



# Impact of land revenue on the urban land growth toward decreasing population density in Jiangsu Province, China



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## ABSTRACT

Although land conveyance fees have accounted for a large portion of local governments' fiscal revenues and have been associated with rapid urban land expansion in China during the past two decades, little attention has been paid to the effect of land revenue on urban development intensity in China. This study focuses on the linkage between land revenue and urban land growth toward a decreasing population density (sparse pattern), termed "sparse effect" of land revenue in this study. A classification approach, based on the rate of demographic and urban land growth, was used to categorize urban land growth in Jiangsu Province, China. By dummy coding those categories, the dependent variable was generated and the multilevel logit model was used to examine the "sparse effect". From 2000 to 2010, 63 analytical units experienced a sparse pattern. Local governments showed some land management behaviors specific to land revenue, including newly-converted-land-prioritized and employment-land-prioritized, which resulted in "expansive effect" of land revenue on urban land growth. Taking advantage of the *hukou* system (household registration), land revenue cast the "selective absorbing effect" on population. The study indicated that the "expansive effect" together with "selective absorbing effect" of land revenue has resulted in the "sparse effect", which could be weaker in a poor, less-developed region.

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## 1. Introduction

In the last two decades, non-agricultural land or construction land in China has rapidly expanded and decreased the density of urban populations. Urban land has increased at a rate faster than that of urban population. China's urban land expanded at a rate about 1.5 times that of urban population growth from 1997 to 2010 (Zhong, Mitchell, & Huang, 2014). The phenomena suggest that China's non-agricultural land growth has experienced a pattern of decreasing population density. Density is one of the key concerns regarding land use research and population density has been commonly used to understand land use change (Schneider & Woodcock, 2008) such as urban sprawl (Kasanko et al., 2006). Sprawl can be presented as expanding outwards alongside increasing population but with a decreasing population density (Garden & Jalaludin, 2009). There is a counterpart to sprawl, for example, urban shrinkage where depopulation is frequently associated with housing and land abandonment (Haase, Haase, & Rink,

2014). There has also been a mismatch between built-up area expansion and urban population decline in some European cities (Kasanko et al., 2006). All of the above-mentioned can be grouped as a pattern of construction land change with decreasing population density.

Many factors have been viewed as causes or drivers for urban land expansion with decreasing population density (sparse pattern), for example, socioeconomic factors, infrastructure development (Kaza, 2013), planning such as "master-planned" for low intensity" in Phoenix, USA (Shrestha, York, Boone, & Zhang, 2012), land-use controls (Pendall, 1999), and lack of instruments to prevent low-density development in Switzerland (Mann, 2009). A few studies have investigated the connection between land-related revenue and land use density change; for example, some analyzed the effect of property tax on urban sprawl (Song & Zenou, 2006). Theoretical analyses of the impact of property tax on urban sprawl have not reached a consistent conclusion (Slack, 2002). There has also been no consistent conclusion reached by empirical studies (Banzhaf & Lavery, 2010; Song & Zenou, 2006).

Land revenue has been a common phenomenon across China and has been increasingly important for local fiscal revenues (Zhan, 2015). The term "land revenue" usually refers to land-based revenue, which is also termed "land finance" (Wu, Li, & Yan, 2015), and

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“land financing” (Ye & Wu, 2014). Generally, there are three methods for measuring China's land revenue. The first is land conveyance fees (Fu, 2015). The second includes land conveyance fees and land-related taxes such as urban land use tax, farmland occupation tax and property deed tax (Wei, 2015). Third includes not only the land conveyance fee and land-related tax but also local governments' loans from land mortgages (Zheng, Wang, & Cao 2014). Although many studies define land revenue as more than just the land conveyance fee, most empirical studies used land conveyance fee as a measurement for land revenue due to data availability and the dominance of the land conveyance fee in China's extra-budgetary revenue (Wu et al., 2015). This study also followed the most common strategy. Land conveyance fee has been used to collect local fiscal revenue in China since the 1980s. Since then, local fiscal revenue has had an increased reliance on land conveyance fee, which accounts for a large portion of local government's fiscal revenue (Wu et al., 2015; Ye & Wang, 2013). In 2013, the total amount for land conveyance fees was about 4.4 trillion Yuan in China (MLR, 2015), accounting for about 63% of total local fiscal revenue and 34% of national fiscal revenue (MLR, 2015; NBSC, 2016). Land revenue reliance or dependence usually refers to the phenomenon that local fiscal revenues are highly reliant on land-based revenue, the measurement of which will be discussed later.

