

Local Fiscal Competition and Deficits in China*

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Abstract: This paper adds to the literature by examining fiscal competition and deficit financing by local governments in a developing country, China. We examine a unique revenue source in China, land-use premiums (a type of property tax), in a panel dataset consolidated at the prefectural level from 2006 to 2016. Our results indicate that fiscal competition in land-use premiums exists and is stronger among wealthier than poorer local governments, a result that supports the view of Cai and Triesman (2005) that competition among asymmetrically endowed regions can lead to less discipline. Moreover, we find higher local deficits are associated with lower land-use premiums, a result that suggests that the local government does not fill any fiscal gap with own revenues.

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1 Introduction

Horizontal fiscal competition has been studied in a number of different contexts, most often at the sub-national level in the US, but also in other developed countries as well as between countries.¹ This type of fiscal competition has been found to be significant across a number of different types of taxes including property taxes (Brueckner and Saavedra, 2001), income taxes (Feld and Kirchgassner, 2001), corporate tax (Devereux et al, 2007), and sales taxes (Agrawal, 2015). Underlying the theory of fiscal competition is the idea that the mobility of resources provokes a competition between governments that could be undesirable if externalities are involved (leading to a “race to the bottom” for instance) or desirable if taxes are essentially benefit taxes (Oates and Schwab, 1988).

Little work has been done on horizontal fiscal competition in developing countries, however, and these countries often have quite different institutional settings than developed countries. Fiscal competition in this setting is often viewed as providing a type of discipline of governments, potentially limiting corruption or pushing governments to provide a more business friendly environment as capital can go elsewhere (Qian and Roland, 1998). Qian and Roland also argue that soft budget constraint issues (whereby local governments create a fiscal gap anticipating additional resources to cover the gap from the center) can be ameliorated through competitive pressures.² Cai and Treisman (2005) argue however that the competition for capital that

¹ Oates (1972) and Zodrow and Miezskowski (1986) are early contributions that discuss fiscal competition.

² For further discussions of the soft budget constraint see for instance Wildasin (1998) and Goodspeed (2002); see Peterson-Lidbom (2010) for empirical evidence in Sweden. A related concept is the vertical fiscal gap (the difference between resources collected locally and local expenditures) which is filled by

underpins horizontal fiscal competition can actually lead to less discipline if regions are asymmetrically endowed – poorer or worse-endowed regions cannot compete with the wealthier regions in any case and so pursue local capture or predatory agendas instead.

Major changes in the finance of local governments in China date to a reform of tax-sharing in 1994. After this reform, tax revenue shared with local governments declined dramatically so that the local tax revenue share was insufficient to fund local expenditures and resulted in a fiscal gap. As noted below, a new revenue source which we will call land-use premiums became available starting in 1988, although it was not used extensively until a housing reform in 1998 that amended the Chinese Constitution to allow for land transactions. Any deficit due could also be filled with additional grants provided by the central government, something we return to in the empirical section.

Our paper adds to the literature by examining local horizontal fiscal competition and deficit finance in a unique developing country setting, China, and examining the Cai and Treisman (2005) hypothesis in this context. We use a unique revenue source in China, land-use premiums, which we describe more fully below. While this revenue source most closely resembles a type of property tax, the Chinese government owns all urban land so it is not quite the same as the Western concept of a property tax.³ Rather, land (or housing) purchases are effectively rent agreements from the government (usually for a long period of time) and the land-use premium is

transfers from the central governments. This is sometimes called “partial fiscal decentralization” (Brueckner, 2009).

³ Rural land is collectively owned.

an additional payment on the transaction that grants developers land-use rights, is based on the value of the land, and is paid to the local government.

Our results indicate that tax competition in land-use premiums exists among wealthier local governments. We find little competition among poorer local governments, however, which supports the view of Cai and Triesman. Moreover, we find higher local deficits are associated with lower land-use premiums, a result that suggests that fiscal competition does not lead to greater discipline and local governments in China do not fill any fiscal gap with their own revenues. Rather, the central government fills the fiscal hole at least in part, a result that is consistent with soft budget constraint arguments and suggests that competitive pressures do not eliminate this problem.

The remainder of this paper is structured as follows. Section 2 discusses the institutional setting in China. Section 3 explains our empirical approach. Section 4 discusses the data and Section 5 presents the results.

