Land-based finance, fiscal autonomy and land supply for affordable housing in urban China: A prefecture-level analysis

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Abstract
China’s booming housing market and the resultant skyrocketing housing prices in Chinese cities during the recent decade have led the Chinese government to step up its effort to provide affordable housing for low- and middle-income households. Despite the central government’s renewed policy focus on affordable housing program, the real pace of its development in urban China has been too sluggish to achieve its intended objective. Based on a panel dataset of land supply in Chinese cities at prefectural level and above during the period of 2009-2013, this paper examines the factors influencing urban governments’ commitment to land supply for affordable housing. It identifies an intriguing pattern characterizing the spatial mismatch between cities devoting a greater share of land for affordable housing and hotspot cities with severe housing affordability challenge. Cities with higher degree of dependence on land finance and higher level of fiscal autonomy were found to be less likely to devote land for affordable housing construction. The study suggests that the project of affordable housing provision in urban China cannot be successfully implemented unless local governments’ reliance on urban land-based interests are weakened.

Key Words: Affordable housing; Land supply; Land finance; fiscal autonomy; urban China

Introduction
China has achieved remarkable progress on various fronts since it adopted reform and open-up policies in the late 1970s. Most noticeably, there has been unprecedented improvement in the housing conditions for hundreds of millions of urban residents in Chinese cities with their per capita floor space increasing from 4 to 29 sq m and the ratio of homeownership increasing from 20 to 70 percent in urban China during 1980 to 2000 (Man, 2011; Yi and Huang, 2014). Such significant
achievements in housing consumption, however, have been accompanied by phenomenal housing price appreciation and growing affordability pressures for middle and low-income households, especially for young graduates, migrants and other newly entrants to urban labor market. It was estimated that the average housing price-to-home ratio for the 35 major cities in China was 10.2 in 2013, which put China in the category of “severely unaffordable” (Zhang et al., 2016). Housing affordability and housing poverty issues are becoming more acute in China’s first-tier cities such as Beijing, Shanghai and Shenzhen, where it takes more than 30 years for an average household with the local median income to buy a 90 sq m apartment (China Daily, 2017). Escalating housing prices and acute housing affordability challenge have been argued to stimulate manufacturing firms to enter real estate market and consequently undermine their innovation incentives, contribute to enlarged social discontent and social-spatial inequality, and threaten to derail China’s urban dream of “a decent home for all” (Huang, 2013; Huang and Li, 2014; Rong et al., 2016). Housing affordability is so crucial to social cohesion and political stability that China’s top decision maker Xi Jiping, during a communist party leadership meeting in Nov 2013, urged his bureaucratic associates to spend more efforts to solve various problems in the housing market and boost the supply of affordable housing (Reuters, 2013; Shi et al., 2016).

Although the central government in China has demonstrated an impressive commitment to affordable housing in recent years, the real pace of affordable housing scheme implemented in Chinese cities has been far away from satisfactory and most of the programs barely met their originally planned targets (Huang, 2012). Scholarly assessment of China’s affordable housing policy and practice has pointed to the root cause embedded in the fragmentation of China’s inter-governmental structure in which “the division of powers, incentives, responsibilities, and revenue sources between the central government and local governments has worked against the state’s goal of efficient and effective affordable housing provision” (Zou, 2014, p. 9).

Specifically, it is argued that the existing public finance system, the performance evaluation system and localization in policy implementation have combined to result in a lack of commitment from local governments to affordable housing (Huang, 2012).

While the existing literature in housing studies has shed important light on the structural reasons for the failure of affordable housing provision, most of them tend to focus on the description and assessment of nation-wide policies and programs at macro scale. Little has been done to empirically substantiate the hypothesized impact
of such structural forces on the pace and scope of affordable housing development in concrete cities. Moreover, treating China as a homogeneous entity ignores enormous regional heterogeneity and cross-city variations in housing outcomes (Huang, 2004; Yu, 2006; Zhu et al, 2014). Therefore, it remains unknown whether and how local commitment to affordable housing provision varied across different Chinese cities.

