ABSTRACT: China’s urbanization is significant worldwide. This process is characterized by under-urbanization of population and fast urban land expansion. The driving forces behind this expansion and their rationale are not fully understood and empirically tested. This study fills this gap by analyzing panel data from 1999–2009 for all 286 prefecture-level cities in China. The findings reveal that land financing, using different measures, significantly contributed to land urbanization in China. Economically stronger cities with higher real estate investment more aggressively pushed for land urbanization. The true purpose of urbanization should be improving the living standard, not to generate revenue. It is suggested that urbanization can serve its justified goals only if fiscal and political relations between central and local governments can be adjusted. As more data become available, future studies are encouraged to further explore the subject by investigating additional factors and the latest trend of urbanization in China.

Nobel laureate in economics Joseph E. Stiglitz has cited urbanization in China, along with high-tech development in the United States, as the two most important issues that will shape the world’s development during the 21st century. In 2011 China’s urban population surpassed that of its rural areas for the first time in the country’s history, following three decades of astonishing economic development. China’s urban population proportion increased from 18% in 1978 to 52% in 2012. It is estimated that China’s urban population will exceed 60% in 2020 and 70% in 2050. It can be seen in Figure 1 that between 1980 and 1995 China’s urban and rural populations both increased, with the urban population growing at a much faster rate. Between 1995 and 2010, China’s rural population experienced a decline from 860 million to 671 million, recording a decrease of 189 million. In the same time period, the urban population grew from 352 million to 670 million, recording an increase of 318 million.

In fact the percentage of urban population has been a widely used measurement of China’s urbanization in many media reports and academic studies. However, this measurement requires more careful examination. China’s dramatic urban and rural demographic changes can be attributed to two reasons. First, millions of rural residents in China have migrated to cities since the country’s opening-up and reform in the late 1970s. It is estimated that in 2011 there were at least 250 million migrant workers in China, a 12% growth from 2008 (National Bureau of Statistics, 2012). It is extremely difficult for most migrants to obtain urban household registration status (hukou), so they are not entitled to urban welfare coverage, such as pensions, health care, and favorable educational
opportunities. Second, tens of millions of other rural residents had their farm land taken by local governments and their resident status administratively changed from rural to urban. Although they are granted urban resident status, their levels of welfare coverage are far below that of original urban residents. These two types of rural to urban demographic transition contribute significantly to China’s rapid “urbanization.” However, the physical presence in urbanized areas does not portend much meaning of urbanization for these “urban populations” since they have fundamentally different welfare coverage, employment opportunities, and daily lifestyle, as compared to China’s official urban residents (Ye, 2011a). As described by Chan (2010), China’s incomplete urbanization is achieved mainly by “allowing ‘temporary’ migration (of a ‘floating population’) to cities but denying the migrants access to urban welfare and many other benefits” (p. 66).

Therefore, the demographic transition can hardly be a meaningful measure of China’s urbanization. This article postulates that urban land expansion is a more valid measurement of urbanization in China. More importantly, this article tests the research hypothesis that land financing has driven land-centered urbanization in China and addresses its policy implications. The remainder of this article will first review the literature on land urbanization in China. A quantitative database of all 286 prefecture-level Chinese cities, mainly based on city demographics, socioeconomic statistics, and local government fiscal figures, will be employed to test the link between land financing and urbanization with panel data covering 1999–2009. Empirical findings and policy discussions will follow before conclusions are drawn.

**LAND-CENTERED DEVELOPMENT AND LAND FINANCING IN CHINA**

Urbanization in China is defined by Gu and Wu (2010) as “a complex and multifaceted process involving population migration from rural to urban areas, rural and urban land conversions, spatial reconfiguration of settlements, and changing governance” (pp. 1–2). Land-centered development has been identified as the most significant feature of China’s urbanization (Heikkila, 2007; Lin, 2007; Xu, Yeh, & Wu, 2009). Lin (2007) argues that rapid outward development of Chinese cities was driven by a city-centered urbanization model as a strategy of “place-making” and “place-promotion” (p. 1832; see also He & Wu, 2005; Shen & Wu, 2012). Urban land was exploited as a source of capital formation. Li, Xu, and Li (2010) further explain the economic and fiscal nature of such a land development process. In China, land ownership is divided. Urban land is fully owned by the state while rural land is collectively owned by villages. Heikkila (2007) depicts different approaches on how land can be urbanized in Chinese cities. Municipal governments acted as the representatives...
of the state to control urban land and its commodification process, extracting large profit from the process (Xu et al., 2009). Conveyance of land user rights from local governments to private developers provided a significant amount of local revenues. In some cases, local governments earn over 50% of their revenues on land transfer fees (Ho & Lin, 2003; Lin, 2007). Under local governments’ strong drive to expand, urban built-up areas in Chinese cities almost doubled from 1996 to 2000 (Figure 2).