2 Institutional Setting

China has a decidedly centralized revenue system but decentralized expenditure system. Table 1 indicates that local government spending was 85 percent of total government spending, but local revenues were only large enough to fund 54 percent of the local expenditures. This leaves a local deficit of the remaining 46 percent. In contrast, the central government takes in much more revenue than it spends, leaving a central government surplus that is about 60% of the size of the local deficit. This is transferred to local governments. There is a remaining deficit of about 40% of the local deficit that constitutes the total government deficit.

Table 1.
China Central and Local General Public Budget, 2016
(100 million yuan)

Level of Government	Government Expenditure	Government Revenue	Deficit (surplus)
Total	187755.21	159604.97	28150.24
Central	27403.85	72365.62	-44961.77
Local	160351.36	87239.35	73112.01

Table 2
China Central and Local General Public Revenue, 2016
(100 million yuan)

Level of Government	Tax Revenue	Non-tax revenue
Total	130360.73	29244.24
Central	65669.04	6696.58
Local	64691.69	22547.66

To understand potential fiscal competition of local governments we need to delve further into the local revenue sources. It turns out that there are two separate budgetary accounts for local governments, the General Public Budget mentioned above and the Government Fund Budget. While these are detailed in separate budgetary accounts, we will treat them as one in our analysis.

Table 2 shows the details of the total central and local revenue indicated in Table 1. Generally, there are two sources of revenue in the general public budget, tax revenue and non-tax revenue. The vast majority of general public budget tax revenues are shared, such as receipts from VAT, individual income, corporate income, and business tax. These are collected locally but the revenues are shared according to a preset formula. Some taxes are exclusively used by local governments, but the revenues from these are small. For instance, there is a house property tax, an urban land use tax, and a land appreciation tax that fund only local governments, the revenues from which are only about 10 percent of local revenues. They are not the focus of our analysis, however.

Important for our analysis is a separate locally-managed budget that is not part of the General Public Budget. This is called the Local Government-Managed Fund and is exclusively administered by local governments. The major source of revenue in the Local Government-Managed Fund is from the sale of State-owned Land-use Rights which we will call “land-use premiums.” To give a sense of the magnitude of this revenue source, the 2016 total for the Local Government-Managed Fund was 42465 hundred million yuan and the revenue from land-use premiums was 32740 hundred million yuan, or 77 percent of the total. Moreover, this is a major overall revenue source as it is 37 percent of all revenues from the General Public Fund shown in Tables 1 and 2.

Land-use premiums originated as part of land market reforms instituted in 1988. According to these reforms, Chinese local governments can grant land-use rights to developers and firms and obtain revenue from these transactions. In China, all land in urban areas is owned by the state. The Chinese Constitution prohibited any organization or individual from appropriating, buying, selling, or leasing land or otherwise engaging in the transfer of land by unlawful means during the period between the 1949 founding of the People's Republic of China and the 1978 Chinese economic reform (Glaeser et al., 2017). Companies, organizations, and individuals were allowed only to acquire nontransferable land-use rights from Chinese governments through non-market-oriented land allocation. During this period, housing was allocated through a working unit-employee linkage. The size and location of dwellings were determined by the size of households, length of employment, and other factors.⁴

Since the 1978 economic reform, the surge in foreign business has challenged the land-use tenure systems, as the demand for access to land has increased (Jiang et al.,1998). The old land system conflicted with the target of the 1978 economic reform that introduced the market system to improve the efficiency of land allocations and correct government failure in the land market. Modern land reforms began in the mid-1980s. Following a successful experiment in Shenzhen, in which state-owned land was leased to foreign corporations, the Constitution was amended in 1988 so that "land use can be transacted according to the law." In 1990, China officially adopted land leasing as the basis for assigning land use rights to urban land users.

⁴ Most urban residents relied on the government or the public institutions that employed them to provide housing; therefore, the consequences of such a socialist housing system were a housing shortage, insufficient investment, unequal distribution, and poor living conditions (Wang and Murie, 1996).

