Restructuring for Growth in Urban China:

Transitional Institutions, Urban Development, and Spatial Transformation

Abstract

This research examines government policies and urban transformation in China through a study of Hangzhou City, which is undergoing dramatic growth and restructuring. As the southern center of the Yangtze River Delta, an emerging global city region of China, Hangzhou has been restlessly searching for strategies to promote economic growth and survive the competition with Shanghai. This paper analyzes Hangzhou's development strategies, including globalization, tourism, industrial development, and urban development, in the context of shifting macro conditions and local responses. We hold that urban policies in China are situated in the broad economic restructuring and the gradual, experiential national reform, and are therefore transitional. We argue that China's urban policies are state institution-directed, growth-oriented, and land-based, imposing unprecedented challenges to sustainability and livability. Land development and spatial restructuring are central to urban policies in China. Last, while Hangzhou's development strategies and policies to some extent reflect policy convergence across cities in China, local/spatial contexts, including local settings, territorial rescaling and land conditions, are underlying the functioning of development/entrepreneurial states.

Keywords: Globalization, Rescaling, development zones, urban development, Hangzhou, China

Introduction

China has been undergoing rapid growth and transition from state socialism since the reform of the late 1970s. Chinese cities have been transformed from socialist cities to post-socialist cities characterized by transitional institutions, developmental/entrepreneurial states, hybrid urbanization, and multi-layered space (Gaubatz, 2008; Heikkila, 2007; Li, 2005; Luo & Wei, 2009; Ma, 2002; Wei & Gu, 2010; Wu & Phelps, 2011). CBDs and development zones have become frontiers of globalization, and a polycentric urban development model can be observed as well. The growth and transformation of Chinese cities are driven by reforms from above and below, and by forces operating domestically and globally, trigged by the triple transitions of decentralization, marketization, and globalization in China (Wei, 2007).

The Chinese state has been transformed from a socialist state and a provider of public goods to a developmental/entrepreneurial state that actively promotes globalization, economic development, and urban growth (Li & Li, 2009; Luo & Shen, 2008; Ma, 2002; Wei, 2005; Zhang, 2002). The transformation of local states is also shaped by the broad contexts of globalization and economic transition, and the local context of specific cities. The trajectories of urban development can be created by different local processes embedded in city-specific culture, history, and economic and political systems (Li & Li, 2009). A better understanding of the changing role of the state and

the transformation of the Chinese cities is necessary to cope with rapid economic growth and urbanization in China.

This paper examines urban policies and urban transformation in China through a study of Hangzhou Municipality, with a focus on the city proper or city districts (hereafter Hangzhou City or Hangzhou). The content of urban policies and the role of the state in Hangzhou have significance beyond the city itself; they well represent the changing nature of local states and urban governance in China, and to some extent, correspond to the broad change in governance and strategies across the urban world. The study of Hangzhou should shed more light on the understanding of urban development/transformation and the role of the state, especially in developing or transitional countries. After the following sections on conceptual background and research context, this paper analyzes in detail the specific development strategies and policies, and the transformation of the city. We also discuss the consequences and limitations of government policies.

Transitional Cities, Developmental/Entrepreneurial Cities, and Globalizing Cities

Chinese cities have been transformed from socialist cities to post-socialist transitional cities. Since the late 1970s, China has adopted a gradual, experiential approach to reforms. Scholars have been very interested in the process, characteristics, and consequences of economic reforms in former socialist countries. They have been debating the nature of reform and

transition in China and are concerned with social costs and spatial ramifications of reform. Mao's state socialism and self-reliance have been restructured through the triple transition of decentralization, marketization, and globalization, which has empowered local states as well as global and market forces in urban and regional development (Wei 2007). The post-socialist Chinese cities are transitional cities characterized by transitional institutions, hybrid urbanization, spatial rescaling, spatial fragmentation, and suburbanization (Heikkila 2007; Li, 2005; Luo & Shen 2008; Ma, 2002; Ma, 2005; Wei, 2005).

China's reform process has brought growth and prosperity to the country; however, the transition has various layers and dimensions. Wei (2007) conceptualizes the reform as a triple process of decentralization, marketization, and globalization, which has reconfigured the relationships between state and market, within the state units, and between domestic and global forces. In the Chinese context, the state leads the formulating, pursuing, promoting, and implementing of urban development strategies and policies (e.g., Ng &Tang, 2004). However, the triple transition has reduced the overall power of the state and its control of the economy and society, and decentralization has empowered local states to mobilize resources for growth. With the decentralization of incentives and responsibilities and pressure from increasing competition, Chinese local states--municipal and county governments in particular--have been more actively involved in local economic development and have become major agents of urban development

and transformation (Ma, 2002; Zhang, 2002; Zhang, 2003).The state also acts within the context of globalization, has to interact with multinational enterprises (MNEs), and increasingly competes globally (Wei, 2010). Government policies have to build upon the existing resources, location, and spatial structure, and implementation is also constrained by global forces and market competition. This paper holds that the role of the state in the transformation of Chinese cities has to be analyzed within the broad contexts of globalization and economic transition, and the local context of specific cities.

First, Chinese transitional cities are also globalizing cities and local state actions respond to broad economic restructuring. Mao's policy of self-reliance has been restructured to favor opening up the domestic economy, and Chinese cities have been increasingly integrated with the global economy, largely through open-door policy and the infusion of foreign investment. Globalization, especially foreign direct investment (FDI), has been impacting the development of Chinese cities; it accelerates market-oriented reform and imposes a pressing need to change the practice of governance. The state is no longer the owner and master of Chinese cities, and is increasingly situated in the market-oriented network of global exchanges and flows; although, it still plays a dominant role in local corporatism or growth coalition. The formulation and effective implementation of local state strategies are, therefore, influenced by national institutions and global-local configurations, or glurbanization (Jessop & Sum, 2000). The broad

context of the emergence of developmental/entrepreneurial cities is the changing role of the state from managerialism to developmentalism and entrepreneurialism in advanced capitalism, and the triple transition of decentralization, globalization, and marketization in China (Wei, 2007). We analyze the development of Hangzhou in the context of shifting macro conditions and local response to macro change.

Second, Chinese institutions have been transformed from emphasizing egalitarianism, social movement, and self-reliance, towards pursuing growth and competitiveness: such a process does not take place overnight; it is a gradual and experiential transitional process. Reforms implemented through the central government-directed top-down process are largely beyond the control of local states, although policy formation involves central-local interactions. Chinese state institutions, whether the central state or the local state, are themselves evolving with changing organizational structures and development priorities, and are therefore transitional in nature (Wei, 2005). Fiscal decentralization in the 1980s provides the impetus to growth during earlier years of reform in response to China's totalitarianism. However, processes of decentralization and territorialization are counterbalanced by recentralization, hierarchization (Xu & Yeh, 2009), and changing state-society relations. States have been increasingly developmental and entrepreneurial, are even more active in policy initiatives since the 1990s, and can be described as corporate states (Walder, 1995), development states (Zhu, 2004), and

entrepreneurial states (Wu & Phelps, 2011). The controlled development of social groups and organizations, due to the limits of political reforms and civil development, also sustains the significant role of the Chinese state, represented by strong mayoral leadership in Chinese cities, an essential factor for Western cities as well (Clarke & Gaile, 1997).