It has to be said that local governments in China have little option but to explore land financing. The fiscal relationship between the central and local governments dramatically altered after an important tax reform in 1994. Previously, local governments collected taxes and shared some part of them with the central government. Nevertheless, the central government altered the rules of the game in 1994 by setting up its own tax collection bureaus at the local level. The central government has claimed the stable, easily collected taxes for its own treasury (Feng, Ljungwall, Guo, & Wu, 2013; Gong &Wu, 2012; World Bank, 2002). As a consequence, the extractive capacity of the central government has grown steadily over the past two decades. As shown in Figure 3, the central government usually
controls over 51% of the national fiscal revenues while covering less than 20% of the expenditures. In other words, local governments have to be responsible for over 80% of the fiscal expenditures with less than 50% of the revenue, despite some intergovernmental transfers from the central government. The gap has continued to widen in recent years. Therefore, in order to keep up with the budget shortfalls, local governments in China have to look for additional revenue sources that are not controlled by the central government. What they found is the “land financing,” which appears in many developing countries in recent years (Peterson & Kaganova, 2010, p. 1).

As a consequence, municipal governments have to capitalize on the land over which they have powers of expropriation, allocation, and conveyance to finance urban services and development projects. This is hardly surprising, because land, unlike capital and labor, is the only immobile asset firmly in the control of municipal government (Lin, 2007). The current land market in China is a combination of free administrative allocation and paid conveyance of land use right, which has made land transfer a lucrative fiscal source for municipal governments to exploit (Ho & Lin, 2003; Lin, 2007; Yeh & Wu, 1996).

Existing literature has tried to build the conceptual framework of land-centered urbanization in China (see, e.g., Chan, 2010; Heikkila, 2007; Xu et al., 2009) and provide theoretical analysis (see, e.g., Li et al., 2010; Yeh & Wu, 1996; Zhu, 2005). The few empirical studies on this subject tend to focus on a single city (Ding, 2004; Liu, Yue, & Fan, 2011; Wei & Zhang, 2012; Xu & Yeh, 2005; Yu & Ng, 2007), such as Beijing, Guangzhou, and Hangzhou. Lin (2007) compares land development patterns in the eastern, central and western regions in China and finds that rapid urban expansion of cities is driven by the conversion of farm land, extension of ring roads, and new zone development. A recent study by Tao, Su, Liu, & Cao (2010), using prefecture-level city data, analyzes the evolution of local governments’ roles in different periods of China’s growth and explores local fiscal incentives to use subsidized land and infrastructure as key instruments in regional competition for manufacturing investment. Very limited empirical studies have been able to assess the impact of land financing (leasing) on China’s urbanization at the city level with a nationwide sample. This article fills this gap by investigating prefecture-level cities in China to provide statistical evidence of the patterns and determinants of China’s land-centered urbanization. Particular attention is paid to land financing as the important factor driving such development.

DATA AND METHODOLOGY

This article measures urbanization in China by the expansion of built-up areas within city boundaries. As discussed above, land financing or land-leasing revenue has been argued to be one of the most important factors that stimulated urban expansion in Chinese cities and thus offers a distinctive explanation of the country’s urbanization (Lichtenberg & Ding, 2009; Ho & Lin, 2003; Lin, 2007; Yeh & Wu, 1996). Fixed-effects, random-effects, and two-stage least squares estimations are run to test the driving forces of urbanization in China by analyzing panel data from 1999 to 2009 for all 286 prefecture-level cities in China (except those in Tibet). Fixed-effects and random-effects estimations are traditional approaches for panel data analysis; one of the purposes of two-stage least squares estimation is to mitigate the problem of reverse causality (for example, urbanization may have an impact on economic development).

Dependent Variable

We use the share of built-up area as a percentage of total city land as one of the proxies for our dependent variable of urbanization to reflect land development in Chinese cities. Many Chinese cities today typically encompass an extensive area which contains an urbanized core (a high-density built-up area with nonagricultural land), surrounded by numerous scattered towns and large stretches of rural territory, usually with a dense farming population. A principal criterion to define the boundary of a Chinese city is the presence of a minimum average population density of at least 1,500 persons per sq. km., or contiguity of built-up areas (Chan, 2007). Built-up areas are defined as any
officially designated and constructed urbanized land for nonagricultural use in a city, including all the continuous urban land and surrounding areas with supportive urban infrastructures (i.e., airport, waste treatment plant, radio station, etc.). It has to be cautioned that the boundary of a Chinese city includes the central city districts (shi xia qu) and outer suburban and rural areas. The land area of central city districts is usually a proportion of the total area of the city. The reason total city land instead of the land of the central city district is used as the denominator is because the boundary of a central city district in Chinese cities often changes. According to a Ministry of Civil Affairs report, there were 717 central city districts in Chinese cities in 1996. The number grew to 852 by 2005 (Ministry of Civil Affairs, 2008). Therefore, using land area of total city land prevents us from getting inconsistent measures of the percentage of built-up areas at different points in time.