The State Council announced the “Provisional Regulations of the People’s Republic of China on Assigning and Transferring the Urban State-owned Land-use Right” in 1991, allowing land users to assign, transfer, rent, and mortgage land-use rights (Valletta, 2001). In these regulations, there are two kinds of land transactions, including land-use rights and the transfer of land-use rights (Hu, 1990). Local governments sell land-use rights to buyers through auctions, tender or other ways as representatives of the state. The price of land-use rights is determined by different factors, such as land-use price, land-use type, location, and land-use density. The housing reform started in the early 1980s and gained momentum in 1994 when employees who worked in the state sector were allowed to purchase the property rights of their apartments at subsidized prices. However, the overall reform was slow and piecemeal until the Chinese Constitution was amended to allow for land transactions (1998 Land Administration Law, Articles 11, 12, and 13).⁵

Notably, the land-use premiums are a purely local revenue source and about the only own-source revenue that local governments in China have access to. Land-use premiums are closely related to property taxes; indeed, they are perhaps about as close as one can get in a system where all property is owned publicly. Functionally, when a transaction takes place the government “sells” the right to develop the land and collects the revenue from the “sale”. The government still owns the land, so it has essentially leased the land and given the lessee the right

⁵ A national law defined the concepts of “economically affordable houses” and “commodity houses.” The price of commodity houses sold or rented was determined by the housing market. This series of actions enhanced the growth of land transactions and the privatization of housing, which led to a dramatic rise in housing prices.

to develop the land in some way. Nevertheless, a fee or tax has been paid for the transaction which is the revenue that the local government receives.

3 Econometric method

To explore horizontal fiscal competition among local governments and deficit finance, we conduct a panel regression as follows:

$$(1) \quad Premium_{it} = \beta_1 Premium_{-it} + \beta_2 Deficit_{it} + \beta_3 GDP_{it} + \beta_4 Premium_{-it} * GDP_{it} + \phi X' + \lambda_i + \mu_t + \varepsilon_{it}$$

where i and t denote the prefecture and year, respectively. The dependent variable, $Premium_{it}$, represents the land-use premiums per capita; $Premium_{-it}$ represents the weighted average of land-use premiums of the prefecture i 's neighbors; $Deficit_{it}$ denotes the deficit per capita measured by the difference between expenditures and revenues in general public budget over total population in prefecture i and year t ; GDP_{it} represents the GDP per capita; $Premium_{-it} * GDP_{it}$ denotes the interaction term of GDP_{it} with $Premium_{-it}$. β_1 , β_2 and β_4 are the coefficients of interest to be estimated. β_1 captures the horizontal competition for land-use premiums; β_2 captures the impact of the any local deficit on the land-use premiums of local governments; β_4 shows the difference of horizontal competition between rich and poor jurisdictions, which aims to test the hypothesis of Cai and Treisman (2005). X' denotes the control variables at the prefectural level, including industrial ratio, expenditure per capita, degree of openness, logarithm of population, population density, and land scarcity. We also include prefecture-specific fixed effects, λ_i , year-specific fixed effects μ_t , and idiosyncratic errors, ε_{it} . The

weighted average of neighboring land-use premiums $Premium_{-it}$ can be expressed as follows:

$$Premium_{-it} = \sum_{j \neq i} \omega_{ij} Premium_{jt}$$

where j denotes the neighbors of prefecture i ; ω_{ij} is exogenous exogenously chosen weights,

normalized so that $\sum_{j \neq i} \omega_{ij} = 1$. We use spatial contiguity weights in the baseline

specification. In order to explore what mechanisms determine the local fiscal competition across prefectures, we alternatively use different spatial weighted matrices, including geographic matrices (distance), economic matrices (GDP rankings), and political matrices (age of leaders).

To address the endogeneity of neighboring land-use premiums, we instrument using the standard instruments in the tax competition and spatial econometrics literature- the set of the spatially lagged explanatory variables $Z_{-it} = \sum_{j \neq i} \omega_{ij} Z_{jt}$ (including deficit, GDP, control variables, and interaction terms.) and fixed effects.⁶ The typical procedure is to regress $Premium_{-it}$ on Z_{-it} and use the fitted values $\widehat{Premium}_{-it}$ in the second stage regression, which yields consistent estimates of the specification (1).

⁶ The justification for this set of instruments can be found in (Brueckner 2003), for example. Kelejian and Prucha (1998) show that the IV approach will render the estimates consistent even in the presence of spatial error dependence.

4 Data

The basic unit of observation is Chinese jurisdictions at the prefectural level.⁷ The sample includes 272 prefectural cities over the period 2006-2016.

Our main dependent variable is per-capita land-use premiums, which we construct by dividing land-use revenue (taken from various issues of Chinese Yearbook of Land Resource (*Zhongguo Guotu Ziyuan Nianjian*)) by population (taken from the Chinese City Statistical Yearbook). The data of other control variables are also mainly obtained from the various issues of the Chinese City Statistical Yearbook. While Chinese local governments have been able to grant the land-use rights to developers and firms to get revenue in transactions since 1988 as noted above, data on land-use revenue in most of cities at the beginning of the land market reforms is lacking, so our sample starts from 2006.

