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Urban development in China

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Introduction

Urban development is seen as a key driver of economic and social development. For many policymakers, the road to economic and social development is alleged to go via a process of urbanization (see World Bank, 2009). At the same time, urbanization also follows economic and social (policy) changes. Whatever the merits of urbanization, it is not without its problems in terms of, for instance, the environment, health issues or the uneven spatial distribution of economic activity into center-periphery structures with, possibly, income inequality as a result. This issue of the *Cambridge Journal of the Regions, Economy and Society* deals with urbanization in China. The unprecedented economic and social changes in China since the start of the economic reforms in the late 1970s have gone along with an equally unprecedented rise in the Chinese urban landscape caused by an enormous migration from the countryside to the city. Studying the causes and consequences of urban development in China is also a way to gain a better understanding of the recent economic and social developments in China.

The eight articles in this issue each highlight a different aspect of urban development in China. They can be grouped into four different but related topics: (i) technology, (ii) population dynamics and migration, (iii) transport and infrastructure and (iv) the financial sector. Taken together, these eight contributions show that urban development has been instrumental to economic development in China, but also that this process has gone along with a range of increasing disparities within and between cities that need to be addressed. Stimulated by a conference held at Xi'an Jiaotong – Liverpool University in June 2015, the majority of contributions to this issue come from (young) Chinese academic researchers, which guarantees a unique inside and expert view on the topics at hand.

This Editorial will not only briefly introduce and summarize the various contributions, but also provide some historical background on the process of urbanization in China. These stylized facts then set out an agenda for the eight articles in this issue. The final section briefly summarizes the contributions of these articles.

The history of urban development

Recent evidence shows that our ancestors were already engaged in building projects constructed by groups of people as long as 175,000 years ago, when they created large mysterious cave structures about 300 metres from a cave entrance in France (Jaubert et al., 2016). It is, of course, a long way from these early structures

to something we could call a city. There is an ongoing debate about what constitutes a 'city' (involving specialization, trade, institutions and infrastructure) or not (see Compton, 2015, also for the discussion below). It is clear, however, that city development is related to the agricultural revolution, which started in the Fertile Crescent around 8500BC.

To illustrate the history of (global) urban development, we focus on the world's largest city over time. Following Chandler (1987), who uses a range of methods to estimate the size of a city, Figure 1 illustrates the evolution of the size of the largest city for the past 5,000 years using a log scale. Memphis (Egypt) was probably the largest city in 3000BC, with a modest population size (according to modern standards) of 30,000 inhabitants, which is dwarfed by modern urban giants like London, New York and Tokyo.[1] Figure 1 shows that the size of the world's largest city started to rise particularly quickly after 1200AD. Given the topic of this issue, we want to highlight the fact that Chinese cities figure quite prominently in Figure 1.

In view of the size of its population, not only currently but throughout history, it comes as no surprise that Chinese cities played an important role in the 'largest city' competition. Chandler (1987) identifies (Figure 1) five Chinese cities as largest city at some point in time. All five are located in current East–Central China (see Figure 2).

The first Chinese city that was at one time the largest in the world is Xi'an (or Chang'an, Shaanxi province), one of the Four Great Ancient Capitals of China and well known for its terracotta warriors. It was the largest city, with 400,000 people around 200BC and again (with the same size) around 600AD.

Kaifeng (Henan province), a former capital of the Song dynasty, was the largest city of the world around 1000–1100AD, with a population size of about 400,000 people. Hangzhou