In 2009 the city with the highest share of built-up area as a percentage of total city land in China was Shenzhen, which exceeded 40%. Shenzhen is one of the Special Economic Zones (SEZs) and one of the most rapidly developing cities in China. The city has quickly become one of the top five largest cities in China, with an estimated population of over 14 million (including permanent, temporary, and migrant populations). Beijing and Shanghai respectively had 8.23% and 14.1% of total city land as built-up areas in 2009. Hulunbeir City, a traditional nomadic city in the Inner Mongolia Autonomous Region, had the lowest share of built-up area as a percentage of total city land, around 0.01%. In 1999, the average share of built-up area as a percentage of total city land for the 286 cities was 0.79%. The figure grew to 1.37% in 2009, which indicated a 7.3% rate of urban expansion annually.

**Independent Variables**

Drawing on the existing literature, this section includes several explanatory factors for urbanization, in particular the economic and fiscal factors. These are (1) dependence on land financing, (2) economic development, (3) average annual wage of staff and workers, (4) total population, (5) the share of nonagricultural population, (6) the share of manufacturing employment, and (7) real estate investment as a share of GDP. Tables 1 and 2 present the data sources and descriptive statistics.

**Dependence on Land Financing**

This is measured by two factors—the share of land lease fee as a percentage of budgetary revenue or budgetary expenditure. Urban expansion, Yew (2012) notes, is engineered by fiscally starving states to improve local fiscal capacity. In China, land-centered development and the pursuit of land revenue is argued to be the strongest drive for urbanization. Therefore, measuring dependence on land financing will help empirically test this relationship.

Tian and Ma (2009) use land lease fee as a share of local revenue to evaluate a local government’s dependence on leasing lands to developers (see also Zhang & Li, 2010). We argue that two measures—contribution of land revenue to local revenue or the share of land revenue in local expenditure—are equally important. Figure 4 depicts the increasing reliance on land lease fees in both local revenue and local expenditure from 1999 to 2009. The average share of land lease fee as a share of budgetary revenue for the 286 cities jumped from 5.6% in 1999 to 56.4% in 2009, although it fluctuated in some years. For the share of land lease fees as a share of budgetary expenditure, the pattern was similar. It increased from 3.9% in 1999 to 28.1% for all cities in 2009. This suggests that land lease fees became increasingly important to both local revenue and local expenditure while local revenue was more reliant on land lease fees.

**Economic Development**

We use GDP per capita (local GDP divided by de facto residents, who by census definition either have urban hukou or have resided in the city for more than 6 months during the previous
Table 1

Variable Measurement and Data Source

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land urbanization</td>
<td>The share of built-up area as a percentage of total city land under the</td>
<td>China data online and China Statistical Yearbooks</td>
</tr>
<tr>
<td></td>
<td>control of city governments and their subordinate county governments</td>
<td></td>
</tr>
<tr>
<td>Dependence on land financing</td>
<td>Land lease fee as a percentage of budgetary revenue or budgetary expenditure.</td>
<td>Land lease fee was retrieved from China Land and Resource Almanac (zhongguo guotu ziyuan nianjian); revenue and expenditure from China data online</td>
</tr>
<tr>
<td>Economic development</td>
<td>Real GDP per capita</td>
<td>China data online and China City Statistics</td>
</tr>
<tr>
<td>Average wage of staff and workers</td>
<td>The average wage of staff and workers in real terms</td>
<td>China data online</td>
</tr>
<tr>
<td>Total population</td>
<td>Population in the urban core city (under city districts (chengqu))</td>
<td>China data online</td>
</tr>
<tr>
<td>Share of nonagricultural population</td>
<td>Share of nonagricultural population in the urban core city (under city districts (chengqu))</td>
<td>China data online</td>
</tr>
<tr>
<td>Real estate investment as a share of GDP</td>
<td>Real estate investment as a share of GDP in the city</td>
<td>China data online</td>
</tr>
<tr>
<td>Share of manufacturing employment</td>
<td>The share of manufacturing employment in the city total labor force</td>
<td>China data online</td>
</tr>
</tbody>
</table>

