



Research Paper

Urban land market and land-use changes in post-reform China: A case study of Beijing

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HIGHLIGHTS

- Land use changed dramatically in post-reform Beijing from 1992 to 2008.
- Cultivated land more than halved while two types of urban built land doubled.
- Land price, cultivated land availability and location are significant dynamic factors.
- Land reforms affected the spatial–temporal dynamics of land use changes.
- Conformity of land price mechanism with reform goals depends on land use types.

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ABSTRACT

China launched an ambitious urban land-use reform to improve land-use efficiency, raise funds for infrastructure construction, and facilitate foreign investment in the late 1980s. Few studies have systematically evaluated the effects of the market mechanisms on land-use changes in Chinese cities. This paper takes the city of Beijing as a case study to quantify the magnitude of land-use changes and model it in relation to spatial and market drivers through time and across the metropolitan region. The analysis uses unique district-level land survey data from 1992, 1996, 2001, 2004 and 2008, as well as land granting records. Analysis reveals that, since the urban land market was established in 1992, the spatial pattern of land uses has changed dramatically in Beijing, land price has exerted a significantly influence on land-use conversion, and the municipal recognition of an open market for land assets has set the spatial–temporal pattern of land uses on a course that sharply differs from past trends in Beijing.

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1. Introduction

China's urban land reform put an end to the so-called Three No's (no price, no time limit, no transferring) land-use system and introduced the paid-to-use land granting mechanism with respect to land supply for urban expansion. This reform has enabled land to play a critical role in economic development. On the one hand, the reform has been instrumental in the creation of new entities in the form of village and town enterprises (VTE) to take advantage of land at near zero price, as well as large labor surpluses, especially in the early reform period (late 1970s and early 1980s)

(Yang & Wen, 2010). Moreover, it generated huge revenue for local governments once urban land markets became widely established in the late 1980s. According to the China Land and Resources Statistical Yearbooks, from 1993 to 2011, the total revenue from land grants amounted to 13.16 trillion yuan in nominal terms. On the other hand, land reform has been blamed for triggering serious problems in land use, such as the inefficient use of urban land, land hoarding and loss of cultivated land (Jiang, Liu, & Li, 2007; Liu & Jiang, 2005; Lu, 2007; Zhang, 2000; Zhou, 2011; Zhou, 2006).

Ironically, China's urban land reform, specifically the establishment of a land market, was expected to preserve cultivated land and to promote more efficient use of the land by substituting a land pricing system to replace the old free-of-charge land-use system (Li, 1999; Zou, 1994). Empirical studies have confirmed that this reform has indeed promoted industrial relocation and urban spatial restructuring (Wu, 1997; Wu & Yeh, 1999; Yeh, 2005). However, critics have pointed out that this reform has also engendered a

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Chinese version of urban sprawl and land-use inefficiency (Deng & Huang, 2004; Zhang, 2000). So far, these criticisms are either unsubstantiated or based on anecdotal evidence. Therefore, this paper aims to study the regulating role of market mechanisms on the metropolitan land economy. In particular, we study the impact of market reforms on the nature and magnitude of changes in urban land uses in the Chinese context. We do so thanks to a unique data series on land-use changes within the Beijing Metropolitan Area that spans two decades.

Several bodies of literature are relevant to the study of urbanization and land-use change. Analysis of land-use dynamics conducted in various geographical contexts has underscored that population growth, economic development, income growth and infrastructure development go hand-in-hand with urban expansion (Baskent & Kadiogullari, 2007; Bilsborrow & Ogendo, 1992; Serneels & Lambin, 2001; Serra, Pons, & Sauri, 2008; William & Turner, 1992). Considering the rapid expansion of urbanization and of the Chinese economy (gross domestic product grew 140.6 times and urban population expanded from 17.92% to 52.57% of China's population between 1978 and 2012, according to the 2013 China Statistical Yearbook), a considerable strand of literature on China's land-use changes *de facto* argued about the degree to which urban expansion has been balanced. Socio-economic factors of land-use changes have all been examined and employed as drivers of land-use change, including population growth, economic development, and infrastructure investments (Fang, Zhang, Zhang, Luo, & Li, 2002; Gu, 1999; He, Shi, Chen, & Xu, 2002; Piao & Ma, 2006). Natural conditions, especially topography, that act as pre-conditions to constrain or facilitate land development have also attracted researchers' attention (Du, 2010). Furthermore, urban planning policy and major events, such as the 2008 Olympic Games and the 1990 Asian Games in Beijing, have been found to trigger remarkable land-use change (Kuang, Liu, Shao, & Sun, 2009). While these studies contribute to explaining urban expansion and land-use change, they fail to interpret the emergence of urban sprawl and the persistence of land-use inefficiencies in Chinese cities.

