

Thank you very much for taking your time reading my draft.

All comments are welcome.

This paper is the first step for my larger project: to understand how the land value capture, infrastructure, real estate, urbanization, and economic growth have reinforced each other in China.

Therefore, I am also looking for suggestions for future research on **institutions, action situations, empirical tests, and laboratory experiments.**

**Land Finance and Land Development Quota in China:
A Game Theory Model of the interaction between central and local governments**

Abstract

Current literature takes for granted that the central government should control the amount of farmland converted by local governments. The widely cited reasons are the costs associated with land finance, such as farmland decrease, containing social risk from land losing farmers, and low land-use efficiency. However, the central government also benefits from local governments' land development financially. What are the trade-offs? And how quota is decided and implemented?

This paper explores three explanations for the dynamics between the central and local governments over the amount of farmland converting for urban expansion. First, local governments' costs are lower than the central government's costs. Local government tends to convert more farmland than the central government's optimum quantity. Second, to realize the discriminating monopoly rents, the central government has to control the total amount of land supplied to the market. Third, the central government lacks the information to make accurate quota allocation.

Based on the transaction costs and the divergence of social costs between local and central governments, this paper develops a game theoretical framework to predict the conditions under which local governments obey or challenge the central government's control. This paper concludes the debate over the economic efficiency of land finance practice.

Land Finance

The demarcation of state-owned land and collectively owned land happened in the early 1980s in China. Since then, local governments have been expropriating collectively owned farmland rapidly and massively as China's urbanization accelerated. Farmers who lose land are compensated based on the original agricultural land-use rights. Then, local governments lease out expropriated lands as state-owned land to commercial and residential developers. The leases are 40, 50, or 70 years and all leasees pay all rents upfront. Land leasing fees could be hundreds or thousands of times higher than compensation paid to the farmers. The profit allows local governments to accumulate a large amount of money in a short time. Local governments use these capital to build infrastructure, subsidize industries, and provide public services. This process is called land finance in China.

Land lease revenue rose from 0.48% of GDP in 2004 to 7.25% of GDP in 2013 nationally¹. Land related fees accounted for an average of 32% of local governments' public fiscal income in 2013. This percentage varied in different regions: 85% in Hainan and 5% in Qinghai in 2008². In 2018, land leasing fee nationally was 6.5 trillion RMB which constitutes 36 percent of government general budgetary revenue³. It raised from 5.2 trillion in 2017 despite slower economic growth and red flags over housing market⁴.

Fiscal system incentivizes land finance

The financial incentive partly explains why land finance is developed and why it is so hard to reform.

In the 1980s, China's "system of fiscal responsibility" incentivized local governments to cultivate business to generate taxes. After submitting a lump sum revenue to the central government, local governments kept the remaining tax revenues. Back then, the land was cheap and mostly free. The local government allocated land generously to attract investment opportunities. Land use decision was decentralized, which meant the central government faced difficulties using only administrative

¹ Bahl, Roy, Chor-Ching Goh, and Baoyun Qiao. "Reforming the public finance system to fit a more urbanized China." *China Financial & Economic Publishing House* (2014).

² Cai, Meina. "Land-locked development: The local political economy of institutional change in China." PhD diss., The University of Wisconsin-Madison, 2012.

³ http://www.gov.cn/xinwen/2019-01/23/content_5360648.htm

⁴ http://www.cfen.com.cn/sjpd/czxx/201802/t20180223_2816902.html

procedures and guidelines to monitor and control local governments' land-use behavior. In 1987, to accommodate private entities and foreign investment using the land, China gradually changed to auctioning commercial land. The market competition revealed the value of land associated with fast economic growth and urbanization. Land leasing fees had become an increasingly larger share of local revenue.

In 1994, tax reform further shifted local governments' attention to selling land. The new tax-sharing requires local governments to share the majority of their tax revenue generated from income and business. However, it did not cut back on sub-national governments' expenditure responsibilities. Table 1. Compares the shares of revenue and expenditure responsibilities of local governments. As a result, there has been a widening gap between local government expenditure and fiscal revenue. Local governments have grown financially dependent on the transfer from the central government. However, local governments cannot project the amount of the transfer from the central government in advance⁵.

On the other hand, the Budget Law⁶ prohibits local governments from having deficits. Therefore, local governments started to expand the types of revenue which they can keep all or the majority of them, such as land leasing fee, and related taxes⁷.

⁵ Su, Ming, and Quanhou Zhao. *The fiscal framework and urban infrastructure finance in China*. The World Bank, 2006.

⁶ Budget Law (2018 Amendment) [Effective]

<http://en.pkulaw.cn/display.aspx?cgid=4fef1f2f1d7b7441bdfb&lib=law>, last access: Nov 2019.

⁷ 国务院办公厅关于规范国有土地使用权出让收支管理的通知 http://www.gov.cn/zwggk/2006-12/25/content_478251.htm. last access: Nov 2019.

Table 1. Shares of revenue and expenditure responsibilities of local governments

The central Revenues	<ul style="list-style-type: none"> Import Tariffs Consumption Taxes Income Taxes and Profits of SOEs under the jurisdiction of the central government Import-related consumption taxes and VATs Taxes imposed on banks, nonbank financial institutions and insurance companies (include business taxes, income taxes, and Urban Maintenance and Development Tax) Taxes on railroads. 	<ul style="list-style-type: none"> Sub-national government administration Local Capital Construction Basic local services, including water supply and distribution, local and regional roads, and highways, wastewater collection and treatment, garbage collection and disposal; urban gas supply; mass transit Maintenance, repair, and operation of urban infrastructure Management of local State-Owned Enterprises (SOEs) Expenditure for Supporting Agricultural Production Primary and secondary schooling; large portion of higher education Health care and hospitals Price Subsidies Poverty alleviation Protection of laid-off workers from SOEs Cultural and heritage protection Environmental protection Local and regional economic development Physical planning
Sub-national Revenues	<ul style="list-style-type: none"> Business Tax (excluding banks, nonbank financial institutions and insurance companies, and railroads) Company Income Tax (excluding local banks, foreign banks, and nonbank financial companies) Profits of locally owned SOEs Personal Income Tax Urban Land Use Tax Urban Maintenance and Development Tax (excluding banks, nonbank financial institutions and insurance companies, and railroads) Fixed Assets Capital Gains Tax House property taxes Stamp taxes Agriculture and Related Taxes Tax on Contracts Land value increment taxes 	
Shared Revenues	<ul style="list-style-type: none"> Value Added Taxes (the central 75%, sub-national governments 25%) Stamp Taxes on Security Exchange (50%-50%) Resource Taxes 	

Source: Su, Ming, and Quanhou Zhao. *The fiscal framework and urban infrastructure finance in China*. The World Bank, 2006.