Table 2

Descriptive Statistics, 1999–2009

<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>Land urbanization</td>
<td>3,029</td>
<td>−0.683</td>
<td>1.227</td>
<td>−4.505</td>
<td>3.705</td>
</tr>
<tr>
<td>Land lease fee as % of budgetary revenue</td>
<td>2,490</td>
<td>3.136</td>
<td>1.364</td>
<td>−3.840</td>
<td>5.886</td>
</tr>
<tr>
<td>Land lease fee as % of budgetary expenditure</td>
<td>2,461</td>
<td>2.374</td>
<td>1.433</td>
<td>−4.521</td>
<td>5.385</td>
</tr>
<tr>
<td>Economic development</td>
<td>2,702</td>
<td>8.906</td>
<td>0.656</td>
<td>7.189</td>
<td>10.891</td>
</tr>
<tr>
<td>Average wage of staff and workers</td>
<td>3,065</td>
<td>9.083</td>
<td>0.295</td>
<td>8.232</td>
<td>11.064</td>
</tr>
<tr>
<td>Total population</td>
<td>3,146</td>
<td>5.786</td>
<td>0.723</td>
<td>2.678</td>
<td>8.094</td>
</tr>
<tr>
<td>Share of nonagricultural population</td>
<td>3,146</td>
<td>3.373</td>
<td>0.539</td>
<td>1.995</td>
<td>5.727</td>
</tr>
<tr>
<td>Real estate investment as a share of GDP</td>
<td>3,039</td>
<td>1.388</td>
<td>0.867</td>
<td>−4.668</td>
<td>4.034</td>
</tr>
<tr>
<td>Share of manufacturing employment</td>
<td>3,041</td>
<td>42.163</td>
<td>13.488</td>
<td>7.399</td>
<td>81.648</td>
</tr>
</tbody>
</table>

Note: All variables excluding the share of manufacturing employment are in logarithms.

year) as a proxy of economic development. Deng, Huang, Rozelle, & Uchida (2010) find that economic development contributes significantly to urban land expansion in China. We hypothesize that economic development spurs urban expansion.

The Average Wage of Staff and Workers

This variable refers to the average wage of employees in the formal sector in the Chinese cities. This often is misinterpreted as household income in urban areas in China. Household income is commonly used as an independent variable affecting urbanization in the Western context (Wassmer, 2008). Nevertheless, the National Bureau of Statistics of China does not report comparable data. The average wage may represent only a fraction of household income, because investment gains and informal incomes are excluded, but this is the closet proxy that can be identified.
FIGURE 4
Land Lease Fee as a Percentage of Revenue and Expenditure, 1999–2009

Source: Land lease fee was retrieved from China Land and Resource Almanac (zhongguo guotu ziyuan nianjian). Revenue and expenditure data from China data online.

Total Population

This variable is the city population at the end of 1 year. Population generates the pressure for urban expansion. Torrens (2006) reports that population growth is “one of the most important engines of change in any urban system” (p. 251). Classic urban economic models proposed by Brueckner and Fansler (1983) also emphasize the effect of total population size on urban land development. Thus we expect population size to be positively related to urban land development in China. It should be noted that we use the urban core population as a proxy in this study. According to the Chinese administrative system, the urban core population means those living in the urban area where municipal governments are located.

The Share of Nonagricultural Population

This variable refers to the share of nonagricultural population in the total core urban population. In line with the planned economy, Chinese population was separated into agricultural and nonagricultural populations. The system is being reformed but remains largely stable in reform-era China. The majority of urban residents have obtained urban residential status (chengzhen hukou). But not all of them have it. The status of nonagricultural residents is related to access to social welfare coverage such as education and other basic services in urban areas. We expect there is a positive relationship between the share of nonagricultural population in the total city population and urban land expansion.

Real Estate Investment as a Share of GDP

As a newly urbanized society, real estate is of fundamental importance to China’s urbanization. Since the late 1990s, real estate development has characterized urban development across the country. Cities in China, large or small, coastal or inland, are enthusiastic at promoting the property market.
As noted by Cartier (2001) and Deng and Huang (2004), real estate investment in urban areas has been associated with many fundamental issues, such as urbanization and arable land losses. Since Chinese local governments do not traditionally collect a significant amount of property taxes, real estate tax revenues are important budget items in addition to revenues from land leasing. Property market development is expected to encourage urban land development as local governments strive to generate more revenues.

*The Share of Manufacturing Employment*

We include the share of the labor force in the manufacturing sector in the total labor force as a proxy of industrial activities. Urbanization is thought to be associated with industrial activities (Antrop, 2004). We postulate that the increase in the share of manufacturing employment has a positive impact on urbanization.