We will be testing whether local governments compete over per-capita land-use premiums. A main dependent variable used in the tax competition literature is the weighted average of neighbors' tax rates. We construct weighted averages of contiguous neighbors' per-capita land-use premiums. As noted in the tax competition literature this variable is subject to endogeneity concerns. The standard approach in the literature is to address this using an instrumental variables technique.

In addition to fixed effects, our control variables include prefecture GDP per capita as a measure of wealth and expenditure per capita to control for the size of the prefecture government.

⁷ These jurisdictions at prefectural level include prefectural cities, autonomous prefectures, and prefectures. For convenience, these jurisdictions are called as "prefectural city" in this paper. The prefectural cities exclude four direct-controlled municipalities (Beijing, Tianjin, Shanghai, and Chongqing).

We also include industrial ratio (which controls for manufacturing concentration), openness to control for trade or capital mobility, population, the population density to measure the degree of urbanization, and a measure of land scarcity which may affect land prices and thereby land-use premiums. We will also include the deficit per capita to control for potential vertical interactions such as soft budget constraint issues. Table A1 in Appendix provides the detailed definitions of the variables, and the summary statistics are given in Table 3.

Table3: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Land-use premium per capita (100 yuan)	2992	18.1234	31.5084	0.0214	602.4103
Deficit per capita (100 yuan)	2992	25.4442	18.8931	-21.0238	181.1518
GDP per capita (1000 yuan)	2992	37.2392	33.4543	2.7575	277.8575
Industrial ratio (percent)	2992	49.5219	10.361	14.95	85.64
Expenditure per capita (100 yuan)	2992	53.878	40.0625	5.4733	367.6532
Openness	2992	0.1747	0.3015	0.005	3.4989
ln Population	2992	427.1714	244.1926	17.61	1399
Population density	2992	414.4653	307.1037	4.6996	2648.11
Land scarcity	2992	0.9997	1.3125	0.0664	15.232

5 Results

We first test for spatial correlation and find that the data on per-capita land use premium is spatially correlated. We calculate Global Moran's I , which is a weight average correlation between -1 and 1, from 2006 to 2016 for the 272 Chinese prefectural units. For all 11 years, the null hypothesis of spatial randomization was rejected because Moran's I statistics were significant at the 1% significance level (See Table A2). In addition, we take Locally robust LM tests for spatial lag correlation (Anselin et al., 1996, Elhorst, 2014). The LM statistic is used to test the significance of any spatial autocorrelation. We find that the null hypothesis that there is no spatial lag correlation in land-use premiums is rejected, but the null hypothesis that there is no spatial error correlation in land-use premiums is not rejected. Therefore, we choose the spatial lag model (SAR) to capture the spatial effect of land-use premiums.

The results using OLS are presented in Table 4. The first two columns present results for fiscal competition without a control for the prefecture deficit, while the second two columns present the results including the prefecture deficit. The coefficient on the weighted neighbors' land-use premium is positive and significant, indicating that prefectures compete over land-use premiums. The slope of the reaction function is positive, that is, an increase in prefecture i 's neighbors' land-use premiums per-capita induces an increase in prefecture i 's land-use premiums.

The control for GDP per-capita is positive and significant, that is wealthier prefectures have higher land-use premiums as expected. In addition, greater expenditures per capita also lead to higher land-use premiums. The control for openness is negative and significant, possibly due to higher shared VAT revenues in prefectures with more trade.

Column 2 adds an interaction with GDP per capita to test the Cai and Treisman (2005) hypothesis that wealthier jurisdictions will be the ones that compete for capital while poorer ones do not find it worthwhile to compete. The results support this hypothesis as greater GDP per capita increases the coefficient on neighbors' land-use premium, that is it increases the slope of the reaction function.

Columns 3 and 4 of Table 4 add the deficit per capita as an additional control. The results from columns 1 and 2 are unchanged while the deficit per capita has a negative and significant coefficient. A higher deficit per capita is associated with lower land-use premium. This indicates that prefectures do not plug a fiscal hole with higher land-use premium, they in fact collect even less revenue by this means. This is suggestive of a soft budget constraint problem, that is that prefectures await additional central government transfers to plug the hole rather than using their own revenue source. Moreover, this takes into account the horizontal competition for land-use premiums. Since the coefficient on the neighbors' land-use premium is essentially unchanged, it does not appear that the additional own-source revenue from land-use premiums has tamed the soft-budget problem.