On the other hand, it has been well documented that in a fiscally decentralized institutional environment in the post-reform era, local governments were incentivized to play a developmental role in fostering China’s spectacular growth performance (Oi, 1992; Xu, 2011). Local governments’ drive for development has been found to be distinguished by strong urbanism since the mid-1990s when urban governments shifted their efforts from promoting industrial growth to ‘urbanizing’ their localities (Han and Kung, 2015; Su and Tao, 2017). A growing amount of literature has in recent years explored the rationale behind “the urbanization of the local state” (c.f. Hsing, 2010) and its economic and social-spatial implications. However, very few, if there is any, has been written to associate urbanizing local state with affordable housing supply amidst China’s land-centered urbanization process.

Against the practical and academic backdrop identified above, this article examines the driving forces influencing the commitment of China’s urban governments to affordable housing provision, based on a recently available database on land resources allocated for the construction of affordable housing in Chinese cities during 2009-2013. It identified an intriguing pattern characterizing the spatial mismatch between cities devoting a greater share of land for affordable housing and hotspot cities with severe housing affordability challenge. Further analysis revealed a statistically negative relationship between urban governments’ reliance on land finance and local commitment to affordable housing supply. In addition, cities with higher levels of fiscal autonomy were found to be less likely to reserve land for affordable housing. The results from this empirical exercise provide evidence to demonstrate the political-economic logic underpinning local governments’ attitude toward affordable housing provision. The study suggests that the affordable housing scheme in China cannot be successfully implemented if local governments’ vested interests in land commodification are not severed.

The remainder of the paper is organized as follows. We first provide a brief overview of affordable housing policies amidst China’s ongoing urban housing reform. It is then followed by a review of three perspectives that are relevant to our understanding of local governments’ commitment to affordable housing supply. After
a clarification of definitional and methodological issues, the results of empirical analysis are reported and discussed in the next section. The final section concludes the study.

**Affordable housing policy in urban China**

Affordable housing policy in China experienced frequent change in policy focus and orientation along with China’s ongoing urban housing reform away from in-kind socialist housing distribution scheme towards increasing commodification and marketization since the 1980s (Wang and Murie, 2011; Huang, 2012; Chen et al., 2014; Shi et al., 2016). The origin of affordable housing scheme can be traced back to the peaceful living (anju) project which was introduced to provide housing for urban middle to low-income families in 1995 (Zou, 2914). It was replaced by the economic and affordable housing program in 1998, partly as a continuation of central government’s intention to further promote housing commodification and home ownership, and partly as a policy tool to stimulate domestic consumption in response to the Asian Financial crisis. The development of affordable housing was relegated to a secondary position in 2003 when ordinary commodity housing was defined as the main housing form (Huang, 2012). There was a discernible trend in housing provision system thereafter characterized by a declining share of economic and affordable housing in total housing investment and simultaneously a nation-wide frenetic rise in urban housing price. Affordable housing programs were revived and expanded since 2007 when the central government started to shift its focus to the goals to ensure housing affordability and social justice and maintain political stability (Huang, 2012). In 2010, affordable housing was officially included in the 12th five year plan as a critical component of the social welfare and public service system (Dang et al., 2014). Some new programs such as public rental housing (PRH) and price-capped housing (PCH) were added to form a comprehensive affordable housing system.

In its broad sense, affordable housing in China includes cheap rental housing (CRH), public rental housing (PRH), economic and affordable housing (ECH), housing with controlled price, housing with shared ownership and recent resettlement housing for displaced households in shantytown redevelopment and urban renewal (Huang, 2015; Shi et al, 2016). The mainstay of China’s affordable housing system includes the first three types, namely CRH, PRH and ECH. CRH refers to in-kind or monetary rental housing subsidies to low-income households facing housing difficulty. PRH is rental housing provided at government-controlled rents to mainly lower-middle income household facing housing difficulties, new employees, and selected qualified migrants (Huang, 2015). ECH is ownership-oriented housing
provided by developers on free land allocated by local municipal governments and sold to qualified households at government-controlled prices.

**What motivates local governments to provide affordable housing?**

While affordable housing policy was formulated at central level, its successful implementation in Chinese cities hinges upon the dedication and commitment of various urban governments. Theoretically, there are several motivations behind local governments’ preferences towards the construction of affordable housing.

