

CHAPTER 1

Optimizing Urban Development

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China's outward-oriented industrialization, spearheaded by the coastal provinces, led to a quickening of urbanization from the start of reforms in the early 1980s. In 1980 China, with an urbanization rate of 19.6 percent, was less urbanized than Indonesia (22.1 percent), India (23.1 percent), or Pakistan (28.1 percent) (table 1.1). By 2005, 42.9 percent of China's population lived in urban areas, still somewhat below the global average of 50 percent but close to the average for East Asia (41 percent) and well in excess of India's 28.7 percent rate.¹

Between 1980 and 2000, 268 million Chinese entered into the urban domain, mainly through migration from rural areas. This figure was almost twice as large as the increase of the urban population in the rest of East Asia (table 1.2). By 2020, urbanization could pass the 60 percent mark, with 200 million or more rural dwellers joining the ranks of the urban population. The scale of urbanization in China will dwarf that occurring elsewhere in East Asia.

This shift in the demographic center of gravity has seismic implications for China and major spillover effects for the rest of the world. It will be a driver of economic growth. The urban economy should generate enough jobs to absorb the additions to the urban workforce at steadily

¹ The classification of the urban population has changed overtime (see Fang 1990; Zhou and Ma 2003).

Table 1.1. Percentage of Population Living in Urban Areas in Selected Asian Countries, 1980–2005

<i>Country</i>	<i>1980</i>	<i>1985</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>
China	19.6	23.0	27.4	31.4	35.8	42.9
India	23.1	24.3	25.5	26.6	27.7	28.7
Indonesia	22.1	26.1	30.6	35.6	42	48.1
Pakistan	28.1	29.3	30.6	31.8	33.1	34.9

Source: NBS 2006; World Bank 2006.

Table 1.2. Urban Population in China and East Asia, 1960–2005
(*millions*)

<i>Year</i>	<i>China</i>	<i>East Asia</i>
1960	130.7	86.2
1970	144.2	125.2
1980	191.4	177.6
1990	302.0	241.1
2000	459.1	314.2
2005	562.1	352.4

Source: Data for East Asia are from World Bank 2006. Data for China are from Fang 1990, Pannell 2003, and NBS 2006.

Note: East Asia includes Hong Kong (China), Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.

rising wages if the economy continues to grow at least 8 percent a year (feasible given the elastic labor supply); capital accumulation is sustained; and the scope for enhancing technological capabilities increases.^{2,3} Meeting these conditions is crucial for urban residents, because urban employment opportunities and the median urban wage will determine living standards in cities (see chapter 8). These conditions will have a bearing on whether the influx of people leads to the formation of slums, as it has in many Latin American cities. They will also affect income distribution,⁴

2 Bosworth and Collins (2007) estimate that total factor productivity rose by 4 percent a year between 1993 and 2004 and that its contribution to overall growth was only a little less than that of capital. He and Kuijs (2007) estimate that TFP grew by 2.8 percent per annum during 1993–2005.

3 New York's real manufacturing wages kept rising in the second half of the 19th century, even though a significant number of immigrants came to New York. In the early part of the 20th century, when immigration to the United States increased dramatically, real wages in New York (the entry point of many immigrants) started to fall (Glaeser 2005b).

4 Because of the widening gap between rural and urban incomes and interprovincial disparities, China's income distribution, as reflected by the Gini coefficient, has risen rapidly, from 0.33 in 1980 to 0.49 in 2005 ("China's Income Gap" 2006). Other estimates of the Gini coefficient in 2005 are slightly lower. The distribution of net wealth in urban areas, which is strongly influenced by property ownership, is also becoming more skewed, although it remains relatively equal (Wu 2004; Gustafsson, Shi, and Zhong 2006; Saich 2006).

overall energy and water consumption, and the quality of life in cities. A rising median wage rate and a relatively egalitarian income distribution would be broadly advantageous, but they would also push up per capita resource consumption. Chinese cities would become larger users of local and global resources, including global public goods. At the same time, prosperity and technological capability would provide the means to contain the resource costs and externalities associated with growth. A slow-growth scenario or a scenario in which average income rises but incomes become more unequal might lead to somewhat lower resource consumption, perhaps more than counterbalanced by sociopolitical tensions, which could jeopardize economic performance.

A host of policies will collectively determine growth, income distribution, resource use, and the quality of life. From an urban perspective, five sets of policies are especially noteworthy:

- Policies affecting rural-to-urban migration and intersectoral differences in average household incomes
- Policies affecting the size distribution of cities and the relative concentration of people in major metropolitan centers
- Policies affecting the development of urban infrastructure
- Policies that impinge on the availability of and access to public services and social safety nets
- Policies and institutions that regulate energy and water use in cities and help control urban pollution.⁵

These policies are the primary focus of this volume.

The rest of this chapter is divided into five sections. The first section briefly reviews the history of urbanization since ancient times. The second section describes some of the positive and negative consequences of migration to cities. The third section explores factors that will define China's urban development strategy. The fourth section examines the policies that will guide urban change. The fifth section provides some concluding observations.

Urbanization in China since Ancient Times

Urbanization in China began almost 4,000 years ago, although Neolithic villages had begun sprouting in river valleys as early as 5000 BC

⁵ China's plans with regard to energy-use pricing, efficiency, technology, and regulation are presented in NDRC (2007). Rosen and Houser (2007) assess the demand and supply situation and the implications of China's consumption on global markets. Shalizi (2007) provides an assessment based on a comprehensive modeling framework.

(Ebrey 1996). Ho Ping-ti writes of the “large urban centers” that arose in Shang times (circa 1700–1100 BC) and of the high walls of packed earth that surrounded many settlements, including most notably, the cities near Cheng-chou and An-yang in Hunan (Ho 1975; Friedman 2005). The number of cities proliferated during the Zhou dynasty (1122—221 BC). Created primarily to fulfill military and administrative roles, these cities also took on other functions (Zhao 1994).

The curve tilts ever so gently upward as urban populations began to grow during the Qin (221–206 BC) and Han dynasties (202 BC–AD 220). By the time of the Southern Song dynasty (12th century), 10–13 percent of the Chinese population lived in cities, with Kaifeng, the capital of the Song, having a population of almost 1 million people (Bairoch 1991).⁶ Mote (1999) surmises that the number of urban dwellers in China during the middle years of the Song dynasty equaled those in the rest of the world at that time.

For a few hundred years thereafter, the curve remains fairly flat. However, the scale of cities such as Hangzhou on the West Lake impressed Marco Polo, who had seen no comparable center in Europe (“the most splendid city in the world . . . [with] 13,000 bridges mostly of stone”) (Polo 1958: 213). By the time the Ming dynasty was entering its twilight years in the 16th century, the curve of urbanization had inched up a notch to 11–14 percent (Bairoch 1991). Major centers such as Beijing and Nanjing housed almost 1 million people, a handful of cities had populations of half a million or more, and “scores of urban places” had populations of 100,000. “Urban life was rich, comfortable, and elegant . . . varied and lively [in the larger cities]” (Mote 1999: 763).

By the late 19th century, the urban share of China’s population had fallen to 6.0–7.5 percent, although the absolute number of urban dwellers rose, because population growth accelerated in the 18th and early 19th centuries (Bairoch 1991; Zhao 1994). By this time, the industrializing countries of Europe had pulled ahead, with urbanization rates of 61 percent in Britain and 29 percent in Europe as a whole. This gap between China and Western Europe had widened further by 1949, when the communist regime took hold of the reins of government.

Initially, the new government allowed cities to grow. Since the 1960s, however, China has sought to tightly manage the course of urbanization (see Kwok 1981; Fang 1990). The intersectoral movement of people and, from the 1970s, fertility rates were controlled with considerable

6 Zhao (1994) cites a much higher figure of 22 percent for the urban population under the Song dynasty.

success through the combined efforts of the Communist Party and the government bureaucracy.⁷

The main instrument used to regulate movement is the *hukou* system, which assigns every person in China a residence in a specific locality.⁸ This system distinguishes urban from rural residents, with urban households enjoying far more benefits and privileges than rural ones (see Friedman 2005). The one-child policy—which is still enforced, albeit more flexibly than it once was—meanwhile checked population growth, pushing fertility down from 5.9 in 1970 and 2.9 in 1979 to 1.7 in 2004 (Hesketh, Lu, and Xing 2005). Urban fertility was 1.3 in 2005, while the rate in rural areas was a little less than 2 (Hesketh, Lu, and Xing 2005). By 2005 China's population was growing at 0.59 percent a year (NBS 2006).

