax-sharing ratios across provinces generates different fiscal incentives for local governments within the provinces, which significantly influences their behaviors.

2.2 Theoretical considerations

Based on the institutional setup of the Chinese fiscal system, in this subsection we establish a simple theoretical model to examine how local fiscal incentives, captured by the CIT tax-sharing ratio, may affect government expenditures and, as a result, capital investment in the regions.

Consider an economy that consists of *N* regions, indexed by i. In each region, a numeraire output is produced under perfect competition and this output can be used either for private or government consumption. The production function in each region is given by $F_i(L_i, K_i, G_i)$, where K_i is the amount of perfectly mobile capital, G_i is the amount of public expenditure made by the regional

[4] See Li (2010) for a comprehensive description of the sub-provincial fiscal system in China.

government that enhances the productivity of domestic capital, and L_i is the amount of a fixed production factor such as land or labor. For analytical convenience, the fixed factor is normalized to unity and the production function can be rewritten as $F_i(K_i, G_i)$, which is increasing, twice continuously differentiable, and concave in the level of capital investment K_i; that is, $\frac{\partial F_i}{\partial K_i} > 0 > \frac{\partial^2 F_i}{\partial K_i^2}$.[5] Domestic capital investment and public expenditures are complements, so an increase in public expenditure increases the marginal productivity of capital investment, that is, $\frac{\partial^2 F_i}{\partial K_i \partial G_i} > 0$. By making this assumption, we basically assume that public expenditures are at least partially productivity-enhancing. The cost of public expenditure is given by the convex function $C_i(G_i)$.

In each region, public expenditures are financed by a source-based specific tax on capital t, which is fixed and coordinated by the central government in China for all i(i.e., $t_i = \bar{t}$).[6] Since capital is assumed to be perfectly mobile across regions, the market clearing condition implies an allocation of capital across regions such that its net return in all regions is equalized to the given economy-wide net return on capital (r), that is,

$$\frac{\partial F_i}{\partial \mathrm{K}_i} - \bar{t} = r \tag{1}$$

where $\frac{\partial F_i}{\partial K_i}$ denotes the marginal product of capital investment and the net return of capital is assumed to be positive in order to ensure a non-zero allocation of capital in each region, that is, $r > 0$. With equation (1), we can solve the capital allocated in region i,

$$\frac{\partial K_i}{\partial G_i} = -\frac{\frac{\partial^2 F_i}{\partial K_i \partial G_i}}{\frac{\partial^2 F_i}{\partial {K_i}^2}} > 0 \tag{2}$$

As indicated, the stock of capital investment in region i increases in the level of public expenditure G_i. To complete the model, we assume the governments are partially self-interested, caring about private income, government revenues, and some combination of the two. The objective function W_i of region i is to maximize the sum of private income and local tax revenues, net of the costs of public expenditures,

[5] We assume there is no domestic ownership of capital. Thus, the amount of capital being attracted can be treated as the same amount of investment made in the region. This assumption, which is consistent with Wildasin (1988), has been used by Hindriks et al. (2008), and Kempf and Rota-Graziosi (2010). As argued by Laussel and Le Breton (1998), this assumption can be justified as a partial equilibrium reflecting the high concentration of capital distribution in the regions.
[6] Tax legislation in China is highly centralized, with the central government setting uniform statutory tax rates across all local jurisdictions.

$$W_i = F_i(K_i, G_i) - \frac{\partial F_i}{\partial K_i} K_i + \lambda_i \bar{t} K_i - C_i(G_i) \tag{3}$$

where $F_i(K_i, G_i) - \frac{\partial F_i}{\partial K_i}$ is the return on the immobile factor (i.e., private income) and $\lambda_i \bar{t} K_i$ represents local tax revenues, with λ_i ($0 \leq \lambda_i \leq 1$) being the capital tax-sharing ratio for local government i. This latter parameter is determined by the upper-level government and is therefore exogenously given.