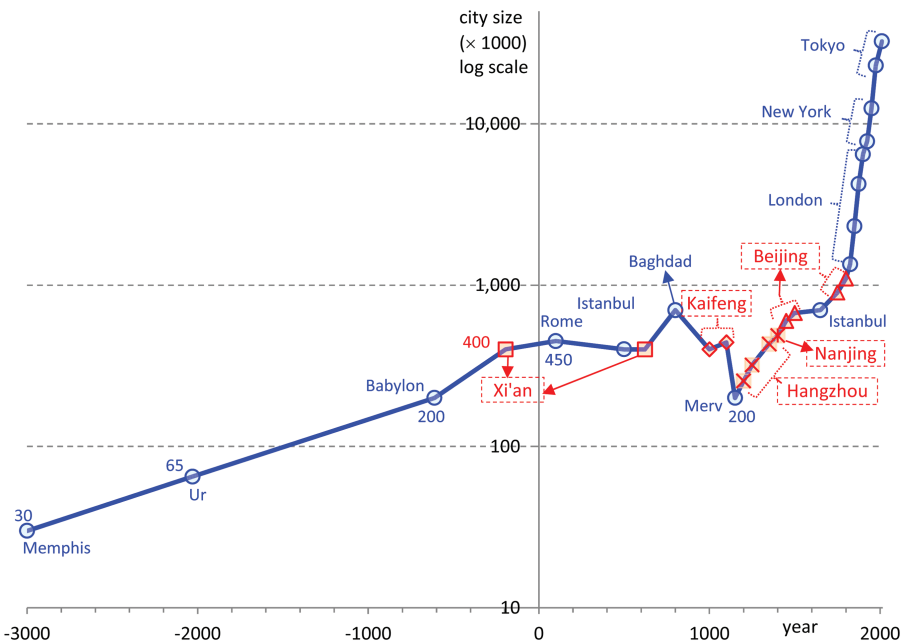

Figure 1. *The world's largest city since 3000BC.*
Source: based on data from Chandler (1987), updated for Tokyo metropolis in 2015; non-Chinese cities indicated with circular markers, all other cities are Chinese.

Figure 2. *China, its neighbours, and the world's largest Chinese cities in history.*

(Zhejiang province), the southern terminus of the Grand Canal, had the honour of the world's largest city from 1200 to 1350, with a population rising from 255,000 to 432,000. It was briefly replaced by Nanjing (Jiangsu province), another of the Four Great Ancient Capitals, around 1400 with a population of 487,000. Nanjing was replaced by the province-city Beijing, yet another of the Four Great Ancient Capitals, which was the largest city around 1450–1500, and again around 1750–1800. Its population rose from 600,000 to 1.1 m in this time period.[2] Beijing was overtaken by London (first city to reach five million), New York (first city to reach 10 million), and Tokyo (first city to reach 20 million and 30 million). All five Chinese cities mentioned above are still large today by world standards.

Urbanization in China since 1960

Today more than half of the world's population lives in cities, but this is a relatively recent phenomenon. In 1960 about 34% of the world population lived in cities, rising to 53% in 2014 and crossing the 50% threshold only in 2011 (see Figure 3a). As one might expect, there is a high positive correlation between the share of the rural population and the share of income or employment generated in agricultural activities. Since the latter is negatively correlated with general development levels (as measured by income), there is a positive correlation between income levels and urbanization. This is illustrated in Figure 3a for the high-income OECD member countries, where the share of the urban population was 64% in 1960 (almost twice the world average), rising to 81% in 2014 (28 percentage points higher than the world average).

Figure 3a also depicts urbanization developments in China and India, by far the two largest countries in terms of total population. In 1960 the degree of urbanization was substantially below the world average in both countries, and slightly lower in China than in India, namely

16 versus 18%. In India the developments are stable: the urban population share rises steadily every year and reaches 32% in 2014. In China the developments are much more dramatic (see also below). Initially, the urban population share rises from 1960 to 1964 (from 16.2 to 18.3%), but then it declines until 1972 (to 17.2%) and slowly crawls back until 1977 (to 17.5%). From 1979 on the urban population share starts to rise quickly (more than 0.7 percentage points per year) and even more strongly from 1996 onward (more than 1.0 percentage points per year), reaching 54% in 2014 and surpassing the world average in 2013.

