Effects of Plans on Urban Development in Beijing: Do They Contain Growth

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Abstract

The setting of urban construction boundaries (UCBs) through the imposition of comprehensive master plans (CMPs) is commonly practiced in Chinese cities. However, the effectiveness of UCBs in containing urban growth has been challenged. We argue that the failure of UCBs in China in containing urban growth can be explained by developers' behavioral reaction to these policies, rather than for institutional reasons. In this paper, we first explain, theoretically and conceptually, why UCBs in general could cause urban sprawl, rather than stop it. Using the case of Beijing in particular, we further examine the effectiveness of the UCBs policy and conclude, as predicted by our analysis, that the urban growth in Beijing during the two planning periods from 1983 to 2005 took place mostly outside the UCBs. We argue therefore that a successful land control measure, such as CMPs in China, should take into account the developers' behavioral reaction in order to stop effectively urban sprawl.

Keywords: Growth Management, Land Use Planning, Land Use Regulation, Planning, Urban Development, Urban Sprawl

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Introduction

The comprehensive planning approach to managing urban growth as manifested by limiting cities in compact forms is being widely applied. For example, in the United States, the "growth management" policy and "smart growth" concept were developed primarily to curb widespread urban sprawl (Porter, 1986; DeGrove and Miness, 1992; Stein, 1993; Nelson and Duncan, 1995; Urban Land Institute, 1998; Porter et al., 2002; Szold and Carbonell, 2002; Bengston et al., 2004,; Barnett, 2007). Among different approaches to managing urban growth, urban containment policy, widely adopted in the United States, has been extensively introduced to many countries (Bengston and Youn, 2006; Couch and Karecha, 2006; Millward, 2006). Urban containment policies basically have three major forms: urban growth boundaries (UGBs), urban service boundaries (USBs), and greenbelts (Pendall et al., 2002). UGB is probably the best known among these urban containment boundaries and has been extensively discussed in China (Zhang, 2004; Liu, 2005; Feng et al., 2008; Huang and Tian, 2008; Han et al., 2009b; Zhao et al., 2009). The land control mechanism in China closest to the idea of UGBs is urban construction boundaries (UCBs).

In China, there is a tradition of managing urban growth pattern through land use regulation tools. A city master plan (CMP) has traditionally been a crucial type of spatial plan to both envision city development perspective in the future and implement land use control over a specific time period, typically 20 years. According to the *Code for Classification of Urban Land Use and Planning Standards of Development Land* (GBJ137-90) promulgated by the Ministry of Construction, all land in the CMP area is classified into ten categories, among which nine categories belong to urban construction area (Ministry of Construction, 1990). The UCBs, encompassing all these nine categories of land use, have been applied for a long time as the basis to issue land development permit. The containment function of UCBs were further consolidated by the new *Code for Classification of Urban Land Use and Planning Standards of Development Land* (GB 50137-2011, Ministry of Housing and Urban-Rural Development, 2011), which specified that all land is classified into construction and non-construction uses. Although the UCBs were never explicitly marked in the land use maps of a CMP, they have functioned as special and important boundaries to distinguish urban land from rural area. The studies on the UCBs of Chinese cities have been limited for a long time, mainly because of the insufficient elementary land use data. With the advance of the remote sensing technology, many studies have analyzed the historical land use pattern of Chinese urban growth and have successfully described the geographic characters of urban land use change in several Chinese cities using the remote sensing data (Cheng and Masser, 2003; He and Chen, 2003; Li et al., 2003; Dai et al., 2006; Wu et al., 2006; Mu et al., 2007; Xu et al., 2007; Yu and Ng, 2007). However, since the periods of research in previous studies had little correspondence with the CMP periods, the influence of the CMP policies on land use change remained unclear. As a result, little research has been developed yet to examine the effectiveness of the UCBs over several consecutive and intact CMP periods and explain why.