As noted above, it is well known in the tax competition literature that the weighted neighbors' tax rates are endogenous. To correct for this the standard approach is to use instrumental variables to correct this, and we implement this through the standard two-stage least squares approach as previously described.

Table 4: OLS Competition Results

	<i>Dependent variable: Land-use premium per capita</i>			
	(1)	(2)	(3)	(4)
SPL premium per capita	0.0559** (0.0253)	-0.0321 (0.0330)	0.0480* (0.0253)	-0.0336 (0.0329)
GDP per capita	0.3373*** (0.0582)	0.1879*** (0.0683)	0.0960 (0.0798)	-0.0289 (0.0859)
Deficit per capita			-0.3597*** (0.0816)	-0.3383*** (0.0816)
Industrial ratio	-0.0460 (0.1039)	0.0126 (0.1045)	0.0359 (0.1052)	0.0857 (0.1057)
Expenditure per capita	0.0818* (0.0440)	0.1121** (0.0445)	0.2950*** (0.0653)	0.3105*** (0.0653)
Openness	-16.5124*** (3.9581)	-14.1582*** (3.9869)	-14.9217*** (3.9612)	-12.8219*** (3.9881)
ln Population	0.0205 (0.0269)	0.0237 (0.0268)	0.0039 (0.0270)	0.0079 (0.0270)
Population density	0.0045 (0.0204)	0.0025 (0.0204)	-0.0049 (0.0205)	-0.0063 (0.0204)
Land scarcity	-0.0599 (12.9451)	-1.7070 (12.9125)	-3.7258 (12.9280)	-5.0427 (12.8992)
SPL premium per capita × GDP per capita		0.0025*** (0.0006)		0.0023*** (0.0006)
Observations	2,992	2,992	2,992	2,992
R ²	0.0641	0.0700	0.0708	0.0759
Adjusted R ²	-0.0360	-0.0298	-0.0290	-0.0237
F Statistic	23.1395*** (df = 8; 2702)	22.6029*** (df = 9; 2701)	22.8656*** (df = 9; 2701)	22.1821*** (df = 10; 2700)

Note: *p<0.1; **p<0.05; ***p<0.01

The two-stage least squares second-stage results are given in Table 5, which repeats Table 4 using two-stage least squares rather than OLS.⁸ Column 1 of Table 5 indicates no competition

⁸ As Bound, Jaeger, and Baker (1995) indicate, it is important to avoid weak instruments. Our instruments are fairly strong with the first-stage results indicating R² of 0.0526 and 0.0618, and F-statistics of 10.7 and 11.1.

between prefectures. However, once the neighbors' weighting matrix is interacted with GDP per capita in column 2 we again find significance of the neighbors' weighting matrix, with wealthier prefectures exhibiting stronger competition as before. Columns 3 and 4 of Table 5, which include the deficit per capita, continue to indicate that wealthier prefectures react more strongly to competitive pressures from neighboring prefectures. The deficit per capita again shows a negative and significant coefficient, indicating that the prefecture does not plug any fiscal hole with its own revenue source.

Table 5: Two-stage Least Squares Results

	<i>Dependent variable: Land-use premium per capita</i>			
	(1)	(2)	(3)	(4)
SPL premium per capita	0.0389 (0.1309)	-0.2096 (0.1402)	0.1584 (0.1236)	-0.0441 (0.1332)
GDP per capita	0.3411*** (0.0648)	0.2343*** (0.0682)	0.0886 (0.0802)	-0.0097 (0.0837)
Deficit per capita			-0.3344*** (0.0862)	-0.3464*** (0.0861)
Industrial ratio	-0.0478 (0.1048)	-0.0088 (0.1047)	0.0417 (0.1054)	0.0775 (0.1055)
Expenditure per capita	0.0806* (0.0450)	0.0978** (0.0450)	0.2879*** (0.0658)	0.3098*** (0.0659)
Openness	-16.5674*** (3.9832)	-14.8409*** (3.9829)	-14.6797*** (3.9715)	-13.1689*** (3.9785)
ln Population	0.0208 (0.0269)	0.0261 (0.0269)	0.0036 (0.0270)	0.0074 (0.0270)
Population density	0.0038 (0.0211)	-0.0048 (0.0211)	0.0002 (0.0213)	-0.0071 (0.0213)
Land scarcity	-0.2862 (13.0680)	-4.0409 (13.0375)	-2.0117 (13.0683)	-5.1982 (13.0565)
SPL premium per capita × GDP per capita		0.0024*** (0.0005)		0.0020*** (0.0005)
Observations	2,992	2,992	2,992	2,992
R ²	0.0625	0.0705	0.0701	0.0756
Adjusted R ²	-0.0378	-0.0293	-0.0297	-0.0240
F Statistic	22.5013*** (df = 8; 2702)	22.7571*** (df = 9; 2701)	22.6322*** (df = 9; 2701)	22.0813*** (df = 10; 2700)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 6 investigates further the relationship of the deficit and fiscal competition (2SLS results are presented while OLS results are given in the Appendix). Column 2 repeats the result that the fiscal competition is more intense the wealthier is the locality. Column 3 adds an interaction with the deficit and indicates that higher deficit localities have less intense competition. This suggests that there could be a relationship between tax competition, wealth,

