Urbanisation and Fiscal Risks in China

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Declaration

This dissertation is the result of my own work, and no part of it is the outcome of work done in collaboration, except as declared in the Preface and specified in the text.

It is not substantially the same as any other work that I have submitted or is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other university or similar institution, except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted or is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other university or similar institution, except as declared in the Preface and specified in the text.

It does not exceed the prescribed word limit for the relevant Degree Committee.

No material from the research conducted for this thesis has been published.

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Liangqi Wu

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Abstract

China has witnessed rapid urbanisation over the past three decades. It has been generally successful in mobilising resources and providing the infrastructure that cities need to grow their economies. The central government has played a major role in China's urbanisation through setting the overall development direction, land granting, and policy formulation. However, the responsibilities of infrastructure financing have been gradually shifted to local governments, and consequently, local budgetary systems face substantial funding challenges. While the decentralised structure of Chinese politics provides strong incentives for local officials to take the lead in urbanising China, fiscal institutions place heavy financial burdens on local governments. This thesis studies two major problems that arose from China's urbanisation process. In terms of theoretical contribution, the thesis both advances the theories of Chinese style fiscal federalism and provides new evidence to enhance its explaining power.

The first study is on China's infrastructure financing and local government debt. It finds that local government debt for infrastructure is positively affected by the land demand from the private sector. Furthermore, land finance is positively related to the level of local government debt. The results reveal that the visible hand of local governments works creatively to meet infrastructure development targets handed down by the 'iron hand' of the central government.

The second study is on local government financing vehicles' (LGFVs) borrowing costs and land finance. It finds that local governments with higher land leasing revenue could bring down the borrowing costs of local LGFVs, while a higher ratio of land revenue to fiscal revenue would raise LGFVs' borrowing costs. A booming local land market would push up the value of land assets held by LGFVs and therefore strengthen its 'collateral channel', enabling LGFVs to borrow at a lower cost. The thesis' findings can help investors better identify the risks associated with LGFV bonds and enable local government borrowing at a lower cost.

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Chapter 1

Introduction

The recent history of China has been dominated by massive urbanisation. As of 2020, more than 60% of the total population lived in cities, compared with only 17.9% in 1978. China's urbanisation is pro-growth, with resources being mobilised and geared towards building infrastructure (buildings, roads, and industrial and post-industrial services like public utilities). This large-scale investment in infrastructure promotes agglomeration in settlement patterns and makes domestic demand the engine of growth. Two key drivers of China's urbanisation have been fiscal decentralisation to local governments and a GDP-based performance evaluation system, which has seen funds awarded from the centre on the basis of economic measures of development. These two institutional arrangements have encouraged experimentation locally, setting up competition between cities for resources. In turn, this competition has stoked local initiatives in appraising local leaders' success against national development goals.

Land is the main source of payment for China's urbanisation. The combination of China's system of land tenure and its public finance system, including local governments' cheap access to land, monopoly power in land supply, and unbalanced revenue and expenditure assignments, strongly incentivises local governments to generate local revenue from land sales. While revenue from land sales provides a big part of their revenues, local governments also heavily rely on debt backed by future land sales, which are offered through local government financing vehicles (LGFVs) to circumvent restrictions on their borrowing. These practices have contributed to the unsustainable financing of growth in cities, growing fiscal risk, unsound urban growth, and corruption in land sales.

This thesis carried out two studies. The first answers the call for further research into infrastructure financing. It develops a theoretical model to investigate the complex relationship between the issuance of local government debt for infrastructure financing, land finance, and land demand from the private sector in China. Using LGFVs' accounting data, I find that the 'visible hand' of local governments works creatively to meet infrastructure development targets handed down by the 'iron hand' of the central government. Further, local governments are more effective when they consider private sector activity in their debt issuance decisions. By studying the two sources of finance in a unified framework, this thesis provides reliable and practical evidence of how infrastructure financing works in China.

Rapid urbanisation and its huge financing demands drive up the size of China's local government debt. According to the Bank for International Settlements, China's debt to GDP ratio reached 257% in 2017[1], higher than the United States' 152% and more than that of most emerging economies. In terms of debt growth, McKinsey (2015)[2] estimated that China's total debt grew from US\$2.1 trillion to US\$28.2 trillion between 2000 and 2014, an increase of US\$26.1 trillion, greater than the GDP of the US, Japan, and Germany combined. China's total per capita debt to per capita annual income ratio is 11.5, far larger than that of US (7.5) and Brazil (8.1), and in line with that of Greece (11.8) (Ansar *et al.* 2016).

This magnitude of China's local government debt has attracted the concern of both academia and international organisations. The economist Paul Krugman[3] warned that China's unsustainable level of investment is driven by a dangerous level domestic debt. IMF's recent financial stability report (issued by the end of 2017) also suggested that the volume of China's local government debt is on a dangerous trajectory according to the international experience. The report said '*the rapid increase of corporate debt (most of which were issued by Chinese sub-national government's off-budget companies) in China needs to be properly analysed, which has increased the complexity of the financial system and endangered financial stability*'.[4] International rating agencies like Moody[5] and S&P[6] also take stock of the accumulating risks associated with mounting debt, downgrading China's sovereign rating from Aa3 to A1 and from A+ to AA- respectively, and changing their outlooks from stable to negative. All these warnings show that China's debt problem is serious, urgent, and deserving of systematic study.

The second study is on the relationship between the Chinese land market and LGFVs' borrowing costs. While the vigour of local land markets is an important factor in determining LGFV bond yields, the specific mechanism of how land finance affects LGFVs' borrowing costs is not fully understood. Using LGFV bond data and city-level land market data between 2011 and 2019, I find a negative relationship between local governments' land leasing revenue and LGFVs' borrowing costs, and a positive relationship between local governments' reliance

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1 https://www.bis.org/statistics/tables_f.pdf

2 https://www.mckinsey.com/~/media/McKinsey/Global%20Themes/Employment%20and%20Growth/Debt%20and%20not%20much%20deleveraging/MGI%20Debt%20a nd%20not%20much%20deleveragingFullreportFebruary2015.ashx

3 http://uk.businessinsider.com/paul-krugman-interview-china-greece-brexit-2016-2?r=US&IR=T

4 https://www.imf.org/en/News/Articles/2017/12/07/pr17469-china-imf-executive-board-concludes-financial-sector-stability-assessment

5 https://www.moodys.com/research/Moodys-downgrades-Chinas-rating-to-A1-from-Aa3-and-changes--PR_366139

6 https://www.bloomberg.com/news/articles/2017-09-21/s-p-lowers-china-s-rating-to-a-from-aa-says-outlook-stable

on land leasing revenue and their LGFV bond yields. A negative relationship holds when land assets can be held as collateral for financing growth: when local land prices are high, LGFVs' borrowing costs fall on account of the appreciation of the underlying collateral. This study demonstrates hitherto unacknowledged determinants of LGFVs' borrowing costs. Its policy implications should guide local governments in reducing their borrowing costs and steering investments away from risky and wrongly priced development. Specifically, the findings should enable bond investors to identify the default risks in LGFV bonds.

The rest of the thesis is organised as follows. Chapter 2 presents general background information and introduces the literature dealing with China's urbanisation. I systematically review the institutional arrangements for the country's system of land tenure, local and central taxation, and the political relationships between central and local governments. Chapter 3 presents the thesis' theoretical framework. It introduces two competing theories of how local government officials are motivated to behave before critically evaluating these frameworks. Chapter 4 explores local governments' use of LGFVs to finance infrastructure. Chapter 5 examines the effect of land finance on LGFVs' borrowing costs. Chapter 6 examines how local corruption leads to higher borrowing costs for firms. Chapter 7 concludes the thesis.

Chapter 2

Background Information and Literature Review

2.1 Overview

This chapter provides background information about China and conducts a general literature review. China has urbanised on the basis of intertwined arrangements and institutions for land tenure, tax, and political control, and through the instruments and incentives framed by those arrangements. By presenting and analysing these institutional forms and their problems, this chapter builds an analytical foundation for its theoretical framework in Chapter 3 and the three inter-connected papers from Chapter 4 to Chapter 6.

This chapter is organised as follows. Section 2.2.1 traces China's progress in urbanisation and provides an account of its driving forces. Section 2.2.2 describes China's institutional forms for land tenure and the different roles the central and local governments play in the land market. Section 2.2.3 discusses the fiscal institutions, explaining how LGFVs have been able to develop so fast in the last two decades. Section 2.2.4 introduces the volume and structure of China's local government debt and its associated applications. Section 2.2.5 describes China's political system and the associations between corruption and land. Concluding the chapter, Section 2.3 identifies three research questions arising from the specifics of China's urbanisation.

2.2 Background Information and General Literature

2.2.1 China's Urbanisation: Its Driving Forces

Urbanisation in China

Since the 1980s, China has experienced rapid urbanisation characterised by large migration from rural to urban areas, the rapid expansion of cities and construction of new city districts (Zheng *et al.* 2014). For example, by 2019, 60% of China's population lived in cities, compared with only 17.9% in 1978[7]. From 1984 to 2019, the area of land under urban construction

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7 China Statistical Year Book, 2020, National Bureau of Statistics of China (http://www.stats.gov.cn/tjsj/ndsj/2020/indexch.htm)

increased from 8,842 km^2 to 60,312.45 km^2, an annual growth rate of 16.63%. The country had 653 large cities in 2010, up from 69 in 1947 and 223 in 1980; it had 100 cities with one million population or more, versus 37 in the United States and 32 in India (Hamnett 2020).

Figure 2.1 shows that the share of China's total population living in cities has increased steadily from less than 20% in 1978 to 60.3% in 2019, amounting to an increase of more than 600 million people. However, the annual urban population growth rate shows a different pattern. Due to the 'Cultural Revolution' between 1966 and 1976 and the 'Up to the Mountains and Down to the Countryside Movement Policy' or 'Sent-Down Policy' between the 1960s and 1970s, more than 17 million young city residents were forced to live in rural areas for up to 12 years (Honig & Zhao 2015). Between 1978 and 1982, the 'reform and opening up policy' led to a dramatic rise in the annual growth rate of the urban population, which increased from around 1% to above 5%. After 1982, this figure began to fall, roughly settling at 2.29% in 2019. However, this rate (in part a measure of countryside-to-city migration) is still significantly higher than the world's average year-on-year urban population growth rate of 1.88%.

Figure 2.1 The Growth of China's urban population (in percentage terms), 1960-2020
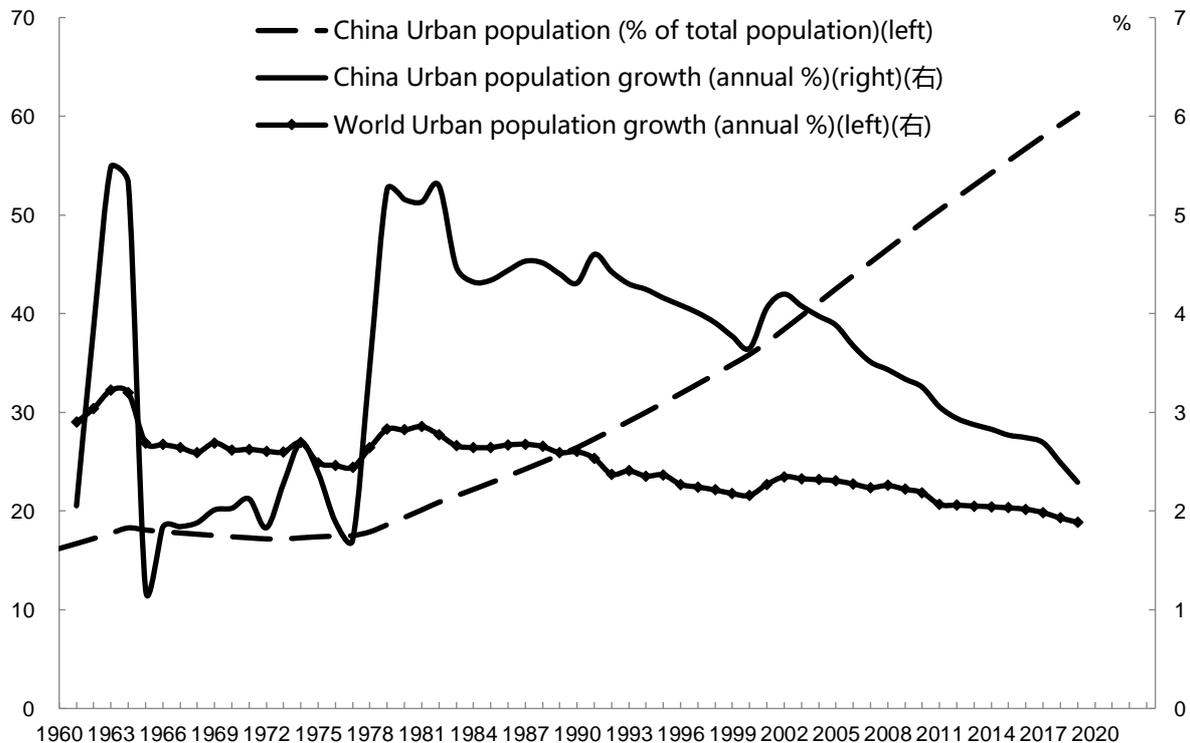
Source: World Bank (2010)

Although China's urbanisation is unprecedented in brute terms, the increase in its urbanisation rate is not an outlier when compared to that of other countries (Figure 2.2). In fact, the change in China's urbanisation rate has been lower than that of Japan and South Korea at comparable stages of their development, though higher than that of the United States and the United Kingdom. Moreover, despite rapid urbanisation, the share of the urban population has broadly kept pace with expectations given China's per capita income.

Figure 2.2 China's urbanisation compared with its international rivals
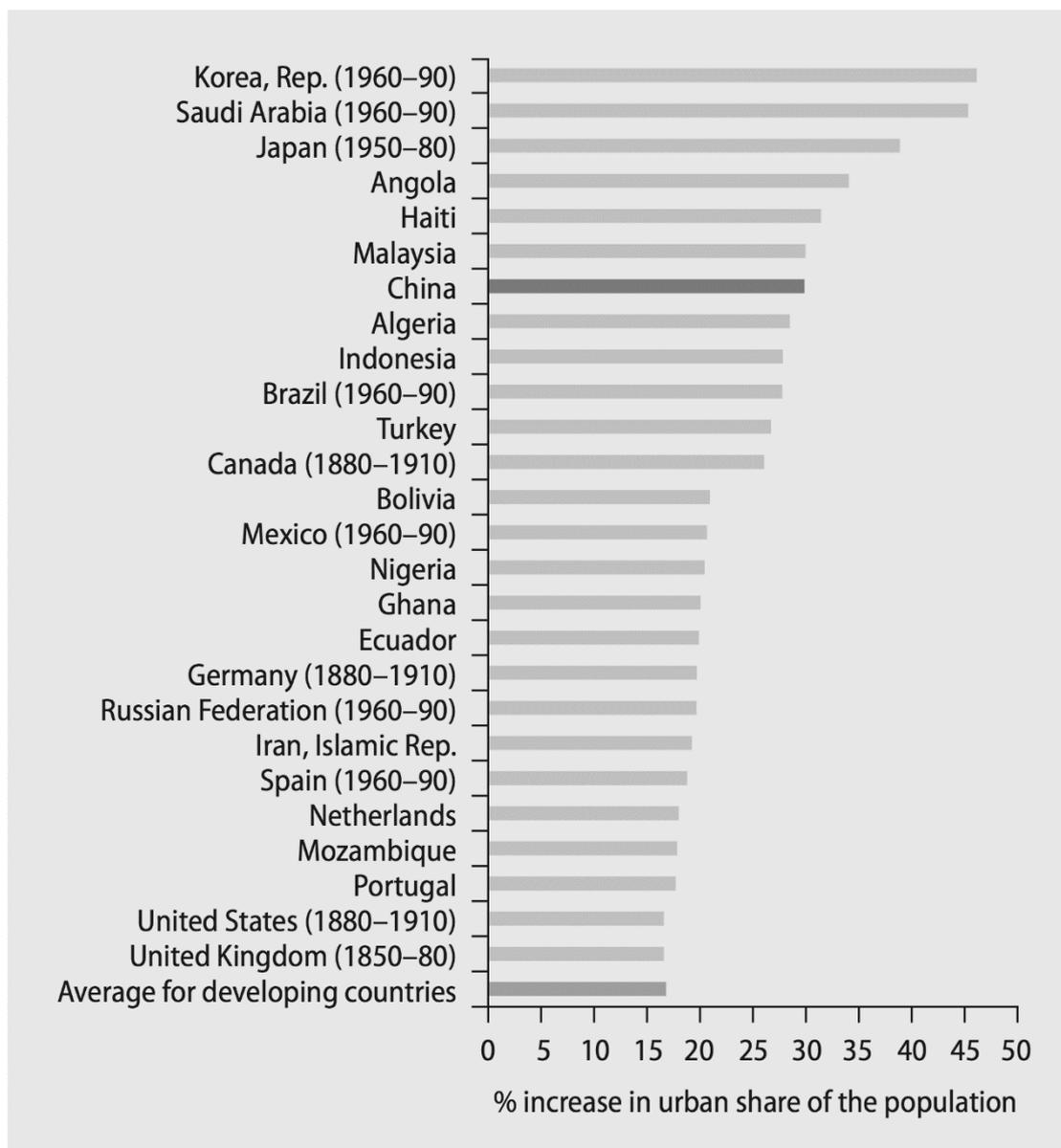
Note: It should be noted that the urbanisation rates on which this figure is based are not fully comparable, as definitions of urban areas differ from country to country. Source: World Bank staff calculations based on World Development Indicators and Bairoch and Goertz (1986).

Figure 2.3 shows trends in the size of the urban population and extent of built-up areas in China. China's rate of urban construction has outstripped its demographic urban population growth. The coefficient of elasticity for urban land (the rate of increase in the area of land under urban construction, divided by the rate of urban population increase) is 1.85 for the period from 2000 to 2010. While this figure dropped marginally to 1.73 for the period between 2010 to 2019, the growth of China's urban areas remains about twice as fast as the growth in the country's urban population. The area of cities at the prefectural level (i.e. cities equivalent to large regional municipalities in the West) expanded by 70.1% between 2001 and 2007, whereas the associated population swelled by no more than 30% (Gao, 2011)[8]. Not surprisingly, Fernando (2010) reports an estimated around 64 million vacant apartments in China, space in buildings that could have housed as much as 15% of China's 2009 population[9]. This is a warning sign of over-urbanisation, the consequence of over-land-conversion by local governments. Their control of land use would seem to be a distorted market mechanism, giving rise to the phenomenon of an over-supply of 'ghost towns' (Zheng *et al.* 2014) and to development zone 'fever' (Zhang 2011; Herlevi 2017). More importantly, the increasing number of land disputes between local governments and rural farmers (Wu & Heerink 2016) has provoked social unrest (Meligrana *et al.* 2011) and an erosion of trust between villagers and local authorities (Cui *et al.* 2015). This urbanisation model is not sustainable, neither economically nor politically (Zheng *et al.* 2014).

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8 Gao, Y., Urbanization appears to be a great leap forward (in Chinese), 2011, (http://society.people.com.cn/GB/1063/13909007.html)

9 Fernando, There are now enough vacant properties in China to house over half of America, 2010, (http://www.businessinsider.com/there-are-now-enough-vacant-properties-in-china-to-house-over-half-of-america-2010-9?IR=T)

Figure 2.3 The trends of urban population and built-up area, 1997-2019
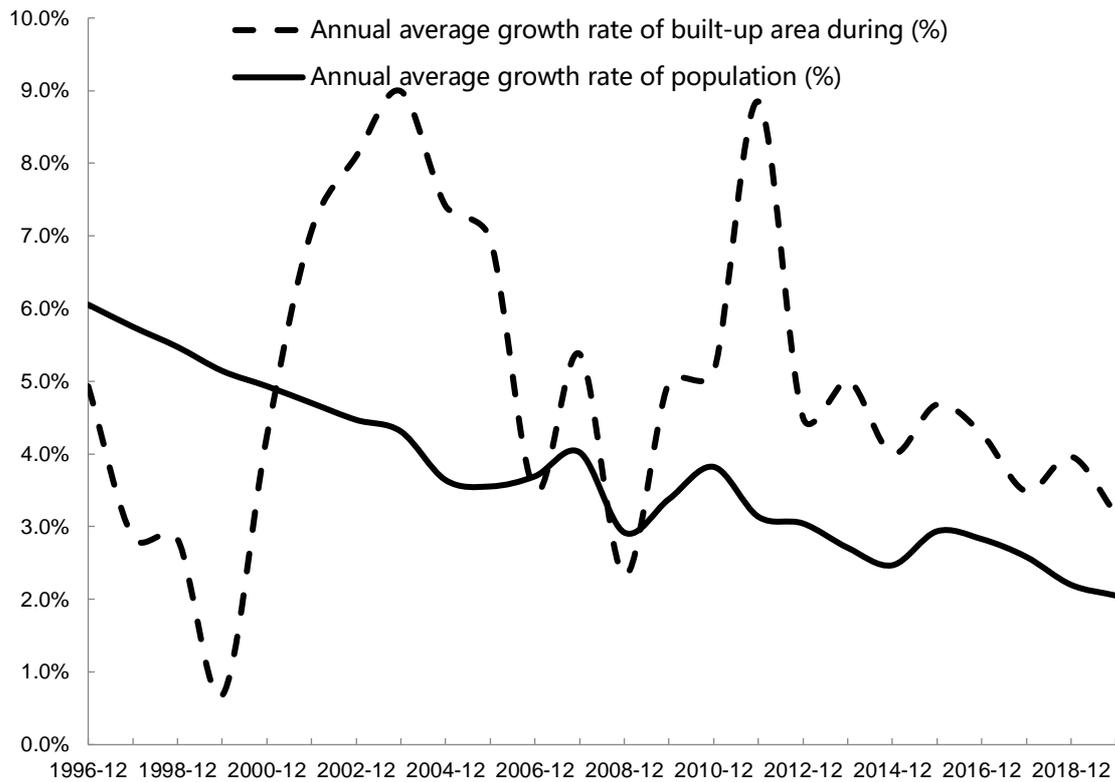
Source: China Statistical Yearbook, National Bureau of Statistics of China

The Driving Forces of Urbanisation

Scholars have understood urbanisation in China in different ways. Urbanisation has been associated with industrialisation, population or economic growth, and the upward trend in personal income (Deng *et al.* 2008, 2010). For example, Deng *et al.* (2008) find that urban land tends to expand by 3% when China's economy, measured by gross domestic product, grows 10%. Scholars have also found that demographic urbanisation in China has facilitated urban land expansion, though it has not been a 'proactive determinant' (Ma 2002; Deng *et al.* 2020).

Recent studies found that China's rapid urbanisation is not simply the passive outcome of economic growth but has been actively pursued by local governments as a means of securing revenue. Due to a series of changes in fiscal arrangement between central and local governments since 1994, the central government has claimed an increasing share of tax revenues, while responsibility for local expenditure has been decentralised. As a result, local governments have shifted their efforts from supporting local enterprise to 'urbanising' China (Kung 2013). The studies advancing this argument tend to see local governments as a 'rational

revenue maximiser' (Cao *et al.* 2008; Tao *et al.* 2010; Ye & Wang 2013); to bridge revenue shortfalls, government has grabbed land and seized land-related revenue primarily by three means. First, they have achieved forms of lump-sum land revenue from leasing land to residential and commercial users. Second, they have set up a sustainable source of taxable profits by attracting industrial enterprise to low-prices they have offered (Tao *et al.* 2010). Third, they adopted the debt-land leverage strategy to use land assets as collateral to borrow from the financial market through LGFVs.

However, in determining whether or not 'devolution of responsibility leads to land finance', as is popularly believed, the empirical evidence is mixed. At a provincial level, Wu *et al.* (2015b) find a significant positive relationship between land premium revenues and a region's degree of fiscal decentralisation (both in terms of revenue and expenditure).Ye and Wang (2013), however, find that on the sub-provincial level, no significant relationship holds between responsibility for expenditures and an authority's reliance on land finance. Instead, a significant negative relationship obtained between the degree of revenue decentralisation shows how far an authority engages in land finance. Then again, Wang and Ye (2016), using a prefectural level city data set, would appear to reverse their earlier conclusions in finding a positive correlation between the devolution of responsibility and land finance. Other Chinese publications, like those of Liu and Wu, find revenue decentralisation has no impact on land finance using a prefectural-level city dataset, while expenditure decentralisation does underlie cities' land-based finance. The result is a mixed picture with regard to any claim that 'fiscal arrangements concerning the decentralisation of welfare spending has prompted local governments' reliance on land finance'.

2.2.2 Forms of Land Tenure: Central-Local Government Relations

China's Land Tenure

China is characterised by a unique dual urban-rural land system, in which the government distinguishes urban land owned by the state from rural land owned by village collectives. On state-owned land, land use rights can be sold, transferred, and leased in the urban land market, and a variety of development activities are permitted. On rural land, however, according to the Land Administration Law, regulations favour agricultural use, and development is strictly constrained to three major types, namely, residential plots for farmers, land used for public facilities, and land used for township or village enterprises.

Urban expansion is not only a process of change in land use—converting arable land for non-agricultural purposes—but also for changes in the 'status' of land—converting collectively owned land into state-owned land. Status change may only be carried out by local governments, since under the Land Administration Law (LAL), only the state can lawfully acquire land owned by collectives. Only after such an ownership change can land users, whether commercial developers or the local government itself, develop land for industrial, commercial, and infrastructural purposes. As a result, the primary land market is dominated by local governments as the sole suppliers of land.

After land status change, or, in other words, requisition, local governments are empowered to transfer land leasehold rights to users: for 70 years for residential use, 50 years for industrial and mixed uses, and 40 years for commercial uses. The local government has four transaction methods for disposing of land rights: xieyi zhuanrang (negotiated sales) and three types of auctions—guapai (or two-stage auctions), paimai (English auctions), and zhaobiao (sale by sealed bids). Of these, negotiated sales are the most opaque: local governments negotiate one-on-one with designated purchasers, usually manufacturing companies looking for industrial sites. This allows buyers in negotiated sales to leverage a greater measure of bargaining power than those in competitive transaction methods like auctions. However, since 2004, the central government has introduced a series of laws to ban closed-door negotiations, aiming to make the land market more efficient (Zhou *et al.* 2020; Jiang & Lin 2021).

Central Government's Role in Land Market

With regard to the issue of controlling land use, the Chinese socialist state has been both powerful and powerless. It is powerful in the sense that it has, theoretically, what Kornai (1992) refers to as 'an undivided power' in making rules (laws, regulations, and policies) to control land development. It is also powerless because state rules have not always been effectively enforced. Instead, the rules have often been contested, circumvented, and manipulated not only by land developers and users but also by state agencies and managers at various local administrative levels (Lin & Ho 2005). As succinctly put by Xu (2011), 'under the supervision of the central government, local governments initiate, negotiate, implement, divert, and resist reforms, policies, rules, and laws'.

The scope for this manipulation exists because central and local governments play different roles in the market with respect to land use, and as such, intervene in the land market in different

capacities. Local governments act as an 'economic man' possessing 'individual rationality'. In distributing land in their jurisdiction, their goal is promoting economic growth and increasing (maximising) local revenue. In its capacity as a public authority, meanwhile, the central government functions as a rational 'collective', whose goal is to promote the healthy development of the national economy and maximise social welfare. The central government is motivated to create a fair land market, and at the same time, allocate land resources rationally. These differences lead to divergences between their policy formulation and execution.

The priority of the central government is food security. However, during urbanisation, large-scale requisition of land inevitably entails a reduction in land under arable cultivation. Simulation results suggest that a 1 percentage point increase in China's urbanisation rate will precipitate a decline of 0.065% of China's cultivated area and a 0.067% decline in China's agricultural productive capacity (World Bank & DRC 2014). As Figure 2.4 shows, land under construction and arable land have changed inversely in their proportions since the late 2008. Built land has increased from 3106×10^4 ha to 3957×10^4 ha, an increase of 11.8%, while arable land has fallen to $65,706 \times 10^4$ ha, a reduction of $64,486 \times 10^4$ ha over the period 2003-2017. This rapid rate of decline in arable land has led to the contradictory phenomenon of a 'large population with relatively little arable land', exacerbating the risks of food insecurity in China. To tackle this issue, the State Council of China passed, in 1994, a set of 'Basic Farmland Protection Regulations', then in 1998, revised the Land Management Law to protect from over-land conversion. These measures proposed annual quotas to limit the quantity of land each administration can convert to urban use. In general, land policy reforms aim to improve land-use efficiency, enhance land management, and protect farmland.