Land-use conversion modeling also has limited interpretative power for this issue. It assumes that the present discounted value of net returns determines the land-use type of a particular land parcel; land owners would decide how to use their land in order to maximize their total income (Chakir & Le Gallo, 2013; Plantinga, 1996; Plantinga & Irwin, 2006; Segerson, Plantinga, & Irwin, 2006). This theory, however, is built on two premises. First, it assumes the existence of a perfectly working market mechanism to properly reflect future land-use returns and also that expected future or alternative land-use returns would be fully capitalized into price. Second, the theory postulates that land owners have the right to decide how to use their land holdings. Yet, today's China is still transitioning from one regime to another and neither condition prevails. The land market is still underdeveloped and land pricing is still distorted, while owners and users of rural land lack the freedom to use their land for nonagricultural development. When rural land is proposed for urban development, it must first be expropriated and go through an approval process. An extensive body of literature has now accumulated on the institutional aspects of land-use change in Chinese cities. In a recent study, the authors have shown that the land pricing system helped to constrain urban expansion when it was initially introduced; however, it promoted urban sprawl because of local governments' intervention in land market. More detailed discussion can be found in Du, Peiser, Thill, and Feng (2012), Tao, Su, Liu, and Cao (2010), Zhou (2004) and others.

Further studies have pointed to the heavy reliance of the local government fiscal system on land revenue as a critical source of distortion, as these government entities are drawn into becoming

full-fledged land developers (Cao, Feng, & Tao, 2008; Lichtenberg & Ding, 2009). It has been found that land grant revenues account for 60–80% of local governments' extra-budgetary revenue, which does not need to be shared with the central government. In some regions, land revenues are even comparable to the total budgetary income of local governments (Jiang et al., 2007; Liu & Jiang, 2005; Zhou, 2007). While astonishing, such data fall short of serving as evidence of endemic problems in the land management system. Indeed, heavy reliance of local governments on land revenue does not necessarily lead to land-use problems, provided that sound governance is in place. Tao et al. (2010) pointed out that fiscal incentives have caused local governments to turn land development into a money-making business and made them less cautious in expropriating rural land (Tao et al., 2010). The relationship between land pricing and the land hoarding practices of local governments have been clearly demonstrated (Du & Peiser, 2012). However, the impact of China's land pricing system on the pace of urban expansion has so far not been studied.

According to the urban land rent theory, urban spatial expansion results mainly from three fundamental forces, that is, population growth, income rise, and decline in transportation costs. The urban spatial boundary is determined by the location of where urban land rents equate to agricultural land rents (Brueckner, 1987, 2000; Edward & Kahn, 2003; Wheaton, 1974). Urban land reform, and particularly the establishment of a land market, has brought improved economic efficiency with respect to land resource management in China. In principle, higher land prices should help to constrain the urban boundary and slow down the pace of urban expansion, while holding all other factors constant. However, the reality is at variance with this expectation and ample evidence of land-use inefficiency and urban sprawl has been reported (Cao, 2004; Yu, 2010; Zhou, 2006).

Therefore, this paper posits that the newly established urban land markets have an influential role on urban land development and redevelopment processes and on the distribution of land uses. A more developed market economy for land and higher land prices would be expected to be more effective in constraining urban expansion. This paper examines the specific impact of land prices and land markets as a new counterbalancing factor for administrative intervention on land use by statistically analyzing their effect on land conversion and land development. Moreover, the panel data analysis enables us to effectively control the impact of other potential factors on land use and to focus on the factors of interest in this study. We model the extent to which land price impacts the pace of urban expansion. The analysis uses unique district-level land survey data assembled for years 1992, 1996, 2001, 2004 and 2008, as well as land granting records within the Beijing Metropolitan Area since the 1992 urban land reform. These land-use data are based on the local governments' periodic land-use surveys using detailed land classifications, supplemented by a systematic field validation of the interpreted aerial image; therefore, these data provide the most accurate and systematic record of actual land use. Beijing is well suited to the purpose of this study because it is a typical mega city undergoing the transformation from a planned economy to a socialist market economy and because it has relatively good data records that are unavailable in many other cities. Beijing has a total territorial area of 1.641 million hectares. During our study period, more than half of its cultivated land was lost, while both urban/town land and mining/industrial land doubled.

The rest of this paper is organized as follows. Section 2 reviews the critical phases experienced by land market development in Beijing. Section 3 measures the magnitude of land-use changes between 1992 and 2008. Section 4 models the influence of land price on urban land-use changes. Section 5 discusses our main findings, while Section 6 draws the conclusions of the paper.

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