Legal framework enables land finance

The government monopolized urban land supply gradually through a series of amendments to the Chinese Constitution⁸ and Land Administration Law⁹.

After decades of gradually confiscating private urban land, the State declared its ownership of all urban areas in the Constitution 1982 Amendment. The Amendment assigns lands in rural and urban fringe as collectively owned except those belonging to the State in accordance with the law. It also restricts: "No organization or individual may appropriate, buy, sell, or engage in the transfer of land by unlawful means. The rights to use land may be transferred according to law."

In the following 15 years, the law was unclear about how to transfer land use rights. Nevertheless, local governments started to lease state-owned urban land to foreign and private corporations at the end of the 1980s. The strong demand for land from economic growth and urbanization brought the government an incredible amount of revenue. Land Administration Law 1998 Amendment

⁸ <http://en.pkulaw.cn/display.aspx?cgid=7c7e81f43957c58bbdfb&lib=law>

⁹ <http://en.pkulaw.cn/display.aspx?cgid=098c17d5cfc8b2a7bdfb&lib=law>

added Article 43: "Any entity or individual that needs land for construction purpose should apply for the use of land owned by the State by law..... The term 'apply for the use of land owned by the State' used in the preceding paragraph refers to land owned by the State and also land originally owned by peasant collectives but having been expropriated by the State." This article gives the State legal rights to monopoly urban land supply.

There are no articles that permit or prevent the transfer of use rights of existing collectively owned residential and industrial land. Villagers have supplied these lands directly to urban users. In the last 20 years, a large amount of literature has studied these informal or illegal transfer¹⁰. The rights to use agricultural land can be transferred in the market under certain conditions (LAL, article 14 & 15). However, villagers cannot change land usage. Therefore, this is no demand for them unless the government converted these collectively owned farmlands as urban state-owned land. This restriction gives the central government monopoly power over (i) the supply of legal urban land and (ii) the authority to convert collectively owned farmland into state-owned urban land.

In 1982, when the government announced state ownership over urban land, cities were small. Since then, many cities have grown 2 to 5 times larger. Expropriating collectively owned land is the only way to supplement the stock of state-owned urban land. Other articles supported the procedures of expropriation and set low compensation standards.

The legal framework also allows the government to expropriate collectively owned land as they wish at low compensation. Article 10 of the Constitution and Article 2 of the Land Administration Law state: "The State may, for public interests, expropriate or take over land for public use, and pay compensation in accordance with the law." However, the legal definition of the public interest in relevant statutes remains unclear. Article 2 gives State Council the legal rights to sell State-owned land on behalf of all people. However, the definition of collectively has left empty. Without legal representatives of collective ownership weakens villagers' property rights during land

¹⁰ Wu, Fulong, Fangzhu Zhang, and Chris Webster. "Informality and the development and demolition of urban villages in the Chinese peri-urban area." *Urban Studies* 50, no. 10 (2013): 1919-1934.

Webster, Chris, Fulong Wu, Fangzhu Zhang, and Chinmoy Sarkar. "Informality, property rights, and poverty in China's "favelas"." *World Development* 78 (2016): 461-476.

Tian, Lin I. "The chengzhongcun land market in China: Boon or bane?—A perspective on property rights." *International Journal of Urban and Regional Research* 32, no. 2 (2008): 282-304.

expropriation. Specifically, Article 2 states: "China resorts to socialist public ownership, i.e., ownership by the whole people and ownership by collectives, of land. In ownership by the whole people, the State Council is empowered to be on behalf of the State to administer the land owned by the State". This article not only gives the State Council the legal rights to sell land on behalf of all people. The lacking of definition and representative of collective owner weakens villagers' property rights during land expropriation.

Article 47 of Land Administration Law sets: "Expropriation compensation should be made according to the original purposes of the land expropriated." The contracted period of farmland to rural households is 30 years. The contract is subject to renew automatically. The government gives residential land to households for free and permanently. The collective still owns the land. The compensation is given to individual rural households and based on previous land use rights. The compensation to collective ownership is missing in any formal documents, and practice.

The combination of Article 47 and current land tenure has two implications. The leasing fee of expropriated land was tens of thousands of times the compensation paid to rural households. And two, the government has expropriated farmlands because they have lower compensation than residential land. Much of the rural residential land is underused or discarded. Therefore, the following case studies focus on using a (so-called) market to convert farmland to rural residential land.

Political and administrative

Without understanding governance in China, it is impossible to know how lawmakers could design and implement institutions quickly on such a large scale.

The State Council sits at the top of China's vast government machine. It drafts and makes sure the national economic plan and the state budget gets implemented from the national to the local level. It is also responsible for law and order. It holds power over almost every aspect of people's lives.

National People's Congress (NPC) has the power to change the constitution and make laws under China's 1982 Constitution. Its western counterpart is parliament. However, the full congress with

3,000 delegates from all over the county meets once a year. Seventy percent of the delegates are party members. Therefore, what tends to happen is that the party draft most new legislation and passes it to the NPC for "consideration," better described as speedy approval. Critics argue the NPC is little more than a rubber stamp for the party decision.

Courts and prosecutors are one way to manage the economy and people's lives. Rarely do these judicial actors protect people from the State or defend individual rights. Often government and state own enterprises view court decisions as something to be negotiated, not obeyed.

