



Land finance in China: Analysis and review

Joseph Gyourko^a, Yang Shen^b, Jing Wu^b, Rongjie Zhang^{b,*}

^a The Wharton School, University of Pennsylvania and NBER, PA, United States

^b Hang Lung Center for Real Estate and Department of Construction Management, Tsinghua University, Beijing, China

ARTICLE INFO

JEL:

O23

H54

H72

H74

R14

R30

Keywords:

Land finance

Local government

Infrastructure financing

Local government debt

ABSTRACT

China's land finance system has been a key contributor to the country's "economic miracle" over recent decades. While there is much existing research on different components of the land finance system, this paper, based on both an academic literature review and data analysis, provides an integrated understanding of how these parts function in tandem around the pivotal role of profitability in the system. First, we summarize the essentials of China's land finance system by providing a framework to understand the self-reinforcing cycle between local governments' financing and spending activities based on urban land-use rights (LURs). We also quantify the magnitude of profits generated by the cycle and its contribution to China's urban development. Second, we investigate the institutional underpinnings of the system, which empower local governments as the monopoly supplier of urban LURs. We also document the rising temporal trend in land prices in most cities. Both these institutional and market factors facilitate the profitability of land finance. Finally, we shed light on the sustainability of the system. Local governments' strong incentives to maximize the profitability of land finance have resulted in increasing economic and social costs/risks. Meanwhile, the feasibility of the system increasingly is coming into question, as both ongoing institutional reforms and recent urban land market cooling raise potentially fundamental challenges to the profitability of land finance.

1. Introduction

China's land finance system (*tu di cai zheng* in Chinese), or local governments' high reliance on urban land-related financing, is a key component of China's economic life because of its essential role in various aspects of the country's remarkable urban development. As is documented below, China's land finance system undoubtedly has been successful in helping facilitate the country's rapid urbanization over the past few decades, which has underpinned its very high overall economic growth. A dominant share of local governments' debt financing activities is also directly or indirectly related to land finance, which makes land finance a critical factor shaping local government debt risks. The incentives embedded in this system also significantly impact local governments' urban land supply decisions, which not only affect the temporal-spatial pattern of urban development, but can also materially influence real estate market fluctuations. In sum, one cannot comprehend China's urban development over recent decades without a deep understanding of the land

* Corresponding author at: Heshanhang Building, Tsinghua University, Beijing 100084, China.

E-mail address: zhangrj19@mails.tsinghua.edu.cn (R. Zhang).

finance system, both its achievements and costs/risks.

Nevertheless, concerns about land finance's viability going forward are growing. Perhaps the most obvious example is the central government's 2017 statement that listed “no land finance” as one of the top three principles in its plan to develop the new Xiong'an development.^{1,2} Moreover, the recent cooling down in China's housing and residential land markets in major cities has triggered broad concern about the feasibility of land finance in the coming future. Indeed, this paper is being written at a time when discussions of reform of the land finance system have moved to the top of China's urban policy agenda. It is critical for policymakers to have a more thorough understanding of the preconditions necessary for the operation of the system, as well as its economic and social costs, so that reforms can be made based on the best information possible.

China's experiences can also provide useful lessons for other developing economies. Government-authorized land-based financing, especially for infrastructure investment, is growing in the developing world (Peterson, 2008) in places as varied as India (Vyas, Vyas, & Mishra, 2022), Vietnam (Nguyen, Krabben, Musil, & Le, 2018), and Sub-Saharan Africa (Berrisford, Cirolia, & Palmer, 2018; Lisk, 2013). The context in which their systems were established and operated is different from China's, but they share many characteristics with China's system and concerns with China's policymakers. For example, the challenge of effectively “unlocking” land value seems to be omnipresent across these countries, and similar concerns exist about the risks arising with land-based financing (Peterson, 2008).

Many studies have been written about different aspects of China's land finance system, but a comprehensive description and analysis of the whole system does not exist in one place. This paper is intended to fill that gap. In addition to the rich research in the economics field, we also incorporate findings from the substantial academic literature in political science, urban planning, and sociology. Additionally, we include insights from a number of influential studies published only in Chinese that are unfamiliar to most researchers outside China.³ We also conduct our own descriptive data analysis based on both macro- and micro-level data to provide a clearer understanding of several essential facts about the system.

Our analysis is organized around three key topics on the land finance system, with the pivotal role of profitability in the system highlighted throughout. First, we establish a framework to characterize the essentials of China's land finance system. In short, the land finance system involves local governments creating new urban land-use rights (LURs) via land acquisition, selling LURs to private and public land users, and, most importantly, realizing profits from the gap between the revenues from selling LURs and their acquisition costs. This market is economically large, as official statistics report that total land-sales revenues by local governments reached over 55 trillion RMB between 2007 and 2020. Local governments incurred costs to acquire LURs, and we estimate them to be about 65% of the total land-sales revenues on average. These costs are partly counterbalanced by the revenues raised from ancillary taxes on real estate-related transactions generated by the creation and selling of leasehold estates. We conclude that they amount to about 75% of land-sales profits. Taking 2018 as an example, we estimate that the total volume of land-related profits received by local governments, including both land-sales profits and real estate-related taxes, amounts to about 4 trillion RMB, which equals over 40% of total budgetary income at the local level. Thus, the system is important by any metric. It is also noteworthy that there is extensive heterogeneity across markets in the profitability of the land finance system. LUR acquisition costs do rise with local market land value, but the net benefits of the system have not been equal across cities. The most expensive housing and land markets have benefitted the most. The importance of the profitability of land finance is also evidenced by the fact that the dominant share of local governments' debt financing activities is explicitly or implicitly tied to local governments' future land sales profits, making the land finance system, especially its profitability, a critical factor in shaping local governments' borrowing capacities, too.

Land-sales profits, as well as land-related borrowings, have played a dominant role in supporting local governments' massive infrastructure investments over the past two decades. The funding from the land finance system also supports local governments' other public good provisions, such as subsidies to local firms. Both the urban infrastructure investments and firm subsidies have underpinned China's economic growth over the past few decades. Moreover, the infrastructure investments and/or firm subsidies help boost local land prices, which, in turn, can feed on itself by further enhancing the profitability of the system. Such a self-reinforcing cycle around land finance supports local governments in playing a key role in China's rapid urbanization and its “economic miracle.”

Second, we provide detailed discussion of the institutional features underpinning the land finance system. The answer to the question of “why local governments in China use land finance” appears to be straightforward – the land finance system was due largely to a 1994 tax-sharing reform that reduced local governments' share of many tax revenue streams while not shrinking their spending needs. It is much more complicated to answer “why land finance has worked effectively (so far) in China.” Its institutional underpinnings, which facilitate the profitability of the land finance system, are important to understand in this respect. First, local

¹ The Xiong'an New Area is located in Baoding, Hebei province, which lies about 100 km southeast of Beijing. Though Xiong'an New Area is directly administrated by the local government of Hebei Province, it is part of a national-level strategy aimed at alleviating increasing population and housing market pressures in Beijing, as well as promoting the further integration of the Beijing-Tianjin-Hebei city-region. For more information about the Xiong'an New Area, see Zou and Zhao (2018).

² Source: Zhao, Kezhi, “A good first step in the planning of Xiong'an New Area,” *People's Daily*, May 9, 2017.

³ Considering that a non-Chinese-speaking reader likely has difficulty evaluating the quality of a study published in Chinese, we select articles published in top Chinese-language journals according to the following criteria: (1) The journal is academic in nature, publishing scholarly research papers; (2) the journal is widely perceived as the top journal in its field in China; and (3) the journal provides a research summary or abstract in English for each paper. Based on these rules, most of the Chinese-language studies reviewed below come from the following journals: *Social Science in China* (*zhong guo she hui ke xue*, the top journal in social science), *Economic Research Journal* (*jing ji yan jiu*, the top economics journal), *China Economic Quarterly* (*jing ji xue ji kan*, another top economics journal), *Management World* (*guan li shi jie*, the top management journal), and the *Journal of Financial Research* (*jīn róng yán jiū*, the top financial journal).

governments were designated the monopoly provider of local urban LURs. Thus, a city faced no competition from other entities when it made an offer to buy rural land and convert it to urban land. Moreover, the compensation paid was based on land value for current (agricultural) use, instead of its future urban use. Similar rules also apply when local governments repurchase allocated or sold urban LURs and convert them to new LURs. This arrangement allows the urban government to make a profit, something that was accentuated by the rising temporal trend in land prices until recently. It is noteworthy that the rich institutional framework underpinning the land finance system includes both explicit rules such as laws and official documents and implicit norms that are influential in practice. Some of these details do not appear to be appropriately recognized in the existing literature and can lead to misunderstandings about the system. Hopefully, our analysis will bring more clarity to how the system works on the ground within China's federal system.

Finally, we try to shed some light on the sustainability of the land finance system. We conduct this analysis from two perspectives. On the one hand, local governments' high reliance on land finance, especially their strong incentives to maximize profitability, has resulted in increasing costs and risks. The potential for costly moral hazards to build seems clear. When a system is a key facilitator of infrastructure provision and thus is vitally important to the functioning of both local and central government, it is not difficult to imagine that banks, firms, and individuals could come to believe that China's land finance system was "too big (or important) to fail." Mispricing in debt and equity instruments in housing and land markets, as well as in land-backed local government debts, can arise in such a situation. Potential distortions associated with the growth of the system are also a source of growing concern. These distortions include whether the land finance system is contributing to imbalances in the housing market, having undesired impacts on urban form, or damaging rural development. We review the research on these topics, but much remains to be done if we are to have a clearer, or even a robust quantitative, estimate of the costs and benefits of China's land finance system.

On the other hand, the discussions from the feasibility perspective deliver clearer information. As highlighted above, the feasibility of the land finance system strongly depends upon its profitability, or a large gap between the sales revenues of LURs and their acquisition costs. Recent policy interventions allow for limited competition to urban governments as the sole provider of LURs, as well as changes in compensation rules that favor rural land owners. These changes, when combined with lower trend growth in urban land values since 2017, challenge the stability of the land finance system, because they reduce the profitability of the system from the perspective of local urban governments. Thus, the policy priority of the ongoing reform is not how to reduce local governments' reliance on land finance, but to develop viable alternative revenue sources for local governments.

2. Essentials of land finance

When academic researchers or policymakers use the term "land finance" in China, they are referring to Chinese local governments' high reliance on various types of land-related financing.⁴ This system can be conceived as depicted in Fig. 1, which is based on the work by Wu, Deng, Huang, Morck, and Yeung (2014) and Zheng, Sun, Wu, and Wu (2014). This schematic shows the land finance system has many parts, and they can interact with one another in potentially complex ways. The local government is the essential operator. It is incentivized to promote local economic growth and may do so with subsidies and direct investments, which require capital and, thus, urban land financing. Urban land is an important asset of the local government and can be used to raise funding directly or indirectly.

This section first describes why and how local governments in China "own" urban land assets. We then provide stylized facts about how and to what extent local governments utilize their land assets to implement both "equity financing" and "debt financing," relying on the profitability of land finance to make it all work. Finally, we discuss how local governments utilize the funds raised.

2.1. Local governments' assets of land-use rights

After the People's Republic of China's founding in 1949, the Constitution explicitly authorized state ownership of all urban land and farmer-collective ownership of all rural land as a core element of socialism. During the following three decades of the planned-economy era, state-owned urban land was strictly prohibited from trading. On behalf of the State, local governments authorized state-owned enterprises or other entities to use urban land for free. In other words, local governments allocated the rights of the use of urban land, LURs or land use rights in other words, to these entities.

China then started its dramatic reform in 1978, converting the planned-economy system to a market-oriented system. The marketization of essential production factors, including urban land, played a vital role in this process. Operating on the premise of retaining the State's ultimate ownership of urban land, the LUR market was gradually established beginning in the 1980s.⁵ The Land Administration Law (LAL) in 1986 provided the first official protection of LURs owned by private enterprises or individuals, and it also explicitly allowed entities/individuals to pay for LURs. An important milestone was the 1988 amending of the Constitution to officially allow for market transactions of LURs. In the subsequent Property Law in 2007 and the Civil Code in 2020, LURs are formally recognized as one of the core property rights that are legally protected in China. This series of reforms formally established the separation of urban land ownership and LURs. The State still holds ultimate ownership of urban land, which is prohibited from trading.

⁴ More precisely, the so-called "local governments" here only include city- and county-level local governments. China's government hierarchy consists of five layers: central, provincial, prefecture, county, and township (Xu, 2011). According to the Land Administration Law, urban land resources are controlled by the prefectural-level city governments and the county-level governments under the supervision of the provincial-level government.

⁵ See Ding (2003), among others, for a more detailed review of the historical context in which urban land system reform was enacted in mainland China.

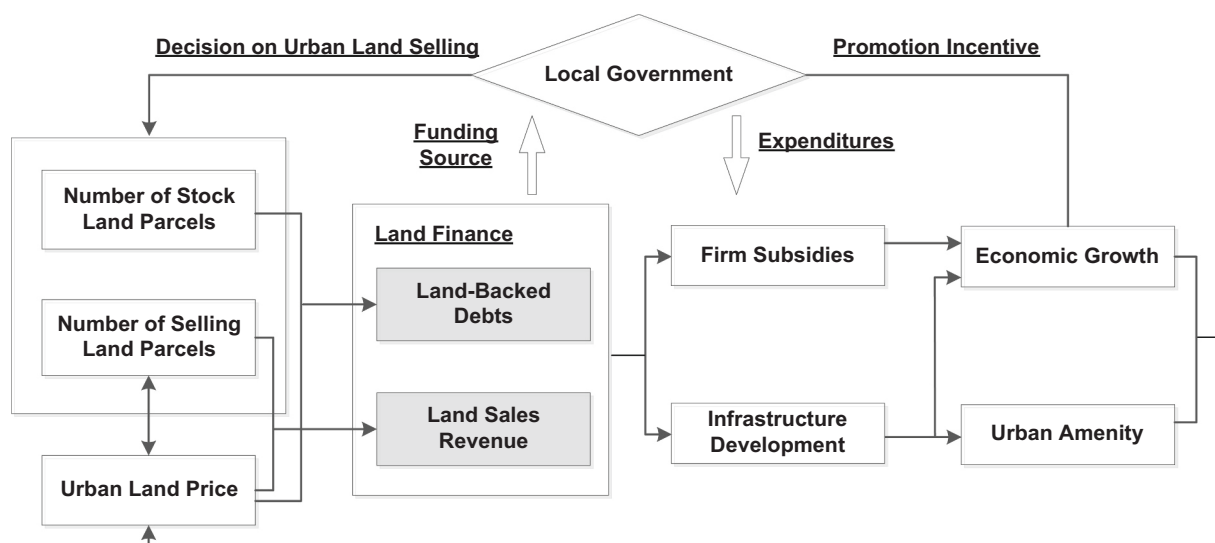


Fig. 1. Conceptual framework of the land finance system.

However, the LURs can be transferred, mortgaged, and sold for profit as a bundle of property rights.⁶ Western readers will recognize the similarities between LURs and the usage rights embodied in what is termed the leasehold estate in their countries. In both parts of the world, an LUR or leasehold estate can represent a very large fraction of the value of the underlying land.

It is important to note that LURs that have already been granted or sold to entities are controlled by the institution or individual owners that purchased them, not the local governments that still own the underlying land. Those governments cannot receive future benefits in terms of additional lease payments once the LUR is conveyed.⁷ Instead, local governments can and do hold the LURs associated with new developable urban land acquired via the so-called “land acquisition” process, and the value of *new* urban LURs can be the most important asset of a local government (Ding, 2007). In other words, what really matters to a local government is the “profits” associated with the creation of new urban LURs; that is, the gap between the market value and the acquiring cost of the LUR associated with a parcel of new developable urban land.