Panels b and c of Figure 3 show the impact on the absolute number of people living in cities (panel b) and in rural areas (panel c). For the high-income OECD countries the urban population rose by 86% or 400 million people in the period 1960–2014 (from 463 to 863 million), while the rural population declined by 20% or 50 million people (from 257 to 207 million). In the same period, the Indian urban population rose by 420% or 339 million people

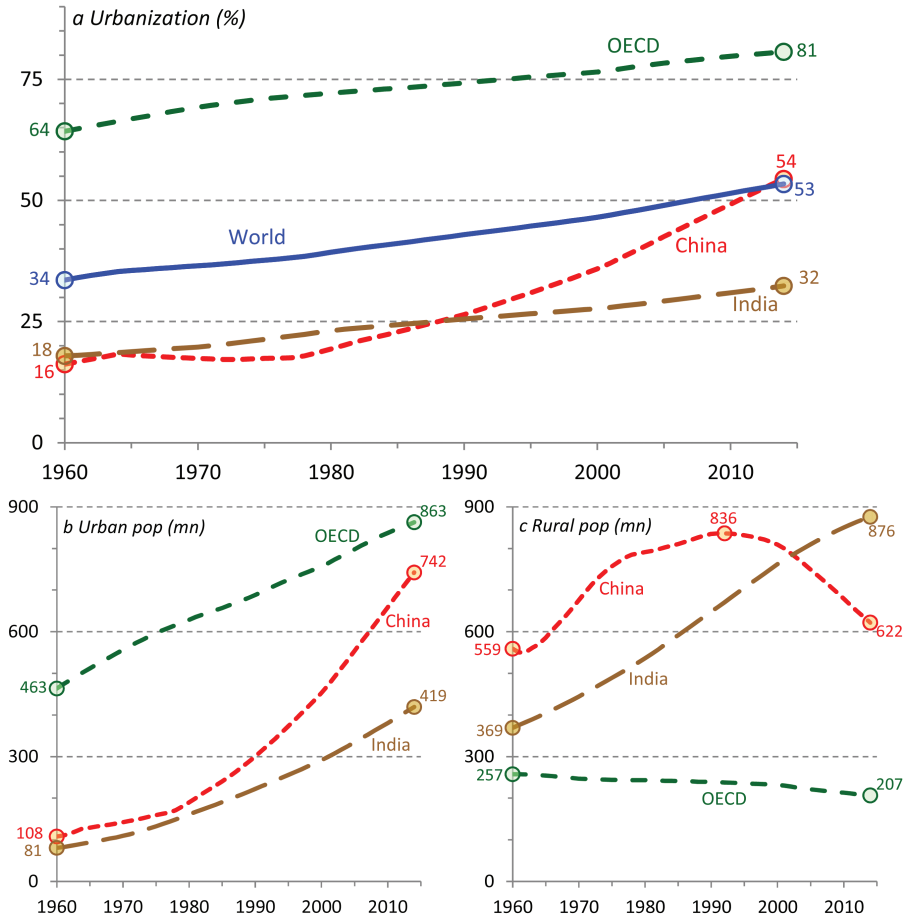

Figure 3. *Urban development since 1960.*
Source: based on data from World Development Indicators online; urbanization: urban population (% of total); panel b: urban population in million; panel c: rural population in million; OECD = high income Organization for Economic Cooperation and Development countries.

(from 81 to 419 million) and the rural population by 137% or 507 million (from 369 to 876 million). In absolute terms, the population increase in India is thus larger in the villages than in the cities.

China takes care of the largest urban population increase in this period, namely by 587% or 634 million people (from 108 to 742 million). The *increase* in the number of people living in Chinese cities is thus higher than the current population size of the European Union, and about twice the current population size of the USA. In the Chinese rural areas, the population increased only by 11% or 63 million people (from 559 to 622 million). Those numbers are distorted, however, by the fact that there was a peak of 836 million people in the Chinese rural population in 1991 (meaning an increase of 50% or 277 million people in the period 1960–1991) and a substantial decline since then (a fall of 26 percent or 215 million people in the period 1991–2014). Under the simple assumption that the Chinese population growth is the same in the cities and the rural areas, the implied migration flow from the villages towards the cities in China is a staggering 461 million people in the period 1960–2014.[4] If the population growth rate is higher in the rural areas, the implied migration flows are even larger. The Chinese *Hukou* system, that limits migration from rural regions to the city, is partly motivated by the desire to handle these enormous migration flows towards cities (see Bosker et al., 2012).[5]