Together these two policies slowed the increase in the urban share of China's population to a crawl until well into the 1980s (Fang 1990). Migration between sectors was not brought to a complete halt, but the *hukou* system reduced it to a trickle, by making it difficult to find housing or gain access to essential services outside of one's official place of residence. Changing one's residence and, most important, obtaining an urban *hukou* required and still requires hard-to-obtain official approval, especially in larger cities.

Once industrial and trade reforms gathered momentum in the 1980s, demand for workers from urban enterprises began drawing more migrants to the cities, increasing the pressure on municipal authorities to relax *hukou* rules. Initially, many cities resisted these pressures, preferring a very gradual easing of the restrictions for fear that anything more would attract an unmanageable flood of migrants. This change in policy stimulated the multiplication of industry in small towns and villages in rural areas, which by 1990 employed 93 million workers (see chapter 2) and was responsible for 17 percent of China's exports of manufactures.⁹ By

7 China's efforts to regulate population growth gathered momentum after the Cultural Revolution in the late 1960s. Fertility was already declining in the 1970s before the announcement and subsequent implementation of the one-child policy in 1979 (Baochang and others 2007). See Hesketh, Lu, and Xing (2005) regarding the impact of the policy over a quarter century.

8 During the second half of the 1960s and in the 1970s, the government also "sent down" urban youth to rural areas and redeployed millions of urban workers to interior or southwestern provinces in order to disperse industrial capabilities and reduce China's vulnerability to attacks from abroad. On these rustication and Third Front inland industry development programs, see Gardner (1971), Bernstein (1977), Naughton (1988), Fang (1990), and Demurger and others (2002).

9 The government encouraged these former "commune and brigade" enterprises, because they raised rural incomes and stemmed migration (Zhu 2000; Wu 2005).

1996 township and village enterprises (TVEs) employed 135 million and accounted for 46 percent of exports (Li 2006).¹⁰ Rural industrialization drew on an unforeseen reservoir of entrepreneurship and was aided by fiscal decentralization that encouraged lower-level cadres to take the lead in developing industry (Oi 1992; Qian 1999).

By the mid-1980s, attitudes toward urbanization began to shift, with cities coming to be viewed as “growth poles” and the “city as leading the country.” Some Chinese researchers argued that “growth poles should be scattered through the country, each sending waves of economic growth in its hinterland” (Fan 1997: 630). In order to accelerate industrialization and meet the needs of construction and other services, cities had to absorb more migrants. Moreover, the small towns that had become important foci for industrial development grew to become substantial urban centers with concentrations of industry and were reclassified as cities, a process known as *in situ* urbanization.¹¹

China retained the *hukou* system, but by the mid-1990s the inevitability of rising urbanization was widely accepted, only its speed remained an issue. Differing views came to determine the enforcement of *hukou* requirements. Viewing migration as a means of expanding their industrial bases and using the fiscal revenue generated to build urban infrastructure, small- and medium-size cities began to welcome the flow of labor from the rural sector. In contrast, many larger cities, especially in coastal areas, remained wary. They absorbed large numbers of temporary migrants to satisfy their for industrial and construction workers needs¹² but continued to use *hukou* to limit permanent migration.¹³

Benefits and Challenges of Urban Migration

Urbanization is now perceived as intrinsic to the process of growth and modernization, and the role of rural migration in diversifying sources of rural incomes and narrowing intersectoral disparities in household incomes is better understood (Knight and Song 2003). But

10 Employment in TVEs declined thereafter but has since recovered, reaching 143 million in 2005 (NBS 2006).

11 Zhu (2000) describes this process in Jinjiang county, Fujian Province. See also chapter 2.

12 Pannell (2003) describes the regional pattern of urbanization in China and the demographic structure of the urban population.

13 In some cities, particularly in Guangdong and Fujian (for example, Dongguan), non-residents account for up to half of the population.

the desire to manage migration and contain the costs of urban housing and social benefits provided to residents means that there is an unwillingness to dismantle the *hukou* system, although Beijing has allowed local governments much greater discretion regarding how it is applied and enforced.

Per capita annual income disparities of 1:2.4 between rural and urban areas and vastly greater job opportunities in cities make it highly attractive for rural people to migrate.¹⁴ The result is that migration is adding to the numbers of registered urban residents and swelling the ranks of the so-called “floating population,” made up of people with rural *hukou* who are temporarily living and working in cities (see chapter 3). The size of this transient (inter- and intracounty) population was almost 148 million in 2005 (see chapter 3); they are most numerous in eastern metropolitan centers, such as Beijing, Guangzhou, Shanghai, and Shenzhen, which have plentiful jobs and the “bright lights” that draw migrants.¹⁵

The influx of migrants, permanent or floating, has had a number of positive and negative effects. The migration of mainly young people to cities drawn from the better-educated rural cohorts has promoted growth by enhancing the labor supply and by injecting an additional dose of entrepreneurship and dynamism into the urban labor market (Bloom and Williamson 1997).¹⁶ The remittances migrants send to their villages have significantly bolstered rural household consumption, in some cases contributing as much as 40 percent of annual household incomes (the average is closer to 20 percent). Migrants have helped bring living standards in some of the poorest rural areas closer to urban levels. These and other positive outcomes outweigh some of the problems associated with migration.

14 The unadjusted differential in rural and urban incomes is 1:3.5. See chapter 2 and tables 10.8 and 10.18 in the *China Statistical Yearbook* (NBS 2006). The rural and urban income divide is the main cause of income inequality in China (Sicular and others 2007). Tsui (2007) shows that inequality among provinces has arisen from the allocation over time of capital and FDI and the influence that allocation has had on total factory productivity across provinces.

15 The provinces and cities that have attracted the largest number of migrants are Guangdong, Zhejiang, Jiangsu, Shandong, Beijing, Shanghai, and Guangzhou. About 15–20 million migrants work in Guangdong (“Delta Dreams” 2006), the destination of migrants from Hunan, Jiangxi, Sichuan, Guangxi, and Hainan. Shandong has attracted migrants from Heilongjiang and Liaoning (see chapter 3; Fan 2005).

16 Bloom and Williamson (1997) find that demographic shift, which affected labor force growth, age structure, domestic savings, and domestic investment, was responsible for 1.4–1.9 percent of the annual growth in GDP in East Asia between 1965 and 1990.

Perhaps the most serious concern centers on the risk migrants run of becoming part of the urban poor.¹⁷ Temporary migrants have limited access to health and education services. Their age makes them healthier than older people but leaves them more vulnerable to accidents and childbirth. Migrants are less likely to visit a doctor when sick and more likely to self-medicate. The cost of sending their children to school can be a major burden. Some live in crowded conditions, although the evidence on this problem is equivocal.¹⁸

While migrants' income net of remittances can be meager, migrants are less likely than elderly or disabled urban residents to fall below the poverty line. The evidence reported in chapters 2, 3, and 4 suggests that only a small percentage of urban migrants can, strictly speaking, be classified as poor.¹⁹

There are worries that the departure of many young educated workers will denude the countryside of skills, know-how, and entrepreneurship. This is unlikely for some time to come, if ever. China's farm population exceeds the numbers needed; many workers return to their villages after a stint in the cities and invest their earnings in farming or other rural activities. Moreover, the most educated are less likely to migrate (see chapter 3; Murphy 2002).²⁰

The increase in China's urban population from 191 million in 1980 to 562 million in 2005 has called for massive investment in urban housing and infrastructure. Amazingly, China has been able to absorb more than 370 million people in its cities without the proliferation of urban slums, although sewerage and waste disposal services have struggled to keep up with demand. Between 1990 and 2000, 130 million new urban dwellers were provided access to improved sanitation facilities;

17 Townspeople have traditionally displayed antipathy toward rural migrants, finding it difficult to comprehend their dialects, complaining about their lack of culture, and blaming them for bringing crime and disease to urban areas. Some of this antipathy persists and is responsible for the continuing resistance to migration (Zhang 2001). According to Ravallion, Chen, and Sangraula (2007), urban poverty is just 4 percent of the rural rate, and it has remained low since the mid-1990s, even in the face of heavy migration to the cities.

18 Wu (2002) finds that about a third of all migrants in Shanghai live in dormitories provided by employers and about half rent their accommodations. Overall, migrants in some of the larger coastal cities appear to be living in housing equivalent to that of urban residents at similar levels of income (Jiang 2006).