The problem for each region is deciding its public expenditures level G_i so as to maximize its objective function (3), subject to the capital allocation rule specified in equation (2). The first-order condition (FOC) gives,

$$\frac{\partial \mathrm{W}_i}{\partial \mathrm{G}_i} = \frac{\partial \mathrm{F}_i}{\partial \mathrm{G}_i} + \lambda_i t_i \frac{\partial \mathrm{F}_i}{\partial \mathrm{G}_i} - \frac{\partial \mathrm{C}_i(G_i)}{\partial \mathrm{G}_i} = 0 \tag{4}$$

Taking the derivative of $\frac{\partial \mathrm{W}_i}{\partial \mathrm{G}_i}$ with respect to G_i and λ_i, respectively, and applying the Envelop Theorem to equation (4), we obtain,

$$\frac{\partial \mathrm{G}_i^*}{\partial \lambda_i} = -\frac{\frac{\partial^2 W_i}{\partial \mathrm{G}_i \partial \lambda_i}}{\frac{\partial^2 W_i}{\partial {\mathrm{G}_i}^2}} > 0 \tag{5}$$

The optimal level of public expenditures for region i appears to be an increasing function of the capital tax-sharing ratio assigned to it, λ_i. Given the capital allocation rule in Equation (2), we immediately have $\frac{\partial \mathrm{K}_i^*}{\partial \lambda_i} > 0$. To summarize, Equations (2) and (5) provide the following proposition for empirical testing.

> **Proposition 1.** *An increase in the local capital tax-sharing ratio, λ_i, will increase the level of public expenditures G_i and therefore the level of capital investment K_i.*

A larger value of λ_i implies a higher retained rate of tax revenues at the local level and therefore a stronger incentive for the locality to utilize government expenditure policy to influence capital flows for a larger tax base. In the Chinese context, this theoretical exercise conveys a clear message that fiscal incentives set by provincial governments (λ_i), in the form of local tax-sharing ratios, help to explain the variation in capital investment across provinces. In the subsequent sections, we utilize data from Chinese provinces for empirical evidence.

3 Econometric strategy and data

3.1 Econometric specification

To assess the causal impacts of local fiscal incentives on investment rates of the provinces, we estimate a standard two-way fixed effects model of the form,

$$Invest_{it} = \alpha + \beta CITsp_{it} + \gamma X_{it} + \mu_i + \varphi_t + \varepsilon_{it} \quad (6)$$

where i represents province and t denotes year. The dependent variable $Invest_{it}$ is the investment rate of the province, which is measured by the ratio of total investment in fixed capital to GDP. $CITsp_{it}$ is our measure of local fiscal incentives, which is proxied by the CIT sharing rate at the sub-provincial level of the province; since the tax-sharing rule at this level is set up by the provincial government, we calculate it as the ratio of total retained CIT revenues for all sub-provincial governments to total CIT revenues generated in that province.[7]

As control variables X_{it}, we seek to capture factors that are typically found to be significant in determining investment rate. This leads to the inclusion of real GDP per capita (in log form), and the share of secondary industry in GDP, urbanization, openness, and financial development. Real GDP per capita and the share of secondary industry capture economic development and structure of the province, which generally have strong implications for investment activities in the region. Urbanization, measured by the proportion of urban population, is a proxy for the demographic features of a province that may influence the needs of the residents for investment in fixed assets. Openness, measured by the ratio of total trade (i.e., imports plus exports) to GDP, aims to capture the exposure of a province to trade and therefore the potential needs for investment in fixed assets. In addition, financial development is measured by total loan amount to GDP, and it potentially represents the supply of credit for investment in the province. Finally, μ_i is the time-invariant and province-specific effect for province i, ψ_t is a set of year dummies, and ε_{it} is an *i.i.d.* error term.

3.2 Endogeneity

A potential concern in estimating specification (6) relates to the endogeneity of the sub-provincial CIT sharing ratio. This issue may be present because sub-provincial governments that have higher levels of investment may have stronger incentives to negotiate with the provincial government for

[7] As illustrated in subsection 2.1, the specific tax-sharing rule between the provincial and the sub-provincial governments is set up under the provincial governments' direction.

a larger share of the created tax bases, giving rise to the issue of reverse causality. In addition, the endogeneity may also be due to the potential measurement errors in using the local CIT sharing ratio as a measure of local fiscal incentives, which, by its very nature, may be difficult to measure accurately given the limited availability of data.

To circumvent the endogeneity issue, we use an instrumental variable estimation. The instrument we use is the simulated CIT sharing ratio at the sub-provincial level of a province (denoted as $CITsp\_simuIV_{i,t}$), which is constructed by using the initial value of the actual CIT sharing ratio at the sub-provincial level of the province and the annual rate of change of the average CIT sharing ratio at the sub-provincial level for the entire nation. The idea is that this latter variable captures the potential policy change at the central level in terms of the setting of the tax-sharing rule between the central and provincial governments, which may consequently induce a corresponding change in the tax-sharing rule between the provincial and sub-provincial governments within a province. More specifically, the instrument is calculated as followed,

$$CITsp\_simuIV_{i,t} = CITsp_{i,2003} \times \prod_{2004}^{t}(1 + nc_t) \quad (7)$$

where $CITsp_{i,2003}$ represents the actual CIT sharing ratio of province i in 2003 (the year before the start of our sample period), and nc_t is the annual rate of change of the average CIT sharing ratio at the sub-provincial level for the whole nation.