Theoretically, the role of the state has been analyzed through the governance paradigm, the notions of development and entrepreneurial states/cities, the growth machine, and the politics of scale (e.g., Hall & Hubbard, 1998). Transitional institutions are, however, unstable, characterized by shifting development priorities and strategies and conflicts among government divisions over their self-interests. Wei (2005) argues that transitional institutions are underlying the constant revision of urban master plans and the chaotic urban construction and management in Chinese cities. This paper therefore treats Chinese institutions as transitional, and situates the role of the state in the transitional process of China's economic reforms and urban development. Last, there are strong local/spatial contexts for the functioning of development/ entrepreneurial states, especially the formulation, pursuing, and implementation of urban strategies and policies. The local state has used multiple incentives beyond the narrow fiscal one, including cadre promotion, rent-seeking, and instruments such as urban planning, administrative rescaling, and state development corporations (Wei, 2005; Ma, 2005), making transitional cities developmental and entrepreneurial cities. The cadre promotion and rotation process also presses mayors to

actively pursue new strategies and demonstrate "political grades" (zhengji) during their tenure, leaving their footprints in Chinese cities. Moreover, rent-seeking and personal gains can best be realized through active project initiation and implementation, making local states in China unique players that may not follow the rational market logic of costs and benefits (Xu & Yeh, 2005).

The marketization process in urban development is also driven by the reform in the land market, which makes the land the single most important resource for local states (Qian, 2008). Land reclamation and development, especially in the forms of administrative rescaling and development zones, become the most important instruments of entrepreneurial states (Ma, 2005). Such processes are intertwined with the process of local administrative rescaling, in which central cities take over suburban land through annexing suburban towns and townships and even whole cities and counties (Ma, 2005; Shen, 2007), to benefit from agglomeration economies and avoid central city decline experienced in Western countries. The actions of local states in China are strongly affected by specific local contexts and show a path dependent on evolving process (Li & Li, 2009). The transformation of Chinese cities has by no means followed the convergence thesis that oversimplifies the impact of globalization and homogeneity on third-world cities. The evidence has revealed the hybrid nature of urbanization outcomes in China (Heikkila, 2007). Thus, there are strong internal forces of spatial and local contexts that drive up the transformation of

Chinese cities. The case of Hangzhou shows how the local state aims to build the city with the consideration of local and spatial contexts.

Hangzhou: Research Setting and Development Process

Hangzhou, an ancient capital of China, is representative of coastal metropolises that are undergoing dramatic growth and restructuring. Established in the Qin Dynasty (222 BC), Hangzhou is one of the ancient capitals of China (Figure 1) and a traditional commercial center—especially after construction of the Grand Canal in AD 610 (the Sui Dynasty) connected the Delta with the political center in the north—and the city prospered when it became the national capital during the Southern Song Dynasty (AD 1138-1276) (Wei &Li, 2002). In the Yuan, Ming, and early Qing Dynasties, Hangzhou was known as one of China's most prosperous commercial cities, described by Marco Polo as the most beautiful and splendid city in the world. The Opium War (1840-42) and the opening up of treaty ports marked the restructuring of the urban system of China towards integration with the global economic system. Shanghai has since replaced Hangzhou as the economic center of the Yangtze River Delta (YRD), and emerged as the primate city of China, known as the "Paris of the Orient." Hangzhou also became a semi-feudal and semi-colonial city. Over the years, Hangzhou has been known for its beautiful natural landscapes (e.g., the West Lake), historical heritages, handcraft industries and cultural products such as tea, silk, fan, scissors,

medicine, and painting, as well as the "backyard garden of Shanghai" (Wei &Li, 2002).In 2009, the city and municipality had populations of 4.29 million and 6.83 million, respectively (Table 1).

(Figure 1 and Table 1 about here)

Hangzhou is the capital of the dynamic Zhejiang province, known for its rapid ownership transformation and the development of private enterprises (Ye &Wei, 2005). As the southern center of the YRD, an emerging global city region in China, Hangzhou has been searching relentlessly for strategies to survive the competition with Shanghai (Fig. 1). In the late 1990s, a new leadership emerged in Hangzhou and Zhejiang, proposing bolder reforms to stimulate economic growth and transition and position the city to flourish in the age of globalization and information. The leadership has attempted to make the city more competitive, creative, and livable, with the broad goal of "study in Hangzhou, live in Hangzhou, tour in Hangzhou, and career in Hangzhou." Since then the city entered a stage of most rapid growth and transformation (Table 2).

(Table 2 about here)

"Geneva of the Orient?" Making Hangzhou a World-Class Tourism City

Hangzhou, like many other Chinese cities, has been continuously searching for strategies of development, prosperity, and building its own identity. The roles of urban landscapes and

tourism development has long been a point of debate among policy makers in Hangzhou. The 1953 preliminary plan of Hangzhou proposed to develop the city into one with a beautiful landscape for leisure and renovation, followed by the construction of hotels, landscape sites, and tourism service facilities (Wei, 2005). However, from the early 1960s to the mid-1970s, Chinese cities, Hangzhou not excluded, faced economic stagnation, unrest, and the destructive Cultural Revolution (1966-1976). Hangzhou was transformed into a "socialist productive city," and many of the historical sites were destroyed as feudalistic heritages and symbols of capitalism. Moreover, Hangzhou was also largely closed from the outside world; however, the designation of Hangzhou as a city hosting the visit of President Nixon in 1972 provided some limited funds to improve urban landscapes and tourism facilities.

In the 1981 Master Plan of Hangzhou City, the government recognized the significance of historical heritage and tourism and proposed to develop the city into a tourist city, as well as an industrial city and the provincial capital. A world-class tourism city, even a "Geneva of the Orient," was proposed as a new entrepreneurial discourse. Hangzhou has been making efforts to improve the tourism sector, especially since the late 1990s, with the emergence of a more active, pro-growth leadership. The development of tourism and leisure activities includes four components. First, the focus of tourism development is the West Lake and the Qiantang River. Huge efforts were placed to clean the water in the Lake, as well as other major water bodies in

the city. The water body of the Lake has been expanded towards the west by 0.27 km^2 (or 400 mu), called the Inner West Lake (Xinhua News, 23 February 2002). Second, efforts were made to restore historical sites and cultural heritages. Policies were implemented to clean up the Grand Canal, protect cultural heritages such as the Longjing Tea, as well as preserve and renovate historical heritage sites. Many other well-known historical sites have also been restored, rebuilt, and improved, including the Qinghefang commercial street and Linying Temple. Third, many new sites have been added to the list of cultural heritages and tourist attractions. The Song Dynasty City was built in 1996 with a land area of 0.4 $km^2$for performing cultural activities, although no historical heritages exist at the site (Song Cheng Holdings, 2009). A dozen museums have been newly built. To diversify tourism attractions, the city has built several sites with more modern contents, including Hangzhou Future World. A rigorous effort was the development of the Xixi Wetland, with a land area of 11.5 km^2 (Table 3), which combines wetland protection with leisure and tourism. Lastly, development included improving tourism service and management, and recovering historical activities. Hangzhou has significantly increased the capacity for conventions and conferences, and Hangzhou West Lake Expo has become an annual international event.

(Table 3 about here)

Indeed, Hangzhou is among the first group of 24 cities approved by the State Council in 1982 as a Well-known Historic and Cultural City of China. It has become a popular tourism destination for domestic and foreign visitors. However, while Hangzhou has made much progress in improving historical sites and tourism facilities, becoming China's "Geneva" is a challenging goal. First, Hangzhou's international name recognition is low, and the size of international visitors remains small. Hangzhou does not host international organizations, like the United Nations in Geneva, to make Hangzhou famous. The city's tourism resources are not as globally significant as ancient capitals of Beijing (the Great Wall, the Forbidden City, etc.) and Xian (the Terracotta Army, etc.). Second, the Cultural Revolution and post-Mao urban development have destroyed many historical sites. Although the Grand Canal is known internationally, few historical sites along the Canal still exist. Most of the historical buildings and neighborhoods have been torn down for urban development. Consequently, the central city area has almost no historical sites left. The Song Dynasty City was built from scratch on farmland, and does not have any historical heritages from the Song Dynasty. Last, the city still lacks world-class conference facilities and services and almost none of the museums are known nationally, not even to say internationally. The city's localness is underlying the fact that few international conferences and conventions are being held in Hangzhou. Hangzhou clearly has a long way to go to make the city a world-class tourism city.