**MODEL SPECIFICATIONS**

We adopt the standard panel data models in our study. According to Hsiao and Tahmiscioglu (2008, p. 2698), “panel data, by blending inter-individual differences and intra-individual dynamics, have greater capacity for capturing the complexity of human behavior than data sets with only a temporal or a cross-sectional dimension.” Social scientists are very much interested in dynamic relationships; nonetheless, they cannot be detected in a single cross-section analysis (Wooldridge, 2010, p. 191). Panel data analysis is strong at investigating dynamics in social sciences. The fixed-effects model and the random-effects model are two common approaches to panel data analysis. The random-effects model can generate more efficient results of the slope coefficients than those produced by the fixed-effects model. In addition, the transformation employed in the random-effects model does not rule out time-invariant variables (Kennedy, 2003, p. 305). Therefore, as long as a random-effects model is statistically justified, it should be chosen (Wooldridge, 2010). Nevertheless, the fixed effects model always generates consistent results. The Hausman specification test commonly used to compare the fixed- and random-effects models suggests that fixed-effects models should be preferred in this study. The results of the random-effects models are reported as a reference. We use the standard fixed-effects model to analyze land urbanization in the Chinese cities:

\[
Y_{jt} = \alpha_0 + \beta X_{jt} + \gamma C_{jt} + \alpha_j + \gamma_t + \epsilon_{jt},
\]

where \( j \) indicates cities, \( t \) denotes year, \( Y \) refers to land urbanization as measured by the share of city built-up area as a percentage of the total land under the control of city governments and their subordinate county governments, \( X \) denotes some important variables such as local governments’ reliance on revenues from land transfer fees with \( C \) referring to a battery of socioeconomic variables, \( \alpha_j \) and \( \gamma_t \) refer to the city fixed effects and the year fixed effects, respectively, while \( \epsilon_{jt} \) is the random error.

**Baseline Results**

We introduce 12 models in this study. In the baseline models, we use fixed- and random-effects modeling to explain urbanization. In Models 5 and 6, we use the two-stage least squares (2SLS) estimations to handle the endogeneity issue. As four centrally controlled cities are different from the rest of the samples, we employ fixed-effects and random-effects modeling among Chinese cities excluding four centrally controlled cities to evaluate the robustness of the study (Models 7–10). We further use the two-stage least squares (2SLS) estimations among Chinese cities excluding four centrally controlled cities to test the results (Models 11 and 12). Table 3 reports the estimation results using the panel data analysis. According to variance inflation factor (VIF) tests, no multicollinearity problem was detected in any of our models. With the land lease fee as a share of budgetary revenue
TABLE 3

<table>
<thead>
<tr>
<th></th>
<th>FE (1)</th>
<th>RE (2)</th>
<th>FE (3)</th>
<th>RE (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land lease fee as % of budgetary revenue</td>
<td>0.0157+ (0.00839)</td>
<td>0.0290*** (0.00485)</td>
<td>0.0179* (0.00864)</td>
<td>0.0294*** (0.00487)</td>
</tr>
<tr>
<td>Land lease fee as % of budgetary expenditure</td>
<td>0.263* (0.123)</td>
<td>0.506*** (0.0338)</td>
<td>0.201+ (0.118)</td>
<td>0.465*** (0.0334)</td>
</tr>
<tr>
<td>Economic development</td>
<td>−0.325* (0.127)</td>
<td>−0.164*** (0.0471)</td>
<td>−0.283* (0.117)</td>
<td>−0.119** (0.0458)</td>
</tr>
<tr>
<td>Average wage of staff and workers</td>
<td>0.247+ (0.130)</td>
<td>0.528*** (0.0314)</td>
<td>0.271* (0.130)</td>
<td>0.543*** (0.0310)</td>
</tr>
<tr>
<td>Total population</td>
<td>0.112 (0.122)</td>
<td>0.375*** (0.0397)</td>
<td>0.0858 (0.119)</td>
<td>0.360*** (0.0384)</td>
</tr>
<tr>
<td>Share of nonagricultural population</td>
<td>0.0234 (0.0148)</td>
<td>0.0616*** (0.0110)</td>
<td>0.0246+ (0.0149)</td>
<td>0.0676*** (0.0106)</td>
</tr>
<tr>
<td>Real estate investment as a share of GDP</td>
<td>0.00122 (0.00222)</td>
<td>0.00370*** (0.00108)</td>
<td>0.000732 (0.00220)</td>
<td>0.00317*** (0.00105)</td>
</tr>
<tr>
<td>Share of manufacturing employment</td>
<td>−1.995 (1.491)</td>
<td>−7.919*** (0.371)</td>
<td>−1.809 (1.412)</td>
<td>−7.932*** (0.359)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.374</td>
<td>2.374</td>
<td>2.396</td>
<td>2.396</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.4289</td>
<td>0.4456</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: All variables excluding the share of manufacturing employment are in logarithms. Standard errors in parentheses.

