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Urban Land Revenue and Sustainable Urbanization in China: Issues and Challenges

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Abstract: Since urban land development launched in 1987, urban land transactions and local land leasing revenue have exploded sharply in China. Classical research on urban land use and urbanization often focuses on making decisions and enacting policies of zoning and land use regulations. Scholars from different disciplines have long been aware of this issue and have attempted to account for it with different theories of urbanization. This paper considers urbanization and the associated spatial interaction effect as an alternative factor in China's urban land revenue. After reviewing the existing literature on China's land reform, a dynamic panel data model with GMM estimator is established to explore the reasons for the emerging land revenue. The empirical results show that the spatial weight matrix is significant to the land leasing revenue, and the provincial level of fiscal decentralization has negative effect on the volume of urban land leasing revenue. These empirical results demonstrate that local governments have the intrinsic motivation to maximize the land leasing revenue, which is significant to expand local optional revenues. The province having higher urbanization level usually experiences the larger scale of urban land revenue. The spatial interaction effect among adjacent provinces has a significant effect on urban land revenue which is closely associated with local economic growth. However, it is essential to know that the large scale of rural land conversion and disordered urbanization force negative payoffs, such as environmental degradation, the damage of farmland, and the problem of food safety.

Keywords: urbanization; land reform; land revenue

1. Introduction

In the three decades that followed the 1978 launch of land reforms and opening-up policies, China's urbanization has been profoundly affected. In the process of this substantial systemic reorganization, urban land use and urbanization have experienced radical changes. Classical research on urban land use and urbanization often focuses on making decisions and enacting policies of zoning and land use regulations. Scholars from different disciplines have long been aware of this issue and have attempted to account for it with different theories of urbanization, mainly including in the contexts of urban geography [1,2], urban politics [3,4], urban economics [5,6], and urban sociology [7,8]. The most notable theory of urban land use and urban growth was introduced by Molotch [7]. Molotch, in the article "The City as a Growth Machine", theorized that the city is an engine of growth that centers on the exchange of land. The growth machine essentially operates to the advantage of land-based elites [9].

As urban land is commodified and generates revenues in the form of transaction fees, surcharges, and taxes, the process of urbanization have become land-centered, simultaneously strengthened economic localism and land resource political control. Under this background, some scholars [10–12] have attempted to apply Growth Machine Theory to understand the urban land use and the growth of local economy in China. However, unlike many other transitional economies in Central and Eastern Europe and in the former Soviet Union, China did not take the Svejnar model and has adopted an incrementalist approach to gradually privatize and decentralize its economy. The main characteristic of Chinese urban growth is not measured by the expansion of population as in the U.S. context [4], because Chinese government controls population mobility, but measured as an expanding land conversion in rural/urban fringe areas [13]. With the qualitative and descriptive analysis, this article first attempts to explore urban land reform and land revenue in urban China, and suggest an explanation of their underlying dynamics. Using a dynamic panel data model using GMM estimator, thepaper then provides an empirical analysis to investigate the possible effects of certain explanatory factors on China's urban land leasing revenue.

This study made a theoretical contribution to understand the characteristics of Chinese urban land revenue and urban development. Drawing upon insights from the perspective of urban land reform and agricultural land conversion, this study analyzed how Chinese municipalities have engaged in the land-dominated urbanization process under the collective ownership of rural land, and the urban land use that has emerged from the new approach toward local public finance and government revenue [14–16]. Rural land conversion and urban land market have not functioned simply as a passive outcome of urbanization, but has been actively pursued by local governments as a means of revenue generation to finance local economic growth [14]. This paper provides a detailed explanation of the dynamics of urban land revenue in the context of the dualistic structure of land ownership and regional competition. After Section 2 of a brief introduction to the institutional background and a literature review, the paper presents descriptive statistics in Section 3 concerning China's dual land ownership system and the rural–urban land conversion process. Using a panel data model, the Section 4 discusses the empirical evidence on urban land revenue and the rural–urban land transition in China. The Section 5 discusses the conclusions to be drawn from this study.