and the level of deficit. Column 5 adds a triple interaction of competition with both locality wealth and the deficit. This indicates that wealthier localities that have higher deficits have less intense competition, suggesting soft budget constraint issues are still at work even with competition.

As a robustness test, we experimented with adding nontax revenue to land-use premiums as another source of own revenue. Table 7 presents the specifications of the last two columns of Table 5 with the new revenue variables for both OLS and 2SLS, and the results are quite similar to our previous results in Table 5. The coefficient on the interaction with GDP per capita is slightly lower but we still find that competition is stronger among wealthier prefectures. Moreover, the coefficient on the deficit per capita is substantially larger, adding further evidence suggesting a soft budget constraint issue. Higher deficits lead to lower own source revenue of all sources.

Table 6: 2SLS: Interaction of deficit per capita with horizontal competition

	<i>Dependent variable: Land-use premium per capita</i>			
	(1)	(2)	(3)	(4)
SPL premium per capita	0.1584 (0.1236)	-0.0441 (0.1332)	-0.0386 (0.1330)	0.0437 (0.1343)
GDP per capita	0.0886 (0.0802)	-0.0097 (0.0837)	-0.0516 (0.0846)	0.0016 (0.0854)
Deficit per capita	-0.3344*** (0.0862)	-0.3464*** (0.0861)	-0.3058*** (0.0869)	-0.2272** (0.0889)
Industrial ratio	0.0417 (0.1054)	0.0775 (0.1055)	0.1025 (0.1056)	0.1033 (0.1053)
Expenditure per capita	0.2879*** (0.0658)	0.3098*** (0.0659)	0.3199*** (0.0658)	0.3195*** (0.0657)
Openness	-14.6797*** (3.9715)	-13.1689*** (3.9785)	-12.1215*** (3.9862)	-11.0483*** (3.9847)
ln Population	0.0036 (0.0270)	0.0074 (0.0270)	0.0112 (0.0270)	0.0154 (0.0269)
Population density	0.0002 (0.0213)	-0.0071 (0.0213)	-0.0098 (0.0213)	-0.0035 (0.0213)
Land scarcity	-2.0117 (13.0683)	-5.1982 (13.0565)	-6.7477 (13.0449)	-4.0660 (13.0273)
SPL premium per capita × GDP per capita		0.0020*** (0.0005)	0.0028*** (0.0006)	0.0034*** (0.0006)
SPL premium per capita × Deficit per capita			-0.0020*** (0.0007)	-0.0005 (0.0008)
SPL premium per capita × GDP per capita × Deficit per capita				-0.0001*** (0.00002)
Observations	2,992	2,992	2,992	2,992
R ²	0.0701	0.0756	0.0789	0.0842
Adjusted R ²	-0.0297	-0.0240	-0.0207	-0.0152
F Statistic	22.6322*** (df= 9; 2701)	22.0813*** (df = 10; 2700)	21.0239*** (df = 11; 2699)	20.6792*** (df = 12; 2698)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 7: Land-Use Premiums and Nontax Revenue