China's (urban) development is dramatically different before and after the Economic Reform (ER) process started by Deng Xiaoping in December 1978, as illustrated in Figure 4 (panel a in levels and panel b in changes). Before 1979 the urban population share is stagnant (at about 17.5%), as is income per capita relative to the world average (at about 3.3%). In the early 1960s income declines as a result of Mao's Great Leap Forward, causing the death of millions of people, while urbanization rises slowly. From 1966 to 1976 the effects of the Cultural Revolution become visible, in part with forcible re-location of people to the countryside and a decline in urbanization.

Mao's death in September 1976 led to a reinstatement of Deng Xiaoping, who soon afterwards adopted Economic Reform policies to expand rural incentives, encourage enterprise autonomy, reduce central planning, open up to international trade flows with the outside world, establish foreign direct investment in China and pass new legal codes. This led to a sharp increase in both the degree of urbanization and relative income per capita since then, with a peak in 2009 when China's income per capita level rises 3.9 percentage points faster than the world average and urbanization rises 1.34 percentage points.

Urbanization and income per capita

As indicated in Figure 4 and briefly discussed above, the degree of urbanization tends to go hand in hand with rising income per capita, not only for China but also for all other countries. In China's case, several researchers have argued recently that China is under-urbanized: see Lu and Tao (2009), Fujita et al. (2004) and Au and Henderson (2006a, b). Institutional restrictions on internal migration, notably but not exclusively the *Hukou* system, are largely held responsible for this outcome (Bosker et al., 2012).

The case for China's under-urbanization is illustrated for the year 1995 in the bubble diagram of Figure 5, which depicts the log of income per capita (in constant 2005 US$) on the horizontal axis and the degree of urbanization (urban population as percent of the total population) on the vertical axis for 186 countries.[6] The size of the bubbles is proportional to population in 1995. There is, obviously, considerable variation in the degree of urbanization and in the log of income per capita, but on average these two variables are strongly related: the slope of the regression line depicted in the figure is 10.9 and this line explains more than 55%

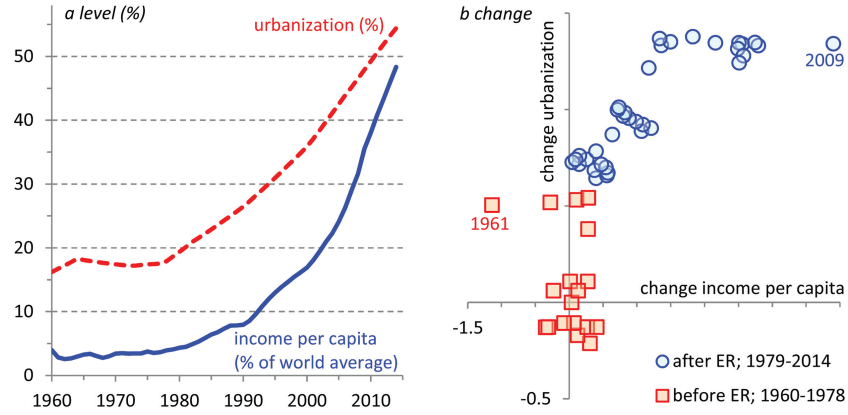

Figure 4. *China: urbanization and income per capita since 1960.*
Source: World Development Indicators online; urbanization: urban population (% of total); income per capita: GDP in constant 2005 USD (% of world average GDP in that year); changes in percentage points.