Focusing on the UCBs function as containing urban growth, Han et al. (2009a) recently selected Beijing City as the case of examination of their effectiveness. Han et al. (2009a) further concluded that the UCBs were limited in containing urban growth and that the UCBs might not be large enough to accommodate all new development. In short, the UCBs in China did not successfully function as a basic spatial instrument to contain urban growth, at least in the case of Beijing. In other words, the UCBs in Beijing are considered as ineffective, but no satisfactory reasons have been provided to explain why (Han et al., 2009a). Instead of assuming perfect rationality of local governments and developers (Knaap et al., 1998), we intend to look at in greater depth based on the assumption of bounded rationality to explain analytically the micro, dynamic adjustment among developers, local governments, and landowners due to the setting of UCBs and show how land use plans as manifested by UCBs affect land development behavior individually and thus urban development collectively in order to provide useful recommendations as to how such plans should be made in China in light of planning effectiveness for urban development. On the other hand, the land tenure system in China is peculiar, from a market economy point of view, in that land owners can only “rent,” but not “own” the land for a specific period of time. We argue that this peculiarity does not render the Coase theorem on transaction cost as useless, but rather it enhances the argument of the Coase theorem in that landowners only own the “right” in the land (Coase, 1960). Manipulation of right in land is the essential element in land development, regardless of the types of land tenure system. Han et al’s (2009a) work prompts research on measures to improve the implementation of UCBs, including information dissemination of plans, prediction of contingencies, and timely revision of UCBs. But before we can do this, explanations must be provided as to why UCBs fail in China in containing urban growth. In the next section, we will provide a property right approach to exploring micro, dynamic adjustment of developers, local governments, and landowners due to the setting of UCBs, and proceed to derive testable hypotheses explaining why UCBs fail in China in containing urban growth. Theoretical explanations and empirical examinations of the hypotheses and predictions depicted in Section 2 is provided in Sections 3 and 4, respectively. We conclude in Section 5.

Land Development: A Property Right Account

Cities are the outcome of individual spatial decisions that interact with each other. To understand how cities evolve, it is fundamental to understand the land development behavior of individual agents *and* how they interact. The analytic method for exploring empirically and theoretically land development activities and their interaction are depicted in the this section.

The usual difficulties in modeling the land development process are that the process involves many participants with conflicting perspectives, and that it is almost impossible to characterize the behavior of the participants in a common framework. For example, the process can be described in terms of decision sequences, focusing on how decisions are made in the process, or a production-based approach, which emphasizes how the final products are established (Gore and Nicholson, 1991). Given the idiosyncratic characteristics of the land development process depicted in different descriptive models, we argue that two elements pervade in any type of land development process, namely, information and property right.

The land development process is usually divided into four phases: acquisition, approval, construction, and letting. In the first phase, the developer must locate a parcel of land that might yield profits from the project. Once the land is secured, the process enters into the second phase, in which the developer must apply for the necessary permits. Construction commences in the third phase. In the fourth phase, the final output after construction is then sold or leased in the market in order to yield profits for the developer. As argued by Schaeffer and Hopkins (1987), in each phase, planning yielding information is conducted with respect to environments, values, and related decisions. Plans are made and revised as sets of related, contingent decisions based upon the information gathered. As a result, the land development process is a sequential decision making problem, the decisions made in each phase being contingent on those to be made in the future. To clarify the roles that information and property right play in the land development process, we focus in the research on the first phase: land acquisition. The interpretation of the behavior in other phases can be made similarly.

Property right plays an important role in the land development process so it is useful first to define property right. Property right is the power to consume, obtain income from, and alienate the assets over which the owners have the authority to do so (Barzel, 1991). Thus, the property right over a parcel of land is the power to use the land to make a profit through cultivating, improving, or exchanging it. According to Barzel, in reality, property right is impossible to delineate completely in any exchange. Thus, transaction costs arise due to incomplete information about attributes of assets. For example, in making investment decisions developers usually acquire information about the locational advantages of parcels of land with a certain amount of cost. This implies that some of the attributes of exchanged goods, unknown to either party involved in the exchange, are left in the public domain, and the exchanging parties are motivated to capture these attributes during the exchange.

This is particularly true in land transaction, regardless of the types of land tenure. More specifically, the property right of a parcel of land can be divided into fixed, legal right and variable, economic right. Whereas the fixed, legal right is that legally protected by the government, such as documented ownership of the land, variable, economic right includes the attributes of the land affecting its valuation, such as its accessibility to transportation network. Because the fixed, legal property right usually incurs the fixed cost of land acquisition as indicated by land price, we argue that it is the variable, economic property right that fundamentally affects how and why developers proceed in the land development process. If the economic property right is not taken into account in the land development process, the developer would be indifferent between two parcels of land with the same amount of fixed, legal costs but different attributes. However, this is obviously not the case in reality, regardless of the types of land tenure.

Consider a developer in the first phase of land acquisition, looking for an appropriate parcel of land for a certain type of development. The attributes of each parcel of land vary depending on its location, land price, geological conditions, access to public facilities and infrastructure, the socioeconomic conditions of the surrounding environment, landscape, amenities, scenery, and environmental considerations. No two parcels of land are identical, and methods used to measure these attributes are expensive and often imperfect in their results. As a result, complete information about land attributes is prohibitive in cost to obtain, which results in positive transaction costs. Put differently, both the exchanging parties will invest resources to measure the attributes of the land before deciding whether to proceed in the exchange. After the transaction costs expenditures, the developer and the owner of the land each will only obtain a certain amount of the information about these attributes, albeit incomplete. The information is incomplete for both parties because information is asymmetric or at least different due to the prohibitive cost of the complete measurement of all attributes of a parcel.