These administrative, legislative, and judicial bodies are not independent in the western sense, and they all report to the Chinese Communist Party. The Chinese Communist Party is the only ruling party in China. It also controls the military, premium employment opportunities, and economic sources. Its 73 million members make it the largest political party in the world. The Party's most senior leaders hold the most important posts of China's People's Liberation Army and control the paramilitary People's Armed Police. The Party's organization department controls more than 70 million party personnel assignments nationally. The Party also has a strong influence on economic matters. Over 85% of China's 109 corporations listed on the Fortune Global 500 are State-Owned Enterprises (SOEs). SOEs contain 10 million Communist Party members¹¹.

The central government in this paper mainly means the State Council, but sometimes also includes the legislative and judicial bodies. The local governments in this dissertation primarily refer to the administrative authorities. They are the agency of the central government. Figure 1 shows that the administrative division of China consists of six levels. As of 2017, China administers 33 provinces, 334 prefecture divisions, 2862 counties, 41,034 towns and townships, and 704,382 residential streets in the urban and villages in the rural.

¹¹ South China Morning Post. (2017). How the Communist Party controls China's state-owned industrial titans <https://www.scmp.com/news/china/economy/article/2098755/how-communist-party-controls-chinas-state-owned-industrial-titans> (last accessed 1 Aug 2019)

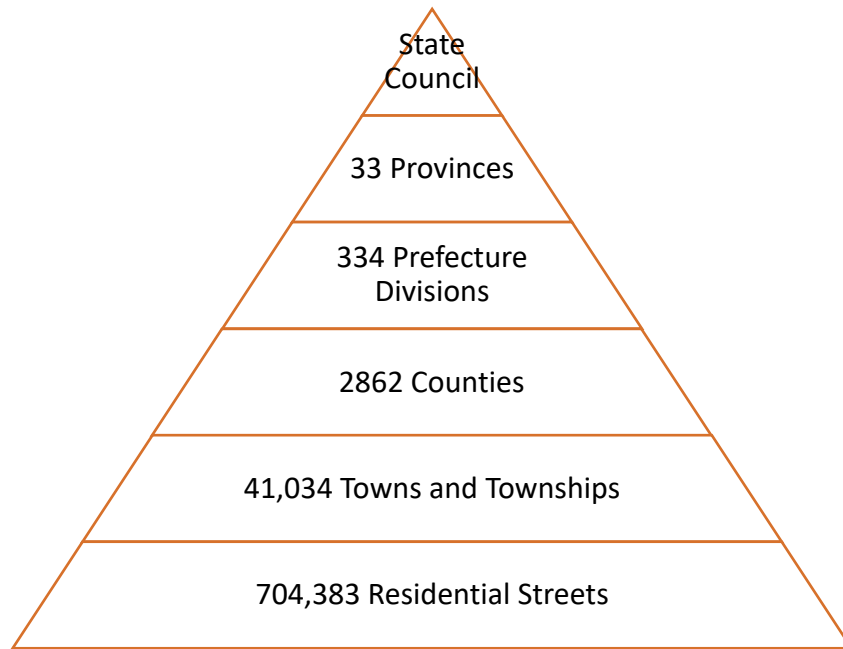


Figure 1. Administrative Structure of China

Source: Made by the author

People in charge of different levels of local governments, around 7000, are all appointed by the Party's organization department¹². Officers at the village level are either elected by the villagers or appointed by the higher-level government. Officers can only govern one city for 5 to 10 years, after which the Party assigns them to another city. Whether they are appointed to a lower, higher, or the same level of positions in a new city depends mainly on their performance--i.e., GDP growth--in their previous station.

China has decentralized in many economic fields and public services and expenditures. However, it is the least decentralized on the fiscal revenue and political areas. Powers and decisions flow from the top level to an intermediate level of counties and cities, and finally to the local-level townships.

¹²http://news.bbc.co.uk/2/shared/spl/hi/asia_pac/02/china_party_congress/china_ruling_party/how_china_is_ruled/html/provinces.stm

Socioeconomic consequences

To begin, for land financing to work, local governments first must expropriate land. Sometimes, the government improves the land before leasing. The necessary improvements include zoning, connections to utilities--water, sewage, electricity, communication systems--and access to transportation hubs. In some cases, local governments provide shops, restaurants, recreational facilities, and green spaces. Some industry parks also provide startup office and warehouse spaces. This supply needs to meet the demand from firms and households. At the beginning of China's urbanization, everything was in short supply. It was not hard for the market to digest government supply. But in recent years, there are increasing cases of idled land and ghost cities¹³, which indicates oversupply something and misallocation of resources. Some argue that it is too early to define these investments as wasteful because studies estimate 200 million people will migrate from rural to urban if China's urbanization rate reaches 70 percent.

Land use efficiency suffers too. First of all, there are many types of land are allocated for free or at the compensation costs, such as land for government offices, universities, and infrastructures¹⁴. Local governments' extravagant office building raised wide attention nationally and internationally. In 2013, the Central government even banned new, expanding or restoring existing local government compounds¹⁵. Li et al. criticize the university fever exemplifies the rise of land-centered speculative urbanism¹⁶. Second, local governments subsidize industrial land to compete with each other to attract manufacturers to their jurisdictions¹⁷. The policy encourages manufacturers to occupy more land and overinvest than is socially optimum¹⁸.

¹³ Shepard, Wade. *Ghost cities of China: the story of cities without people in the world's most populated country*. Zed Books Ltd., 2015.

¹⁴ Urban Real Estate Administration Law of the People's Republic of China (2009 Amendment) [Effective] <http://en.pkulaw.cn/display.aspx?cgid=08895b3881ff389ebdfb&lib=law>

¹⁵ <https://www.nytimes.com/2013/07/24/world/asia/china-orders-halt-to-construction-of-government-buildings.html>

¹⁶ Li, Zhigang, Xun Li, and Lei Wang. "Speculative urbanism and the making of university towns in China: A case of Guangzhou University Town." *Habitat International* 44 (2014): 422-431.

¹⁷ Xue Bai. *Fiscal Decentralization, Intergovernmental Competition and the Structural Deviation of Land Prices* (財政分權、政府競爭與土地價格結構性偏離). Finance & Economics 03 (2011).