2. Literature Review and Institutional Background

Urbanization and urban land use have historically been important subjects in the context of urban policy and research, and many studies have been concerned with these topics in both developed and developing countries. Four methodologies from different disciplines to urbanization and urban land use have evolved: the geographic, political, sociological and economic perspectives. The geographic perspective assumes that urbanization is the most significant force shaping land use and land transactions in cities, and utilizes the spatial approach to focus on urban expansion. This approach also argues that the costs associated with land acquisition and land transactions are the fundamental causes of urban expansion in the cities of emerging economies [15]. At the same time, this perspective hypothesizes that the increase in the proportion of urban dwellers among an entire population, especially through migration of people from rural to urban areas, results in a new set of demands placed on urban land and development [16].

Political scientists theorize that city might be run by a political machine and regarded as a bastion of pluralism [3]. Molotch's theory offered a new paradigm to interpret urban growth machine. City can been conceived as the areal expression of the interest of some land-based elite [7]. Such an elite is seen to profit through the increasing intensification of the land use of the area in which its members hold a common interest [5]. Urban sociologists assume that urban growth was expected to conform to demands for urban space and competition between consumers in the property and land market [8]. The different social groups and their social environment interact to produce a complex and varied human ecological system to promote urban growth and transformation of neighborhoods [17].

Economic scholars account for urban land use and urbanization from different perspective of economic methodologies. Urban economists claim that land values shape patterns of land use in a city [18]. To understand why land values have such a broad influence on urban development and urban problems, some knowledge of the relationship between land values and improvement values is necessary [19]. Some economists utilized empirical analysis to demonstrate that industrialization, urbanization, population growth, and economic reform measures are major driving forces contributing to land-use change [20–22]. In some emerging economies, such as China, investment-driven urbanization inevitably involves the displacement of farmers from land around the cities [23].

In general, the existing literature from different disciplines on land reform has delivered a wide range of explanations of land revenue patterns in urban China [1–8]. The present paper adds to the existing literature and aims to provide some more comprehensive explanations on the state-owned and state-oriented land system of urban China which has been under reform.

First, rural land conversion and urban land use in China have a special tax system shaping fiscal disparities at the county level [24]. The budgetary revenue produced from the existing urban land at the level of local governments is small, and the taxation of real estate property is still non-existent in China. The limited tax autonomy in China is a significant motivation for local government to raise revenue through rural–urban land conversion, and to use land transactions to finance the vertical fiscal gap [25]. Second, due to the current system of state and collective ownership of land, the relevant administrative departments in local governments (for example, the land and resources bureaus) have played the most decisive role in urban land provision and development [26]. Moreover, land reform in China entitles local governments to influence neighboring urban land use programs the most [27]. With the large provincial differences that exist in China, it is likely that different local fiscal situations and urbanization levels may contribute to the heterogeneity observed from province to province [24].

In summary, the land institution background in China has some characteristics due to its land ownership system and administrative setup [28]. In particular, Chinese urban land system has been experiencing intense adjustments and substantial changes in the last two decades [29]. The land revenue has attracted widespread concern and dispute. However, research on urbanization and urban land revenue in China is limited due to bias in policy analysis of urban land reform and a lack of quantitative research on urban land use and land revenue.

The transaction system of land use rights leasing was established by People's Congress of the PRC in 1988. PRC Constitution had an amendment in 1988 and states: "no organization or individual may appropriate, buy, sell, or lease or unlawfully transfer land in other ways. The right of land use can be transferred in accordance with the law." In May 2001, China promulgated a "Notice on Strengthening Management of State-owned Land Assets", which brought China's land reserve system to be conducted by local governments. In 2012, China promulgated "Regulations on the Tender and Auction of Public Land Use Rights". Land reform and transformation in the last three decades have ensured the efficient administration of land development and local revenue-generation to a significant extent. To understand intercity variations in urban land transactions and land revenue, this article aims to investigate constraints and opportunities shown from the macro level data for all provinces and in the observed changes over time. Many urban local governments have regarded urban land reform as a lucrative source of revenue and a steady foundation of investment for local infrastructure development projects and urban expansion [30]. To some extent, urban land reform and land use rights transfer are considered important contributing dynamics for China's fast urbanization and urban development.