A local government can create LURs associated with new developable urban land in two ways. First, a local government can convert rural-collective-owned land into new developable urban land. For this purpose, the local government can engage in rural land acquisition by paying compensation to rural collectives and farmers in exchange for their rural land ownership. The local government can then redefine the land parcel as an urban land parcel and assign specific zoning (designated usage, limits on floor-area-ratio, etc.) to it. Second, a local government can also repurchase the allocated or sold LURs of a specific urban land parcel by compensating the current LUR holder. It could then demolish the existing building(s) on the land parcel and adjust the designated usage, limits on floor-area ratio, and/or other zoning indicators of the parcel.⁸

A back-of-the-envelope calculation of the total volume and value of new LURs acquired by local governments via either mechanism can be made as follows. The Ministry of Natural Resources (MNR) reports the annual volume (in land area) of rural land acquisition at the national level between 2004 and 2017. As depicted in Fig. 2, the total volume steadily increased from 1.96 billion sqm in 2004 to the peak of 5.69 billion sqm in 2011, and then gradually decreased to 3.28 billion sqm in both 2016 and 2017. The aggregate volume reached 53.09 billion sqm over this 14-year period. The MNR does not explicitly release statistics on the volume of repurchased urban land LURs. Nevertheless, it annually reports the sources of urban land supply, which indicates the share of acquired rural land in total land supply fluctuated between 34.1% and 53.3% during this period, with an average ratio of 42.6%, and the rest being from existing (and repurchased) urban land parcels. Therefore, it is not unreasonable to suppose that the total volume of urban land repurchases was around 71.53 billion sqm ($53.09/42.6\% \times (1-42.6\%)$) during the same period. Thus, local governments acquired new LURs associated

⁶ See Ho (2001) and Rithmire (2017), among others, for more institutional details on China's current urban land ownership system.

⁷ According to the current Constitution and Civil Code, in principle, the LUR associated with an urban residential land parcel can be automatically renewed upon expiration; for other usage land parcels, upon expiration of the LUR, all improvements on the land revert back to the local government, and new LURs must be negotiated. Nevertheless, the laws have not explicitly described or mandated the procedures and pricing mechanisms of such LUR renewals.

⁸ See Ding and Wu (2018), among others, for more institutional details about these two types of land acquisition in China. In both types of land acquisitions, the local government may also need to develop specific infrastructure (e.g., roads, electricity supply, etc.) on the new developable land parcel. We provide more institutional details on land acquisition when discussing the preconditions of land finance in section 3.2.

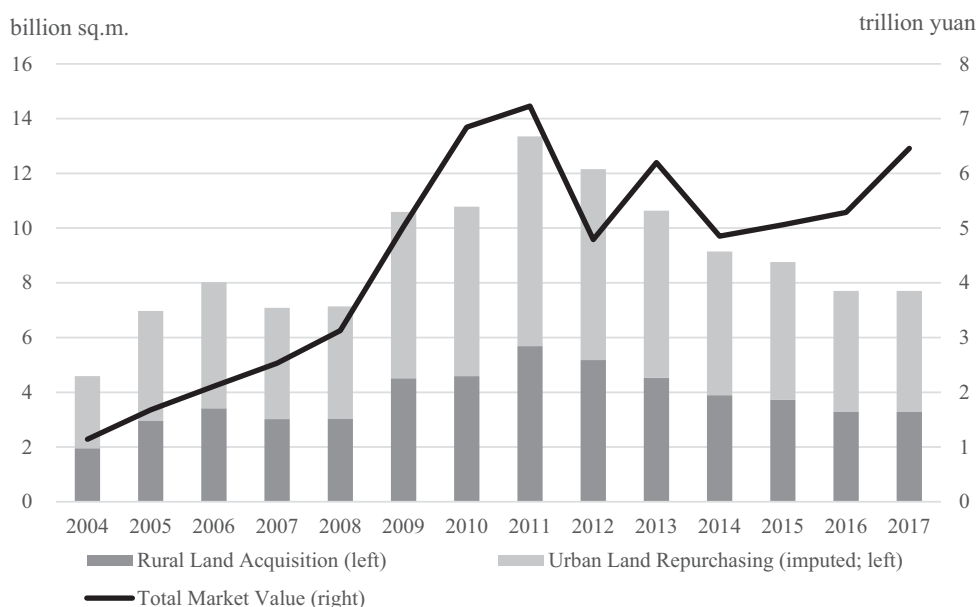


Fig. 2. Estimate of the total volume and value of LURs acquired by local governments.

Note: Authors' calculations based on the data reported by the Ministry of Natural Resources.

with 124.62 billion sqm during these 14 years. Using the MNR's reports of the annual national-level average land price, we impute that the annual market values of the LURs acquired increased from about 1 trillion RMB in 2004 to 5–7 trillion RMB after 2009.⁹ The aggregate value reached 62.34 trillion RMB over the 2004–2017 time span.

An equally important but far less clear issue is the cost associated with LUR acquisitions. Land usage conversion and repurchasing urban land are far from free for local governments, although detailed statistics are limited. The only official statistics about land acquisition costs are the net profit data for land sales reported by the then Ministry of Land and Resources (MLR, now known as MNR) between 2003 and 2008. Using these figures, we depict the distribution of land acquisition costs (in logarithm form) across all 287 Chinese prefecture cities from 2003 to 2008 in Fig. 3. Imputing based on the red line in the figure, national-level average land acquisition costs ranged from 393 yuan (in 2003) to 570 yuan per square meter (in 2007). The median level of land acquisition costs among all cities is much lower than the national-level mean value, which remained stable at around 200 yuan per sqm of land area during the period. Intercity variation is high. Land acquisition was nearly free in some less developed areas—the land acquisition cost was less than 10 yuan per sqm in about 10 cities. By contrast, land acquisition in the hot housing market cities was far more expensive. Specifically, the top quantile of land acquisition cost per square meter ranged from 348 yuan in 2003 to 443 yuan in 2006, while the top decile varied from 609 yuan to 977 yuan. The top 1%, or, equivalently, the three cities with the highest land costs each year, experienced an extremely high level of land acquisition cost between 1821 and 4386 yuan, which was about 10 to 20 times higher than the aforementioned median level. The city with the highest land acquisition cost was Zhuhai in 2003 (2378 yuan). Shenzhen, one of the first-tier cities in China, ranked first since 2004, with the average cost ranging between 2594 yuan (in 2004) and 6507 yuan (in 2006). Beijing took over the position of Shenzhen in 2008 when its average land acquisition cost reached 3526 yuan. Other cities with high land acquisition costs include Xiamen, Fuzhou, Wenzhou, Shantou, Dongguan, and Fuzhou, which are all southeast coastal cities. Fig. 3 also indicates the costs in cities with higher land acquisition costs also had a stronger time trend, which increased between 2003 and 2007 before cooling down in 2008.

Although the above analysis on the cost side is only suggestive, it conveys two important pieces of information. First, land acquisition costs have strong (and persistent) intercity variation. Second, land acquisition costs are typically higher in cities with hot housing and residential land markets. This is not to say that land finance reliance is economically smaller than publicly perceived. However, this observation does suggest at least some local governments cannot realize as much land-related financing as the enormous gross land-sales revenues might suggest. Stated differently, the net contribution of the land finance system tends to be marginally decreasing in the sense that land profits would be shrinking during rising cycles or in cities with hot land markets. Consequently, more information on local governments' land-sales cost structure during more recent years, including more case studies such as those reported in Wang, He, and Gao (2006) and Zhou (2007), would be valuable in pinning down the precise profitability of land finance.

⁹ Taking 2017 as an example, the total volume of LURs acquired by local governments was 7.7 billion sqm around the country. As reported by the MNR, the average land price at the national level was 838 RMB that year. Therefore, the imputed total value of LURs acquired by local governments was 6.45 trillion RMB ($7.7 \times 838 = 6452.6$).

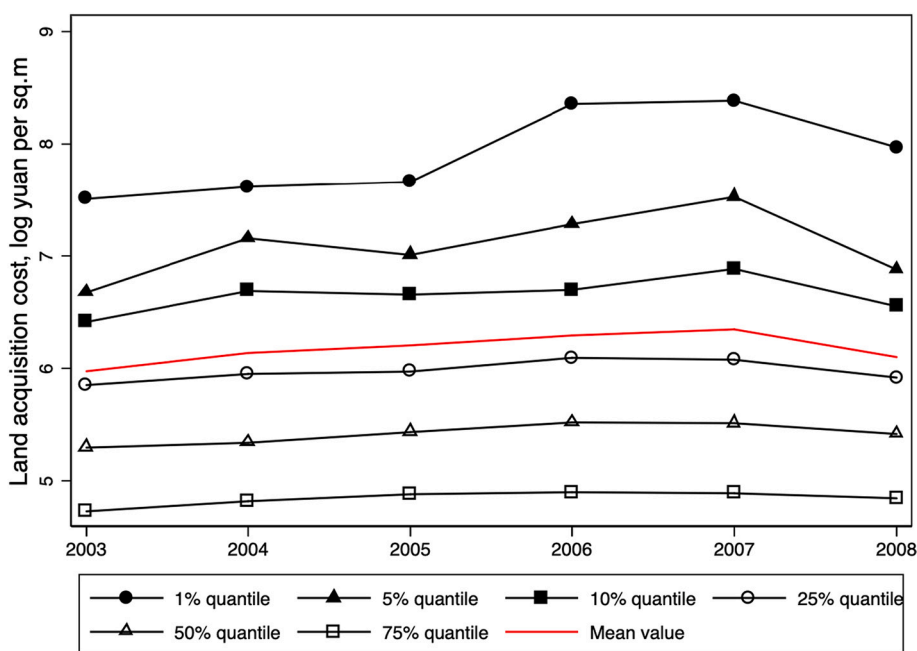


Fig. 3. Distribution of land acquisition cost, 2003–2008.

Note: Authors' calculations based on the data reported by the Ministry of Natural Resources.

2.2. Local governments' land-sales profits

The LURs of new developable land parcels are then controlled by local governments and become their assets, generating substantial cash inflows to local governments via either “equity financing” or “debt financing.” As the monopoly supplier of LURs on new developable urban land parcels within their jurisdictions, a local government's most direct method of land-related financing is “equity financing,” that is, by selling the LURs to entities or individuals and collecting land-sales revenues. In almost all such cases, the value of rental payments over the life of the leasehold is included in an initial lump-sum payment, which is typically treated as the “transaction price” of the land parcel.

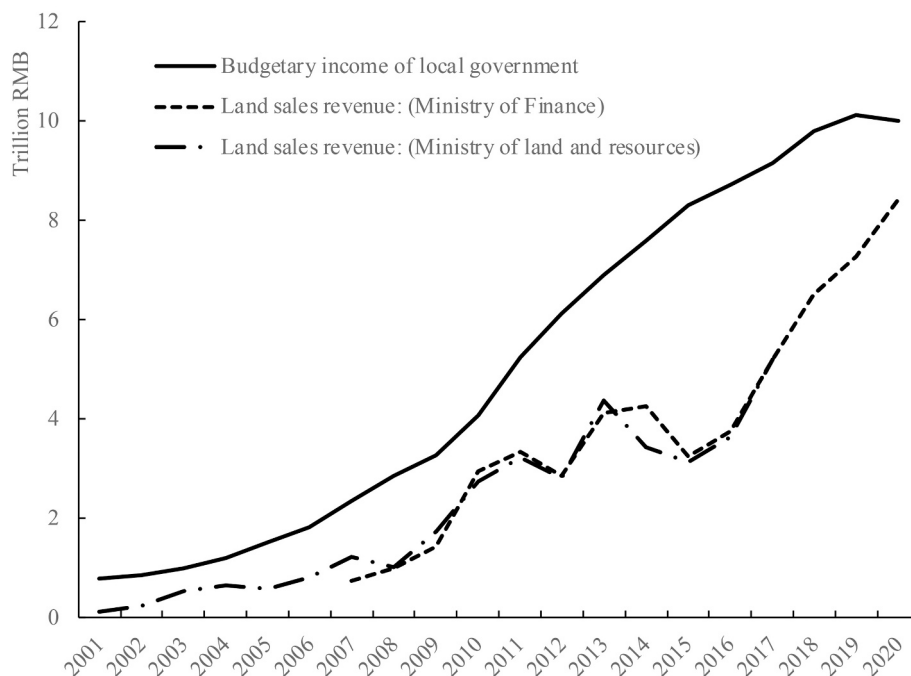
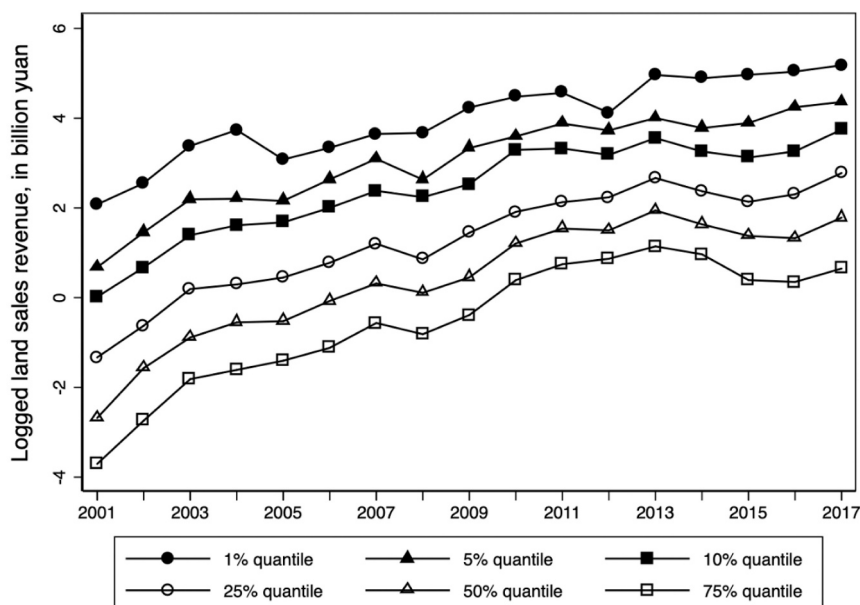
Before 2002, most urban land transactions were completed via opaque negotiations: a firm, if interested in a land parcel, would contact the local government and negotiate the price without direct competition with other entities. It has long been recognized that such a non-competitive arrangement could result in official land prices transacting below the free-market equilibrium price level (Cai, Henderson, & Zhang, 2013). Consequently, in May 2002, the MLR required all residential and commercial land parcels to be sold via a public auction/bidding process. The MLR reiterated or reinforced this requirement in 2004, 2006, 2007, 2009, and 2011, and also extended the regulation to industrial land transactions (see Cai et al. (2013) and Wu, Gyourko, and Deng (2012), among others, for more details). This new arrangement substantially enhanced competition among bidders in the urban land market, especially within the residential and commercial land sectors.

Panel A of Fig. 4 depicts the dramatic surge in land-sales revenues at the national level since 2007, especially after 2009 and then again after 2016. The MNR and the Ministry of Finance (MF) each regularly report a national-level measure of total land-sales revenues, with the former using the official contract price and the latter using the actual payment received. The series are quite similar in absolute terms, and each time series suggests a sharp increase over the past 15 years. The MF numbers indicate annual land-sales revenues increased from 0.73 trillion RMB in 2007 to 8.41 trillion RMB in 2020, a change that implies an average nominal compound annual growth rate of 19.5%. The aggregated land-sales revenues between 2007 and 2020 reached 55.06 trillion RMB. Panel A of Fig. 4 also depicts local governments' budgetary income at the national level as the benchmark. By 2020, this aggregate national measure reached 10.01 trillion RMB. Thus, the ratio of local governments' land-sales revenues to their budgetary incomes reached a historical peak of 0.84.¹⁰

Panel B of Fig. 4 then describes the distribution of land-sales revenues across 300 cities between 2001 and 2017.¹¹ The figure reveals two noteworthy attributes. First, and consistent with Panel A of Fig. 4, the cities with different levels of land-sales revenues all experienced a dramatic surge since 2001 and reached a peak in 2013. The cities at the median level witnessed an increase from 0.068 billion yuan in 2001 to 6.98 billion yuan in 2013, before the decline to 5.95 billion yuan in 2017. Thus, the average nominal compound

¹⁰ Both the high amount and long-term growth in land-sales revenue mainly come from residential and commercial lands, whereas industrial land prices are much lower and more stable. We address this variation in section 2.4 when we discuss the funding usages of land finance.

¹¹ The MNR did not release the city-level land-sales revenue data after 2017.

Panel A: National-Level Land-Sales Revenues, 2001-2020**Panel B: Distribution of Land-Sales Revenues, 2001-2017****Fig. 4.** Land-sales revenues.