As a result, some attributes are thus unspecified and left in the public domain. For example, the owner might conceal a criminal problem in the community where the land is located, while a developer might be secretly informed of a public transit facility that would be constructed near the property, thereby increasing the value of the land. In deciding which parcel of land to acquire for development, we argue that the developer will secure the land from which he or she can maximize the value of property right by capturing that left in the public domain.

Before realizing the exchange, the developer and the owner invest resources to gather information about the attributes of the land to reduce uncertainties/risks. This investment is the major source of transaction cost. Thus, planning as information gathering occurs during each transaction. It is worth noting what information the exchanging parties should gather and how he or she should proceed in information gathering. According to Friend and Hickling (1987), Hopkins (1981), and Schaeffer and Hopkins (1987), the developer is faced with four types of uncertainty: uncertainty about the environment, uncertainty about values, uncertainty about related decisions, and uncertainty about the search for alternatives. In the land development context, before land acquisition, the developer is uncertain about whether the investment would yield net gains. These gains are dependent on the trends of the surrounding environment of the land, government policies concerning future community development, related development decisions of other developers and the government, and possible final outputs of built form. All these types of information influence the profit-yielding attributes of the land under consideration.

As argued earlier, the complete measurement of the attributes of the land is prohibitively expensive since the measurement process incurs cost. Therefore, uncertainties cannot be eliminated completely, and the planning, i.e. information gathering, that occurs requires investment of resources. Planning produces additional information for the developer and landowner whose value is the discrepancy between the expected values of outcomes with and without that information (Hopkins, 2001). As a result, whether the developer should plan depends on whether the increase in the value of the information produced by planning exceeds the cost of conducting planning. In the land acquisition case, if planning with respect to the attributes of land at different locations results in an increase in the expected value of property right captured from the public domain, which in turn exceeds the cost of conducting the planning, then planning is worthwhile and should be conducted by the land developer.

In deciding whether the developer should plan, the information with respect to the four types of uncertainty gathered through planning must be specified a priori. That is, the developer must determine beforehand what information to gather. It has been proven analytically that the information must be payoff relevant and sufficiently accurate; that is information affecting expected gains in making decisions (Lai, 2002). The proof was based on the notion of optimal information structures that would yield the highest expected utility given a best action. These conditions provide a useful guideline for information gathering in reality. In the land development context, the developer should acquire the information that is related to the value of the property right captured in the land exchange, and that accurately measures the attributes of the land and predicts possible consequences resulting from the exchange.

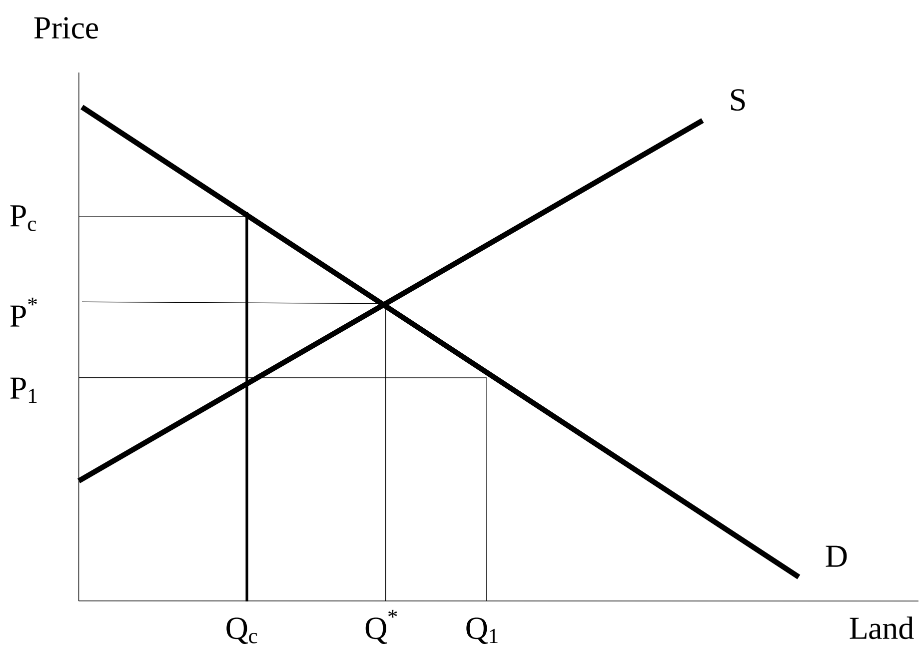
In short, the seemingly idiosyncratic process of land development can indeed be described as a sequence of property right-capturing activities. By completing the contractual exchange, the developer captures the property right in terms of land attributes that is not fully delineated and left in the public domain. The transaction cost incurred in the exchange results mainly from information gathering or planning concerning the measurement of these attributes or the reduction of uncertainties. Since that measurement is costly, not all planning activities yield benefits; benefits are dependent on whether the value of the information gathered exceeds the cost of conducting planning. Since uncertainty cannot be eliminated completely, it follows that some property right is always left in the public domain and the capturing of such right will always occur in any land development process, regardless of how much is invested in planning.