3. Current Land System, Agricultural Land Conversion and Land Transaction in China

The critical factor of China's dual land system is not ownership of land, but the rights to its use, which forms the fundamental legal basis of land transactions and land conversions in contemporary China. Given that land is owned by the country or nominally by collective rural organizations (such as villages and townships), farmers in villages and urban land users have merely owned land use rights rather than land itself.

In regard to land use rights, China's newly expanded urban land can be classified into three categories according to the source of land: (1) acquired rural land transformed from farming use to non-agricultural use; (2) converted land at the fringe of cities occupied by existing villages and TVEs (Township and Village Enterprises); and (3) redeveloped urban land.

Land acquired from rural sources constitutes a major portion of the expansion of urban land. Many scholars have expressed concerns about the negative consequences of excessive farmland conversion, such as urban sprawl [31–33] and food security [16]. Recognizing these problems, the Chinese government has declared that 1.2 million square kilometers (or 1.8 billion mu) of arable land must be maintained for farming nationwide. This is called the "red line" and is intended to ensure sufficient national supply of agricultural products [34]. However, China's agricultural acreage has experienced a sharp decrease since the beginning of the 21st century. Currently, the area of arable land is alarmingly close to the "red line" (shown in Figure 1).
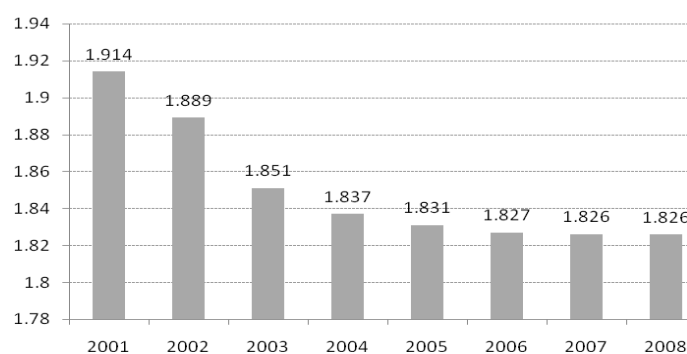

Figure 1. Annual Change of China's Agricultural Acreage. Note: Unit is billion mu. Source: Bulletin of China Land and Resources 2009 issued by Ministry of Land and Resources of People's Republic of China.

Land at the fringes of cities occupied by existing Village and Township Enterprises (TVEs) in many cities is classified as urban land, even though it was originally rural land. To some extent, this category of urban land and the redeveloped existing urban land are more likely to be acquired and developed through market-oriented channels. This in turn has produced a class of super wealthy developers who are able to accumulate wealth rapidly. A summary on the key features of the three categories of urban land use are presented in Table 1.

Table 1. Three Categories of Urban Land Use in Contemporary China.

Urban Land Types	Converted Rural Land	Land at the Fringe of Cities Occupied by Villages and TVEs	Redeveloped Urban Land
Prices	Compensation fees	Compensation fees/market price	Market price
Source of land	Rural agricultural land	Village housing land and industrial land occupied by TVEs	Urban land
Involved parties	Farmers (affected participant); Village Committees (seller); Municipalities (approver and buyer)	Local residents (affected participant); Village Committee or TVEs (seller); Municipality (approver and buyer)	Urban resident (seller); Local Resident Committee (participant); Municipality (approver)
Transaction methods	Fixed compensation	Fixed compensation	Negotiation, fixed compensation
Functions	Commodity housing project development; state project-specific development; infrastructure development by municipal government; local industrial development zones	Commodity housing project; infrastructure development by local municipal government; local industrial development zones	Real estate project; infrastructure development.

Urban expansion in China is fueled by the land transformation from farming to non-agricultural use and by the land transaction practices that grant different land use rights for different land users. Rural farmland conversion is a common method of providing space needed for urbanization in many countries. Various insights into the features that comprise the practice of rural land conversion in China can be gained by comparing them with the corresponding systems in Germany. The legal bases for and process of farmland conversion in both China and Germany are highlighted in Table 2.

Table 2. The Comparison of Legal Basis and Process of Farmland Conversion in China and Germany.