	<i>Dependent variable: (Land-use premium plus nontax revenue) per capita</i>			
	OLS		2SLS	
	(1)	(2)	(3)	(4)
SPL (premium+nontax) per capita	0.0299 (0.0248)	-0.0099 (0.0321)	-0.0150 (0.0772)	-0.1380 (0.0892)
GDP per capita	0.0527 (0.0797)	-0.0305 (0.0904)	0.0591 (0.0804)	-0.0349 (0.0874)
Deficit per capita	-0.6090*** (0.0815)	-0.6016*** (0.0815)	-0.6176*** (0.0827)	-0.6223*** (0.0826)
Industrial ratio	0.1011 (0.1050)	0.1303 (0.1061)	0.0984 (0.1052)	0.1305 (0.1057)
Expenditure per capita	0.6017*** (0.0653)	0.6056*** (0.0653)	0.6057*** (0.0656)	0.6169*** (0.0656)
Openness	-12.1063*** (3.9565)	-10.9582*** (3.9982)	-12.2175*** (3.9616)	-10.9571*** (3.9835)
In Population	-0.0170 (0.0270)	-0.0154 (0.0270)	-0.0172 (0.0270)	-0.0157 (0.0270)
Population density	0.0092 (0.0205)	0.0081 (0.0205)	0.0071 (0.0208)	0.0023 (0.0208)
Land scarcity	-2.3740 (12.9120)	-3.1993 (12.9123)	-3.0718 (12.9651)	-5.2383 (12.9736)
SPL (premium+nontax) per capita × GDP per capita		0.0011* (0.0006)		0.0014*** (0.0005)
Observations	2,992	2,992	2,992	2,992
R ²	0.1579	0.1591	0.1574	0.1598
Adjusted R ²	0.0675	0.0684	0.0670	0.0692
F Statistic	56.2668*** (df = 9; 2701)	51.0710*** (df = 10; 2700)	56.0790*** (df = 9; 2701)	51.3442*** (df = 10; 2700)

Note:

*p<0.1; **p<0.05; ***p<0.01

6 Conclusion

In this paper we examine fiscal competition in land-use premiums (a revenue source closely related to property taxes) in a developing economy, China. We find that tax competition in land-use premiums exists among wealthier local governments but that there is substantially

less among poorer local governments. This finding supports the view of Cai and Triesman (2005) that the competition for capital that underpins horizontal fiscal competition can actually lead to less discipline if regions are asymmetrically endowed. Moreover, we find higher local deficits are associated with lower land-use premiums, a result that suggests that fiscal competition does not lead to greater discipline and local governments in China do not fill deficits with their own revenues. Rather, the central government fills the fiscal hole at least in part, a result that is consistent with soft budget constraint arguments and suggests that competitive pressures do not eliminate this problem.