Figure 2.4 Built land and arable land use change in China, 2003-2017
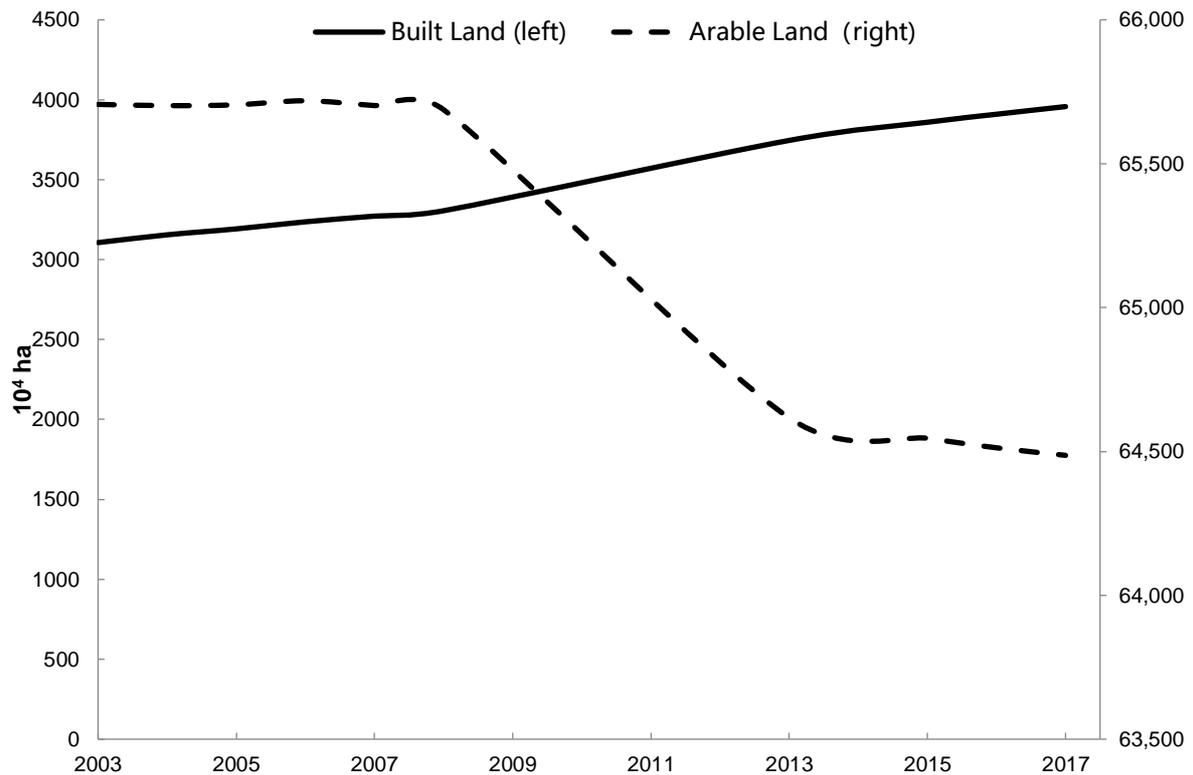
Note: The data are compiled from detailed land use surveys at the county level, provided by the Ministry of Land and resources in each province (city) for the period 2003-2017.

Local Governments' Role in the Land Market

Local governments play a central role in China's land market. During the Mao era, land transactions were prohibited, meaning there was no market for land as a product. Under communist ideology, land was regarded as the common property of 'the people' collectively. The 'opening up' policies of the 1980s gradually established a land market and land supply system. Legally, land ownership was separated from the right to use land. Land ownership continues to rest either with the state or village collectives. Developers and enterprises must lease land from the government before undertaking construction. China's land market has boomed in the past decade. For example, it is estimated that the hedonic price index of residential land grew by about 89% and 48% from 2007 to 2012 in Beijing and Shanghai, respectively. The average land price in 2012 was 57%, 24%, and 41% higher than that in 2007 for residential, industrial, and commercial land parcels, respectively (Qin *et al.* 2016). On the back of escalating land prices (especially for commercial and real estate development in premium locations) on the one hand and artificially low compensations (based on the value of agricultural land use) on the other, many local governments—especially those in rapidly

developing coastal areas—have reaped 'windfall profits' from the state-induced urbanisation process: the total land concession revenue increased from around 2,819.77 billion yuan in 2008 to around 7,067.93 billion yuan in 2019 (see Figure 2.5).

Local governments wear 'four hats' in the land market and urbanisation in general. The first role is as the de facto owners of urban land. According to the Land Management Law, ownership of land rests with the state; and only the state has the right to expropriate rural land for urban use. However, the concept of the 'state' should be understood in such a way as observes a separation between central and local governments. Central government exercises authority over land approval, while enforcement rights over the use of land are the concern of local governments. Central government has the authority to approve the annual land use plan proposed by each provincial government. It is also responsible for the approval of agricultural land use, land acquisitions, and for supervising the rehabilitation of land under cultivation. In general, it controls the total land supply. Local governments at the county or city level are mainly responsible for issuing land ownership certificates. At the same time, they also exercise land acquisition rights and determine land planning. In sum, although the central government has the power to approve plans for land use, local governments wield an executive right to convert, expropriate, and issue certificates for land.

The second role is as the monopoly supplier in the urban land market. All developers and enterprises needing urban land have to purchase land use rights from local governments. In this process, local governments have the right to choose how they sell land (through xieyi zhuanrang, guapai, paimai, or zhaobiao). Differences in land sale methods lead to disparity in land prices, especially between types of use (commercial, residential, and industrial).

The third role is as the biggest beneficiary of the sale of land. Figure 4 shows that the land leasing revenue became a major source for government's fiscal income. Between 2010 and 2019, the share of land leasing revenue accounted for around 30% of the total government's fiscal income. The cost of land conversion was low, while the benefits of re-zoning can be massive. China's Land Administration Law stipulates that total compensation fees for land should not exceed 30 times the average annual value of the product generated from land within three years of the conversion. Compensation costs include land compensation, a subsidy for resettlement and payments for ground attachments and young crops. In practice, the land compensation fee is usually six to ten times the average output value of the first three years of cultivated land. The resettlement subsidy of the agricultural population comes in at four to six

times the average output value of cultivated land over the last three years, and the other subsidies are determined on a discretionary basis by local governments. Under the current land transfer system however, local governments can receive a lump-sum income for leasing the rights of land use for a 40-70-year period based on current market prices. Under the heading of 'deferred land income', they will receive both exclusive local taxes, such as land value added-, cultivated land occupation tax, property tax, urban land use tax, deed tax, stamp duty and city maintenance and construction tax, and also assorted charges for land transfer. All these forms of income are retained by local governments and will be channelled through an extra-budgetary account or off-balance sheet vehicle. In terms of revenue distribution, although the ownership of land belongs to the state, central government does not claim a share of land revenue, leaving all land proceeds with local governments. Further, local governments have absolute control over the use and distribution of land benefit rights.

Figure 2.5 The share of land leasing revenue to total fiscal revenue, 2010-2019
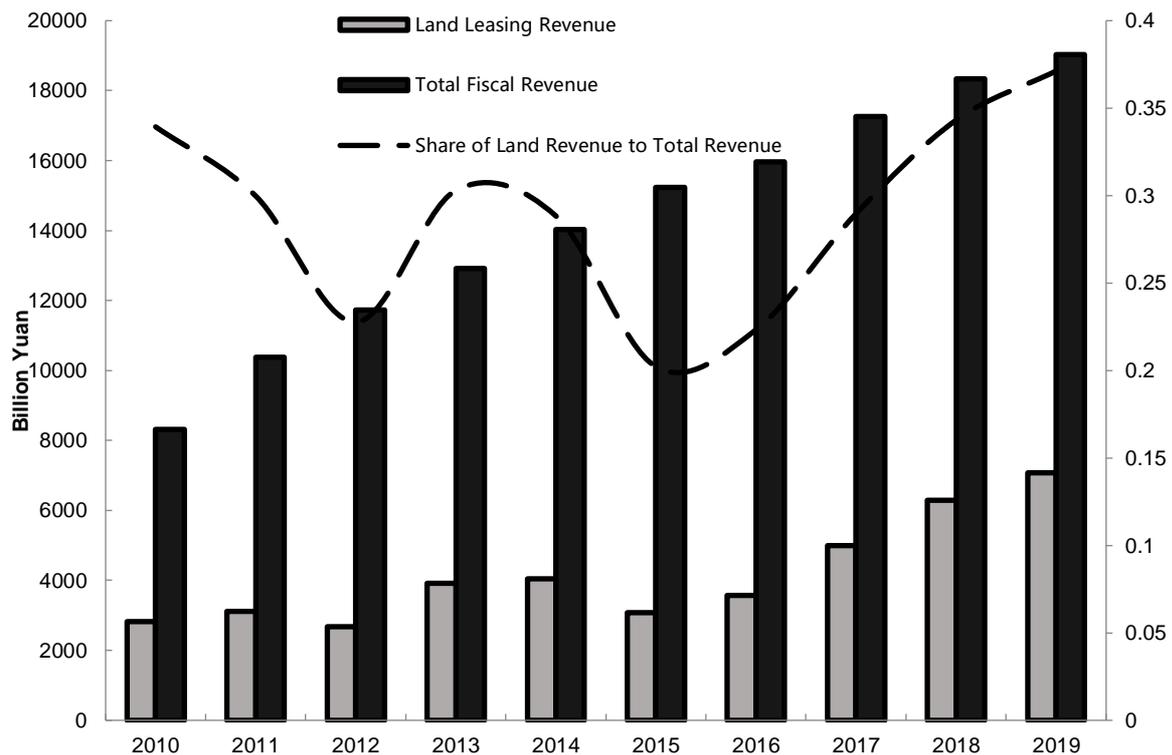
The fourth role is as the agency implementing the policies of the central government concerning land. Faced with central initiatives, one could posit that local governments spend most of their time bending policies to suit their own interests. On the matter of protecting arable

land, for example, the central government initiated a series of regulations limiting the loss of farmland, including compensation schemes for arable land. However, in practice, the occupied arable land is always more productive and larger than supplementary arable land, which indirectly leads to a reduction in the arable land area. This problem shows that the principle of maintaining the productivity of stock of arable land is not protected. What happens instead is more in line with Xu (2011)'s interpretation: 'subnational governments run the bulk of the economy; and they initiate, negotiate, implement, divert, and resist reforms, policies, rules, and laws'.

2.2.3 China's Fiscal Institution and the Rise of LGFVs

China's Fiscal Institution and the Effects of The Soft Budget Constraints Since 2008

The explosive growth in the amount of local debt is usually attributed to China's four trillion fiscal stimulus. The Chinese economy was badly hit by the global financial crisis, with the GDP growth rate falling from 13.9% in 2007 to 7.1% in the quarter of 2008. To shield the post-crisis domestic economy from a slump in foreign demand, China's central government proposed a counter-cyclical fiscal plan worth four trillion yuan (US$568 billion) in November 2008. This plan was initiated by the central government but mainly implemented by local governments, mostly through a series of fiscal relaxations and round of financial deregulation. However, financial deregulation alone cannot fully explain such a rapid increase in debt volume. Rather, China's local debt problem stems from its unique institutional arrangements.

First, the 1994 system of tax sharing transfers the bulk of locally collected tax revenues to the centre, leaving local governments with heavy fiscal shortfalls. For example, local governments retained only 47.6% of national revenue but represented 79.9% of national expenditure in 2009 (Shen *et al.* 2014). Another study over a longer period found that local governments received about 40% of national government revenues, while accounting for more than 60% of national government expenditure (Fan & Lv 2012). Figure 2.6 shows that in recent years, the ratio of expenditure of local governments to total government revenue is above 80%, while the share of revenue to the total is marginally above 50%. This tax change, together with a cadre evolution system, that is, a promotion system for Communist Party officials that ties individuals' careers to local GDP growth provides strong incentives for local governments to actively search out extra-budgetary and off-budgetary revenue (Ong 2012).

Figure 2.6 Fiscal revenue and expenditure of local governments, 1978-2020
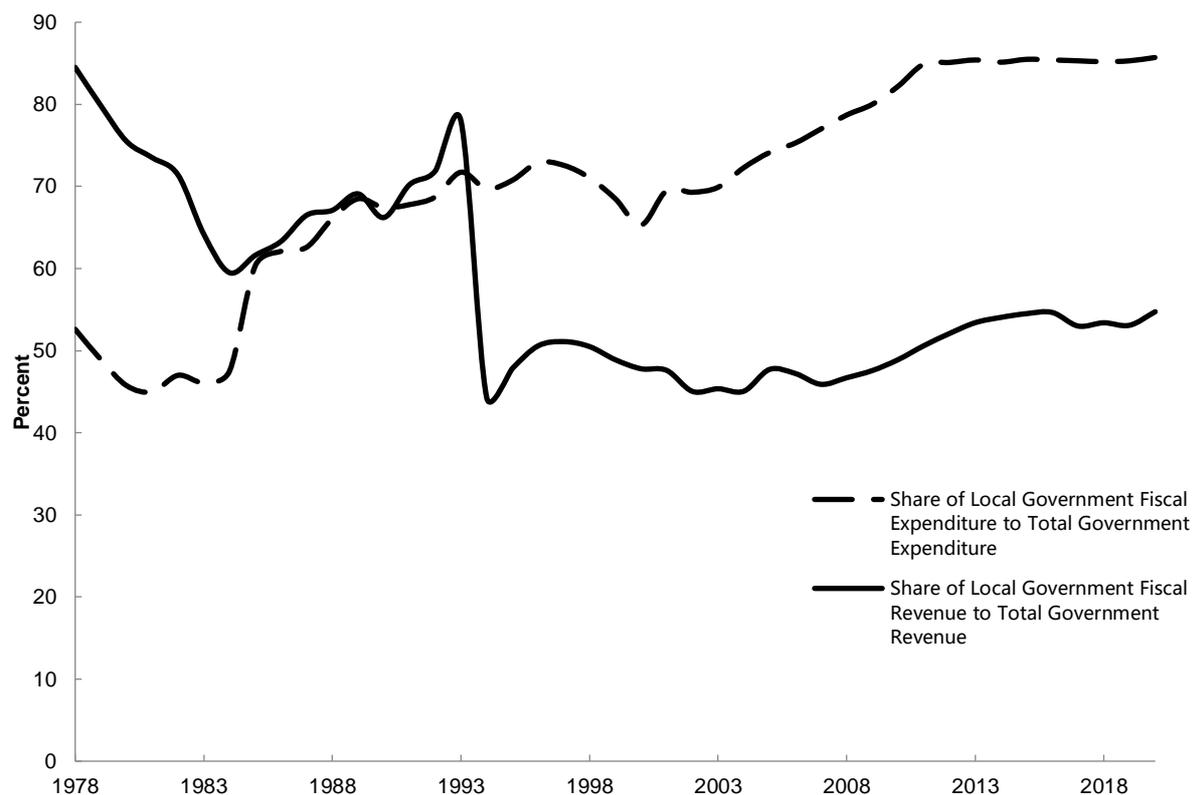
Source: China Statistical Yearbook, National Bureau of Statistics of China

Second, the 1994 Budget Law prohibited local governments from issuing debt and running deficits. However, in reality, local governments have numerous ways to work around this law. For example, grassroots governments can borrow by setting up collective township and village enterprises and pressuring credit institutions into lending to these enterprises (Ong 2012). Another way is to use off-balance-sheet companies known as LGFVs to circumvent the law. LGFVs' borrowing does not show on local government balance sheets, meaning governments have not violated the law while, in fact, being accountable for a large volume of unobservable, off-balance sheet debt. Third, as a result of banking system changes in the late 1990s centralising the power to appoint local bank officers, local banks in reality still cannot resist mounting pressure from local governments to provide external financing in the wake of the tax-sharing reforms.

Local governments' budgetary constraints have been eased or rendered 'softer' by fiscal and financial deregulation. In 2008, the China Banking Regulatory Commission (CBRC) and Ministry of Finance issued special regulations encouraging local governments to devise various ways to attract bank loans and spur infrastructural investment. Financial deregulation grants

LGFVs easy access to the financial system. Specifically, of the 4 trillion RMB stimulus package, 1.18 trillion RMB (29.5% of the total) was disbursed from the central government, while the remaining 2.82 trillion RMB (70.5% of the total package) came from local governments as announced by China's National Development and Reform Commission (NDRC). This large-scale stimulus brought a high volume of investment. The aggregated investment rate increased by 5% of GDP between 2009 and 2010, with the investment rate in non-residential structures going up from 16% of GDP in 2008 to 18% in 2009 and 20% in 2010 (Bai *et al.* 2016). However, the follow-up impact of financial deregulation has been more pronounced than its initial shock.

After the 2009 stimulus, local governments have used LGFVs to circumvent budgetary constraints, grow debt, and consequently widen local fiscal gaps (Bai *et al.* 2016). The number of LGFVs surged to 8221 at the end of 2009 from 3000 in the second half of 2008. In 2009 alone, more than 2000 new LGFVs were established. LGFVs have continued to grow since the stimulus program ended in 2010: their spending has accounted for roughly 10% of GDP each year. With these vehicles becoming such a major contributor to GDP growth, the central government has understood that the rising indebtedness could threaten financial stability, without being entirely able to shut down their financing channels (Financial Times[10]).

The Structure and Arrangement of LGFVs

Despite their diversity, LGFVs share a number of features. They are owned and controlled by local governments but are economically and legally independent entities. Local governments have mapped out their own 'land-infrastructure-leverage' strategy for urban development, which enables them to hide behind LGFVs and adhere to fiscal transfer rules while avoiding local budgetary crises. LGFVs, therefore, are agents of local governments.

As can be seen from the Figure 2.7, LGFVs serve two main purposes—raising funds by borrowing money from banks or issuing debt on the bond markets and undertaking urban construction by coordinating specialised companies, many of which are owned or affiliated to the principal LGFVs.

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[10]https://www.ft.com/content/b303f280-7f14-11e6-8e50-8ec15fb462f4

Figure 2.7 LGFVs structure and arrangement
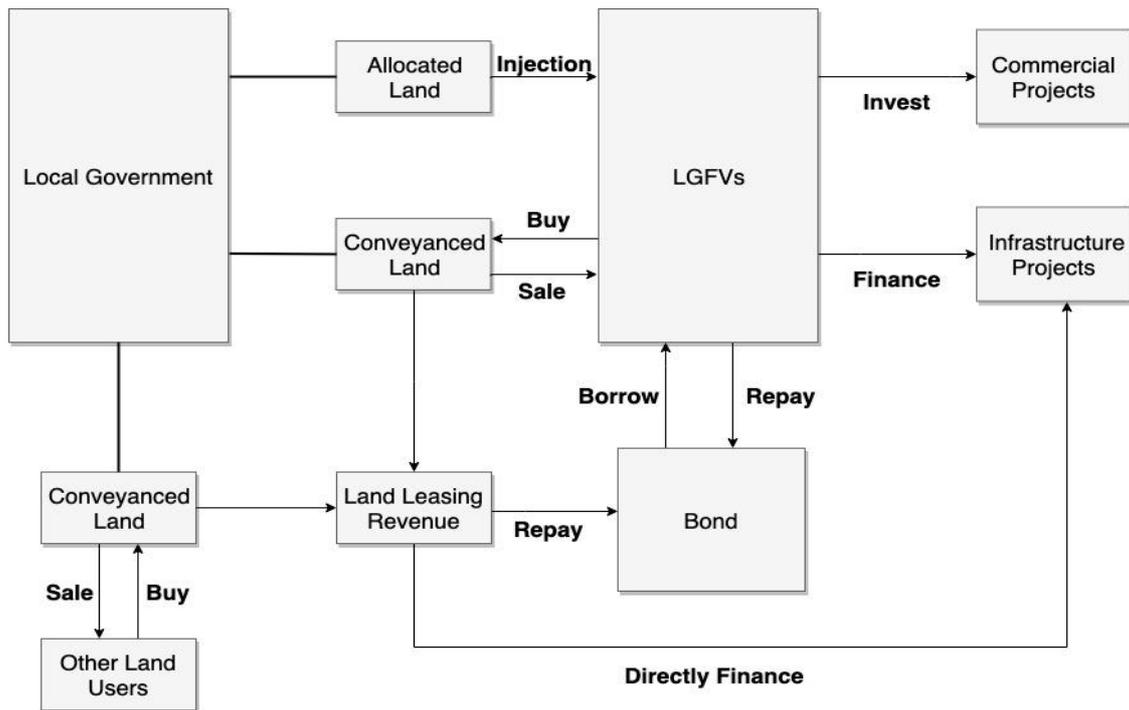
LGFVs in Land and Financial Markets

Local governments were not allowed to raise new debt until the *Budget Law* had been amended in 2014. To bypass the law, local governments set up off-balance-sheet companies known as LGFVs. Legally, LGFVs are state-owned enterprises set up by local governments for infrastructure financing and construction. After the financial crisis in 2008, the central government gradually opened the market for private projects, such as commercial and residential development, to LGFVs (Bai *et al.* 2016). To raise liability from banks and bond markets, local governments pooled public assets, including land and budgetary funds, and injected them into LGFVs to build strong balance sheets. By doing so, LGFVs would be able to meet the requirements for bond issuance, such as the minimum total net asset volume and the debt-to-equity ratio set by the regulatory department.

Figure 2.7 displays the roles of LGFVs in Chinese urban development including public and private projects. A typical arrangement would see a local government transfer the ownership of a plot of land to a LGFV, and then the LGFV would use this land as collateral to borrow from banks and shadow banks (trusts) and to issue bonds. The money would be channelled to finance construction on the plot of land. After the infrastructure projects are completed, land

prices surrounding the core developed area rise and the LGFV can use the land they have set aside to bargain with banks for further loans or as a form of repayment of debt.

In this process, local governments usually support LGFVs by providing guarantees or using their influence to pressure local banks to provide loans. One example is the Shanghai Shenhong company affiliated to the Shanghai municipal government. The latter transferred Shenhong land assets worth 17.26 million yuan and leant on Shanghai-based banks using these assets as collateral to offer short-term loans to Shenhong (Jiang & Waley 2018b).

The first channel for supporting the LGFVs is land allocation, through which the local government allocates land to LGFVs for infrastructure construction. The land is transferred to LGFVs for free but changing the initial purpose of the land use is strictly forbidden. This is because the Land Administration Law stipulates (article 54) that *'allocated land can only be used for infrastructure and for welfare undertakings or governmental and military use'*. In addition, the law specified that allocated land cannot be transferred, leased, or mortgaged. For instance, it is not allowed to sell the land which is allocated to LGFVs to other companies for generating revenue or to convert the land from infrastructure purpose to residential or commercial development.

The second channel for supporting the LGFVs is land conveyance, through which the local government sells land to LGFVs for profit-oriented projects. In addition to infrastructure projects, LGFVs engage in commercial projects, such as residential development and commercial real estate, which are essentially private projects (Bai *et al.* 2016). Like other land users, LGFVs have to pay the fee for the land use before the commencement of project development. The land is sold via the conveyance of land use right, through tender, auction, or listing. Among them, most of the land (77%) was sold by listing, and 21% of land was sold by auction (Huang & Du 2018). In addition, LGFVs were found to have overbid on the land significantly and thus inflate the land price (Huang & Du 2017).

There are several avenues for LGFVs to finance both public and private projects. On the one hand, revenue stemming from land leasing provides credit to support local infrastructure development. Previous studies show that the majority of the land leasing revenue has been earmarked by local governments to inject into LGFVs to finance infrastructure directly (Wang *et al.* 2011). However, the land revenue is insufficient to sustain the infrastructure-led development in urban areas.

On the other hand, LGFVs have borrowed heavily from the financial market. Before 2009, more than 90% of LGFVs' debt were in the form of bank loans (Bai *et al.* 2016), which were worth 5.57 trillion RMB (Pan *et al.* 2017). Although the average maturity of these loans was three to five years, the projects usually lasted decades (Kroeber 2016). Due to the maturity mismatch, the borrowing channel shifted from bank loan to bond market since 2013 (Chen *et al.* 2017a). Empirical evidence in Chen and Wen (2017) show that one more dollar of bank loans in 2009 leads to about 13 cents more issuance of municipal bond to repay bank loans in later years. Local government debt has risen dramatically since 2008. Local government debt in China reached 17.89 trillion RMB in 2013 (Wu *et al.* 2018), which accounted for 31.5% GDP of that year. The rapid accumulation of local government debt associated with systematic risk has become a prominent concern for the central government.

2.2.4 Local Government Debt and Land Development

The Evolution of Local Government Debt Volume and Structure

In the early stages, institutional and legal barriers made it difficult for the central government to obtain real fiscal data from provincial governments (Deng *et al.* 2013). China's true level of local government debt is unknown (Bo *et al.* 2017) and this low level of fiscal transparency leads to the difficulty in conducting in-depth empirical research (Feng 2013). While quite a few empirical works tried to estimate the true level of local government debt (Li & Lin 2011; Chang *et al.* 2013; Ma 2013), the most reliable debt data came from three national-wide auditions conducted by the National Audit Office (NAO) in 2010, 2011 and June 2013 (See Table 2.1). However, even the official debt level figures could vary significantly according to different definitions and coverage.

Table 2.1. China's local government debt level between 2010 and 2013 (trillion Yuan)

Category/Year	2010	2012	2103-6
Debt that the local government needs to repay	6.7	9.63	10.89
The overall debt level regardless of category	10.72	15.89	17.89
Overall debt to GDP ratio	26.69%	30.14%	..

Note: National Audit Office (NAO) classifies the local government debt into three categories: debt that government needs to repay, debt that government guarantees, debt for which government has potential bail-out responsibility. NAO defines the last two kinds of debt as local government contingent debt. Here the overall debt level shows the total local debt level including all three categories. '..' indicates that the data is unavailable. Source: National Audit Office (NAO)'s 2013 report.

Table 2.1 shows the different debt levels according to different categories. In terms of debt that governments need to repay, the overall local debt level was 6.7 trillion yuan by the end of 2010, which increased to 9.63 trillion in 2012 and to 10.9 trillion in June 2013. However, these figures would inflate significantly if I included debt that governments guarantee and debt for which governments have potential bail-out responsibility. After adding these, the overall debt level would be 10.72 trillion, 15.89 trillion, and 17.89 trillion in 2010, 2012, and 2013, respectively, inflated by 37.5%, 40%, and 39%.

Historically, bank loans were the main contributor to local government debt. A June 2013 National Audit Office (NAO) report (Figure 2.8) offers an insight into the composition of local debts. As the chart shows, there are four major types of liabilities: bank loans, BT (built-to-transfer), municipal corporate bonds (issued by LGFVs), and trusts, which make up 57%, 8%, 10%, and 8% of the total debt load respectively in 2013. The recent trend, though, has been for their share to decline, and for the share of municipal bonds to increase significantly. As the Chinese economy slows down, local governments' ability to repay has come into question and the consequent risks to the banking sector have become a growing concern.

Figure 2.8 The Composition of Local Debt in June 2013
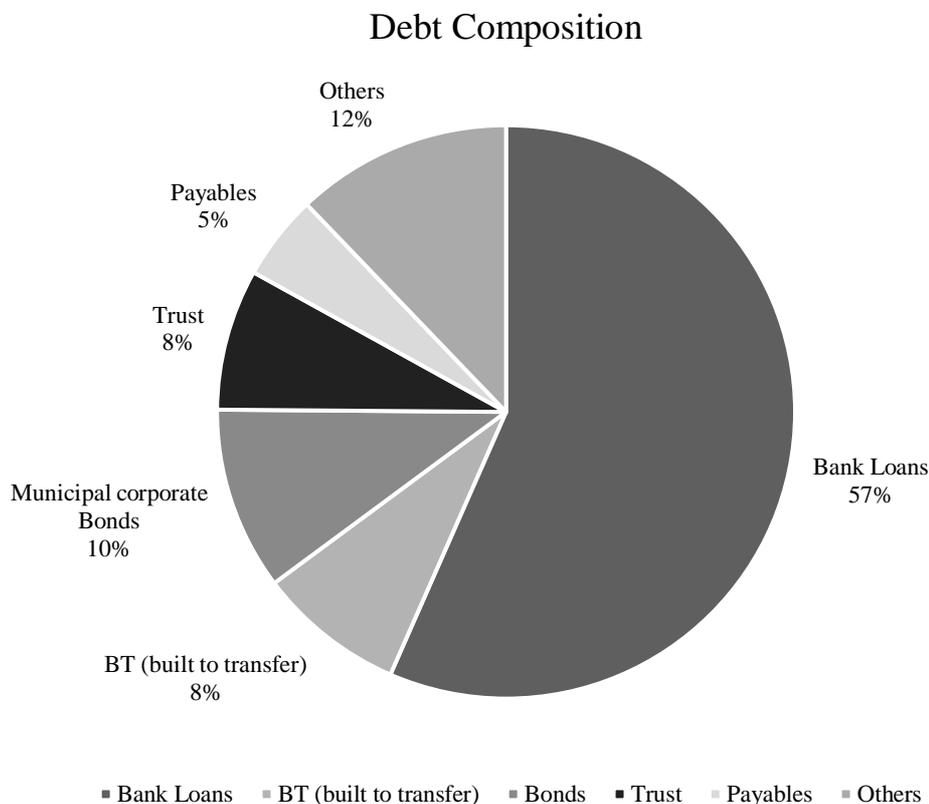
To improve debt transparency and prepare, quite possibly, for an upcoming round of insolvencies, the State Council introduced a debt-for-bond swap program in March 2015, aiming to exchange high-interest local government loans for issues with longer terms and lower interest rates. The revised budget law adopted a strategy of '*opening the front door and closing the back door*' in which it tightened local government off-budget borrowing and other unregulated sources, while allowing provincial governments to issue their own bonds subject to an annual cap determined by the National People's Congress.