The first group of literature conceptualizes local governments’ attitude towards affordable housing from the perspective of “revenue maximization”. It makes the assumption about local governments as revenue maximizers (Su and Tao, 2017). According to this perspective, “like most bureaucracies in the world, local governments in China seek to maximize their budgets” (Su and Tao, 2017, p. 2), since “after all, governments are organizations and they need financial resources to perform their functions and survive” (p. 17). Along this line, in the early reform stage, fiscal decentralization motivated local government officials in China to become development-oriented that emphasized the growth of local state or township and village enterprises within their administrative jurisdictions and embraced local protectionism. The reshuffling of central-local fiscal relations through the introduction of tax-sharing system in 1994 has allowed the central government to control more revenues, while devolving an increasing heavy burden of providing urban social and public services onto the shoulders of local officials (Lin and Zhang, 2015)\(^1\). The shortfall in local fiscal revenue, together with intensified inter-regional competition and the introduction of a dual-track land market since the 1980s, have driven Chinese municipalities onto a new development trajectory in which the commodification, upgrading and expansion of urban built up environment was practiced as a means to generate income to finance urban infrastructure and other mandates (Han and Kung, 2015; Su and Tao, 2017). Since the development of affordable housing projects involves the waiver of land-leasing fees and related taxes and surcharges that urban governments normally levy on real estate development activities, it is not difficult to understand that revenue-hungry local governments have no motivation to promote the development of affordable housing sector. Instead, when compelled by central governments to do so, local governments tend to adopt various countermeasures to

\(^1\)It has been reported that after 1994 local governments accounted for only 40-50% of total government revenue while being responsible for about 70-80% of total government expenditure. As a result, local governments rely heavily on transfers from central government which amounted to over RMB 5.5 trillion and accounted for about 40% of total local revenue in 2015 (http://online.wsj.com/public/resources/documents/NPC2017_Finance_Chinese.pdf)
minimize the potential loss of land-based revenues. For example, a case study by
Dang et al (2014) found that Beijing municipal governments chose to reduce venue
loss by locating affordable housing project in less-desirable location on the urban
fringe with poor accessibility to services and employment opportunities (cited in
Huang, 2015).

The second type of literature approaches local governments’ preference towards
affordable housing scheme from the perspective of the politics of local expenditure,
with particular focus on the connection between fiscal decentralization and local
public goods provision. It has been well documented that in a politically democratic
context, local governments are in a better position to provide levels of public
goods/services matching the demands of their local residents (Oates, 1972). Studies
focusing on China, however, have identified that fiscal decentralization may give rise
to inefficient levels and distorted patterns of local public expenditures. Specifically,
under the context of asymmetrical decentralization (c.f. Chen, 2007) characterized by
economic decentralization to the local and political centralization under the party,
careerist local officials in China would have strong motivation to utilize their
decentralized resources to strive for more development opportunities in order to
enhance their possibilities of upward promotion. This was supported by the results of
some empirical studies which revealed that China’s local governments with growing
financial autonomy were more likely to spend on urban infrastructure and other
productive investments that can bring about sustained economic growth, rather than
on revenue-depleting public goods and services such as education, healthcare and
social welfare (Qiao et al., 2005; Fu and Zhang, 2007; Yin and Zhu, 2011; Wang et al.,
2012; He et al., 2014). As affordable housing constitutes a growing portion of local
expenditure on public goods and services, it is expected that entrepreneurial urban
governments in China will be motivated to spend less on such non-productive
investments.

In addition to the previous logics of revenue maximization and expenditure bias,
the policy choices of local governments can also be understood from the perspective
of state-society relations, as local governments in post-reform China may also have to
face emerging pressure from discontented civil society. Although local residents are of
secondary importance in exerting pressure on urban officials, rising social discontent
with urban livelihood issues especially high housing costs and growing housing
unaffordability constitutes a volcano that once erupted will post great challenge to
social stability and political legitimacy. In China’s nomenklatura system, social
stability is commonly believed to be a paramount target with veto power as failing to
attain this target would cancel out all other achievements in cadre performance evaluation exercise (Edin, 2003). In fact, since 2010 the development of affordable housing was made a performance target for local governments when the ministry of housing and urban-rural development in China introduced the “affordable housing work target and responsibility contract” (Zhao and Rasiah, 2016), although the real effect of such social target remains to be seen. Driven by the concern for urban manageability and social stability, city officials in China may be compelled to address local residents’ demand for affordable housing.