+$p < 0.10$; $p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

being a key independent variable, 42.89% of the variations in land urbanization can be explained by Model 1. Using the share of land lease fee as a percentage of budgetary expenditure as a key independent variable, Model 3 roughly explains 44.56% of the variations of the Y values.

Our main independent variables, land lease fee as a share of budgetary revenue and expenditure, are positively related with land urbanization. In Models 1 and 3, land lease fee as a share of budgetary revenue or expenditure shows a significant relationship with the dependent variable in the fixed-effects models. A 1% increase in dependence on land financing is positively associated with a 0.0157%—0.0179% increase in land urbanization.

Supporting the literature on economic strength in a region and urbanization, this study finds that economic development is positively associated with land urbanization in four models. It should be noted that the significance levels of economic development are much higher in random-effects models.

The average wage of staff and workers in the city exerts a negative and significant impact on land urbanization. A caveat is in order that the average wage in Chinese cities is not equivalent to the household income used in the Western literature; rather, the Chinese average wage reflects the formal wage of employees working in the formal sector. The role of the informal sector has been increasingly important in Chinese cities, but it is extremely difficult to obtain income statistics on informal employment.

As expected, there is a significantly positive relationship between city population size and land urbanization in Chinese cities.

As a common phenomenon in developing countries, real estate investment in urban areas has a significantly positive impact on land urbanization in the Chinese cities. It is nonetheless only confirmed in Model 3 at a significance level of 10%.

Our baseline results indicate the following findings: (1) Dependence on land financing has a significantly positive impact on land urbanization, (2) population size in Chinese cities has a significant and positive relationship with land urbanization, and (3) real estate investment also plays a significant role affecting land urbanization.
TABLE 4

Two-stage Least Squares (2SLS) Estimations, 1999–2009

<table>
<thead>
<tr>
<th></th>
<th>2SLS (5)</th>
<th>2SLS (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land lease fee as % of budgetary revenue</td>
<td>0.0180*</td>
<td>0.0186*</td>
</tr>
<tr>
<td></td>
<td>(0.00765)</td>
<td>(0.00758)</td>
</tr>
<tr>
<td>Land lease fee as % of budgetary expenditure</td>
<td>0.0186*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00758)</td>
<td>(0.00765)</td>
</tr>
<tr>
<td>Economic development</td>
<td>0.418†</td>
<td>0.405†</td>
</tr>
<tr>
<td></td>
<td>(0.235)</td>
<td>(0.234)</td>
</tr>
<tr>
<td>Average wage of staff and workers</td>
<td>-0.276*</td>
<td>-0.271*</td>
</tr>
<tr>
<td></td>
<td>(0.123)</td>
<td>(0.122)</td>
</tr>
<tr>
<td>Total population</td>
<td>0.187</td>
<td>0.192</td>
</tr>
<tr>
<td></td>
<td>(0.147)</td>
<td>(0.146)</td>
</tr>
<tr>
<td>Share of nonagricultural population</td>
<td>0.0115</td>
<td>0.0186</td>
</tr>
<tr>
<td></td>
<td>(0.131)</td>
<td>(0.129)</td>
</tr>
<tr>
<td>Real estate investment as a share of GDP</td>
<td>0.0397*</td>
<td>0.0405*</td>
</tr>
<tr>
<td></td>
<td>(0.0172)</td>
<td>(0.0175)</td>
</tr>
<tr>
<td>Share of manufacturing employment</td>
<td>-0.000338</td>
<td>-0.000317</td>
</tr>
<tr>
<td></td>
<td>(0.00206)</td>
<td>(0.00205)</td>
</tr>
<tr>
<td>N</td>
<td>2,011</td>
<td>2,029</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.3520</td>
<td>0.3583</td>
</tr>
</tbody>
</table>

Note: All variables excluding share of the manufacturing employment are in logarithms. Standard errors in parentheses.
+ $p < 0.10$; * $p < 0.05$.

Robustness Checks

We employ two robustness checks on the baseline models. In Models 5 and 6, we attempt to address the endogeneity issue, and Models 7–10 exclude the four centrally controlled cities (zhi xia shi) of Beijing, Shanghai, Chongqing, and Tianjin.