It's the Industry, Stupid: Development Zones, High-tech Industry and Economic Growth

During Mao's era, like other Chinese cities influenced by the Soviet-model of industrialization, Hangzhou proposed, in 1958, to build the city into an industrial (manufacturing) city. In the following years, an oil refinery and many factories were established, including steel, auto, and heavy chemical factories, making Hangzhou the primary industrial city of Zhejiang. While the 1981 Plan proposed to develop Hangzhou into a tourism city, industrial bureaus were concerned about the limited potential for output generation through tourism. Indeed, manufacturing has been the key sector to Hangzhou's economic growth. To increase industrial production, the city has opened a series of development zones to attract domestic and foreign investments and used multiple measures to develop high-tech industries and the higher education sector.

Development Zones as Frontiers of Globalization

The earlier focus of China's open-door policy in the 1980s was the opening up of the four special economic zones (SEZs), followed by the opening up of the fourteen coastal open cities (COCs).In the early 1990s, China deepened economic reforms by easing restrictions on foreign investment, further reducing tariffs, and opening up domestic markets. With the deepening of the reform and the opening up of Shanghai's Pudong, Hangzhou also intensified its reform efforts to

globalize its economy. FDI in Hangzhou Municipality increased from US$9.1 million in 1985 to US$536.5 million in 1996 and US$4.36 billion in 2010 (Figure 2). Numerous multinational enterprises, such as Motorola, Siemens, and Toshiba, have invested in Hangzhou.

(Figure 2 about here)

Development zones with preferential government policies and professional management have since become the geographical focus of foreign investors, and the frontiers of globalization. The first economic and technological development zone (ETDZ) in Hangzhou, namely Hangzhou (Xiasha) ETDZ, was established in 1984 when Hangzhou was approved by the State Council as one of the COCs opened up for foreign investment and trade (Figure1). In 1993, the State Council approved the establishment of four national-level development zones in Hangzhou: Hangzhou (Xiasha) ETDZ, Hangzhou High-Tech Zone (HHTZ), Xiaoshan ETDZ, and Zhijiang Tourism and Vocation Zone. In addition to preferential policies, development zone authorities also made efforts to entice multinational enterprises, including simplifying the approval procedure, subsidizing investment through local revenues, and providing infrastructure support (Wei et al. 2008). In 2010, the four national ETDZs have recorded FDI of US$1.58 billion, accounting for 36.4% of the total FDI in Hangzhou (HSB, 2011). Hangzhou ETDZ, although with a planned area of 27 km^2, has also become the largest development zone in Zhejiang and occupies large land areas (Table 3). By the end of 2007, the zone recorded FDI of US$2.73billion and had 474 foreign-

invested enterprises from 39 countries and regions, with 49 projects from 23 global Fortune 500 firms (HETDZ, 2009).

"The Number One Project": 'Siliconization,' Infoport, and High-Tech Industry

Jessop and Sum (2000) noted the increased importance of "Siliconization" as an accumulation strategy in East Asia. With the increasing global competition for talent and high-tech industry, Chinese cities began to emphasize the development of the high-tech industry in the late 1990s and have intensified their efforts in recent years. Hangzhou has also been advancing the infrastructure for education, R&D, and high-tech industrial development, especially improving R&D and making Hangzhou a creative city. In 2000, Hangzhou announced the "Number One Project" for high-tech development, which stated that *"*by 2010 Hangzhou should be Zhejiang's high tech R&D center and the center for the exchange of results, a high tech commercialization base area, a high tech products export base area, and one of the country's high tech sector *concentration zones"* (Hangzhou Municipal Government, 2001).In 2002, nine categories with forty policy components were implemented to support R&D and the high-tech industry.

The most ambitious project was the development of a high-tech zone and higher educational districts. The high-tech zone was planned as the core of the high-tech industry in Hangzhou, and the center of local efforts to make Hangzhou an "infoport" (Table 3). The accumulated infrastructure

investment in the zone reached 2.2 billion yuan in 2003 and 8.0 billion yuan in 2006 (HHTZ, 2006). In 2007, the zone had 630 enterprises in high- and new-tech industry and realized an income of 138 billion yuan, with 51 billion yuan in telecommunication equipment and 30 billion yuan in software and related industries (HAEC, 2008). By the end of 2007, Hangzhou had established 33incubation centers and facilities, with 1,706 enterprises, and a total employment of 21,200, and had 310enterprise technology centers (HAEC, 2008). Hangzhou's Alibaba is one of the largest internet firms in China, which took over Yahoo China in 2005.

However, the high-tech industry in Hangzhou also faces fierce competition, not only from Beijing and Shanghai, but also other cities in the YRD like Nanjing and Suzhou. First, Hangzhou is less globalized and has fewer researchers with international experience. In 2009, FDI in Hangzhou Municipality was US$4 billion and ranked the 10th among Chinese cities, still behind its rank in GDP (8th) (SSB, 2010). Hangzhou Municipality had 1.78 million international internet users in 2009, which was less than that in Shanghai, Guangzhou, Beijing, Shenzhen, Suzhou; the number was also lower than that in Wenzhou, ranking second in Zhejiang (SSB, 2010). Second, other than Zhejiang University, few research institutions in Hangzhou are at the national level and rank highly for R&D and technological development. Even fewer research or R&D centers are established by MNEs. Third, development and high-tech zones are largely planned as industrial

zones with little consideration of services and quality of life. Last, government services in R&D and high-tech sectors need to be further improved.

In addition to being a high-tech hub, Hangzhou is a major center for higher education, with 36 higher education institutions, 110,400 college students, and 26,600 graduate students in the municipality (HAEC, 2008). Four higher-education districts have been designated, in which almost all universities and colleges in Hangzhou have built new campuses. The largest is Hangzhou Xiasha Higher-Educational District, which began construction in November 2000 in the north side of the Hangzhou ETDZ. With a planned area of 10.91 km^2 and an investment of 9 billion yuan, it was expected to host 15 colleges and harbor 160,000 students in 2010 (Table 3). The higher education district with the highest standard is the newly built Zhejiang University-Zijingang Campus, which occupies 2.06 km^2 and is promoted as a garden-like campus, with a total building space of 1,180,000 m^2(Zhejiang University, 2008). Further expansion of the campus is also under way. The Xiaoheshan Higher-Educational District occupies 4.96 km^2, and hosts six universities and colleges led by Zhejiang Industrial University (Baidu, 2009). The Binjiang Higher-Educational District neighbors Xiaoshan ETDZ, and was planned to have a land area of 1.82 km^2 and host six universities and colleges (Bureau of Education of Hangzhou, 2003). High-tech and education districts have also occupied considerable urban land, and again confirm the institutionally driven process of land development.

Administrative Rescaling, Urban Planning and Spatial Restructuring for Growth

Administrative rescaling and urban planning are central to development policies and strategies in China, rooted in local states' seeking land to fuel economic growth in Chinese cities (Luo & Shen, 2008; Ma, 2005). Hangzhou has experienced several rounds of administrative rescaling and urban planning, which have accelerated urban expansion and the spatial restructuring of Hangzhou towards a multi-nuclei city. Such a dramatic administrative rescaling and revisions of master plans were also associated with massive investment in transportation infrastructure and new CBD developments, highlighting the transitional nature of urban planning and local state institutions in China (Wei, 2005).