By its very nature, we believe that the simulated CIT sharing ratio should be highly correlated with the actual CIT sharing ratio of the provinces. At the same time, it appears to be determined more exogenously by the investment activities of a particular province. This makes the simulated variable a potentially good instrument for the estimations. In subsection 4.1, we provide more formal evidence to show that both the relevance and exogeneity conditions for a valid instrument are indeed satisfied by the simulated variable.

3.3 Data

The panel dataset we use for the quantitative analysis covers 28 provinces in China for 2004–2013. Due to the availability of data, Tibet, Hainan, and Chongqing are excluded. Given the unstable time period for the setting of the CIT sharing rule at the central-provincial level around 2000–2003, we select 2004 as the starting period for our analysis.

Data used for the calculation of the CIT sharing ratio at the sub-provincial level are taken from the Prefecture, City, and County Public Finance Statistics (Quanguo Dishixian Caizheng

Tongji Ziliao), the China Statistical Yearbook for Regional Economy, and the China Taxation Yearbooks. Other data such as provincial investment rate and all control variables are obtained from the China Statistical Yearbook. Table A1 (see Appendix) provides a detailed description and sources of all the variables, while their summary statistics are reported in Table 1.

4 Empirical results

4.1 Baseline results

Figure 2 presents the scatter plot for the relationship between the CIT sharing ratio at the sub-provincial level and investment rate of the provinces for the sample period covered. As shown, there is a strong and positive relationship between the two variables, providing tentative evidence regarding the potential role of local fiscal incentive on promoting investment in the provinces. However, this evidence itself is not sufficient to establish a causal relationship between the two, we therefore revert to more formal evidence from the empirical estimations.

Table 2 presents the results for specification (6), using the fixed effects and IV estimation approaches. We begin the estimation by only controlling for province fixed effects and year fixed effects in Column (1). We find that the coefficient of the sub-provincial CIT sharing ratio (i.e., $CITsp_{i,t}$) is positive and statistically significant at the 5% level, supporting Proposition 1 that an increase in the local CIT sharing ratio leads to a higher level of investment rate in the province. This estimation, however, is less precise. Column (2) then adds other control variables to the specification. The estimated coefficient remains positive and statistically significant at the 5% level. As shown, our results are quite robust across both specifications.

The next step that we propose in our identification strategy is to account for the potential endogeneity issue of the sub-provincial CIT sharing ratio in the estimations. Before we present the instrumental variable estimation results, we provide some evidence that both the relevance and exogenous conditions are indeed satisfied using the selected instrument. First, Columns (1) and (2) of Table 3 report the first-stage estimation results, where the endogenous variable (i.e., $CITsp_{i,t}$) is regressed on the instrument (i.e., $CITsp\_simuIV_{i,t}$) plus the included exogenous variables. We find the coefficient of the selected instrument to be statistically significant, confirming the relevance condition for our chosen variable as a valid instrument. For both specifications, the F-statistics are significantly more than 10, suggesting that the relevance of our instruments is indeed strong. Next, we check for the exogenous condition, which means that the instrument should have affected the investment rate in the provinces *only* through its impact on the sub-provincial CIT sharing ratio. To

validate this, we include the instrument in the baseline specification (6) as an additional explanatory variable and anticipate insignificant results of the selected instrument in this augmented specification; it would otherwise indicate that the instrument does have other channels through which to influence provincial investment rates after controlling for their impacts on the sub-provincial CIT sharing ratio. Columns (3) and (4) of Table 3 report the results for the augmented specification. We find the estimates of the instrument to be consistently insignificant across specifications with and without adding control variables. Taken all together, this significantly increases our confidence in the validity of the instrument.

The panel instrumental variable estimation results are reported in Columns (3) and (4) of Table 2. As shown, the IV estimates of the sub-provincial CIT sharing ratio remain significantly positive across both specifications and are quantitatively larger than the fixed effects estimates. In our preferred IV specification in Column (4), the coefficient of the sub-provincial CIT sharing ratio is 0.477. This implies that a one percentage point increase in the share of CIT for sub-provincial governments will increase the investment rate of the province by 0.477 percentage points.