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Appendix

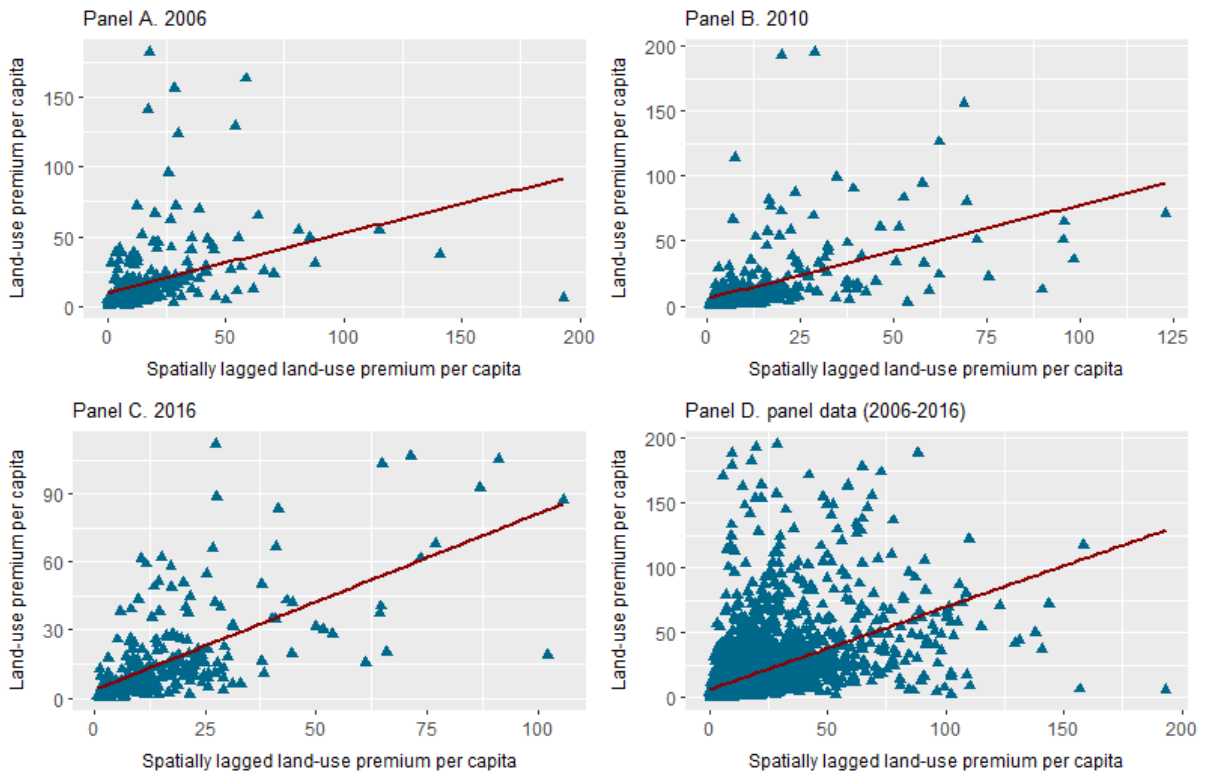
Table A1 Variable Definitions

Variable	Definition
Land-use premium per capita	Land-use premium / total population
Deficit per capita	(The difference between expenditure and revenue in general public budget)/total population
GDP per capita	GDP/ total population
Industrial ratio	Industrial (including construction) value added as a percentage of GDP
Expenditure per capita	General public budgetary expenditure / total population
Openness	(The sum of exports and imports)/GDP
ln Population	The logarithm of population
Population density	Total population / land area
Land scarcity	Land area / the average of land area across prefectures in the sample

Table A2 Moran's I Statistics for Land-use Premiums

Year	Moran's I	Standard Deviation
2006	0.238***	0.036
2007	0.281***	0.038
2008	0.307***	0.040
2009	0.271***	0.039
2010	0.394***	0.040
2011	0.394***	0.040
2012	0.248***	0.040
2013	0.345***	0.037
2014	0.252***	0.039
2015	0.206***	0.040
2016	0.209***	0.039

Figure A1 Spatial Autocorrelation for land-use premiums



Note: Figure A1 virtualizes the spatial association for land-use premiums since it presents how similar a prefecture's neighbors are to the prefecture itself. In panels A-C, we show the positive spatial autocorrelation for land-use premiums for 2007, 2010, and 2016, respectively. In panel D, we find the similar cluster in panels A-C, which is low-low value cluster of land-use premium between 2006 and 2016.

Table A3: OLS Results (Interaction of deficit per capita with horizontal competition)

	<i>Dependent variable: Land-use premium per capita</i>			
	(1)	(2)	(3)	(4)
SPL premium per capita	0.0480*	-0.0336	0.3475***	0.2530***
	(0.0253)	(0.0329)	(0.0789)	(0.0933)
GDP per capita	0.0960	-0.0289	0.0244	0.0331
	(0.0798)	(0.0859)	(0.0860)	(0.0861)
Deficit per capita	-0.3597***	-0.3383***	-0.1669*	-0.1680*
	(0.0816)	(0.0816)	(0.0874)	(0.0874)
Industrial ratio	0.0359	0.0857	0.1037	0.1031
	(0.1052)	(0.1057)	(0.1052)	(0.1052)
Expenditure per capita	0.2950***	0.3105***	0.3095***	0.3146***
	(0.0653)	(0.0653)	(0.0650)	(0.0650)
Openness	-14.9217***	-12.8219***	-12.0991***	-11.5339***
	(3.9612)	(3.9881)	(3.9705)	(3.9798)
ln Population	0.0039	0.0079	0.0153	0.0167
	(0.0270)	(0.0270)	(0.0269)	(0.0269)
Population density	-0.0049	-0.0063	-0.0051	-0.0045
	(0.0205)	(0.0204)	(0.0203)	(0.0203)
Land scarcity	-3.7258	-5.0427	-5.7051	-5.0390
	(12.9280)	(12.8992)	(12.8354)	(12.8340)
SPL premium per capita × GDP per capita		0.0023***	0.0010	0.0019**
		(0.0006)	(0.0006)	(0.0008)
SPL premium per capita × Deficit per capita			-0.0084***	-0.0058***
			(0.0016)	(0.0021)
SPL premium per capita × GDP per capita × Deficit per capita				-0.00004*
				(0.00002)
Observations	2,992	2,992	2,992	2,992
R ²	0.0708	0.0759	0.0855	0.0867
Adjusted R ²	-0.0290	-0.0237	-0.0135	-0.0125
F Statistic	22.8656***	22.1821***	22.9295***	21.3388***
	(df = 9; 2701)	(df = 10; 2700)	(df = 11; 2699)	(df = 12; 2698)

Note:

*p<0.1; **p<0.05; ***p<0.01