	China	Germany
Land tenure	Land ownership belongs to the state or collective agricultural committee. Farmers merely have land-use rights.	Permanent land ownership
Legal basis	Land administration law of China 1998; the new Property Rights Law, 2007	Housing acts; regional planning acts
Land conversion process	Local governments negotiate compensation with representatives of farmers, usually the leader of a village committee.	Municipal governments negotiate land prices with farmland owners.
Compulsory acquisition	Government can acquire land under compulsion without negotiation.	Governments can purchase under compulsion but only in extremely rare cases.
Role of market	Dual land market in rural and urban areas; no set rural land price; land compensation is controlled by government; black room management	A unified land market including farmland and urban land; market-oriented land pricing and all information accessible to public
Role of government	In sole charge of agricultural land conversion.	Initiates development project or cooperates with private sector; not in sole charge of agricultural land conversion, just as one agent in the conversion process
Land prices	Land price is decided by local governments; land price is much lower than market price.	Land price is decided by land market; land price is comparable with market price.
Land rights	Land–use rights only for certain time periods, subject to constraints; agricultural land-use right is usually subject to urban expansion and state projects; limited land compensation only, without incremental profit.	Ownership belongs to land owners; farmland ownership is protected by law; land conversion includes full land compensation and incremental value in land market.

Information source: Land Administration Law of the People's Republic of China (2004 Revision) and Tan et al. (2018) [35].

The legal bases for agricultural land conversion in China are different from those seen in other countries, in which normally private land ownership is protected by laws and national constitutions. Although local governments can compulsorily purchase land under conditions of national emergency or significant national interests, land ownership is respected and guarded by laws and the states themselves. In contrast, the Land Administration Law of China and the Property Rights Law stipulate that land in urban areas is owned by the nation. In contrast, agricultural land belongs to farmers communally (Chinese People's Congress 1998, 2007). Ho (2005) called this phenomenon "ambiguous land property rights" [36]. In fact, farmers in China are merely entitled to land use rights for a certain period which is specified in the rural land contracts between farmers and local village committees, which are government agencies operating at the village level.

Land transformation from farming to non-agricultural construction is the main force driving the rapid decline of arable land in China as well as environmental degradation and desertification. Although the Chinese government has made effort to preserve itsagricultural land since the 1990s,

forced farmland conversion and inefficient land use still present serious problems today. Furthermore, the government power decentralization in recent years has rendered interventions by the central government ineffective. Consequently, local governments at various levels were able to monopolize the land transformation process and the supply of urban construction land. The statistics in Figure 2 show that the most significant amounts of urban land for construction use are approved by local provincial governments during the period from 2006 to 2012. Local provincial governments have more administrative review and approval power to decide the scale of local urban land for construction use which previously required the review and approval by the State Council.
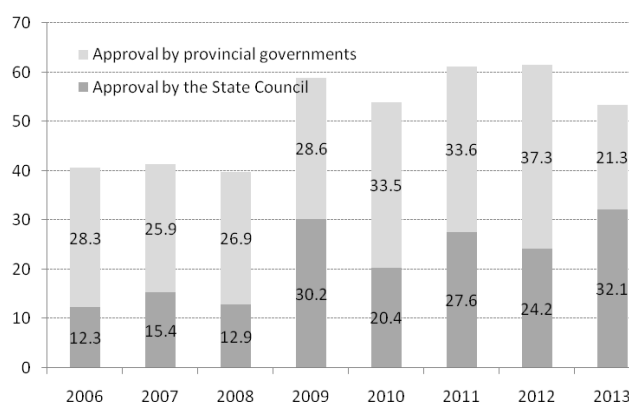

Figure 2. Urban Land for Construction Approved by Provincial Governments and the State Council, 2006–2013. Note: Unit is 10 thousand hectares. Source: Bulletin of China Land and Resources 2014 issued by Ministry of Land and Resources of People's Republic of China.