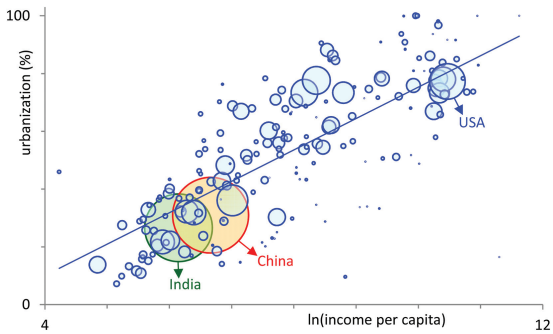

Figure 5. *Urbanization and income per capita, 1995.*
Source: based on data from World Development Indicators online; income per capita: GDP in constant 2005 US$; urbanization: urban population (% of total); bubbles proportional to size of population in 1995.

of the urbanization variance. Since the observation for China is clearly below the regression line, it could be argued that China is 'under-urbanized' relative to other countries. A similar case can be made, in fact, for India, as also illustrated in Figure 5.

Without going into a discussion of causality as to the relationship between urbanization and income per capita (see also Brakman et al., 2014), we simply use the cross-section methodology illustrated in Figure 5 for 1995 as a method for determining a country's degree of under- or over-urbanization in terms of the deviation (in percentage points) of the cross-section regression line in any given year (the slope in Figure 5, 10.9, can be found in Figure 6a for 1995).

Panel a of Figure 6 illustrates the estimated slope coefficient and (minus) the estimated constant for every year since 1960. The estimated slope tends to decline over time (from around 15 to 12), as does (in absolute value) the estimated constant. As panel b of Figure 6 shows, these effects are to some extent related to the number of countries for which we have information available in any given year, which rises from 91 countries in 1960 to a peak of 198 countries in 2005 and then declines again to 168 in 2014. This panel also shows that the explained urbanization variance is inversely related to the number of included countries, while a comparison with panel a shows that the number of included countries also has an impact on estimated slope and intercept. We take these issues as given and now turn to a discussion of the degree of over- or under-urbanization in China, based on this terminology.[7]

Is China under-urbanized?

Using the methodology explained anove, Figure 7 illustrates the degree of over- or

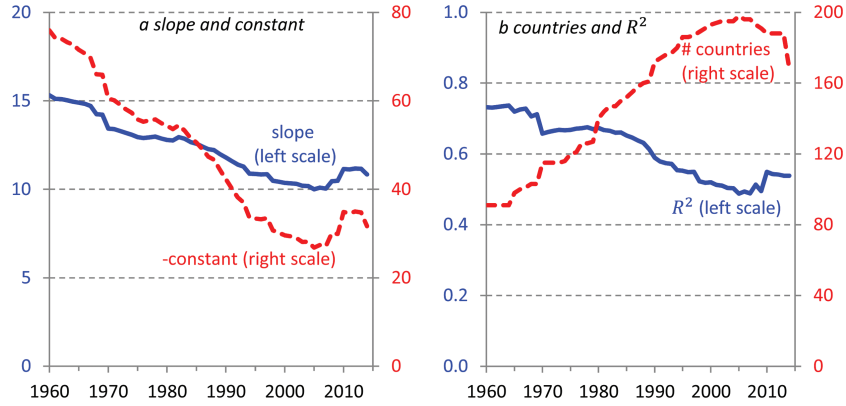

Figure 6. *Urbanization and income per capita regressions over time, 1960–2014.*
Source: see Figure 5.

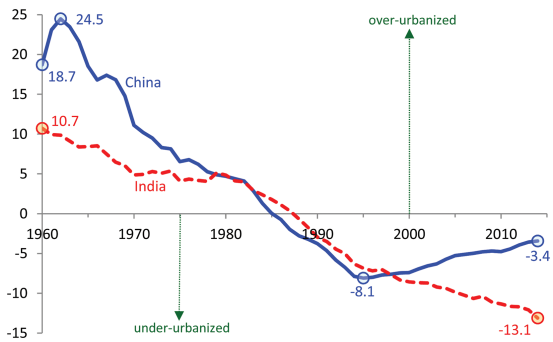

Figure 7. *Deviation of urbanization for China and India, 1960–2014.*
Source: under- or over-urbanization in terms of the deviation (in percentage points) of the cross-section regression line in any given year (see Figure 5 for an illustration for 1995).

under-urbanization in China since 1960. This suggests that China's recently highlighted under-urbanization (with a smaller share of the population in cities than would be expected on the basis of its income per capita level) is a recent phenomenon, starting only in 1986. Before 1986 China was actually over-urbanized, with a higher share of the population in cities than expected on the basis of its income per capita level. The degree of over-urbanization reached a peak of 24.5 percentage points in 1964 and rapidly declined since then (although substantial throughout the 1960s and 70s).