With regard to the control variables that are included in the model, GDP per capita and openness are positively associated with higher levels of investment rate, which reflects a higher demand for investment in these provinces. As predicted, provinces with a higher level of financial development tend to have a higher level of investment rate, supporting that the expansion of credit markets helps improve investment in the provinces. Other explanatory variables are generally found to be not significant in the estimations.

4.2 Robustness

In order to test for the robustness of the main results, we conduct sensitivity analysis along two dimensions. The first is to employ an alternative measure of investment in the provinces. More specifically, instead of using investment rate, we look at investment level by using the logarithm of per capita investment in the provinces as the dependent variable. The new estimation results are reported in Table 4, where we find that the main results are largely unchanged; the sub-provincial CIT sharing ratio is positively and statistically associated with investment level in the provinces.

In the second dimension, we conduct a placebo test by examining the nature of the investment entity. Depending on the investment entity, total investment in the provinces can be classified as central and/or non-central investment. Central investment refers to the investment in fixed assets made directly by the central government and/or its affiliated organizations, while non-central investment refers to all other investment made by sub-national governments and/or their affiliated

organizations, private enterprises, and foreign enterprises. An important distinction between these two types of investment is that the former is carried out by the central authority in order to fulfill its specific policy objectives and most often, it is not driven by the goal of maximizing economic profits. Therefore, fiscal incentives offered to local governments, and the competition policies adopted by them, should have less impact on the allocation of central investment. To explore this point and also use it as a placebo test of our baseline results, we alternatively employ central investment rate and non-central investment rate (scaled by GDP) as the dependent variables and re-estimate specification (6). In line with our prediction, Table 5 shows that the estimate of the sub-provincial CIT sharing ratio remains positive and statistically significant in the estimations when the non-central investment rate is used as the dependent variable. However, the same estimate is negative and statistically insignificant when the central investment rate is treated as the dependent variable. Thus, these results support our main conjecture from a different perspective.

4.3 Heterogeneity

We have shown evidence that a higher level of fiscal incentives leads to a higher level of investment rate in the provinces, the reason being that fiscal incentives motivate local governments to attract more capital investment through public expenditures. These public expenditures, such as public infrastructures, tax expenditures, and even government subsidies, represent broader government activities that help improve productivity or profitability of firms. Given the institutional fact that SOEs make up a larger part of the Chinese economy and they are either directly or indirectly controlled by governments, and also considering the fact that many SOE managers in China have bureaucratic titles and have been recommended for political promotions (Bradshaw et al., 2016), the SOEs usually act in the interest of the governments. Therefore, it may be reasonable to expect that when local governments are presented with stronger fiscal incentives, they may promote investment in SOEs to a larger extent by designing more favorable expenditure policies towards this group of firms. To explore this potential heterogeneous effect, we alternatively use total investment made by SOEs and non-SOEs as the dependent variables and re-estimate specification (6). The results are presented in Table 6. As shown, while the estimated coefficients of the sub-provincial CIT sharing ratio are positive and generally statistically significant in both specifications with alternative dependent variables, the estimate is quantitatively larger for Column (1) (Column (3)) than that of Column (2) (Column (4)), which sheds light on the suggested heterogeneous effect of local fiscal incentives.

4.4 Mechanism of the impact

In this subsection, we clarify the potential mechanism of the impact that we highlight in the simple model in subsection 2.2. More specifically, we explore government expenditures as an important conduit for local fiscal incentives to exert an impact on investment in the provinces.

First, we replace the dependent variable in specification (6) with government expenditures scaled by GDP and formally test the impact of the sub-provincial CIT sharing ratio on government expenditures.[8] The estimation results are reported in Table 7, where the estimated coefficient of the CIT sharing ratio is positive and statistically significant at the margin in the fixed effects estimations (see Columns (1) and (2)). However, it becomes statistically significant when the endogeneity concern is controlled for in Columns (3) and (4). This confirms the stimulating effect of the sub-provincial CIT sharing ratio on government expenditures, which ultimately affects capital investment. Quantitatively, a one percentage point increase in the sub-provincial CIT sharing ratio is associated with a 0.255 percentage point increase in government expenditures (as a percent of GDP).