The profit from land conversion has been a significant basis of local fiscal revenue. Figure 3 demonstrates the changes in leasing land area and land leasing revenue in China from 2005 to 2013. After only 14 years, total land leasing revenue in China has increased by about nine-fold which makes up a relatively significant share (around 7.5%) of Chinese GDP in 2013; this kind of revenue increased every year in this period except 2008 and 2012. The decline in 2008 was caused by the global financial crisis. The slight decrease in the land transaction revenue seen in 2012 was due to the land contraction policy and more strict inspection policy of idle land.
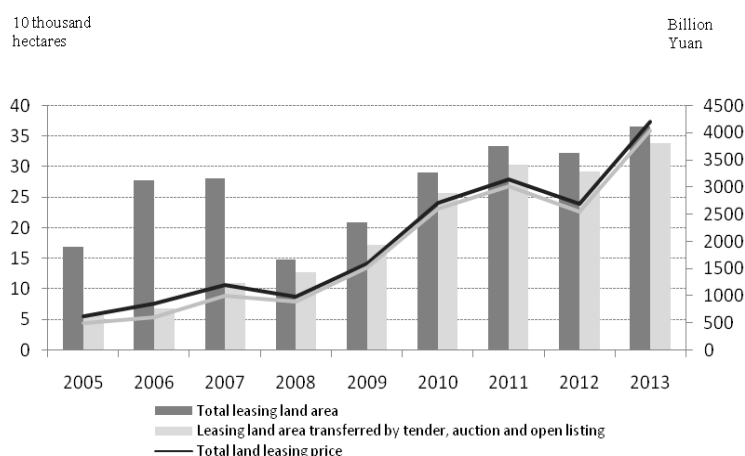

Figure 3. Leasing Area and Price of Urban Land for Construction, 2006–2013. Note: Units are 10 thousand hectares and billion Yuan (adjusted for inflation). Source: Bulletin of China Land and Resources 2014 issued by Ministry of Land and Resources of People's Republic of China.

4. The Empirical Analysis of China's Urban Land Transactions

4.1. Model Specification and Variables

Land leasing revenue is the main economic force behind China's fast urban expansion and the domination of land transactions by local governments. It is also a direct indicator reflecting the health and function of the land market in urban China. The modeling analysis in this section further demonstrates the dynamics of China's local land revenue. With a dynamic panel data model using GMM estimator, we provide an empirical analysis to explore the possible effects of some key explanatory variables on China's urban land leasing revenue. (The Generalized Method of Moments (GMM) approach to parameter estimation was introduced by Hansen [37] and is now well established in the econometric literature. The GMM has comprehensive uses in both the time-series context and the microeconomic setting [38]).

Based on spatial econometric methods, a theoretical model including a consideration of the spatial interaction shows several factors affecting the land leasing revenue in each province's urban land market as follows:

$$y_{i,t} = \alpha y_{i,t-1} + \beta \sum_{i \neq j} \omega_{i,j} y_{i,t} + \delta X_{i,t} + u_i + \varepsilon_{i,t}$$

$y_{i,t}$ is the land leasing revenue in year t and province i, $y_{i,t-1}$ is the lagged variable of the land leasing revenue, and $\omega_{i,t}$ is the spatial weight matrix reflecting the weighted average land leasing revenue of all neighboring provinces adjacent to province i, $\sum_{i \neq j} \omega_{i,j} y_{i,t}$ is a function representing the spatial interaction effect on local land traction in adjacent provinces, and $X_{i,t}$ is a set of explanatory variables which are likely to have significant effects on local land transaction. In this empirical model, $X_{i,t}$ includes three main variables: $D_{i,t}$ is the degree of fiscal decentralization in each province; $U_{i,t}$ is the urbanization level in province i at year t; and $G_{i,t}$ is the local GDP level to show local economic development rank. To eliminate the mutual interaction with the land leasing revenue, $U_{i,t}$ and $G_{i,t}$ are chosen with the growth rates into the empirical model. u_i is the unpredictable entity fixed effects of this model, and $\varepsilon_{i,t}$ is the random error term.