Administrative and Geographical Rescaling

In the 1980s the central government supported the establishment of "cities leading counties" systems and restricted the expansion of administrative areas of central cities. Since the mid-1990s, large cities have been more successful in gaining control of land from suburban counties and cities. Rapid growth and the need for more urban spaces forced Hangzhou to seek land from suburban counties by annexation through its administrative power, with the support of provincial and central governments. In 1996, by annexing three townships from Xiaoshan County and three townships from Yuhang County (Figure1), the land area of Hangzhou City increased from 430 km^2in 1995 to

683 km^2 in 2000, an increase of 58.2 percent (Table 1). These annexations also increased the population by 192,700, with 94,600 from Xiaoshan and 98,100 from Yuhang. The annexation allowed Hangzhou to expand the city towards the south and north. However, the annexation did not satisfy the insatiable demand of Hangzhou for cheap land and space for urban development. With the popularity of annexing whole suburban cities/counties in China, in February 2001 the State Council approved Hangzhou's request to annex Xiaoshan City and Yuhang City to become districts of Hangzhou. The total population of Hangzhou more than doubled, and the land area of Hangzhou City increased from 683 km^2 in 2000 to 3,068 km^2 today (Table 1). The annexation provided a substantial land area for urban expansion. Hangzhou has therefore expanded its territory through rescaling to gain control of more land from suburban counties, effectively making suburbanization part of the urban development process and, thereby, reducing outflow of industries and population outside of Hangzhou City. Annexation has also provided huge profits for real estate corporations and taxes for local governments.

Urban Planning as a Transitional Institution

The nature of transitional state institutions of China is well-reflected in the change of planning institutions in their planning efforts. During early years of the reform, under the influence of the national urban policy, cities in China, including Hangzhou, stressed the control of urban

populations and built-up areas. The 1981 Master Plan of Hangzhou City was approved by the State Council in 1983. As one of the most important historical and tourism cities in China, the Master Plan emphasized the strict control of population growth, including such measures as the restriction on industrial allocation, the organization of functional districts, the development of seven satellite towns, and strict population control policies (Wei, 2005).

With the launch of comprehensive urban reforms in the mid-1980s, the growth of Chinese cities accelerated. However, the increasing demand for urban land and services and the pressure for urban growth made Hangzhou's 1981 plan obsolete. Urban planning increasingly became an instrument for economic growth and urban development, although it was changing from being an enabler of growth to a more diversely conceived discipline (Abramson, 2006). Consequently, Chinese cities began to revise their master plans. In late 1984, Hangzhou started the revision of the 1981 plan, producing a revised plan in 1986 (Wei, 2005). After public exhibition and further improvement, in November 1991, the People's Congress of Hangzhou approved the revised plan. In 1992, the plan was submitted to the Provincial Government of Zhejiang for approval. However, China deepened economic reforms and drastically expanded the open-door policy. The establishment of four national-level development zones was largely beyond the territorial scope of the previous plans. Hangzhou started another round of planning revision in 1993.The Master Plan of Hangzhou (1993-2020) was distributed in 1994 for discussion.

With the annexation of six townships from Xiaoshan and Yuhang, Hangzhou started a new round of urban planning in 1996. In 1997, Hangzhou finished revising the Master Plan, and a full document was produced in 1998. The plan also substantially increased the planning area to include suburban counties, and dramatically increased the spaces for urban development. However, a new leadership emerged in the late 1990s, and in early 2001, Hangzhou succeeded in annexing entire cities of Xiaoshan and Yuhang; another round of planning revision was once again initiated. The Master Plan of Hangzhou (2001-2020) was finished in late 2002, followed by 46 district plans, and 242 specialized plans, such as the Grand Cannel Conceptual Plan, in recent years (Luo et al., 2011). Urban planning in Hangzhou, like other Chinese cities, has become a continuous process of revision, reflecting the exploratory nature of China's economic reforms and the transitional nature of Chinese state institutions (Wei, 2005).

Qianjiang New Town: A New CBD in the Making

Globalization and the expansion of business activities across space have intensified the need for command and service functions, which has facilitated the development of CBDs across China. Hangzhou is no exception. The old business center of Hangzhou is located at Yanan Road near West Lake, which remains the major shopping center. To disperse the burden on the West Lake and

Yanan Road, the city pushed for a northern expansion of commerce towards Wulin Square, with the relocation of the City Hall and the construction of the tallest building—Hangzhou Grand Plaza.

To remain competitive and capitalize from globalization and urban development, Hangzhou proposed a new CBD in the southeast of the city and north of the Qiantang River—Qianjiang New Town, where a new city hall, an opera house, an exhibition center, and many high-rise office and residential buildings are being built. The new CBD is planned to host major government offices, and become the new center of administrative and cultural activities. With a planned total investment of 170 billion yuan, the new CBD will reimage Hangzhou as a globalizing metropolis and an economic powerhouse of the YRD. The city also hopes to make the new CBD Hangzhou's "Pudong," which should facilitate urban expansion towards the south of the Qiantang River where more land is available for development.

However, some are reluctant to relocate government offices and headquarter functions to the new CBD. It is challenging to coordinate the new CBD with the existing business center at Wulin Square, where a number of government offices and state-controlled banks are located. The provincial government offices are located nearby and have no intention to relocate. Only the Bank of Communication has relocated its headquarters. It remains to be seen whether government and semi-government offices will be relocated to the new CBD.

Towards a Multi-nuclei City

Hangzhou, like other large Chinese cities, traditionally had a single urban core, and the city expanded in all directions (Figure 3). The old business center of Hangzhou is located at Yanan Road near West Lake, which remains the major shopping center. The southern end of the Yanan Road is where the City Government of Hangzhou was located, and at the northern end is Wulin Square, the traditional center of political and cultural activities where the Red Sun Exhibition Center and Hangzhou Theater are located. To disperse the burden on the West Lake and Yanan Road, the city pushed for a northern expansion of commerce towards Wulin Square, with the relocation of the City Hall and the construction of the tallest building—Hangzhou Grand Plaza. As a matter of fact, the urban development in Hangzhou was somewhat bounded by industries in the north, the Qiantang River in the south, West Lake in the west, and the Railroad and suburban farmland in the east.

The 1981 Plan proposed to expand towards the east and north to a certain extent, with the goal of controlled development (Wei, 2005) and, as shown in Figure 3, in the1980s, the city expanded in all directions and furthered infill development within the city. Since the early 1990s, the city has expanded dramatically towards the east, the north, and the northwest, and massive construction was underway in the south side of the Qiantang River. While the commercial center of the city is still focused along Yanan Road from the Wulin Gate in the north to Liberation Road in the south, sub-centers are being developed (Figure 3).

(Figure 3 about here)

Industrial land use has also been further pushed towards newly developed areas, especially the development zones. They have been leading the process of suburban land development, and changing urban spatial structure. It is clear that land development in Hangzhou is institutionally led and institutional land use is the major source of land development and urban expansion. The development of Hangzhou ETDZ stimulates the rapid population growth of Xiasha, which has evolved into a sub-center of Hangzhou. With the incorporation of Xiaoshan into Hangzhou City, Hangzhou has been further expanded towards Xiaoshan, making Xiaoshan another sub-center. In the core area, several sub-centers can also be found. While Northern Yanan Road is currently the political, cultural, and commercial center of Hangzhou, not far to its west is where the Provincial Government is located. Nearby in the northwest is the Huanglong Business Circle located between Zhejiang University's Xixi and Yuquan campuses and the Baoshu Mountain in the south, which is also a center for cultural and sports activities. Those developments have resulted in the formation of specialized functional areas, gradually making Hangzhou a multi-nuclei city (Yue, Liu, & Fan, 2010), although the traditional city core is still the strongest center.