Note: Authors' calculations based on the data reported by the Ministry of Finance and the Ministry of Natural Resources.

annual growth rate can be calculated as 32.2%. The upper and lower quantiles experienced a growth rate of 29.3% and 13.5%, respectively. Second, and perhaps more importantly, the distribution pattern of land-sales revenues also indicates substantial intercity variation, which is similar to that of land acquisition costs shown in Fig. 3. The huge volume of national-level land-sales revenues is highly concentrated in a few superstar cities, such as Beijing (ranked in the top 3 in 13 out of 17 years) and Shanghai (ranked in the top 3 in 12 out of 17 years). In 2017 for instance, the total land-sales revenues in the three cities with the highest land-sales revenues

(Beijing, Hangzhou, and Chongqing) reached 0.70 trillion yuan, which accounted for over 13% of the national land-sales revenues that year (5.20 trillion yuan); this amount roughly equals the sum of the nearly 200 Chinese cities with the lowest land-sales revenues. These findings, together with the cost-side analysis shown in Fig. 3, indicate that substantial between-city variation is important when analyzing the Chinese land finance system, though few existing studies focus on it.

However, the land-sales revenue indicator alone does not necessarily reflect the full extent of local governments' "equity financing." On the one hand, as suggested in section 2.1, to measure the true (net) contributions of land sales to local governments' income, we still need to consider the cost of land conversion for local governments and calculate the profits. Here, we directly adopt the ratio of land-sales profits to land-sales revenues (hereafter referred to as the "profit ratio") as the key indicator. As described in section 2.1, we can only get access to data for a few early years (2003–2008). The distribution of this profit ratio across Chinese cities is depicted in Fig. 5. The national-level average value varied from 31% (in 2003) to 37% (in 2007). The median level is slightly higher than the mean value and is also relatively stable. Considering the limited time variation of this ratio, we presume, for simplicity, a constant net profit-revenue ratio at the national-level average value of 35% (the average ratio between 2003 and 2008). However, the net profit-revenue ratio has strong across-city variation, which is highly consistent with the pattern of land acquisition costs shown in Fig. 3. Specifically, the net profit-revenue ratio of the lowest quantile varied from 23% to 26%, while the lowest decile ranged from 12% to 17%. By contrast, the net profit-revenue ratio among the cities in the top quantile was about 60%. Cities in the top decile reached a profit ratio of nearly three quarters in 2003 and witnessed a slight but continuous increase from 2004 to 2007. The cities in the top 5 percentiles (about 15 cities) exhibited an extremely high net profit-revenue ratio of about 90%, which is generated by their negligible land acquisition costs, as discussed in section 2.1.

On the other hand, a broader perspective of "land-related profits" would lead one to conclude the importance of "equity financing" is even more important than what Panel A of Fig. 4 suggests. The reason is that, following the sales of new LURs, the process of transacting and investing in real estate properties can bring substantial tax revenues, apart from the land-sales profits, to local governments. We can gauge the magnitude of these spillovers with a back-of-the-envelope calculation using national data for 2018 that are reported in Table 1. We focus on three categories of local governments' real estate-related tax revenues in this example: taxes generated via real estate transactions, taxes levied on the real estate stock, and taxes contributed by real estate developers. Summing across all real estate-related taxes listed in Table 1 indicates local governments reaped 2.25 trillion RMB in 2018, accounting for nearly 30% of their overall tax revenues. Over three-quarters of these real estate-related tax revenues, or about 1.72 trillion yuan, are related to real estate developments (i.e., the developer-based taxes) or transactions (i.e., the transaction-based taxes) following residential or commercial land sales. Another way to gauge the economic relevance of these tax revenues is to compare them with aggregate net profits of land sales. National-level land-sales revenue was 6.51 trillion RMB in 2018, as reported above. Given an estimated net profit-revenue ratio of 35%, the imputed land-sales profits would be around 2.28 trillion RMB; in other words, the magnitude of tax revenues related to real estate development and transactions (1.72 trillion RMB) amounts to about three quarters of local governments' land-sales net profits.

Summing these two revenue sources indicates the total volume of land-related profits equals about 4 trillion RMB in 2018. This amount equals 41% of the total budgetary income by local governments for 2018 (which is 9.79 trillion RMB)—an economically large amount. For comparison purposes, 4 trillion RMB is about 200% of fixed-asset investment in urban infrastructure (2.01 trillion RMB), 6% of the overall fixed-asset investment (65 trillion RMB), or 4% of the GDP (90 trillion RMB) of the same year. However one gauges it, land-related equity financing is economically important in the Chinese economy.

We also can provide a rough estimate of land financing's economic importance at the city level in 2017. Although we have access to city-level land-sales profit data for that year, we have to impute real estate-related tax revenues by assuming a fixed ratio against land-sales profit based on the national-level data. The average value of land finance reliance is 43.4%, which is close to the national-level value (41%), whereas the median value is a much lower 32%. The lower and upper quantiles are 56.4% and 19.6%, respectively. Land-related equity financing is even higher than total budgetary income in 8% (or 21) of all cities, which further highlights the substantial between-city variation in the local finance system.

2.3. Local governments' land-related debt financing

The development of local governments' land-related debt financing has experienced two regimes, with the structural changes associated with the "Budgetary Law" amendment in August 2014 as the watershed event between the two.

2.3.1. Before 2014: LGFVs' land-related debt financing

China substantially amended its "Budgetary Law" in August 2014, which became effective on January 1, 2015. Before the amendment, the Budget Law explicitly stated that "local budgets at all levels shall be compiled according to the principles of keeping expenditures within the limits of revenues and maintaining a balance between revenues and expenditures, and shall not contain a deficit. Local governments, including their subordinates, should not issue local government bonds, except as otherwise prescribed by laws." This statement legally prohibited local governments from directly implementing debt financing.

To circumvent this legal constraint, local governments started establishing so-called Local Government Financing Vehicles (LGFVs)¹² in the early 2000s. Although the Chinese government has never provided a legal definition of LGFVs, they are widely

¹² The literature has also adopted the term Local Government Financing Platforms (LGFPs) or Local Financing Platforms (LFPs).

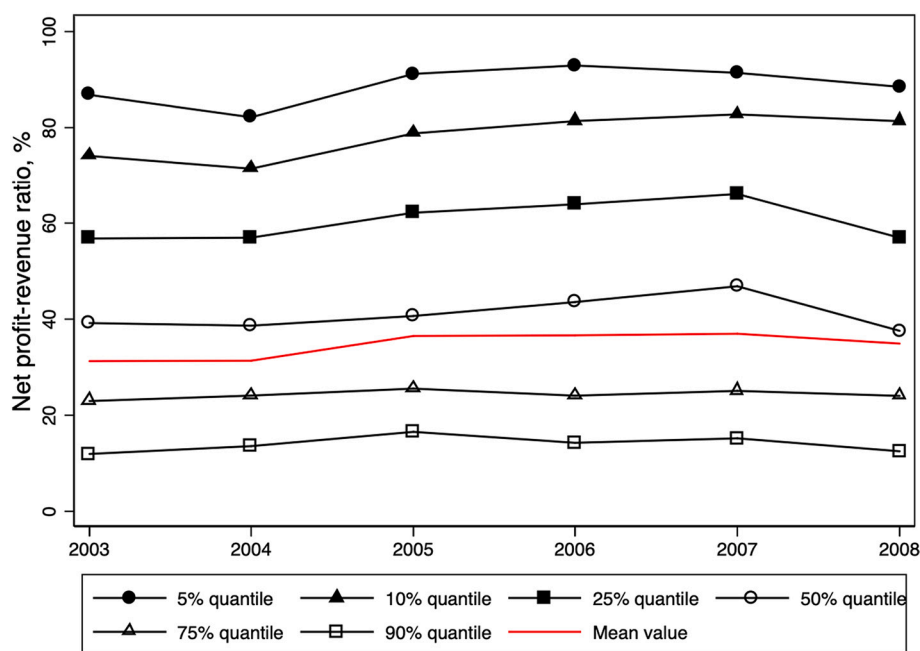


Fig. 5. Distribution of net profit–revenue ratio, 2003–2008.

Note: Authors' calculations based on the data reported by the Ministry of Natural Resources.

Table 1

Breakdown of land-related tax revenues.

Item	Volume (billion RMB)	Share in real estate–related taxes	Share in total tax revenue
1. Transaction Based			
(1.1) Deed tax	0.573	25.5%	7.6%
(1.2) Land value-added tax	0.564	25.1%	7.5%
(1.3) Farmland occupation tax	0.132	5.9%	1.7%
Subtotal	1.269	56.5%	16.8%
2. Stock Based			
(2.1) Property tax	0.289	12.9%	3.8%
(2.2) Urban land use tax	0.239	10.6%	3.2%
Subtotal	0.528	23.5%	7.0%
3. Developer Based			
(3.1) Developers' value-added tax	0.277	12.3%	3.7%
(3.2) Developers' business tax	0.004	0.2%	0.1%
(3.3) Developers' corporate income tax	0.169	7.5%	2.2%
Subtotal	0.451	20.1%	6.0%
Aggregated Real Estate–Related Taxes	2.248	100.0%	29.7%
Total Tax Revenue	7.562	–	100.0%

Note: Authors' calculations based on the data reported by the Ministry of Finance.

accepted as “local government-owned and government-controlled legal entities that carry out government investment projects” (Zhang & Xiong, 2020), which are legally permitted to engage in debt financing activities.¹³ Whatever effective constraints were on local government reliance on LGFVs, they were relaxed after the Global Financial Crisis. In particular, following some financial deregulation associated with the stimulus period in 2009–2010, local governments increased the usage of LGFVs to implement off-balance-sheet debt financing to support infrastructure investment (Bai, Hsieh, & Song, 2016; Chen, He, & Liu, 2020). These LGFV debts, including both bank loans and bonds, have also become one of the most important components of local government debt in China. The only readily available official statistics on these debts are from the National Audit Office (NAO), which reports that as of June 2013, the total volume of outstanding debt borrowed by LGFVs was 4.08 trillion RMB. This amount accounted for 37.5% of the 10.89 trillion RMB total volume of local government debt.

LGFVs' debt financing activities are intimately related to the system of land finance via two channels. First, if a local government transferred LURs associated with new developable land parcels to its LGFVs, the LGFV could use land parcels as collateral to support its

¹³ See Ambrose et al. (2015) and Bai et al. (2016) for more institutional details on LGFVs.

debt financing. However, such formal credit-enhancement arrangements seem relatively rare. Zhang, Wei, and Ou (2019) report that while the total volume of new commercial bank loans with land collateral reached 3.9 trillion RMB in 2009, only 6.6% (257 billion RMB) of that amount was borrowed by LGFVs.¹⁴

Local governments prefer a more flexible and informal arrangement that uses future land-sales revenues (or, more precisely, land-sales profits) as an implicit guarantee to support their LGFVs' debt financing (Liu & Xiong, 2020). As part of the deregulation policies implemented during the stimulus period, the MF announced in 2009 that "local governments will be allowed to finance investment projects with essentially all sources of funds, including budgetary revenues, land revenues, and funds borrowed by local financing vehicles." This policy provided official support from the central government for the implicit guarantee (Bai et al., 2016). Unfortunately, providing direct evidence on the implicit guarantee is not feasible, but existing studies do provide indirect evidence. For example, Ambrose, Deng, and Wu (2015) show exogenous housing price fluctuations have a significantly positive impact on LGFV bonds' ratings and a significantly negative impact on LGFV bonds' yield spreads. Mo (2018) suggests local governments' land-sales revenues serve as a signal of their credit quality. Counties with higher land-sales revenues did experience higher economic growth after the deregulation of local government debts in 2009. Zhang, Liu, and Nian (2018) use the Home Purchase Restriction policy as a quasi-natural experiment in their analysis. Their empirical evidence, based on a difference-in-differences model, shows that when land-sales revenues dropped in the restricted cities after the policy shock, the volume of LGFV bond issuance significantly decreased.

2.3.2. Since 2015: Local government bond and land finance

To curb perceived increasing risks associated with LGFVs, the Chinese government substantially tightened its regulation in 2014. An amended Budget Law effectively allowed for debt financing of infrastructure investments. More specifically, it permitted "provincial governments to raise part of the funding for local investments via issuing local government bonds, within the quotas set by the State Council." Following the new rule, MF issued two documents in April and May of 2015, with detailed guidelines regarding the issuance of so-called general local government bonds and specific local government bonds.

According to these documents, the funds raised by general bonds are to be used to support public service expenditures of the provincial government or its subordinate local governments and can only be repaid by future budgetary incomes. This observation implies the issuance and repayment of general bonds are not related to land finance. Meanwhile, a special bond is designated to raise funds for one or more infrastructure investment projects. The local government issuing a special bond can use the future cash inflows of the infrastructure projects (if any) and/or the government's future land-sales revenues (or, more precisely, land-sales profits) to repay the bond. This bond arrangement provides a formal and legal linkage between land finance and local governments' debt financing activities.

To illustrate, we use one special bond as an example. In May 2017, the provincial government of Guangdong issued a bundle of three special bonds with different maturities. As listed in Table 2, the total amount of these three bonds was 22 billion RMB, and all three bonds received the highest AAA rating. In the issuing document, Guangdong Province's Department of Finance reported a breakdown of designated usages for the funds, although it did not list the names of individual projects to be financed. Furthermore, the issuing document explicitly stated that the funding of bond-service repayment would come from "revenues of urban land LUR sales." However, the document did not report the breakdown of cities or counties contributing to the land-sales revenues. Unfortunately, the MF has not released issuing documents for all local government bonds. Thus, the proportion of special bonds that fully or partially rely on future land-sales revenues is still unclear. This information is needed for an accurate estimate of the current linkage between the urban land market and local government debt.

Fig. 6 reports data on the combined annual issuance at the national level of general and specific bonds for 2015–2019, with a breakdown by category also noted. Annual issuance volume nationally fluctuated between 4 trillion and 6 trillion RMB over this period. The outstanding balance of such government bonds at the end of 2019 was 21.3 trillion RMB. Unfortunately, data limitations make imputing the volume directly or indirectly linked to land impossible.

Finally, it seems reasonable to expect that the fluctuations of land sales revenues/profits could affect the yield spread on special bonds and/or their issuance volume. Unfortunately, and perhaps due to the relatively short history of this new category of bonds, existing studies provide only limited descriptive analysis of this emerging local government bond market (Amstad & He, 2020; Holmes & Lancaster, 2019; Lam & Wang, 2018). We know of no empirical analysis on the pricing mechanism or the issuance decision of these local government bonds in China, especially as it pertains to the relationship between land finance and this specific kind of local government borrowing. The literature also has not empirically studied the impact of the amended Budget Law on local governments' behaviors. Both seem especially ripe topics for strong empirical analysis.

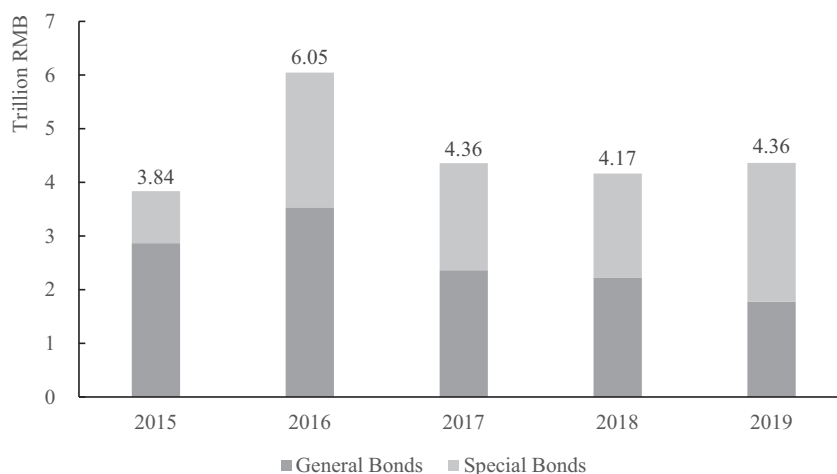
In sum, local governments' major debt financing vehicles, including both the LGFVs in the pre-2015 regime and the local government special bonds in the post-2015 regime, are strongly related to the land finance system. One unique feature is that such a strong relationship does not rely on the conventional collateral channel, as local governments seldom explicitly provide LURs as collateral to support their borrowing. Instead, local governments implicitly (LGFVs) or explicitly (local government bonds) adopt future land-sales revenues/profits as the sources of debt repayment. Therefore, the linkage between land-based "equity financing" and "debt financing" is strong; in other words, it is natural to expect that the profitability of LURs sales will greatly affect local governments' borrowing capacity and the risks of local government debts.

¹⁴ In addition, see Ambrose et al. (2015) for the analysis based on the bond market, which suggests LGFVs are not more likely to use land collateral when issuing bonds.