Effects of UCBs on Land Development

As a concrete example of how the property right approach to land development can be used to interpret developers' behavior in response to the setting of UCBs, consider a city with a growing amount of developable land that is subject to the setting of UCBs. Suppose initially that all developable land is legally permissible and that the land prices are determined through the market mechanism. In this hypothetical example, imposing UCBs would limit all land developed within these boundaries. How would the developer react to such a land control policy?

Referring to Figure 1, the initial demand and supply curves for land are shown as D and S. Viewing land as an intermediate, not the final, good of the land development process, the developer is on the demand side and the landowner is on the supply side. The market clearing price for land is P^* with the associated amount of land exchanged as Q^*. Assume a new land control policy of UCBs is imposed inelastic with respect to price that limits all land developed within Q_c below the equilibrium amount Q^*, indirectly imposing a price limit of land set at P_c. The unit price of land demanded shifts from P^* up to P_c, while the unit price of land supplied shifts from P^* down to P_1, and the market clearing price would be at P_c. However, the landowner is willing to sell at P_1 with the developer to secure the land at P_c, and there would be a price discrepancy of $P_c – P_1$ in the marketplace. The difference in the amount between P_c x Q_c, the amount developer actually pays for the total amount of transacted land, and P_1 x Q_c, the amount the landowner is willing to sell the transacted land, is dissipated in the public domain without identified recipients, but captured by the landowner through the market mechanism. *The implication is that the developer would be willing to risk violation of the UCBs to pay that amount in order to acquire additional land outside the UCBs at a lower cost.* As argued by Barzel, the rationing of any type for a good with a limited supply, for example, by waiting or queuing, is not caused by a "shortage" of the supply of the particular good as traditionally conceived by economists. Instead, the shortage of the particular good in the market is a result of the consumers' maximization principle of capturing dissipated property right. The same argument was applied to gas station owners' reactions toward the oil crises during the 1970s. Other behavioral predictions can be derived in response to the land control policy similar to the above analysis using the property right approach.

Figure 1: Effects of UCBs as developable land control



On the other hand, as argued by Mohamed (2006), imposing the UCBs on a city reduces the risk of land development faced by developers, which in turn triggers off the frog-leap type of development pattern. "This raises an interesting question: do local governments unwittingly promote sprawl when they introduce policies to make the development process more predictable? *The answer appears to be tentatively yes*." (Italic mine)(Mohamed, 2006, p. 34). Finally, plans do not necessarily reduce uncertainty though they definitely help cope with it and developers seeking the green-field sites for development outside the UCBs might face a lower degree of uncertainty and smaller transaction cost than infill and redevelopment inside these UCBs. Therefore, we argue that plans, such as UCBs, might encourage use of exurban sites for development rather than discouraging it. With the three effects of the imposition of UCBs discussed in this section: increase in land prices and encouragement of use of exurban sites due to developers' behavior and increase in uncertainty due to plans, we suspect that imposing UCBs in Beijing would cause unwittingly urban sprawl rather than contain it, a hypothesis we test empirically in next section.