19 The exclusion of dependants could introduce some bias.

20 Murphy's (2002) study of counties in Jiangxi describes the proactive approach taken by officials to entice back migrants who have accumulated capital and skills while in cities. Returning migrants are responsible for establishing numerous businesses in their home towns and villages.

nearly a third of the urban population still lacks these services, however (Mohan 2006).

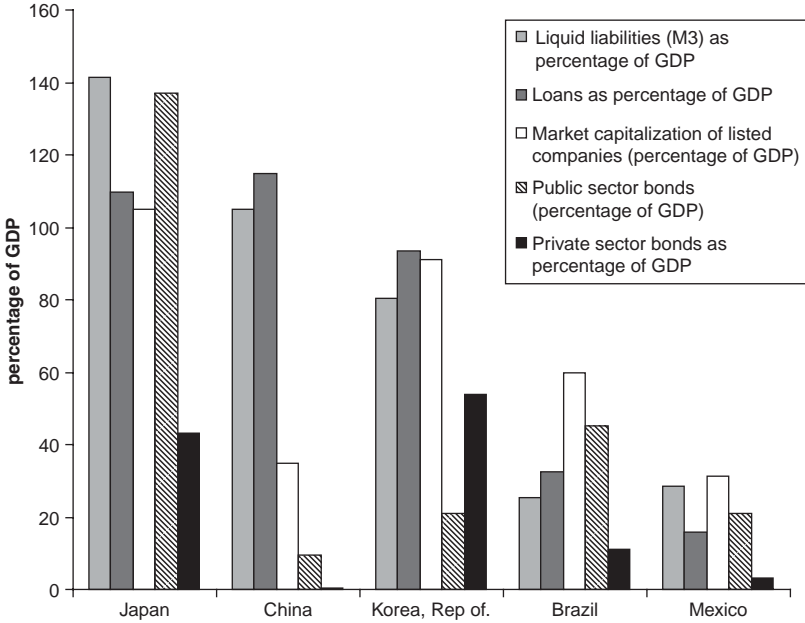
Old workplaces, their housing compounds, and concentrations of small businesses contribute to urban dilapidation in inner-city areas. On the fringes of major cities such as Beijing, migrants have created small enclaves, where housing quality can be variable. In Beijing's Zhejiang village, for example, living standards are relatively high, because migrants work in small businesses that produce clothing and footwear. Migrants from Henan who collect rubbish are much poorer (Wu 2004).

The relative smoothness of the urban transition has been made possible by the availability of investment funds intermediated by the banking system, the remarkable strides made by the construction sector, and acceptable growth in regulatory capacity in urban centers. But the role of capital generated through high domestic savings has been paramount.

Urban investment started from a modest base in the mid-1980s and accelerated throughout 1990s, although growth slowed in 1999 and 2000. Beginning in 2001, urban investment picked up the pace again, registering double-digit growth, especially in 2003, when it rose 20 percent, and 2004, when it rose 31 percent. For 2004 the share of housing expenditure is estimated to have been 10 percent of GDP, with total infrastructure spending estimated at almost 20 percent of GDP (Yusuf and Nabeshima 2006b).

This investment has made an enormous difference, visible to any visitor. More important, it has enabled China to accommodate a far-reaching geographic and intersectoral distribution of the population. Might the resources have been allocated more efficiently and through more-varied financial channels? Chapter 5 indicates how the allocative process has been distorted by the need to sustain state-owned enterprises and by the actions of local authorities, who are able to influence banks' lending decisions. But the fact remains that no country has matched the scale of China's achievement in mobilizing financial resources using the banking system to funnel capital to urban development. This financial widening is signified by the high rates of M3—a definition of the money supply that includes currency, demand deposits, savings and time deposits, ODs, money market accounts, eurodollar deposits, and REPOS and the ratio of loans to GDP, which compare favorably with those of Japan and exceed those of Brazil, the Republic of Korea, and Mexico. However, the low ratios of bonds and market capitalization of listed companies to GDP indicate a good deal of room for enhancing financial depth (figure 1.1).

Figure 1.1. Financial Development in Selected Countries, 2005



Source: Data on M3 and market capitalization are from World Bank 2006; data on public and private sector bonds as a percentage of GDP are from the World Bank’s internal financial data base; data on loans as percentage of GDP are from International Financial Statistics (IFS) Chinese bond data are from Mu 2005.

Urban residents consume far more energy than their rural counterparts.²¹ The energy is used for transport, heating, cooling, for generating electricity, and industry. In 2005, agriculture, forestry, and fishery consumed only 3.6 percent of total commercial energy. Urban households consumed 3.63 times more commercial energy than their rural counterparts.²² As more of China’s population locates in cities, commercial energy use per capita is bound to rise significantly.

Other factors also contribute to the energy intensity of the urban economy. They include motorization, space heating and cooling, and the proliferation of energy-using appliances, all of which have high-income elasticities. As urban households become more affluent, their demand for

21 For energy production in China from renewable and nonrenewable sources between 1980 and 2002, see Chen and Chen (2007a, 2007b).

22 This does not include energy consumption by rural enterprises or use of energy from biomass (Pan 2002).

all three will continue to push up energy consumption.²³ In 2005, industry accounted for 70 percent, transport for 7 percent, and households for 10 percent of energy consumed (NBS 2006).²⁴ The share of transport is sure to rise substantially, propelled by the trend toward private vehicle use.²⁵ Household consumption of electricity will also rise (see chapter 6).

Energy consumption creates negative externalities, in the form of carbon dioxide pollutants, and acid rain. In 2006, China became the leading emitter of carbon dioxide into the atmosphere (6.2 billion tons as against 5.8 billion tons by the United States). Release of sulfur dioxide and particulates, particularly in the northern parts of the country, is exacerbated by the shortage of water. As a result, only a very small fraction of the coal used can be washed to rid it of sulfur, ash, and impurities (Roumasset, Wang, and Burnett 2006).²⁶ As energy use climbs, air pollution in Chinese cities from nitrogen oxide, sulfur dioxide, and particulates—already among the most severe in the world—could become even more intense.²⁷ Of the 20 cities with the worst air pollution in the world, 16 are in China (Wu 2006; Ho and Nielsen 2007).²⁸

China's energy demand mirrors the unusually dynamic growth of its urban economy. The increasing use of energy is a sign of economic vigor and rising incomes. Between 2000 and 2005, the elasticity of consumption averaged 0.93; in 2005, 69 percent of energy derived from coal and 21 percent from oil. Of the energy derived from petroleum, net imports accounted for

23 Although shifts in consumption that increase the share of services will reduce energy consumption, the Economist Intelligence Unit estimates that China's energy consumption relative to that of the United States will rise from 39 percent in 2000 to 86 percent in 2011 ("The Health of a Nation" 2007).

24 Industry and transport absorb 80 percent of petroleum consumed, mostly in the form of middle distillates (CBO 2006).

25 Ownership of passenger vehicles increased from 9.9 million vehicles in 2001 to 21 million in 2005, propelled by an easing of consumer credit (Roumasset, Wang, and Burnett 2006; China Statistical Yearbook 2006). Some cities, such as Suzhou, are taking a lead in improving air quality by encouraging the use of motorbikes that use battery power. But even in this "beautifully preserved" and "well-tended city," the air is "almost unbreathable" and the "canals are filled with black bubbling water" (Cheng 2006: 1859).

26 The impurities present in the coal being shipped increases the burden on China's railway system, which devotes 40 percent of its capacity to the transport of coal ("Free Flow" 2005). Washing coal is not without complication, because the sludge and wastewater must be treated to avoid localized pollution.

27 The severity of air and water pollution was already evident in the early 1970s. In response, a national conference was held in 1973 and a basic environmental law passed in 1979 (Kojima 1987). Acid rain falls on one-third of China; emissions from Chinese industry and power plants also contribute to acid rain in Japan and the Republic of Korea (Roumasset, Wang, and Burnett 2006).

28 The world's most polluted city is Linzen, in Shanxi, which produces coke. Lanzhou, the capital of Gansu, is also among the top 10 ("Lanzhou to Walk" 2007).

44 percent, and the share is rising (CBO 2006; NBS 2006). Given the depletion of petroleum resources and the threat of climate change induced by greenhouse gases (which could also contribute to a significant reduction in national crop fields by mid-century) the implications of China's urbanization are disconcerting in the medium term and troubling over the longer run. Limiting the energy intensity of urban development will be a struggle, but it is one that policy makers will find impossible to sidestep.