The models used in this study raise issues about a potential endogeneity (e.g., reverse causation) problem. Economic development and urbanization may have a two-way relationship. As economic development affects the level of urbanization, measured by the built-up area as a share of the total land of the city, this may contribute to GDP growth in a region. As suggested by Wooldridge (2009), the fixed-effects model may, to some extent, address the problem of endogeneity. Nevertheless, it is not enough without introducing additional methods. In this study, we employ the two-stage least squares (2SLS) estimations to mitigate the issue of endogeneity and especially reverse causation. Therefore we would like to investigate whether changes in independent variables cause change in the dependent variable, not the reverse, although we acknowledge the limitations of 2SLS estimations.

We enter lag two regressors (economic development) as the instruments to handle the endogeneity threat. The instruments pass the weak instrument test and overidentification test (Hayashi, 2000; Stock & Yogo, 2005). The result suggests that the impact of our main explanatory factors on land urbanization remains significant (Table 4). Nevertheless, urban population is not significantly related to land expansion, which means that it offers no explanatory power to the dependent variable. In the 2SLS models, real estate investment in urban areas has a significantly positive impact on urbanization.

We also exclude four centrally controlled Chinese cities in the models with both fixed- and random-effects tests (Table 5). Centrally controlled Chinese cities refer to the cities of Beijing, Shanghai, Tianjin, and Chongqing. Two reasons stand out for the tests. First, the political structure is different between the above four cities and all other Chinese cities. For one thing, in contrast to other cities, they share a very high political status—the administrative rank of the mayor of Beijing, for example, is equivalent to the provincial governor, whereas an ordinary city mayor ranks much lower than the provincial governor administratively. Second, perhaps more importantly, demographic factors in the above four municipalities are distinct from those in other cities. This suggests that, compared with the baseline models, the regression excluding the four municipalities remains unaffected. In
fixed-effects models, the significance level increases to 5% when using land lease fee as a share of budgetary revenue (Model 7).

As shown in Table 6, we include the 2SLS models using the data set excluding the four centrally controlled Chinese cities (Models 11 and 12). The result remains almost unchanged with regard to the main explanatory factors. It shows that findings in Table 6 are comparable to those in Table 4 although the $R^2$-squared drops slightly in Table 6.
FINDINGS AND DISCUSSION

The statistical analyses reveal several important findings regarding urbanization in China. First, Chinese cities have experienced a significant increase in urban built-up areas. As described above, the share of built-up area as a percentage of total city land increased 73% in the 286 cities surveyed from 1999 to 2009. At the same time, dependence on land financing also increased dramatically. The share of land lease fee as a share of local budgetary expenditure, for example, jumped by 616% between 1999 and 2009.

More importantly, strong positive relations were identified between dependence on land financing and land urbanization in Chinese cities. For those cities that are more dependent on land leasing fees as part of their local budget, the government is under greater pressure to exploit the land and to generate more revenue to support public spending. Our findings support the arguments that China’s urbanization has been land-centered and an outcome of strong government-driven forces. The real estate investment significantly drove land urbanization in Chinese cities. In addition, economically more developed cities with a higher GDP per capita significantly recorded more aggressive urban land expansion.

These important factors together reflect the phenomena of land-centered urbanization in China, driven by local fiscal resource extraction and real estate property development. Chinese cities adopted different approaches to make more land available and generate more land lease revenues. In this process, the empirical results in this research indicated that economically more advanced cities with heavier real estate investment were more aggressive in pursuing urban land expansion to support local growth. In China, major cities with stronger economic output usually are equipped with more favorable status and flexible policies from higher authorities, which give them stronger “teeth” in fighting with their competitors. For example, in 2000 the City of Guangzhou redrew its administrative boundary by adjusting Huadu and Panyu from the status of county-level cities to urban districts. Following this reorganization, the area under the direct administration of the city government increased from 1,400 to 3,719 square kilometers, which significantly enriched the local land bank and alleviated development pressure within the city’s jurisdictions (Xu & Yeh, 2005). In addition, major cities like Beijing, Shanghai, and Guangzhou were able to seize opportunities of hosting high-profile international events and to allocate vast urban land for megaprojects (Lin, 2007; Liu, 2012; Ren, 2008; Sun & Ye, 2010). When megaprojects or land annexation are not viable, many Chinese cities adopt the “redevelopment” model to exploit more land in urban villages for real estate development (He & Wu, 2005; Ye, 2011b). Indeed, many Chinese cities adopt a combination of these approaches to maximize land revenues and push urbanization.