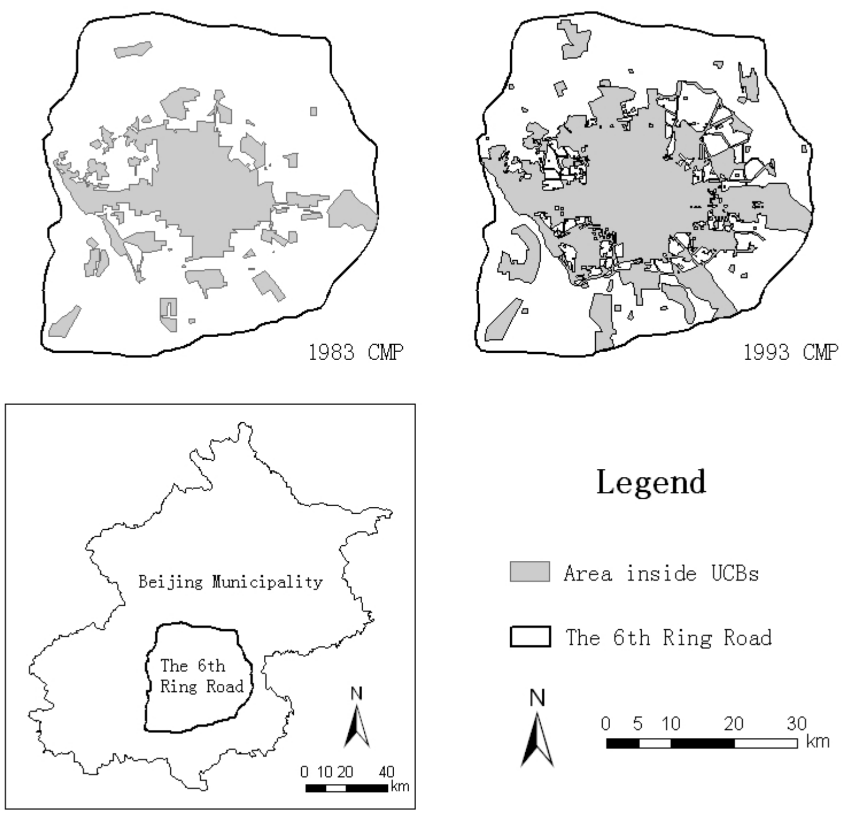
Empirical Examination

In Beijing, as shown in Figure 2, there have been altogether three versions of CMPs since the 1980s: the Beijing CMP (1981–2000) was put forward in 1982 and approved in 1983; the Beijing CMP (1991–2010) was put forward in 1992 and approved in 1993; the Beijing CMP (2004–2020) was put forward in 2005 and approved in the same year (Beijing Municipal Institute of City Planning and Design, 1982; 1992; 2005). Consequently, the Beijing CMP (1981–2000) actually functioned from 1983 to 1993, the Beijing CMP (1991–2010) from 1993 to 2005, while the Beijing CMP (2004–2020) from 2005 to the present. In this section, the three Beijing CMPs are denoted as the 1983 CMP, the 1993 CMP, and the 2005 CMP, respectively. Moreover, the actual implementing period of the 1983 CMP is denoted as "the first planning period," and that of the 1993 CMP as "the second planning period." In addition, Beijing is characterized by a ring-concentric growth pattern, including six ring roads and over ten radiant roads. The 6^{th} ring road is selected in this section as the study area due to the following two reasons. First, the 6^{th} ring road is the outmost ring road of Beijing and is easy to identify. Second, the area inside the ring road is large enough to encompass the central city of Beijing and much of its surrounding open space for the estimation of urban growth intensities. We are interested, therefore, in examining whether the making of the CMPs in Beijing, thus the setting of UCBs, would contain urban sprawl in the Beijing metropolitan area.

According to the traced boundaries of the land use planning maps in these two CMPs as the basic maps to trace the boundaries of the UCBs, the total area in the UCBs in the 1983 CMP is 549 km2, and the area between the UCBs and the 6th ring road is 1757 km^2. In addition, the total area in the UCBs in the 1993 CMP is 935 km^2, and the area between the UCBs and the 6^{th} ring road is 1371 km^2. A comparison of the areas between the UCBs and the 6^{th} ring road across the two planning periods already shows that much development has taken place outside the UCBs during the first planning period.

To examine the effectiveness of the UCBs, it is crucial to distinguish the land uses they allow and encourage from those they prohibit and discourage. Consequently, the land use within the 6th ring road was classified into urbanized land areas and open space in this section. The urbanized land is defined as all types of developed land, including urban and rural built-up areas and urban green space, such as developed parks, golf courts, and other urban green space for recreation. At the same time, open space is defined as land for agricultural use (according to its broad definition in China), including farmland, woodland, pastureland and orchards. The estimation of these areas are conducted using the Landsat images.

Figure 2: UCB maps in the 1983 CMP and in the 1993 CMP



The present research examines the effectiveness of UCBs basically by comparing developments outside with those inside the boundaries. Three presumptions are identified to assess the effectiveness of the UCBs. The first presumption is that less urbanization should occur outside the UCBs than inside if the UCBs are effective to contain urban growth. The second is that the total possible increase in urbanized land area should be less than or equal to the existing open space within the UCBs at the beginning of each planning period in order to achieve effective urban containment, meaning that the area of land consumed should be no more than supplied. The third is that the urban growth immediately outside the UCBs should be avoided if the UCBs are effective to contain urban growth, as that growth would significantly undermine the urban containment objective by encouraging urban sprawl.