**Data and Research Methodology**

The central question for theoretical and empirical enquiry in this study essentially concerns the way in which local governments’ supply of land for affordable housing is connected to their fiscal interests in land leasing. Based on the above literature review, the main hypothesis to be tested is that cities with higher dependence on land finance and higher level of fiscal autonomy are less likely to devote land for affordable housing. The question and hypothesis listed above have brought about several research parameters that require clarification. To operationalize the measurement of possible explanatory factors, three major indicators will be constructed. Firstly, the ratio of land conveyance income to total fiscal revenue will be used to measure the concern of urban governments for revenue maximization. The larger the ratio, the stronger incentives that local governments have for maximizing municipal revenue from land commodification and the more reluctant they are to reserve land for affordable housing.

Secondly, urban governments’ preference toward local public goods provision is measured by the indicator of fiscal autonomy defined as the ratio of fiscal revenue to fiscal expenditure. Larger ratio of this indicator denotes higher degree of decision-making autonomy over urban expenditure and less reliance on fiscal transfer from central government. As is reviewed above, higher degree of local fiscal autonomy in the Chinese context may lead to a bias in expenditure structure towards urban public services in general and affordable housing in particular.

Thirdly, the potential pressure from civil society in affordable housing provision is measured by an indicator of urban housing affordability defined as the ratio of average urban wage salary to average urban housing price in each municipality.

The main objective of this study is to examine local commitment to affordable
housing provision in Chinese cities, which will be measured by the share of land area devoted to CRH, PRH and ECH in total land area supplied. Data on urban land supply for different use types come from China land and Resources almanac. Because the almanac did not provide detailed breakdown for land supplied for affordable housing until 2009, this study has to focus on the period of 2009-2013 for data availability.

In addition, following the practice of earlier studies, some independent variables such as GDP per capita, economic structure defined as the ratio of manufacturing value-added to urban GDP, and fiscal capacity measured by the ratio of fiscal revenue to urban GDP will be included to control their possible impact on local motivation to affordable housing provision. Table 1 lists out the descriptive statistics of all variables for the panel data that are used in this study.

Table 1 here

Local commitment to affordable housing provision

In a manner consistent with the shift of central government’s focus to social-political goals since 2007, urban governments in China were required to reserve more land for affordable housing program, as is shown by the increasing share of land devoted to affordable housing scheme in total land supplied for residential purpose (Figure 1).

Figure 1 here

Such national trend, however, masks considerable internal heterogeneity across Chinese cities. Figure 2 maps out the spatial distribution of local commitment to land supply for affordable housing in 2009 and 2013 respectively. Based on the degree of deviation away from national average level, all municipalities in China were classified into different categories. It is generally discernible that with few exceptions, most of the cities with higher share of land reserved for affordable housing were concentrated in central and western area. This spatial pattern is quite contrary to our conventional understanding of the spatial dimension of China’s economic development level. Since housing affordability is more of a challenge in China’s first-tier cities located along the east coast, such spatial pattern of local commitment to affordable housing provision tends to suggest a spatial mismatch between affordable housing supply and demand.

Figure 2 here

In order to further explore the driving forces underlying urban governments’ motivation, a regression model will be estimated with the following form:

\[
\text{Affordable}_{\text{housing}}_{\text{land}}_{i,t} = \beta_1 \text{Land}_{\text{Finance}}_{i,t} + \beta_2 \text{Fiscal}_{\text{Autonomy}}_{i,t} + \beta_3 \text{Affordability}_{i,t} + X_{i,t} + \alpha_i + \gamma_t + \epsilon_i
\]
Where the main variables are defined as above. $X_{i,t}$ corresponds to covariates including GDP per capita, economic structure defined as the ratio of manufacturing value-added to urban GDP, and fiscal revenue to urban GDP, etc. All the independent variables are measured at the same year with the dependent variables. The term $\alpha_i$ denotes city/prefecture dummy variables, $\gamma_t$ corresponds to year dummy variables.

To avoid omitted-variable bias, we used a city fixed effect model. In addition to the regression analysis based on the full sample, we also divide the whole sample into three groups, namely east, central and west areas, to explore whether the determinants of local commitment to affordable housing vary across three macro regions. The results are listed out in Table 2

**Table 2 and Figure 3 here**

The first result from the regression analysis is that the independent variable of land finance is significantly negative. Such negative association is observable from the scatterplot between the variable of land supply for affordable housing and the variable of local reliance on land finance (Figure 3). This implies that cities with higher degree of reliance on land leasing fee for local revenue have weaker motivation to devote land for affordable housing program because doing so will compel local governments to forego a lucrative source of income. The consistently significant and negative coefficients for land finance variable among three macro regions further suggest that seeking revenue maximization is a dominant motivational factor influencing Chinese urban governments’ decision on land allocation.