¹⁸ al HUANG Jian-bai; XU Zhen; XU Shan. "Land Price Distortion, Enterprises' Property and Over-investment—An Empirical Research Based on the Data of Chinese Industrial Enterprises and Land Price of Cities in China(土地價格扭曲、企業屬性與過度投資——基于中國工業企業數據和城市地價數據的實證研究)." China Industrial Economics 03 (2015).

Residential and commercial lands generate most leasing fees. Local governments have set expectations that house and land prices will rise, and thus investment in both¹⁹ increased. Rising incomes and the booming economy supported these expectations. But what will happen when the economy slows? This proposition is especially concerning in cities with a high ratio of average house price to average household income. Demographia International Housing Affordability Survey classifies the ratio under 3 as affordable²⁰. China's ratio is 20.9, compared to only 3.9 in the United States. Also, the long-run estimation of high GDP assumes robust real estate and construction sectors. For example, Hau and Ouyang²¹ identify the speculation in the real estate crowded out investment in the local industrial sector.

The social risk from land losing farmers and food production concerns from decreased areas of farmland are widely recognized²². Around 45 million farmers lost their land due to expropriation by 2007. This number is expected to swell to 87 million by 2020, and 100 million by 2030²³. Around 65% of rural disturbances were caused by sentiment over government undue procedure and unjust compensation during land expropriation²⁴.

There are disputes over how the government calculated its 1.8 billion mu farmland conservation target. Nevertheless, there is no doubt that China's agricultural resources are highly stretched out to feed the 1.4 billion population. The urbanization and rising income also have been shifting China's eating habit, including more and higher quality protein²⁵. Import could be a solution, but self-sufficiency has always been an essential ideology for Chinese leaders.

¹⁹ Wu, Jing, Joseph Gyourko, and Yongheng Deng. "Evaluating conditions in major Chinese housing markets." *Regional Science and Urban Economics* 42, no. 3 (2012): 531-543.

²⁰ 15th Annual Demographia International Housing Affordability Survey: 2019 Rating Middle-Income Housing Affordability.

²¹ Local capital scarcity and industrial decline caused by China's real estate booms <https://voxeu.org/article/china-s-real-estate-booms-local-capital-scarcity-and-industrial-decline>

²² Chan, Nelson. "Land acquisition compensation in China—problems and answers." *International Real Estate Review* 6, no. 1 (2003): 136-152.

Han, Sun Sheng, and Chun Xing He. "Diminishing farmland and urban development in China: 1993–1996." *GeoJournal* 49, no. 3 (1999): 257-267.

²³ 劳动保障部课题组. 我国被征地农民社会保障制度研究. China Labor, 02(2007).

²⁴ China Daily. (2010). Rural land disputes lead unrest. http://www.chinadaily.com.cn/cndy/2010-11/06/content_11510530.htm (Last access 28 May 2016)

²⁵ <https://www.bloomberg.com/graphics/2017-feeding-china/>

Land conservation and development quota

At the beginning of the People's Republic of China, little attention was paid to land conservation. The focus then was on dividing the land ownership, use rights, and rights to transfer between the State and individuals. It was a period of moving back and forth between private and public land ownership. In addition, the low urbanization rate and dull economy put little pressure on land conservation because development was not pressing. At that time, land-use decisions were usually made by the commune in rural areas or by counties or higher levels of government in the cities.

After 1978, economic growth in both rural and urban areas led to an uncontrollable conversion of farmland land to construction land. Within the 47 years from 1949 to 1996, 0.58 billion mu (96 million acres) of farmland land were lost. That is equivalent to 12.33 million mu (2.03 million acres) per year. The majority of this was structural change within the agricultural sectors, such as changing rice fields into fishing ponds. However, 25% of farmland land loss was due to urban expansion from 1986 to 1990; that number went up to 51% from 1990 to 1992. There was also regional disparity. The farmland land loss caused by urbanization was as high as 67.8% in more developed Eastern Coast cities.²⁶ As a consequence, a hierarchical review and approval system was established to remove land decision making from the commune level. It transferred decision making to a Land Administration Bureau at a higher administrative level. Each bureau was authorized to approve up to a certain amount of land conversion according to its hierarchical level. However, this policy was severely manipulated by state agencies at local administrative levels who have been the beneficiaries of converting land. For example, they cut a big area of land small enough to be approved locally. Or they misclassified farmland land as already “non-farmland land”.²⁷

The central government was alarmed by the fast pace of farmland land losing and ineffective administration procedures. In November 1991, the central government called for the establishment of "protected basic farmland regions" and then in 1994 promulgated "regulations for the protection of basic farmland." In 1997, Chinese leaders found the conversion rate was 2.5 times faster than

²⁶ Li. Y. ed. (2000) *Zhongguo tudi ziyuan* [China's land resource, in Chinese]. *China Land Press*, p133. Beijing

²⁷ Lin, G. C., & Ho, S. P. (2005). The State, land system, and land development processes in contemporary China. *Annals of the Association of American Geographers*, 95(2), 411-436.

official statistics from Landsat photographs for 1987, 1991, and 1995 in 17 cities.²⁸ Shortly after that, the State Council froze all agricultural land conversion from 1997 to 1999. In 1998, Land Management Law was revised, requiring local governments to "ensure that the total amount of cultivated land within its administrative region is not reduced."²⁹ The first agricultural land conservation target was set in 1996, aiming to keep at least 1.92 billion mu (0.32 billion acres) until 2010. However, in 2000, overall agricultural land was 1.923 billion mu, very close to the conservation target. Therefore, the target was revised to 1.92 billion mu until 2005. Unfortunately, only 1.83 billion mu (0.3 billion acres) of agricultural land remained in 2005, less than the 1.92 billion target. To avoid failure again, in 2006, the central government moved to the so-called "strictest farmland land conservation regulations in history" and set a target of 1.8 billion mu.

At the same time, the central government designed three quotas to control the land development pace in all Chinese cities. They are newly added construction land quota, farmland conservation quota, and newly created cultivate land quota. The newly added construction land quota is the amount of agricultural and unused land that can be converted into construction land. Farmland conservation quota sets up the total amount of cultivated land in a particular area. According to the Outline of National Overall Land Use Plan (2006 - 2020), 1.818 and 1.805 billion mu of farmland should be conserved in 2010 and 2020, respectively. Newly created cultivate land quota aims to increase the quantity of cultivating land through unused land development and consolidation.