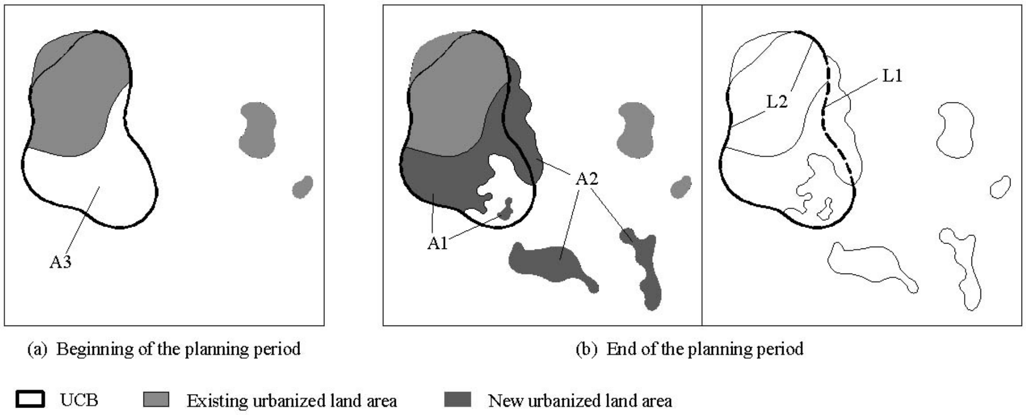
According to these presumptions, three quantitative indicators are defined for the assessment of the UCBs, i. e., boundary containment ratio (BCR), boundary sufficiency ratio (BSR), and boundary adjacent development ratio (BADR), as follows:

$$BCR = A_2/A_1, \quad (1)$$
$$BSR = (A_1 + A_2)/A_3, \quad (2)$$
$$BADR = L_1/L_2, \quad (3)$$

where A_1 and A_2 are areas of urbanized land increase (open space consumption) inside and outside the UCBs during the planning period, respectively; A_3 is the area of open space inside the UCBs at the beginning of the planning period; L_1 and L_2 are lengths of the UCBs with and without new land development immediately outside, respectively. Figure 3 illustrates conceptually all types of areas and boundaries defined in equations (1), (2), and (3).

According to the presumptions, we expect that a high value of BCR indicates a large share of urban growth outside the UCBs, that a high value of BSR indicates an insufficient size of the UCBs, and that a high value of BADR indicates a high proportion of urban growth occurring immediately outside the UCBs.

Figure 3: Illustration of the areas and boundaries of analysis



The results of the comparison between the two planning periods in Beijing are shown in Figures 4 and 7 as well as in Tables 1 and 2. During the first planning period, the urbanized land area inside the UCBs increased from 333.3 km^2 in 1983 to 474.6 km^2 in 1993. At the same time, the urbanized land area between the UCBs and the 6th ring road increased from 76.3 km^2 in 1983 to 239.2 km^2 in 1993. As a result, during the first planning period, the urbanized land area increased by 141.4 km^2 inside the UCBs, consisting of 46.5% of the total urbanized land growth in the 6th ring road; while it increased by 162.8 km^2 between the UCBs and the 6th ring road, consisting of 53.5% of the total urbanized land growth in the 6th ring road. Urban growth in Beijing was found to have occurred immediately outside the UCBs. At the beginning of the first planning period, 22.0% or 134 km of all UCBs had already been adjacent to the existing land development outside them. During the first planning period, 28.2% or 172 km of all the UCBs had new land development immediately outside them. By the end of the first planning period, only 49.8% or 304 km did not have any land development immediately outside the UCBs (see Figures 4 and 5).

Table 1: Land area change inside and outside the UCBs in the first planning period 1983~1993 (km^2)

Item	Urbanized land area		Open space		Urbanized land area change	Open space change
	1983	1993	1983	1993	1983~1993	1983~1993
Inside UCBs	333.3	474.6	215.7	74.4	141.4	−141.4
Outside UCBs	76.3	239.2	1680.7	1517.8	162.8	−162.8