"Oriental Leisure Capital?" Challenges to Livability and Sustainability

Hangzhou has significantly improved its economic conditions and urban infrastructure since the reform. In 2010, Hangzhou Municipality had GDP of 509 billion yuan (Table 2), ranking second among provincial capitals in China (SSB, 2010). The discourse of the city has also been increasingly moving towards livability or quality of life, with the promotion of "Oriental Leisure Capital." In late 2006, Hangzhou called for a national competition for the image of the city. "A City with Flavor and Quality of Life" (Shenghuo Pingzhe Zhi Cheng) was selected as the winning reimaging. Hangzhou has also received a series of national and international awards. In 2001, Hangzhou received United Nations Human Settlement Awards, and was named the Safest City by the Ministry of Public Security. Hangzhou has been ranked the top one or two by the National Bureau of Statistics in terms of its happiness index. The designation of the West Lake as a World Heritage Site in 2011 has added an extra incentive for historical preservation and the development of the tourism industry.

The growth and prosperity, however, have also brought new problems and challenges to Hangzhou. Like other Chinese cities, Hangzhou has experienced rapid population growth. In 1985, the population of Hangzhou City was 1.25 million, including the 1 million non-agricultural population (Table 1). By the end of 2009,the municipality had a population of 6.83 million and the city proper had a population of 4.29 million (with household registration) (Table 2), making

Hangzhou one of the largest cities in China, and creating a huge pressure on job market, service provision, land, equity and environment.

With population and economic growth, Hangzhou has been experiencing an unprecedented real estate boom, making it one of the most expensive cities in China. The highest prices for housing are found near the West Lake. Market prices for apartments in Hangzhou reached 25,000 yuan per square meter (approximately US$400 per square foot) in 2009, an increase of about ten times in the last ten years (Information Centre of Ministry of Land Resources, 2009), which were prices comparable to those in Shanghai. Housing prices in some near-suburban areas have more than tripled in the last several years. In 2009, land development income reached 120 billion yuan, leading Chinese cities and even surpassing that of Shanghai and Beijing (Xinhua News, 09 January 2009). The huge profits made in the real estate market by developers and local governments have stimulated more speculation. Rising living costs have put tremendous pressure on regular workers and the poor. The real estate development process has also led to the corruption of government officials (Ding, 2003), evidenced by the fall of a number of high rank government officials—especially the 2011 death sentence of Vice Mayor Xu Maiyong, who was in charge of urban/land development (Xinhua News, 13 May 2011).

Rapid growth is challenging the issue of sustainability (Pannell, 2007) and the idea of livable city. Hangzhou has been struggling to provide urban spaces for the rapidly increasing urban

population. The inner city has severe shortage in public space, transportation land use, and residential space. The relocation of industries from the central area of the city and the development of new districts has subsequently increased urban built-up areas (Table 1). Considerable agricultural land and water bodies have been lost to urban and industrial development (Yue, Liu, & Fan, 2011). Suburban areas, however, are largely bedroom communities and remain "rural" lacking services and urban ways of life. Putting the 'urb' in the suburbs and creating a sense of urbanity and community, as proposed for the suburbs in the United States (Lang, Blakely, & Gough, 2005), are also viable options for planners in China.

Conclusion

The process of decentralization has decentralized power and responsibilities to local governments, while marketization and globalization have forced China to face market forces and global restructuring, making Chinese cities more competitive and growth-oriented. The triple transitions of decentralization, marketization, and globalization have created a growth-oriented environment, and empowered local states in pursuit of growth, which corresponds to the change of governance in developed societies from managerialism to developmentalism/entrepreneurialism. Local states have become even more active in local policy initiatives, still play a dominant role in growth coalition and state corporatism, and largely direct urban development through state-

controlled land resources and development instruments. Chinese cities, Hangzhou included, have recorded dramatic growth and land expansion. However, the case of Hangzhou does reflect the complexity and multifaceted nature of local states in Chinese urban development, by emphasizing its hybridity, instability, and questionable sustainability.

Hangzhou's development strategies include globalization, tourism, industrial development, and urban development, which are broadly similar to other Chinese cities. We, therefore, see policy convergence across cities in China through knowledge diffusion and policy learning. However, amid convergence, we can still find that development policies have strong local foundations and show evidence of hybridity (Heikkila, 2007), and that Hangzhou's development strategies are built upon local advantages. First, the city's historical and physical landscapes provide rich resources for the tourism industry and urban living. Second, as the capital of Zhejiang province, Hangzhou hosts the major universities and research institutions of Zhejiang, and therefore enjoys advantages in human and physical capital, which serve as the basis for the high-tech industry. Third, Hangzhou is increasingly integrated with the YRD and the global economy, which benefits Hangzhou through the infusion of global capital. Last, the private sector in Zhejiang also provides extra capital for urban development and the real estate boom, providing extra incentives for rescaling and land development. These sector foci on tourism and industrial growth reflect the strength of Hangzhou. On the other hand, Hangzhou is not as globalized as Shanghai and Suzhou, again reflecting the

endogenous nature of the city compared with these latter two cities, as found in the case of Changchun (Li & Li, 2009). We have therefore found both policy convergence and divergence in addition to the imprints of geography on urban policies and development process.

The local state has played an active role in urban policy and development. Land development has become a central component of urban policies. Urban planning has become a tool to rationalize urban expansion and obtain land development quotas from the central government. Rescaling has been used as a tool to increase urban administrative areas and provides more land resources for urban development. State institutions not only direct the land development process, but also lead large-scale land development projects, whether in the development of the tourism industry (the case of Xixi Wetland), development zones such as Hangzhou and Xiaoshan ETDZs, high-tech zone, or educational districts. It is the state institution that leads rapid urban development and expansion in China. Moreover, as evidenced in Hangzhou, urban policies in Chinese cities are unstable or transitional, featured by the restless changes of administrative boundaries, endless revisions of urban master plans, and shifting city leaders' development objectives (Wei, 2005; Xu & Yeh, 2005), which has made urban planning a highly challenging task in Chinese cities.

Hangzhou's development is also facing challenges in sustainability and livability. The policy convergence in attracting global capital and developing high-tech industry means Hangzhou has to compete with many capitals. As argued by Luo and Shen (2008), the lack of coordination of

interurban competition has wasted tremendous development resources in Chinese cities and makes many of these development projects more unsustainable and inefficient. Growth-oriented cities also face challenges in social equity issues. The infusion of population and capital has made Hangzhou one of the most expensive Chinese cities to live, challenging the livability of the city. Land development and speculation have on the one hand, made real estate prices skyrocket, and on the other hand, resulted in corruption and rent seeking. Hangzhou, therefore, is at the crossroads yet again, to face new challenges and solve intensified social and environmental problems.

UU IR Author Manuscript

References

Abramson, D.B. (2006). Urban planning in China. Journal of the American Planning Association 72(2), 197-215.

Baidu. (2009). Introduction of Xiaoheshan Higher-Educational District. http://baike.baidu.com/view/1946193.htm. Accessed 22.11.09.

Bureau of Education of Hangzhou. (2003). College town. Hangzhou Technology (Hangzhou Keji) 2, 16-17.

Clarke, S. E., & Gaile, G. L. (1997). Local politics in a global era. Annals of the American Academy of Political and Social Science, 551, 28-43.

Ding, C. (2003). Land policy reform in China. Land Use Policy, 20(2), 109-120.

Gaubatz, P. (2008). Commercial redevelopment and regional inequality in urban China. Eurasian Geography and Economics, 49(2), 180–199.

HAEC (Hangzhou Almanac Editorial Committee). (2002-2008). Hangzhou Nianjian (Hangzhou Almanac). Hangzhou: Hangzhou Almanac Editorial Committee.