China's maximum level of under-urbanization occurred in 1995, with 8.1 percentage points fewer people living in cities than what would be expected on the basis of its income level, hence the reason to choose this year for our illustration in Figure 5. Since 1995 China's degree of under-urbanization has declined substantially, to only 3.4 percentage points in 2014. The 1964 peak level of over-urbanization is illustrated in panel a of Figure 8. The most recent level of modest under-urbanization in 2014 is illustrated in panel b of Figure 8. All in all, we conclude that China's degree of under-urbanization as emphasized in the recent literature may have been substantial in 1995, but has virtually disappeared by now (in line with Brakman et al., 2014). Remarkably, perhaps, China's more substantial degree of over-urbanization in the 1960s seems to have received no attention in the literature.

For comparison purposes, Figure 7 also shows the degree of over- or under-urbanization for India over the period 1960–2014. India's developments are similar to those of China, in the sense that it moves from being over-urbanized initially (up to 1987) to being under-urbanized recently (since 1988). India's developments are different in the sense that its degree of over-urbanization was more modest (10.7 percentage points in 1960), while its

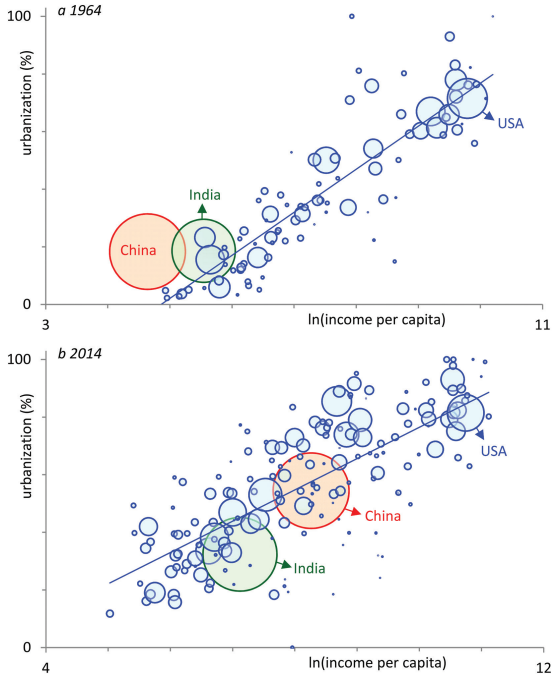

Figure 8. *Urbanization and income per capita, 1964 and 2014. Source: see Figure 5; size of bubbles proportional to population in 1964 (panel a) and 2014 (panel b).*

degree of under-urbanization is more substantial (13.1 percentage points in 2014) and seems to continue to increase. From this perspective, it seems a good suggestion for the literature to start analysing India's degree of under-urbanization, rather than China's.

This concludes our brief *tour de histoire* on urbanization in China. What stands out is that the largest country in the world in terms of population has seen a remarkably diverse history of urbanization; it has been home to the largest cities in the world, went through a counter-urbanization revolution during the Mao reign, and is rapidly urbanizing since 1978. After the introduction of the economic reforms in 1978, urbanization in China really took off, also compared to other countries. Given the sheer size of the country, and the variation in urbanization over time, China can teach us a lot on the causes and consequences of urbanization. This is the topic of this special issue.