Next, we test for the role of government expenditure in shaping the net impact of the sub-provincial CIT sharing ratio on investment in the provinces. We add the additional variable, government expenditures, to specification (6) and re-estimate the model. A confirmation of our hypothesized mechanism of local fiscal incentives would then predict a diminishing (if not completely vanishing) estimated effect of the sub-provincial CIT sharing ratio in the new specification. In line with our prediction, after adding government expenditures, we find that the estimate of sub-provincial CIT sharing ratio remains positive but become statistically insignificant, as shown in Table 8. The estimated coefficients of government expenditures across all specifications reveal a positive association between government expenditures and investment rate in the provinces. This points to the fact that government expenditures generated a direct positive effect on investment in the provinces. By isolating the positive influence of the increase in government expenditures, the positive effect of the sub-provincial CIT sharing ratio on investment rate in the provinces is largely weakened, thus confirming the role of government expenditures as a potential channel of impact.

[8] Alternatively, it would be interesting to use the measure of productive government expenditures as the dependent variable. However, due to the change of the functional classification of government expenditures in China in 2007, it became unfeasible to isolate the so-called productive items. Moreover, the functional classification of productive items appears to be quite controversial in the literature.

5 Concluding remarks

Fiscal incentives offered to local governments have long been regarded as having important implications for local government behaviors and the economic performance of local jurisdictions. This paper aims to provide supporting evidence for this by studying how fiscal incentives offered to Chinese local governments have affected their choice of competing policies regarding capital, and therefore the investment rate in the locality. In addition, answering this question helps explain the unusually high investment rate in China, which has been one of the main driving forces of Chinese economic growth over the past decades. To this end, we first build a simple fiscal competition model to demonstrate that a higher level of fiscal incentives for local governments, proxied by the sub-provincial CIT sharing ratio, motivates local governments to adopt an expansive expenditure policy, resulting in a higher level of investment. We then test this theoretical hypothesis by using both fixed effects and instrumental variables models and a province-level panel dataset for the period 2004–2013. Our empirical results indicate that a larger CIT sharing ratio at the sub-provincial level is positively associated with a higher investment rate in the provinces and the results are shown to be robust across alternative measures of investment and a placebo test. We also provide evidence that local governments are more likely to promote investment made by SOEs (rather than non-SOEs), which are under their direct control. Finally, we shed some light on the mechanism of the impact by identifying the role of government expenditure in affecting the nexus between local fiscal incentives and investment rate in the provinces.

Our findings have significant policy relevance. First, we offer a novel explanation for the long-standing and unusually high investment rate in China. While a significant body of research has contributed to the understanding of this phenomenon, there has been little research from the perspective of exploiting the incentives offered to local governments. We therefore fill the gap in this regard. Second, under the fiscal competition framework, fiscal incentives appear to successfully motivate local governments to intensify competition, which contributes to the high investment rate in the provinces. However, this rigorous fiscal competition has to some extent also been argued as being the cause of some unintended consequences regarding local behaviors, such as overspending on productive expenditures and attracting polluting industries. If this is deemed undesirable by the central authority, there will be a need to recentralize the tax-sharing rules in order to organize fiscal incentives for local governments and their distortionary behaviors.