Hall, T., & Hubbard P. (Eds.). (1998). The Entrepreneurial City. New York: John Wiley & Sons.

Hangzhou Municipal Government. (2001). High-tech Industry planning in Hangzhou, 2001-2010.http://www.hangzhou.gov.cn/main/wjgg/hzzb/5688/133/T83979.html. Accessed 26.09.11.

Hangzhou Statistical Bureau (HSB). (2011). Hangzhou 2010ShehuiJinjiFazhanTongjiGongbao (Report on Economic and Social Development in Hangzhou in 2010).Beijing: China Statistical Press.

Hangzhou Statistical Bureau (HSB). (1996-2010). Hangzhou Tongji Nianjian (Hangzhou Statistical Yearbook). Beijing: China Statistical Press.

Heikkila, E.J. (2007). Three questions regarding urbanization in China. Journal of Planning Education and Research, 27(1), 65-81.

HETDZ (Hangzhou Economic and Technological Development Zone). (2009). Introduction to Hangzhou Economic and Technological Development Zone http://www.heda.gov.cn/jpm/tz/content15.html. Accessed 20.09.09.

HHTZ (Hangzhou High-Tech Zone). (2006). Built a new model harmonic society based on the scientific development perspective. http://www.hhtz.gov.cn/hhtz/DesktopDefault.aspx?TabID=5305a7c0-9139-44eb-ad68-702073366f71&ID=4de8023c-7b39-4cdf-8e38-e782f884320f,60ef4273-dda4-48c7-bd55-4d51fa763c21,2006-12. Accessed 22.09.09.

Information Centre of Ministry of Land Resources. (2009). Weekly report of real estate prices of Hangzhou.http://www.lrn.cn/landmarket/landprice/todaymarket/hangzhou/200909/t20090929_417256.htm. Accessed 12.10.09.

Jessop, B. & Sum, N. L. (2000). An entrepreneurial city in action. Urban Studies, 37(12), 2287-2313.

Lang, R.E., Blakely E.J. & Gough, M.Z. (2005). Keys to the new metropolis. Journal of the American Planning Association, 71(4), 381-391.

Li, S. M. (2005). China's changing urban geography. Issues & Studies, 41(4), 67-106.

Li, Y., & Li, Z. (2009). Chinese local state entrepreneurialism: A case study of Changchun. International Development Planning Review, 31(2), 199-220.

Luo, J. & Wei, Y. H. D. (2009). Modeling spatial variations of urban growth patterns in Chinese cities. Landscape and Urban Planning, 91(2), 51-64.

Luo, X. L., &Shen, J. F. (2008). Why city-region planning does not work well in China? Cities, 25(4), 207-217.

Luo, X. L., Yu, T., Wei, X. Q., Yang, Q. Y., & Hu, L. (2011). Transformation of urban planning in China. Chengshi Wenti (Urban Problem), 188(3), 37-42.

Ma, L. J. C. (2002).Urban transformation in China, 1949-2000. Environment and Planning A, 34(9), 1545-1569.

Ma, L. J. C. (2005). Urban administrative restructuring, changing scale relations and local economic development in China. Political Geography, 24(4), 477-497.

Ng, M. K. & Tang, W. S. (2004).The role of planning in the development of Shenzhen, China. Eurasian Geography and Economics, 45(3), 190-211.

Pannell, C.W. (2007). The China challenge. Eurasian Geography and Economics, 48(1), 3-15.

Qian, Z. (2008). Empirical evidence from Hangzhou's urban land reform. Habitat International, 32 (4), 494-511.

Shen, J. F. (2007). Scale, state and the city: Urban transformation in post-reform China. Habitat International, 31(3-4), 303–316.

Song Cheng Holdings. (2009). Milestone of Songcheng. http://www.songcn.com/zjsc/dsj.asp#96. Accessed 21.10.09.

SSB (State Statistical Bureau). 2010. Zhongguo Chengshi Tongji Nianjian 2010 (Urban Statistical Yearbook of China 2010). Beijing: China Statistical Press.

Walder, A. G. (1995). Local governments as industrial firms. American Journal of Sociology, 101(2), 263-301.

Wei, Y. H. D. (2005). Planning Chinese cities. Urban Geography, 26(3), 200-221.

Wei, Y. H. D. (2007). Regional development in China. Eurasian Geography and Economics, 48(1), 16-36.

Wei, Y. H. D. (2010). Beyond new regionalism, beyond global production networks. Environment and Planning C: Government and Policy, 28(1), 72-96.

Wei, Y.H.D., & Li, W. M. (2002). Reforms, globalization, and urban growth in China. Eurasian Geography and Economics, 43(6), 459-475.

Wei, Y. H. D., Leung, C.K., Li, W.M. & Pan, R. (2008).Institutions, location, and network of multinational enterprises in China. Urban Geography, 29(7), 639-661.

Wu, F., & Phelps, N. A. (2011). (Post) suburban development and state entrepreneurialism in Beijing's outer suburbs. Environment and Planning A, 43(2), 410-430.

Xinhua News. (23 February 2002). The western expansion project initiated, totally changing the face of the West Lake began. http://news.xinhuanet.com/newscenter/2002-12/03/content_648355.htm. Accessed 23.09.11.

Xinhua News. (9 January 2009). National land sales revenue reached 1.5 trillion yuan in 2009, occupying 4.4% of GDP). http://news.xinhuanet.com/house/2010-01/09/content_12780512.htm. Accessed 27.09.11.

Xinhua News. (13 May 2011). Xu San duo. http://news.xinhuanet.com/house/2010-01/09/content_12780512.htm. Accessed 27.09.11.

Xu, J., &Yeh, A. G. O. (2009). Decoding urban land governance: State reconstruction in contemporary Chinese cities. Urban Studies, 46(3), 559-581.

Ye, X.Y. & Wei, Y. H. D. (2005).Geospatial analysis of regional development in China. Eurasian Geography and Economics, 46(6), 445-464.

Yue, W. Y. Liu, & P. Fan, (2010) Polycentric urban development: The case of Hangzhou, Environment and Planning A, 42(3), 563-577.

Zhang, L.Y. (2003). Economic development in Shanghai and the role of the state. Urban Studies, 40(8), 1549-1572.

Zhang, T. W. (2002).Urban development and a socialist pro-growth coalition in Shanghai. Urban Affairs Review, 37 (4), 475-499.

Zheng, J. (2010). The "entrepreneurial state" in "creative industry cluster" development in Shanghai. Journal of Urban Affairs, 32(2), 143-170.

Zhejiang Statistical Bureau (ZSB). (2010). Zhejiang Liushi Nian (Zhejiang 60 Years, 1949-2009). Beijing: China Statistical Press.

Zhejiang University. (2008). Introduction of Zijingang Campus. Hangzhou: Zhejiang University.

Zhu, J.M. (2004). Local development state and order in China's urban development during transition. International Journal of Urban and Regional Research, 28(2), 424-47.

Response to Reviewer

1. Spelling out the acronyms in their first usage: done.

2. Editorial changes: I have revised the errors identified by the reviewer and further edited the paper to improve the writing.

3. Typically US dollar is used for FDI while Chinese yuan is used for Chinese monetary unit. This paper follows this tradition. Also there are problems of changing exchange rates while I use the same unit, i.e. either changing dollar into yuan or vice versa. I am therefore hesitant to make the change. Hope you understand my choice.

4. I have added manufacturing to refer to the narrowly defined industry in China, while maintaining the term industry in a few places when the term is more broadly used.

