



# Economic transition, spatial development and urban land use efficiency in the Yangtze River Delta, China



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## ABSTRACT

Global urbanization and urban sprawl have made urban land efficiency (ULE) a significant issue for sustainable development. The Yangtze River Delta (YRD), the largest globalizing city region in China, has experienced dramatic urbanization, and land for future development has become a scarce commodity. This paper explores the spatial patterns and underlying determinants of ULE in the YRD, focusing on accessibility and economic transition. We find that the spatial agglomeration effect of ULE has intensified with the development of transportation accessibility and has mainly spread from southern Jiangsu to other areas. The integrated transportation and spatial autoregressive (TSAR) model suggests that accessibility and globalization play a significantly positive role in ULE, and that marketization as well as decentralization also have significant effects. Furthermore, a geographically weighted regression (GWR) shows that the drivers of ULE vary across the YRD. ULE in northern Zhejiang is more sensitive to foreign direct investment (FDI) and tertiary industry development, while ULE in southern and central Jiangsu are more likely to be associated with globalization and labor-intensive manufacturing.

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## 1. Introduction

Since the deepening of economic reforms in the early 1990s, China has been undergoing rapid urbanization. The urbanization ratio in China increased from 17.9% in 1978 to 49.7% in 2010, and expected to reach 60.3% by 2020 (Yue, Liu, & Fan, 2013). It also leads to rapid growth of urban land (Deng, Huang, Rozelle, & Uchida, 2008), and more rapid urban land expansion has been taking place in the most developed coastal cities and regions in the Pearl River Delta (Chen, Chang, David, & Zhang, 2014) and the Yangtze River Delta (Zhang, Uwasu, Hara, & Yabar, 2011), including Guangzhou (Gong, Chen, Liu, & Wang, 2014; Ma & Xu, 2010) and Hangzhou (Yue et al., 2013). In the context of this rapid urbanization, it is necessary to promote land use efficiency to balance the increasing demand of land for construction and the limited land resource, especially for the YRD and the PRD.

A limited number of studies has focused on urban land

efficiency (ULE) in China, which is defined as economic output of per square kilometer (or mile) of land, and finds that its determinants are related to urbanization and industrialization (Kuo & Tsou, 2015; Meng et al., 2008; Zhu, 2004b; Zitti, Ferrara, Perini, Carlucci, & Salvati, 2015; Barbosa, Braganca, & Mateus, 2015). They have found that the patterns of urban development and environmental change have significant impacts on ULE (Barbosa, Braganca, & Mateus, 2015). Researchers have investigated ULE in particular cities in China, such as Guangzhou (Gong et al., 2014), Shanghai (Cui & Wang, 2015), Beijing (Du, Thill, Periser, 2016) and Wuhan (Liu et al., 2015), by addressing the drivers of land-use structure. However, the existing literature has largely ignored two important forces underlying urban land efficiency: spatial spillover effects from neighboring areas and impacts of economic reform and transition.

This paper constructs a conceptual framework to analyze patterns and determinants of urban land use efficiency in the Yangtze River Delta (YRD), the largest emerging global city region of China. We focus on the role of accessibility and economic transition in the understanding of the spatial effects of ULE. By emphasizing spatial effects, the present study has the potential to make an important contribution to the existing literature.

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## 2. Economic transition and urban land use efficiency

Classical location theory suggests that transportation accessibility is an important determinant of industrial location and land use (Huang & Dennis Wei, 2015). Because spatial spillover effects depend on the spatial or temporal distance in space, a developed transportation network can reduce the temporal distance and improve the spatial spillover effects. Studies have built Integrated Transportation and Land Use Models (ITLUMs) to assess the impact of land-use and transportation infrastructure on the evolution of urban areas (Behan, Maoh, & Kanaroglou, 2008; Hunt, Kriger, & Miller, 2005; Sim, Malone-Lee, & Lawrence Chin, 2001; Miller, Douglas Hunt, Abraham, & Salvini, 2004). However, these studies mainly focus on the evaluation of urban land sustainability in a particular city, and have paid less attention to interurban and interregional spatial interactions of ULE.

In our analytical framework, economic transition is conceptualized in terms of the processes of globalization, marketization, institutional decentralization, and urbanization, all of which have a significant impact on ULE (Fig. 1). Transportation accessibility is integrated to measure spatial externalities of land use (He, Zhao, Tian, & Shi, 2013; Irwin & Bockstael, 2004).