Urban development in China and the articles in this issue

Since urbanization is positively related both to the level and growth of income per capita (and a host of other social-economic indicators), understanding the process of urban development and its relevance for economic development is key to understanding the process of economic development itself. Figures 5 and 8 illustrate the positive relationship between urbanization and income per capita. This positive relationship has been used by policymakers to push urbanization in order to stimulate economic development (World Bank, 2009). But this relationship is far from straightforward. Apart from the aforementioned question of causality—urbanization can drive income, or high incomes in cities attract more people—both urbanization and income per capita are influenced by a host of other variables. Relationships like those depicted in Figures 5 and 8 are in the end nothing more than simple correlations.

A dominant line of research in urban and regional economics or economic geography highlights that more urbanization and hence more economic development comes at a price; more uneven distribution of economic active and unequal income across space and people within countries. Even though this claim is not undisputed, it makes clear that the univariate country analysis of Figures 5 and 8 are of limited value, as spatial disparities are hidden.

Instead of offering a full-blown model of urban and economic development in China, the articles in this issue of the *Cambridge Journal of the Regions, Economy and Society* each offer interesting pieces of the giant jigsaw puzzle that depicts urban development in China. They reflect on a limited number of topics and can be grouped accordingly. By doing so they also reflect important determinants of (Chinese) urban and economic development in the geography literature at large.

A first topic concerns the role of *technology* in shaping Chinese productivity and the agglomeration effects within and between industries and cities. The importance of *human capital* is addressed. A second topic deals with the relevance of *population dynamics and migration* for urban development in China. The growth of the population as well as the spatial allocation of the population is both a determinant and driver of urban development. In essence, whereas the first topic covers the role of technology or (human) capital in Chinese urban and economic development, the second highlights the role of labour. A third topic covers the role of *transport and infrastructure* for urban and economic development in China. It does so by making the geography or spatial component of this development explicit through the analysis of the impact of inter-city infrastructure investments and also by offering a network analysis of a specific mega-city region in China. The fourth and final topic concerns the role of the *financial sector* in regional economic development. Whereas the other topics focus on trade and growth, this topic puts the financial sector centre stage and looks into the impact of credit expansion for regional economic development in China.

With respect to the first topic, the article by Rodríguez-Pose and Wilkie traces the rise of China from a knowledge-economy laggard to world leader over the last two decades, using a comparative perspective. Chinese trends in R&D and patenting are compared to those of the countries of the 'triad' (the European Union, Japan and the US), as well as to those of other large emerging economies (Brazil, India, Mexico and South Africa). The authors find how both in innovation inputs and outputs China reflects an innovation reality closer to that of the most developed areas of the world than that of other emerging countries. When it comes to the central theme of this issue, it is found that Chinese innovation is much more geographically concentrated than in other countries. This geographical pattern of innovation may have until now facilitated innovation in China, but it is argued to pose serious future risks in terms of the sustainability of the innovation system. The article by Howell, He, Yang and Fan studies the effects of technological *relatedness* on firm productivity, and whether the size of those effects varies for low and high performing firms. Their main findings point towards the important role that technological relatedness has on increasing firm productivity, providing some support that regions should pursue a strategy of 'regional branching'. The findings also reveal, however, that increasing technological relatedness may asymmetrically harm underperforming firms and thereby widen disparities in productivity between local firms. This may foster uneven inter-regional development in China.

The third and last paper that falls under the technology topic is by Wang, Zhang and Song, who use provincial-level data of the Chinese IT industry from 2003 to 2011 to investigate how amenities affect the distribution of workers' locations. By distinguishing high-skilled and high-income IT service workers from IT manufacturing workers, they show that amenities play an important role in regional attractiveness for IT service employment, whereas their role is less important in IT manufacturing employment. They attribute this finding to the 'firms-following-workers' mechanism in the services sector, whereas the 'workers-following-firms mechanism' is thought to dominate the manufacturing sector.