Figure 2.9 shows the debt level that local governments should repay since 2015, with the figure rising from 14.82 trillion in 2015 to 21.31 trillion in 2019. The share of bond to total debt outstanding also saw a significant increase from 3% in 2015 to 99% in 2019.

Figure 2.9 Local government debt and bond outstanding, 2015-2019
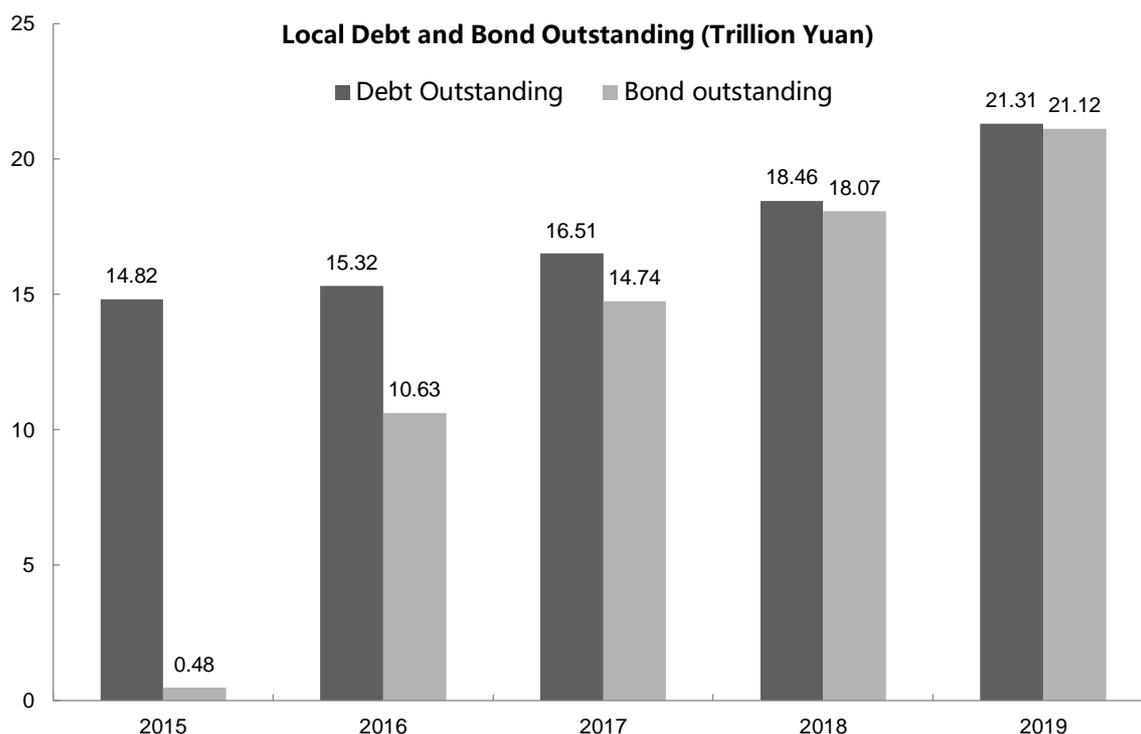
Local government debt and land development

A strong connection exists between local government debt and China's land development. On the one hand, debt is issued to finance local infrastructure and to buy land and compensate its

previous residents. As Table 2.2 clarifies, urban infrastructure-related expenditure accounts for the lion's share of total debt revenue—more than 70%. On the other hand, governments expect to repay debt (both to banks and holders of bond issues) from future land-related revenues, as these are generated both by rising land prices and the proceeds of land leasing. Table 2.3 shows the percentage of debt that is expected to be repaid out of land and land-related revenue: 38% in 2010, dropping slightly to 37.23% in 2012. Table 2.4 shows detailed provincial debt-to-land revenue ratios in 2013. These ratios show how heavily reliant a region or province is on land-related revenues to pay off its debts. The ratios for the ten most land-dependent provinces average 40%, with the highest—above 65%—accounting for Zhejiang province. Many scholars (Zhang & Barnett 2014; He *et al.* 2016) and organisations (IMF 2016) worry that if land values fall, the value of land-based collateral would also fall, which may pose a threat to lenders.

Table 2.2. The use of debt revenues

The use of debt revenues	Value (trillion yuan)	Percentage (%)
City construction	3.53	36.72
Transportation	2.39	24.89
Land buying	1.02	10.62
Social welfare related	0.92	9.54
Agricultural and water conservancy construction	0.46	4.77
Environment protection	0.27	2.84
Solving local financial risk	0.11	1.15
Industry input	0.13	1.33
Energy resources	0.02	0.25
Other	0.76	7.89
Total	9.61	100.00

Source: National Audit Office (2013)'s report

Table 2.3. Total debt will be repaid by land revenue (billion Yuan)

Category/Year	2010	2012
Debt repaid by land related revenue	25473.51	34865.24
Total debt that governments have responsibility to repay	67109.51	93642.66
The percentage of land revenue repaid debt to total debt	38%	37.23%

Source: National Audit Office (NAO)'s 2013 report

Another problem is that despite sustained high land prices, asset-based revenue streams may no longer be able to cover interest payments in several provinces (something in fact projected to happen in 2009, given that Ningxia province, for example, saw its interest payments rise to 5.56 times its land transfer fees in 2006; see He *et al.* (2014)). Wu *et al.* (2016) describe how the city of Guangzhou found it hard to sell of parcels of land to repay bank loans and coupons

on bonds issued by the LGFVs. The situation has improved this decade due to the sharp rise in land prices and related bubble in house prices. However, it is questionable whether high housing demand can drive a perpetual rise in land prices. The local state would face substantial risks of widespread default if housing and land prices were to decline.

Table 2.4. Top ten provinces' debt repayment reliance on land revenue ratio

Province	Overall debt (billion yuan)	Debt promised repaid by land revenue (billion yuan)	Land revenue reliance ratio
Zhejiang	4133.91	2739.44	66.27%
Tianjin	2171.39	1401.85	64.56%
Fujian	1864.44	10655.09	57.13%
Hainan	915.66	519.54	56.74%
Chongqing	3261.40	1659.81	50.89%
Beijing	5972.34	3016.27	50.50%
Jiangxi	2187.79	1022.06	46.72%
Shanghai	5044.34	2222.65	44.06%
Hubei	4099．14	1762.17	42.99%
Sichuan	5314.07	2125.65	40.00%

Source: National Audit Office (NAO)'s 2013 report

2.2.5 China's Political System of Selection and Corruption

China's Political Selection System

China's cadre management system was copied from the Soviet Union's nomenklatura and bestows ultimate control over local cadres' political careers on central government, or, rather, on the Communist Party. Based on a set of evaluation criteria, the 'organisation' departments of the Party conduct annual assessments to evaluate local officials, then use positive and negative forms of incentives (rewards and threats) to shape local officials' behaviour. Assessments may only be used as a reference, with final decisions being left to party standing committees, usually made up of the 11-13 most prestigious and powerful leaders at each administrative level, who are charged with the authority to decide who will be promoted and who dismissed.

According to the Civil Servant Law of 2005, the assessment criteria orient themselves with regard to a set of multiply interpretable principles: virtue (de 德), competence (neng 能), diligence (qin 勤), achievements (ji 绩), and the absence of venality (lian 廉). In practice, however, these ambiguous principles tend to express themselves in hard performance targets. In general, cadres are rewarded or punished based on how well they hit these targets. While some scholars (Su *et al.* 2012) argue that neither an explicit nor implicit responsibility system (TRS) applies to provincial level administration, it is commonly the case that these performance-driven evaluations govern the management of county and township government and local officials' careers in these ranks.

Performance targets may be divided into three categories based on their criticality to the survival of the regime. The most important ones are the so-called 'imperative targets' or in Chinese yipiao foujue zhibiao (一票否决指标 in Chinese). These are population quotas (reflecting the implementation of the 'one child policy') and measures of political stability, as captured by incidences of large-scale protest. Failing to meet these targets usually means an official has sacrificed his (or less usually, her) chances of promotion and any bonuses. They may even be demoted. The next level of priority target is characteristically referred to as 'hard' and usually takes stock of an administrative area's economic performance in such terms as GDP per capita, some measure of the comprehensive benefits of economic development, and regional disparities in economic development. Soft targets, meanwhile, usually include how assiduous officials have been in conducting propaganda or recruiting party members. Among the hard targets, as shown in Table 2.5, in the past two decades, over half the assessments of leaders have been conducted in terms of economic targets.

Table 2.5 National Guidelines for Performance Targets for Local Party and State Leaders

1988 Categories	2006 Categories	2009 Categories
GNP	GDP per capita	GDP per capita
Gross value of industrial output	GDP per capita growth rate	Comprehensive benefits of economic development
Gross value of agricultural output	Local budgetary income per capita	Regional disparity in economic development
Gross value of output of TVEs	Local budgetary income per capita growth rate	Cost of economic development
National income per capita	Urban income	Urban income
Rural income per capita	Urban income growth rate	Rural income
Labour productivity of state and collective enterprises	Rural income	Resource consumption Nine-year compulsory
Taxes and profits remitted - Fiscal income	Rural income growth rate	Healthcare
Sales retention	Resource consumption Nine-year compulsory education	Urban employment
Infrastructure investment realised	Social safety net Urban employment	Public security
Grain output	Urban and rural cultural activity	Urban and rural cultural activity
Local budgetary income - Local budgetary expenditure	Population and family planning	Population and family planning
Procurement of agricultural and subsidiary products	Resource conservation (including farmland)	Resource conservation (including farmland)
Forested area	Investment in technology	Investment in technology and innovation
Nine-year compulsory education completion rate	Environmental protection	Environmental protection
Natural population growth rate		

Note: Each 1988 category was assessed for both level and growth rate. The 1988 guideline was applied to the evaluation of leading cadres at the county level, while the 2006 and 2009 guidelines were applied to the evaluation of leading cadres at and above the county level. Source: Zuo (2015)'s paper

Bell and Annual (2017) describe China's political system as a 'political meritocracy', in which political leaders are (generally fairly) assessed and chosen according to their competence. Xu (2011) describes this system as a 'regionally decentralised authoritarian regime'. On the one hand, a nested system of choosing subordinates allows higher-level leaders to decide on the criterion of promotion (and demotion). On the other, subnational governments (provinces, municipals, and counties) are not only granted a high degree of autonomy over local economic activities, but also rights over local resources, such as land, enterprises, financial resources, and raw materials. China's 'multiregional organisational form' (or M-form) promises, in theory, that higher-level leaders' quality of performance information will be better than in unitary form

(U-form) countries (Maskin *et al.* 2000). The multiregional, broadly hierarchical but still involved organisational scheme of Chinese government sets the whole country up as a coherent incentive system for local leaders, that is, as a regional tournament competition. As a result, local officials are highly motivated to boost their regions' GDP growth rate, as this may be observed by the central government.

But do officials, in fact, always do this? Chen *et al.* (2005) find that at a provincial level, each official's performance relative to his or her immediate predecessor significantly affects whether they are promoted. Li and Zhou (2005) similarly show that regional officials are motivated to promote regional economic growth. Chen *et al.* (2017) re-examined Li and Zhou (2005)'s findings, revealing that promotion decisions are apparently made not just on the basis of an official's improvement (or not) on their predecessors, but based on their relative ranking among peers. Shih *et al.* (2012) and Meyer *et al.* (2016) challenge the tournament thesis, stating that, in post-reform China, factional affiliations continue to play an important role in promoting central leaders (from province to the centre). Landry *et al.* (2018)'s recent work controls for political factions and selection bias, continuing to find a positive relationship between officials' economic performance and their promotion prospects at lower governmental levels (from county to prefecture), though not at a higher level (from prefecture to province and from province to central government).

Political Corruption in Land and Real Estate Market

Apart from improving local economic growth, corruption is another shortcut for local officials to get promoted. China's political corruption is most serious in the real estate sector (Zhu 2012). Most corruption in the real estate industry occurs during the process of transferring land use rights, where both the corrupt officials and bribed firms are mutually beneficiated from this process. For example, using the national land transaction data between 2004 and 2016, Chen and Kung (2019) reveal that firms having a connection with the Politburo, the highest ruling circle of Chinese Communist Party, can obtain the land parcels at 55.4%-55.9% discount compared to their non-connected counterparts in the primary land market. In return, those local officials who provide discount to princeling firms, are 23.4% more likely to be promoted.

China's land tenure rules make for an almost ideal environment to investigate the extent of local officials' corrupt behaviour. It is within the power of local governments to allocate land parcels through choosing the auction format and striking preauction side deals between bidders

and local officials. Favoured developers in a two-stage auction process could be taken into the first round, deterring the entry of other bidders. Empirical evidence shows that land prices achieved through two-stage auctions are significantly lower than in English auctions (Cai *et al.* 2013). Li (2019) shows that local governments tend to use two-stage auctions for low-value land to maximise personal benefits, while reserving English auctions for high-value land to drive up the public benefits of the sale.

2.3 Conclusion

This chapter described the main features of China's urbanisation as captured by the general literature. It demonstrates how local governments are the main drivers, and beneficiaries, of the urbanisation process. Both the literature and observations bring to light certain fundamental weaknesses in the existing system, which go beyond imposing inefficiency costs to threaten basic financial sustainability. This thesis addresses three major problems and research gaps associated with China's urbanisation.

First, enormous infrastructure investment in China is generally justified by the rapid rate of urbanisation and sharp growth of income. It is undeniable, though, even by the advocates of breakneck urbanisation, that some infrastructure investments are driven by the distorted incentives of government officials. To attract industrial investment and raise more revenue, local governments may over-invest in infrastructure to service newly developed tracts of urban land. Because land leasing revenue and debt raised through LGFVs are two major sources of funding for infrastructure finance, it is important to investigate how these two different funding sources are mobilised, and whether local investment in infrastructure can even in theory meet real local demand. These questions are addressed in Chapter 4.

Second, a stable and sustainable system of debt finance is critical to China's continuing urbanisation. Land has played an important role as collateral for borrowing by LGFVs, linking the health of local finances to land prices and real estate development. While China's land prices have seen a steady increase over the last three decades, urban land values can be highly volatile—and will presumably reach a plateau when the entire country has reached peak urbanisation. The basis on which local bonds are issued is that local governments stand behind the LGFVs and guarantee their paper value, which means that land price fluctuations have the potential to induce instability in local government budgets and threaten local fiscal soundness. Given how China's financial system has provided a huge amount of credit to LGFVs, it is

important to investigate their solvency and how their default risks imperil China's financial stability. The research question concerning LGFVs' borrowing risks is addressed in Chapter 5.

Chapter 3

Theoretical Framework

3.1 Overview

This chapter sets out the thesis's theoretical framework. Land use and urbanisation in China are central to the country's emerging political, social, and economic landscape. Urbanisation is thus germane to any assessment of China's development nationally, while the design of incentives in encouraging modernisation has proved to be a topic of great interest internationally. This chapter first reviews key publications on the theme of how urbanisation may be incentivised in China. Then, I critically review two competing theories. Finally, I propose this work's conceptual framework using one preferred theory and suggest how the findings presented in the later chapters support the conceptualisation of the prices and risks of housing debt.

Two competing theories describe the incentives offered to local government officials to drive urbanisation in China: a Regional Tournament Competition Model (RTC) and a Fiscal Federalism (FF) Model. The thesis has collected data and developed methods of analysis to verify these theories. Both models have limitations that stem from the complexity of local government behaviours in land conversion and urbanisation. Briefly, the chapter finds that the Fiscal Federalism (FF) model, overall, provides a better description of the land development decisions taken by local government officials. The Federalism Model is also more challenging to represent theoretically and substantiate empirically, given the much wider range of factors to be considered under this framework.

The chapter is structured as follows. Section 3.2 provides an overview of urbanisation in China. Section 3.2.1 and 3.2.2 review the two mainstream theories of incentivisation in explaining the role of local governments in urban expansion. Section 3.2.3 states the limitations of the two theories. Finally, Section 3.3 comes down in favour of one theory, explaining how the findings of this thesis back up the fiscal federalism theory, introducing some caveats and putting in place a conclusion.

3.2 Theories of Local Government Incentives

3.2.1 The Regional Tournament Competition Model (RTC)

The first mainstream framework to explain the incentives of local governments to engage in urbanisation is the RTC model. Under this framework, local governments actively pursue land development as a means of revenue generation to finance local economic growth, and consequently, urbanisation has become a vehicle for local governments to attract foreign and domestic capital, strengthen place competitiveness, and enhance the political as well as financial gains of individual cadres (Lin & Yi 2011; Lin *et al.* 2015). The motivation behind their efforts stems from the build-in mechanism of RTC for economic growth, which provides incentives through appointment and promotion within the hierarchical structure through various channels, measured by its unique relative performance evaluation system (Xu 2011).

When a region has a higher growth rate than others, the head of the region will be more likely to be promoted (Xu 2011). This leads to the assumption underlying many studies that the central government makes promotion or turnover decisions based on a performance score of these leaders. Chen *et al.* (2005) find that each official's performance relative to his/her immediate predecessor does have a significant impact on promotion. Li and Zhou (2005) similarly show that regional officials were indeed strongly motivated to promote regional economic growth.

Land, as an important resource controlled by the officials, played an active role in the local officials' behaviour. He *et al.* (2016) find that the interregional competition among officials for better economic performance inspired local governments to employ land development to mobilise more capital investment for growth. Scholars find that land revenue may directly contribute to the local official's promotion probability (Cai 2004; Guo 2009; Yew 2011; Chen & Kung 2016; Chen & Kung 2019). As a result, the RTC framework underpins many existing studies to understand the role of land in promoting economic growth in China.

First, land is modelled as an important factor of production, not only for agriculture but also for manufacturing industries and services. Ding and Lichtenberg (2011) introduce land into an urban GDP growth model and confirm the importance of land availability. Viewing growth as a function of technology, labour, land, and capital, Li (2014) finds that public land auction increases land price and thus has a positive impact on economic growth. Other scholars also

empirically confirm the positive impacts of land leasing (Liu *et al.* 2008) and industrial land expansion (He *et al.* 2014) on economic growth (GDP).

Second, the revenue generated from leasing land use rights has become a vital source of capital for urban infrastructure (Wang *et al.* 2011; Ding *et al.* 2014; Zhong *et al.* 2019).Ding *et al.* (2014) find that local governments would channel land revenue more towards growth orientated infrastructure such as urban road and or image public impression of local economic success. Fan *et al.* (2016) find that land development exerts a positive influence on urban economic growth through public infrastructure. Land revenue has also been successfully used as a tool to sustain infrastructure investment and then to attract foreign direct investment (FDI), triggering urban economic growth indirectly (He *et al.* 2014).

Third, local governments have used land as a strategic tool to attract FDI to promote local economic growth by leasing land through negotiation at a very low price (Cao *et al.* 2008; Liu *et al.* 2008; Huang & Du 2017). Local governments strived to attract industrial investors through this 'race to the bottom' in land leasing price (Lin & Ho 2005; Liu *et al.* 2008; Tao *et al.* 2010; Ding & Lichtenberg 2011; He *et al.* 2014; Huang & Du 2017). Legally, local governments are de facto owners of land and can reap low-cost land from local farmers under the current land requisition system (Lin & Ho 2005; Ding 2007; Cao *et al.* 2008) as well as lease out land through non-market mechanisms with low prices (Liu *et al.* 2016b).

Table 3.1 Summary of Papers Using RTC Model

Author	Sample size	Sampling period	Statistical method
Liu, *et al.* (2008)	Provincial level data	1998-2005	Panel data analysis
He *et al.* 2014	Prefectural level data	2004-2008	SEM analysis
Li (2014)	Provincial level data	2000-2009	Fixed effect panel data analysis
Fan *et al.* (2016)	Prefectural level cities data	1999-2012	Mediating effects analysis method
Guo (2009)	County level data	1997-2002	Fixed effect panel data analysis
Ding *et al.* (2014)	Prefectural level cities data	1999-2006	Fixed effect panel data analysis
Liu *et al.* (2016a)	Prefectural level data	1999-2010	2SLS method
Chen and Kung (2016)	County level data	1999-2008	2SLS, Linear probability model, Ordered logit model
Huang and Du (2017)	Prefectural level data	2003-2012	Spatial panel data model

3.2.2 The Fiscal Federalism Model (FF)

Different from the tournament competition model, the FF framework regards local governments as fiscal revenue maximisers (Jin *et al.* 2005). In this strand of literature, both political competition and fiscal incentives are considered as the motivation of local governments to promote urbanisation in China (Lichtenberg & Ding 2009; Tao *et al.* 2010; Lu & Landry 2014; Han & Kung 2015; He *et al.* 2016). However, the competition does not mean 'tournament', but 'horizontal or regional competition' (Su *et al.* 2012; Su & Tao 2017).

According to the 'market-preserving federalism' theory proposed by Montinola *et al.* (1995a); Jin *et al.* (2005), local governments will promote economic growth if three conditions can be met. First, whether a fiscal contracting system between central and local governments can deliver local policies that promote local enterprises and market development. Second, under a given fiscal contracting system, whether a more prosperous local economy enables local governments to collect more revenues for local spending. Third, a 'hard budget constraint' holds for local governments, placing the onus of solving financial problems on local governments and cutting out the potential bailout from the central government. The 'fiscal contracting system' implemented in the 1980s met these two conditions by allowing local governments to keep the surpluses after fixed submissions to the centre (Oi 1992; Montinola

et al. 1995b) and by ceasing to guarantee upper-level budget allocations to meet local expenditures (Kung 2013). In other words, local governments had to rely primarily on revenues created within their own jurisdictions. They were granted control rights over both revenues and profits generated by these endeavours. An important part of the revenue came from the development of non-farm enterprises (Qian & Xu 1993; Jin *et al.* 2005; Cao *et al.* 2008; Kung 2013)

In 1994, the tax-sharing reform initiated a series of fiscal reforms that enabled the central government to receive the bulk of the tax revenue but left sub-national governments responsible for public services provision and financing. It shifted local governments' efforts from promoting local enterprises to 'urbanising' China (Han & Kung 2015). Local governments retained about 40% of national revenue but contributed well over 60% of national expenditure (Fan & Lv 2012; Shen *et al.* 2014). As a result, the fiscal gap in local level government's budget continued to widen (Jia *et al.* 2014). Subsequently, the central government began to levy a 50% enterprise profit tax (increased to 60% in 2003) since 2002. This effectively discourages local governments from improving enterprise efficiency regardless of ownership. Meanwhile, the central state has not proposed to share with local governments the business tax, which consists primarily of taxes levied upon the construction and real estate industry. This transition led local governments to pursue land transferring fees as one of the major revenues, referred to as 'land finance' (Cao *et al.* 2008; Ye & Wang 2013; Han & Kung 2015; Wu *et al.* 2015b; Zhong *et al.* 2019). Land finance results in a rapid urban expansion in China (Tao *et al.* 2010; Yew 2011; He *et al.* 2014; Ye & Wu 2014). Moreover, the rate of urban spatial expansion is higher in areas where land conversion is more profitable (Ding & Lichtenberg 2011).

The FF model helps better understand the motivation behind local governments' urbanisation strategies. For example, the land leasing strategy adopted by a local government depends on its fiscal conditions. Pan *et al.* (2015) find that those local governments with lower fiscal deficit to GDP ratio tend to lease land to residential or commercial real estate developers, while those local governments with higher fiscal deficit to GDP ratio favour industrial development. Huang and Du (2017) find that as local governments place more weight on land-leasing revenue, they lease out less industrial land, at a lower price, and more residential land at a higher price. This is because residential and commercial development generate significant initial tax revenue, but industrial development provides a more sustainable model of revenue growth (Cao *et al.* 2008;

Tao *et al.* 2010; Su *et al.* 2012). The theory also underpins local governments' land hoarding behaviours. By strategically limiting land supply or hoarding land for commercial and residential development in their jurisdictions, local governments can ensure that land and property prices continue to rise (Wu 2010; Du & Peiser 2014).

Table 3.2 Summary of Papers Using FF Model

Author	Sample size	Sampling period	Statistical method
Ran Tao *et al.* (2010)	Prefectural level cities data	1999-2003	Panel data analysis
Ye and Wu (2014)	Prefectural level cities data	1999-2009	2SLS, Fixed effect & Random effect panel data analysis
Ye and Wang (2013)	Provincial level data	1999-2009	Fixed effect panel data analysis
He *et al.* (2014)	Prefectural level data	2002-2008	SLM and SEM spatial regression models
Linchtenberg and Ding (2009)	Coastal region provinces data	1996-2004	Panel data analysis
Pan *et al.* (2015)	Provincial level data	1999-2010	PSTR model
Qun *et al.* (2015)	Provincial level data	1999-2008	SYS-GMM estimator
Han and Kung (2015)	Prefecture-level data	1999-2005	OLS and SIV (simulated instrumental variable)
Du and Periser (2014)	Provincial level data	1995-2010	CUE-GMM estimator

3.2.3 A Critical Evaluation of the Two Frameworks

The RTC framework is mainly criticised for lacking descriptive power, because it cannot fully explain the behaviour of local officials. Arable land is converted for urban use regardless of strict regulations and potential penalty imposed by the central government (Han & Kung 2015); Chinese leaders did not apply the cadre management system to encourage growth (Shih *et al.* 2012; Su *et al.* 2012). These are at odds with the empirical findings in Li and Zhou (2005). Most of this strand of literature regards the causality between the 'tournament competition' for growth and the degree of urbanisation as a pre-condition and proceeds to prove that land expansion can contribute to the economic growth (Lin & Ho 2005; Liu *et al.* 2008; Tao *et al.* 2010; Ding & Lichtenberg 2011; He *et al.* 2014). A technical challenge in the attempt to verify this theory is the difficulty of quantifying the likelihood of promotion in the current political system in China.

Following the RTC thesis, what incentivises local officials to exert efforts and thus influences local officials' behaviour is not whether they would actually be promoted or not, but the probability of promotion. To increase the odds of being promoted, local officials exert efforts in different directions, that is, use factional ties, manipulate economic growth rate, and use land as a leverage in ramping up GDP growth. Some preliminary investigations have already been done. Chen *et al.* (2017b) and Cai *et al.* (2017), find that the local leaders' age and the time horizon, which are two important impact factors for promotion probability, influence the local governments' land leasing strategy.

The FF framework considers the complex and unique fiscal and political systems in China and subsequently has a better descriptive power. However, existing studies are limited by technical problems, such as the endogeneity issues associated with using FDI per capita as the proxy of horizontal competition between jurisdictions (Cao *et al.* 2008; Tao *et al.* 2010; He *et al.* 2016; Qin *et al.* 2016). Most importantly, this model does not consider the full range of political incentives and constraints of decision-makers. Although local governments are believed to mostly follow a monotonous target—maximising revenue—in reality, they do not always do so. Therefore, the theory cannot fully explain local governments' land leasing behaviour, especially when there are external shocks like policies from the central government. Recent empirical works show that the land leasing strategy is indeed influenced by politicians' tenure limits and mandatory retirement ages (Cai *et al.* 2017; Chen *et al.* 2017b). Wang and Hui (2017) find that in cities with higher house prices, two-stage auctions are adopted more frequently than English auctions. Such interventionist behaviour results in significantly depressed land prices and house prices. Political connections also violate the FF thesis—local governments usually sell land to politically connected firms at a discount (Cai *et al.* 2013; Wu & Yang 2020). As preliminary as these findings may seem, they certainly indicate an under-researched yet important direction for future study. I therefore proposed my own theoretical framework based on the FF thesis in section 4.3.