The annual quota cap is decided by the central government according to the 1.8 billion mu conservation target. The quota is then allocated by the higher-level government to the next lower level governments under its jurisdiction until it reaches the county level.

²⁸ U.S. Embassy Beijing. (1997). China's farmland loss rings alarm satellite photographs reveal a serious problem <http://fas.org/spp/guide/china/earth/landloss.htm> (Last access 26 May 2016)

Supra note 1, p411

²⁹ Article 33, Land Management Law 1998, Beijing China.

Some clarifications

Current literature takes granted that the central government should control the amount of farmland converted by local governments. The widely cited reasons are the costs associated with land finance, such as farmland decrease, containing social risk from land losing farmers, and low land-use efficiency. However, Rithmire³⁰ observed that institutions permit land expropriation has strengthened. Farmland conservation has been implemented internationally, even in places that face less pressure from land scarcity³¹. It is an important reason but not be determinant. The costs of importing food can hardly justify the reduced land leasing fee. Most importantly, the central government also benefits from local governments' land development economically and financially. How does the central government make the trade-offs?

At the same time, the central government's constraints have continuously been contested and circumvented by local governments. Previous research pointed out that the current tax-sharing system lefts local governments a few other choices but to rely on land finance. It explains local governments' incentives. However, it does not explain why the central government allowed it to happen. Besides, the central government has been regulating local land use behavior since the 1980s, which is earlier than the 1994 tax reform.

The following sections provide three theoretical explanations to the dynamics between the central and local governments over the amount of farmland that should be converted each year. First of all, local governments' private costs are lower than the social costs of farmland converting. They tend to convert more farmland than socially desirable. Secondly, in order to realize the discriminating monopoly rents, the central government has to control the total amount of land supplied to the market. Local governments are competing with each other by offering subsidized land to attract economic activities. The central government wants to prevent them from flooding the market with cheap land. Thirdly, the central government lacks the information to make accurate quota allocation. It explains why the central government permits local initiatives to overcome its regulations.

³⁰ Rithmire, Meg Elizabeth. "Land institutions and Chinese political economy: Institutional complementarities and macroeconomic management." *Politics & Society* 45, no. 1 (2017): 123-153.

³¹ Millward, H. (2006). Urban containment strategies: A case-study appraisal of plans and policies in Japanese, British, and Canadian cities. *Land Use Policy*, 23(4), 473-485.

Monopoly, social costs and land supply

The Chinese government behaves as a discriminating monopolist and uses either an auction mechanism or negotiation system to allocate land. The government generally auctions residential land to the highest bidder. But for industrial land, it negotiates with manufactures for the price. In this system, the government maximizes the total value of land leasing fees, the business tax generated by capital investment, and income tax from employment.

To realize the discriminating monopoly price, the central government throttles the pace of land supply to prevent local governments from racing to the bottom. The direct conflict of interests between participants is characteristic of these Chinese political tournaments. Local officials' competition causes prolonged local protectionism, duplicative investments, and destructive competition among regions³². Zhang³³ examined the competition between local governments when they price industrial land.

Discriminating monopolist attempts to maximize its profits leads to the same allocation of land as the supply and demand mechanism of the competitive market. However, this does not mean the amount of land supplied by the discriminating monopolist is socially optimum.

The socially optimal level of output is reached when the marginal private cost is equal to marginal social cost. The social cost is the sum of private costs and externalities. Some activities have positive externalities, such as research and development, to improve the quality of life. The private cost is higher than the social cost when producers do not receive compensation for providing positive externalities. This situation leads to an underproduction of such goods. Some activities have negative externalities, such as unpriced pollution and congestion from driving. When the producer does not pay for these negative externalities, the private cost is lower than the social cost. In this situation, producers produce more than is socially desirable.

³² Li-An Zhou. The Incentive and Cooperation of Government Officials in the Political Tournaments: An Interpretation of the Prolonged Local Protectionism and Duplicative Investments in China. *Economic Research Journal*. 06(2004).

³³ Zhang Qing-yong. Local Governments' Competition and the Leasing Price of Industrial Land in China. *Research of Institutional Economics*. 01 (2006).

Figure 1 illustrates the mathematical expression of the output under the divergence between private and social cost. D presents the demand curve. P_s are the marginal social cost, and Q_s are the corresponding socially optimum output. When a producer does not internalize all the costs of production, the marginal private cost, P_1 , is lower than the marginal social cost. The output, Q_{p1} , is larger than the optimal social level. When a producer is not compensated for positive externalities, the marginal private cost, P_2 , is higher than the marginal social cost. The output, Q_{p2} , is below the optimal social level.

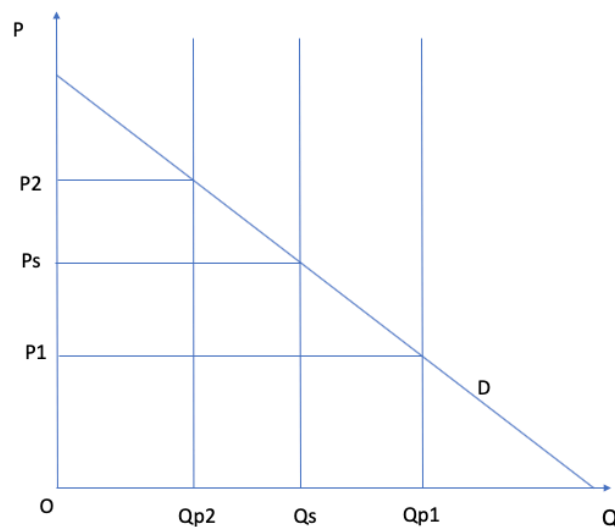


Figure 1. Production under social costs and private costs

This research identifies four factors contributing to that local governments' private costs of converting farmland is lower than social costs. First of all, the compensation paid to convert farmland is lower than what would be in a competitive market, and if the rural collective ownership is more clearly defined. Second, current local governments generate income from land at the expense of future governmental income. Local officers govern cities for five to ten years, but the government leases land for terms of 50 to 70 years. As I explained above, the government receives all lease payments upfront, and thus the current government collects and uses the income of future generations. Local governments also use the land as collateral for bank loans for which future governments are accountable.