Echoing other studies on China’s urban development, our analysis suggests that economic growth drove up urbanization. Nonetheless, the average wage of staff and workers in the city was found to have a negative impact on land urbanization. As previously explained, this measurement represents wages of workers in formal sectors without considering households’ informal gains, which may account for a sizable proportion of urban household income in China. Inclusion of such comprehensive data will help better investigate the relationship between urban wealth and land expansion. However, such data are not readily available for China. The analysis of the impact of local formal wage on urbanization serves as a reference. In addition, our analysis indicates that population size and level of industrialization do not necessarily determine the urbanization path for a city in the Chinese context.

CONCLUSIONS AND FUTURE RESEARCH

According to the latest national statistics, land transfer in China recorded a historic high in the first six months of 2013, in both total area and government revenue generated from land transfer, despite several years of tightened housing market control policies (Ministry of Land and Resources, 2013). Extracting economic benefits from land development has been a dominant character of China’s urbanization. Intergovernment fiscal relations and local governments’ strong impetus to compete and develop substantially drive the expansion of urban land in China. Land financing is arguably the “invisible hand” of China’s urbanization. This article provides empirical evidence of this missing
Urbanization, Land Development, and Land Financing in China

13

link in the existing literature. Other factors, such as heavier investment in real estate and stronger economic status, were also found to significantly drive land urbanization in Chinese cities.

It is important to realize that urbanization is a multidimensional phenomenon. China’s urbanization is unique in terms of its speed, scale, and government-driven nature. Future research is called upon to further advance study on this subject. When more data become available, better measurements can be developed to analyze variables that have been identified as important in the urbanization process, such as household income, commuting time, and urban–suburb disparity. It will also be important to identify varying urbanization models in different regions and among different types of cities in China (Ye, 2009, 2013). Some recent trends, such as urbanization in the peri-urban areas, can be incorporated to better analyze urbanization development in Chinese cities (Gross, Ye, & LeGates, 2014; Ye, 2014; Zhao, 2013).

The recent 18th National Congress of the Chinese Communist Party adopted urbanization as a primary development strategy to support China’s economic growth in the next few decades. As land becomes scarce in Chinese cities, urbanization has to change its objective from its primitive goal of generating revenue to serving residents. Local governments have to adjust the logic of their actions from using urbanization as a way to extract fiscal resources to taking the opportunity to improve the desirability of urbanization. This task will not be accomplished without modifying the fiscal and political relations between the central and local governments. China’s urbanization will continue to be the most significant event affecting world development. But only when its drives and goals are justified can that urbanization be more desirable and sustainable.

ACKNOWLEDGEMENTS: This research was jointly supported by a 985 III Project, National Social Science Fund major program 13&ZD041, Ministry of Education key research center major project 13JJD630014, excellent research fund and internal project of Center for Chinese Public Administration Research, and excellent young faculty training project of Sun Yat-sen University. The authors would like to thank Dajian Zhu, Wen Wang, Fangzhi Ye, Xiulian Ma, Huiping Li, Richard LeGates, Jill Gross, and three anonymous reviewers for their constructive input. An earlier version of this article was presented at the 43rd Annual Conference of the Urban Affairs Association in San Francisco. The usual disclaimer applies.

ENDNOTES

1 A prefectural city is an administrative division of Chinese governments, ranking below a province and above a county (or county-level city) in China’s administrative structure.

2 The Ministry of Land and Resources compiled the data on the land leasing fee. The ministry has built up a nationwide data collection system with regard to the revenue. According to the official guideline, the land leasing fee is being saved under the local coffer. Though we don’t rule out the possibility of underestimating the land lease fee, in general the data are reliable after various cross-checks.

REFERENCES


**ABOUT THE AUTHORS**

**Lin Ye** is an Associate Professor in Center of Chinese Public Administration Research, Institute for Urban Governance and Urban Development, School of Government at Sun Yat-sen University in Guangzhou, China. He holds an MPA and PhD in urban and public affairs from the University of Louisville. His research interests are in urban policy and politics, metropolitan and regional governance, and urbanization in China. His academic work has appeared in both urban studies and public administration journals, such as *Journal of Urban Affairs*, *Journal of Urban Planning and Development*, *Journal of Planning Literature*, *Social Policy and Administration*, *Public Administration Review*, *American Review of Public Administration*, and other journals in China.

**Alfred M. Wu** is a Lecturer in the Department of Asian and Policy Studies at the Hong Kong Institute of Education. He earned his PhD from City University of Hong Kong. His research interests include central–local fiscal relations, public sector reform, corruption and governance, and social protection in Greater China. He is the author of the forthcoming book *Governing Civil Service Pay in China*. He is also the author or co-author of articles in such journals as *World Development*, *Public Choice*, *Publius: The Journal of Federalism*, *Review of Public Personnel Administration*, *Social Policy and Society*, and *Journal of Contemporary China*. 