3.3 Conclusions and Conceptual Framework

This chapter has introduced the two main theories explaining China's urbanisation and local governments' incentives. An overarching conceptual framework building on the FF thesis is presented in Figure 2.9. It shows that China's current approach to financing urbanisation has been reasonably successful in mobilising the resources that cities needed to grow their economies, build essential infrastructure, and deliver services to the expanding urban

population. It also demonstrates that unlike western countries, where urbanisation is usually fuelled by more spontaneous economic growth or agglomeration, China's urbanisation is driven by local governments' fiscal imperatives and by political competition between jurisdictions. In this process, local governments use land and the laws around it to facilitate the rapid expansion of the urban area and to finance the construction of the large-scale urban infrastructure needed to attract business and industry. These actions echo existing work that (Tao *et al.* 2010; Su *et al.* 2012) discusses the horizontal regional competition thesis.

China's dual system of treating urban and rural land differently enables local governments to sell land at a high price while virtually expropriating it from peasants cheaply. Local governments' monopoly power over land leads to their injecting land-based assets into LGFVs to strength their balance sheet and borrow from the financial market. As a result, leasing income and LGFV capital represent two major funding sources for infrastructure financing. Intensive infrastructure investment drives more urbanisation in surrounding areas, which contributes to local economic growth in a feedback loop. Local officials hope to benefit from this: more urbanisation leads to higher fiscal revenues and greater probability of their promotion.

The findings of the thesis not only address the practical problems associated with China's urbanisation, but help specify the FF thesis in three senses. Under the FF thesis, Chinese local governments are revenue maximisers (Jin *et al.* 2005). The FF thesis-based literature mainly focusses on how fiscal decentralisation leads to China's urbanisation, without seeking to explain the specific means by which local governments can raise finances and their possible externalities or negative consequences (Jin *et al.* 2005; Jia *et al.* 2014; Han & Kung 2015; Wu *et al.* 2015b). This work aims to enhance the explanatory power of the FF framework in specifying it to the facts of China's most recent and large-scale phase of urbanisation.

Figure 3.1 Conceptual Framework of China's Urbanisation under the FF Thesis
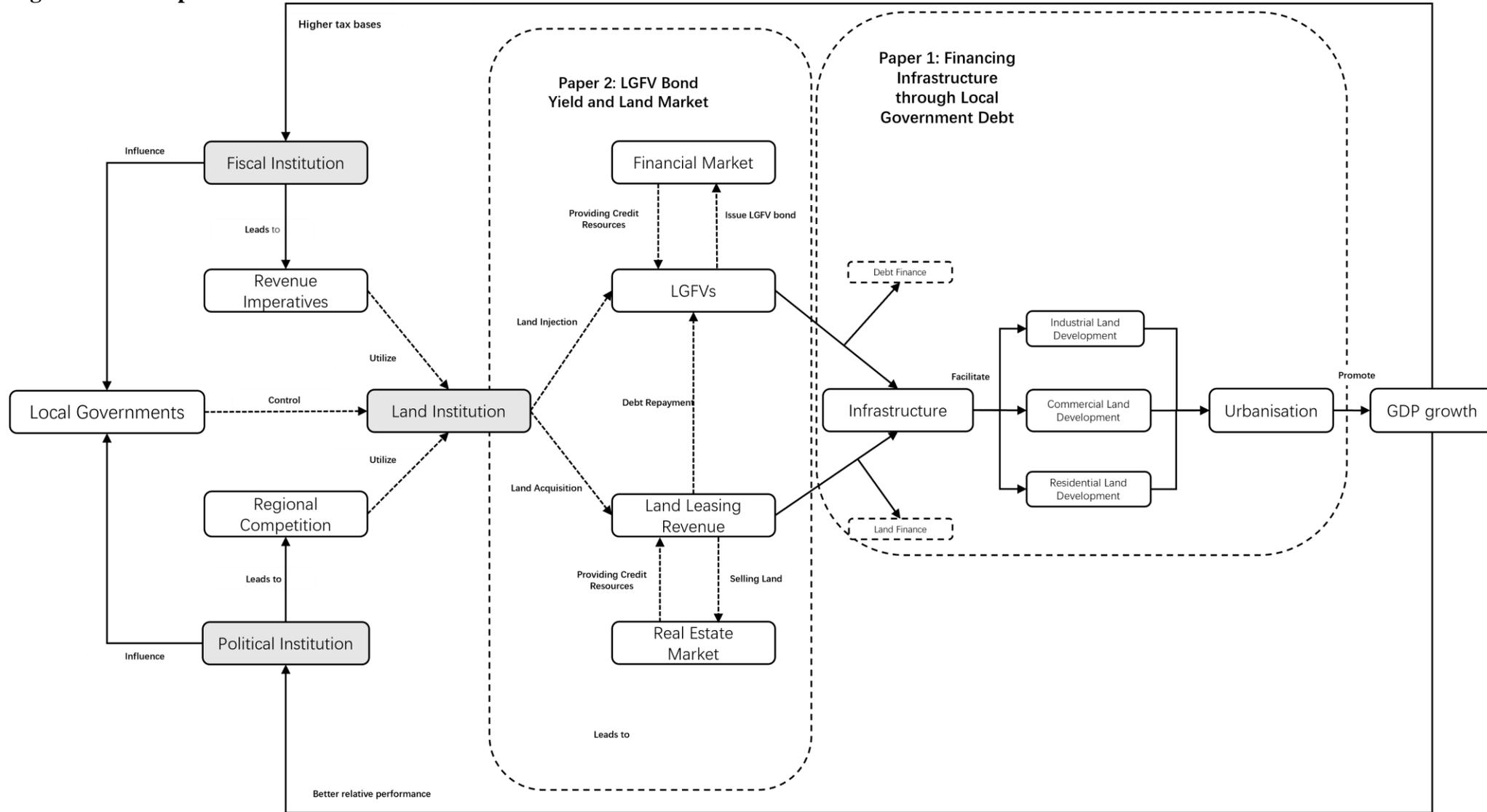
Note: this figure displays the overarching conceptual framework of the thesis.

First, Chapter 4 enhances the explanatory power of FF theory in a new era of urban development. The thesis successfully accounts for how local governments are selling off industrial land cheaply to attract manufacturing industries as a substantial part of future local tax bases (Tao *et al.* 2010; Su *et al.* 2012; Su & Tao 2017). On the other hand, as anticipated, massive investment in infrastructure, particularly airports, rail, and roads, have paved the way for the country's transition to an export-driven economy. In line with the prediction, thousands of industrial parks and development zones were set up in the 2000s, with their scale eventually amounting to a national phenomenon (Zhang 2011; Herlevi 2017; Su & Tao 2017). The FF thesis closely accounts for local governments' development strategy since China's accession to the WTO in 2001, when fixed investment and exports became the main factors for growth (Zhu & Kotz 2011). In May 2020, the Chinese government announced its new development strategy in their latest five-year plan: the dual circulation strategy. This aims to strike a new balance between global integration (i.e. the 'first circulation') and domestic income (i.e. the 'second circulation') (Blanchette & Polk 2020). Under this new plan, aside from land leasing revenue, the debt raised by LGFVs remains a major source for infrastructure financing. The empirical results from Chapter 4 show a positive relationship between debt-financed infrastructure and commercial land development. The findings of this chapter offer evidence that might help refine the FF thesis for this new era: debt-financed infrastructure was built not to accommodate export-led manufacturing, but to support a domestic consumption-led economy.

Second, Chapter 5 elaborates the FF theory by providing the evidence that Chinese style fiscal federalism meets the 'hard budget constraint' (HBC) condition (Montinola *et al.* 1995a). Under the soft budget constraint (SBC), undisciplined local governments will easily over-borrow from the financial market at a low cost, because both the lenders and local governments are expecting the potential bailout from the central government (Montinola *et al.* 1995a; Kornai *et al.* 2003; Ong 2012). The SBC is also detrimental to local governments' incentives to promote growth because the potential bailout removes any fear of the consequence of their choice. Though the early studies like Ong (2012) find that Chinese local governments suffered from the SBC, Chapter 5 finds that their borrowing costs are heterogeneous. The results from Chapter 5 shows that different local governments are borrowing at different costs based on their fiscal soundness, and having a higher land leasing revenue can lower LGFVs' borrowing costs. The findings reveal that Chinese local governments are faced with hard budget constraints in the sense that the local land leasing revenue and economic prosperity ties directly to the borrowing costs of their LGFVs. As local governments' fiscal problems remain their own, the hard budget

constraint provides important incentives for local officials to oversee and ensure their government's fiscal soundness.

Chapter 4

Financing Infrastructure Projects through Local Government Debt in China

4.1 Introduction

Since the beginning of its economic reform in the 1980s, China has been investing heavily in infrastructure projects inside and outside the country. According to the World Bank, China's share of gross fixed capital formation in the GDP increased from 24% in 1990 to 43% in 2018, while its GDP growth rates at an impressive rate over the same period (see Figure 4.1). Although a high level of investment in infrastructure is expected among emerging economics, China's commitment to infrastructure pales in comparison to that of India, Russia, and Brazil (i.e. the rest of the BRIC block), of which the share of gross fixed capital formation in the GDP ranged between 20% to 29% in 2018.

Figure 4.1 Gross Fixed Capital Formation (% of GDP) and National GDP in Trillions (current US$) for Industrialised and Emerging Economies, 1990-2019

Source: The World Bank (https://data.worldbank.org/indicator/NE.GDI.FTOT.ZS and https://data.worldbank.org/indicator/NE.GDI.FTOT.CD).
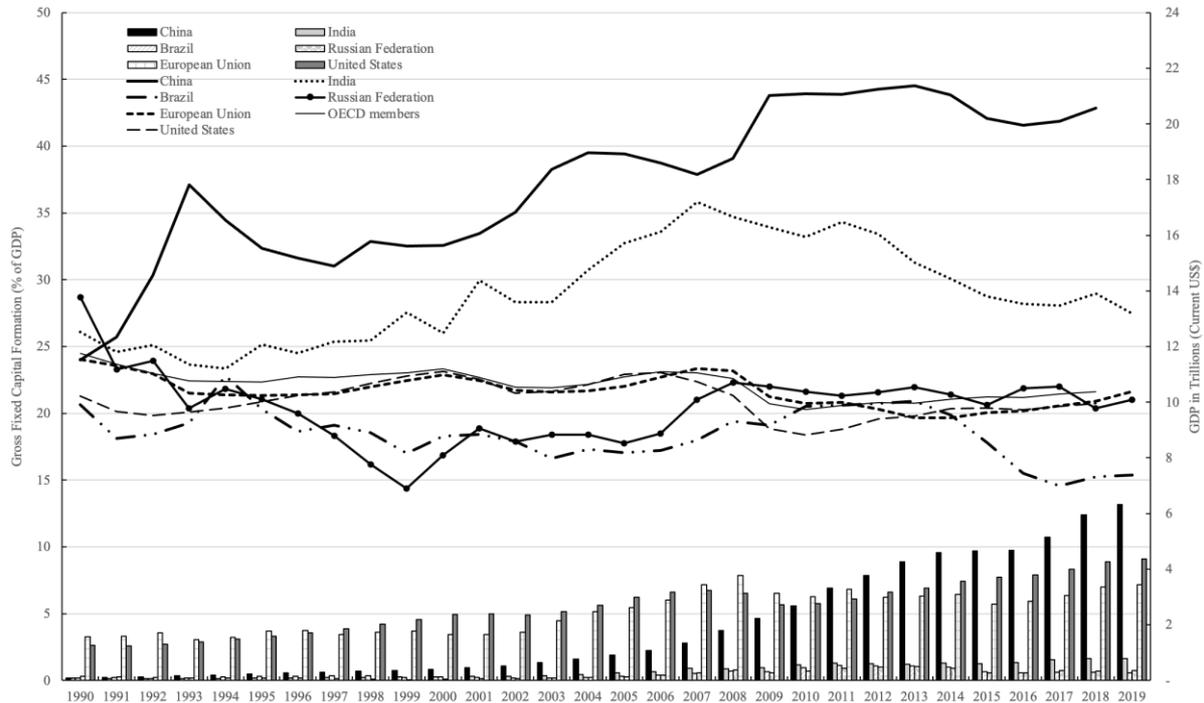
Infrastructure investment is an important tool for the Chinese government to stimulate economic growth (Wu 2010), to counter regional and global economic crises (World Bank 2010), and to promote geopolitical agenda (Mohan & Tan-Mullins 2019). Consequently, infrastructure development has always been a part of the central government's master plans. For example, infrastructure investment in roads and bridges is central to the Belt and Road initiative. Although China has made a significant transition from a central planning system to a market-oriented economy in the last three decades, infrastructure development is still firmly controlled by the central government's 'iron hand'.

In the last two decades, many developing countries have embarked on fiscal decentralisation, transferring the responsibility of public goods provision from central government to local governments (Bardhan & Mookherjee 2006). Much of the responsibilities of infrastructure development has been gradually shifted to the visible hand of local governments. In the context of infrastructure financing, how the local government strategy evolves along with the market-oriented and decentralisation transition in many countries, has always been of the great interest

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to the academia and policymakers (Tsui 2011; Wang *et al.* 2011). This issue is especially prominent in China where the central and local governments work closely in the process of infrastructure-led urbanisation (He *et al.* 2016). The rapid urbanisation and economic development in China have put great pressure on local governments to finance infrastructure development.

Furthermore, the 1994 tax sharing reform transfers the bulk of tax revenues to the centre, leaving local governments with heavy fiscal shortfalls. In less than 20 years, local governments' share of national government revenues has dropped below 40%, while their share of national government expenditure stands above 60% (Fan & Lv 2012; Shen *et al.* 2014). This fiscal institutional change, together with the GDP-orientated cadre evaluation system gives local governments strong incentives to look for extra-budgetary and off-budgetary revenue (Ong 2012).

Land leasing revenue, accounting for the lion's share of extra budgetary revenue, has become an important source of funding for urban infrastructure (Wu 2010; Wang *et al.* 2011; Ding *et al.* 2014; Feng *et al.* 2015). In 2018, the total land leasing revenue in China reached 39.9% of local government revenue. Moreover, local governments have been found to hoard land to control land supply and to raise land price (Du & Peiser 2014). Such a strategy helps local governments collect more revenue from land leasing to fund infrastructure projects (He *et al.* 2014). This practice results in an upward spiral among land prices, land revenue, and infrastructure investment. This phenomenon is referred as 'land finance' in the literature and public media (see, for instance, Fu 2015; Wu *et al.* 2015b; Pan *et al.* 2017).

After the financial crisis of 2008, local government debt has become another important source of fiscal revenue in China. To help the economy recover from the crisis, China introduced an economic stimulus plan in 2009 for large scale infrastructure investment (Shi & Huang 2014). In addition, the central government liberalised the financial market for local governments (Bai *et al.* 2016). Both the countercyclical policy and financial liberalisation opened up effective channels for local governments to secure credit from the financial market for infrastructure investment and development. Even though the 1994 Budget Law prohibited local governments from issuing debt and running a deficit, local governments worked round this law by setting up off-balance sheet financing vehicles known as LGFVs, which are state-owned enterprises that are initially set up by local governments for infrastructure financing and construction, to borrow from banks and bond market (Chen *et al.* 2017a). As a result, China has become the

biggest spender on fixed investment (in absolute value) in the world and the most indebted country among emerging markets (Dobbs *et al.* 2015). Such a debt-driven infrastructure financing fever is referred to by some scholars as 'developing by borrowing' (Pan *et al.* 2017).

Despite the importance of the topic, there has been limited research in the literature to aid the understanding how infrastructure financing works in China. There is some evidence of local governments using land as collateral for municipal debt (see, for example, Wu *et al.* 2016; Jiang & Waley 2018b; Li & Chiu 2018). I find only one empirical study showing that land leasing revenue positively affected local government debt volume between 2009 and 2012 (Pan *et al.* 2017). A considerable research gap still exists regarding local governments' debt financing strategy for infrastructure projects. To bridge this gap in the literature, I develop a theoretical model to investigate how land financing and business activities from the private sector influence local government debt issuing. My theoretical model predicts that, if local governments considered business activities from the private sector in debt issuing decisions, local government debt level should be determined by the land demand for private development. Further a higher level of land finance revenues encourages local governments to borrowing more from the credit market. In the empirical investigation, I focus on the debt raised by LGFVs, as LGFV debts have become the largest component of local government debt in China.

This research contributes to the literature by responding to the call for studies on infrastructure financing in the Global South (O'Brien *et al.* 2019; Whiteside 2019). This is one of the few investigations into alternative funding and financing models of infrastructure projects in China (Tan & Zhao 2019). On the policy front, the findings provide timely assessment of how well the 'iron hand' of the central government and the 'visible hand' of local governments are working together on infrastructure provisions. In May 2020, the Chinese government announced its new development strategy in the latest five-year plan: the Dual Circulation strategy. It is a new balance away from global integration (i.e. the first circulation) and a move towards increased domestic reliance (i.e. the second circulation) (Blanchette & Polk 2020). Such a strategy helps local governments collect more revenue from land leasing to fund infrastructure projects (He *et al.* 2014). Correspondingly, infrastructure development decisions should be more responsive to demand from domestic markets (Buckley 2020). The findings suggest that the reforms of local government debt markets in the last decade has paved the road for this transition.

The rest of the chapter is organised as follows. Section 4.2 presents a review of local government debt and LGFVs in China, followed by the development of a theoretical framework and testable hypotheses in Section 4.3. Empirical evidence is presented and discussed in Section 4.4 and 4.5. The last section discusses the policy implications and conclusions.

4.2 Literature Review

4.2.1 Institutional Background

Chinese political institutions can be described as a 'regionally decentralised authoritarian regime' (Xu 2011), which is a highly hierarchical system that allows the central government to set the criteria for promotion (and demotion) for subordinate governments (province, municipal, and county levels). Since the opening up of the economy in the 1980s, greater weight has been put on local economy growth, which is measured by local GDP growth rate. This results in a GDP-orientated cadre evaluation system. Not surprisingly, local governors are highly motivated to boost the GDP growth in their jurisdiction to compete with their peers (Xu 2011).

Meanwhile, subordinate governments are also granted a high degree of autonomy over local economic activities, as well as the discretion over the use and distribution of local endowments such as land and financial resources. Land and infrastructure are crucial to the growth in productivity and economic development as the former provides the space and the latter facilitates the public services. These haves become two critical factors in many important decisions by local governments under China's GDP-orientated cadre evaluation system. For instance, Pan *et al.* (2017) find that land development is highly correlated with urban growth as a large scale of land has been used for the construction of public infrastructure. Ding *et al.* (2014) note that local governments indicate a tendency to channel a large proportion of land revenue towards growth orientated infrastructure such as urban roads and highways rather than welfare spending. In addition, land revenue has been invested in specific infrastructure that is more likely to attract FDI, which stimulates economic growth indirectly in urban areas (Tao *et al.* 2010; He *et al.* 2014). Such land use strategies in China indeed improve local governors' chances for promotion. Chen and Kung (2016) find that, other things being equal, land leasing is positively related to the likelihood of promotion of city governors. Ultimately, local

governors turn to land leasing to finance urban development and to advance their political career.

4.2.2 LGFVs in the Land and Financial Markets

In the aftermath of the financial crisis in 2008, the central government orchestrated a stimulus plan and credit relaxation, and the Ministry of Finance and China Bank Regulation Committee (CBRC) opened a new channel to provide credit support and encouraged the establishment of LGFVs to invest in infrastructure (Chen *et al.* 2017a). Since then, LGFVs became an active and important player in the land market and a major borrower in the financial market. After the crisis, the central government has gradually opened the market for private projects to LGFVs (Bai *et al.* 2016). To raise funds from banks and bond markets, local governments injected public assets, such as land and budgetary funds, into LGFVs to improve their balance sheets. By doing so, LGFVs could meet the requirements for bond issuance, such as the minimum total net asset volume and the debt-to-equity ratio set by the regulatory department.

As the monopoly supplier in the urban land market in China, local governments can choose between two options of injecting land to LGFVs: state allocation (huabo) and conveyance (churang). Land parcels transferred to LGFVs through state allocation are free but for public use only, such as infrastructure construction or military uses. In addition, the law prohibits state-allocated land from being transferred, leased, or used for mortgage lending.

Land injected through land conveyance is not free but can be used in for-profit projects. LGFVs must pay the fee to secure land use rights from local governments. Land conveyance of land use rights are conducted through tender, auction or listing, with listings accounting for over 70% of all transactions (Huang & Du 2017). In addition to infrastructure projects, LGFVs can use the land purchased from local governments for commercial projects, such as residential or commercial real estate development (Bai *et al.* 2016).

LGFVs also borrowed heavily from the financial market to finance their public and private projects. Before 2009, more than 90% of LGFVs' debt was in the form of bank loans (Bai *et al.* 2016), which were worth 5.57 trillion RMB (Pan *et al.* 2017). Although the average maturity of these loans were three to five years, LGFV projects usually last for decades. To deal with the maturity mismatch, LGFVs' borrowing channel has shifted from bank loans to the bond market since 2013 (Chen *et al.* 2017a). Local government debt in China reached 17.89 trillion

RMB in 2013, which accounted for 31.5% of that year's GDP (Wu *et al.* 2018). The geographical variation and level of local governments' dependence on LGFVs in infrastructure development are illustrated in Figure 4.2.

Figure 4.2 Proportion of LGFV debt in financing of total infrastructure development in China (2009-2017)

4.2.3 Regulations of LGFV debt

LGFV debt, which are essentially local government debt, can expose the central and local governments to substantial systematic risks. First, LGFVs are established to be off-budget entities of local governments and are run as a corporate entity. The lack of transparency and accountability in LGFVs could be detrimental to the financial system. Second, although local governments are monitored and controlled to ensure they operate under a (fiscal) budgetary deficit, LGFVs as separate entities are not limited to a deficit budget. In addition, local governments have reserved a proportion of fiscal revenues for LGFVs' solvency of their debts. Therefore, the rapid accumulation of local government debt has become a prominent concern for the central government.

In response to the growing risks associated with the inflated local government debt volume, the central government released a series of regulations. In 2010 and 2013, two nation-wide audits were carried out by the National Audit Office to identify and classify the outstanding amount of local government debt. In a document issued in 2013, the organisational department of the China Communist Party included 'the outstanding of local government debt' as a critical criterion for local cadres' promotion. In 2014, the State Council issued the 'No.43 Document' that imposed strict restrictions on LGFVs regarding initiating new debt. Meanwhile, the organisational department included municipal debt outstanding amount as a criterion in the cadre evaluation system. These regulations from the central government have resulted in some fundamental changes in LGFVs' debt financing strategy, which in turn changed local governments' willingness to invest infrastructure and the financial environment. In 2015, the Amended Budget Law took effect and allowed local governments to raise new debt. Afterwards, the Ministry of Finance initiated a large-scale debt swap program, under which a considerable amount of LGFV debt could be swapped by general obligation municipal bonds issued by the central government. This reduced the financial risk associated with local government debt.

Table 4.1 Measures and policies aimed at curbing surging debt volumes

Date	Regulations	Content
Dec 2010	Nation-wide debt auditing	Identify and classify the volume of outstanding local government debt
Jun 2013	Nation-wide debt auditing	Identify and classify the volume of outstanding local government debt
Dec 2013	Notice on the improvement of the evaluation of leading cadres and leadership ranks of local party and government administration	Incorporate the debt outstanding into the cadre evaluation system
Oct 2014	Document 43 issued	Formally restrict LGFVs from borrowing to fund new investment
Jan 2015	Amended Budget Law took effect	Granted local governments the right to raise debt on their own behalf
Dec 2015	Debt swap program[11]	Swapped 1 trillion or 54% of fully guaranteed debt

4.3 Theoretical Framework

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11 http://www.gov.cn/gongbao/content/2016/content_5059103.htm

In line with the FF thesis, this study develops a two-period model to describe local governments' behaviour of infrastructure financing [12]. In this two-period cycle, local governments aim to develop infrastructure with a target (denoted by Q), while choosing optimal land allocation to maximise land revenue. In the infrastructure study, Q is usually measured by the area of land for infrastructure development, with the unit cost k.

In the first period, the local government aims for infrastructure development target Q_1, and thus the infrastructure investment can be calculated as kQ_1. The local government balances the fiscal expenditure including the support to industrial development I_1 with unit subsidies s, by using land finance (LF_1) and debt finance (D_1), as described in the equation below.

$$LF_1 + D_1 = kQ_1 + sI_1 \ ,$$

where the land revenue mainly comes from the leasing of commercial and residential lands, that is, $LF_1 = n_1C_1 + p_1R_1$ where n_1 and p_1 are the prices of commercial and residential lands respectively. Industrial land leasing is not included in this calculation because it doesn't generate positive revenue (e.g. the land price is equal to or less than the cost of land clearance). This is because local governments in China have been keeping industrial land prices low, sometimes selling them for free or at a net loss, to boost local economic growth (Cao *et al.* 2008).

In the second period, the local government aims for infrastructure development Q_2 so that $Q_1 + Q_2 = Q$. The local government intends to maximise the fiscal balance, which comprises the land revenue $LF_2 = n_2C_2 + p_2R_2$, infrastructure investment kQ_2, and support to industrial development with subsidies sI_2. The final fiscal balance is

$$V_2 = LF_2 - kQ_2 - sI_2 \ .$$

Following Cai and Treisman (2005), the total productivity of a city is determined by the public and private investments. Specifically, assuming a Cobb-Douglas productivity function as follows.

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[12] It should be noted that if increased debt raises financing costs to above equilibrium, due to the tournament political competition, the local officials may want to still invest in development projects. The political structure is not modelled and perhaps it could change actions taken by local officials.

$$Y_t = AQ^\sigma I^\alpha C^\beta \, ,$$

where $A > 0$ denotes multi-factor productivity capturing the effect of the local endowment on the output, Q, I and C represent the stock of infrastructure, industrial, and commercial development respectively. $A, \beta, \sigma > 0$, and $\alpha + \beta + \sigma < 1$ indicates decreasing returns to scale. With log-linear approximation, the growth rate of total productivity for each period is

$$y_t \equiv \ln\frac{Y_t}{Y_{t-1}} \approx \left[1 + \sigma\frac{Q_1}{Q} + \alpha\frac{I_1}{I} + \beta\frac{C_1}{C}\right] \, ,$$

Where Q, I and C represent the stock of infrastructure, industrial, and commercial development at time t-1, respectively. Q_1, I_1 and C_1 are the flow of infrastructure, industrial and commercial development at time t, respectively. In the short run, land prices grow as wages and productivity improve (Roback 1982). In this case, land prices change at the rate of y_t in each period. For example, the prices of commercial land from period 1 to period 1 becomes

$$n_2 = n_1\left[1 + \sigma\frac{Q_1}{Q} + \alpha\frac{I_1}{I} + \beta\frac{C_1}{C}\right] \text{ and } p_2 = p_1\left[1 + \sigma\frac{Q_1}{Q} + \alpha\frac{I_1}{I} + \beta\frac{C_1}{C}\right].$$

Meanwhile, land is non-renewable and a limited resource. The local government faces land budget constraints for commercial development, that is, $C_1 + C_2 = N$.

Thus, the local government in the second period has the fiscal balance

$$V_2 = n_2 C_2 + p_2 R_2 - kQ_2 - sI_2$$

$$= n_1\left[1 + \sigma\frac{Q_1}{Q} + \alpha\frac{I_1}{I} + \beta\frac{C_1}{C}\right](N - C_1) + p_1\left[1 + \sigma\frac{Q_1}{Q} + \alpha\frac{I_1}{I} + \beta\frac{C_1}{C}\right]R_2 - k(Q - Q_1) - sI_2$$

From first order condition, I have

$$\frac{\partial V_2}{\partial C_1} = n_1\left[\left(\frac{\sigma n_1}{kQ} + \frac{\beta}{C}\right)(N - c_1) - \left(1 + \sigma\frac{LF_1 + D_1 - sI_1}{kQ} + \alpha\frac{I_1}{I} + \beta\frac{C_1}{C}\right)\right] + \frac{\beta}{C}p_1 R_2 + n_1 = 0.$$

With some arrangements, the equation becomes

$$(1)\ \frac{\beta}{C}p_1 R_2 + \left(\frac{\sigma n_1}{kQ} + \frac{\beta}{C}\right)n_1 N - n_1\sigma\frac{D_1}{kQ} = n_1\left\{\sigma\frac{LF_1}{kQ} - \left(\frac{\sigma s}{kQ} - \frac{\alpha}{I}\right)I_1 + \left(\frac{\sigma n_1}{kQ} + \frac{2\beta}{C}\right)c_1\right\}.$$

Taking derivatives (w.r.t. D_1, LF_1, I_1, C_1, R_1) on both sides, I obtain

(2) $-\frac{\sigma}{kQ}dD_1 = \frac{\sigma}{kQ}dLF_1 + \left(\frac{\alpha}{I} - \frac{\sigma s}{kQ}\right)dI_1 + \left(\frac{\sigma n_1}{kQ} + \frac{2\beta}{C}\right)dC_1.$

The maximum debt that the local city government can raise in a given period (e.g. a quarter) is regulated by provincial government with a quota system (Huang and Chan, 2018). In this two-period model, the debt quota is assumed to be D, that is, $D_1 + D_2 \leq D$. Meanwhile, the rate of national treasury bond has been declining and money supply (M2) has been increasing in China. As a result, local government debt becomes a popular option to raise funds. Most local governments try to use up all the quota, and equation (2) becomes

(2a) $\frac{\sigma}{kQ}dD_2 = \frac{\sigma}{kQ}dLF_1 + \left(\frac{\alpha}{I} - \frac{\sigma s}{kQ}\right)dI_1 + \left(\frac{\sigma n_1}{kQ} + \frac{2\beta}{C}\right)dC_1.$

This gives the following propositions that captures the role of land finance and the private sector in local governments' debt financing of infrastructure development.