Third, land expropriations with unjust compensation or without due process create local resentment. People in other places would worry that similar things would happen to them and thereby increases the distrust between the government and people nationally.

Finally, the majority of local governments do not give farmland conservation priority. Regions that are less developed have abundant farmland. They do not think that food security is a problem. The regions that converted farmland for urban growth have, for the most part, promising industrial and service sectors. These regions do not want to revert these higher productive sectors for agricultural production. Also, they have been mainly relying on import food for other parts of the county or internationally. They do not see that food security would be a life-threatening problem.

Here, we assume that the central government, or the CCP, wants to keep its regime permanently. Then it bears the last three types of social costs that local governments do not consider. Still, the central government benefits from the low compensation paid to convert collectively owned farmland as state-owned land. Therefore, the central government's costs are higher than local governments, but its social costs are lower than those that local governments experience.

Figure 2 illustrates that local governments' optimum quantity of farmland conversation is higher than the central government's. Both the central and local governments' optimum quantities are higher than what is socially desirable.

D presents the demand curve. P_s is the marginal social cost, and Q_s is the corresponding social optimum output. When the central government does not have to bear all of the costs, the marginal cost, P_c , is lower than the marginal social cost. The output Q_c is larger than the socially optimum. The local governments' cost, P_l , is even lower than the central government's cost P_c . It converts more farmland than the central government want. Therefore, the central government uses land development quota to narrow the gap between Q_c and Q_l .

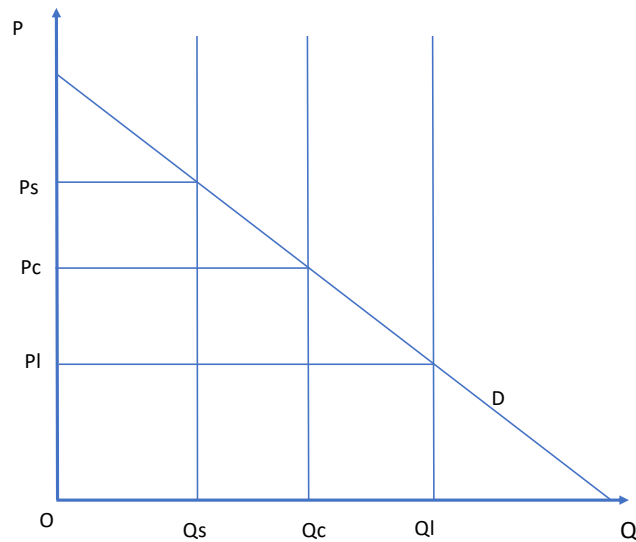


Figure 2. Optimum Farmland Converting Quantities for Government and Society

Problems of quota allocation

Currently, the central government allocates land development quota to each city. The quota specifies the amount of land local governments can convert each year. The only apparent benefit of this policy has been a "more balanced city system"³⁴. However, the allocation principle based on egalitarian disregards the comparative advantages in natural resources, geographical locations, and access to investments.

Central government suffers from the lack of information, and precise monetary measures of benefits and costs³⁵. Three problems arise from this. First, there are mismatches between the

³⁴ Yeh Anthony Gar-On and Xu Xue-Qiang (1989) City development in China 1953-86. Working Paper No. 41, Centre of Urban Studies and Urban Planning, University of Hong Kong, Hong Kong.

³⁵ Coase, Ronald H. "The federal communications commission." In *Private and Common Property*, pp. 53-92. Routledge, 2013.

central government's quota and local governments' needs. A case in point is the coexistence of ghost cities in some of Chinese cities and housing shortages in others. There are also mismatches between government supply and market demand. The local land bureau lists the land available on its website. However, not all of them could be sold. Third, it is hard to implement because of the principal agency problems between the central and local governments. The central government seems incapable of reining in the predatory local government³⁶.

Game model

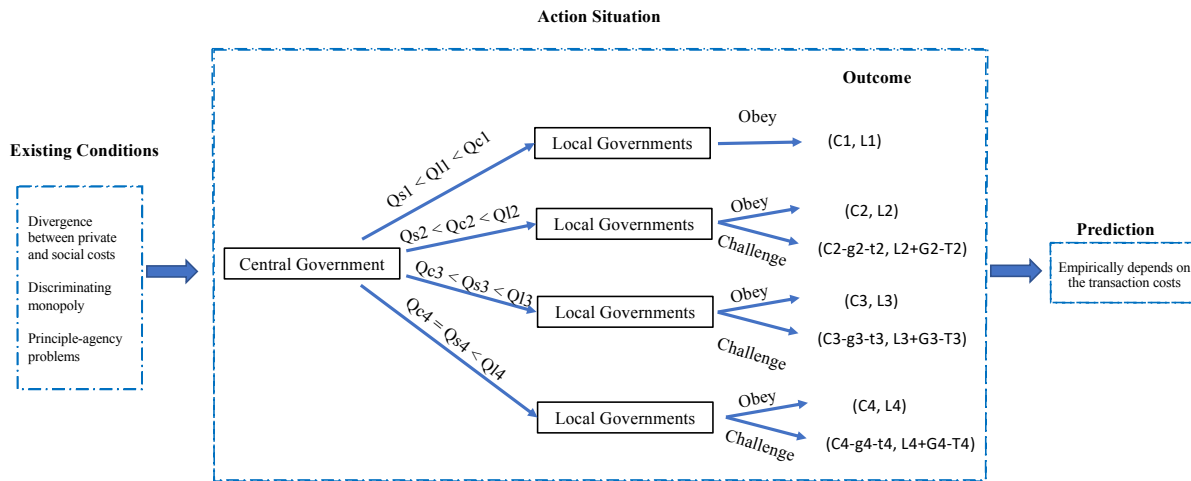
Based on the transaction costs and the divergence of social costs between central and local governments, this section develops a game theoretical framework to predict, under what conditions, local governments would obey or disobey constraints put by the central government. Flow Chart 2 is the theoretical model. Figures 2.1 and 2.2 provide numerical examples of whether local government challenges central control.