Table 2

An example of local government special bonds.

A. Basic information on bonds					
Bond	Amount (billion)	Maturity	Rating	Coupon Rate	
1,705,108.IB	3.30	5 years	AAA	3.85%	
1,705,109.IB	1.32	7 years	AAA	3.96%	
1,705,110.IB	1.98	10 years	AAA	3.93%	
Urban Infrastructure	Intercity transportation infrastructure	LURs acquisition	Health, education and culture	Agriculture	Others
B. Designate usage of funding (in million RMB)					
3778.47	1465.56	1307.41	18.00	27.36	3.20

**Fig. 6.** National-level local government bond issuance, 2015–2019.

Note: Authors' calculations based on the data reported by the Ministry of Finance.

2.4. Usage of land-related funding

Compared with the explicit sources of land finance, the usage of land-related funding is much less clear because the official breakdown of land-related funding usage is seldom reported. The literature has provided some (indirect) evidence. Most of the land-related funding is believed to have been spent on two areas: urban infrastructure investment, which helps improve cities' local amenities and boosts economic development; and providing subsidies to attract firms, which is viewed as directly helping promote growth. Therefore, the system is perceived by the public as the backbone of urban development in China, as well as a major contributor to overall economic growth.

2.4.1. Infrastructure investments

In most developing countries, local governments' land-based financing targets infrastructure investment (Peterson, 2008). During the reform era, local governments in China have strong incentives to support infrastructure investment, which not only could boost short-term GDP growth via the investment channel, but also attract more firms and thus facilitate long-term economic growth (Cai & Treisman, 2005). Most studies tend to highlight the huge contribution of infrastructure investments to both short- and long-term economic growth in China (Li, Wu, & Chen, 2017; Wang, Zhang, & Xu, 2014).

Land finance has played a dominant role in supporting local governments' infrastructure investments over the past two decades (Zhang & Xiong, 2020). Wang, Zhang, Zhang, and Zhao (2011) provide a breakdown of the funding sources of local governments' urban infrastructure investments based on various official statistics and conclude land finance dominates all potential funding sources. Some statistics also exist from the perspective of local government debt. According to the reports from the NAO, by the end of 2013, 34.5% (or 5.80 trillion RMB) of the 16.75 trillion RMB in local government debt went to finance urban infrastructure investment. Another 4.09 trillion RMB (or 24.4%) went toward investments in intercity transportation infrastructure. Additionally, Ambrose et al. (2015) find that, of all the corporate bonds issued by LGFVs, 53% list infrastructure investments as the designated usage.

Various empirical estimates also support the conclusion that an increase in land-sales revenues leads to a jump in local governments' investments in infrastructure. Zuo and Yin (2013), Wu, Deng, Huang, et al. (2014), Zheng et al. (2014), and Ding, Niu, and

Lichtenberg (2014) each use city-level panel data to reach this finding. These studies also provide further analysis of local governments' preferences for different types of infrastructure investment. For example, Zuo and Yin (2013) and Wu, Deng, Huang, et al. (2014) report that local governments prefer spending land-sales revenues on investments in economic infrastructure such as transportation in lieu of non-economic infrastructure such as that supporting the environment. Ding et al. (2014) and Chen and Hu (2015) suggest local governments are reluctant to spend land-sales revenues on public services such as education. Note that, mainly due to data constraints, all these empirical analyses adopt land-sales revenues, instead of profits, as the proxy of local governments' benefits from land finance. The effect of such a potential measurement error remains an open question.

2.4.2. Providing firm subsidies

Interjurisdictional tax competition between countries or local governments is prevalent worldwide (Genschel & Schwarz, 2011; Wilson, 1999). In the context of "fiscal federalism, Chinese style," local governments in China have strong incentives to compete with rival regions by providing subsidies to attract firm investments (Liu & Martinez-Vazquez, 2014; Long, Zhu, Cai, & Li, 2014; Xu, 2011). Land finance is widely believed to substantially support local government in providing various firms subsidies, although direct empirical evidence remains limited.

Theoretically, the land finance system can help provide firm subsidies via two channels. One major channel of (implicit) subsidy comes from low and stable industrial land prices. While the land finance system in China mainly refers to the equity financing and debt financing associated with *residential* and *commercial* land, the system also enables the use of lower-priced industrial land to attract firms. Specifically, local governments typically implement a dual-track strategy in land supply, or the so-called strategy of "low-cost industrialization and high-cost urbanization" (Fan, Mo, & Zhang, 2015; Tao, Lu, Su, & Wang, 2009) - while local governments tend to maximize the lump-sum revenues from the residential land supply, they prefer to keep industrial land prices low to attract firms, which they believe will boost local GDP growth and bring in future tax revenues. Fan et al. (2015) and Zhao, Wang, and Gong (2017) construct theoretical models to provide a more formal explanation of local governments' incentives to implement this dual-track strategy. The existing literature has also provided rich empirical evidence on the implicit subsidy associated with industrial land supply (Tao et al., 2009; Tian, Wang, & Zhang, 2020; Tian, Yu, & Gong, 2019). Some studies further suggest the implicit subsidies to industrial land create distortions and lead to problems such as inefficient land usage and overinvestment in certain industries (Fan et al., 2015; Huang & Du, 2017; Wu, Zhang, Skitmore, Song, & Hui, 2014; Xu, Huang, & Jiang, 2017).

Note that although most of these studies highlight the co-existence of high and rising residential land prices with low and stable industrial land prices, they do not provide direct causal evidence. For instance, Lin, Qin, Yang, and Zhu (2020) and Tian et al. (2020) point out that industrial land prices are subject to the central government's regulation requirements, such as the minimum price policy, but do not discuss local governments' capacity of providing implicit subsidies to industrial land parcels. Thus, it is less clear how industrial land prices would respond if residential land sales declined, which makes it another topic in need of more research.

Besides subsidies associated with lower industrial land prices, local governments can also provide tax subsidies to firms. Though the literature on such a channel is scant, it is reasonable to expect that the effect of tax subsidies should be even more important than industrial land price subsidies because they apply to both new and existing firms. The existing literature provides rich empirical evidence that Chinese local governments often offer various types of firm tax subsidies, including tax reductions, tax rebates, or looser regulation. These subsidies have been shown to help attract firm investment (Jia, 2014; Zhang, Sun, Li, & Wu, 2021), boost exports (Chandra & Long, 2013; Girma, Gong, Görg, & Yu, 2009), and encourage research and development (Li & Zheng, 2016). Theoretically, land-sales revenues could affect local governments' budget constraints and thus their capacity to provide tax subsidies. Nevertheless, the literature has not directly linked land finance with local governments' land subsidies via causally identified empirical estimation. The only empirical evidence thus far comes from Zhang et al. (2021), who claim that an exogenous positive shock to local governments' land-sales revenues engenders significantly more tax subsidies to local firms and also significantly reduces the intensity of tax collection. More empirical analysis on this important topic also would be valuable.

2.5. Self-reinforcing positive feedback

The previous subsections summarize what is known about local governments' financing and spending activities regarding their urban LURs assets, but still do not present a full picture of the land finance system. It is important to recognize that these financing and spending activities are not segmented; instead, they can strongly interact with one another and form a self-reinforcing positive feedback cycle, as illustrated in Fig. 1 at the beginning of this section. On the one hand, local governments use the value arising from transferrable LURs associated with new urban developable land parcels to generate revenues from land sales or to help back debt issues. Local governments then spend most of those funding on infrastructure investments and/or firm subsidies, which either improve urban amenities or help attract more firms. Standard equilibrium location theory in urban economics indicates a more prosperous local area and/or one with a higher quality of life would have higher land prices (Roback, 1982), which, in turn, can feed on itself by further enhancing local governments' land financing capacities. Wu, Deng, Huang, et al. (2014), Zheng et al. (2014), and Guo and Shi (2018) provide empirical evidence of such a positive feedback effect.

Importantly, several studies have pointed out that the self-reinforcing cycle around land finance substantially boosts local economic growth. For example, Zhao et al. (2017) build a DSGE model on the impacts of land finance on economic growth. Tao, Su, Liu, and Cao (2010), Wu (2010), and Wu, Deng, Huang, et al. (2014) use panel data to confirm a statistically significant and economically meaningful effect of land finance on economic growth. Mo (2018) uses financial deregulation during the stimulus period as an exogenous shock and finds that counties with higher land-sales revenues experienced higher economic growth between 2009 and 2014.

3. Institutional underpinnings of land finance

Section 2 documents that the land finance system has been a major contributor to local economic growth during the past two decades. Despite this obvious advantage of the land finance system, another question has not been answered: Why do local governments in China have the incentive to create and follow such a system? Subsequently, another closely related and even more important question is, where does the capacity to adopt such a system come from? Or, equivalently, why is the land finance system feasible in China? This section aims to answer these questions by investigating the institutional underpinnings.

3.1. The reason local governments use land finance

Among all possible explanations for the emergence and prevalence of land finance, the most fundamental one is the heavy budgetary burden that Chinese local governments have been experiencing during the past more than two decades, which has long been embedded in the institutional features of the local government system in China. Under the regionally decentralized authoritarian system, or the so-called “fiscal federalism, Chinese style,” each regional government has both a high degree of autonomy and a strong incentive to foster local economic development (Jin, Qian, & Weingast, 2005; Maskin, Qian, & Xu, 2000). The governance structure at the local government level played a key role in China's economic development during the reform era (Xu, 2011); and in particular, the regionally decentralized authoritarian system is widely believed to have materially contributed to China's economic miracle (Blanchard & Shleifer, 2001; Breznitz & Murphree, 2011). This governance structure requires a great amount of infrastructure investment by local governments, which begs the question of how it might be financed. The typical way in most countries is for local governments to finance it with tax revenues, which is indeed what Chinese local governments did before 1994.

The 1994 policy intervention dramatically altered the “tax-sharing system” to effectively reduce revenues flowing to the local government sector.¹⁵ Fig. 7 documents the sharp decline in local governments' share in fiscal income at the time of the policy intervention—from nearly 80% of all fiscal income in 1993 to below 50% in the following year. Local governments' share of fiscal income has averaged around 50% in subsequent decades. While the tax-sharing system reform enhanced the financial strength of the central government, it did not reduce the obligations of local government regarding fostering local economic growth. Fig. 7 also shows no decline in local governments' share in total fiscal expenditures at the time of the policy change, and that share has trended up since the turn of the century. Taking 2020 as an example, local governments had to take up more than 85% of the total fiscal expenditures, while receiving only half of the total tax revenues. The central government redistributes a significant portion of its share of the tax revenues back to local governments in less developed regions, as part of a policy goal to mitigate regional inequality in economic development. However, such transfer payments cannot effectively relieve the overall budgetary burden on local governments, because the relatively prosperous urban areas have not benefited from these fiscal transfer payments, and the central government places significant restrictions on the use of most of these transfer payments (Fu & Shen, 2012).

Thus, due to the 1994 tax-share reform, most local governments in China faced an unprecedented challenge arising from the gap between shrinking budgetary funding sources and unchanged or even growing spending needs. A new revenue source to fill such a gap was needed to ensure robust urban development and economic growth. With state-owned land being a primary asset of local governments, local governments typically sought off-budgetary funding sources from land finance in particular (Lv & Wang, 2021).

Although this conclusion seems to be well accepted in the policy and academic communities, it is difficult to prove. One possible way is to test whether a local government has a higher reliance on land finance when facing tighter budgetary constraints. However, the challenges arising from a lack of variation in the data and endogeneity concerns have led to few empirical analyses of the causal relationship between local government budgetary burdens and their reliance on land finance. One that does find the causal relationship between fiscal burdens and land finance is Sun and Zhou (2013), who employ an SYS-GMM estimation strategy on a provincial-level panel dataset and conclude that if the tax shared with the central government increases by 1%, local governments' land sales revenues increase by 1.16%–1.42%. This paper is the only one that estimates the elasticity between budgetary incomes and land-sales revenues. Some other researchers identify the existence of causal relationships using policy shocks. Wang, Skidmore, Wu, and Wang (2020) use the Business Tax-to-Value-Added Tax Reform, which was implemented throughout China in May 2016, as a quasi-natural experiment. This reform refers to converting the Business Tax, which generates a tax revenue stream fully owned by the local government, into a Value-Added Tax, which involves a shared stream of revenues following the tax-sharing-system reform in 1994. Doing so resulted in a sharp reduction in local governments' tax revenues. Their analysis suggests local governments' land-sales revenues significantly increased after the tax reform. Wang, Wu, and Wu (2021) use another change for identification, arguing that export changes driven by non-local factors are an exogenous shock to local governments' budgetary revenues. Their empirical results suggest a one-standard-deviation decrease in the export shock is associated with an increase of one quarter of a standard deviation in the corresponding local governments' land-sales volume. Nevertheless, the estimated empirical effect of the fiscal burden on local governments' incentives to pursue land finance is less clear than many might believe.¹⁶ More empirical analysis is needed to reach a thorough understanding of how local governments' budgetary burden influences their incentives to adopt the land finance system.

Also note that the literature poses other potential explanations for the widespread use of land finance. One is related to local chief political officers' incentives to pursue their political promotion, which may further enhance the first explanation by exacerbating the budgetary burden on local governments. The central government in China retains personnel control of its subordinate local officers by

¹⁵ See Shen, Jin, and Zou (2012) and Zhou (2006), among others, for more details of the tax sharing system reform in 1994.

¹⁶ A few studies, such as Fan (2015), also cast doubt the relationship between budgetary burden and land finance incentives.

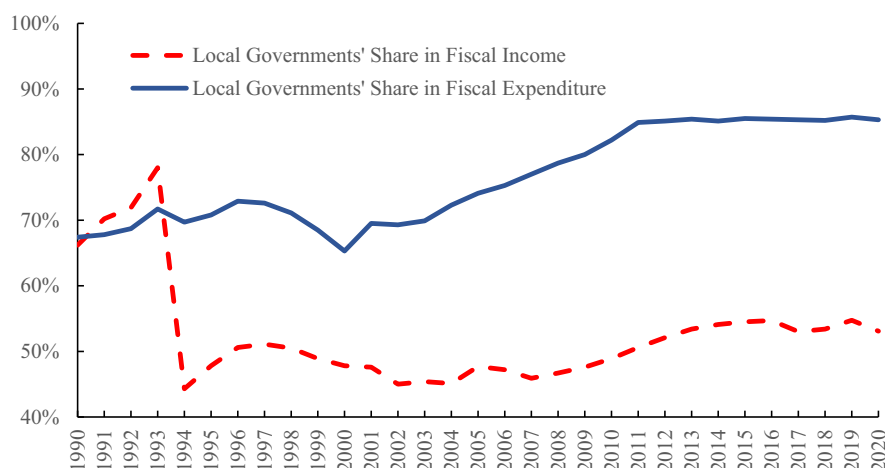


Fig. 7. Local governments' share in fiscal incomes and expenditures.

Note: Authors' calculations based on the data released by the National Bureau of Statistics, China.

evaluating their performance and rotating, promoting, or even terminating them over time. Several empirical studies show the local GDP growth rate is one of the most critical indicators in such evaluations (Jia, Kudamatsu, & Seim, 2015; Li & Zhou, 2005; Wu, Deng, Huang, et al., 2014), which provides local political heads strong incentives to pursue GDP growth. Related literature suggests three prominent ways to boost short-term GDP growth: urban infrastructure investment (Banerjee, Duflo, & Qian, 2020; Wu, Deng, Huang, et al., 2014; Zhang, Gao, Fu, & Zhang, 2007), attracting private firm investment by providing subsidies to them (Jia, 2014), and expanding public spending more generally (Que, Zhang, & Schulze, 2019). Each relies on a substantial amount of local government spending. Therefore, local chief officers, especially those more eager to win in the “political promotion tournament,” have strong incentives to acquire additional funding to promote local GDP growth. With limitations on tax revenue flows since 1994, these chief officers naturally seek off-budgetary funding sources via the land finance channel.

Empirical evidence supports this hypothesis. For example, Li, Hong, and Huang (2013) suggest city governments' land supply outcomes are indeed influenced by local officers' competition in the promotion tournament. Specifically, based on a time-space dynamic panel model, they provide evidence that the land sales behavior of municipal governments is spatially correlated among neighboring cities, which suggests intercity competition-imitation interactions. In other work, Hsu, Li, Tang, and Wu (2017) report that cities' land-sales revenues change with local chiefs' number of years in office. Lu, Yao, and Wang (2022) provide similar findings based on provincial-level leader data. Chen and Kung (2016) provide empirical evidence that increased land-sales revenues hike local government officials' promotion probabilities. The magnitude of the impact is large: a one-standard-deviation increase in land-sales revenues results in a 1.96 percentage points increase in the probability of promotion, which accounts for 28.24% of the actual average probability of promotion.