(i) $\frac{\partial D_2}{\partial C_1} = n_1 + \frac{2\beta}{C}\frac{kQ}{\sigma} > 0$. This suggests that commercial development in the current period has a positive effect on local government debt issued in the next period. Specifically, the commercial sector affects the local government debt through two channels, that is, immediate contribution to land revenue (through n_1) and potential contribution to productivity (through $\frac{2\beta}{C}\frac{kQ}{\sigma}$).

(ii) $\frac{\partial D_2}{\partial I_1} = \frac{kQ}{\sigma}\left(\frac{\alpha}{I} - \frac{\sigma s}{kQ}\right) < 0$ when $\frac{\alpha}{I} - \frac{\sigma s}{kQ} < 0$. This condition reflects the industrial sector and affects the local debt through two channels, that is, positive contributions to productivity (through $\frac{\alpha}{I}$) and negative contribution to land revenue (through $-\frac{\sigma}{kQ}s$)[13]. The condition is equivalent to compare $\frac{\alpha}{s}\frac{1}{I}$ and $\frac{\sigma}{k}\frac{1}{Q}$. First, $Q < I$ as Chinese cities have promoted industrial development for the past decades. Second, $\frac{\alpha}{s}$ and $\frac{\sigma}{k}$ represents the ratio of the productivity to the cost when investing in industry and infrastructure, respectively. The infrastructure development shows a substitute effect as it brings enhances efficiency and boosts local economy compared to industrial development in China (Shi & Huang 2014). The condition

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[13] We could consider $LF_1 - sI_1$ as the total revenue of land leasing in the first period.

$\frac{\alpha}{I} - \frac{\sigma s}{kQ} < 0$ thus is almost true, and the inequality indicates the industrial development in the current period has a negative total effect on the local government debt in the next period.

(iii) $\frac{\partial D_2}{\partial LF_1} = 1$. The positive value indicates that land finance in the current period positively affects local government debt issued in the next period. On one hand, the local government has discretion on the land supply. A higher land revenue indicates a larger demand for fund for infrastructure development (Ding *et al.* 2014; Pan *et al.* 2017). As land leasing offers an effective channel to obtain quick cash to bridge funding gaps, land revenue is more flexible than tax revenue in the short run. For the debt loaner, land revenue signifies an additional fund to debt solvency. On the other hand, a higher land revenue shows higher land demand and larger investments from the private sector. It signals that the private sector holds optimistic anticipation regarding economic growth. The development of this sector would improve tax revenue in the long run. The strong market expectation also enhances the debt loaner's confidence in the local government's repayment ability.

Because the residential sector is not included in the production equation $Y_t = AQ^\sigma I^\alpha C^\beta$, equation (2a) shows no direct implications on the role of residential sector. However, the boom in China's residential real estate market causes resources misallocation between real estate and other sectors in the economy. Specifically, the residential real estate sector in China has a strong crowding-out effect on non-real estate investment (Chen & Wen 2017). Lenders favour residential real estate development projects because they offer higher returns than other industries (Allen *et al.* 2019). Due to this crowding-out effect, I expect a negative (albeit indirect) relationship between residential land transaction and debt for infrastructure investment. Based on the three propositions derived from equation 2(a) of Section 3.3 and the analysis on the residential real estate sector, I derive four hypotheses.

Hypothesis 1A: The land acquired by the industrial sector negatively affects the amount of local government debt devoted to infrastructure development.

Hypothesis 1B: The land acquired by the residential sector negatively affects the amount of local government debt devoted to infrastructure development.

Hypothesis 1C: The land acquired by the commercial sector positively affects the amount of local government debt devoted to infrastructure development.

Hypothesis 2: The land finance positively affects the amount of local government debt devoted to infrastructure development.

Specifically, Hypothesis 1 regards the roles of the private sector while Hypothesis 2 regards the role of land finance in the debt dynamics of local governments. The empirical verification of my theoretical model and the hypotheses are given in the next section.

4.4 Empirical Implementation

I collect data from WIND database and the Land Registry to facilitate the empirical analysis. The data set covers 33 major cities[14] in China between 2009 and 2017, because LGFV activities were limited before 2009. Variable definitions and descriptive statistics of all variables are shown in Table 4.2. All data are in quarterly frequency.

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[14] The 33 cities are selected from the list of 35 major cities excluding Lhasa and Ürümqi. The list is defined by National Bureau of Statistics in China.

Table 4.2 Variable definitions and descriptive statistics

Variable	Definition	Data Source	Mean	Std. Dev	Min	Max
InvCF	The cash outflow of LGFV investments in a city	WIND	61.83	110.94	0.00	1125.36
OpCF	The cash inflows of LGFV operating activities in a city	WIND	2.48	12.48	-84.25	91.42
GCF	Gross cash flow of LGFVs in a city, $GCF = InvCF - OpCF$	WIND	59.36	111.45	-21.46	1176.66
IndTran	Total industrial land sale area	WIND	121.30	154.65	0.00	1487.35
ResTran	Total residential land sale area	WIND	107.69	131.21	0.00	1644.39
ComTran	Total commercial land sale area	WIND	29.83	35.86	0.00	316.55
IndRev	Total industrial land revenue	WIND	0.56	0.76	0.00	7.65
ResRev	Total residential land revenue	WIND	8.17	11.35	0.00	94.34
ComRev	Total commercial land revenue	WIND	2.01	3.68	0.00	38.58
TotalRev	Total land revenue	WIND	10.74	13.69	0.00	110.40
r	Capital cost, the national basic lending rate	WIND	6.24	0.91	4.76	8.06
Indpr	Log land price of industrial sector in a city	WIND	6.52	0.46	5.53	8.31
Respr	Log land price of residential sector in a city	WIND	8.48	0.90	6.44	11.11
Compr	Log land price of commercial sector in a city	WIND	8.85	0.83	6.82	10.91
FIP	Change in the price index of fixed investment	WIND	0.01	0.03	-0.08	0.10
GDP	GDP growth rate in a city	WIND	0.03	0.09	-1.01	0.69
FisRev	The local government's budgetary revenue collected in a city	WIND	21.50	26.29	0.28	213.10
slope	The average slope of terrain in a municipality	GIM cloud (http://www.dsac.cn/DataProduct/Detail/200803)	2.15	1.71	0.06	5.77
crp	The corruption index measured by the total misconduct by officials divided by the total officials in each province	Annual Report on the work of each province's procuratorate	0.00	0.00	0.00	0.01
lhp	Log of the house price in a city	WIND	9.15	0.51	7.89	10.92

4.4.1 The Measurement of LGFVs for Infrastructure Development

To test the hypotheses in Section 4.3, I need a reliable measurement of local government debt for infrastructure development. Some exiting studies use LGFV bonds as the proxy, and the data between 2009 to 2017 is available (see, for example, Pan *et al.* 2017). Technically, LGFV bonds should be primarily used for infrastructure projects. In practice, it is not the case as a part of the fund raised in LGFV bonds are often used for commercial development or for public spending (Bai *et al.* 2016). It is difficult to distinguish the proportion of LGFV bonds for infrastructure financing from other uses, because such information is not available to public. Consequently, LGFV bonds are not reliable measurements of LGFV debt that were used for infrastructure development.

To address this issue, I use cash flow data of LGFVs to reliably identify the proportion of funds used for infrastructure development, because cash flow data provides micro-level accounting information that is subject to annual auditing. The data on LGFVs' cash flow is collected from the WIND database. This study's procedure involves three steps to obtain the estimate of the debt that the local government raised for total infrastructure investment.

The first step is to obtain the cash outflow of investments (InvCF). Under China's accounting standards, it consists of four sub-accounts: 1) cash paid for purchasing and constructing fixed assets, intangible assets, and other long-term assets, 2) cash paid for investment, 3) net cash paid for acquiring subsidiaries and other business units, and 4) cash paid for activities related to investment. The first sub-account records the cash outflow related to LGFVs' infrastructure investment. I include the other three as it is common practice for LGFVs to manipulate accounts and require their subsidiaries to construct infrastructure in retrospect.

The second step is to calculate the cash inflow of operating activities (OpCF) that contains several sub-accounts. The largest sub-account is cash inflow from selling goods and providing services, which represents LGFVs' real earning under the cash basis accounting system. By using this sub-account, I can estimate the cash inflow related to commercial earning. The rationale behind this practice is that, only commercial activities can generate cash inflows, while most of infrastructure projects cannot produce cash inflow into LGFVs' account. The constructed infrastructure will be transferred from construction in process into accounts receivable and will be kept on the balance sheet generating zero cash inflow until the local government pays and takes it over.

Finally, I calculate the gross investment cash flow of LGFVs (GCF) as the difference between the cash outflow of investments and cash inflow of operating activities, that is, $\text{GCF} = \text{InvCF} - \text{OpCF}$. This forms the measurement of the debt that the local government raised for total infrastructure investment in a city.

4.4.2 The Measurement of Land Finance and Investment from the Private Sector

I obtain data from the Land Registry to measure land finance and investments from the private sector. To gauge investment activities of the private sector, I obtain data on land acquisition in the industrial, residential, and commercial sectors (denoted as IndTran, ResTran, ComTran, respectively, as defined in Table 2).

The measurement of land finance is challenging. I consider three alternative measurements. The first variable is the total revenue of land leasing (TotalRev). It is the overall leasing revenue of industrial (IndRev), commercial (ComRev) and residential (ResRev) land and is commonly used in the land finance literature (Pan *et al.* 2017). I also construct two variables to quantify land finance (LandFin). The first is the ratio of the total land revenue to the total budgetary revenue of the local government (Land2Fis). This ratio measures the fiscal reliance of local governments on land revenue (Mo 2018). In addition, land revenue to GDP (Land2GDP) is adopted as an alternative measurement to Land2Fis (Mo 2018). Land2Fis and Land2GDP are better measurements of local governments' reliance on land sale revenues because they are less influenced by the economic scale of each province. They also alleviate potential multicollinearity issues by simultaneously including both land transaction volume and revenue in the model.

4.4.3 The Model

With the variables defined above, I estimate the following equation

$$\text{GCF}_{i,t} = \alpha_0 + \alpha_1 \text{IndTran}_{i,t-1} + \alpha_2 \text{ResTran}_{i,t-1} + \alpha_3 \text{ComTran}_{i,t-1} + \delta \text{LandFin}_{i,t-1} + \boldsymbol{\varphi} \mathbf{X}_{i,t-1} + T_t + S_t + \varepsilon_{i,t}$$

where i and t denote city and time, respectively. $\mathbf{X}_{I,t}$ is a matrix of variables that controls for factors likely to affect the dependent variable. It includes the change in the price index of fixed investment ($\text{FIP}_{I,t}$), capital cost (i.e. the lending rate r_t), GDP growth rate at the city level

($GDP_{I,t}$), the log prices of residential, industrial, and commercial land at the city level (Land price$_{I,t}$), and fixed effects including year effect (T_J) and seasonal effect (S_K). The details are provided in Table 2.

To test Hypotheses 1A through 1C, I expect that $\alpha_1 < 0$, $\alpha_2 < 0$, and $\alpha_3 < 0$. For Hypothesis 2 to be true, the coefficient estimates of LandFin$_{I,t-1}$ should be positive.

4.5 Empirical Findings

4.5.1 Fixed-effect Panel Regression Estimations

I first estimate both fixed-effect and random-effect panel regression models with clustered standard errors at the city level. The Hausman test suggests that fixed-effect models fit the data better. Thus, my discussions are based on the fixed-effect panel regression outputs in Table 4.3.

First, the coefficients of IndTran and ResTran are negative while that of ComTran is positive. This supports Hypothesis 1. The three sectors, however, consider weak impacts on the local government debt as none of the coefficients are statistically significant. In other words, the local government did not take the future development of the private sector into account when using debt financing. Second, the coefficients of the three land finance measurements, that is, TotalRev, Land2Fis and Land2GDP are positive and statistically significant at 10%. The results support Hypothesis 2 that the land finance positively affects the local government debt.

Table 4.3. Estimation outputs of panel regression (Dependent variable: GCF)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
$IndTran_{i,t-1}$	-0.071	-0.071	-0.070	-0.063	-0.072
	(0.051)	(0.051)	(0.052)	(0.051)	(0.051)
$ResTran_{i,t-1}$	-0.020	-0.001	-0.033	-0.048	-0.019
	(0.023)	(0.023)	(0.032)	(0.035)	(0.025)
$ComTran_{i,t-1}$	0.135	0.131	0.129	0.159	0.153
	(0.132)	(0.134)	(0.135)	(0.138)	(0.136)
$Land2Fis_{i,t-1}$	6.083*				
	(3.349)				
$Land2GDP_{i,t-1}$		70.879*			
		(41.597)			
$TotalRev_{i,t-1}$			1.023***		
			(0.242)		
$ResRev_{i,t-1}$				1.393***	
				(0.324)	
$ComRev_{i,t-1}$					-0.353
					(0.508)
$FIP_{i,t-1}$	374.766***	373.272***	336.834***	336.477***	380.5796***
	(85.008)	(85.234)	(84.739)	(82.658)	(88.393)
$r_{i,t-1}$	-14.354***	-13.890***	-13.487***	-13.119***	-14.645***
	(4.448)	(4.369)	(4.353)	(4.295)	(4.268)
$GDP_{i,t-1}$	0.267	1.601	-1.233	-1.444	0.40763
	(16.156)	(15.880)	(15.802)	(15.476)	(16.271)
$indpr_{i,t-1}$	35.156	35.415	31.103	33.260	37.332
	(52.260)	(52.177)	(50.177)	(48.841)	(53.360)
$respr_{i,t-1}$	33.470	33.840	27.040	26.323	32.888
	(27.813)	(27.852)	(26.522)	(26.125)	(28.193)
$compr_{i,t-1}$	-25.845	-26.165	-17.635	-16.038	-27.979
	(27.830)	(27.374)	(27.618)	(27.781)	(27.273)
Seasonal FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Wald-test	4.13***	6.07***	10.79***	11.71***	7.98***
Hausman test	30.90**	29.21**	53.64***	30.16**	6.21
# of obs.	1146	1155	1155	1155	1155

Notes: significance levels: *** p<0.01, ** p<0.05, * p<0.1. The standard errors are clustered at the city level and shown in parentheses.

I further explore the data by including the revenue from residential land leasing (ResRev) and commercial land leasing (ComRev) separately in the model. On average, residential land revenue accounts for 70% of total land revenue while commercial land revenue takes up 20%. The industrial revenue is excluded as previous studies show that Chinese local governments

have controlled industrial land prices to sell land to the private sector at low price, and sometimes even for free or at a net loss to boost local economic growth (Cao *et al.* 2008). Models 4 and 5 show that ResRev positively and significantly affects the local debt while ComRev negatively but insignificantly affects the local debt. The possible reason for the latter is that the commercial land revenue is not a major source for local governments to finance infrastructure. The findings of land revenue are similar to those of land finance reliance, and support Hypothesis 2. A higher level of land finance would lead to a higher level of local government debt financing for infrastructure.

4.5.2 Instrumental Variable Estimations

As LGFV debt and land finance are under the control of local governments, the estimations may be biased by endogenous variables calculated based on land revenue (i.e. TotalRev, Land2Fis, and Land2GDP). To address this issue, the instrumental variable (IV) approach is employed to re-estimate the models.

Following the strategy for instrumenting land revenue in the study of local governance and politics in Chen and Kung (2016), I select several proxies to instrument the supply and demand. First, land suitable for commercial and residential development in a city serves as a suitable candidate to instrument the supply. I use the average slope of terrain (slope) as the IV. House prices (lhp) are adopted as the IV for land demand. I also include the interaction between house price and terrain slope for the IVs. In addition, land transactions are found to be distorted by government corruption (Chen & Kung 2016). Hence, the interaction between house prices and corruption index (crp) is employed as an additional IV for land revenue. The data for house prices and slopes are collected from the WIND database.

The two-stage (2SLS) estimation within fixed effect panel model is applied for the IV regression. To confirm my identification strategy, I regress both the dependent variable and endogenous land finance by the instrumental and control variables in the first stage of the model. The standard errors are clustered at the city level. I found an insignificant relationship between the dependent and IVs while significant relationships between land finance and IVs. This suggests that these two IVs are valid.

In the second stage, GCF is regressed on the predicted values of land revenue from the first stage estimation and control variables. I report the results in Panel A in Table 3. The IV

estimations show some improvements over the OLS panel regression results in Table 4.4. First, the results of IV regression are consistent with the results of panel regression. The point estimates (absolute value) of 2SLS are greater than those of OLS, which suggests that OLS estimate is likely to be downward biased. I find a negative effect from the industrial and residential sectors, and a positive effect from the commercial sector on local government debt for infrastructure development across five models. The findings are consistent with Hypothesis 1. However, only the coefficients of ResTran are significant at the 10% level in model (III) and (IV). Overall, the support to Hypothesis is weak. Second, all instrumented land finance variables except for ComRev show that the land finance significantly and positively affects the local government debt; Hypothesis 2 is true.

4.5.3 Evidence of Structural Changes

As discussed in Section 2.3.1, the two documents ('Document 43' and 'Notice on the improvement of the evaluation of leading cadres and leadership ranks of local party and government administration') significantly changed local governments' borrowing behaviours. It is possible that there was a structural break around 2013. Thus, the five models in the Panel A of Table 4.3 are re-estimated by using the subsamples between 2013-2017. The results are reported in Panel B in Table 4.4.

The subsample results suggest that land finance significantly and positively affects local government debt in Models I through III. The results are consistent with those of the full sample. The patterns of the private sector are consistent with those of the full sample as well. Industrial and residential sectors negatively influence while the commercial sector positively influences the local government's debt financing for infrastructure development across the six models. The direction, relative magnitude, and statistical significance of the effects of land finance remains the same as in the full-sample models.

Furthermore, the effects of residential and commercial sectors become significant in Models I through IV. This supports Hypothesis 1B and 1C. The difference in significance of coefficients of the private sector between the sub-sample and full sample indicates that 'Document 43' reshaped local governments' strategy in infrastructure financing. After 2013, local governments' debt financing of infrastructure projects is more responsive to activities of the private sector in their cities. Specifically, local governments consider the future development

of the commercial and residential sectors because the former enhances debt solvency through tax revenue in the long run and the latter crowds out other sectors from capital markets.

In summary, both the public and the private sectors affect local government debt issuing for infrastructure financing. For the public sector, land finance propels the debt level, and the pattern is not affected by the local government debt market reform around 2013. The influence from activities in the private sector (i.e. the residential and commercial real estate markets), on the other hand, is only significant after 2013. Although the theoretical model implies the industrial development should restrict the local governments' debt financing, the data shows the industrial sector has small, negative impacts on local government debt.

Table 4.4 Estimation results of the second stage of 2SLS model within fixed effect panel

Model	Panel A: Sampling period 2009Q1-2017Q4					Panel B: Sampling period 2013Q3-2017Q4				
	(I)	**(II)**	**(III)**	**(IV)**	**(V)**	**(I)**	**(II)**	**(III)**	**(IV)**	**(V)**
$IndTran_{i,t-1}$	-0.063	-0.063	-0.065	-0.050	-0.078	-0.134	-0.128	-0.099	-0.084	-0.082
	(0.060)	(0.056)	(0.053)	(0.052)	(0.056)	(0.098)	(0.097)	(0.093)	(0.092)	(0.103)
$ResTran_{i,t-1}$	-0.176	-0.133	-0.115*	-0.133*	-0.016	-0.292**	-0.371**	-0.310***	-0.315***	-0.213
	(0.110)	(0.081)	(0.066)	(0.071)	(0.053)	(0.138)	(0.195)	(0.113)	(0.117)	(0.238)
$ComTran_{i,t-1}$	0.039	0.042	0.106	0.178	-0.171	0.391**	0.372**	0.489**	0.591***	-0.397
	(0.145)	(0.146)	(0.142)	(0.145)	(0.267)	(0.205)	(0.187)	(0.204)	(0.218)	(0.947)
$Land2Fis_{i,t-1}$	76.442**					115.818*				
	(40.518)					(61.96)				
$Land2GDP_{i,t-1}$		576.937**					809.436**			
		(297.012)					(422.886)			
$TotalRev_{i,t-1}$			2.651**					2.930**		
			(1.122)					(1.169)		
$ResRev_{i,t-1}$				3.180**					3.212**	
				(1.464)					(1.361)	
$ComRev_{i,t-1}$					12.514					26.743
					(12.517)					(31.881)
$FIP_{i,t-1}$	326.533***	347.125***	273.020***	284.590***	247.702**	-476.475	-514.661	-19.761	-17.844	-308.299
	(116.956)	(93.222)	(89.092)	(97.734)	(98.743)	(377.137)	(362.291)	(133.118)	(130.248)	(519.167)
$r_{i,t-1}$	-4.549	-8.739	-11.6972**	-11.2064**	-13.405**	42.344	50.272	13.038	10.991	29.075
	(8.323)	(5.955)	(4.700)	(4.904)	(5.234)	(35.511)	(34.572)	(10.967)	(11.132)	(26.453)
$GDP_{i,t-1}$	-0.202	10.503	-3.75968	-3.749	-1.541	40.369	97.738	4.751	2.619	22.569
	(17.686)	(17.09)	(15.212)	(15.316)	(17.515)	(51.999)	(79.548)	(26.055)	(24.745)	(43.782)
$indpr_{i,t-1}$	34.596	37.948	28.088	32.178	15.986	107.642	110.598	96.552	90.849	132.681
	(52.881)	(53.249)	(50.113)	(48.465)	(49.689)	(68.261)	(74.523)	(59.515)	(59.308)	(104.517)
$respr_{i,t-1}$	18.822	18.664	21.746	22.022	20.900	46.541	45.096	58.541	60.555	42.954
	(30.749)	(30.673)	(27.674)	(28.196)	(27.494)	(49.927)	(49.692)	(46.568)	(45.874)	(67.123)
$compr_{i,t-1}$	-13.479	-13.378	-11.144	-10.411	-14.398	-41.796	-40.043	-45.300	-45.060	-50.505
	(32.726)	(33.143)	(29.65)	(29.384)	(31.367)	(46.022)	(46.014)	(32.509)	(31.268)	(53.105)
Seasonal FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wald-test	684.03***	1388.54***	3352.73***	3506.90***	3208.29***	1393.22***	2950.52***	726.07***	746.44***	987.07***
# of obs.	1146	1155	1155	1155	1155	594	594	594	594	594

Notes: significance levels: *** p<0.01, ** p<0.05, * p<0.1. The standard errors are clustered at the city level and shown in parentheses.

4.6 Policy Implications and Conclusions

One of the most important roles of public policy is the provision of public goods and infrastructure (Collier & Venables 2017). This is a challenging undertaking for developing countries, where local and central governments often face tight financial constraints. In China, local governments have been using the land-value capture model to finance infrastructure projects. Although this strategy served China's rapid urbanisation process well in the past, there has been widespread concern about the potential systematic risk resulting from the land finance model. Local governments are under pressure to find alternative funding sources.

In the last decade, local government debt, particularly LGFV debt, has become an important source to finance infrastructure development in China. Ideally, the use of land leasing revenue will reduce the total cost of infrastructure projects as it does not involve interest payment. The interest payment of local government debt should be justified by tax revenues generated from infrastructure-supported activities from the private sector. A well-balanced 'capital structure' of infrastructure projects is a good mix to ensure healthy land leasing revenue (i.e. the equity) and local government debt (i.e. the debt part), such that local governments are neither over-reliant on land leasing revenue nor overburdened by debt interest payment.

Given the outstanding levels of local government debt after the 2008 global financial crisis, it is important to investigate whether local government debt issuing is responsive to activities in the private sector. The analysis of LGFV data between 2009 and 2017 shows a positive relationship between land finance and local government debt for infrastructure development throughout the sampling period. This relationship became slightly stronger after stricter regulations on local government debt announced between 2013-2014. On the other hand, local government debt issuing response to the private sector was weak before the tightening of local government debt in 2013/14 and has become stronger and wider since then. During the 2013-2017 subsampling period, local government debt was positively affected by the commercial development, and negatively affected by the residential development. The relationship between local government debt level and the industrial sector remains insignificant throughout the whole sampling period.

The empirical results suggest that not only is the visible hand of local governments working creatively to meet infrastructure development targets handed down by the 'iron hand' of the central government, but local governments are also becoming more effective by considering

private sector activities in their debt issuing decisions. The regulations of local government debt issuance released in 2013-14 are the triggers of such responsiveness to market information. Although this transformation has not been completed across all sectors, it does suggest that the financing model of infrastructure projects is heading in a promising direction.

This study is a response to the call for further infrastructure financing research from the Global South in general. I provide both a theoretical model and empirical evidence of the complex relationship between local government debt issuing for infrastructure financing, land finance, and demand from the private sector in China. More importantly, this study also has significant policy implications to the Dual Circulation economic development strategy, which is an essential part of the latest Five-Year Plan accounted for in May 2020 (The People's Daily 2020). This requires the funding, financing, and management of infrastructure projects to be more responsive to the domestic markets than foreign direct investment. The responsiveness of local government debt issuing to business activities in the commercial and residential sectors, and the irresponsiveness of local government debt issuing to the industrial sector (which is more driving by foreign direct investment) indicate that the 2013/14 local government debt reform may have paved the way for the implementation of the Dual Circulation strategy. Policy makers should be cautious about the strong and consistent positive relationship between land leasing revenue and local government debt level, particular after the central government tightened the local government debt markets in 2013/14. The regulation of local debt markets will trigger the adjustment of other financing means, such as land leasing revenue. The central government should be aware of such intriguing interrelationships among alternative financing methods.

Chapter 5
LGFV Bond Yield and Land Market

5.1 Introduction

From 2008 to 2020, the total outstanding amount of LGFV bonds went up by 10 times, from 1.89 trillion RMB to 10.87 trillion RMB (USD 1.65 trillion). This amount represented 28.1% of the total bonds outstanding of the Chinese bond market (38.69 trillion), representing a sum equivalent to 10.6% of total GDP (101.59 trillion) by the end of 2020. What makes LGFV bonds unique is their zero-default record (thus far) compared with an average default rate of 1.24% for the whole non-LGFV bond sector. LGFV bonds play an important role in both China's bond market and financial system, but the LGFV bond market has attracted a disproportionately small amount of academic and policy world attention.

Of this attention, most has taken the form of criticism and concerns expressed about the long-term viability of China's system of debt financing. For example, the strong connection between LGFV bonds and China's land development has raised concerns over the risks attached to such a huge amount of debt. One concern is that LGFV bonds are generally issued to finance local infrastructure construction and preparatory works like land acquisition and to compensate previous owners (typically farmers; see Chapter 3 for more details)—activities which generate nearly zero cash inflow. The debt parcelled in LGFV bonds is expected to be repaid out of future land-related revenue generated from rising land prices and the proceeds of land leasing. Many scholars (He *et al.* 2014; Zhang & Barnett 2014) and organisations like the IMF (2016) are concerned that if land values fall, the value of land collateral will depreciate, which may pose a threat to lenders.

The literature has found that China's LGFVs enjoy lower borrowing costs compared with non-LGFVs thanks to local governments' implicit guarantee of them (Ambrose *et al.* 2015). Due to this implicit guarantee, the yield spreads of LGFVs bond are determined by local governments' fiscal conditions and economic development (Ang *et al.* 2018). As a result, a booming housing market as a rule adds extra solvency to local fiscal conditions and tends to depress the yield (and raise the price) on LGFV bonds (Ambrose *et al*. 2015; (Ang *et al.* 2018).