Figure 4: Urbanized land area change during the first planning period

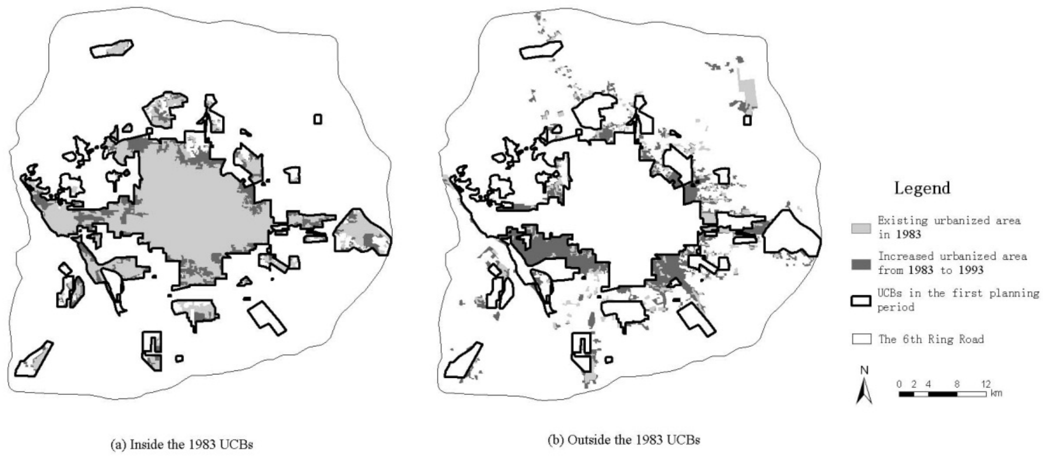
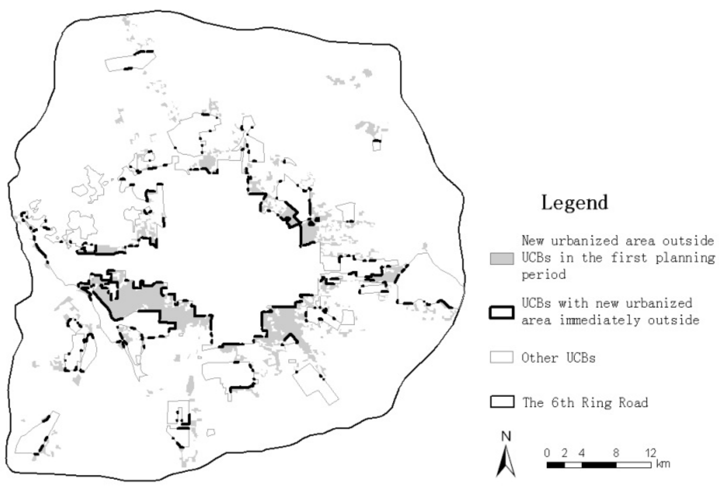


Figure 5: UCBs with urbanized land growth immediately outside during the first planning period



The growth pattern during the second planning period shows similar results. During the second planning period, the urbanized land area inside the UCBs increased from 619.1 km^2 in 1993 to 807.1 km2 in 2005. At the same time, the urbanized land area between the UCBs and the 6th ring road increased from 94.2 km^2 in 1993 to 336.3 in 2005. During the second planning period, the urbanized land area increased by 188.0 km^2 inside the UCBs, consisting of 43.7% of the total urbanized land growth in the 6th ring road; while it increased by 242.1 km^2 between the UCBs and the 6th ring road, consisting of 56.3% of the total urbanized land growth in the 6th ring road. Urban growth was also found to have occurred immediately outside the UCBs. At the beginning of the second planning period, 41.9% or 518 km of all UCBs had already been adjacent to the existing land development outside them. During the second planning period, 25.3% or 313 km of all the UCBs had new land development immediately outside them. By the end of the second planning period, only 32.7% or 404 km did not have any land development immediately outside the UCBs (see Figures 6 and 7)

Table 2: Land area change inside and outside the UCBs in the second planning period 1993~2005 (km^2)

Item	Urbanized land area		Open space		Urbanized land area change	Open space change
	1993	2005	1993	2005	1993~2005	1993~2005
Inside UCB	619.1	807.1	315.9	127.8	188.0	−188.0
Outside UCBs	94.2	336.3	1276.8	1034.7	242.1	−242.1