Finally, some researchers also link land finance to government officials' rent-seeking incentives. Conceptually, it is sensible to believe that the urban land supply process provides relatively rich rent-seeking opportunities for local officials. Cai et al. (2013), Zhang, Gao, and Xu (2013), and Chen and Kung (2019) provide indirect evidence of corruption associated with urban land sales. Zhao, Chen, Feng, and Zhong (2020) and Fang, Wu, Zhang, and Zhou (2021) also find substantial impacts of China's anti-corruption campaign since 2012 on local governments' land-sales activities. Nevertheless, no evidence exists that local government officials established the system of land finance mainly to create or enlarge rent-seeking opportunities. Any corruption seems more likely to be a byproduct, not the primary cause, of the land finance system.

3.2. Preconditions of land finance

Understanding why local governments in China had a strong incentive to seek a special funding source is relatively straightforward, but why land finance can effectively serve this purpose is less clear. Although the central government has never issued documents that formally established the land finance system, local governments gradually established informal, but practical, ways to facilitate the operation of land finance as a non-normative fiscal revenue source (Lv & Wang, 2021). These practices form the critical institutional underpinnings of the land finance system. In this subsection, we discuss institutional preconditions and market preconditions that make the land finance system work in China, both of which are highly related to the profitability of land finance. Whether those preconditions continue to hold will greatly influence the sustainability and future development of land finance in China, something that we address below in section 4.

3.2.1. Local governments' monopoly power in the land-usage conversion

As described in section 2.1, the feasibility of land finance relies on local governments' control of LURs associated with new developable urban land parcels, which are converted from either rural land or occupied urban land. In other words, the profits

collected by local governments via land finance are essentially derived from the price gap between these land parcels' current usages (rural usage or relatively lower-density/lower-profitability urban usage) and designated usages (relatively higher-density/higher-profitability urban usage). Therefore, the feasibility of land finance relies on a local government being able to acquire rural and/or occupied urban land parcels at relatively low prices.

According to the regulations listed in the LAL, to implement a land acquisition, the local government needs to obtain the consent of the current landowner (for a rural land parcel) or the current LUR holder (for an occupied urban land parcel). Thus, the local government needs to negotiate with the current owner/holder to reach an agreement, especially about the compensation terms. One would expect that, in equilibrium, the current owner/holder should ask for a high compensation price, leaving limited, or even zero, profits to the local government. However, the local governments effectively control compensation to keep the prices they pay low, because of three institutional arrangements.

First, as stated in the Constitution and the LAL (before the 2020 amendment), the relevant local government is the sole entity that can legally implement rural-to-urban land conversions or adjust usage and zoning indicators of occupied urban land parcels. In other words, the current landowner or LUR holder can only choose to accept or reject the local government's compensation offer. It cannot expect a higher bid from a competitor to the local government, because the law allows no such competitor. Stated differently, the local government is the monopoly supplier of conversion rights and LURs in its jurisdiction.

Second, according to the LAL, the compensation price is supposed to be calculated based on the current, instead of the designated, conditions of the land parcel. Typically, the local government does not release the designated usage of the land parcel or the key zoning indicators, such as the floor-area ratio, during the land acquisition process. For example, if the rural land parcel to be acquired is currently farmland, the compensation price is based on its agricultural value, which is typically calculated as the zero-interest-rate discount on the 30-year agricultural output value (Ding, 2007). Similarly, if an urban land parcel is currently zoned for industrial usage with low density, the compensation price would be calculated based on that usage, even if it is then converted to residential usage with higher density after the acquisition.

Third, according to the LAL, if the land acquisition is for the “public interest,” the local government has the power to implement compulsory land acquisition. Neither the LAL nor other laws clearly define what the “public interest” refers to. In practice, the local judiciary has the power to determine whether a specific acquisition is in the public interest. In rare cases, the concept of public interest has been extended to “economic development,” including the development of real estate projects (Nguyen, Duan, & Zhang, 2018). Naturally, such a legal perspective substantially enhances local governments' bargaining power in land acquisition negotiations.

3.2.2. Local governments' high autonomy in controlling urban land supply

Similar to most other major economies, China imposes strict regulations on urban land expansion and usage at both the national and local levels, especially for the purpose of cultivated land protection (Lichtenberg & Ding, 2008; Liu, Zhao, & Song, 2017b). According to the LAL, the State issues the national-level “Land Use Master Plan” (*tu di li yong zong ti gui hua*) every 15 years. As an essential part of the master plan, the State sets a ceiling on the total area of urban land for each province, which, together with each province's current urban land volume, implicitly restricts the quota for rural-to-urban land conversions during the 15-year period in each province. The provincial-level governments then issue their master plans accordingly, including assigning an urban land stock ceiling and rural-to-urban land conversion quota to each city, and similarly for lower levels of government. By law, the aggregated volume of rural-to-urban land conversion of a province/city/county cannot exceed the allocated quota. Based on the master plan, each local government annually creates a “Land Use Annual Plan” (*tu di li yong nian du ji hua*), which designates the volume of rural-to-urban land conversion and urban land supply for the year.¹⁷

Theoretically, the quota system restricts local governments' capacity to implement land finance—a local government cannot convert and prepare as much new developable land as it needs to meet financing requirements if doing so would violate the constraint implied by a designated quota. However, the constraint of the quota system can be substantially softened in practice in at least the following three ways.

First, the central government has established two formal mechanisms that permit local governments to seek additional land conversion/supply quotas. From the between-jurisdiction perspective, a local government can trade quotas with other local governments via the so-called “land development rights transferring and trading” arrangement (Wang & Tao, 2009). From the within-jurisdiction perspective, if a local government can legally develop new farmland, it is allowed to obtain a higher rural-to-urban land conversion quota under the premise that the total volume of cultivated land is held constant, which is the so-called “linking decrease of arable land with the increase of construction land” arrangement (Tan, 2014). Li, Zhang, and Chen (2020) provide empirical evidence that these quota transfers are not necessarily driven by actual demand but by other factors such as local officers' promotion incentives and associated reliance on land finance.

Second, local governments can choose to negotiate with a higher-level government for more rural-to-urban land conversion or/and urban land-supply quota. One typical justification would involve arguing the current quota cannot accommodate the rapid extent of change in local social and economic conditions. In such a situation, the local government might have already run out of the quota designated in the 15-year master plan. Some studies qualitatively point out that local governments typically can at least partially achieve their goals and get more quota (Shao, Spit, Jin, Bakker, & Wu, 2018; Tan, 2014).

Third, local governments could just choose to ignore the constraint and implement rural-to-urban conversions beyond the quota. In

¹⁷ See Lichtenberg and Ding (2008) and Long (2014), for example, for more details on China's urban land use policy.

most cases, the punishment for breaking the quota of rural-to-urban land conversion or urban land supply is acceptably small, especially if the local government can still meet the cultivated-land protection requirement (Liu et al., 2017; Wang, Wu, Yan, Guo, & Peng, 2020; Wei, 2015).

3.2.3. Local governments' high autonomy in determining land-related funding usage

Since early 2007, the central government has required that a local government include all its land-sales revenues in its government-managed funds. As listed in Table 3, the central government also issues a detailed list of qualified usages, and the land-sales revenues in the government-managed funds can only be spent on these items. Nevertheless, such a seemingly strict regulation still provides local governments substantial autonomy in determining the usage of land-related funding usage. One important reason is that in addition to the items in the categories of "actual costs" and "regular fees" that are directly related to the cost of land acquisition and development, several broader items are also included in the "free expenditure" category. In particular, the central government lists "urban construction" as one of the qualified expense items, which can cover most spending on urban infrastructure. Moreover, according to the amended Budget Law, since 2015, the local governments can also legally use the land-sales revenues in the government-managed funds to repay local government bonds, which further enhances their autonomy in determining spending usage.

3.2.4. Market preconditions

In addition to the institutional conditions discussed above, the increasingly high value of urban land parcels (especially those designated for residential usage) in most Chinese cities during the past two decades provides another essential precondition of land finance from the market perspective. Market conditions help the land finance system function in at least two ways. On the one hand, high land prices ensure a high absolute amount of land-sales revenues and land-backed borrowing. On the other hand, the positive trend in land prices enables a local government to acquire land parcels much more easily at a relatively low price and sell the LURs at a relatively high price to generate a high land-sales profit.

Residential land values are closely related to housing prices. Several studies have documented a wide and persistent housing price growth around China (Fang, Gu, Xiong, & Zhou, 2016; Wang, Li, & Wu, 2020; Wu, Deng, & Liu, 2014), although fewer studies focus on the land price path. In Fig. 8, we provide an updated version of the constant-quality residential land price indices in 35 major cities by Deng, Gyourko, and Wu (2012) and Wu, Gyourko, and Deng (2016). Despite a few short downturns, such as occurred during the Global Financial Crisis, the aggregate index of the 35 major cities generally continued to increase from 2004 to 2019. The accumulated growth of the aggregate index reached over 820%, for a compound average annual growth rate of about 15%. Moreover, the price increases clearly occurred not only in the eastern region, but throughout all three census regions.

Land prices are not as widely studied as housing prices in the existing literature. In Fig. 9, we adopt the same methodology as Fig. 8, using the full sample of micro-level residential land transaction data released by the MNR to construct annual constant-quality residential land price indices in 300 cities around the country between 2007 and 2017. This set of indices with broader urban coverage may be less accurate than the indices for major cities discussed above, because we cannot control for as many quality attributes of the land parcels in our hedonic estimations. These indices span a shorter time horizon, too. Nevertheless, we can still safely conclude from Fig. 9 that most cities, not just a few large superstars, experienced substantial residential land price growth during this period.

One might argue the remarkable land price increase shown in Figs. 8 and 9 is endogenous—local governments intentionally boost land price surges to enhance the self-reinforcing cycling around the land finance. Such a phenomenon exists to some extent, and we discuss related studies in the next section. Nevertheless, such a potential endogeneity is not the primary driver of the booming urban land market in most Chinese cities. Strong fundamentals have supported this price growth to a large extent over the past two decades. Between 2000 and 2019, the total urban population in China increased from 458.6 million to 848.3 million, for a compound average annual growth rate of 3.1%. Meanwhile, the real compound average annual growth rate of GDP, per capita GDP, and per capita disposable income for the urban population reached 9.1%, 8.5%, and 8.2%, respectively. Such a strong and ongoing urban population growth and broader economic growth generate strong demand for housing and urban land (Wu et al., 2012, 2016) and, arguably, fuel the increases in urban land prices.

Finally, in addition to the price perspective, the volume perspective also serves as a critical precondition for land finance. The urbanization rate in China is relatively low (only 63.9% in 2020, which is below that in developed countries) and continues to rise. Therefore, from the market perspective, a high potential supply of migrants into urban areas combined with the potential to create new housing for them via rural-to-urban conversions or denser zoning complements high and increasing land prices as a precondition of land finance. Thus, it is natural for local governments, especially those from the third- and fourth-tier cities, to implement land acquisitions and conversions with the expansion of their urban areas.

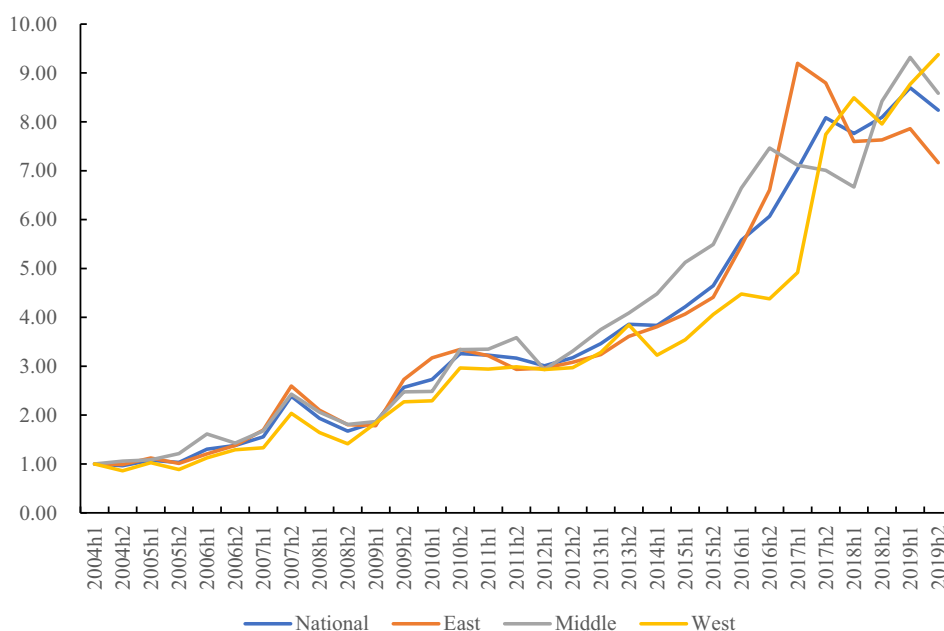
4. Sustainability of land finance

As highlighted in section 2, the self-reinforcing cycle around land finance has contributed substantially to local urban development as well as overall economic growth in China during the past two decades. Additionally, we documented in section 3 that the land finance system is rooted deeply in the institutional underpinnings of China, which supports the feasibility of the system. However, despite all these factors, the sustainability of the land finance system in the current context remains an open question and has attracted growing concern in recent years. This section aims to shed light on this issue from two perspectives.

Table 3

Official definition of urban LUR sales costs.

Type	Item	Standard
Actual expenditure-based	Land acquisition compensation	By actual expenditure
	Infrastructure development on the sold land parcels	
	Land-transfer business fee	
Regular fees	Farmland development fee	By regulations: No more than 15%*160 yuan/m ²
	Farmland development fees prepared for superior governments	By regulations: No more than 140 yuan/m ²
	Affordable housing expenditure fee	By regulations: 5% after all the above
	Urban construction	
	Rural infrastructure construction	
Free expenditure items	State Land Funding	By needs
	Employee compensation of bankrupt or restructured state-owned enterprises	
	Farmers' social security	
	Subsidies for land-expropriated farmers	

**Fig. 8.** Constant-quality residential land price index of 35 major cities.

Note: Authors' calculations based on the micro-level residential land transaction data in 35 major cities.

4.1. Costs/risks of the land finance system

The first perspective focuses on the trade-off between benefits and costs of land finance and whether that trade-off has turned negative. While the research reviewed in section 2 highlights the great contribution of the system to China's urbanization and overall economic growth, there are also a growing number of studies pointing out that local governments' high reliance on land finance, especially their strong incentives to maximize its profitability, has generated remarkable economic and social costs/risks.

4.1.1. Misallocation of land resources

Research suggests local governments typically make land supply decisions to maximize land finance-related revenues/profits, which need not be consistent with simply meeting local demand for space (Lichtenberg & Ding, 2009; Wang & Hui, 2017). As such, this type of land supply behavior may lead to the misallocation of land resources.

From a quantity perspective, local governments tend to supply more land parcels when they have higher funding needs (Pan, Huang, & Chiang, 2015). This oversupply in the urban land sector can lead to various negative outcomes.¹⁸ One is that too much rural land is converted to urban usage. Cao, Feng, and Tao (2008), Lin and Yi (2011), Lin (2014), and Ye and Wu (2014) highlight that, due

¹⁸ In some cases, local governments may also choose to intentionally under-supply residential land in order to hike land prices (Du & Peiser, 2014; Du, Thill, & Feng, 2014), which also leads to distortions in both the land and housing markets.