Theoretically, however, it is not clear how local governments' activities in raising land finance should affect bondholders. Both Ambrose *et al.* (2015) and Ang *et al.* (2018) support the idea that rising local house prices are correlated with lower borrowing costs for LGFVs, yet the mechanism of how land markets affect the yield of LGFV bond is still not fully understood. Besides, this research was mostly conducted before 2014 when the central government issued a series of regulations curbing the growth of local government debt. The impact of these regulations on LGFV bond markets remains unclear.

This chapter frames three hypotheses explaining the mechanism through which the land market affects the default risks of LGFV bonds: a land revenue channel, a 'land dependence' channel, and a 'land collateral' channel. By using a new dataset between 2011 and 2019, the study is able to verify its hypotheses on the basis of empirical evidence.

In receiving revenue from land, LGFVs undertake the role of infrastructure provision, which should have been played by local governments. In effect, LGFVs act functionally as a government department in corporate guide (in a 'corporate coat', in Chinese), while de facto control of the financial vehicle lies with government. The financing platform otherwise does not engage in corporate activities that might generate cash inflows, and its debt repayment ability is relatively weak compared with other companies. LGFVs of this structure, or function, depend heavily on the fiscal revenue of the local government as a guarantee for debt repayment. The expectation in setting up the vehicle is that land leasing revenues will improve local government finances, strengthen local governments' ability to guarantee the solvency of LGFVs, and reduce debt repayment risks.

However, as land leasing revenue fluctuates more, and is more unsustainable in principle than budgetary revenue, a higher proportion of total fiscal revenue arising from land leases is likely to be correlated with higher volatility in a local government's disposable income. Therefore, LGFVs' repayment risks are likely to be higher when a region's reliance on land leasing revenue accounts for a higher proportion of its total fiscal revenue.

From another perspective, the land assets held by LGFVs can be viewed as a form of collateral. The literature has found that a booming local land market will lead to higher valuations of a local government's (or LGFVs') real estate assets currently held apart from the market; these assets represent collateral for firms to borrow (Chaney *et al.* 2012). If the platform encounters debt repayment difficulties, LGFVs have the option of selling land assets in hand. Therefore,

rising local land prices will raise the liquidation value of land assets, making LGFVs', in principle, less vulnerable to default.

This chapter provides empirical evidence for these hypotheses. Higher local land leasing revenues lower the yield spread on LGFV bonds, while a higher proportion of land leasing revenue in the total budgetary income increases LGFVs' borrowing costs. However, such a relationship only started to hold after the landmark policy document No.43 issued in 2014. The chapter further contributes to the literature on Chinese LGFV debt by estimating how the implicit guarantor's perceived tax solvency affects the pricing of LGFV bonds (Ambrose *et al.* 2015; Liu *et al.* 2017; Ang *et al.* 2018). As land revenue constitutes a large proportion of a local government's fiscal revenue, the local land market directly determines the cost of LGFV bonds.

Second, several recent studies attempt to ascertain the impact of changes in the price of real estate assets on the costs of debt. This chapter contributes to the literature on how real estate may be used as collateral in debt financing. Using a different dataset, Wu *et al.* (2015a) find that real estate collateral effects do not hold in China, but Chen *et al.* (2015) suggest that the effect holds only for private firms. The analysis confirms LGFVs lower borrowing costs by using land as collateral.

The rest of the chapter is organised as follows: Section 5.2 describes the arrangements by which local government bonds attract investment in China. Section 5.3 reviews the literature and proposes the main hypotheses tested in the chapter. Section 5.4 describes the sample selection procedure and variables used in the empirical tests. Section 5.5 examines the hypotheses empirically and model policy shocks. Section 5.6 states the policy implications of the findings. Section 5.7 summarises these findings.

5.2 Literature Review

5.2.1 Land Finance and LGFV Bond

Empirical evidence shows that the volume of LGFV issuance and land finance share the same main driver. Pan *et al.* (2017) find that the level of local governments' land leasing premia and the magnitude of their debts are positively correlated. They also find that political competition and budgetary revenue, the two main drivers of land (Cao *et al.* 2008; Wu *et al.* 2015b), have a positive correlation with LGFV debt volume. Wu *et al.* (2016) documents how the city of Guangzhou ran into difficulty in selling land parcels to repay the bank loans and LGFV bonds. The sharp rise in residential land sales in the context of local governments' fiscal shortfalls supports the hypothesis that local officials use land financing to stimulate economic development. Jiang and Waley (2018a) describe the case of a Shanghai Shenhong LGFV. They found that urban investment and development companies (UIDCs) enjoy a privileged relationship with local governments giving them special access to the land market and to bank loans. This research confirms local governments' debt financing behaviour is closely related to land financing.

5.2.2 The Determinants of LGFV Bond Yield

Due to their implicit ultimate backing from local governments (see section 2.1 for more details), the yields of LGFV bond show distinctive features, with the risk premium reflecting the local government's financial strength rather than company (special vehicle) fundamentals. Luo and Chen (2019)'s research shows that most conventional bond characteristics like duration, size and guarantee play an important role in determining both the bond yield and credit rating of LGFV issues. However, the bond issuer's characteristics have little explanatory power. Scholarship has found that the economic development and fiscal health of the local government affects the yield of LGFV bonds in a given region. For example, Chen *et al.* (2015) find regional disparities in economic development between the mid-west and east, as these are manifest in the different costs investors pay to trusts backed by the guarantees of regional municipal governments. Even when municipal governments in less developed regions guarantee LGFV loans, this does not always translate to a lower cost of development capital. Investors take credit ratings seriously, meaning that a higher notional credit rating (e.g. for a less developed region) does not always lead to a lower interest rate. Liu *et al.* (2017) also find

that provincial fiscal conditions (i.e. the local government's fiscal balance sheet) has also become an important determinant of LGFVs' yield spread.

In terms of the impact of real estate on LGFV bonds, the literature finds that the yield on LGFV bonds is closely related to the health of the local real estate market and to a perception of local political risks. Using the difference between the LGFV bond yield and a synthetic matching central government yield, Ang *et al.* (2018) find that, apart from company-specific characteristics, LGFVs located in provinces where real estate values account for a higher proportion of local GDP tend to carry lower financing costs. One standard deviation in local real estate GDP corresponds to about an 8.6% decrease in excess LGFV bond yields. At the same time, political risk, proxied by the total number of local officials arrested for corruption in a given region, has a significant negative effect on LGFV bond prices. In other words, heavily corrupt regions carry higher political risks reflected in higher financing costs. Ambrose *et al.* (2015) find that areas with higher expected house price growth are able to issue debt at lower risk premia, which suggests that the extent or intensity of real estate development is an important determinant of LGFV bonds' yield curve.

In sum, investors price the strength or plausibility of local governments' implicit guarantee into LGFVs' bond yields. In particular, the local government's fiscal strength, the local housing market, and the political risks are important determinants of bond yields. However, little research has addressed itself to the mechanism of how local land markets affect the yield.

5.3 Research Hypotheses

The literature shows that LGFVs are backed by implicit local government guarantees (Ambrose *et al.* 2015; Liu *et al.* 2017; Ang *et al.* 2018). Regions adopting different degrees of land development face different fiscal conditions (Cao *et al.* 2020). As land-related revenue constitutes a large part of local governments' total revenue, an increase in local land leasing revenue typically translates into an increase in local fiscal disposable income. Investors generally believe in the guarantee of LGFV bonds, which means that as the solvency of local governments improve, the default risk of LGFV bonds tends to fall and its yield spread begins to tighten.

Hypothesis 1: LGFV located in regions with more land revenue should enjoy lower the borrowing cost.

On the one hand, the real estate market itself is highly volatile (Grenadier 1995; Liu *et al.* 2016a), and residential land revenues lead to a high degree of fluctuation. The Chinese real estate market is under huge pressure from central government macro-policy partly in response to how its revenues are more volatile than general budgetary revenue (Wang & Hui 2017; Li *et al.* 2020). In normal times, real estate values increase and LGFVs are able to rollover debts without increasing their cost of financing. In difficult times, when land values are falling, debt holders may demand more collateral, which increases financing costs and generates a significant rollover risk for LGFVs.

Hypothesis 2: LGFV located in the regions with heavier land revenue dependence should have higher borrowing costs.

The relationship between the land market and LGFV borrowing costs can be understood at a micro firm level. Research has found a 'real estate collateral channel' for companies otherwise facing financial constraints. Chaney *et al.* (2012) reveal that firms would invest more if the value of real estate in hand increases. In the context of China, Wu *et al.* (2015a) find that the real estate collateral channel does not hold. Using firms' real estate holdings of Chinese listed firms, the rising land price cannot help firms borrow more. In contrast to Wu *et al.* (2015a)'s finding, Chen *et al.* (2015) detect a collateral channel for private Chinese firms. Because local governments inject land assets into LGFVs to strength their balance sheet, a booming local land market means a higher value for the LGFVs' collateral, making them more capable of repaying borrowings.

Hypothesis 3: LGFVs holding land assets in the regions experiencing a real estate boom would enjoy lower borrowing cost due to the collateral channel.

5.4 Data and Variables

5.4.1 Sample Selection

Information on LGFV bond characteristics, offering yields and ratings, financial conditions of the issuing LGFVs, as well as fiscal conditions of the local governments (cities) are taken from the WIND database for the period between 2011 and 2019. Since financial and fiscal variables are available annually and often not publicly disclosed until at least a quarter after each year-end, I match LGFV bond yield spreads with lagged financial and fiscal variables. The study

eliminates observations of unavailable LGFV financial data and cities without fiscal variables. The final sample consists of 9,336 nonconvertible bond issues made by 1,458 unique LGFVs. Figure 5.1 shows the regional distribution of the final sample.

5.4.2 Measurement of Cost of Bond Financing

I employ the Yield Spread, measured by the at-issue bond yield in excess of the Treasury yield with comparable maturity, to gauge the cost of bond financing. This measure is widely used in the literature to capture the ex-ante cost of debt (Bhojraj & Sengupta 2003; Mansi *et al.* 2004; Ortiz-Molina 2006).

Unlike international credit rating systems, which have wide rating ranges, the Chinese credit rating system has only four rating categories, from AAA to AA-. The literature has found that while Chinese bond rating agencies' (CRAs) ratings are not comparable with those of international CRAs, they reflect the different default risks (Livingston *et al.* 2018). For credit ratings, I follow Livingston *et al.* (2018) to compute the bond rating using a conversion process in which AAA rated to AA- rated bonds are assigned a value of 4 to 1. For yield spread, I use the 10-year treasury bond as the bench market.

5.4.3 Measurement of Firm's Land Asset Holding

To test the land asset collateral channel, I first develop an estimate of annual change in the value of firms' real estate asset holdings at the time of LGFVs' bond issuance. Following Wu *et al.* (2015a)'s methods, I use changes in the market value over time of real estate assets owned by the LGFV in the reference year alongside a standardised measure of LGFVs' total assets. Thus, the collateral value measure is defined as:

$$\text{Ratio}_{\text{REV1}_{i,t}} = \frac{\left[\text{Land}_{\text{Assets}_{i,t-1}} \times \text{LP}_{\text{YOY}_{c,t}}\right]}{\text{ASSET}_{i,t-1}}$$

where $\text{Ratio}_{\text{REV1}_{I,t}}$ is the market value of real estate assets owned by firm I at the end of year t (i.e. at the end of the previous year), $\text{LP}_{\text{YOY}_{c,t}}$ is the annual growth rate in the local land price growth for firm i's headquarters city c in year j, and $\text{ASSET}_{I,t-1}$ is the total assets of firm i at the beginning of year t (i.e. at the end of the previous year).

To check the robustness of the measurement, I also use the $HP_{YOY_{c,t}}$, the annual growth rate in the local house price growth for firm i's headquarters city c in year t as alternative measurements.

$$Ratio_{REV2_{i,t}} = \frac{\left[Land_{Assets_{i,t-1}} \times HP_{YOY_{c,t}}\right]}{ASSET_{i,t-1}}$$

5.4.4 Other Variables

Given the developing nature of the Chinese bond market, I follow the seminal work of Livingston *et al.* (2018) regarding the control variables: bond maturity and issue amount. I include an inter-bank dummy to show which exchange the bond is traded on, because it has been found that bonds are traded at higher prices on the exchange market than those traded by institutional investors in the interbank market in China (Liu *et al.* 2019). I control for the issuer's accounting data, which are commonly included in bond yield research (Huang *et al.* 2015; Luo & Chen 2019): the logarithm of total assets, ROA, and net leverage ratio. Factors that influence the fiscal condition of local governments are also included: fiscal pressure measured by the budgetary expenditure divided by the fiscal revenue. As a higher level of local governments translates to a stronger fiscal condition, I also control for the level of local government associated with a specific LGFV.

5.4.5 Summery Statistics

Figure 5.1 shows the regional distribution of aggregate LGFV bond issuance amount. I find that the regional heterogeneity in bond issuance is significant. The east coast regions like Jiangsu, Zhejiang, Fujian rank in the first tier of debt issuance amount regions, whereas the debt scale of west regions like Xinjiang, Qinghai, and Ningxia are small. Among north-east provinces, Heilongjiang and Jilin have issued very little amount of LGFV debt over the last decades.

Figure 5.1 Regional distribution of aggregate LGFV bond volume during the sampling period (2011-2019)

Notes: Tibet did not issue any LGFV bond during the sample period. Numbers are in billion Yuan.

Table 5.1 summarises the definitions and descriptive statistics of variables employed in this study, including firms' financial information, bond information, and local economic information. Local land market information includes land leasing revenue, ratio of land leasing revenue to the total budgetary revenue, annual land price growth rate, and annual house price growth rate. Financial information includes firm size, leverage ratio, and return on assets (ROA). Local economic condition includes growth of the local economy, land price, and level of the local government's fiscal pressure.

Table 5.1 Variable definitions and descriptive statistics

Variable	Definition	Mean	Std. Dev	Min	Max
A. Dependent Variables					
YIELD_SPREAD	Yield of LGFV bond issues minus same maturity of 10-Year Treasury bond	2.407	1.151	-2.178	8.261
RATINGS	Ordinal variable taking on values from 4 to 1 representing AAA to AA respectively	3.046	0.857	1.000	4.000
B. Local Land Market Attributes					
LAND_REV	One year lag of logged total land leasing revenue in a given city	5584422	5487718	111405	26400000
LAND_DEP	One year lag of total land leasing revenue to budgetary revenue in a given city	0.411	0.289	0.024	1.708
LP_YOY	Annual land price growth in a given city	0.340	0.612	-0.745	5.548
HP_YOY	Annual house price growth in a given city	0.061	0.106	-0.420	0.470
C. Bond Information					
RATING_RES	Rating residual after orthogonalized with bond, firm, and local characteristics	-1.14e-10	0.553	-3.90	2.796
INT_DUM	= 1 if the bond is traded in the inter-bank market	0.761	0.426	0	1
PUBLIC_DUM	= 1 if bond is public offering	0.719	0.450	0	1
AMOUNT	Log of gross amount of bonds issued in billions of RMB	10.608	7.706	0.250	100
MATURITY	Log of years to bond maturity	4.197	2.659	0.038	23.000
D. Firm's Financial Information					
ROA	One year lag of income before extraordinary item over total assets	1.548	1.790	-14.927	26.017
ASSET	One year lag of logged of the total book value of assets	627.706	1084.444	1.597	23134.530
LEVERAGE	One year lag of total book debt over total assets	86.836	66.954	-164.224	513.500
RATIO_REV1	Change in the market value of real estate assets measured by local land price changes, held at the beginning of each year, normalised by firm assets (see the text for more details)	0.004	0.021	-0.044	0.551
RATIO_REV2	Change in the market value of real estate assets, measured by local house price changes, held at the beginning of each year, normalised by firm assets (see the text for more details)	0.001	0.004	-0.008	0.094
E. Local Economic Information					
GDPG	One year lag of the growth rate of GDP in a given city	0.100	0.045	-1.000	0.383
LAND_PRICE	One year lag of the land price in a given city	7.823	0.875	5.626	10.267
FISCAL_PRESS	One year lag of budgetary expenditure to budgetary revenue in a given city	1.343	0.339	0.904	3.826

Note: This table summarises the primary variables used in this study. The first column shows the variable name. The second column briefly presents the definition of each variable. Column 3 to 7 present the number of observations, mean, standard deviation, minimum value, and maximum value, respectively. The table mainly consists of five panels: dependent variables. Local land market attributes, bond information, firm's financial information, and local economic information

5.5 Empirical Findings

To test the hypothesis proposed in Section 4, I research the land revenue and land collateral effect on LGFV bond rating and yield spreads through the following regressions:

$$\text{Ratings}_{i,j,t} = \alpha_0 + \alpha_1 \text{Land}_{rev_{j,t-1}} + \alpha_2 \text{Land}_{dep_{j,t-1}} + \alpha_3 \text{RATIO}_{REV_{j,t-1}} + \alpha_4 L_{j,t-1} +$$

$$\delta Z_{i,t-1} + \varphi B_i + T_t + C_t + \varepsilon_{i,t} \ (1)$$

$$\text{Yield}_{\text{spread}_{i,j,t}} = \alpha_0 + \alpha_1 \text{Land}_{\text{rev}_{j,t-1}} + \alpha_2 \text{Land}_{\text{dep}_{j,t-1}} + \alpha_3 \text{RATIO}_{\text{REV}_{j,t-1}} +$$

$$\alpha_4 \text{Rating}_{\text{res}_{i,t}} + \alpha_5 L_{j,t-1} + \varphi B_i + T_t + \delta Z_{i,t-1} + C_t + \varepsilon_{i,t} \quad (2)$$

To address possible endogeneity concerns, all variable of interests and the control variables are in one year lag. In equation (1), where $\text{Ratings}_{I,j,t}$ is the rating of LGFV bond i in local government j in year t; $\text{Land}_{\text{rev}_{j,t-1}}$ and $\text{Land}_{\text{dep}_{j,t-1}}$ are the total land leasing revenue and the ratio of land leasing revenue to budgetary revenue in local government j; $\text{RATIO}_{\text{REV}}$ is the change in the market value of real estate assets measured by local land price changes, held at the beginning of each year, normalised by firm assets (see the text for more details). A significant negative coefficient α_3 means that the collateral effects can help firms borrow at a lower cost. $L_{j,t-1}$ is a vector of proxies for local government j's economic conditions which are available up to previous year (denoted as [t-1]), including GDPG, defined as one year lag of the growth rate of GDP in a given city. The variable FISCAL_PRESS is the local fiscal pressure defined as one year lag budgetary expenditure to budgetary revenue in a given city. $Z_{I,t-1}$ is a vector of proxies for firm level financial conditions, including one year lag of log total assets, estimated earnings (ROA), and leverage (liability/total assets). The set of bond characteristics (B_i) reflect the typical factors that capture differences in bond liquidity such as maturity, total amount, and the market where the bond is expected to trade (inter-bank or exchanges). The fixed effects include year effect (T_J) and city fixed effects (C_J).

In equation (2) $\text{Yield\_spread}_{i,j,t}$ is the yield on LGFV bond i less the yield on the China Treasury bond with maturity closest to the LGFV bond i. A potential problem with the raw credit ratings in the yield spread regressions is that the credit ratings may have already incorporated the information of some of the control variables. To avoid the potential multicollinearity problems, I use an estimate of the bond ratings instead of those of the raw measurements (Liu *et al.* 2010; Liu & Jiraporn 2010). Specifically, I estimate a model for credit rating with all control variables included in the equation. The error term from this regression contains rating information net of the impact of these control variables. I then label the error term as the RATING_ RES in the yield spread regressions.

5.5.1 Land Finance and LGFV Bond Ratings

One of the most important factors affecting the cost of bond yield is firm's credit ratings. I begin by asking whether credit-rating agencies incorporate the land revenue into their rating

results. I run an ordered probit model because the categories of credit ratings convey ordinal risk assessments. Given the numerical values assigned to the ratings, a negative coefficient would indicate that the variable is associated with lower credit ratings and higher risks.

Table 5.2 presents the results of how land finance affects LGFVs' bond ratings. Specifications (1) to (6) shows that the coefficients of both LAND_REV and LAND_DEP are statistically insignificant. In terms of land collateral channels, specifications (1) to (6) shows that the coefficients of both RATIO_REV1 and RATIO_REV2 are statistically insignificant. This result indicates that Chinese rating companies did not incorporate land finance and land collateral information into their ratings.

While credit ratings provide little information on land finance, they do take stock of company level financial information. For example, ROA is positively correlated with bond ratings at a 1% significant level, LEVERAGE is negatively correlated with bond ratings at a 5% significant level, and ASSETs is positively correlated with bond ratings with 1% significance. Local fiscal conditions are also noticed by the rating companies, with GDPG and FISCAL_PRESS being positively and negatively correlated with ratings at the 1% and 5% significance level, respectively.

Table 5.2 Regression model of bond ratings

	(1)	(2)	(3)	(4)	(5)	(6)
	RATINGS	RATINGS	RATINGS	RATINGS	RATINGS	RATINGS
		OLS			Ordered Probit	
LAND_REV	0.057	0.025	0.021	0.054	0.032	0.020
	(0.073)	(0.069)	(0.067)	(0.066)	(0.068)	(0.068)
LAND_DEP	0.014	0.169	0.099	-0.055	0.171	0.108
	(0.174)	(0.159)	(0.202)	(0.175)	(0.173)	(0.212)
RATIO_REV1	0.211	-0.794	-0.803			
	(1.016)	(1.073)	(1.077)			
RATIO_REV2				2.986	-0.854	-1.143
				(4.409)	(4.972)	(4.922)
LP_YOY	-0.022	0.012	-0.002			
	(0.026)	(0.037)	(0.061)			
HP_YOY				-0.503**	0.026	0.079
				(0.240)	(0.278)	(0.279)
AMOUNT	0.089***	0.016***	0.016***	0.089***	0.016***	0.016***
	(0.007)	(0.005)	(0.005)	(0.007)	(0.005)	(0.005)
MATURITY	-0.085***	-0.033***	-0.031***	-0.084***	-0.032***	-0.031***
	(0.016)	(0.011)	(0.011)	(0.016)	(0.011)	(0.011)
PUBLIC_DUM	0.036	0.037	0.032	0.039	0.036	0.030
	(0.056)	(0.056)	(0.056)	(0.056)	(0.057)	(0.056)
INTBANK_DUM	0.456***	0.132***	0.135***	0.455***	0.132***	0.135***
	(0.032)	(0.029)	(0.028)	(0.032)	(0.029)	(0.028)
ROA		0.145***	0.143***		0.145***	0.143***
		(0.021)	(0.021)		(0.021)	(0.022)
LEVERAGE		-0.002**	-0.002**		-0.002**	-0.002**
		(0.001)	(0.001)		(0.001)	(0.001)
ASSET		1.418***	1.420***		1.418***	1.420***
		(0.096)	(0.096)		(0.096)	(0.095)
GDPG			-1.331***			-1.333***
			(0.508)			(0.506)
FISCAL_PRESS			0.607**			0.585**
			(0.260)			(0.248)
LAND_PRICE			0.070			0.077
			(0.130)			(0.086)
Year Dummy	Y	Y	Y	Y	Y	Y
Province Dummy	Y	Y	Y	Y	Y	Y
City Rank	Y	Y	Y	Y	Y	Y
N	8619	8619	8602	8619	8619	8602
R^2 or Pseudo R^2	0.2285	0.4810	0.4936	0.2285	0.4810	0.4936

Notes: This table shows results of OLS regression in model (1) to (3) and ordered Probit in model (4) to (6). Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The standard errors are clustered at the province level and shown in parentheses.

In summary, although bond characteristics and local economic condition is incorporated into their rating system, Chinese credit rating agencies do not incorporate the local land market information into their bond ratings.

5.5.2 Land Finance and LGFV Bond Yields

I empirically examine the relation between land finance and yield spread. Table 5.3 displays the results of regressions using bond yield spread as the dependent variable. In all models, I cluster the standard errors at the city level to ensure robustness to unspecified city correlations.

Model (1) only includes bond characteristic controls and model (2) based on model (1), adds firm's financial information. Model (3) based on model (2), incorporates the local economic information. Model (4) to model (6) substitutes RATIO_REV1 and LP_YOY with RATIO_REV2 and HP_YOY, respectively. In all these models, the LAND_REV is negatively related to bond yields with coefficients significant at the 5% level and LAND_DEP is positively correlated with the yield spread significant at the 1% level. The results are consistent with Hypothesis 1 and 2 that the higher land leasing revenue leads to a lower cost of bond and the higher dependence of land revenue leads to a higher borrowing cost.

In terms of land collateral channels, from model (1) to model (3), the RATIO_REV1 registered a significant negative sign. In model (4) to model (6) the alternative measurements are used and the change in the market value of real estate assets leads to a negative coefficient on the yield spread with significant level at 5%, which is consistent with the hypothesis 3.

The coefficient estimates of other control variables are largely consistent with the literature. For example, the greater the fiscal pressure a city was faced with, the higher the borrowing costs to the city (Ambrose *et al.* 2015; Liu *et al.* 2017). As expected, the coefficient of FISCAL_PRESS in model (3) and model (6) show a positive significant sign.

Table 5.3 Land finance and LGFV bond yields

	(1) Yield_Spread	(2) Yield_Spread	(3) Yield_Spread	(4) Yield_Spread	(5) Yield_Spread	(6) Yield_Spread
LAND_REV	-0.097*	-0.071*	-0.099**	-0.085**	-0.063**	-0.097**
	(0.049)	(0.049)	(0.053)	(0.046)	(0.045)	(0.053)
LAND_DEP	0.322***	0.285**	0.288**	0.327***	0.268**	0.281**
	(0.112)	(0.118)	(0.115)	(0.117)	(0.119)	(0.115)
RATIO_REV1	-1.242**	-1.001**	-0.978**			
	(0.518)	(0.485)	(0.487)			
RATIO_REV2				-4.729***	-3.893**	-4.082**
				(1.680)	(1.669)	(1.749)
LP_YOY	0.024	0.009	-0.016			
	(0.027)	(0.028)	(0.039)			
HP_YOY				0.080	-0.092	-0.053
				(0.195)	(0.173)	(0.172)
RATINGS_RES	-0.256***	-0.256***	-0.256***	-0.256***	-0.256***	-0.256***
	(0.037)	(0.031)	(0.031)	(0.037)	(0.032)	(0.032)
AMOUNT	-0.017***	0.004	0.004	-0.017***	0.004	0.004
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
MATURITY	-0.014	-0.028***	-0.028***	-0.014	-0.028***	-0.028***
	(0.009)	(0.008)	(0.007)	(0.009)	(0.008)	(0.007)
PUBLIC_DUM	-0.822***	-0.797***	-0.801***	-0.824***	-0.797***	-0.800***
	(0.038)	(0.032)	(0.031)	(0.039)	(0.033)	(0.032)
INTBANK_DUM	-0.347***	-0.245***	-0.243***	-0.346***	-0.244***	-0.243***
	(0.032)	(0.029)	(0.029)	(0.032)	(0.029)	(0.029)
ROA		-0.031***	-0.032***		-0.031***	-0.032***
		(0.007)	(0.007)		(0.007)	(0.007)
LEVERAGE		0.001***	0.001***		0.001***	0.001***
		(0.000)	(0.000)		(0.000)	(0.000)
ASSET		-0.305***	-0.305***		-0.306***	-0.306***
		(0.023)	(0.023)		(0.023)	(0.023)
GDPG			0.214			0.201
			(0.313)			(0.317)
FISCAL_PRESS			0.336*			0.337*
			(0.216)			(0.207)
LAND_PRICE			0.115			0.103**
			(0.073)			(0.051)
CONSTANT	5.759***	6.713***	3.355	5.615***	6.624***	3.562
	(0.606)	(0.615)	(3.594)	(0.571)	(0.573)	(3.590)
Year Dummy	Y	Y	Y	Y	Y	Y
City Dummy	Y	Y	Y	Y	Y	Y
City Rank	Y	Y	Y	Y	Y	Y
N	8602	8602	8602	8604	8604	8604
R^2	0.501	0.545	0.546	0.501	0.545	0.546

Note: *, **, and *** denote significance level of 1%, 5%, and 10%, respectively. Standard errors are presented in parentheses. The standard errors are clustered at city level.

5.5.3 Policy Shocks and Structure Changes

The landmark policy shock of the 2013-14 debt regulations induced a structural change in the LGFV bond market. Document 43 came out in September 2014. The model splits up data into before and after 2014 subsamples to test the robustness of the results.

Table 5.4 presents the land revenue and dependence channel before and after the policy shock. The results after 2015 are consistent with those of the full sample. However, results before 2014 show that both LAND_REV and LAND_DEP are statistically insignificant. This difference between two sample periods is consistent with early research conducted by Liu *et al.* (2017) using the sub-sample between 2008 and 2014, which also failed to register any effect of land revenue on yield spreads. FISCAL_PRESS also shows similar results. The coefficient of FSICAL_PRESS is insignificant before 2015 but becomes positively related after with yield spreads at a 1% level of significance. These results suggest that LGFV debt has been increasingly viewed by investors as, effectively, a local government obligation.