Secondly, the variable of fiscal capacity is significantly positive for the full city sample. This is not surprising as providing affordable housing is a resource-depleting activity that requires not only fiscal transfer from central government but also matching fund from local governments through land leasing fee, housing provident fund and other channels. Therefore, cities with higher level of fiscal capacity have more financial resources for affordable housing scheme and are more likely to devote land for the program. Contrary to the effect of fiscal capacity, the variable of fiscal autonomy is significantly negative for the full city sample. The negative association between the variable of land supply for affordable housing and the variable of fiscal autonomy is reflected in the scatterplot in both 2009 and 2013. This implies that cities

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2Eastern region includes Beijing, Hebei, Liaoning, Jiangsu, Shandong, Zhejiang, Shanghai, Tianjin, Fujian, Hainan and Guangdong. Central region includes Shanxi, Jilin, Anhui, Jiangxi, Henan, Hubei, Heilongjiang and Hunan. Western region includes Sichuan, Chongqing, Guizhou, Yunnan, Shaanxi, Gansu, Tibet, Qinghai, Ningxia, Xinjiang, Guangxi and Inner Mongolia. The three regions are defined according to the regionalization scheme in the 7th five-year plan.
with higher level of fiscal autonomy are more likely to spend on urban infrastructure and commodity housing which can bring about economic growth and land price appreciation than on affordable housing which is often regarded as a drain on local fiscal resources. Alternatively, this result can also be interpreted as urban governments with lower degree of fiscal autonomy are more dependent on transfers from the central government and are therefore more obligated to follow the mandate from central government which in recent years paid growing attention to affordable housing provision.

It is interesting to note that the impact of fiscal capacity and fiscal autonomy varied between coastal and inland areas. As is seen in Table 2, both of these two factors are significantly negative in central and western regions, while being insignificant in eastern coast. This inter-regional difference in driving forces of local land supply for affordable housing can be understood from several angels. On one hand, compared with cities in relatively developed coastal area with functional market mechanism, diversified fundraising channel and favorable investment environment where marginal return from additional investment in urban infrastructure is small, urban governments in less developed region are more motivated to spend on infrastructure and other productive investments in order to catch up with their developed counterparts. In other words, city governments in inland area are more growth-oriented and therefore are less inclined to devote financial and land resources to unproductive affordable housing. On the other hand, cities with less fiscal autonomy are more dependent on central government transfers and would have greater incentives to commit resources for affordable housing units, which have since 2009 become increasingly an important fulcrum through which central transfers to cities are allocated. Given that central transfers for affordable housing programs are only available for central and western provinces, it is understandable that the factor of fiscal autonomy is only significant in these areas. In addition, cities along China’s east coast tend to be more market oriented with a strong presence of non-state economy, an augmented and diversified tax base and a considerable share of fiscal revenue contributed by individual income tax. Local governments there are expected to be more responsive to local concerns for affordable housing and other livelihood issues.

Thirdly, the indicator of housing affordability has no significant impact on local land supply for affordable housing. In other words, whether or not urban housing

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3An alternative test has been done using the ratio of average disposable household income per capita of urban residents to average urban housing prices for robustness check. The signs and coefficients for both land finance and fiscal autonomy are consistent with the main results we report in table 2. The indicator of housing affordability is significant only in the full sample regression but not for the three
price is affordable to ordinary residents does not figure prominently in local governments’ decision over land allocation. This reflects the sobering fact that despite recent advocacy for people-centered development, local governments in China’s authoritarian political system are still not accountable to local residents.

Conclusion and Discussion

China’s booming housing market and the resultant skyrocketing housing prices in Chinese cities during the past decade have led the Chinese government to step up its effort to provide affordable housing for low- and middle-income households. Despite central government’s renewed policy focus on affordable housing program, the real pace of its development in urban China has been so far too sluggish that both provision and consumption of affordable housing in Chinese cities are “too little to go around” (Huang, 2012, p. 954). While some earlier studies have pinpointed the structural reasons leading to the undersupply of affordable housing in urban China, little efforts have been made to quantify the real impact of these reasons on the progress and development of affordable housing in different cities across China.