Land revenue reliance has been viewed as one of most important factors influencing China's recent landscape change, especially since the mid-1990s. Some studies pointed out that land revenue reliance is an unsustainable method as it is at the expense of farmland (Cao, Feng, & Tao, 2008), rural industry (Zhan, 2015), and even social stability (Zheng et al., 2014). Although research has reached a consensus that land revenue reliance has led to excessive expansion of urban land in China (Tan, Qu, Heerink, & Mettepenningen, 2011), the role of land revenue on the sparse pattern of urban land expansion has received little attention and more empirical studies are needed.

After this introduction, Section 2 gives a theoretical analysis on “sparse effect” of land revenue on urban land growth. Section 3 illustrates why and how multilevel modeling is used to empirically investigate the “sparse effect” based on classifying sparse pattern of urban land growth. Sections 4 and 5 provide model estimation results and discussions, respectively. In the final section, the conclusions are given.

## 2. Conceptual framework: “sparse effect” of land revenue on urban land growth

There are five levels of government in China: central, provincial, prefectural, county and township. The county-level region includes county, county-level city and district; the township-level region includes town and township. County-level city and county are now similar to each other. The word “city” in China can be used for prefecture-level city and county-level city (NBSC, 2011), and the word “city” is used in this paper to refer to a prefecture-level city unless otherwise specified.

Local government has become the de facto landlord of state-owned land despite its role as the state's agent (Tian, 2015). According to the Institution of China (NPC, 2004), all the land in China is in socialist public ownership, taking two forms - state ownership and collective ownership. The local government can convert collectively-owned land to state-owned land by expropriating collectively-owned land and selling state-owned land use rights to get revenue. According to the Land Administration Law (Garden and Jalaludin), the State Council exercises the right of state land ownership on behalf of the State (SCNPC, 1998). According to the 1994 Urban Real-estate Administration Law, both prefectural and

county governments have the right to lease state-owned land and get land conveyance fees (SCNPC, 1994).

The excessive rural-urban land conversion and urban land expansion encouraged by the land revenue reliance has been termed an “expansive effect” of land revenue on land use in this article. For a self-interested and rational government, land supply will be used as a tool to maximize its revenue (Tian, 2015), and the effect of land development on a local government's financial revenue in turn influences land development (Skidmore, Merriman, & Kashian, 2009). An empirical study indicated that local governments in Wisconsin, USA relying on property tax tend to create sprawl development in order to broaden their tax base (Pendall, 1999). A government behaves as a revenue-maximizing actor but is not unconstrained (Buchanan & Lee, 1982). For example, since environmental amenities have a significantly positive effect on land price (Gibbons, Mourato, & Resende, 2014), a government cannot ignore the environmental issue when a land development decision is made to collect revenue. Although some local governments have increasingly paid attention to ecologically or environmentally friendly development (Chang & Sheppard, 2013), China's local governments generally manage the land in a revenue-maximization way (Cao et al., 2008; Cohen, 2016). As there has been no agricultural tax since 2004, rural land, especially agricultural land use, usually generates no fiscal revenue. Therefore, urban expansion and converting rural land to urban land usually means the tax base is being broadened. To maximize the net revenue of land supply, it is reasonable to not only maximize the income but also minimize the cost of land supply by optimizing the sources of land supplied. In practice, the compensation for expropriated rural land is lower than that for the existing urban land. Thus, it is more cost-effective for local governments to lease out expropriated rural land for non-agricultural use than taken-back state-owned land (Yew, 2011). This makes local governments prefer to convey newly-added construction land rather than existing urban land redevelopment, termed “newly-converted land-prioritized” in this study. Newly-converted construction land refers to land converted from any other land use but construction land use.

Different kinds of land supplies have been empirically shown to provide different contributions to local revenue in China (Cao et al., 2008). The uses of urban construction land can be grouped as urban residential land, commercial land, manufacturing land and other urban land. From the fiscal perspective of local governments, urban land conveyance generates two revenue streams: one is the current land conveyance fees and the other is future taxes derived from businesses operated on the conveyed land (Tao, Su, Liu, & Cao, 2010). In the context of no property taxes in China (Cao et al., 2008), the conveyance of residential land contributes to local fiscal revenue in the short run, but residential land usually means a continuous fiscal expenditure to local government in the long run. The conveyance of commercial land not only contributes to local fiscal revenue in the short run because of the land conveyance fee but also in the long run because of business taxes generated from commercial land.

Conveyance of manufacturing land usually means that local governments receive much less conveyance fees than that of residential and commercial land because of its low price. The demand for manufacturing land is location non-specific or less location-specific (Cao et al., 2008; Tao et al., 2010). Due to the competition for manufacture investment among local governments, local governments tend to provide manufacturing land at a low price, sometimes even at zero cost (Cao et al., 2008; Tao et al., 2010). However, manufacturing land generates tax revenue once factories are operating and sustainable, and gradually increasing taxes generates income for local governments in the long run (Tao et al., 2010). An artificially low price for industrial land development

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