Table 5.4 presents the results for land collateral channels before and after the shock. Using land as collateral is more robust and consistent than using it as a source of revenue in showing a significant negative sign in all the models

Table 5.4 Regression model of policy structural change

	(1) YIELD_SPREAD Year<=2014	(2) YIELD_SPREAD Year <=2014	(3) YIELD_SPREAD Year >=2015	(4) YIELD_SPREAD Year >=2015
LAND_REV	0.08	0.115	-0.150	-0.152**
	(0.153)	(0.113)	(0.064)	(0.064)
LAND_DEP	0.08	0.084	0.45**	0.417***
	(0.198)	(0.218)	(0.149)	(0.156)
RATIO_REV1	-9.64***		-1.001**	
	(2.7419)		(0.516)	
RATIO_REV2		-32.68		-3.925**
		(21.81)		(1.774)
LP_YOY	0.030		-0.011	
	(0.138)		(0.047)	
HP_YOY		0.804		-0.079**
		(0.011)		(0.029)
RATINGS_RES	-0.278***	-0.277***	-0.290***	-0.289***
	(0.036)	(0.036)	(0.038)	(0.038)
AMOUNT	-0.008	-0.006	0.039	0.037
	(0.036)	(0.036)	(0.029)	(0.029)
MATURITY	-0.406***	-0.408***	0.011	0.012
	(0.033)	(0.033)	(0.044)	(0.044)
PUBLIC_DUM	-0.745***	-0.743***	-0.832***	-0.831***
	(0.056)	(0.057)	(0.032)	(0.032)
INTBANK_DUM	-0.271***	-0.272***	-0.129***	-0.129***
	(0.037)	(0.037)	(0.040)	(0.040)
ROA	-0.016**	-0.017**	0.001**	0.001**
	(0.011)	(0.011)	(0.011)	(0.011)
LEVERAGE	0.001	0.001	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
ASSET	-0.133***	-0.136***	-0.101***	-0.101***
	(0.031)	(0.030)	(0.024)	(0.023)
GDPG	1.265	1.104	0.700	0.587
	(0.865)	(0.882)	(0.514)	(0.530)
FISCAL_PRESS	-0.441	-0.580	0.815***	0.829***
	(0.491)	(0.478)	(0.229)	(0.234)
Year Dummy	Y	Y	Y	Y
City Dummy	Y	Y	Y	Y
City Dummy	Y	Y	Y	Y
_cons	-10.355	-7.949	-3.516	-1.751
	(9.753)	(9.984)	(6.480)	(6.670)
N	3329	3329	5157	5157
R^2	0.384	0.383	0.502	0.502

Note: *, **, and *** denote significance level of 1%, 5%, and 10%, respectively. Standard errors are presented in parentheses. The standard errors are clustered at city level.

5.6 Policy Implication and Discussion

This chapter shows that the land market plays an important role in determining LGFVs' borrowing costs. A booming local land market can lower LGFVs' borrowing costs via two channels: it can strengthen (1) local governments' fiscal position and lend more credence to its implicit guarantee for LGFV bonds, and (2) LGFV balance sheets by inflating the value of land assets held in those vehicles. However, LGFVs' land revenue, especially from revenues, can be lumpy; and some local governments' notionally commercial firms may be located in regions where too heavy a reliance on land revenue would impose onerous borrowing costs.

Three dimensions of policy implication can be inferred from the study's results. First, it would seem the case that Chinese rating agencies fail to capture different local governments' degree of dependence on land finance in their rating models. This neglect makes it difficult for bond investors to identify and measure the risks associated with LGFVs. For local governments, it is desirable to have a strong base with a balance of land and other tax revenue; however, administrations which have achieved this balance do not necessarily enjoy higher ratings on their debt, in comparison with their counterparts who lack the same budgetary discipline. There is a need for Chinese rating agencies to re-calibrate their rating models and improve their rating results. Local governments and LGFVs with an efficient land finance strategy deserve strong credit ratings and should be in a position to seek the best terms on bonds and loans from the financial market. This may help reduce the costs of intermediation and thereby finance urban infrastructure more economically.

Second, this chapter's results suggest that China's political arrangements have the potential to balance some of the risks of LGFV debt. Currently, due to the incentives offered to officials chasing promotion, politicians' tenure limits and mandatory retirement ages affect local governments' land leasing strategy (Cai *et al.* 2017; Chen *et al.* 2017b) which makes most of local governments' land leasing strategy short-sighted. The effect is to make most of local leasing strategies short-term oriented. The negative relationship between local governments' reliance on land leasing revenue and LGFV bond yields represents a violation of central and local governments' monotonous target—of maximising revenue. Having a broader range of development targets would make land leasing strategies more sustainable. From the point of view of the sustainability of local debt, the long-term risks of over-reliance on land leasing possibly outweigh the short-term benefits of selling large amounts of land. In formulating development policies, local governments should consider debt sustainability and land use

efficiency: land leasing revenue can supplement the government fiscal shortfalls, without officials selling land use rights too aggressively[15]. Study findings have shown that China's land and debt market are inter-connected, which suggests that central and local governments should not regulate house prices too closely, since artificial ceilings (for instance) could pose a threat to local governments' fiscal revenue and hence financial stability.

Third, the results in section 5.5.3 show that local governments' fiscal revenue, land leasing revenue, and degree of reliance on land-related revenue have become the determinants of LGFV bond yield since 2015 when the central government issued the No.43 document. These results reveal that the No.43 Document successfully 'hardened budgetary constraints' making investors believe that local governments, rather than the central government, bore bailout responsibility for their LGFV debt. Results suggest the ambiguity over whether LGFV was backed by local governments, was cleared up. In the future, it may be necessary for the central government to impose fiscal rules and set LGFV debt limits for local governments. At the same time, local governments should propose their own debt issuance or budgetary plans when tapping the financial market to demonstrate the soundness of their development projections.

5.7 Conclusions

Academia has yet to fully to grasp the relationship between the Chinese land market and the yield spread of LGFVs. Using the latest dataset, this chapter has offered empirical evidence suggesting that investors factor in the strength of implicit local government support of their LGFVs, insofar as a positive relationship holds between cities' land revenue and the cost of their newly issued LGFV bond. A negative relationship holds, however, between governments' land revenue dependence and their yield spread. Further, a booming land and housing market can lower the cost of bonds through appreciating housing assets in LGFV portfolios being understood as collateral supporting their debt.

The study has enhanced our understanding of the dynamic relationship between municipal debt borrowing costs and land finance in China. The findings are of great importance for bond investors in their assessment of their exposure to the credit risks on LGFV bonds. This contribution can help investors better understand the determinants of LGFVs' bonds yield, and

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[15] Note that I only model the relationship between land finance, dependence on land revenue and the cost of a LGFV bond according to a partial equilibrium model and do not consider the potential bias in results using a total equilibrium model.

their spread over Treasury benchmarks, as these derive from a series of local economic, fiscal, and political factors. In the meantime, the results this study has generated can help local governments improve their financial soundness and lower their financing costs.

Chapter 6
Summary and Conclusions

China's urbanisation has been generally successful at mobilising resources and providing the infrastructure that cities need to grow the country's economy. However, the local budget system faces substantial financing challenges. While China's political arrangements offer local officials' incentives to urbanise China, its fiscal institutions (or the division of taxing and spending powers between central and local governments) place heavy financing burdens on cities. In consequence, local governments have put land and debt finance at the centre of their plans to invest in infrastructure. By reviewing some recent political changes in the context of the literature dealing with China's urbanisation, this thesis has identified three major problems with China's urbanisation financing model. Pertinent questions arise: first, how local governments use debt to finance infrastructure construction; second, how the local land market affects LGFV bond yields; and third, how corruption locally affects firms' (including LGFVs') borrowing costs. The answers to these questions are of great importance to China's future policy making on urbanisation. In Section 7.1, I present the main findings to these questions and state how the work has contributed to knowledge. The final discussion in Section 7.2 is of this work's limitations and of the future research directions it suggests.

6.1 Key Findings and Contributions

Chapter 2 presents the thesis' background information, conducted through a literature review. The work then builds on factors identified by this research to put together a model of the complex relationship between the different roles of land, fiscal, and political structure in China's urbanisation. The thesis' conceptual framework acknowledges that there are problems associated with the financing of China's urban development. The framework in Section 2.3 helps us better understand the main drivers of urbanisation and the most widely used practical means of financing it. Urbanisation proceeds according to a closed feedback loop in which local governments are incentivised to pursue urbanisation for fiscal and political purposes and finally rewarded by a larger tax base, economic growth, and political promotion. However, three major problems with this 'virtuous cycle' conception of growth are identified: 1) local governments may finance urban infrastructure by over-relying on land finance; 2) LGFVs' borrowing costs are priced by the market; it may either make borrowing unaffordable or

systemically misprice risks, threatening large-scale market failure, and 3) corruption (or perceptions of corruption) may warp firms' borrowing costs.

In Chapter 3, I discuss two competing theories explaining local governments' incentives: a Regional Tournament Competition (RTC) thesis and a Fiscal Federalism (FF) thesis. Both theories have limitations that stem from the complexity of local government behaviours in land conversion and urbanisation. In reviewing the literature, I find the Fiscal Federalism (FF) model overall provides a better description of the land development decisions taken by local government officials.

Chapter 4 contributes to the literature by responding to the call for studies on infrastructure financing in the Global South (O'Brien *et al.* 2019; Whiteside 2019). This is one of the few investigations into alternative funding and financing models of infrastructure projects in China (Tan & Zhao 2019). On the policy front, this study's findings provide timely assessment of how well the 'iron hand' of the central government and the 'visible hand' of local governments are working together on infrastructure provisions. In May 2020, the Chinese government announced its new development strategy in the latest five-year plan: the Dual Circulation strategy. It is a new balance away from global integration (i.e. the first circulation) and towards increased domestic reliance (i.e. the second circulation) (Blanchette & Polk 2020). Such a strategy helps local governments collect more revenue from land leasing to fund infrastructure projects (He *et al.* 2014). Correspondingly, infrastructure development decisions should be more responsive to demand from domestic markets (Buckley 2020). The findings suggest that the reforms of local government debt markets in the last decade has paved the road for this transition.

Chapter 5 contributes to scholarly understanding in modelling the relationship between LGFV bond yields and the local land market. Empirical results reveal that local land leasing revenues are associated with lower LGFV bond yields, while a higher share of land finance in cities' fiscal revenue tends to push up LGFV bond yields. The study also found a negative relationship for a so-called land asset collateral channel: increases in local land and house prices depress LGFV borrowing costs, thanks to appreciation in the market values of land assets held by LGFVs. These findings fill a knowledge gap in how the land market and local governments' use of land finance determines LGFV bond yields. This chapter considers three applicable factors that the bond investors should consider when buying LGFV bonds. It also provides

useful suggestions for government's land policy and for institutional reforms of local government debt management.

Overall, the findings of this thesis fit well with a theory of Chinese fiscal federalism (FF). Chapter 4 sets out to enhance the explanatory power of the FF thesis by adapting it to the circumstances of a new era. It shows that Chinese local governments use LGFV debt to finance infrastructure for commercial land development. Results reveal that the central government's Dual Circulation Strategy shifts a large part of economic development from exports to domestic consumption. Chapter 5 verifies the thesis' hard budget constraint for China, providing evidence that Chinese local governments borrow on the understanding that their future revenue will pay back bondholders' claims.

6.2 Limitations and Future Research Directions

This thesis has several limitations. The findings discussed in Chapter 4, while consistent with the hypothesis, pertain only to the city level. A more comprehensive study could use county level data since there are more than 2,000 counties in China, many of whose local governments issue debt. This more close-grained analysis would provide a more comprehensive understanding of Chinese local governments' financing strategy. Second, the work uses accounting data of LGFVs' cash outflow to proxy infrastructural investment, which fails to quantify the specific type of investment city governments are making. If it were possible to classify types of infrastructure investment, we could understand the role of infrastructure in the economy in a more meaningful way. Third, an experimental study might do better at evaluating the effects of the 2014 policy change on LGFVs' borrowing behaviour, possibly verifying a causal relationship. However, due to the difficulty of finding an appropriate control group, a DID (difference in difference) research method is not applicable. In the future, as more data becomes available and more stringent policies are issued, research will be able to draw on larger samples and use data for sharper policy shocks in testing the relationship between LGFV debt and infrastructure financing.

Chapter 5 explores the relationship between LGFVs' borrowing costs and the local land market. One major concern is the endogeneity associated with LGFV bond yields in their relation to land finance. While the study uses a lagged term for independent variables to alleviate this endogeneity problem, it is still reasonable to suspect that land finance and LGFV bond yields have a long-term relationship, which might induce a reverse-causality problem (potentially

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leading to bias). Using an IV (instrumental variable) approach could possibly address this concern. The basic strategy would be to find an instrument for land revenue using the interaction of a demand shifter with a fixed supply. I use an interaction term between a national interest rate with the measure of land slope in a city to construct an IV; the underlying logic is that changes in demand will lead to price changes if the local supply of land is inelastic (Chen & Kung 2016). However, the results could not pass the weak-identification (F-test) tests.

Lastly, although this thesis sheds light on two particular risks that threaten the orderly financing of China's urbanisation, further research on other aspects of urbanisation is urgently required. This thesis has examined China's political arrangements and market for local government debt and opens the way to a fuller consideration of policy-oriented questions. For example, academic work could consider how to improve the intergovernmental grants system and match local governments' expenditure (over different periods) with their revenues. The Chinese government is concerned with preserving national food security while continuing urbanisation and expanding the urban area. It has an interest in reforming the land system to ensure local governments use land more efficiently. How China meets these challenges is crucial to its sustainable urbanisation and economic development.

References

Allen, F., Qian, Y.M., Tu, G.Q., Yu, F., 2019. Entrusted loans: A close look at China's shadow banking system. Journal of Financial Economics 133, 18-41

Ambrose, B., Deng, Y., Wu, J., 2015. Understanding the Risk of China's Local Government Debts and its Linkage with Property Markets. SSRN Electronic Journal

Ang, A., Bai, J., Zhou, H., 2018. The Great Wall of Debt: Real Estate, Political Risk, and Chinese Local Government Financing Cost. Georgetown McDonough School of Business Research Paper No. 2603022

Ansar, A., Flyvbjerg, B., Budzier, A., Lunn, D., 2016. Does infrastructure investment lead to economic growth or economic fragility? Evidence from China. Oxford Review of Economic Policy 32, 360-390

Bai, C.E., Hsieh, C.T., Song, Z., 2016. The long shadow of China's fiscal expansion. Brookings Papers on Economic Activity, 129-181

Bairoch, P., Goertz, G., 1986. Factors of Urbanisation in the Nineteenth Century Developed Countries:A Descriptive and Econometric Analysis. Urban Studies 23, 285-305

Bardhan, P., Mookherjee, D., 2006. Decentralisation and accountability in infrastructure delivery in developing countries. Economic Journal 116, 101-127

Bell, D.A., Annual, R., 2017. Comparing Political Values in China and the West: What Can Be Learned and Why It Matters. In: Annual Review of Political Science, Vol 20. Annual Reviews, Palo Alto, 93-110

Bhojraj, S., Sengupta, P., 2003. Effect of corporate governance on bond ratings and yields: The role of institutional investors and outside directors. Journal of Business 76, 455-475

Blanchette, J., Polk, A., 2020. Dual Circulation and China's New Hedged Integration Strategy. Center for Strategic and International Studies, Washington DC, USA

Bo, L., Mear, F.C.J., Huang, J.C., 2017. New development: China's debt transparency and the case of urban construction investment bonds. Public Money & Management 37, 225-230

Buckley, C., 2020. Xi's Post-Virus Economic Strategy for China Looks Inward. In: The New York Times

Cai, H., Wang, Z., Zhang, Q., 2017. To build above the limit? Implementation of land use regulations in urban China. Journal of Urban Economics 98, 223-233

Cai, H.B., Henderson, J.V., Zhang, Q.H., 2013. China's land market auctions: evidence of corruption? Rand Journal of Economics 44, 488-521

Cai, H.B., Treisman, D., 2005. Does competition for capital discipline governments? Decentralization, globalization, and public policy. American Economic Review 95, 817-830

Cai, Y., 2004. Irresponsible state: local cadres and image-building in China. Journal of Communist Studies and Transition Politics 20, 20-41

Cao, G.Z., Feng, C.C., Tao, R., 2008. Local "Land finance" in China's urban expansion: Challenges and solutions. China & World Economy 16, 19-30

Cao, R.F., Zhang, A.L., Cai, Y.Y., Xie, X.X., 2020. How imbalanced land development affects local fiscal condition? A case study of Hubei Province, China. Land Use Policy 99, 13

Chaney, T., Sraer, D., Thesmar, D., 2012. The Collateral Channel: How Real Estate Shocks Affect Corporate Investment. American Economic Review 102, 2381-2409

Chang, J., Yang, L., Huang, Y., 2013. How big is the Chinese Government debt? China Economic Journal 6, 152-171

Chen, K.J., Wen, Y., 2017. The Great Housing Boom of China. American Economic Journal-Macroeconomics 9, 73-114

Chen, P., Wang, C., Liu, Y., 2015. Real estate prices and firm borrowings: Micro evidence from China. China Economic Review 36, 296-308

Chen, T., Kung, J.K.-s., 2019. Busting the "Princelings": The Campaign Against Corruption in China's Primary Land Market*. The Quarterly Journal of Economics 134, 185-226

Chen, T., Kung, J.K.S., 2016. Do land revenue windfalls create a political resource curse? Evidence from China. Journal of Development Economics 123, 86-106

Chen, Y., Li, H.B., Zhou, L.A., 2005. Relative perfonnance evaluation and the turnover of provincial leaders in China. Economics Letters 88, 421-425

Chen, Z., He, Z., Liu, C., 2017a. The financing of local government in China: Stimulus loan wanes and shadow banking waxes. National Bureau of Economic Research Working Paper Series No. 23598

Chen, Z.G., Tang, J., Wan, J.Y., Chen, Y., 2017b. Promotion incentives for local officials and the expansion of urban construction land in China: Using the Yangtze River Delta as a case study. Land Use Policy 63, 214-225

Collier, P., Venables, A.J., 2017. Urbanization in developing economies: the assessment. Oxford Review of Economic Policy 33, 355-372

Cui, E.N., Tao, R., Warner, T.J., Yang, D.L.L., 2015. How Do Land Takings Affect Political Trust in Rural China? Political Studies 63, 91-109

Deng, S.L., Peng, J., Wang, C., 2013. Fiscal transparency at the Chinese provincial level. Public Administration 91, 947-963

Deng, X.Z., Huang, J.K., Rozelle, S., Uchida, E., 2008. Growth, population and industrialization, and urban land expansion of China. Journal of Urban Economics 63, 96-115

Deng, X.Z., Huang, J.K., Rozelle, S., Uchida, E., 2010. Economic Growth and the Expansion of Urban Land in China. Urban Studies 47, 813-843

Deng, Y., Qi, W., Fu, B.J., Wang, K., 2020. Geographical transformations of urban sprawl: Exploring the spatial heterogeneity across cities in China 1992-2015. Cities 105, 13

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.R., 2007. Policy and praxis of land acquisition in China. Land Use Policy 24, 1-13

Ding, C.R., Lichtenberg, E., 2011. Land and urban economic growth in China. Journal of Regional Science 51, 299-317

Dobbs, R., Lund, S., Woetzel, J., Mutafchieva, M., 2015. Debt and (not Much) deleveraging. McKinsey & Company, New York

Du, J.F., Peiser, R.B., 2014. Land supply, pricing and local governments' land hoarding in China. Regional Science and Urban Economics 48, 180-189

Fan, G., Lv, Y., 2012. Fiscal prudence and growth sustainability: An analysis of China's public debts. Asian Economic Policy Review 7, 202-220

Fan, X., Zheng, D., Shi, M., 2016. How Does Land Development Promote China's Urban Economic Growth? The Mediating Effect of Public Infrastructure. Sustainability 8, 279

Feng, J., Lichtenberg, E., Ding, C., 2015. Balancing act: Economic incentives, administrative restrictions, and urban land expansion in China. China Economic Review 36, 184-197

Feng, X., 2013. Local Government Debt and Municipal Bonds in China: Problems and a Framework of Rules. Copenhagen Journal of Asian Studies 31, 23-53

Fu, Q., 2015. When fiscal recentralisation meets urban reforms: Prefectural land finance and its association with access to housing in urban China. Urban Studies 52, 1791-1809

Grenadier, S.R., 1995. The persistence of real-estate cycles. Journal of Real Estate Finance and Economics 10, 95-119

Guo, G., 2009. China's Local Political Budget Cycles. American Journal of Political Science 53, 621-632

Hamnett, C., 2020. Is Chinese urbanisation unique? Urban Studies 57, 690-700

Han, L., Kung, J.K.S., 2015. Fiscal incentives and policy choices of local governments: Evidence from China. Journal of Development Economics 116, 89-104

He, C.F., Huang, Z.J., Wang, R., 2014. Land use change and economic growth in urban China: A structural equation analysis. Urban Studies 51, 2880-2898

He, C.F., Zhou, Y., Huang, Z.J., 2016. Fiscal decentralization, political centralization, and land urbanization in China. Urban Geography 37, 436-457

Herlevi, A.A., 2017. Economic Growth or Sowing the Seeds of Destruction? The Role of Economic Development Zones in China. Journal of Chinese Political Science 22, 675-689

Honig, E., Zhao, X.J., 2015. Sent-down Youth and Rural Economic Development in Maoist China. China Quarterly 222, 499-521

Huang, T., Wu, F., Yu, J., Zhang, B.H., 2015. International political risk and government bond pricing. Journal of Banking & Finance 55, 393-405

Huang, Z.H., Du, X.J., 2017. Strategic interaction in local governments' industrial land supply: Evidence from China. Urban Studies 54, 1328-1346

Huang, Z.H., Du, X.J., 2018. Holding the market under the stimulus plan: Local government financing vehicles' land purchasing behavior in China. China Economic Review 50, 85-100

IMF, 2016. IMF Executive Board Concludes Financial Sector Stability Assessment with China.

Jia, J.X., Guo, Q.W., Zhang, J., 2014. Fiscal decentralization and local expenditure policy in China. China Economic Review 28, 107-122

Jiang, R.H., Lin, G.C.S., 2021. Placing China's land marketization: The state, market, and the changing geography of land use in Chinese cities. Land Use Policy 103, 16

Jiang, Y., Waley, P., 2018a. Shenhong: The Anatomy of an Urban Investment and Development Company in the Context of China's State Corporatist Urbanism. Journal of Contemporary China 27, 596-610

Jiang, Y.P., Waley, P., 2018b. Shenhong: The anatomy of an urban investment and development company in the context of China's state corporatist urbanism. Journal of Contemporary China 27, 596-610

Jin, H.H., Qian, Y.Y., Weingast, B.R., 2005. Regional decentralization and fiscal incentives: Federalism, Chinese style. Journal of Public Economics 89, 1719-1742

Kornai, J., Maskin, E., Roland, G., 2003. Understanding the soft budget constraint. Journal of Economic Literature 41, 1095-1136

Kroeber, A.R., 2016. China's Economy: What Everyone Needs to Know. Oxford University Press.

Kung, J.K.-s., 2013. From Industrialization to Urbanization: The Social Consequences of Changing Fiscal Incentives on Local Governments' Behavior. In: Law and Economics with Chinese Characteristics: Institutions for Promoting Development in the Twenty-First Century. Oxford Scholarship Online.

Landry, P.F., Lu, X.B., Duan, H.Y., 2018. Does Performance Matter? Evaluating Political Selection Along the Chinese Administrative Ladder. Comparative Political Studies 51, 1074-1105

Li, H.B., Zhou, L.A., 2005. Political turnover and economic performance: the incentive role of personnel control in China. Journal of Public Economics 89, 1743-1762

Li, J., 2014. Land sale venue and economic growth path: Evidence from China's urban land market. Habitat International 41, 307-313

Li, J., Chiu, L.H.R., 2018. Urban investment and development corporations, new town development and China's local state restructuring - the case of Songjiang new town, Shanghai. Urban Geography 39, 687-705

Li, M., 2019. Information and Corruption: Evidence from China's Land Auctions.

Li, S.Y., Lin, S.L., 2011. The size and structure of China's government debt. Social Science Journal 48, 527-542

Li, Y.Y., Zhu, D.L., Zhao, J.M., Zheng, X.D., Zhang, L.Y., 2020. Effect of the housing purchase restriction policy on the Real Estate Market: Evidence from a typical suburb of Beijing, China. Land Use Policy 94, 13

Lichtenberg, E., Ding, C.R., 2009. Local officials as land developers: Urban spatial expansion in China. Journal of Urban Economics 66, 57-64

Lin, G.C., Li, X., Yang, F.F., Hu, F.Z., 2015. Strategizing urbanism in the era of neoliberalization: State power reshuffling, land development and municipal finance in urbanizing China. Urban Studies 52, 1962-1982

Lin, G.C.S., Ho, S.P.S., 2005. The state, land system, and land development processes in contemporary China. Annals of the Association of American Geographers 95, 411-436

Lin, G.C.S., Yi, F., 2011. Urbanization of Capital or Capitalization on Urban Land? Land Development and Local Public Finance in Urbanizing China. Urban Geography 32, 50-79

Liu, C., Wang, S.J., Wei, K.C.J., Zhong, N.H., 2019. The demand effect of yield-chasing retail investors: Evidence from the Chinese enterprise bond market. Journal of Empirical Finance 50, 57-77

Liu, L.X., Lyu, Y., Yu, F., 2017. Implicit Government Guarantee and the Pricing of Chinese LGFV Debt. SSRN Electronic Journal

Liu, M.X., Tao, R., Yuan, F., Cao, G.Z., 2008. Instrumental land use investment-driven growth in China. Journal of the Asia Pacific Economy 13, 313-331

Liu, T.-Y., Chang, H.-L., Su, C.-W., Jiang, X.-Z., 2016a. China's housing bubble burst? Economics of Transition and Institutional Change 24, 361-389

Liu, T., Cao, G.Z., Yan, Y., Wang, R.Y., 2016b. Urban land marketization in China: Central policy, local initiative, and market mechanism. Land Use Policy 57, 265-276

Liu, Y., Ning, Y., Davidson III, W.N., 2010. Earnings Management Surrounding New Debt Issues. Financial Review 45, 659-681

Liu, Y.X., Jiraporn, P., 2010. The effect of CEO power on bond ratings and yields. Journal of Empirical Finance 17, 744-762

Livingston, M., Poon, W.P.H., Zhou, L., 2018. Are Chinese credit ratings relevant? A study of the Chinese bond market and credit rating industry. Journal of Banking & Finance 87, 216-232

Lu, X.B., Landry, P.F., 2014. Show Me the Money: Interjurisdiction Political Competition and Fiscal Extraction in China. American Political Science Review 108, 706-722

Luo, H., Chen, L., 2019. Bond yield and credit rating: evidence of Chinese local government financing vehicles. Review of Quantitative Finance and Accounting 52, 737-758

Ma, J., 2013. Hidden Fiscal Risks in Local China. Australian Journal of Public Administration 72, 278-292

Ma, L.J.C., 2002. Urban transformation in China, 1949-2000: a review and research agenda. Environment and Planning a-Economy and Space 34, 1545-1569

Mansi, S.A., Maxwell, W.F., Miller, D.P., 2004. Does auditor quality and tenure matter to investors? Evidence from the bond market. Journal of Accounting Research 42, 755-793

Maskin, E., Qian, Y.Y., Xu, C.G., 2000. Incentives, information, and organizational form. Review of Economic Studies 67, 359-378

Meligrana, J., Li, Z., Zhang, Z., 2011. Resolving Land Use Disputes in China:An Analysis of a Method of Dealing with Citizen Complaints. Environment and Urbanization ASIA 2, 251-264

Meyer, D., Shih, V.C., Lee, J., 2016. Factions of different stripes: gauging the recruitment logics of factions in the reform period. Journal of East Asian Studies 16, 43-60

Mo, J.W., 2018. Land financing and economic growth: Evidence from Chinese counties. China Economic Review 50, 218-239

Mohan, G., Tan-Mullins, M., 2019. The geopolitics of South-South infrastructure development: Chinese-financed energy projects in the global South. Urban Studies 56, 1368-1385

Montinola, G., Qian, Y., Weingast, B.R., 1995a. Federalism, Chinese Style: The Political Basis for Economic Success in China. World Politics 48, 50-81

Montinola, G., Qian, Y.Y., Weingast, B.R., 1995b. Federalism, Chinese style - the political basis for economic success in China. World Politics 48, 50

O'Brien, P., O'Neill, P., Pike, A., 2019. Funding, financing and governing urban infrastructures. Urban Studies 56, 1291-1303

Oi, J.C., 1992. Fiscal reform and the economic foundations of local state corporatism in China. World Politics 45, 99-126

Ong, L.H., 2012. Fiscal federalism and soft budget constraints: The case of China. International Political Science Review 33, 455-474

Ortiz-Molina, H., 2006. Top management incentives and the pricing of corporate public debt. Journal of Financial and Quantitative Analysis 41, 317-340

Pan, F.H., Zhang, F.M., Zhu, S.J., Wojcik, D., 2017. Developing by borrowing? Inter-jurisdictional competition, land finance and local debt accumulation in China. Urban Studies 54, 897-916

Pan, J.N., Huang, J.T., Chiang, T.F., 2015. Empirical study of the local government deficit, land finance and real estate markets in China. China Economic Review 32, 57-67

Qian, Y., Xu, C., 1993. Why China's economic reforms differ: the M-form hierarchy and entry/expansion of the non-state sector. Economics of Transition and Institutional Change 1, 135-170

Qin, Y., Zhu, H.J., Zhu, R., 2016. Changes in the distribution of land prices in urban China during 2007-2012. Regional Science and Urban Economics 57, 77-90

Roback, J., 1982. Wages, rents, and the quality of life. Journal of Political Economy 90, 1257-1278

Shen, C.L., Zhao, X.J., Zou, H.F., 2014. Fiscal decentralization and public services provision in China. Annals of Economics and Finance 15, 135-160

Shi, H., Huang, S.Q., 2014. How much infrastructure Is too much? A new approach and evidence from China. World Development 56, 272-286

Shih, V., Adolph, C., Liu, M.X., 2012. Getting Ahead in the Communist Party: Explaining the Advancement of Central Committee Members in China. American Political Science Review 106, 166-187

Su, F., Tao, R., 2017. The China model withering? Institutional roots of China's local developmentalism. Urban Studies 54, 230-250

Su, F.B., Tao, R., Xi, L., Li, M., 2012. Local Officials' Incentives and China's Economic Growth: Tournament Thesis Reexamined and Alternative Explanatory Framework. China & World Economy 20, 1-18

Tan, J., Zhao, J.Z., 2019. The Rise of Public-Private Partnerships in China: An Effective Financing Approach for Infrastructure Investment? Public Administration Review 79, 514-518

Tao, R., Su, F.B., Liu, M.X., Cao, G.Z., 2010. Land leasing and local public finance in China's regional development: Evidence from prefecture-level cities. Urban Studies 47, 2217-2236

The People's Daily, 2020. The Report of the May Politubro Meeting. URL http://cpc.people.com.cn/n1/2020/0515/c64094-31709627.html?mc_cid=28966ada58&mc_eid=902fe70bde

Tsui, K.Y., 2011. China's infrastructure investment boom and local debt crisis. Eurasian Geography and Economics 52, 686-711

Wang, D., Zhang, L., Zhang, Z., Zhao, S.X., 2011. Urban infrastructure financing in reform-era China. Urban Studies 48, 2975-2998

Wang, W., Ye, F.Z., 2016. The Political Economy of Land Finance in China. Public Budgeting and Finance 36, 91-110

Wang, Y., Hui, E.C.-m., 2017. Are local governments maximizing land revenue? Evidence from China. China Economic Review 43, 196-215

Whiteside, H., 2019. Advanced perspectives on financialised urban infrastructures. Urban Studies 56, 1477-1484

World Bank, 2010. Supporting China's Infrastructure Stimulus Under the Infra Program. URL https://web.archive.org/web/20191205041352/http://siteresources.worldbank.org/INTSDNET/Resources/5944695-1247775731647/INFRA_China_Newsletter.pdf

World Bank, DRC, 2014. Urban China: Toward Efficient, Inclusive, and Sustainable Urbanization.