While fossil fuels can be imported, water in the quantities required cannot. Desalinating seawater consumes energy; pumping the water inland adds to the energy costs. Looking ahead, urban development in the drier regions of China is likely to be circumscribed by the availability of usable water. Currently, two-thirds of China's cities are faced with water scarcity, caused by the uneven geographical distribution of water supplies, the diversion of water for agricultural purposes, and pollution from industrial sources (especially organic material), which renders up to 70 percent of the water from five of China's seven largest rivers unfit for consumption. Research on the Pearl River delta area shows that urban river water is far more polluted than water in rural counties (Ouyang, Zhu, and Kuang 2006). At great cost, China is diverting water from the Yangtze to the northeastern part of the country to meet the needs of the increasingly water-stressed 3-H region (the basins of the Huai, Hai, and Huang [Yellow] Rivers). Once completed, this effort will provide some relief, though for how long is uncertain, as are the ecological consequences for the Yangtze basin and the receiving region.

Per capita water availability in 2005 was just 2,152 cubic meters, only 12 percent of which was used for household purposes. Urban per capita water consumption in China is relatively modest compared with Japan and the United States (see chapter 7). But water is inefficiently utilized, because it remains underpriced. China uses 6 times more water per unit of GDP than the Republic of Korea and 10 times more than Japan. For this reason, underground water is also being pumped at unsustainable rates, causing the water table to fall, increasing the mineral content of water, and resulting in the subsidence of the land in cities and the infiltration of brackish water into subterranean aquifers.²⁹

29 The North China Plain derives close to 60 percent of its water supplies from groundwater, and according to some projects, the aquifers could be largely depleted in 30 years ("Beneath Booming Cities 2007; Evans and Merz 2007). Groundwater tables have dropped by as much as 90 meters in the Hai plains and by 100–300 meters in Beijing; they are also dropping in Shanghai and Shijiazhuang, where many wells must be dug to a depth of 200 meters to find clean water (see chapter 7). See Pielou (1998) on the problems caused by the unsustainable extraction of groundwater.

More than 680 million Chinese live in the drier northern region (which has just one-sixth of the per capita water supply available in the south and one-tenth of the world's average), more than half of them are urban dwellers. As this ratio climbs to 60 percent in the next 15 years and per capita urban consumption rises, as is likely, the intersectoral allocation of water and the management of water use will require strategic thinking on the cultivation of water-intensive cereals such as corn and wheat, the course and shape of urban development and the effective coordination of basin-wide water management both surface and subterranean (see chapter 7). The policies described below will have to be applied with considerable force, as there are no substitutes for water.

Urban development is a complex, multifaceted process; farsighted and entrepreneurial management is a key to success. The sheer pace at which Chinese cities are expanding and the decentralized structure of government puts a particularly high premium on the planning and managerial skills of local authorities. Cities in China have coped more effectively with rapid urbanization, the mobilization of resources, the building of infrastructure, and the wooing of industry than cities in other middle- and lower-middle-income countries. Moreover, the country's larger cities are better governed than its smaller ones (see chapter 8). So far, most cities have been able to arrest the spread of slums (Flavin and Gardner 2006; Jiang 2006) and contain the spread of crime. Chinese cities are cleaner than average, and in the majority of cases, the combined efforts of Street Offices and higher-level municipal departments ensure that policies are competently executed. This is a considerable achievement, and the fact that citizen satisfaction levels rose between 2003 and 2005 is a good sign (see chapter 8). On average, other large countries, such as Brazil, India, and Indonesia, lag well behind China in terms of effective municipal functioning.

However, according to the World Values survey conducted in 2006, Chinese have much more confidence in their government than Americans, with 97 percent of Chinese and just 37 percent of Americans expressing confidence. Moreover, 84 percent of Chinese but just 37 percent of Americans believe that the government is not in the grip of special interest groups (Shiller 2006).³⁰ The findings reported in chapter 8 indicate that urban Chinese place less trust in their local governments (67 percent) than in the central government (84 percent).

30 A Lichtman/Zogby poll conducted in late 2006 found that only 3 percent of Americans surveyed had trust in the U.S. Congress ("The Way We Were" 2006).

The dissatisfaction of China's urban dwellers with local governments derives from four sources. First, corruption is a major concern. As in other countries, it is associated with land deals, construction projects, bank lending, social security funds, and other activities.³¹ Transparency International ranked China 70th of 163 countries in 2006, but this type of index provides only a partial perspective (Transparency International <http://www.transparency.org/>).

Second, there is dissatisfaction with the provision of health services, more so than with education.³² Even for privileged urban residents, health services are becoming less accessible and costlier. More and more people have to pay out of pocket for health care and medications, and the shift to curative care is shortchanging more cost-effective preventive medicine.³³

Third, as cities expand into periurban areas, the confiscation and sale of farm land to developers is being strongly condemned, especially by displaced farmers, who receive limited compensation and face difficulty finding employment in the urban labor market. Others view these sales as evidence of corrupt dealings and inept fiscal management, because current expenditures are being offset by the proceeds from these sales rather than being aligned with revenues appropriately augmented by intergovernmental transfers.

Fourth, the urban safety net for the poor—a mix of the widowed elderly, the disabled, laid-off state enterprise workers lacking marketable skills, people working in the informal sector, and migrants—is inadequate (Wu 2004). *Di Bao*—a means-tested transfer that offers minimal assistance to urban residents who satisfy the poverty criteria—is a bare-bones scheme that deserves to be augmented or supplemented by additional assistance. Beyond this, there is growing concern regarding unemployment compensation for laid-off workers and the adequacy of pension benefits.³⁴

These are not minor complaints, and they are rising in volume, despite the efforts of the central government to root out corruption with frequent inspection tours by the Communist Party's Central Commission for

31 In September 2006 a number of officials from the Shanghai administration, including the mayor, were implicated in the misappropriation of US\$400 million from the municipal pension fund ("Anti-Graft Campaign" 2006; "Shanghaiad" 2006).

32 Gan and Gong (2007) show how periods of morbidity before the age of 21 significantly reduce an individual's education status.

33 Medical expenses account for 11.8 percent of household consumption, more than education or transport ("China's Income Gap" 2006).

34 Wu (2005) provides a detailed account of how China has developed the elements of a social security system (pensions, medical insurance, and unemployment compensation) and reviews current reform options. Other proposals for reforming the pension system are presented by Dunaway and Arora (2007).

Discipline Inspection, which meted out harsh punishments. Wu (2006) cites an official report indicating that 42,000 public officials were investigated for corrupt practices each year between 2002 and 2005 and that action was taken against 30,000 every year.³⁵ He notes that corruption was largely responsible for losses by the banking system equal to 6.25 percent of GDP between 1999 and 2001 and fraudulent public expenditures amounting to 2.4 percent of GDP. Reforms of the bureaucratic structure and incentives, the health system, local taxation, revenue sharing with the central government, transfers from the central government to cover the costs of unfunded expenditure assignments, and social security are all ongoing, but they barely keep up with the problems. As a result, the clamor about urban governance is not subsiding; as China's urban middle class grows and becomes more aware, protests could become more widespread.³⁶

Governance issues may be easier to resolve, if partially, in China than elsewhere, because unlike many other countries, it has a vibrant urban economy that is generating jobs and constantly adding to the pool of resources. China does not face entrenched problems of slums, urban decay, an impoverished underclass, or low fiscal buoyancy, and so far it has been able to absorb migrant flows (Flavin and Gardner 2006). China's cities have performed relatively well, and many are governed by able and energetic leaders who are eager to improve economic circumstances and living conditions.

Crafting an Urban Development Strategy

Like many other countries, China is seeking a development path that tends to equalize rural and urban per capita incomes over time.³⁷ This objective, emphasized in the 11th Plan, calls for comparable growth rates across sectors (see Yusuf and Nabeshima 2006a). Barring that, rough parity between sectors can be maintained only by a decline in the population of

35 By redoubling its efforts in 2006 and firing four high-level officials, the government has made some headway ("China's Crackdown" 2006).

36 The number of protests rose tenfold between 1993 and 2005, to 87,000 ("In Face of Rural Unrest" 2006; Wu 2006). The spike in protests appeared after 1996, when the reform of state-owned enterprises began to add to the ranks of the urban unemployed. Many of those complaining are former state enterprise employees and displaced farmers. Some of these and other protests fall into the category of "rightful resistance," in which protestors frame "their claims with reference to protections implied in ideologies or conferred by policymakers" (O'Brien and Li 2006: 3).