Based on a panel dataset of land supply in Chinese cities at prefectural level and above during the period of 2009-2013, this study examines the factors influencing local governments’ commitment to land supply for affordable housing scheme. The empirical findings identify an intriguing pattern whereby cities committed to providing more land for affordable housing construction are spatially separated from those cities with severe housing affordability challenge. Further statistical analysis reveals a significant negative relationship between urban governments’ reliance on land finance and their commitment to supply land for affordable housing. While strong fiscal capacity could allow cities to supply more land resources for affordable housing development, urban governments with growing fiscal autonomy, especially those located in less developed central and western areas, were found to be more interested in using land to promote urban economic growth and consequently were less likely to devote land for affordable housing and other non-productive purposes. The analysis found no significant impact for urban housing affordability challenge on local governments’ decision over land supply for affordable housing. The empirical findings thus confirm the presence of “revenue maximization” and “expenditure bias” logics characterizing the behavior pattern of China’s urban governments whose attitude towards affordable housing supply in Chinese cities, despite the recent push models of regional subsamples. It loses its significance in all the models if the independent variable of GDP per capita is replaced with average disposable household income of urban residents. The results are available upon request.
by the central government, are still heavily shaped by the political-economic concerns structured from above, rather than the concern for the housing affordability of ordinary urban residents from below.

This study has also important implications for the effectiveness of China’s ongoing campaign to enlarge its affordable housing program. China’s local governments’ vested interests in the maximization of land-based revenue are driven in part by the existing public finance system in which urban governments taking a small share of budgetary revenue have to shoulder the majority of expenditure on urban public and social services, and in part by the land regime that enabled local municipal governments to monopolize land supply and leverage urban land and real estate for economic growth (Huang, 2012; Su and Tao, 2017). Therefore, if China wants to ensure the successful implementation of its affordable housing program, urban governments should be given a larger share of budgetary revenue and be encouraged to develop a broad and diversified local tax bases to reduce their dependence upon land-based revenues. At the same time, land management system should be gradually reformed to allow suburban farmer and rural collectives a larger role in deciding over local land supply and the distribution of land-based interests (Huang, 2012; Huang and Tao, 2015). Moreover, the presence of local expenditure bias towards urban infrastructure and other productive investments at the relative expense of affordable housing and other livelihood concerns is embedded in China’s cadre performance evaluation system that still prioritizes the fulfillment of measurable economic targets. It is therefore inadequate to simply step up the financial resources available to local governments in order to expand local affordable housing program. As the findings of this study suggest, urban governments will have no incentives to respond to the concern of local residents and guarantee sufficient resource inputs into affordable housing program if the performance evaluation system is not reformed to include accurate, quantifiable and enforceable targets related to the program. This study focuses on land supply for various forms of affordable housing programs as a whole. Since homeownership-oriented programs such as ECH are by nature different from rental programs such as CRH and PRH in terms of political and fiscal incentives as well as targeted beneficiaries, further research could be conducted in the future to explore the similarities/differences in driving forces underlying local commitment to owner-occupied vs. rental programs in Chinese cities.

References
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Figure 1 The share of land supplied for affordable housing in total land supplied, 2009-2013
Figure 2 Local commitment to land supply for affordable housing, 2009 and 2013
Table 1 Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordable housing land</td>
<td>1499</td>
<td>19.80211</td>
<td>19.22536</td>
<td>0.05</td>
<td>99.07054</td>
</tr>
<tr>
<td>land finance</td>
<td>1499</td>
<td>67.59694</td>
<td>61.72907</td>
<td>0.3056933</td>
<td>1777.127</td>
</tr>
<tr>
<td>Fiscal autonomy</td>
<td>1499</td>
<td>46.12589</td>
<td>23.73487</td>
<td>5.361506</td>
<td>184.8309</td>
</tr>
<tr>
<td>Affordability</td>
<td>1499</td>
<td>11.52378</td>
<td>3.750888</td>
<td>1.015836</td>
<td>34.53701</td>
</tr>
<tr>
<td>Fiscal Capacity</td>
<td>1499</td>
<td>7.298695</td>
<td>2.869155</td>
<td>2.21</td>
<td>25.70106</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>1499</td>
<td>34.12765</td>
<td>23.29788</td>
<td>4.491</td>
<td>171.6448</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1499</td>
<td>45.31593</td>
<td>31.65956</td>
<td>1.510404</td>
<td>847.2063</td>
</tr>
</tbody>
</table>

Note: Data on affordable housing land and land finance comes from *China land and resources almanac*; Data on fiscal autonomy, fiscal capacity, GDP per capita and manufacturing comes from *China statistical yearbook for regional economies*. Data on affordability is calculated from the China Premium Database (CEIC) and *China statistical yearbook for regional economies*.