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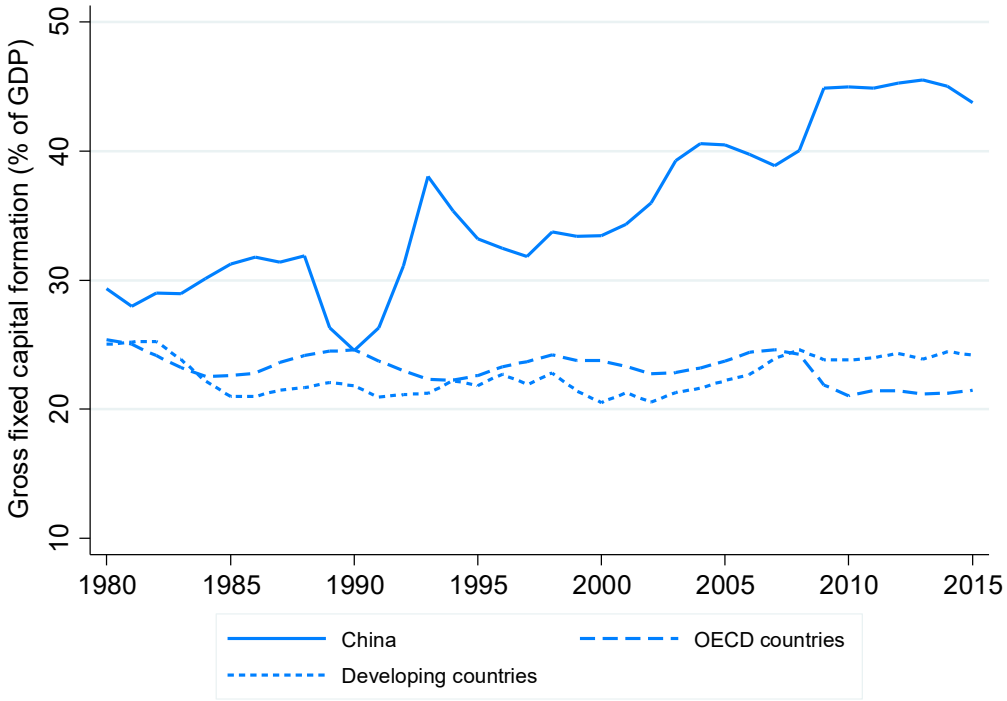
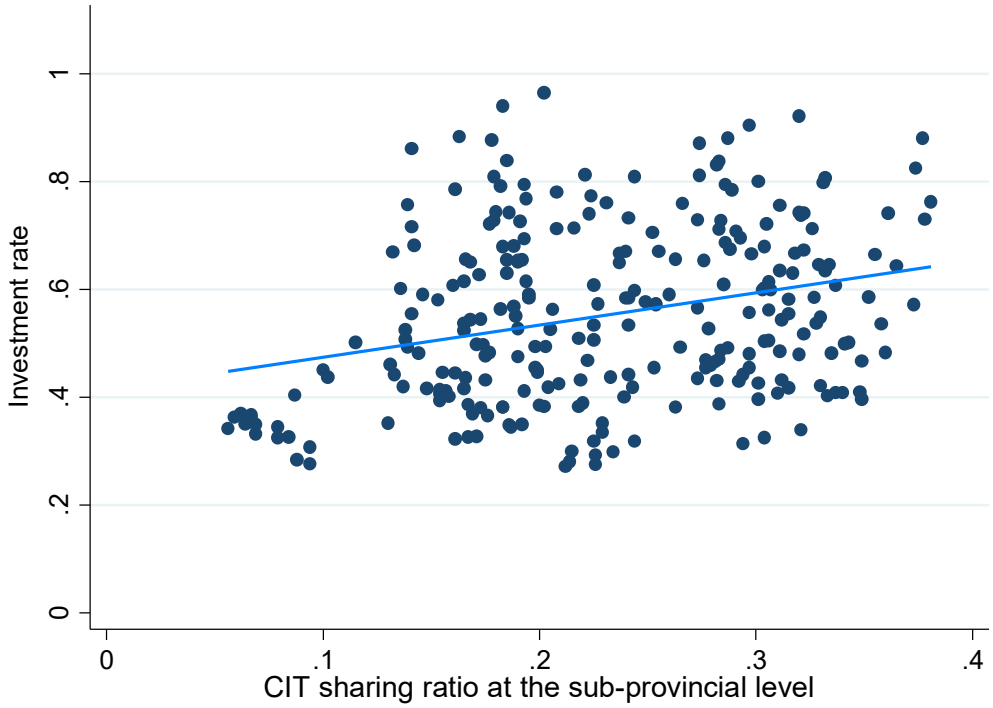
Figures and tables

Figure 1 Investment rates around the World, 1980–2015



Source: World Development Indicators Database

Figure 2 Scatter plot of local fiscal incentives and investment rate in the provinces



Source: Authors' calculation

Table 1 Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Invest	279	0.554	0.178	0.243	1.267
Invest_central	279	0.050	0.040	0.007	0.203
Invest_noncentral	279	0.456	0.179	0.186	1.110
Invest_soe	223	0.185	0.090	0.058	0.588
Invest_nonsoe	223	0.403	0.133	0.159	0.797
CITsp	258	0.231	0.077	0.056	0.381
CITsp_simuIV	266	0.232	0.078	0.063	0.409
GDP per capita, log	280	5.297	0.605	3.702	6.596
Secondary industry	280	48.794	6.806	22.300	60.133
Openness	280	0.354	0.438	0.036	1.722
Urban	280	0.373	0.171	0.158	0.906
Finance	280	1.037	0.362	0.000	2.555
Govexp	280	0.195	0.088	0.079	0.612

Table 2 Baseline results: Fixed effects and IV estimations

	OLS		IV	
	(1)	(2)	(3)	(4)
CITsp	0.328**	0.348**	0.510**	0.477*
	(0.151)	(0.146)	(0.229)	(0.245)
GDP per capita, log		0.256*		0.260***
		(0.145)		(0.082)
Secondary industry		0.001		0.001
		(0.003)		(0.002)
Openness		0.217**		0.217***
		(0.105)		(0.053)
Urban		–0.077		–0.036
		(0.234)		(0.153)
Finance		0.141		0.142**
		(0.101)		(0.059)
Province fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	258	258	258	258
R-squared	0.780	0.822	0.778	0.821
Number of provinces	28	28	28	28
Cragg-Donald F Statistic	-	-	99.53	84.16