Due to a lack of information, the central government could not predict what the optimum quantities for itself, local governments, and the society are. Here, Q_c represents the quota assigned by the central government. Q_l is the local optimum quantity. Q_s is the socially optimum quantity. Q_c is known because it is set up by the central government. Q_l varies by locality. It is unknown by both central and local governments. But local governments have better information and estimate. Q_c is unknown, but affects supply and demand.

The quota, Q_c , could fall in one of the four situations, as shown in Flow Chart 2. Whether the local government would challenge the central quota depends on the transaction costs and the gain from a challenge. G_l represents local government's gain from a challenge; $-G_c$ represents the central government's lost when local governments get what they want. T_l represents the local government's transaction costs to negotiate with the central government to relax the quota; t_c represents the central government's transaction costs to investigate whether local government's challenge is legitimate.

³⁶ Lin, George CS, and Samuel PS Ho. "The state, land system, and land development processes in contemporary China." *Annals of the Association of American Geographers* 95, no. 2 (2005): 411-436.

Lin, George CS. *Developing China: land, politics and social conditions*. Routledge, 2009.



Flow Chart 2 _ Central VS local on land development quota

In the first situation, $Qs1 < Ql1 < Qc1$. It means the quota is larger than the local government wants. Consequently, it is larger than the social optimum. Under this condition, the local government will not challenge the central government's decision. The outcome is a minimum utility, C1, for the central government because it failed to control local government. Local government's gain is maximum, L1.

In the second situation, $Qs2 < Qc2 < Ql2$. The central government's quota is larger than the social optimum but smaller than the local government wants. If local government accept the quota, the outcome from the central and local government is C2 and L2. If local governments challenge the central constraint, their payments are C2-g2-t2, and L2+G2-T2 respectively.

In the third situation, $Qc3 < Qs3 < Ql3$. The central government's quota is smaller than both the social optimum and local government wants. If local government accept the quota, the outcome from the central and local government is C3 and L3. If local governments challenge the central constraint, their payments are C3-g3-t3, and L3+G3-T3 respectively.

In the fourth situation, $Q_{c4} = Q_{s4} < Q_{l4}$. The central government's quota is smaller than both the social optimum and local government wants. If local government accept the quota, the outcome from the central and local government is $C3$ and $L3$. If local governments challenge the central constraint, their payments are $C3-g3-t3$, and $L3+G3-T3$ respectively.

The gains follow some general trends. The central government's optimum quantity is larger than the social optimum and lower than the local government's optimum. $C2$ should be the highest gain for the central government. $C4$ should larger than $C3$. However, the relationship between $C1$ and $C3$ depends on how Q_c deviates from the social and local optimum. When Q_c is larger than Q_l , the central government bears some of the local government's social costs. When Q_c is smaller than Q_s , the central government loses financial and economic benefits from farmland converting.

The local government's outcome linearly increases as the central government's quota increase. That is $L1 > L2 > L4 > L3$. Therefore, the gains from successful challenge central control follow $G3 > G4 > G2$.

However, the transaction costs vary depending on the different local government's information advantage, negotiation power, etc. Whether local government challenges the central quota depends on the transaction costs and gains from a successful challenge. If the local government's gain minus transaction costs are negative, $G_i - T_i < 0$, then the local government will obey the central control. Figure 2.1 offers a numerical example of this condition.

If the local government's gain minus transaction costs are positive, $G_i - T_i > 0$, then the local government will challenge central control. Figure 2.2 offers a numerical example of this condition.