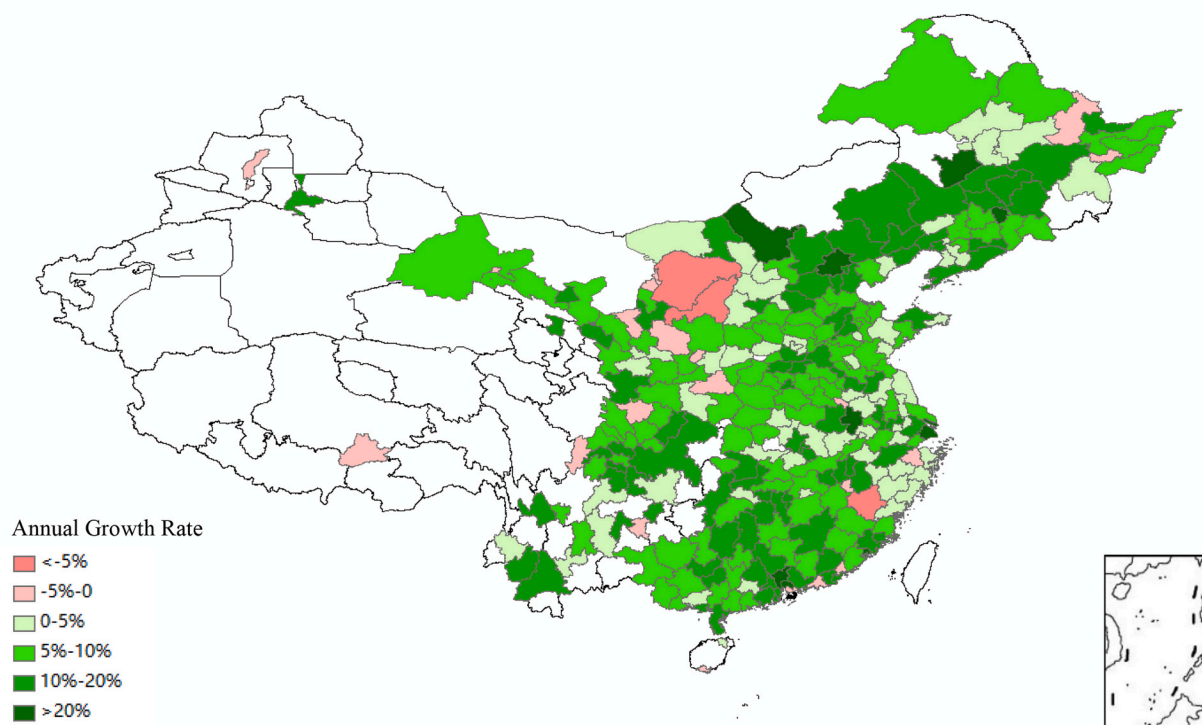


Fig. 9. City-level annual residential land price growth, 2007–2017.

Note: Authors' calculations based on the micro-level residential land transaction data in 300 cities.

to the existence of the land finance system, the urbanization process in China relies more heavily on “land urbanization” than on human capital or advanced technology. The empirical findings by Wang, Shao, Wang, and Wu (2021) further suggest the oversupply results in urban land-use inefficiency. In particular, because local governments typically use residential land supply to chase land-sales revenues, the residential land supply is likely to experience a dramatic jump when local governments need additional funding, which would affect the economically important housing market in turn. As a most remarkable example, during the 2009–2010 stimulus period, the aggregate residential land supply at the national level sharply increased from around 1 billion sqm in the pre-stimulus period to around 2.5 billion sqm in 2010–2011 (Fig. 10). Consequently, most cities in the country witnessed a dramatic increase in the volume of housing starts, which was then converted to a rising and high housing inventory volume after 2012. The central government finally had to list “destocking” as one of the national-level policy priorities in 2016. Moreover, due to the local chiefs' promotion incentives and their significant autonomy in determining their land supply goals, it is not unreasonable to worry that local governments will tend to be short-sighted when making annual land supply plans.

Local governments' strong incentives to pursue land finance profits can also lead to misallocations from a spatial perspective. Local governments are more inclined to acquire and convert land parcels with higher profit potential, but not necessarily parcels that need to be redeveloped or urbanized. In particular, several studies point out that land finance has been a major driver of the intensive urban sprawl in many Chinese cities during recent decades (Yong Liu, Fan, Yue, & Song, 2018; Yew, 2012; Yue, Liu, & Fan, 2013). For instance, the theoretical model by Anglin, Dale-Johnson, Gao, and Zhu (2014) suggests that, due to the land finance system, more land is used to push out the outskirts of the cities rather than renewing the city centers, resulting in cities with larger areas but less developed (i.e., with older and lower buildings) city centers in China than would be optimal.

4.1.2. Fueling mispricing in housing markets

The now very high absolute levels of house prices in many markets, along with very high price-to-rent and price-to-income multiples, have led to widespread concerns about potential mispricing risks in the housing market, as well as growing housing affordability problems (Fang et al., 2016; Li, Qin, & Wu, 2020; Wu et al., 2012, 2016). For instance, Wu et al. (2012, 2016) suggest strikingly high price-to-rent multiples in major Chinese cities—above 50 in Beijing and Shanghai since 2013. Li, Qin, and Wu (2020) point out that homeowners' mortgage repayment-to-income ratio kept above 0.50 in the top 5% cities between 2014 and 2018. Many believe the system of land finance is highly related to the housing price surge. For example, Wang and Hou (2021) construct a DSGE model and show land finance accounts for about 40% of housing price variation in China. Such an impact can be self-reinforced due to the strong correlation between land and housing prices, which would further enhance the impact of the land finance system on the housing market.

Though extensive public discussions focus on the role of land finance in rising housing prices, the underlying mechanisms and the

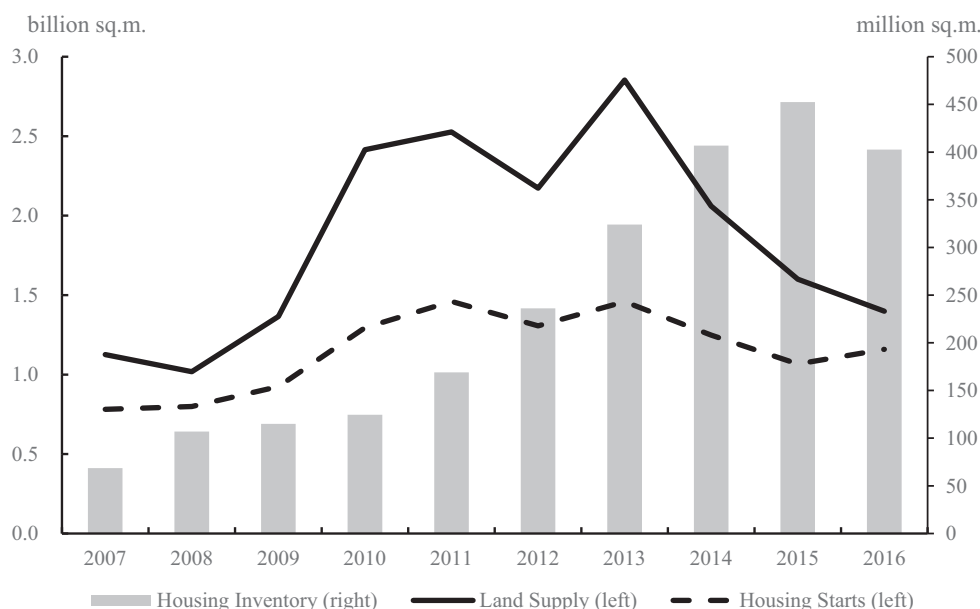


Fig. 10. Residential land and housing supply around the stimulus period.

Note: Authors' calculations based on the data reported by the Ministry of Natural Resources and the National Bureau of Statistics.

subsequent welfare implications are not clear. The existing literature digs into the mechanisms from two angles. A few studies approach the issue from a fundamental value perspective, which at least partly admits the positive effects. Based on the self-reinforcing framework depicted in section 2.5, [Zheng et al. \(2014\)](#) and [Wu, Deng, Huang, et al. \(2014\)](#) provide empirical evidence that land finance helps boost local economic growth and improve the quality of life, which in turn hikes housing's fundamental value. [Wu, Feng, and Li \(2015\)](#) reach a similar conclusion. Their empirical analysis suggests local governments' fiscal pressure and reliance on land finance mainly affect local housing prices by improving amenities and increasing household incomes.

More researchers highlight that local governments' strong incentives to pursue land finance fuel mispricing in the housing market and exaggerate housing market risks, which lays particular emphasis on the negative effects over the positive effects. In particular, local governments tend to intentionally implement intervention policies that fuel the housing market to expand land-sales revenues. [Han and Kung \(2015\)](#) suggest local governments are typically aggressive in enforcing housing market stimulus policies but reluctant to implement cooling measures even under intense pressure from the central government. [Mei and Wen \(2020\)](#) develop a DSGE model to show local governments intentionally control residential land supply to maximize land-sales revenues, which hikes housing prices and negatively affects household consumption and private firm investment. [Hu and Qian \(2017\)](#) provide empirical evidence that local governments with higher reliance on land finance intentionally restrict their inputs into public housing development, further boosting housing price surges and heightening housing affordability problems. [Huang and Du \(2018\)](#) use micro-level land transaction data and show LGFVs significantly overbid in the residential land market, especially in cities with larger fiscal pressures. Some studies also suggest land finance can affect market participants' expectations and behaviors. [Pan et al. \(2015\)](#) suggest market participants' common beliefs about local governments' implicit guarantee increase speculation in the housing market. [Zhang, Geltner, and de Neufville \(2018\)](#) develop a system dynamics model of the urban housing market in China, also suggesting local governments' reliance on land finance fuels speculative demand in the local housing market.

4.1.3. Amplifying systematic risks

The existing literature points out that several major mechanisms that played a key role in amplifying the negative impact of the real estate busts in the U.S. and Japan, such as the collateral channel effect ([Wu, Gyourko, & Deng, 2015](#)) and housing mortgage defaults ([Deng, Zheng, & Ling, 2005](#); [Kuang, 2014](#)), are much less likely to be important in China. However, the land finance system generates unique channels for a potential housing market correction to damage China's macroeconomy.

Thus far, researchers have identified two major potential channels. The first involves the negative effect of a housing market correction on investment. Although the standard theoretical model focuses on the effect of land price fluctuations on firm investment ([Liu, Wang and Zha, 2013](#)), in the context of land finance in China, any impact is more likely to concentrate on local governments' investments. The DSGE model by [Guo, Liu, and Zhao \(2015\)](#) shows that because land price fluctuations can significantly affect local governments' land-sales revenue and, in turn, infrastructure investments, the overall effect of land finance is to increase the amplitude of the macroeconomic cycle fluctuations by 12.6%. [Mei, Cui, and Wu \(2018\)](#) also develop a DSGE model and come to a similar conclusion. By contrast, [He \(2019\)](#) and [Wang, Wu, and Wu \(2021\)](#) raise another possibility that local governments may implement a pro-cyclical residential land supply policy to dampen economic fluctuations. For instance, [Wang, Wu, and Wu's \(2021\)](#) empirical evidence shows local governments supply more residential land when they experience negative export shocks, which partially offsets

the impact of such exogenous shocks on the local economy. Hence, we need more research to settle this issue.

The second channel concerns the risks associated with burgeoning local government debts. As described in section 2.3, local governments have to implicitly (before 2015) or explicitly (since 2015) rely on land-related income to repay their debts. Accordingly, it is natural to expect a substantial reduction in land-sales revenues/profits to trigger local governments' debt problems, up to and including default. In other words, land finances generate a strong correlation between housing market risks and local government debt risks (Pan, Zhang, Zhu, & Wójcik, 2017), which are perceived as two potential systematic risks in China. Unfortunately, the existing literature provides only limited quantitative evidence on such a linkage. As one of the few examples, Ambrose et al. (2015) report empirical evidence that bonds issued by LGFVs are priced in the bond market with higher yield spreads if the local housing market is expected to experience price drops. More research is called for in this field.

4.1.4. Negative effects on rural development

As highlighted in sections 2.1 and 3.2, the feasibility of land finance essentially relies on the profits, instead of revenues, of land conversions. Therefore, local governments naturally have strong incentives to control land acquisition costs, especially the reimbursement rate, at a low level to maximize the profits associated with land conversion. As one of the few direct pieces of evidence, Cai, Fan, Ye, and Zhang's (2021) empirical analysis based on China Household Finance Survey data shows more indebted local governments tend to pay land-losing villagers less compensation, and thus partially transfer their debt pressure to them.

The low compensation substantially reduces the benefits to current rural landowners, resulting in several negative consequences. First, when landless farmers are forced to be converted to urban residents, they can experience a long-term welfare loss if they do not receive enough compensation to support their livelihoods in the urban area (Ong, 2014; Zhou, 2007). Second, dissatisfaction with inadequate compensation has become a major driver of social instability in rural areas. The survey by Liu and Sun (2014) suggests that 65% of cases involving rural petitions or administrative lawsuits are about land, of which 73.2% are directly related to land acquisitions. Ding and Lichtenberg (2011) also suggest the discrepancy between urban land value and compensation for requisitioned rural land is the economic root of rural unrest associated with the conversion of farmland to urban uses. Finally, the hazards of even partial expropriation significantly reduce farmers' incentives to provide long-term inputs to their farmland (Jacoby, Li, & Rozelle, 2002).

The great gap between urban land value and compensation for requisitioned rural land also leads to the phenomenon of so-called "small property rights housing" (He, Wang, Webster, & Chau, 2019; Liu, Wong, & Liu, 2012) and "urban villages" (Wang, Wang, & Wu, 2009; Zheng, Long, Fan, & Gu, 2009) in many cities. Instead of agreeing with local governments' acquisition offers, villagers at the city edge may insist on holding rural land ownership. They then build or redevelop residential buildings and rent the units to urban residents (i.e., the "urban villages"), or even collaborate with professional developers to develop housing projects and illegally sell the units to urban households (i.e., the "small property rights housing"). As an extreme case, by the end of 2011, urban villages and small property rights housing accounted for 49.3% of the housing stock in Shenzhen.¹⁹ Although some studies point out that these illegal dwelling units can contribute to the alleviation of the housing affordability problem (Zheng et al., 2009), they still lead to social and environmental problems.

Besides these four aspects, at least two important issues remain on the research agenda into the costs and risks of the land finance system. First, decisions about the future reform of land finance conceptually rely on cost-benefit analysis, and, thus, work is needed to better quantify the likely welfare change arising from the system. We also need more detailed estimates of the contribution of land finance to specific costs/risks. Presently, directly comparing the costs/risks of land finance with its benefits, which should serve as the starting point of the future reform of the land finance system, remains difficult. Liu, Wang, Zhang, and Xiong (2020) use a threshold regression model to show the effect of added land supply on economic growth tends to disappear when the land supply volume or industrial level exceeds specific thresholds. Another work by Guo and Jiang (2019) examines China's optimal fiscal policy in a general equilibrium model. The optimal policy in their model suggests a much lower reliance on land finance than currently exists in China. Geng, Zhang, Liang, Bao, and Skitmore (2018) construct the "Chinese land financing sustainability index," which fluctuated between 1999 and 2011 but has remained relatively low since then. Each of these studies suggests the costs of land finance now could outweigh their benefits, but no consensus based on standard economic models and empirical estimation strategies exists yet.

Second, not all cities experience the same costs; between-city variation in costs is high. For instance, local governments' land finance-related incentives may mainly lead to an oversupply of residential land and, thus, housing in some cities; in others, it may mainly fuel mispricing, potentially generating opposite effects on the local housing market. Similarly, the effect on systematic risks is also determined by local governments' financing strategies and debt structures. So far, we have very limited insight into such variation across cities. This heterogeneity could play an important role in designing city-specific reform policies.

4.2. Feasibility of the land finance system

Another way to assess the sustainability of the land finance system is to reexamine the feasibility going forward of the preconditions necessary to sustain the system of land finance. Both the institutional factors and the market conditions discussed in section 3.2 are experiencing fundamental changes, the directions of which indicate decreasing feasibility of the land finance system.

On the one hand, land-sales revenues/profits are trending down following the changing anticipation of the housing market since 2017. In his report at the 19th National Congress of the Communist Party of China in October 2017, President Jinping Xi explicitly

¹⁹ Source: Nan Fang Daily, March 7, 2012 (http://epaper.southcn.com/nfdaily/html/2012-03/07/content_7063837.htm).

stated that “housing is for living in and not for speculative investment” (*fang zhu bu chao*), which has become the central government's guiding principle in urban housing sector development. Stabilization of housing and residential land prices has been explicitly listed as a policy requirement for major cities. In response, various local governments issued a series of market intervention policies to restrict housing speculation and rein in house price surges. The housing market does reflect the effect of these cooling policies. Fig. 8 documents a marked slowing in the growth rate of residential land prices after 2017. Local governments have also substantially increased investments in public housing units, following the directives from the central government. One example is Guangzhou's plan for 2021–2025, in which the public housing sector would account for half of the new housing supply. Such changes in housing market conditions will restrict local governments' potential residential land-sales revenues, in terms of both prices and quantities.