Figure 6: Urbanized land area change during the second planning period

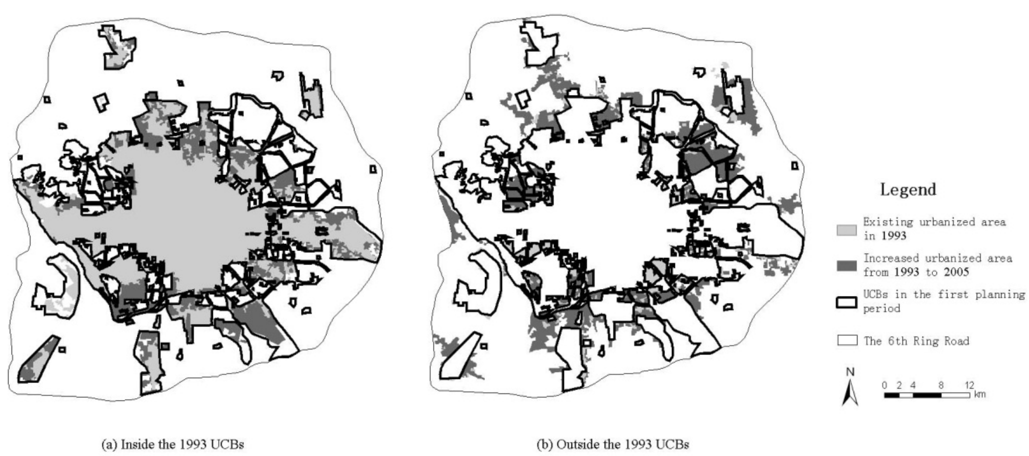
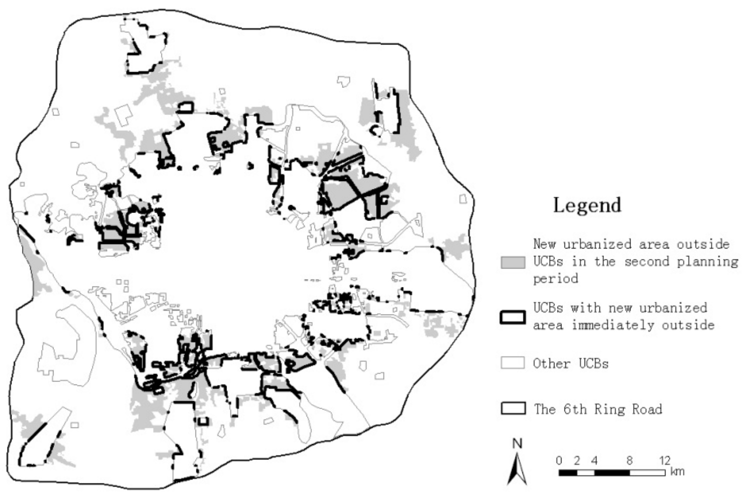


Figure 7: UCBs with urbanized land growth immediately outside during the second planning period



By calculating the three BCRs, BSRs, and BADRs in the two planning periods, respectively, a comparison was made to analyze the implementation effectiveness of the UCBs in the Beijing CMPs from early 1980s to mid 2000s (see Table 3). The results are summarized as follows.

Table 3: Comparison of the implementation of UCBs in the two planning periods

The first planning period			The second planning period		
BCR	BADR	BSR	BCR	BADR	BSR
1.15	0.57	1.41	1.05	0.77	1.50

1. The BCR was 1.15 in the first planning period and 1.05 in the second planning period. It indicates that the urban growth outside the UCBs had a larger share of the total growth than that inside the UCBs in both planning periods.

2. The BADR was 0.57 in the first planning period and 0.77 in the second planning period. The high values of BADR suggest that a large amount of urban growth had occurred immediately outside the UCBs.

3. The BSR was 1.41 in the first planning period and 1.50 in the second planning period. Both are greater than 1. It suggests that the UCBs were not planned encompassing areas large

enough to accommodate all new urbanization if measured by the actual development density in both planning periods.

It can be concluded, therefore, that the urban growth in Beijing during the two planning periods from 1983 to 2005 took place mostly and increasingly outside the UCBs, in particular in the land which was immediately adjacent to existing development, a result predicted by our analysis depicted in the previous section. Han et al. (2009a) attributed the failure of the UCBs in Beijing in containing urban sprawl to three factors: First, the lack of a transparent system for urban land use planning and control led to insufficient information dissemination and thus the prevalence of illegal and informal constructions outside the UCBs. Second, the limitation of the traditional land use prediction method that is derived from the traditional comprehensive planning process resulted in the underestimation of the scale of the UCBs. Third, the absence of a mechanism to monitor and adjust timely the UCBs also contributed to the spill of new constructions over the UCBs. Though these institutional constraints might explain in part why the UCBs in Beijing fail, the more fundamental reasons, we believe, would be the higher costs of development within the UCBs incurred by making the CMPs, as depicted in the previous section.

Conclusions

The reasons why the UCBs policy fails in China are depicted here from the perspectives of property right capturing, the psychology of residential developers, and effects of plans. An empirical study shows that the setting of the UCBs by the imposition of the CMPs in Beijing did encourage urban growth outside the UCBs. We argue that imposing the UCBs on a city forces, on the one hand, developers to seek green-field site outside the UCBs to reduce the development cost in order to capture the dissipated property right due to price discrepancy in land, and that, on the other hand, it also encourages developers to satisfice on one project and then move quickly to another due to the mental account of the psychological tendency of developers. We also argue that both driving forces, property right capturing and satisficing in land development, reinforce each other and make the UCBs policy in China ineffective. Institutions matter, but it is the developers' behavioral reaction to the imposing of the CMPs that makes the UCBs policy fail in China. Therefore, a successful land control measure, such as CMPs in China, should take into account the developers' behavioral reaction in order to stop effectively urban sprawl. Toward this end, what remains to be done in the future is to test empirically the behavioral approach to the effectiveness of the UCBs policy in China and make concrete recommendations.

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