37 Per capita rural incomes were below the national average in 21 of 31 provincial-level units in 2005. Rural per capita incomes were 20 percent below the national average in Sichuan and Chongqing and 40 percent below in Gansu and Guizhou ("China: Does the Countryside?" 2007).

Table 1.3. Rice, Wheat, and Maize Yields in Selected Countries and Regions, 1997–2002
(tons per hectare)

Rice (2002)		Wheat (1998–2000)		Maize (1997–99)	
Country	Yield	Country	Yield	Country	Yield
United States	7.4	China	3.8	United States	8.3
Japan	6.6	United States	2.9	Brazil	5.3
China	6.3	Argentina	2.5	China	4.9
Vietnam	4.6	Canada	2.4	Mexico	2.7
Thailand	2.6	Russian Federation	1.6	Argentina	2.4
Asia	4.0	East Asia	3.8	East Asia	4.8
World	3.9	World	2.7	World	4.3

Source: Pingali 2001; Ekboir 2002; data on rice are from World Rice Statistics (<http://www.irri.org/science/ricestat/>).

the slower-growing sector or income transfers from the higher-income sector to the lower-income sector.

Narrowing Rural–Urban Gaps

Crop yields in China are high relative to China's main comparators (table 1.3), leaving little scope for more than a very modest annual increase. Rice yields are close to those of Japan and the United States and well above those of Vietnam. Yields of wheat match those of the United States. These high yields are achieved through the use of improved seeds, the heavy application of fertilizers, and in the north through increasing reliance on groundwater. Farmers in China use 228 kilograms of plant nutrients per hectare—far more than the world average of 90 kilograms in 2002 (FAO 2003). By using agricultural extension services effectively, Chinese farmers have introduced new varieties and exploited biogenetic technologies, bringing themselves close to the technological frontier for food grains (Jin and others 2002), especially in rice production.³⁸ The gap between potential and actual yield is only 15 percent. This gap is much larger in India (58 percent) and the Philippines (65 percent)

38 Genetically modified crops are being widely researched and planted in China. China began research on genetically modified crops in the early 1980s and is now one of the leading countries in this field (Falkner 2006). Bt cotton is a transgenic strain of cotton that incorporates the genes of a soil-dwelling bacterium, *bacillus thuringiensis*, hence the name. The added genes induce the cotton plant to secrete toxins, which reduces the depredations of certain caterpillars, beetles, and flies that feed on the plant and can destroy it. Bt cotton was approved in 1997, and 3.7 million hectares were planted in 2004. Genetically modified varieties of rice, wheat, soybean, potato, rapeseed, cabbage, and tomatoes are under development or being introduced (Huang and others 2007).

(Jin and others 2002). According to Liu and Wang (2005), between 1991 and 1999, technological advances were responsible for more than half of growth in agricultural productivity in China.

A continuing shift toward animal husbandry, horticulture, and off-farm activities should gradually raise farm incomes, but substantial gains through a large increase in the prices of major grains, for example, would incur heavy fiscal costs, face resistance from urban interests, and be subject to restrictions by the World Trade Organization (WTO). The possibility of widening the scale of off-farm activities exists, but TVEs have passed their high-water mark, and industry thrives more in urban and periurban locations than in rural ones.

Rural development has been the objective of a succession of government programs, including, most notably, the 8-7 program, which spanned much of the 1990s.³⁹ Other programs are building infrastructure and attempting to improve the delivery of social services. Recently, the government has taken steps to raise the disposable incomes of agricultural households by eliminating the agricultural income tax. Despite these measures, bringing rural incomes closer to the urban average is proving to be an uphill task.

The challenge of narrowing income gaps is similar to that experienced in more-advanced countries. In Japan, for example, income differentials between sectors narrowed only as a result of migration, which sharply reduced rural populations; generous agricultural price support programs; and the increase in off-farm employment opportunities. In 2003 per capita incomes in the leading rice-producing prefectures, such as Niigata and Akita, were close to those in Osaka and 70 percent of per capita income in Tokyo (Japan Statistics Bureau 2005).

A mix of policies will be needed in China, but a significant narrowing will depend mainly on migration plus remittances. Other policies will also play roles, however. These include (a) continuing efforts to strengthen agricultural productivity through diversification into higher-value activities; (b) technological advances that raise yields and conserve land, water, and other inputs; (c) investment in rural infrastructure in areas where returns over the longer term are high; (d) provision of secure, longer-term property rights over farmland;⁴⁰ (e) provision of better social services for

39 The program, announced in 1993, provided subsidized loans, supported public works, and offered budgetary grants (Park, Wang, and Wu 2002).

40 The recently passed property law strengthens ownership rights and allows farmers to renew land leases ("Caught between Right and Left" 2007).

rural households; (f) rural credit schemes; and (g) to the extent feasible, resource transfers via the price mechanism or fiscal channels.

From the perspective of a development strategy that seeks to maintain high aggregate growth and bring rural incomes closer to urban levels, a multistranded approach is warranted. In conjunction with pricing policies, efforts to raise agricultural yields, conserve water, promote diversification, and strengthen the transport and marketing infrastructure can increase rural incomes and temper the incentives to migrate to cities. Creation of infrastructure should focus on areas with long-term potential, however; other kinds of transfer and income support are better suited for rural communities in which the land is infertile and water scarce. Encouraging people to move out of fragile areas is the most-sensible approach from both economic and ecological perspectives.⁴¹ Attempting to improve their livelihoods through costly investments is likely to have a modest payoff and only delay by a few years an exodus from these areas. Regional policies—in Brazil, Italy, and other parts of the European Union—have a poor record (Sinn and Westermann 2001).

Directing Migrant Flows and Managing Urban Growth

Migration should be to where jobs are going to be; it should support growth in urban regions with the greatest longer-term promise. Directing migrants to high-growth areas would ensure that they are absorbed by urban labor markets and increase their chances of being assimilated into urban society. It is when migrants enter slow-growing or stagnating urban economies that problems of unemployment lead to social problems and the flaring of tensions between newcomers and longtime residents.

Geographical location and city size have the greatest effect on whether urban migration can contribute to a virtuous urban growth spiral. Migrating to a coastal location or a location on a major transport artery was favored in the past and remains advantageous, even though great advances in surface and air transport should have diminished the relative attraction of such locations.⁴² Coastal cities in particular exert an unusually strong pull, which is linked to the quality of their physical environment and their milder climate. With sea levels set to rise, some coastal cities might be endangered

41 Current policies are helping shape such a trend: by the end of 2005, 23 million hectares of low-quality farmland had been converted to woodland or grassland (“Saying ‘No’” 2006).

42 See Liu (1993) on the location of Chinese cities.

three and four decades from now, but for the moment, the pull they exert is undiminished.⁴³

The availability of fresh water is emerging as an additional determinant of urban growth and livability, as cities grow very large and become voracious consumers of water.⁴⁴ A location along a waterway can help lessen water-supply constraints, and waterfront development can enhance the quality of urban life.

The size of cities is also important.⁴⁵ Economies of scale and agglomeration increase growth rates as cities expand (see, for example, Yusuf and others 2003; Rosenthal and Strange 2004). Agglomeration contributes by deepening labor markets, inducing technological spillovers, and encouraging a wide mix of activities. It enables firms and consumers to more easily access inputs and services and allows networked clusters of firms to emerge. Agglomeration also supports innovation—sometimes at the intersection of two or more activities or scientific disciplines—and the diversification of goods and services (Bettencour, Lobo, and Strumsky 2007; Carlino, Chatterjee, and Hunt 2007). Such diversification is often the principal avenue for increasing sales in national or world markets. In a globalizing economy, agglomeration economies are a safety valve permitting urban industry to expand in new directions and to maintain both a diversified portfolio of outputs and the potential for adding new activities as some existing ones die out.⁴⁶

A large urban center also provides an environment in which firms have an easier time achieving scale economies, because local markets are large and enable firms to move down the cost curve before venturing

43 The likelihood that some coastal areas will be submerged as seawaters rise might call for planning with regard to the development of coastal cities (“Cities Should Plan” 2005). The experience of the Dutch will become more and more relevant. Among China’s megacities, Shanghai confronts the greatest challenge, because of its limited elevation above the current sea level and low-lying terrain; subsidence caused by groundwater depletion; scouring of coastline by strong currents; the presence of wetlands and flood-prone areas; and susceptibility to typhoons (Sherbinin, Schiller, and Pulsipher 2007).