Table 1
Growth of population and land areas in Hangzhou City, 1950-2009

	Hangzhou Municipality			Hangzhou City		
Year	Total Population (1000)	Non-Agricultural Population (1000)	Metropolitan Area (sq. km)	Total Population (1000)	Non-Agricultural Population (1000)	Built-up Area (sq. km)
1950	3121.2	751.8	13	647.5	493.4	-
1960	4037.4	1089.6	122	969.3	802	-
1970	4588.2	1019.4	65	945.5	707.1	-
1980	5155.3	1288.8	430	1130.8	879.3	53
1985	5430.5	1534.6	430	1246.7	1000.1	61
1990	5747.8	1690.0	430	1338.9	1099.7	69
1995	5979.6	1914.3	430	1435.2	1213.8	102
2000	6215.8	2270.0	683	1791.8	1436.9	177
2005	6604.5	2975.4	3068	4095.2	2455.6	315
2009	6833.8	3544.8	3068	4294.4	2978.3	393

Notes:
a. the data of population in this table are population with residence registration;
b. the numbers of population in Hangzhou Municipality in 1950 and 1960 refer to the numbers in 1952 and 1962 respectively;
Source: HSB, 1996-2010; ZSB, 2010

Table 2

Selected Indicators of Hangzhou City, 1950-2009

Year	1950	1978	1995	2009	Annual Growth (%) 1950-1978	1978-1995	1995-2009
Hangzhou City							
Total Population (with residence registration, million)	0.65	1.05	1.44	4.29	1.7	1.9	-
GDP (million yuan)	96	1,420	36,978	406,987	-	14.5	-
Per Capita GDP (yuan)	147	1,389	25,969	95,342	-	12.3	-
FDI (US$ million)			320	3,552			-
Per Capita FDI (US$)			222	832			-
Sectoral Structure of GDP (%)							
Primary	13.3	3.7	1.56	2.15	-	3.6	-
Secondary	34.2	75	51.89	44.5	-	14.1	-
Tertiary	52.5	21.2	48	53.3	-	17.6	-
Hangzhou Municipality							
Total Population (with residence registration, million)	3.19	5.05	5.98	6.83	1.8	1.0	0.9
GDP (million yuan)	447	2,840	76,201	508,755	5.4	14.9	12.7
Per Capita GDP (yuan)	145	565	12,797	74,761	3.5	13.8	10.8
FDI (US$ million)	-	-	427	4,014	-	-	16.8
Per Capita FDI (US$)	-	-	71	583	-	-	16.2
Sectoral Structure of GDP (%)							
Primary	51.01	22.31	1.60	3.8	2.0	4.1	5.1
Secondary	23.49	59.62	50.03	46.90	9.7	17.0	12.6
Tertiary	25.50	18.07	48.37	49.30	5.0	17.0	13.8

Notes: The data in this table are calculated at current prices; the per capita GDP is calculated by population with residence registration; the Annual Growth is calculated at comparable prices; the data of Hangzhou City in 2008 include the original Yuhang and Xiaoshan Districts and are not comparable to the data in 1995.

Source: HAEC, 1996; HSB, 2010; ZSB, 2010

UU IR Author Manuscript

Table 3

Major Developments and Projects in Hangzhou

		Year Initiated	Land Areas (km^2)
Tourism Spots	Song Dynasty City	1996	0.4
	Hangzhou Future World	1997	0.25
	Hangzhou Paradise	1999	1.3
	Xixi Wetland	2005	11.5
Development Zones	Hangzhou Economic and Technological Development Zone	1993	104.7
	Hangzhou High-Tech Zone	1990 1997 (Binjiang)	11.44 Binjiang: 73
	Xiaoshan Economic and Technological Development Zone	1990	Shibei: 9.2 Qiaonan：18.8 Jiangdong: 105
	Zhijiang Tourism and Vocation Zone	1992	9.88
Educational Districts	Xiasha Higher-Educational District	2000	10.91
	Zhejiang University-Zijingang Campus	2001	2.06
	Xiaoheshan Higher-Educational District		4.96
	Binjiang Higher-Educational District		1.82
Infrastructure Construction	Xiaoshan International Airport	2000	0.1
	Hangzhou East Railway Station	2008	0.156
	Shanghai-Hangzhou High Speed Railway	2010	202 km
New Towns Construction	Qianjiang New Town	2001	21
	Linjiang New Town	2003	160.2
	Dajiangdong New Town	2009	500
	Linping New Town	2010	7.5

Source: Compiled from varied developments and projects websites.