On the other hand, from the institutional perspective, both the difficulty and the cost of land acquisition are increasing due to a series of recent policy changes that further reduce the net profit of land finance. First, and perhaps most importantly, local governments are losing their monopoly role in rural-to-urban land conversions (section 3.2), which makes acquiring new developable lands more difficult. According to the amended LAL, which became effective on January 1, 2020, a village, on behalf of the collective of its rural households, is allowed to directly sell or lease LURs associated with rural developable land to external (i.e., non-village) entities or individuals following specific procedures. In this case, the corresponding local urban government can no longer benefit from the gap between urban land value and compensation for rural land requisition. A few cases of such direct LUR transfers already exist, most of which are designated for rental housing units. The market share in total land supply from this new channel remains negligible in most cities, but if it were to become mainstream, it would change the institutional root of the land finance system in general and rural-to-urban conversions specifically.

Second, the costs of land acquisition, especially reimbursement costs, are increasing as well. In response to some of the problems associated with land acquisitions described above in section 4.1, the central government issued the “Emergency Notice on Strict Management to Prevent Land Acquisition in Violation of Laws and Regulations” in 2013. This notice imposed stricter regulations on the procedures for land acquisition and higher standards on compensations to current owners. Conceptually, these new regulations ease the contradictions of land acquisitions but increase land-conversion costs, which would negatively affect the feasibility of land finance, although we still cannot find reliable statistics or empirical evidence on them. More broadly, some researchers point out that the central government is imposing stricter regulations on the urban land conversion and supply quota system in general (Liu et al., 2017).

If the system of land finance were to become less sustainable, that begs the very important question of what would replace it as a funding source for local governments. Both central and local governments have made several attempts in recent years to change the financing of urban infrastructure development in particular. The most noteworthy trend is the dramatic surge of public-private partnership (PPP) projects in the urban infrastructure sector since about 2014. Over 14,000 PPP projects were initiated between 2014 and 2017 in mainland China, becoming the major financing vehicle for urban infrastructure investment (Zhang, Gao, Feng, & Sun, 2015; Zhang, Zhang, Wu, & Wang, 2019).²⁰ However, the unprecedented increase within such a short period appears to have led to over-adoption or even abuse of PPP projects (Wang, Xiong, Zhong, & Zhang, 2020; Zhang, Zhang, et al., 2019). The central government then imposed stricter regulations on PPP in late 2017, which not only significantly reined in further application of PPP, but also withdrew support for about 40% of the existing PPP projects. China also embarked on an attempt to develop Real Estate Investment Trusts (REITs) in the urban infrastructure sector in 2020. The first batch of nine REITs were issued in June 2021, all of which are based on existing urban infrastructure projects. In addition, during the past two decades, policymakers and academics have debated introducing a property tax (Liu, 2019; Zhang & Hou, 2016; Zhu & Dale-Johnson, 2020). So far, the property tax is only officially levied in Shanghai and Chongqing for a limited share of the housing stock. In October 2021, the central government explicitly stated that more cities would soon join the property tax pilot program, although neither the list of pilot cities nor the details of property tax codes have been publicly released. Generally speaking, the possibility of any or all of these sources entirely replacing the dominant role of land finance in the foreseeable future seems unlikely. Hence, developing viable alternative revenue sources is a final top research and policy priority as part of the reform of the land finance system.

5. Concluding remarks

China's land finance system has played a critical role in the nation's economic life. Selling urban LURs generated over 55 trillion RMB in gross revenues for local governments between 2007 and 2020. In 2018, the land-sales profits received by local governments (once ancillary tax revenues are accounted for) equal over 40% of total budgetary income at the local level. These cash flows played a vital role in underpinning the issuance of local government debt through LGFVs or direct bonds (depending on the time period). Much of the funding collected from these land-related equity- or debt-financing activities was used to fund infrastructure provision of one type or another.

This system functioned effectively in recent decades. In general, it will do so when local governments can make a profit. Rules that allowed local government to “buy low and sell high” helped facilitate the profit, as did a generally rising trend in urban land prices. Note the system will not function as well if land price appreciation flattens or becomes negative, as we have witnessed since 2017. Moreover, recent political reforms that raise the potential for competitive bidders to urban governments or set higher standards on land acquisition compensation to current land holders also seem likely to reduce the viability of the system to those same governments.

²⁰ The number of PPP projects in China outpaced the total number of analogous projects elsewhere in the world in the post-2014 time period.

Concerns about the potential costs of the system have risen in recent years, including the potential misallocation of land resources to serve needs beyond those required to help balance the supply and demand for space in a market. Another negative externality that has received research attention recently is the potential for mispricing in housing markets. The possibility that rural areas are being harmed by the land finance system is also a concern. Useful research into each of these issues exists, but much more remains to be done if we are to pin down these potential costs, so that we can better understand the true net benefit of the land finance system. Beyond these potential negative externalities associated with land finance in China is the broader question of the extent to which it generates moral hazard. Knowing how systemically risky the system might be is difficult without better insight into how different actors view the system as “too big to fail.”

For policymakers in China, our analysis and review provide insights into the ongoing reform of the land finance system. The critical challenge for both the central and local governments is the decreasing feasibility of land finance in funding urban infrastructure investment due to its lower profitability. In other words, the top policy priority is not whether local governments should reduce their reliance on land finance, but how to replace land finance as a crucial funding source for local governments. One option would be to restructure the 1994 tax-sharing agreement, but doing so would likely have important spillover effects on the entire economy because the restructure would change the central government's tax revenue flow. Another possibility is to reduce infrastructure spending now that much urbanization has already occurred. The rise of infrastructure REITs as an alternative funding source would also help take pressure off local governments to possibly over-utilize the land finance system.

For policymakers in other developing or transitional economies interested in implementing government-authorized land-based financing, the major takeaway is the importance of profitability in the system. To reiterate, the success of the land finance system in China (so far) relies on its profitability, which comes from the combination of three factors: first, the institutional underpinnings enabling local governments to keep the costs of acquiring LURs at a relatively low level; second, a rising trend in urban land prices until recently; and third, local governments' spending activities that further fuel future urban land price increases. These three factors will also serve as crucial preconditions if policymakers plan to “replicate” the land finance system in their countries. Meanwhile, these policymakers must also always keep an eye on the potential costs/risks associated with the system. If China is a good guide, most of them will be related to the incentive to maximize the profitability of land finance.

For academic researchers interested in China's land finance system, we have pointed out several valuable research topics in the review and would like to conclude by highlighting three of them here. First, an integrated framework that can quantify both the benefits and costs of the land finance system and, thus, its overall role in China's economy and social development is of great importance. Second, much more theoretical and empirical evidence is needed on how the land finance system affects local governments' borrowing capacities and debt risks. Finally, considering the pivotal role of profitability in the land finance system, we surely need a more thorough understanding of the cost side to the creation of LURs.

Data availability

Data will be made available on request. The affiliated slides can be downloaded via <https://www.sciencedirect.com/journal/china-economic-review/about/announcements#land-finance-in-china-analysis-and-review>.

Acknowledgements

We greatly appreciate the insightful comments from the editor and two anonymous referees. Linzhen Zhu and Qiuyi Wang provided outstanding research assistance. Wu thanks the National Natural Science Foundation of China (No. 71874093 and 72,174,100) for financial support. Gyourko thanks the Research Sponsor Program of the Zell/Lurie Real Estate Center at Wharton for support.

References

- Ambrose, B. W., Deng, Y., & Wu, J. (2015). Understanding the risk of China's local government debts and its linkage with property markets. In SSRN. #2557031.
- Amstad, M., & He, Z. (2020). Chinese bond market and interbank market. In M. Amstad, G. Sun, & W. Xiong (Eds.), *The handbook of China's financial system*. Princeton University Press.
- Anglin, P., Dale-Johnson, D., Gao, Y., & Zhu, G. (2014). Patterns of growth in Chinese cities: Implications of the land lease. *Journal of Urban Economics*, 83, 87–107.
- Bai, C., Hsieh, C., & Song, Z. (2016). The long shadow of China's fiscal expansion. *Brookings Papers on Economic Activity*, 129–181.
- Banerjee, A., Dufo, E., & Qian, N. (2020). On the road: Access to transportation infrastructure and economic growth in China. *Journal of Development Economics*, 145.
- Berrisford, S., Cirolia, L., & Palmer, I. (2018). Land-based financing in sub-Saharan African cities. *Environment and Urbanization*, 30(1), 35–52.
- Blanchard, O., & Shleifer, A. (2001). Federalism with and without political centralization: China versus Russia. *IMF Staff Papers*, 48, 171–179.
- Breznitz, D., & Murphree, M. (2011). *Run of the red queen: Government, innovation, globalization, and economic growth in China*. China: Yale University Press.
- Cai, H., Henderson, J., & Zhang, Q. (2013). China's land market auctions: Evidence of corruption? *RAND Journal of Economics*, 44(3), 488–521.
- Cai, H., & Treisman, D. (2005). Does competition for capital discipline governments? Decentralization, globalization, and public policy. *American Economic Review*, 95(3), 817–830.
- Cai, M., Fan, J., Ye, C., & Zhang, Q. (2021). Government debt, land financing and distributive justice in China. *Urban Studies*, 58(11), 2329–2347.
- Cao, G., Feng, C., & Tao, R. (2008). Local “land finance” in China's urban expansion: challenges and solutions. *China & World Economy*, 16(2), 19–30.
- Chandra, P., & Long, C. (2013). VAT rebates and export performance in China: Firm-level evidence. *Journal of Public Economics*, 102, 13–22.
- Chen, T., & Kung, J. (2016). Do land revenue windfalls create a political resource curse? Evidence from China. *Journal of Development Economics*, 123, 86–106.
- Chen, T., & Kung, J. (2019). Busting the “princelings”: The campaign against corruption in China's primary land market. *Quarterly Journal of Economics*, 134(1), 185–226.
- Chen, W. Y., & Hu, F. (2015). Producing nature for public: Land-based urbanization and provision of public green spaces in China. *Applied Geography*, 58, 32–40.
- Chen, Z., He, Z., & Liu, C. (2020). The financing of local government in China: Stimulus loan wanes and shadow banking waxes. *Journal of Financial Economics*, 137(1), 42–71.

- Deng, Y., Gyourko, J., & Wu, J. (2012). Land and house price measurement in China. In A. Heath, F. Packer, & C. Windsor (Eds.), *Property markets and financial stability*. Bank of International Settlement and Reserve Bank of Australia.
- Deng, Y., Zheng, D., & Ling, C. (2005). An early assessment of residential mortgage performance in China. *Journal of Real Estate Finance and Economics*, 31(2), 117–136.
- Ding, C. (2003). Land policy reform in China: Assessment and prospects. *Land Use Policy*, 20(2), 109–120.
- Ding, C. (2007). Policy and praxis of land acquisition in China. *Land Use Policy*, 24(1), 77–99.
- Ding, C., & Lichtenberg, E. (2011). Land and urban economic growth in China. *Journal of Regional Science*, 51(2), 299–317.
- Ding, C., Niu, Y., & Lichtenberg, E. (2014). Spending preferences of local officials with off-budget land revenues of Chinese cities. *China Economic Review*, 31, 265–276.
- Ding, C., & Wu, Y. (2018). China's land acquisition under marketisation. In F. Plimmer, & W. McCluskey (Eds.), *Routledge handbook of contemporary issues in expropriation*. Routledge.
- Du, J., & Peiser, R. (2014). Land supply, pricing and local governments' land hoarding in China. *Regional Science and Urban Economics*, 48, 180–189.
- Du, J., Thill, J. C., & Feng, C. (2014). Wealth redistribution in urban land development under a dual land system: A case study of Beijing. *Papers in Regional Science*, 93(2), 501–517.
- Fan, J., Mo, J., & Zhang, J. (2015). Housing models and urbanization in China: Empirical research from the perspective of land supply. *Social Science in China*, 4, 44–63 (in Chinese).
- Fan, Z. (2015). The source of land finance: Fiscal pressure or investment incentives. *China Industrial Economics*, 6, 18–31 (in Chinese).
- Fang, H., Gu, Q., Xiong, W., & Zhou, L. (2016). Demystifying the Chinese housing boom. *NBER Macroeconomics Annual*, 30(1), 105–166.
- Fang, H., Wu, J., Zhang, R., & Zhou, L. (2021). *Anti-corruption campaign, stereotyping and the resurgence of the SOEs: Evidence from China's real estate sector* (Working paper).
- Fu, W., & Shen, K. (2012). Equalizing transfer payment and the structure of local government's expenditure. *Economic Research Journal*, 5, 45–57 (in Chinese).
- Geng, B., Zhang, X., Liang, Y., Bao, H., & Skitmore, M. (2018). Sustainable land financing in a new urbanization context: Theoretical connotations, empirical tests and policy recommendations. *Resources, Conservation and Recycling*, 128, 336–344.
- Genschel, P., & Schwarz, P. (2011). Tax competition: A literature review. *Socio-Economic Review*, 9(2), 339–370.
- Girma, S., Gong, Y., Görg, H., & Yu, Z. (2009). Can production subsidies explain China's export performance? Evidence from firm-level data. *Scandinavian Journal of Economics*, 111(4), 863–891.
- Guo, S., & Jiang, Z. (2019). Optimal fiscal policy with land financing in China. *Macroeconomic Dynamics*, 23(7), 2649–2674.
- Guo, S., Liu, L., & Zhao, Y. (2015). The business cycle implications of land financing in China. *Economic Modelling*, 46, 225–237.
- Guo, S., & Shi, Y. (2018). Infrastructure investment in China: A model of local government choice under land financing. *Journal of Asian Economics*, 56, 24–35.
- Han, L., & Kung, J. (2015). Fiscal incentives and policy choices of local governments: Evidence from China. *Journal of Development Economics*, 116, 89–104.
- He, S., Wang, D., Webster, C., & Chau, K. (2019). Property rights with price tags? Pricing uncertainties in the production, transaction and consumption of China's small property right housing. *Land Use Policy*, 81, 424–433.
- He, Y. (2019). The optimal land supply policy of Chinese local government. *Singapore Economic Review*, 1–20.
- Ho, P. (2001). Who owns China's land? Policies, property rights and deliberate institutional ambiguity. *The China Quarterly*, 166, 394–421.
- Holmes, A., & Lancaster, D. (2019). China's local government bond market. *RBA Bulletin* (June), 179–194.
- Hsu, W., Li, X., Tang, Y., & Wu, J. (2017). Determinants of urban land supply in the People's Republic of China: How do political factors matter? *Asian Development Review*, 34(2), 152–183.
- Hu, F., & Qian, J. (2017). Land-based finance, fiscal autonomy and land supply for affordable housing in urban China: A prefecture-level analysis. *Land Use Policy*, 69, 454–460.
- Huang, Z., & Du, X. (2017). Government intervention and land misallocation: Evidence from China. *Cities*, 60, 323–332.
- Huang, Z., & Du, X. (2018). Holding the market under the stimulus plan: Local government financing vehicles' land purchasing behavior in China. *China Economic Review*, 50, 85–100.
- Jacoby, H., Li, G., & Rozelle, S. (2002). Hazards of expropriation: Tenure insecurity and investment in rural China. *American Economic Review*, 92(5), 1420–1447.
- Jia, J. (2014). Tax incentives, corporate effective average tax rate, and firm entry. *Economic Research Journal*, 7, 94–109 (in Chinese).
- Jia, R., Kudamatsu, M., & Seim, D. (2015). Political selection in China: The complementary roles of connections and performance. *Journal of the European Economic Association*, 13(4), 631–668.
- Jin, H., Qian, Y., & Weingast, B. (2005). Regional decentralization and fiscal incentives: Federalism, Chinese style. *Journal of Public Economics*, 89(9–10), 1719–1742.
- Kuang, W. (2014). The residential mortgage delinquency risks in China. *Economic Research Journal*, 1, 155–168 (in Chinese).
- Lam, R., & Wang, J. (2018). China's local government bond market. In *IMF working paper WP/18/219*.
- Li, H., & Zhou, L. (2005). Political turnover and economic performance: The incentive role of personnel control in China. *Journal of Public Economics*, 89(9–10), 1743–1762.
- Li, K., Qin, Y., & Wu, J. (2020). Recent housing affordability in urban China: A comprehensive overview. *China Economic Review*, 59, Article 101362.
- Li, W., & Zheng, M. (2016). Is it substantive innovation or strategic innovation? Impact of macroeconomic policies on micro-enterprises' innovation. *Economic Research Journal*, 4, 60–73 (in Chinese).
- Li, X., Hong, G., & Huang, L. (2013). The mystery of land finance growth in China: Tax sharing reform, strategic interaction of land finance. *China Economic Quarterly*, 12(4), 1141–1160 (in Chinese).
- Li, X., Zhang, W., & Chen, S. (2020). Local cooperation, collusion and institutional innovation under strict land-use regulation system: Evidence from transferable land development rights policy in Zhejiang Province. *China Economic Quarterly*, 19(3), 797–824 (in Chinese).
- Li, Z., Wu, M., & Chen, B. R. (2017). Is road infrastructure investment in China excessive? Evidence from productivity of firms. *Regional Science and Urban Economics*, 65, 116–126.
- Lichtenberg, E., & Ding, C. (2008). Assessing farmland protection policy in China. *Land Use Policy*, 25(1), 59–68.
- Lichtenberg, E., & Ding, C. (2009). Local officials as land developers: Urban spatial expansion in China. *Journal of Urban Economics*, 66(1), 57–64.
- Lin, G. (2014). China's landed urbanization: Neoliberalizing politics, land commodification, and municipal finance in the growth of metropolises. *Environment and Planning A*, 46(8), 1814–1835.
- Lin, G., & Yi, F. (2011). Urbanization of capital or capitalization on urban land? Land development and local public finance in urbanizing China. *Urban Geography*, 32(1), 50–79.
- Lin, Y., Qin, Y., Yang, Y., & Zhu, H. (2020). Can price regulation increase land-use intensity? Evidence from China's industrial land market. *Regional Science and Urban Economics*, 81, Article 103501.
- Lisk, F. (2013). "land grabbing" or harnessing of development potential in agriculture? East Asia's land-based investments in Africa. *The Pacific Review*, 26(5), 563–587.
- Liu, C., & Xiong, W. (2020). China's real estate market. In M. Amstad, G. Sun, & W. Xiong (Eds.), *The handbook of China's financial system*. Princeton University Press.
- Liu, J., & Sun, M. (2014). The occurrence of group events regarding rural land expropriation and its governance. *Journal of Public Management*, 11, 101–113.
- Liu, R., Wong, T., & Liu, S. (2012). Peasants' counterplots against the state monopoly of the rural urbanization process: Urban villages and "small property housing" in Beijing, China. *Environment and Planning A*, 44(5), 1219–1240.
- Liu, S., Wang, Z., Zhang, W., & Xiong, X. (2020). The exhaustion of China's "land-driven development" mode: An analysis based on threshold regression. *Management World*, 6, 80–119 (in Chinese).
- Liu, X., Zhao, C., & Song, W. (2017). Review of the evolution of cultivated land protection policies in the period following China's reform and liberalization. *Land Use Policy*, 67, 660–669.
- Liu, Y., Fan, P., Yue, W., & Song, Y. (2018). Impacts of land finance on urban sprawl in China: The case of Chongqing. *Land Use Policy*, 72, 420–432.
- Liu, Y., & Martínez-Vázquez, J. (2014). Interjurisdictional tax competition in China. *Journal of Regional Science*, 54(4), 606–628.