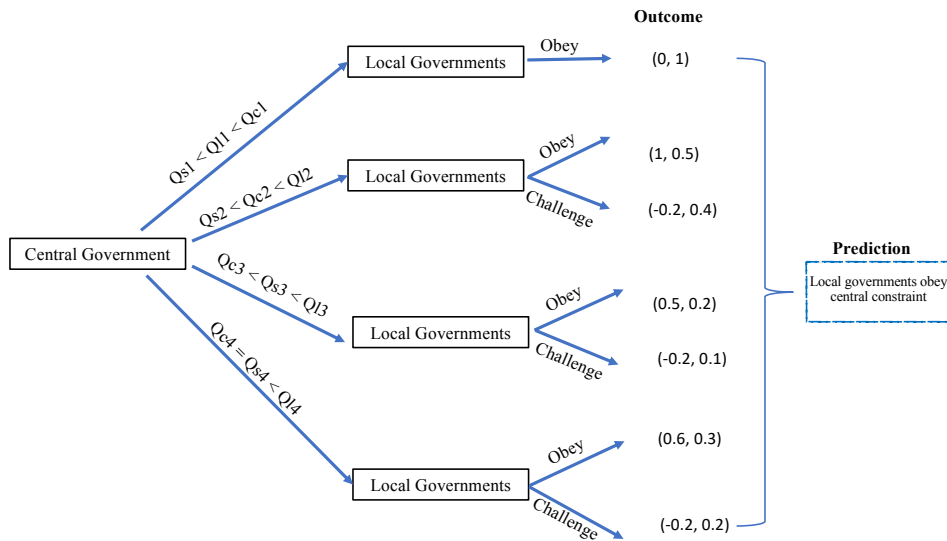


Figure 2.1 _ An numerous example of local obey

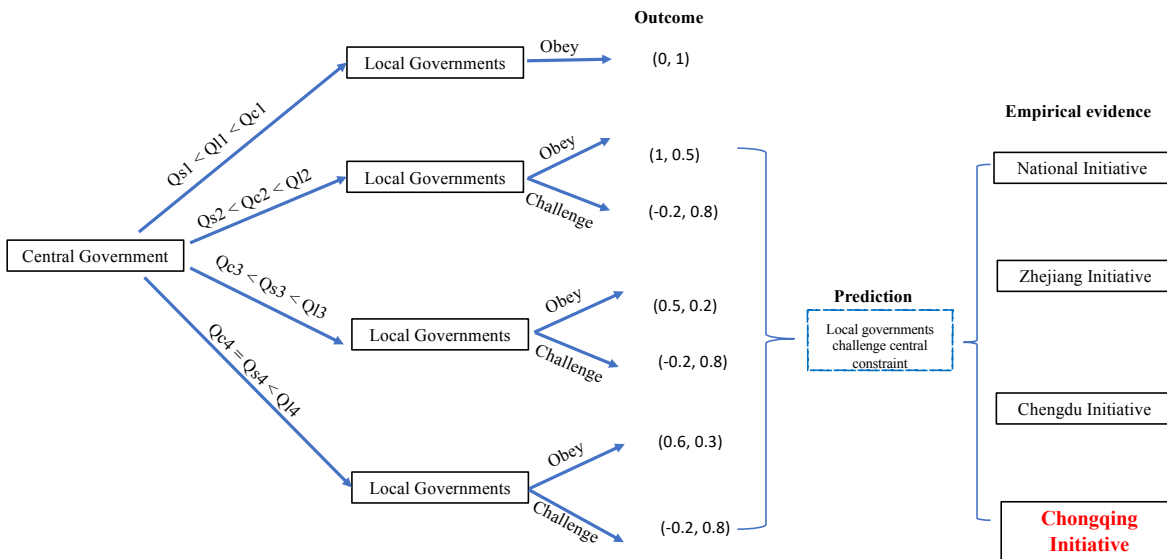


Figure 2.2 _ An numerous example of local challenges

The diverse local initiatives provide support for our predictions. Up to 2016, 24 provinces and municipal cities had central government permission to offset development through the declaration of new agricultural land. Article 19 of Land Administrative Law: “creating an equivalent amount of arable land to be occupied 占用耕地与开发耕地相平衡.” The purpose of this article is to ensure that the total amount of cultivated land within its administrative region is not reduced. Local governments reclaim new farmland in rural areas and then ask the central government for permission to increase a certain amount of farmland to be converted in the urban fringe.

Nevertheless, this local initiative does not address the issue of land losing farmers in the urban fringe. It is also restricted this way: 1) it must be within the jurisdiction of a city or county, 2) the development is connected and balanced, 3) each project needs central government approval. Later, Chongqing, Chengdu, and Zhejiang gained more autonomy from the central government. First of all, their judicial extents of development and trading quota extended to the whole municipality and province. Second, development and trading are separate, which means more flexibility. The province or municipal government has the authority to organize projects without central preapproval. Chan³⁷ and Cai³⁸ investigate Chengdu and Zhejiang initiatives.

Conclusion

Theoretically, the government tends to convert more farmland than the socially optimum level. However, whether the central government's quota is lower or higher than socially desirable is an empirical question. After all, the centrally planned and allocated quota system suffers from an effective pricing mechanism for land used for public purposes.

A growing number of researches have been arguing the importance of land or land finance on China's economic growth and macroeconomic stability. Liu³⁹ emphasizes the enormous investment, profit, and income opportunities that real estate and construction sectors offer to house

³⁷ Shi, Chen. "Institutional diversity in transferring land development rights in China: government, market, and self-organization." *HKU Theses Online (HKUTO)* (2018).

³⁸ Cai, Meina. "Land-locked development: The local political economy of institutional change in China." PhD diss., The University of Wisconsin-Madison, 2012

³⁹ Liu, Minquan. *Land Financing-led Urbanization in China: Evolution, Scale and Lessons*. Paper written for United Nations Economic Commission for Africa (UNECA) in its deliberations on urbanization and development strategies in Africa. 2018.

buyers, private developers, and local governments. He claims that land finance and consequently booming real estate sector sped up the urbanization process, and contributed to the country's structural transformation. In 2015, the real estate sector directly only accounted for 6% of the national GDP in 2015. But if including all upstream and downstream industries, the sector's contribution was between 16 to 20%⁴⁰. Chen et al.⁴¹ estimates that a 1% rise in the real estate sector's investment increased 0.4% direct employment. When counting all related sectors, total employment rose from 6.7 to 11.7%. In 2014, the construction industry accounted for 16 percent of urban employment in China, comparing that of 8 percent in the US and 13 percent in Spain's latest housing boom⁴².

These claimed economic efficiency and contribution are important but not conclusive. First of all, we lack empirical evidence. Second, a government monopoly can increase the supply of land rapidly. When the rights of land users/owners are limited, the "muscular" government bypasses due process. However, the land investment might not be in the right location, developed at the right time, etc⁴³.

Third, there are challenges over some underlying assumptions. What is less clear is the economic efficiency of land finance. It is undeniable that land leasing fee financed infrastructure and industrial parks. These leases facilitated, and perhaps led, urbanization and industrialization. It is also true that the Chinese government accumulated an enormous amount of land leasing fees in a short time. The government can build at a speed and scale that no single private company can match. However, how did the government know better than the private sector where to build infrastructure and manufacturing? Second, if the government did not collect land leasing fees, where would this capital be invested? Without answering these questions, we cannot conclude that land finance is the most efficient way to urbanization and industrialization.

⁴⁰ http://www.p5w.net/news/gncj/201610/t20161030_1621474.htm

⁴¹ Chen, M. and M. Cheng (2014), An Econometric Analysis of the Employment Effect of the Real Estate Sector in China. Master Dissertation, Huazhong University of Science and Technology.

⁴² Glaeser, Edward, Wei Huang, Yueran Ma, and Andrei Shleifer. "A real estate boom with Chinese characteristics." *Journal of Economic Perspectives* 31, no. 1 (2017): 93-116.

⁴³ Bertaud, Alain. *Land markets, government interventions, and housing affordability*. Wolfensohn Center For Development at Brookings, 2010.

In terms of equality, people argue the government uses land leasing fees for infrastructure development, industrialization, and public services. It benefits society as a whole instead of private landowners. However, the assumption is that the private landowner does not invest. Even if a private owner does not invest, he or she would put the land income in the bank. The bank would lend it out as capital financing in the economic system. The most important question is: which type of equity has lower costs?

This paper only provided an overview of the issues and debates about China's land driven development approach. It provides one of many possible theoretical models under the institutional analysis framework. A good understanding of the issues discussed in this paper requires massive scale and dedicated empirical studies of the context, process, and outcomes.