Note: The dependent variable is the ratio of total investment to GDP. Columns (1) – (2) report the fixed effects estimation results. Columns (3) – (4) report the instrumental variables estimation results, where the instrument is the simulated CIT sharing ratio at the sub-provincial level. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 3 Validity test of the instrument

	IV first-stage		Exogenous test	
	(1)	(2)	(3)	(4)
CITsp			0.246	0.298*
			(0.153)	(0.158)
CITsp _simuIV	0.517***	0.500***	0.137	0.090
	(5.826)	(5.274)	(0.159)	(0.138)
GDP per capita, log		–0.053		0.251*
		(–1.449)		(0.145)
Secondary industry		0.000		0.001
		(0.514)		(0.003)
Openness		0.012		0.219**
		(0.458)		(0.105)
Urban		–0.131		–0.060
		(–1.506)		(0.230)
Finance		–0.027		0.137
		(–1.496)		(0.101)
Province fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	258	258	258	258
R-squared	0.562	0.581	0.781	0.822
Number of province	28	28	28	28

Note: The dependent variable in Columns (1)–(2) is the CIT sharing ratio at the sub-provincial level, while the dependent variable in Columns (3) – (4) is the ratio of total investment to GDP. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 4 Robustness: alternative measure of investment

	OLS		IV	
	(1)	(2)	(3)	(4)
CITsp	0.518	0.600**	0.994**	0.835*
	(0.466)	(0.291)	(0.469)	(0.444)
GDP per capita, log		1.284***		1.292***
		(0.276)		(0.148)
Secondary industry		0.000		0.000
		(0.007)		(0.004)
Openness		0.294		0.293***
		(0.198)		(0.102)
Urban		–0.398		–0.324
		(0.384)		(0.253)
Finance		0.190		0.191*
		(0.185)		(0.109)
Province fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	258	258	258	258
R-squared	0.938	0.967	0.937	0.966
Number of province	28	28	28	28
Cragg-Donald F Statistic	-	-	99.53	84.16

Note: The dependent variable is the logarithm of total investment. Columns (1) – (2) report the fixed effects estimation results. Columns (3) – (4) report the instrumental variables estimation results, where the instrument is the simulated CIT sharing ratio at the sub-provincial level. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 5 Placebo test: Central investment vs. non-central investment

	Central Investment		Non-central Investment	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
CITsp	–0.045	–0.079	0.344**	0.412*
	(0.038)	(0.048)	(0.163)	(0.232)
GDP per capita, log	–0.037	–0.038**	0.283*	0.286***
	(0.034)	(0.019)	(0.145)	(0.083)
Secondary industry	0.001	0.001*	–0.001	–0.001
	(0.001)	(0.001)	(0.003)	(0.002)
Openness	–0.008	–0.008	0.204**	0.204***
	(0.012)	(0.011)	(0.085)	(0.046)
Urban	0.035	0.025	–0.055	–0.033
	(0.027)	(0.024)	(0.184)	(0.132)
Finance	0.008	0.008	0.143	0.143***
	(0.011)	(0.008)	(0.087)	(0.053)
Province fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	258	258	258	258
R-squared	0.189	0.183	0.867	0.867
Number of province	28	28	28	28
Cragg-Donald F Statistic	-	84.16	-	84.16

Note: The dependent variable in Columns (1)–(2) is the ratio of total investment made by central government to GDP; and the dependent variable in Columns (3)–(4) is the ratio of total investment made by non-central authorities to GDP. Columns (1) and (3) report the fixed effects estimation results. Columns (2) and (4) report the instrumental variables estimation results, where the instrument is the simulated CIT sharing ratio at the sub-provincial level. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 6 Effect heterogeneity: SOEs versus non-SOEs