Table 2 Regression result

<table>
<thead>
<tr>
<th>(1) Affordable housing land (Full sample)</th>
<th>(2) Affordable housing land (Eastern region)</th>
<th>(3) Affordable housing land (Central region)</th>
<th>(4) Affordable housing land (Western Region)</th>
</tr>
</thead>
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<tr>
<td>Land finance</td>
<td>-0.0328*</td>
<td>-0.107***</td>
<td>-0.129***</td>
</tr>
<tr>
<td>(0.0184)</td>
<td>(0.0269)</td>
<td>(0.0229)</td>
<td>(0.0103)</td>
</tr>
<tr>
<td>Fiscal autonomy</td>
<td>-0.205*</td>
<td>0.290</td>
<td>-0.598**</td>
</tr>
<tr>
<td>(0.111)</td>
<td>(0.229)</td>
<td>(0.241)</td>
<td>(0.125)</td>
</tr>
<tr>
<td>affordability</td>
<td>-0.224</td>
<td>-0.264</td>
<td>-0.856**</td>
</tr>
<tr>
<td>(0.265)</td>
<td>(0.363)</td>
<td>(0.394)</td>
<td>(0.415)</td>
</tr>
<tr>
<td>Fiscal capacity</td>
<td>1.231**</td>
<td>-1.334</td>
<td>2.735**</td>
</tr>
<tr>
<td>(0.620)</td>
<td>(1.742)</td>
<td>(1.190)</td>
<td>(0.756)</td>
</tr>
<tr>
<td>Log(gdp)</td>
<td>10.91</td>
<td>1.985</td>
<td>9.552</td>
</tr>
<tr>
<td>(7.236)</td>
<td>(12.82)</td>
<td>(13.38)</td>
<td>(13.18)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.0331</td>
<td>-0.723*</td>
<td>0.722*</td>
</tr>
<tr>
<td>(0.0209)</td>
<td>(0.383)</td>
<td>(0.378)</td>
<td>(0.0206)</td>
</tr>
<tr>
<td>Year</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>1.646</td>
<td>0.0205</td>
<td>0.152</td>
</tr>
<tr>
<td></td>
<td>(1.334)</td>
<td>(2.077)</td>
<td>(2.563)</td>
</tr>
<tr>
<td>2011</td>
<td>1.933</td>
<td>0.453</td>
<td>2.655</td>
</tr>
<tr>
<td></td>
<td>(1.846)</td>
<td>(2.981)</td>
<td>(2.934)</td>
</tr>
<tr>
<td>2012</td>
<td>3.801</td>
<td>2.683</td>
<td>2.372</td>
</tr>
<tr>
<td></td>
<td>(2.347)</td>
<td>(4.208)</td>
<td>(3.778)</td>
</tr>
<tr>
<td>2013</td>
<td>-0.183</td>
<td>4.049</td>
<td>2.287</td>
</tr>
<tr>
<td></td>
<td>(2.644)</td>
<td>(4.558)</td>
<td>(4.666)</td>
</tr>
<tr>
<td>Constant</td>
<td>-88.29</td>
<td>25.45</td>
<td>-84.94</td>
</tr>
<tr>
<td></td>
<td>(72.02)</td>
<td>(128.2)</td>
<td>(125.7)</td>
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</tbody>
</table>

<table>
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<tr>
<th>City Fixed Effect</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
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<tr>
<td>N</td>
<td>1499</td>
<td>476</td>
<td>496</td>
<td>527</td>
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<tr>
<td>adj. $R^2$</td>
<td>0.084</td>
<td>0.098</td>
<td>0.148</td>
<td>0.114</td>
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Note: Standard errors in parentheses and clustered at the city level. * p<0.1, ** p<0.05, *** p<0.01. There are 101, 103 and 120 clusters/cities in eastern, western and central regions respectively. GDP is weighted by the Consumer Price Index.
Figure 3 Scatterplot between land supply for affordable housing, land finance and fiscal autonomy, 2009 and 2013