The spatial interaction effect among adjacent provinces is determined directly by how the terms "neighboring" is defined. In this article, the measurement of "neighboring" is defined by both geographical distance and the difference in the economic development levels of the two provinces. Our hypothesis is that more significant spatial interactions will exist between two provinces with shorter geographical distance between them as well as similar levels of economic development. With the normalization method shown below, the variable for the spatial weight matrix is estimated and standardized:

$$\omega_{i,j} = \frac{1/d_{i,j}}{\sum\limits_{j=1}^{n} 1/d_{i,j}} \times \frac{1/|G_i - G_j|}{\sum\limits_{j=1}^{1} 1/|G_i - G_j|}, \ i \neq j$$

Inside spatial weight matrix, each term is equal to the multiplier of inverse distances and inverse margins of GDP between two different provinces, i and j. $d_{i,j}$ is the geographical distance between two capital cities of adjacent provinces, and G_i, G_j are the corresponding provincial GDP levels.

4.2. Data

The data for all variables except $U_{i,t}$ and $D_{i,t}$ can be found in the China Statistical Yearbook (1999–2012) and the China Land and Resources Almanac (1999–2012). The levels of provincial urbanization used in this article were calculated using the United Nations urbanization method, which was issued by the Population Division of the Department of Economic and Social Affairs of the United Nations. The fiscal decentralization degree is a proxy variable for measuring the level of fiscal competition between central government and the local governments, and it is calculated with the data from the Financial Yearbook of China (1999–2012). Because Chongqing was established as

China's fourth provincial-level municipality after 1996, Chongqing's data were merged with Sichuan Province for consistency of the data. In addition, the data for Tibet were not included the empirical model because of missing values.

4.3. Results and Discussion

The outcomes of the dynamic panel data model are stated in Table 3.

Table 3. The results of the dynamic panel data model.

Dependent Variable: The Land Leasing Revenue (Yuan)		
Independent variables	Coefficients	z statistic
Constant	8.79	3.92
The lag variable of the land leasing revenue (yuan)	0.42	0.19 **
The spatial interaction effect ($\sum_{i \neq j} \omega_{i,j} y_{i,t}$)	0.23	0.18 *
The urbanization level	0.71	0.16 *
The fiscal decentralization degree	−4.35	1.72 *
GDP	3.21	2.48 *
Ar (1)		−2.91 *
Ar (2)		−1.21
Hansen test	33.75	

Number of provinces: 29; Number of observations: 406; * Level of significance: 10%; ** Level of significance: 5%.

The results of Hansen and AR test show that GMM in this paper is first order difference. GMM estimation starts from second order sequence correlation. Some characteristics can be found from the empirical results. First, the result of estimates in the spatial weight matrix is significantly attached with the AR (1) lagged dependent variable. The value of the GMM estimate suggests that all provinces have positive effects on their neighbors' urban land transactions. This means that, in China, a province may experience an increase in urban land leasing revenue if its neighboring province experienced a growth in numbers of local urban land leasing transactions. Moreover, this positive effect also suggests that all local governments may share the objective of obtaining maximum land leasing revenue to enlarge local discretionary revenues. This result is consistent with the existing classical theory of horizontal fiscal competition in China.

Second, as was expected, there was a substantial negative connection between the provincial level of fiscal decentralization and the volume of urban land leasing revenue. This means that local governments have greater numbers of local land transactions if they have less local budget revenue distributed by the central government. This conclusion is consistent with the theoretical hypothesis and the land revenue reality of Chinese provinces. Those provinces experiencing budget revenue difficulties are more likely to encourage local land transactions and gain more off-the-book revenue from local land markets. Moreover, this result also suggests that the fiscal decentralization movement implemented by the central government is one of the significant reasons for Chinese urban land expansion and the serious problem of land revenue.

Third, the values for urbanization levels $U_{i,t}$ are statistically positive, which means that more land leasing revenue in a province is correlated with higher urbanization levels. This is consistent with the rising demand for land caused by fast rates of urbanization. The geographic distribution of urbanization levels suggests that provinces with higher levels of urbanization need more urban land development and use it to support their urbanization process sustainably. The urban land markets in these provinces are more prosperous due to their heated local real estate markets. Finally, the positive coefficient of GDP may imply that the provinces with higher GDP also have more urban land transactions. This result supports our hypothesis that economically developed provinces have more demand for land and larger scale local land markets.