Wu, J., Gyourko, J., Deng, Y., 2015a. Real estate collateral value and investment: The case of China. Journal of Urban Economics 86, 43-53

Wu, J.X., Wu, Y.R., Wang, B., 2018. Local government debt, factor misallocation and regional economic performance in China. China & World Economy 26, 82-105

Wu, Q., Li, Y.L., Yan, S.Q., 2015b. The incentives of China's urban land finance. Land Use Policy 42, 432-442

Wu, S., Yang, Z., 2020. Informal government preferences and asymmetric land allocation in China. Land Use Policy 99

Wu, W.P., 2010. Urban infrastructure financing and economic performance in China. Urban Geography 31, 648-667

Wu, Y., Heerink, N., 2016. Foreign direct investment, fiscal decentralization and land conflicts in China. China Economic Review 38, 92-107

Wu, Y.F., Li, X., Lin, G.C.S., 2016. Reproducing the city of the spectacle: Mega-events, local debts, and infrastructure-led urbanization in China. Cities 53, 51-60

Xu, C.G., 2011. The fundamental institutions of China's reforms and development. Journal of Economic Literature 49, 1076-1151

Ye, F.Z., Wang, W., 2013. Determinants of Land Finance in China: A Study Based on Provincial-level Panel Data. Australian Journal of Public Administration 72, 293-303

Ye, L., Wu, A.M., 2014. Urbanization, Land Development, and Land Financing: Evidence from Chinese Cities. Journal of Urban Affairs 36, 354-368

Yew, C.P., 2011. Explaining Land Use Change in a Guangdong County: The Supply Side of the Story. China Quarterly, 626-648

Zhang, J.F., 2011. Interjurisdictional competition for FDI: The case of China's "development zone fever". Regional Science and Urban Economics 41, 145-159

Zhang, Y., Barnett, S., 2014. Fiscal Vulnerabilities and Risks from Local Government Finance in China. IMF Working Papers 14, 1

Zheng, H.R., Wang, X., Cao, S.X., 2014. The land finance model jeopardizes China's sustainable development. Habitat International 44, 130-136

Zhong, T.Y., Zhang, X.L., Huang, X.J., Liu, F., 2019. Blessing or curse? Impact of land finance on rural public infrastructure development. Land Use Policy 85, 130-141

Zhou, M., Wang, B., Chen, Z., 2020. Has the anti-corruption campaign decreased air pollution in China? Energy Economics 91

Zhu, A.D., Kotz, D.M., 2011. The Dependence of China's Economic Growth on Exports and Investment. Review of Radical Political Economics 43, 9-32

Zhu, J., 2012. The Shadow of the Skyscrapers: real estate corruption in China. Journal of Contemporary China 21, 243-260

Zuo, C., 2015. Promoting City Leaders: The Structure of Political Incentives in China. The China Quarterly 224, 955-984

Allen, F., Qian, Y.M., Tu, G.Q., Yu, F., 2019. Entrusted loans: A close look at China's shadow banking system. Journal of Financial Economics 133, 18-41

Ambrose, B., Deng, Y., Wu, J., 2015. Understanding the Risk of China's Local Government Debts and its Linkage with Property Markets. SSRN Electronic Journal

Ang, A., Bai, J., Zhou, H., 2018. The Great Wall of Debt: Real Estate, Political Risk, and Chinese Local Government Financing Cost. Georgetown McDonough School of Business Research Paper No. 2603022

Ansar, A., Flyvbjerg, B., Budzier, A., Lunn, D., 2016. Does infrastructure investment lead to economic growth or economic fragility? Evidence from China. Oxford Review of Economic Policy 32, 360-390

Bai, C.E., Hsieh, C.T., Song, Z., 2016. The long shadow of China's fiscal expansion. Brookings Papers on Economic Activity, 129-181

Bairoch, P., Goertz, G., 1986. Factors of Urbanisation in the Nineteenth Century Developed Countries:A Descriptive and Econometric Analysis. Urban Studies 23, 285-305

Bardhan, P., Mookherjee, D., 2006. Decentralisation and accountability in infrastructure delivery in developing countries. Economic Journal 116, 101-127

Bell, D.A., Annual, R., 2017. Comparing Political Values in China and the West: What Can Be Learned and Why It Matters. In: Annual Review of Political Science, Vol 20. Annual Reviews, Palo Alto, pp. 93-110.

Bhojraj, S., Sengupta, P., 2003. Effect of corporate governance on bond ratings and yields: The role of institutional investors and outside directors. Journal of Business 76, 455-475

Blanchette, J., Polk, A., 2020. Dual Circulation and China's New Hedged Integration Strategy. Center for Strategic and International Studies, Washington DC, USA

Bo, L., Mear, F.C.J., Huang, J.C., 2017. New development: China's debt transparency and the case of urban construction investment bonds. Public Money & Management 37, 225-230

Buckley, C., 2020. Xi's Post-Virus Economic Strategy for China Looks Inward. In: The New York Times

Cai, H., Wang, Z., Zhang, Q., 2017. To build above the limit? Implementation of land use regulations in urban China. Journal of Urban Economics 98, 223-233

Cai, H.B., Henderson, J.V., Zhang, Q.H., 2013. China's land market auctions: evidence of corruption? Rand Journal of Economics 44, 488-521

Cai, H.B., Treisman, D., 2005. Does competition for capital discipline governments? Decentralization, globalization, and public policy. American Economic Review 95, 817-830

Cai, Y., 2004. Irresponsible state: local cadres and image-building in China. Journal of Communist Studies and Transition Politics 20, 20-41

Cao, G.Z., Feng, C.C., Tao, R., 2008. Local "Land finance" in China's urban expansion: Challenges and solutions. China & World Economy 16, 19-30

Cao, R.F., Zhang, A.L., Cai, Y.Y., Xie, X.X., 2020. How imbalanced land development affects local fiscal condition? A case study of Hubei Province, China. Land Use Policy 99, 13

Chaney, T., Sraer, D., Thesmar, D., 2012. The Collateral Channel: How Real Estate Shocks Affect Corporate Investment. American Economic Review 102, 2381-2409

Chang, J., Yang, L., Huang, Y., 2013. How big is the Chinese Government debt? China Economic Journal 6, 152-171

Chen, K.J., Wen, Y., 2017. The Great Housing Boom of China. American Economic Journal-Macroeconomics 9, 73-114

Chen, P., Wang, C., Liu, Y., 2015. Real estate prices and firm borrowings: Micro evidence from China. China Economic Review 36, 296-308

Chen, T., Kung, J.K.-s., 2019. Busting the "Princelings": The Campaign Against Corruption in China's Primary Land Market*. The Quarterly Journal of Economics 134, 185-226

Chen, T., Kung, J.K.S., 2016. Do land revenue windfalls create a political resource curse? Evidence from China. Journal of Development Economics 123, 86-106

Chen, Y., Li, H.B., Zhou, L.A., 2005. Relative perfonnance evaluation and the turnover of provincial leaders in China. Economics Letters 88, 421-425

Chen, Z., He, Z., Liu, C., 2017a. The financing of local government in China: Stimulus loan wanes and shadow banking waxes. National Bureau of Economic Research Working Paper Series No. 23598

Chen, Z.G., Tang, J., Wan, J.Y., Chen, Y., 2017b. Promotion incentives for local officials and the expansion of urban construction land in China: Using the Yangtze River Delta as a case study. Land Use Policy 63, 214-225

Collier, P., Venables, A.J., 2017. Urbanization in developing economies: the assessment. Oxford Review of Economic Policy 33, 355-372

Cui, E.N., Tao, R., Warner, T.J., Yang, D.L.L., 2015. How Do Land Takings Affect Political Trust in Rural China? Political Studies 63, 91-109

Deng, S.L., Peng, J., Wang, C., 2013. FISCAL TRANSPARENCY AT THE CHINESE PROVINCIAL LEVEL. Public Administration 91, 947-963

Deng, X.Z., Huang, J.K., Rozelle, S., Uchida, E., 2008. Growth, population and industrialization, and urban land expansion of China. Journal of Urban Economics 63, 96-115

Deng, X.Z., Huang, J.K., Rozelle, S., Uchida, E., 2010. Economic Growth and the Expansion of Urban Land in China. Urban Studies 47, 813-843

Deng, Y., Qi, W., Fu, B.J., Wang, K., 2020. Geographical transformations of urban sprawl: Exploring the spatial heterogeneity across cities in China 1992-2015. Cities 105, 13

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.R., 2007. Policy and praxis of land acquisition in China. Land Use Policy 24, 1-13

Ding, C.R., Lichtenberg, E., 2011. LAND AND URBAN ECONOMIC GROWTH IN CHINA. Journal of Regional Science 51, 299-317

Dobbs, R., Lund, S., Woetzel, J., Mutafchieva, M., 2015. Debt and (not Much) deleveraging. McKinsey & Company, New York

Du, J.F., Peiser, R.B., 2014. Land supply, pricing and local governments' land hoarding in China. Regional Science and Urban Economics 48, 180-189

Fan, G., Lv, Y., 2012. Fiscal prudence and growth sustainability: An analysis of China's public debts. Asian Economic Policy Review 7, 202-220

Fan, X., Zheng, D., Shi, M., 2016. How Does Land Development Promote China's Urban Economic Growth? The Mediating Effect of Public Infrastructure. Sustainability 8, 279

Feng, J., Lichtenberg, E., Ding, C., 2015. Balancing act: Economic incentives, administrative restrictions, and urban land expansion in China. China Economic Review 36, 184-197

Feng, X., 2013. Local Government Debt and Municipal Bonds in China: Problems and a Framework of Rules. Copenhagen Journal of Asian Studies 31, 23-53

Fu, Q., 2015. When fiscal recentralisation meets urban reforms: Prefectural land finance and its association with access to housing in urban China. Urban Studies 52, 1791-1809

Grenadier, S.R., 1995. THE PERSISTENCE OF REAL-ESTATE CYCLES. Journal of Real Estate Finance and Economics 10, 95-119

Guo, G., 2009. China's Local Political Budget Cycles. American Journal of Political Science 53, 621-632

Hamnett, C., 2020. Is Chinese urbanisation unique? Urban Studies 57, 690-700

Han, L., Kung, J.K.S., 2015. Fiscal incentives and policy choices of local governments: Evidence from China. Journal of Development Economics 116, 89-104

He, C.F., Huang, Z.J., Wang, R., 2014. Land use change and economic growth in urban China: A structural equation analysis. Urban Studies 51, 2880-2898

He, C.F., Zhou, Y., Huang, Z.J., 2016. Fiscal decentralization, political centralization, and land urbanization in China. Urban Geography 37, 436-457

Herlevi, A.A., 2017. Economic Growth or Sowing the Seeds of Destruction? The Role of Economic Development Zones in China. Journal of Chinese Political Science 22, 675-689

Honig, E., Zhao, X.J., 2015. Sent-down Youth and Rural Economic Development in Maoist China. China Quarterly 222, 499-521

Huang, T., Wu, F., Yu, J., Zhang, B.H., 2015. International political risk and government bond pricing. Journal of Banking & Finance 55, 393-405

Huang, Z.H., Du, X.J., 2017. Strategic interaction in local governments' industrial land supply: Evidence from China. Urban Studies 54, 1328-1346

Huang, Z.H., Du, X.J., 2018. Holding the market under the stimulus plan: Local government financing vehicles' land purchasing behavior in China. China Economic Review 50, 85-100

IMF, 2016. IMF Executive Board Concludes Financial Sector Stability Assessment with China.

Jia, J.X., Guo, Q.W., Zhang, J., 2014. Fiscal decentralization and local expenditure policy in China. China Economic Review 28, 107-122

Jiang, R.H., Lin, G.C.S., 2021. Placing China ? s land marketization: The state, market, and the changing geography of land use in Chinese cities. Land Use Policy 103, 16

Jiang, Y., Waley, P., 2018a. Shenhong: The Anatomy of an Urban Investment and Development Company in the Context of China's State Corporatist Urbanism. Journal of Contemporary China 27, 596-610

Jiang, Y.P., Waley, P., 2018b. Shenhong: The anatomy of an urban investment and development company in the context of China's state corporatist urbanism. Journal of Contemporary China 27, 596-610

Jin, H.H., Qian, Y.Y., Weingast, B.R., 2005. Regional decentralization and fiscal incentives: Federalism, Chinese style. Journal of Public Economics 89, 1719-1742

Kornai, J., Maskin, E., Roland, G., 2003. Understanding the soft budget constraint. Journal of Economic Literature 41, 1095-1136

Kroeber, A.R., 2016. China's Economy: What Everyone Needs to Know. Oxford University Press.

Kung, J.K.-s., 2013. From Industrialization to Urbanization: The Social Consequences of Changing Fiscal Incentives on Local Governments' Behavior. In: Law and Economics

with Chinese Characteristics: Institutions for Promoting Development in the Twenty-First Century. Oxford Scholarship Online.

Landry, P.F., Lu, X.B., Duan, H.Y., 2018. Does Performance Matter? Evaluating Political Selection Along the Chinese Administrative Ladder. Comparative Political Studies 51, 1074-1105

Li, H.B., Zhou, L.A., 2005. Political turnover and economic performance: the incentive role of personnel control in China. Journal of Public Economics 89, 1743-1762

Li, J., 2014. Land sale venue and economic growth path: Evidence from China's urban land market. Habitat International 41, 307-313

Li, J., Chiu, L.H.R., 2018. Urban investment and development corporations, new town development and China's local state restructuring - the case of Songjiang new town, Shanghai. Urban Geography 39, 687-705

Li, M., 2019. Information and Corruption: Evidence from Chin• s Land Auctions.

Li, S.Y., Lin, S.L., 2011. The size and structure of China's government debt. Social Science Journal 48, 527-542

Li, Y.Y., Zhu, D.L., Zhao, J.M., Zheng, X.D., Zhang, L.Y., 2020. Effect of the housing purchase restriction policy on the Real Estate Market: Evidence from a typical suburb of Beijing, China. Land Use Policy 94, 13

Lichtenberg, E., Ding, C.R., 2009. Local officials as land developers: Urban spatial expansion in China. Journal of Urban Economics 66, 57-64

Lin, G.C., Li, X., Yang, F.F., Hu, F.Z., 2015. Strategizing urbanism in the era of neoliberalization: State power reshuffling, land development and municipal finance in urbanizing China. Urban Studies 52, 1962-1982

Lin, G.C.S., Ho, S.P.S., 2005. The state, land system, and land development processes in contemporary China. Annals of the Association of American Geographers 95, 411-436

Lin, G.C.S., Yi, F., 2011. Urbanization of Capital or Capitalization on Urban Land? Land Development and Local Public Finance in Urbanizing China. Urban Geography 32, 50-79

Liu, C., Wang, S.J., Wei, K.C.J., Zhong, N.H., 2019. The demand effect of yield-chasing retail investors: Evidence from the Chinese enterprise bond market. Journal of Empirical Finance 50, 57-77

Liu, L.X., Lyu, Y., Yu, F., 2017. Implicit Government Guarantee and the Pricing of Chinese LGFV Debt. SSRN Electronic Journal

Liu, M.X., Tao, R., Yuan, F., Cao, G.Z., 2008. Instrumental land use investment-driven growth in China. Journal of the Asia Pacific Economy 13, 313-331

Liu, T.-Y., Chang, H.-L., Su, C.-W., Jiang, X.-Z., 2016a. China's housing bubble burst? Economics of Transition and Institutional Change 24, 361-389

Liu, T., Cao, G.Z., Yan, Y., Wang, R.Y., 2016b. Urban land marketization in China: Central policy, local initiative, and market mechanism. Land Use Policy 57, 265-276

Liu, Y., Ning, Y., Davidson III, W.N., 2010. Earnings Management Surrounding New Debt Issues. Financial Review 45, 659-681

Liu, Y.X., Jiraporn, P., 2010. The effect of CEO power on bond ratings and yields. Journal of Empirical Finance 17, 744-762

Livingston, M., Poon, W.P.H., Zhou, L., 2018. Are Chinese credit ratings relevant? A study of the Chinese bond market and credit rating industry. Journal of Banking & Finance 87, 216-232

Lu, X.B., Landry, P.F., 2014. Show Me the Money: Interjurisdiction Political Competition and Fiscal Extraction in China. American Political Science Review 108, 706-722

Luo, H., Chen, L., 2019. Bond yield and credit rating: evidence of Chinese local government financing vehicles. Review of Quantitative Finance and Accounting 52, 737-758

Ma, J., 2013. Hidden Fiscal Risks in Local China. Australian Journal of Public Administration 72, 278-292

Ma, L.J.C., 2002. Urban transformation in China, 1949-2000: a review and research agenda. Environment and Planning a-Economy and Space 34, 1545-1569

Mansi, S.A., Maxwell, W.F., Miller, D.P., 2004. Does auditor quality and tenure matter to investors? Evidence from the bond market. Journal of Accounting Research 42, 755-793

Maskin, E., Qian, Y.Y., Xu, C.G., 2000. Incentives, information, and organizational form. Review of Economic Studies 67, 359-378

Meligrana, J., Li, Z., Zhang, Z., 2011. Resolving Land Use Disputes in China:An Analysis of a Method of Dealing with Citizen Complaints. Environment and Urbanization ASIA 2, 251-264

Meyer, D., Shih, V.C., Lee, J., 2016. FACTIONS OF DIFFERENT STRIPES: GAUGING THE RECRUITMENT LOGICS OF FACTIONS IN THE REFORM PERIOD. Journal of East Asian Studies 16, 43-60

Mo, J.W., 2018. Land financing and economic growth: Evidence from Chinese counties. China Economic Review 50, 218-239

Mohan, G., Tan-Mullins, M., 2019. The geopolitics of South-South infrastructure development: Chinese-financed energy projects in the global South. Urban Studies 56, 1368-1385

Montinola, G., Qian, Y., Weingast, B.R., 1995a. Federalism, Chinese Style: The Political Basis for Economic Success in China. World Politics 48, 50-81

Montinola, G., Qian, Y.Y., Weingast, B.R., 1995b. FEDERALISM, CHINESE STYLE - THE POLITICAL BASIS FOR ECONOMIC SUCCESS IN CHINA. World Politics 48, 50-&

O'Brien, P., O'Neill, P., Pike, A., 2019. Funding, financing and governing urban infrastructures. Urban Studies 56, 1291-1303

Oi, J.C., 1992. FISCAL REFORM AND THE ECONOMIC FOUNDATIONS OF LOCAL STATE CORPORATISM IN CHINA. World Politics 45, 99-126

Ong, L.H., 2012. Fiscal federalism and soft budget constraints: The case of China. International Political Science Review 33, 455-474

Ortiz-Molina, H., 2006. Top management incentives and the pricing of corporate public debt. Journal of Financial and Quantitative Analysis 41, 317-340

Pan, F.H., Zhang, F.M., Zhu, S.J., Wojcik, D., 2017. Developing by borrowing? Inter-jurisdictional competition, land finance and local debt accumulation in China. Urban Studies 54, 897-916

Pan, J.N., Huang, J.T., Chiang, T.F., 2015. Empirical study of the local government deficit, land finance and real estate markets in China. China Economic Review 32, 57-67

Qian, Y., Xu, C., 1993. Why China's economic reforms differ: the M-form hierarchy and entry/expansion of the non-state sector. Economics of Transition and Institutional Change 1, 135-170

Qin, Y., Zhu, H.J., Zhu, R., 2016. Changes in the distribution of land prices in urban China during 2007-2012. Regional Science and Urban Economics 57, 77-90

Roback, J., 1982. Wages, rents, and the quality of life. Journal of Political Economy 90, 1257-1278

Shen, C.L., Zhao, X.J., Zou, H.F., 2014. Fiscal decentralization and public services provision in China. Annals of Economics and Finance 15, 135-160

Shi, H., Huang, S.Q., 2014. How much infrastructure Is too much? A new approach and evidence from China. World Development 56, 272-286

Shih, V., Adolph, C., Liu, M.X., 2012. Getting Ahead in the Communist Party: Explaining the Advancement of Central Committee Members in China. American Political Science Review 106, 166-187

Su, F., Tao, R., 2017. The China model withering? Institutional roots of China's local developmentalism. Urban Studies 54, 230-250

Su, F.B., Tao, R., Xi, L., Li, M., 2012. Local Officials' Incentives and China's Economic Growth: Tournament Thesis Reexamined and Alternative Explanatory Framework. China & World Economy 20, 1-18

Tan, J., Zhao, J.Z., 2019. The Rise of Public-Private Partnerships in China: An Effective Financing Approach for Infrastructure Investment? Public Administration Review 79, 514-518

Tao, R., Su, F.B., Liu, M.X., Cao, G.Z., 2010. Land leasing and local public finance in China's regional development: Evidence from prefecture-level cities. Urban Studies 47, 2217-2236

The People's Daily, 2020. The Report of the May Politubro Meeting. URL http://cpc.people.com.cn/n1/2020/0515/c64094-31709627.html?mc_cid=28966ada58&mc_eid=902fe70bde

Tsui, K.Y., 2011. China's infrastructure investment boom and local debt crisis. Eurasian Geography and Economics 52, 686-711

Wang, D., Zhang, L., Zhang, Z., Zhao, S.X., 2011. Urban infrastructure financing in reform-era China. Urban Studies 48, 2975-2998

Wang, W., Ye, F.Z., 2016. The Political Economy of Land Finance in China. Public Budgeting and Finance 36, 91-110

Wang, Y., Hui, E.C.-m., 2017. Are local governments maximizing land revenue? Evidence from China. China Economic Review 43, 196-215

Whiteside, H., 2019. Advanced perspectives on financialised urban infrastructures. Urban Studies 56, 1477-1484

World Bank, 2010. Supporting China's Infrastructure Stimulus Under the Infra Program. URL https://web.archive.org/web/20191205041352/http://siteresources.worldbank.org/INTSDNET/Resources/5944695-1247775731647/INFRA_China_Newsletter.pdf

World Bank, DRC, 2014. Urban China: Toward Efficient, Inclusive, and Sustainable Urbanization.

Wu, J., Gyourko, J., Deng, Y., 2015a. Real estate collateral value and investment: The case of China. Journal of Urban Economics 86, 43-53

Wu, J.X., Wu, Y.R., Wang, B., 2018. Local government debt, factor misallocation and regional economic performance in China. China & World Economy 26, 82-105

Wu, Q., Li, Y.L., Yan, S.Q., 2015b. The incentives of China's urban land finance. Land Use Policy 42, 432-442

Wu, S., Yang, Z., 2020. Informal government preferences and asymmetric land allocation in China. Land Use Policy 99

Wu, W.P., 2010. Urban infrastructure financing and economic performance in China. Urban Geography 31, 648-667

Wu, Y., Heerink, N., 2016. Foreign direct investment, fiscal decentralization and land conflicts in China. China Economic Review 38, 92-107

Wu, Y.F., Li, X., Lin, G.C.S., 2016. Reproducing the city of the spectacle: Mega-events, local debts, and infrastructure-led urbanization in China. Cities 53, 51-60

Xu, C.G., 2011. The fundamental institutions of China's reforms and development. Journal of Economic Literature 49, 1076-1151

Ye, F.Z., Wang, W., 2013. Determinants of Land Finance in China: A Study Based on Provincial-level Panel Data. Australian Journal of Public Administration 72, 293-303

Ye, L., Wu, A.M., 2014. Urbanization, Land Development, and Land Financing: Evidence from Chinese Cities. Journal of Urban Affairs 36, 354-368

Yew, C.P., 2011. Explaining Land Use Change in a Guangdong County: The Supply Side of the Story. China Quarterly, 626-648

Zhang, J.F., 2011. Interjurisdictional competition for FDI: The case of China's "development zone fever". Regional Science and Urban Economics 41, 145-159

Zhang, Y., Barnett, S., 2014. Fiscal Vulnerabilities and Risks from Local Government Finance in China. IMF Working Papers 14, 1

Zheng, H.R., Wang, X., Cao, S.X., 2014. The land finance model jeopardizes China's sustainable development. Habitat International 44, 130-136

Zhong, T.Y., Zhang, X.L., Huang, X.J., Liu, F., 2019. Blessing or curse? Impact of land finance on rural public infrastructure development. Land Use Policy 85, 130-141

Zhou, M., Wang, B., Chen, Z., 2020. Has the anti-corruption campaign decreased air pollution in China? Energy Economics 91

Zhu, A.D., Kotz, D.M., 2011. The Dependence of China's Economic Growth on Exports and Investment. Review of Radical Political Economics 43, 9-32

Zhu, J., 2012. The Shadow of the Skyscrapers: real estate corruption in China. Journal of Contemporary China 21, 243-260

Zuo, C., 2015. Promoting City Leaders: The Structure of Political Incentives in China. The China Quarterly 224, 955-984