44 China is home to 22 percent of the world’s population but just 8 percent of global fresh water supplies (Flavin and Gardner 2006).

45 China has three megacities with populations of more than 10 million: Beijing, Shanghai, and Chongqing. A fourth, Shenzhen, probably falls into this category if the nonresident population is included.

46 Although China’s exports to the United States increasingly overlap with those from OECD countries, these exports sell at a discount, because their quality and technological sophistication are lower (Schott 2006). Hummels and Klenow (2005) and Hausmann and Klinger (2006) suggest that the growth of export revenues depends on diversification into new products (many in product categories that are close to those of current exports) and or improvements in quality as incomes rise.

into overseas markets.⁴⁷ Large cities are more likely to offer environments that are contestable, if not competitive, with low barriers to the entry and exit of firms and greater incentives for firms to be innovative.

Little in the empirical literature suggests that cities are subject to diminishing returns to scale, but poorly planned and managed cities can confront serious issues of congestion, pollution, and high living expenses, particularly as a result of increasing rents. These problems can also affect medium-size cities. Cross-country experience shows that good land planning, regulation, and coordination by bureaucracies as well as administrative subdivisions can enable cities to reap the benefits of size and avoid most of the pitfalls. In fact, as survey evidence presented in chapter 8 suggests, that larger Chinese cities tend to be better managed than smaller cities.

Polycentric spatial development (which prevents the congestion arising from a single downtown focus with the help of zoning regulations and the use of floor area ratios to vary population densities and create multiple foci) and a well-designed transport system are key to making large cities livable. Also important are land-use policies that conserve land through densification and mixed use without sacrificing essential green spaces and recreational amenities conducive to livability. Legislating rules is one key step; enforcing them firmly, but when needed, flexibly, is another. Cities often fail to follow through with policies governing the use of automobiles. As a result, they end up with severe congestion; urban sprawl, which increases energy consumption; and air and noise pollution.⁴⁸ The capacity to implement policy is thus a hallmark of the successful metropolitan area.

Large cities can encounter difficulties if they do not mobilize sufficient revenues to defray current expenditures or fail the test of creditworthiness, which makes it hard for them to raise capital from capital markets for long-lived investments. This problem is not limited to large cities, although the bigger centers are more likely to be burdened with fiscal expenditures.

In summary, size is a plus. In a more-open and competitive global economy, a large city gains an edge from agglomeration and urbanization

47 Pannell (1992) reviews the history of Chinese cities through the early postreform period. He finds that large cities were more efficient than smaller ones.

48 Sprawl is a particular problem for secondary cities in China. Because of the lack of infrastructure financing, new urban development tends to take place along existing highways or trunk roads, without much planning. This contributes to sprawl and increases commute time, congestion, the cost of providing energy, water, and sanitation infrastructure, and pollution.

economies that impart industrial flexibility. Major urban centers also enjoy the advantages of global transport connections and are more likely to be hooked into the international business networks for manufacturing, producer services, and research. These international links are sources of trade, capital, and ideas, the oxygen that gives life to urban dynamism.

Financing Urban Development

Urban development is not possible on the cheap. Huge volumes of funds have to be raised and committed to projects that can take many years to come to fruition and the effective life of which can span decades or even centuries.

Cities faced with the prospects of substantial in-migration can become caught in low-level traps if they fail to pour capital into such investments in a fairly short period of time. A “big-push” investment strategy has obvious merits for putting in place axial transport, housing, commercial, energy and water, and sewerage infrastructures.

Building ahead of demand makes sense, so that industry is not hamstrung by capacity constraints and urban physical plant can accommodate the influx of people without congestion and the creation of slums. An example is New York City, which was designed for 1 million residents when the population was barely 100,000. Central Park was created 150 years ago, and the subway system was built 100 years ago, well ahead of demand (“The New New York” 2006).⁴⁹ Planning for long-term growth smoothed the expansion of Tokyo in the postwar period.⁵⁰

Several Chinese cities have followed this route. Throughout the 1980s, Shanghai spent 5–8 percent of its GDP on urban infrastructure investment. In the 1990s it spent 11–14 percent of GDP, in a big push to redevelop the city, including developing Pudong (figure 1.2); this effort is now winding down. Both Beijing and Tianjin spend more than 10 percent of their GDP on urban infrastructure (Yusuf and Nabeshima 2006b). To cope with the rising demand for electricity and to eliminate brownouts, China commissioned 80 gigawatts of generating capacity in 2006 and will put an estimated 75 gigawatts on line in 2007 (“What Shortage?” 2006).

49 Omnibus services began in the 1820s (Glaeser 2005b).

50 Until the 1960s, fewer than 100,000 housing units were constructed in Tokyo. Beginning in the 1970s, in line with the rapid increase of population in Tokyo, the construction of new housing units accelerated dramatically, reaching more than 900,000 units by 1990.

Figure 1.2. Investment in Urban Infrastructure in Shanghai, as Percentage of GDP, 1985–2004



Source: Shanghai Municipal Statistical Bureau 2005.

Where cities have approached infrastructure development piecemeal and lagged behind demand—Lagos, Lima, Karachi, and Mumbai are prime examples—the urban environment has deteriorated.⁵¹ As population pressures have mounted, industry has struggled to grow, fewer jobs have been created, and cities have entered into a low-level growth syndrome in which poverty, slums, and crime have become firmly entrenched.⁵²

Conventional wisdom has resisted the big-push strategy, conflating it with lumpy investments. But experience with migration-led urbanization suggests that a high level of investment in industry and infrastructure has multiplier and accelerator effects, which can stoke prolonged virtuous spirals that generate not just growth and employment but also the urban facilities and housing needed to accommodate a rising population.

Urban development—especially when it is driven by a big-push strategy—requires capital, lots of it. Although the global integration of capital markets has created channels for the circulation of capital, much of this capital must come from domestic saving and financial entities

51 In 1950 fewer than 300,000 people lived in Lagos. The city's population rose by an average rate of 6 percent a year in the second half of the 20th century. Every year more than 600,000 people migrated to Lagos from West Africa. If current trends continue, by 2015 Lagos will have 23 million people, making it the third-largest city in the world after Tokyo and Mumbai ("The Megacity" 2006).

52 Informal transactions account for at least 60 percent of economic activity in Lagos ("The Megacity" 2006).

(Feldstein and Horioka 1980; Feldstein 2005). Rapid urban development that can keep pace with large intersectoral transfers of workers demands rising domestic savings and mechanisms for investing the resources. To be creditworthy enough to gain access to these resources, cities must be well managed financially. Financial deepening can facilitate the process, but it takes time to build institutions; train people; and create sophisticated instruments, risk-assessment skills, rating and monitoring agencies, and regulatory capabilities (Yusuf 2007). Late-starting countries that must cope with urbanization rates of 3–5 percent a year or more have to rely on banks initially, but they need to move quickly to establish mortgage and bond markets; institutions for both securitizing instruments such as mortgages and regulating the intermediates involved; and avenues for the secondary trading of securities.⁵³

Local-currency bond markets make it possible to diversify lending away from banks and to match long-term assets with debt of equivalent maturity. They generate yields for a range of maturities and permit the hedging of exposures. Well-functioning bond markets not only lower borrowing costs, they also impart greater stability to financial markets.⁵⁴

If urbanization is to avoid the many pitfalls that lie in wait, it needs to be supported by resource mobilization and fiscal transfers commensurate with the desired rate of development. When cities are not “bankable”—that is, when resource mobilization is weak or insufficient capital finds its way into urban projects because public and private channels are inadequate or transaction costs are too high—urbanization cannot be matched by the requisite urban development. The lack of financial depth and sophistication has not initially proven to be the binding constraint. It is the feeble supply of domestic capital for the urban sector (because the instruments, skills, and channels have not been created) and inept municipal financial management that are frequently associated with weak economic growth.

53 By the end of 2005, China’s mortgage market, which started in 1998, had grown to US\$227 billion (Y 1,777 billion), larger than the market in the Republic of Korea (US\$200 billion). China’s market represents just 10 percent of GDP, however, while the market in the Republic of Korea represents 27 percent of that country’s GDP (“Mortgage Industry” 2006).