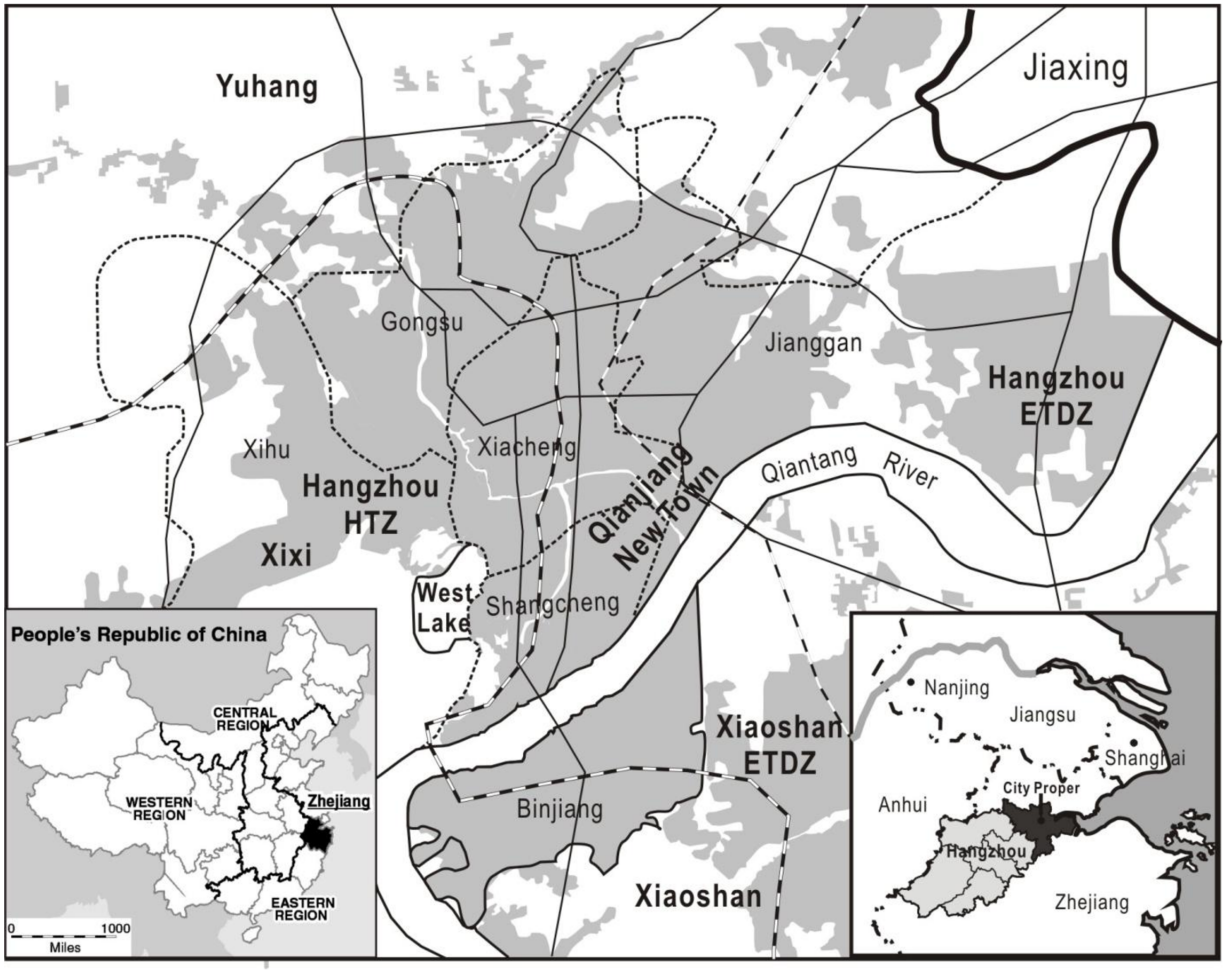

Fig.1. Location and Urban Spatial Structure of Hangzhou

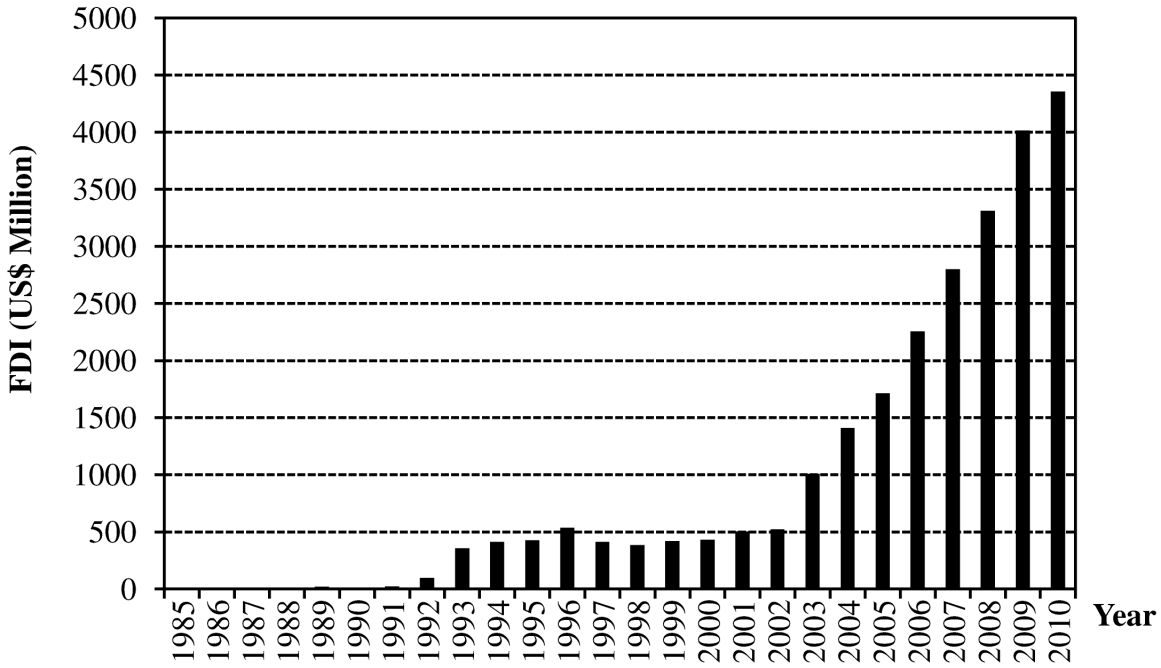

Fig. 2. FDI in Hangzhou Municipality, 1985-2010.

Source: HSB 2010, 2011.

.

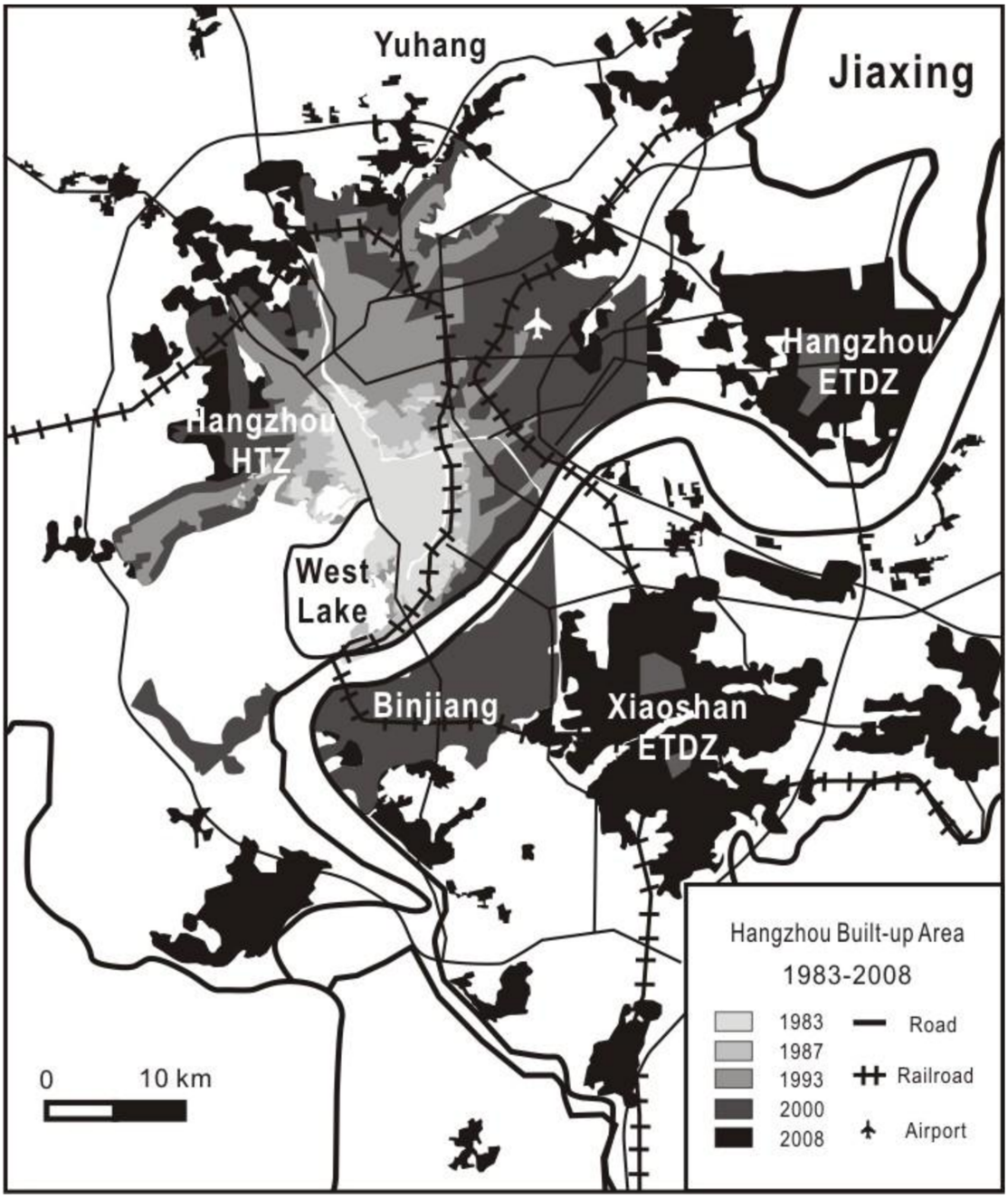

Fig. 3. Expansion of Urban Built-up Area in Hangzhou, 1983-2008.

Restructuring for growth in urban China: transitional institutions, urban development, and spatial transformation

Yehua Dennis Wei*
Center for Modern Chinese City Studies, East China Normal University, Shanghai, China;
Department of Geography, University of Utah, Salt Lake City, UT 84112, USA

*Tel.: 1-801-581-8218; fax: 1-801-581-8219.
E-mail address: wei@geog.utah.edu

Acknowledgement

We'd like to acknowledge the funding of Lincoln Institute of Land Policy (CYW010511) and University of Utah Funding Incentive Seed Grant (51003414). We would also like to thank the research assistance of Zhouyang Wang and Haifeng Liao.

December 2011