### 2.1. Globalization and urban land use efficiency

Globalization integrates the Chinese economy into the world-wide economy (He & Zhu, 2007). China, especially its coastal regions, has participated deeply in globalization, and has experienced reform policies that have attracted large foreign direct investment (FDI) and international trade since the late 1970s (Wei, 2001). Globalization is a significant driver of China's economic growth and urban land expansion (Gao, Wei, Chen, & Chen, 2014; Gao, Wei, Chen, & Yenneti, 2015; Huang, Wei, He, & Li, 2015; Li, Wei, & Huang, 2014).

Globalization has also promoted ULE in the YRD. On the one hand, globalization has great potential to increase ULE by allowing regional specialization in land use and productivity growth as a response to the global shortage of productive land (Lambin & Meyfroidt, 2011; Meliciani & Savona, 2014; Wei, Yuan, & Liao, 2013). On the other hand, globalization has increased international trade liberalization, which has intensified competition, so a number of enterprises have chosen intensive land use strategies to reduce costs (Garrett, Lambin, & Naylor, 2013). Additionally, globalization promotes increasing FDI into the YRD, especially its development zones, which could enhance ULE (Wang, 2013; Wei & Leung, 2005). This is because FDI provides capital support to inject

more advanced technology and better managerial skills so built-up land in development zones can be used more effectively (Liu & Wu, 2011). Moreover, policy privileges in development zones, including special rules for land use tax and customs duty as well as lower land prices (Wang, 2013; Zeng, 2010), have reduced production costs and thereby increased the economic output of land use.

### 2.2. Marketization and urban land use efficiency

Marketization is another significant aspect of China's economic transition, and it has intensified since the early 2000s (Wei, 2001). Land system reforms have changed the pattern of urban development from central government-controlled to market-oriented (Deng, 2003; Ho & Lin, 2003). The economic value of the land has gradually emerged in China, which has led to the improvements of ULE (Ho & Lin, 2003). To further marketize the land, the Chinese government separated land use rights from land ownership (Zhu, 2004b). Scholars have argued that marketization and land reform have profoundly changed the land relocation system and have added value to the land, mediated by land use efficiency compliance with the land market mechanism (Chen, 2012; Cheng, Turkstra, Peng, Du, & Ho, 2006; Ding, 2003).

Marketization also significantly influences ULE. First, the land market has both social and economic importance for individual initiatives and consequent competition (Zhu, 2004a). Competitive advantages and lower production costs lead to higher productivity (Cai & Wang, 2003). Second, a competitive land market facilitates land use efficiency by allocating land resources to the most efficient users, mainly high-tech industries and advanced services, which increases the value of urban land and improves the urban land use efficiency.

### 2.3. Decentralization and urban land efficiency

Another aspect of the economic transition is institutional decentralization, which generates incentives and distributes certain property rights to agents who can claim profits from production based on their own decisions (Zhu, 2002). The negotiation of the land use right between the central and local governments can influence urban land efficiency. The institutional hierarchy in China determines institutional forces on land use change. However, China's institutional changes have created some uncertainty because the previous institutionalization of the status quo was weak and new institutions have not yet functioned effectively (Zhu, 2013). Inhibitive institutional forces restrict the land conversion and preserve the land resources, such as land-use regulations,

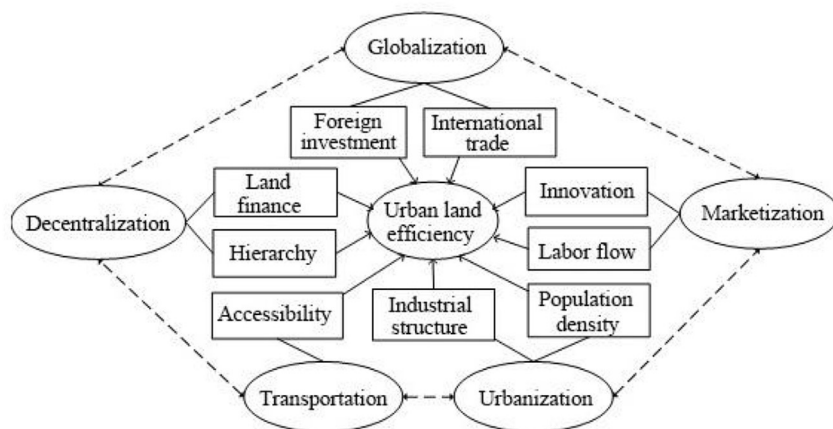


Fig. 1. The research framework.

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