54 By abolishing a quota that limited the annual issuance of corporate bonds to Y 100 billion (US\$13.2 billion), the Chinese authorities have encouraged listed companies to raise funds by issuing bonds and to use the funds to pay off higher-interest bank debts. Doing so is particularly appealing to companies engaged in urban real estate, infrastructure, and urban development (“Chinese Companies” 2007).

Providing Urban Social Services

In addition to physical infrastructure, people require social services. Vulnerable people need a safety net to avoid sliding into poverty as they age, become unemployed, or are affected by accidents or loss of property.⁵⁵ From social as well as private perspectives, the most needed services and the ones with the highest returns are health care and education. These services build human capital, contribute to individual well-being, provide a measure of insurance against poverty, and produce positive externalities (see chapters 2 and 3; Yusuf, Nabeshima, and Ha 2007a, 2007b).

Adequate access to health and education services for the entire urban population should be a central objective of urban development. It is an objective that is often not given the priority it deserves. The shortfall is most serious during the critical stage when urban populations are exploding. By making inadequate provisions for services, cities fail to augment a resource that over the longer term is vital for growth, industrial diversification, and the quality of the business climate. By focusing on physical infrastructure, governments at both the national and subnational levels defer essential and complementary investments in human capital, which builds manufacturing and technological capabilities. Investing in human capital is also the best insurance against unemployment and urban crime. Rather than waiting until shortages become glaringly apparent—by which time it is often too late to mobilize sufficient resources—cities should view services as intrinsic to their big-push urban development strategies.

Health and education services also permit the gradual phasing in of an old-age safety net and unemployment insurance schemes. These schemes are expensive. They need to be backstopped by supporting institutions and to evolve together with the financial sector.

Limiting Increases in Urban Energy Consumption

The lifeblood of the urban economy is energy (see chapter 6). Urban transport, industry, and households dominate energy consumption in all middle- and high-income countries. Energy use fuels growth and enhances livability, but it is also the principal source of air pollution and carbon emissions. For the foreseeable future, urban development will remain dependent on ample supplies of energy, with transport depending on petroleum and households relying mainly on electricity

55 On the problems posed by shocks for individual households and the options for insuring against them, see Baeza and Packard (2006).

and gas. Barring an incident that leads to an interruption of supplies, there is no imminent shortage of petroleum in the near term.

The warning signs of tightening petroleum supplies are everywhere, however. The more-accessible major sources of petroleum are being rapidly exploited, and even if new reserves are found offshore, production costs will be much higher, because the extraction must be from great depths. Thus, if economic growth rates worldwide remain healthy, the relative prices of energy could increase significantly.

Given the likely increase in energy prices and the deleterious effect of the consumption of fossil fuels on the environment, reducing the energy coefficient of urban development is essential. Especially for countries at a relatively early stage of urbanization, with a great deal of long-lived investment in urban infrastructure and buildings ahead, measures that can cut energy use and energy losses have a high payback. Among the measures with the greatest consequences, the design of urban transport is the most significant, because it determines the physical characteristics of the city⁵⁶—how much it sprawls and encroaches into the surrounding agricultural land—and the reliance on automobiles for intra- and intercity travel. Appropriate incentives can lead to the efficient utilization of public transit in large cities, which are much more energy efficient than other locales.⁵⁷

Enforcing strict standards and codes are two additional measures that can limit the increase in electricity consumption for air conditioning and appliances, even as urban populations and urban incomes continue their upward march. Another approach would be to install “smart” meters, which can assess variable charges based on the time of day to encourage energy conservation, especially at peak load times (“Going Metric” 2006). Encouraging the adoption of “green” technologies and eco-friendly designs can also reduce energy use (see Yusuf and Nabeshima 2006a and the numerous practical suggestions in Steffen 2006).⁵⁸

An efficient energy-conserving big-push strategy that is also eco-friendly needs to incorporate the construction industry. The quality

56 The spatial characteristics of a city, the occupational activities there, and the degree to which people depend on cars for mobility profoundly influence the incidence of chronic diseases associated with obesity, such as diabetes and cardiovascular disease, according to Frumkin, Frank, and Jackson (2004) and Monda and others (2006).

57 Phang (2000) describes Singapore’s techniques for controlling the ownership and use of cars.

58 In projecting the energy intensity of China’s economy, Wei and others (2006) find that incomes are the principal source of rising utilization and technological change the main mitigating factor.

and design of construction and the incorporation of new energy- and materials-conserving technologies will determine how much energy is saved, directly and indirectly (Fernandez 2007). The design, construction, and maintenance of infrastructure also influence energy use by the transport, water, and sanitation sectors. Among all of the industries contributing to urban development and local multiplier effects, construction is far and away the most important. Enhancing the productivity and technological capabilities of this industry should be a critical part of any urban development strategy.

Dealing with the Scarcity of Water

Full recognition of the trend in water scarcity is long overdue. For some cities, a crisis looms not too far in the future. Many others are likely to confront severe shortages within a few decades. For late urbanizers, there is a clear opportunity to design the water supply, wastewater collection, and sanitation systems so that they maximize the potential for recycling water, supplying water of different grades for different purposes, and minimizing the loss of water from leaking pipes.

As with energy, standards for appliances and sanitary systems can also reduce the amount of water and restrict the use of drinking-quality water for some purposes only. Standards for the purity of water released by commercial and industrial establishments can increase recycling and minimize pollution of water courses and aquifers.

Regulation, physical design, and technology are three strands of an urban water strategy. Pricing is a fourth. It complements the others and is critical to the success of any longer-term strategy to ensure that an urbanizing world will not run short of water.

Managing Urbanization

Urbanization, development, and a rising quality of life are difficult to combine without sound planning and regulation and the implementation of a host of policies. Small cities and large ones must be well managed for benefits to be fully realized and diseconomies kept in check. Achieving good management—and governance—is subject to many factors. These include the autonomy to conduct policy and raise revenue; the quality of local leadership; and planning and administrative capacities. They also include the availability of policy instruments; the existence of institutions for mediating and implementing policies (such as private–public partnerships and the legal system); and the efficacy of interjurisdictional coordination, where this counts. But urban development is arguably most affected by the design and efficiency of regulations that incentivize

industry; by land-use and transport policies; by fiscal management and how it is reflected in credit ratings, as well as the provision of public services; and by environmental policies that intersect with and reinforce those impinging on land use and urban transport (see chapter 8 on the dynamics of decision making at the local level).

From Strategy to Policy

Given the pace of urbanization and the numbers of people involved, the decision makers responsible for guiding China's urban development have their hands full. Fortunately, they are better placed than their counterparts in other countries to achieve successful urban development, for several reasons:

- China is generating the resources to finance an urban big-push and to date has been able to channel these resources into urban industry and infrastructure, through the fiscal system, the banks, and new financial instruments.
- Because China is a relatively late starter and much building and renewal of urban physical capital lies in the future, there is unparalleled scope for designing efficient and livable cities.
- Chinese municipalities have the autonomy and the authority to introduce and implement regulations governing land use, the transport system, and the urban environment.
- The *hukou* system enables municipalities to exercise some control over the flow of permanent migrants. Industrial growth virtually throughout China is such that manufacturing, construction, and services are largely able to absorb inflows of migrants.
- Although many Chinese cities must cope with a backlog of air and water pollution, the slums and endemic poverty that have taken root in other countries are largely absent from Chinese cities thus far.
- As a late starter, China can draw on the experience of other countries with respect to urban design, the effects of private vehicle use, and pollution. At the same time, it can exploit advances in a host of technologies that will conserve energy and water and curtail harmful emissions.

This is not to say that urban development will be trouble free. For China, however, the enormous intersectoral transfer of people can be a less-daunting process than it was and is for other countries.

The chapters in this volume delineate a number of policies that can promote rapid urban development within a framework of a national

strategy that seeks to achieve a balanced increase in incomes. From the range of policies presented, seven stand out.

Increase Human Capital

In both urban and rural sectors, education and health care policies that increase human capital can stimulate growth of agricultural and industrial activities and reduce the risks of unemployment (Glaeser and Saiz 2003; Berry and Glaeser 2005; Glaeser 2005a; Glaeser and Berry 2006). Greater access to these services can raise the incomes of rural households, which facilitates migration. Making these services available to urban migrants deepens the resource base in cities, promotes equity, and helps combat poverty. From the standpoint of both growth and welfare, health policies should focus on preventive and primary care, and education policies should seek to enhance the quality and raise the level of education.