- Liu, Z. (2019). Land-based finance and property tax in China. *Area Development and Policy*, 4(4), 367–381.
- Liu, Z., Wang, P., & Zha, T. (2013). Land-price dynamics and macroeconomic fluctuations. *Econometrica*, 81(3), 1147–1184.
- Long, H. (2014). Land use policy in China: Introduction. *Land Use Policy*, 40, 1–5.
- Long, X., Zhu, Y., Cai, W., & Li, S. (2014). An empirical analysis of spatial tax competition among counties based on spatial econometric models. *Economic Research Journal*, 8, 41–53 (in Chinese).
- Lu, S., Yao, Y., & Wang, H. (2022). Testing the relationship between land approval and promotion incentives of provincial top leaders in China. *Journal of Chinese Political Science*, 27(1), 105–131.
- Lv, W., & Wang, W. (2021). China's inclusive public fiscal system: A study based on non-normative fiscal revenue. *Social Science in China*, 3, 46–64 (in Chinese).
- Maskin, E., Qian, Y., & Xu, C. (2000). Incentives, information, and organizational form. *Review of Economic Studies*, 67(2), 359–378.
- Mei, D., Cui, X., & Wu, Y. (2018). House price fluctuation, land finance and business cycle in China. *Economic Research Journal*, 1, 35–49 (in Chinese).
- Mei, D., & Wen, X. (2020). External shocks, land finance and macroeconomic policy dilemmas. *Economic Research Journal*, 5, 66–82 (in Chinese).
- Mo, J. (2018). Land financing and economic growth: Evidence from Chinese counties. *China Economic Review*, 50, 218–239.
- Nguyen, H., Duan, J., & Zhang, G. (2018). Land politics under market socialism: The state, land policies, and rural–urban land conversion in China and Vietnam. *Land*, 7(2), 51.
- Nguyen, T., Krabben, v.d. E., Musil, C., & Le, D. (2018). Land for infrastructure in Ho Chi Minh City: Land-based financing of transportation improvement. *International Planning Studies*, 23(3), 310–326.
- Ong, L. (2014). State-led urbanization in China: Skyscrapers, land revenue and "concentrated villages". *China Quarterly*, 217, 162–179.
- Pan, F., Zhang, F., Zhu, S., & Wójcik, D. (2017). Developing by borrowing? Inter-jurisdictional competition, land finance and local debt accumulation in China. *Urban Studies*, 54(4), 897–916.
- Pan, J., Huang, J., & Chiang, T. (2015). Empirical study of the local government deficit, land finance and real estate markets in China. *China Economic Review*, 32, 57–67.
- Peterson, G. (2008). *Unlocking land values to finance urban infrastructure*. The World Bank.
- Que, W., Zhang, Y., & Schulze, G. (2019). Is public spending behavior important for Chinese official promotion? Evidence from city-level. *China Economic Review*, 54, 403–417.
- Rithmire, M. (2017). Land institutions and Chinese political economy: Institutional complementarities and macroeconomic management. *Politics and Society*, 45(1), 123–153.
- Roback, J. (1982). Wages, rents, and the quality of life. *Journal of Political Economy*, 90(6), 1257–1278.
- Shao, Z., Spit, T., Jin, Z., Bakker, M., & Wu, Q. (2018). Can the land use master plan control urban expansion and protect farmland in China? A case study of Nanjing. *Growth and Change*, 49(3), 512–531.
- Shen, C., Jin, J., & Zou, H. (2012). Fiscal decentralization in China: History, impact, challenges and next steps. *Annals of Economics and Finance*, 13(1), 1–51.
- Sun, X., & Zhou, F. (2013). Land finance and the tax-sharing system: An empirical explanation. *Social Science in China*, 4, 40–59 (in Chinese).
- Tan, M. (2014). Strict control and incentive: Evolution of the policy of linking decrease of arable land with increase of construction land and its implication. *Social Science in China*, 7, 125–142 (in Chinese).
- Tao, R., Lu, X., Su, F., & Wang, H. (2009). China's transition and development model under evolving regional competition patterns. *Economic Research Journal*, 7, 21–33 (in Chinese).
- Tao, R., Su, F., Liu, M., & Cao, G. (2010). Land leasing and local public finance in China's regional development: Evidence from prefecture-level cities. *Urban Studies*, 47(10), 2217–2236.
- Tian, W., Wang, Z., & Zhang, Q. (2020). A great new world? China's industrial land market post-2007. In *SSRN working paper #3573226*.
- Tian, W., Yu, J., & Gong, L. (2019). Promotion incentives and industrial land leasing prices: A regression discontinuity design. *Economic Research Journal*, 10, 89–105 (in Chinese).
- Vyas, I., Vyas, H., & Mishra, A. (2022). Land-based financing of cities in India: A study of Bengaluru and Hyderabad and directions for reforms. *Journal of Public Affairs*, 22(1), Article e2378.
- Wang, D., Zhang, L., Zhang, Z., & Zhao, S. (2011). Urban infrastructure financing in reform-era China. *Urban Studies*, 48(14), 2975–2998.
- Wang, F., Xiong, W., Zhong, N., & Zhang, M. (2020). The alienation of PPP financing under strict control of local government debt: Analysis based on promotion incentive. *China Economic Quarterly*, 19(3), 1103–1122 (in Chinese).
- Wang, H., & Tao, R. (2009). The "Zhejiang model" of land development rights transferring and trading. *Management World*, 8, 39–52 (in Chinese).
- Wang, J., Skidmore, M., Wu, Q., & Wang, S. (2020). The impact of a tax cut reform on land finance revenue: Constrained by the binding target of construction land. *Journal of Urban Affairs*, 1–30. forthcoming.
- Wang, J., Wu, Q., Yan, S., Guo, G., & Peng, S. (2020). China's local local governments breaking the land use planning quota: A strategic interaction perspective. *Land Use Policy*, 92, Article 104434.
- Wang, P., Shao, Z., Wang, J., & Wu, Q. (2021). The impact of land finance on urban land use efficiency: A panel threshold model for Chinese provinces. *Growth and Change*, 52(1), 310–331.
- Wang, Q., Wu, J., & Wu, S. (2021). *Falling export and rising land supply: Government's responses to export shock in China* (Working paper).
- Wang, R., & Hou, J. (2021). Land finance, land attracting investment and housing price fluctuations in China. *International Review of Economics and Finance*, 72, 690–699.
- Wang, X., He, M., & Gao, Y. (2006). The empirical study of the land revenue allocation in agricultural land transfer. *Management World*, 5, 62–68 (in Chinese).
- Wang, X., Li, K., & Wu, J. (2020). House price index based on online listing information: The case of China. *Journal of Housing Economics*, 50, Article 101715.
- Wang, X., Zhang, L., & Xu, X. (2014). Local government land lease, infrastructure investment and local economic growth. *China Industrial Economics*, 7, 31–43 (in Chinese).
- Wang, Y., & Hui, E. (2017). Are local governments maximizing land revenue? Evidence from China. *China Economic Review*, 43, 196–215.
- Wang, Y., Wang, Y., & Wu, J. (2009). Urbanization and informal development in China: Urban villages in Shenzhen. *International Journal of Urban and Regional Research*, 33(4), 957–973.
- Wei, Y. (2015). Zone fever, project fever: Development policy, economic transition, and urban expansion in China. *Geographical Review*, 105(2), 156–177.
- Wilson, J. (1999). Theories of tax competition. *National Tax Journal*, 269–304.
- Wu, G., Feng, Q., & Li, P. (2015). Does local governments' budget deficit push up housing prices in China? *China Economic Review*, 35, 183–196.
- Wu, J., Deng, Y., Huang, J., Morck, R., & Yeung, B. (2014). Incentives and outcomes: China's environmental policy. *Capitalism and Society*, 9(1), 1–41.
- Wu, J., Deng, Y., & Liu, H. (2014). House price index construction in the nascent housing market: The case of China. *The Journal of Real Estate Finance and Economics*, 48(3), 522–545.
- Wu, J., Gyourko, J., & Deng, Y. (2012). Evaluating conditions in major Chinese housing markets. *Regional Science and Urban Economics*, 42(3), 531–543.
- Wu, J., Gyourko, J., & Deng, Y. (2015). Real estate collateral value and investment: The case of China. *Journal of Urban Economics*, 86, 43–53.
- Wu, J., Gyourko, J., & Deng, Y. (2016). Evaluating the risk of Chinese housing markets: What we know and what we need to know. *China Economic Review*, 39, 91–114.
- Wu, W. (2010). Urban infrastructure financing and economic performance in China. *Urban Geography*, 31(5), 648–667.
- Wu, Y., Zhang, X., Skitmore, M., Song, Y., & Hui, E. (2014). Industrial land price and its impact on urban growth: A Chinese case study. *Land Use Policy*, 36, 199–209.
- Xu, C. (2011). The fundamental institutions of China's reforms and development. *Journal of Economic Literature*, 49(4), 1076–1151.
- Xu, Z., Huang, J., & Jiang, F. (2017). Subsidy competition, industrial land price distortions and overinvestment: Empirical evidence from China's manufacturing enterprises. *Applied Economics*, 49(48), 4851–4870.
- Ye, L., & Wu, A. (2014). Urbanization, land development, and land financing: Evidence from Chinese cities. *Journal of Urban Affairs*, 36, 354–368.
- Yew, C. P. (2012). Pseudo-urbanization? Competitive government behavior and urban sprawl in China. *Journal of Contemporary China*, 21(74), 281–298.

- Yue, W., Liu, Y., & Fan, P. (2013). Measuring urban sprawl and its drivers in large Chinese cities: The case of Hangzhou. *Land Use Policy*, 31, 358–370.
- Zhang, B., Zhang, L., Wu, J., & Wang, S. (2019). Factors affecting local governments' public-private partnership adoption in urban China. *Sustainability*, 11(23), 6831.
- Zhang, J., Gao, Y., Fu, Y., & Zhang, H. (2007). Why does China enjoy so much better physical infrastructure? *Economic Research Journal*, 3, 4–18 (in Chinese).
- Zhang, L., Gao, Y., & Xu, X. (2013). Land sales with collusion between local governments and firms. *Management World*, 12, 43–62 (in Chinese).
- Zhang, L., Liu, J., & Nian, Y. (2018). Land market fluctuations and local government debts: Evidence from the municipal investment bonds in China. *China Economic Quarterly*, 17(3), 1103–1126 (in Chinese).
- Zhang, L., Wei, H., & Ou, D. (2019). Land financing, local debt, and leverage: Analysis of the land mortgage behavior of local government financing platforms. *Journal of Financial Research*, 3, 92–110 (in Chinese).
- Zhang, P., & Hou, Y. (2016). A model for the ability-to-pay index of China's real property tax, tax burden distribution and redistributive effects. *Economic Research Journal*, 51(12), 118–132 (in Chinese).
- Zhang, R., Sun, W., Li, H., & Wu, J. (2021). Land financing, corporate tax subsidy, and investment attraction. *China Journal of Economics*, 8(4), 57–86 (in Chinese).
- Zhang, S., Gao, Y., Feng, Z., & Sun, W. (2015). PPP application in infrastructure development in China: Institutional analysis and implications. *International Journal of Project Management*, 33(3), 497–509.
- Zhang, X., Geltner, D., & de Neufville, R. (2018). System dynamics modeling of Chinese urban housing markets for pedagogical and policy analysis purposes. *The Journal of Real Estate Finance and Economics*, 57(3), 476–501.
- Zhang, Z., & Xiong, Y. (2020). Infrastructure financing. In M. Amstad, G. Sun, & W. Xiong (Eds.), *The handbook of China's financial system*. Princeton University Press.
- Zhao, F., Wang, C., & Gong, L. (2017). Land finance and Chinese macroeconomic fluctuations. *Economic Research Journal*, 12, 46–61 (in Chinese).
- Zhao, R., Chen, J., Feng, C., & Zhong, S. (2020). The impact of anti-corruption measures on land supply and the associated implications: The case of China. *Land Use Policy*, 95, Article 104605.
- Zheng, S., Long, F., Fan, C. C., & Gu, Y. (2009). Urban villages in China: A 2008 survey of migrant settlements in Beijing. *Eurasian Geography and Economics*, 50(4), 425–446.
- Zheng, S., Sun, W., Wu, J., & Wu, Y. (2014). Infrastructure investment, land leasing and real estate price: A unique financing and investment channel for urban development in Chinese cities. *Economic Research Journal*, 8, 75–81 (in Chinese).
- Zhou, F. (2006). A decade of tax-sharing: The system and its evolution. *Social Science in China*, 6, 100–115 (in Chinese).
- Zhou, F. (2007). The role of government and farmers in land development and transfer. *Sociological Studies*, 22(1), 49–82.
- Zhu, G., & Dale-Johnson, D. (2020). Transition to the property tax in China: A dynamic general equilibrium analysis. *Journal of Urban Economics*, 115, Article 103214.
- Zou, Y., & Zhao, W. (2018). Making a new area in Xiong'an: Incentives and challenges of China's "millennium plan". *Geoforum*, 88, 45–48.
- Zuo, X., & Yin, X. (2013). Monopoly of the primary market land and the provision of local public goods. *China Economic Quarterly*, 12(2), 693–718 (in Chinese).