	OLS		IV	
	SOEs	Non-SOEs	SOEs	Non-SOEs
	(1)	(2)	(3)	(4)
CITsp	0.192	0.166*	0.405***	0.267*
	(0.113)	(0.095)	(0.134)	(0.161)
GDP per capita, log	0.119	0.265**	0.118**	0.264***
	(0.074)	(0.110)	(0.051)	(0.069)
Secondary industry	–0.003**	–0.002	–0.003***	–0.002
	(0.002)	(0.002)	(0.001)	(0.002)
Openness	0.074*	0.201***	0.075***	0.201***
	(0.043)	(0.056)	(0.026)	(0.038)
Urban	0.107	–0.218**	0.180*	–0.184**
	(0.127)	(0.098)	(0.105)	(0.084)
Finance	0.125***	0.088	0.124***	0.087*
	(0.045)	(0.057)	(0.033)	(0.046)
Province fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	209	209	209	209
R-squared	0.566	0.871	0.541	0.870
Number of province	28	28	28	28
Cragg-Donald F Statistic	-	-	82.33	82.33

Note: The dependent variable in Columns (1) and (3) is the ratio of total investment made by SOEs to GDP; and the dependent variable in Columns (2) and (4) is the ratio of total investment made by non-SOEs to GDP. Columns (1) and (2) report the fixed effects estimation results. Columns (3) and (4) report the instrumental variables estimation results, where the instrument is the simulated CIT sharing ratio at the sub-provincial level. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 7 The effect of local fiscal incentives on government expenditures

	OLS		IV	
	(1)	(2)	(3)	(4)
CITsp	0.158	0.154	0.224*	0.255**
	(0.132)	(0.117)	(0.116)	(0.117)
GDP per capita, log		–0.034		–0.031
		(0.069)		(0.032)
Secondary industry		0.000		0.000
		(0.002)		(0.001)
Openness		0.105***		0.104***
		(0.026)		(0.015)
Urban		0.001		0.033
		(0.094)		(0.066)
Finance		0.031		0.032
		(0.030)		(0.022)
Province fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	258	258	258	258
R-squared	0.674	0.718	0.671	0.712
Number of id	28	28	28	28
Cragg-Donald F Statistic	-	-	99.53	84.16

Note: The dependent variable is the ratio of government expenditures to GDP. Columns (1) – (2) report the fixed effects estimation results. Columns (3) – (4) report the instrumental variables estimation results, where the instrument is the simulated CIT sharing ratio at the sub-provincial level. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 8 Mechanism of impact: The role of government expenditures

	OLS		IV	
	(1)	(2)	(3)	(4)
CITsp	0.134	0.177	0.242	0.196
	(0.185)	(0.157)	(0.226)	(0.253)
Govexp	1.233***	1.112***	1.200***	1.106***
	(0.282)	(0.323)	(0.191)	(0.201)
GDP per capita, log		0.294**		0.294***
		(0.137)		(0.077)
Secondary industry		0.000		0.000
		(0.004)		(0.002)
Openness		0.101		0.102*
		(0.113)		(0.058)
Urban		–0.078		–0.073
		(0.189)		(0.129)
Finance		0.106		0.107**
		(0.085)		(0.050)
Province fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	258	258	258	258
R-squared	0.819	0.849	0.818	0.849
Number of id	28	28	28	28
Cragg-Donald F Statistic	-	-	90.69	75.06

Note: The dependent variable is the ratio of total investment to GDP. Columns (1) – (2) report the fixed effects estimation results. Columns (3) – (4) report the instrumental variables estimation results, where the instrument is the simulated CIT sharing ratio at the sub-provincial level. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Appendix

Table A1 Description and sources of variables

Variable	Definition	Source
Invest	Ratio of total investment on fixed assets to GDP	China Statistical Yearbook
Invest_central	Ratio of total investment made by the central authority to the GDP	China Statistical Yearbook
Invest_noncentral	Ratio of total investment made by the non-central authorities to the GDP	China Statistical Yearbook
Invest_soe	Ratio of total investment made by SOEs to the GDP	China Statistical Yearbook
Invest_nonsoe	Ratio of total investment made by non-SOEs to the GDP	China Statistical Yearbook
CITsp	The ratio of total retained CIT revenues for all sub-provincial governments to total CIT revenues generated in that province	The Prefecture, City, and County Public Finance Statistics, the China Statistical Yearbook for Regional Economy, and the China Taxation Yearbooks.
CITsp_simuIV	Simulated CIT sharing ratio at the sub-provincial level	Authors' calculation
GDP per capita, log	Real GDP per capita, log	
Secondary industry	Ratio of secondary industry to total GDP, %	China Statistical Yearbook
Openness	Ratio of total trade (exports plus imports) to GDP	China Statistical Yearbook
Urban	Ratio of urban population to total population	China Statistical Yearbook
Finance	Ratio of total loan amount to GDP	China Statistical Yearbook
Govexp	Ratio of government expenditures to GDP	China Statistical Yearbook

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