Manage the Flow of Migration

Although the *hukou* system should be dismantled over the longer run, it remains a useful tool for directing and managing the flow of migrants. It should be used to achieve two objectives. One is to try to contain the number of migrants individual cities absorb as permanent residents. To the extent that the *hukou* system can achieve this, migration can match the supply of affordable housing, infrastructure, social services and jobs in cities. A second is to try to direct migrant flows from areas with declining agricultural potential and water shortages to urban areas with better growth possibilities, in order to realize economies of agglomeration and scale.⁵⁹ This matching needs to be combined with the planning and design of megacities in a way that achieves compactness and polycentricity. The coastal cities in the Yangtze delta and the south are likely to continue to attract migrants. These cities may need to extend urban *hukou* privileges to some of these migrants and to invest in infrastructure and services to accommodate them.

Deepen Financial Markets

To finance urban development, China needs financial markets that allocate resources more efficiently. It also needs a wider range of instruments, in order to meet the needs of different kinds of borrowers and offer the spread of maturities required by investors. The reliance on banks for financing and

59 China's WTO membership is likely to negatively affect wheat- and corn-growing farmers in the northeast, as noted in chapter 2.

the use of urban development investment corporations (UDICs) (created by municipal authorities as semiautonomous vehicles that borrow from the banks) have advantages but also some risks (Su and Zhao 2007). Municipalities can limit their fiscal commitments to urban development and instead tap the banks. But the UDIC–banking nexus increases banks' exposure on long-lived investments through organizational channels that might create problems in the future.⁶⁰ Changing the legal, tax, and accounting rules to permit the emergence of secondary bond and mortgage markets would be a step forward. Other measures include adoption of rules that encourage securitization of mortgages; strengthening of mortgage insurance; issuance of general financial bonds; and trading, including forward transactions, in the interbank bond market. Financial innovations and institutional developments, including refinancing arrangements and loan guarantees, would also facilitate urbanization.

Improve Cities' Fiscal Efforts

Many Chinese cities have been balancing their books by selling or leasing land or charging off-budget fees. The income from such transactions accounts for almost 25 percent of municipal revenues. Sooner or later, this process will come to an end. Urban governments need to create a durable fiscal system that can meet future and current capital needs, taking account of the anticipated growth rates of urban economies and populations. Doing so entails revenue-sharing and transfer agreements with the central authorities and an elastic base for local revenues with a few robust tax instruments to satisfy local needs. It also calls for a firm agreement with the central government on expenditure assignments that are equitable and sustainable given the anticipated flows of revenue from all sources.⁶¹

Contain Energy Costs

Ensuring that urban development is not constrained by rising energy costs will depend on four factors. Arguably the most important are pricing policies (especially of power) that accurately communicate information on relative scarcities and induce efficient utilization (see chapter 6).

60 Chinese banks have a history of loan portfolio problems. Although reforms have reduced the scale of the problem, weak risk-assessment skills and poor governance remain sources of vulnerability (Podpiera 2006).

61 See, for instance, World Bank (2003a, 2003b); Dabla-Norris (2005); and Su and Zhao (2007).

A second factor is how China proceeds with its motorization strategy within the context of urbanization.⁶² One part of this strategy relates to the incentives for the automobile industry to produce fuel-efficient cars and to redouble efforts to innovate. Another part has to do with demand for cars, which will be a function of policies on taxes on cars, gasoline, licensing and registration fees, and road user charges; car financing; research and development; urban land use; investment in road building; and public transport. Currently, many Chinese cities are subject to so-called “ribbon development” alongside major highways and floor area ratios are still quite low. This type of development saves developers and local governments from investing in secondary feeder and access roads, but it leads to much greater sprawl and raises the energy- and infrastructure-related costs of urbanization.

A third factor is advances in home-grown technology and technology transfer from abroad. The degree to which policy accelerates these advances will influence the efficiency with which fossil fuels are utilized as well as the diversification into renewable sources.⁶³

A fourth factor is the raft of regulatory policies, including environmental and land use policies and policies defining building codes and standards for consumer appliances. In conjunction with the perfecting of mechanisms for enforcement, these policies will play a significant part in determining energy demand.

Manage Water Resources

Pricing, regulatory, technology, sewage treatment, and wastewater recycling policies will also be decisive with respect to the utilization of water.⁶⁴ Given the distribution of water, its low per capita availability,

62 Between 1991 and 2005, the number of cars per 1,000 people in China rose from less than 2 to 10.

63 Considerable progress is being made in developing clean-coal technologies that China could tap. These include supercritical boilers (which heat steam to 600°C beyond the critical boiling point and therefore need 17 percent less coal than conventional coal-fired plants); integrated gasification combined cycles (which convert coal to gas); and techniques for capturing carbon (“Big Effort” 2006). An earmarked tax on electricity consumption now finances the development of renewable energy. The government is also investing in nuclear power and ethanol. China has 9 operating nuclear reactors supplying electricity, 2 more under construction, and another 20 planned (Flavin and Gardner 2006; Hunt and Sawin 2006; “Saying ‘No’” 2006). Currently, among renewable sources of energy, only onshore wind turbines in certain locations are generally profitable. Solar energy, offshore wind turbines, and tidal power are still relatively costly (“On the Verge” 2006).

64 A little more than half of urban sewage is currently treated before being discharged into water bodies, which partly accounts for the low quality of the lake and river water (“Saying ‘No’” 2006).

and its deteriorating quality, the problem of water availability needs to be tackled immediately. As noted in this chapter and in chapter 7, the geography of future urbanization and the degree to which it is concentrated in the relatively water-abundant parts of the country could play an important role in providing a solution to the problem.

A massive transfer of water could be a costly solution, on a number of counts. The distribution of water resources, the implications of impending climate change on future supplies, and policies affecting the production of grain in the northeast should all be factored into the urbanization strategy. Ongoing climate change makes it desirable to take account of water availability across the country when making long-term plans for urban development.

Reduce Pollution

Policies on the conservation and consumption of water and energy resources will affect environmental pollution, which is a drag on GDP growth and degrades the quality of life. There are various estimates of the costs of indoor and outdoor pollution to the economy, ranging from 3 to 6 percent of GDP. A redoubling of efforts by the government and industry would appear to be desirable (“Green GDP” 2007; Ho and Nielsen 2007; “China’s Green Accounting” 2007).

Concluding Observations

This chapter raises but a few of the issues and policies that will guide urbanization and urban development in China, but they are likely to be among the most crucial. More than half of China’s population lives in rural areas; decades of urbanization lie ahead. Almost three-quarters of Brazil’s population live in urban areas, and an even higher percentage of the population of the United States is urban (World Bank 2006). Possibly by the middle of this century, China could be approaching these levels of urbanization. Between now and then, decisions will be made that will affect the geographical distribution of the population and the building of the urban, transport, and water supply infrastructure to house and support urban inhabitants. Enormous amounts of capital will be committed if the big-push approach is continued.

With so much at stake, it is essential that decisions be closer to the optimal in the long-term sense. Markets alone cannot achieve the outcomes desired, but efficient financial, energy, and water markets, for example, can help achieve good outcomes. Taking the institutional and policy

steps to make markets work more efficiently should be a priority. Successful markets will need to be backed by good government planning and policies based on careful analysis, using the best information available. Factoring in the systems of urban design and construction, as well as innovation, could increase the likelihood that urban development achieves multiple objectives. The approaches to urbanization, urban/design and urban innovation systems will play major roles, especially when it comes to making longer-term decisions about the distribution of people geographically and across cities of different sizes.

The Chinese authorities have some instruments with which to influence both of these outcomes, namely, the *hukou* system and the government's role in allocating investment. These instruments are two among a number of factors that determine the flows of people and capital. The design of policies and the application of these instruments depend on complex negotiations by several levels of government as well as other players, such as the banks. Such interactions among the various stakeholders are useful, because many points of view and a broad range of information can be factored in; the process also diminishes the risk of egregious mistakes. By the same token, the negotiated approach increases the degree of policy slippage and delays in implementation. Policy slippages and the likelihood of delays are unavoidable, but urbanization will not wait. China must move forward with policies to contain the costs of rapid growth, narrow the gap between rural and urban incomes, raise the quality life, and minimize negative externalities. To do so, urbanization and urban development should remain at the top of policy makers' agendas until the pressing issues are resolved.

The potential gains to China from urbanization are substantial. So, too, are the costs. Striking the right balance between the two will be the greatest challenge for Chinese policy makers over the next quarter century and more.

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