5. Conclusions

In contrast to the socialist era in China, urban land development corporations can now obtain urban land use rights in local urban land markets. The conversion of land from farming to non-agricultural use is administrated by local governments, further complicating urban land contexts in Chinese provinces. This in turn leads to different urban land use patterns across provinces. This research focuses on the agricultural land conversion process in China's provinces and examines China's current land system and the major dynamics of China's urban land transactions. Using the GMM model and various sources of data, this research explores the possible effects of some key explanatory variables on China's urban land leasing revenue. Some conclusions can be summed up as follows.

First, the empirical results show that urban land revenue is negatively correlated with fiscal decentralization in the provinces of China to a significant degree. To cities with relatively low fiscal decentralization, the government-dominated land system is helpful to bring the supplement of poor local revenue. This result is consistent to the findings of the Growth Machine Theory that claims the city is an engine of growth that centers on the exchange of land. However, Chinese case contributes to this theory that the strength of economic coalitions between local and central government based on exchange of land is varied in different regions. To amplify local finance, Chinese local governments utilize their monopolistic power over land transfer to generate return from urban land markets [39]. Thus, if local government has lower budget revenue distributed from-y the central government, it is much more likely for local government to encourage more local land transactions and thereby gain more off-the-books benefit [40].

Second, the results of the GMM model demonstrate that urban land use and revenue patterns vary significantly across provinces. The amount of urban land revenue in provinces with higher urbanization levels is very likely to be larger than in provinces with lower urbanization levels. Despite the increasing redevelopment of existing urban land in developed provinces, there is a large new supply of urban land in these provinces from land transformation from farming to non-agricultural use [41]. Overly rapid urbanization in these provinces has been driven to a large extent by local governments in their efforts to acquire land from farmers; this has not only expanded the geographic areas of cities but also motivated landless farmers to become part of urban populations. This conclusion can be found in the existing literature of urban land use and urban growth in other countries. This research adds to the existing literature and found that the rural land conversion is not only the wealth and power of urban growth as described in the theory of growth machine, but also the source of the of population growth in urban China. Different from other countries, Chinese national policy controls population mobility via household registration system [42–44]. The level of urbanization cannot be measured only by urban population size and composition, but by the expansion of city through the rural land conversion in rural/urban fringe area [45]. Thus, the geographic distribution of urbanization levels suggests that provinces with higher levels of urbanization need more urban land development and urban land use to support their sustainable urbanization process and provide local fiscal revenue [46].

In summary, there are significant interacting factors analyzed by this study which contribute to China's overly rapid urbanization, patterns of urban land use, and amounts of local government revenue over the past few decades. The financial pressure local governments experience prompt different economic interests in agricultural and non-agricultural use land, and this also fuels China's recent rapid urbanization [47].

However, although market-based urban land use and market incites the rapid urbanization process in Chinese cities, it is essential to understand that the large scale of rural land conversion and disordered urbanization result in negative consequences, such as environmental degradation, the damage of farmland, and the problem of food safety [40,48,49]. A similar problem can be found in other countries that the effectiveness of farmland preservation measures is challenged by the efforts to convert agricultural land to nonfarm uses in rural/urban fringe areas. However, due to its large population and relatively scarce arable land, it is important for Chinese government to pay special

attention to rural land conversion and over land revenue. To have more urban construction land, the latest round of rural land transformation in China is expected to force farmers to move into high-rise buildings and acquire their housing sites to support urban expansion. The reform is, therefore, called "the movement of farmers going upstairs" [50]. The over conversion of rural land and over rapid urbanization process are neither healthy nor sustainable in the long run. Chinese urban land has increasingly sprawled and encroached upon arable land and rural settlements. In the process of urban expansion, rural settlement and arable land depletion have experienced significant loss, which have serious negative effects on agricultural production and food safety [51]. China has extremely scarce land resources compared to the world average. It would be impossible to keep to a target of 0.12 billion hectares of cultivated land in the future under the current rapid urbanization process [40].

Author Contributions: J.C. had the original idea for the study and carried out the design with all co-authors. F.G. was responsible for structure improvement and language polish. H.W. and Z.W. were responsible for data cleaning and carried out the analyses, and J.C. and H.L. drafted the manuscript, which was revised by all authors. All authors read and approved the final manuscript.

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