The second topic concerns the relevance of population dynamics and migration for urban development in China. There are two articles that explicitly cover this topic. The first, by He and Mao, uses national census data to revisit the interactions between population dynamics and economic development by incorporating the spatial discrepancies between the *Hukou* and non-*Hukou* population. They show that economic development is capable of attracting

more non-*Hukou* population. Population growth fosters service development and exerts little influence on manufacturing sectors, where non-*Hukou* population accounts for a larger portion than its counterpart. Their findings suggest that the *Hukou* system is still able to curb the population-development spiral by delinking economic development and social improvement. The second article on urban population dynamics and migration, by Tian, Tian and Cushing, focuses on the repeat migration of migrant workers in China. They explore repeat migration from the perspective of the duration of each migration stage in a migration history. They finds that age at first migration, the accompaniment of family members, and the types and location of destination cities have significant effects on the potential of migrants' subsequent movements to other cities.

The role of *transport and infrastructure* is the third topic in our issue on urban development in China. The article by Chen, Salike, Luan and He analyses the effects of inter- and intra-city transportation infrastructure on the growth of cities using a panel dataset comprising 219 Chinese cities over 1999–2012. According to their estimates, the long-term contribution of inter-city infrastructure accounts for 6% of city growth, that of intra-city public transit being 2%. The core cities are found to benefit more from these infrastructures than peripheral cities. Notably, the impact of transport infrastructures on economic growth are most pronounced in the west but least in central China. Eastern China benefits strongly from investments in transportation infrastructure even though such infrastructure is already abundant. The second article on infrastructure and transport is by Yuyuan Wen, and it establishes identification indicators and criteria to delineate the Beijing-Tianjin-Heibei megacity region. Based on an empirical analysis of advanced producer services and commuting flow, it focuses on the characteristics of producer services and their relevance for poly-centricity in this megacity region. It became more spatial polycentric over time; internal and global network connections and thus functional connectivity have been improving in this megacity region while at the same time Beijing dominates the region connectivity in all respects.

The final article in this issue is on the role of the financial sector, and more particularly on credit expansion for economic and regional development. Bezemer and Zhang study the relationship of financial development to income growth in China during 1995–2013. Their findings suggest that by claiming resources for investment in gross capital formation and net exports, credit expansion held back the growth of consumption by households and government. They exploit cross-province variation in credit growth rates to find that the effects are stronger with more rapid credit growth. The findings are consistent with an investment bias in China's development path. They suggest that a more gradual and more balanced allocation of credit would benefit growth.

Conclusion

The topics addressed in this special issue are diverse, but all contributions indicate that China is currently rapidly urbanizing, and is increasingly able to reap the benefits of urbanization and agglomeration. The drawbacks of urbanization in terms of more spatial inequality and associated social and environmental problems are, however, also noteworthy and important. Future research on urbanization in China should be able to shed more light on the possible trade-offs when it comes to the costs and benefits of urbanization.

Endnotes

[1] We omit a few cities in the first 2000 years of Figure 1 that took over the 'largest city' banner, but without clear information on the number of inhabitants.

[2] The missing city of the 'Four Great Ancient Capitals' is Luoyang (Henan province).

[3] According to the 2010 China census the size of the current agglomeration of Kaifeng is 4.7 million, of

Nanjing 8.0 million, of Xi'an 8.5 million, of Hangzhou 8.7 million, and of Beijing 19.6 million. None of these cities is currently China's largest. According to the census, that accolade goes to the city-province Chongqing with 28.8 million people. Chongqing is, however, an administrative combination of individual cities, so the truly largest Chinese city to date is actually Shanghai with 23.0 million people. From a Chinese perspective, however, Kaifeng is currently not considered a large city.

[4] This includes 'migration' of people for villages that pass the threshold of becoming a city.

[5] The *Hukou* system, which is unique for China, is a visa system that regulates rural-urban migration and the sector of employment; agricultural or non-agricultural. Some agricultural workers can be employed in cities, not only in agricultural employment but also in jobs such as 'equipment operator', 'business service personnel', or 'production and transport related workers.' The Chinese government is currently taking measures to relax the *Hukou* system (see Chan and Buckingham, 2008; The Economist 2010). For an analysis what the relaxation of the *Hukou* system could imply for China, see Bosker et al. (2012).

[6] The similar graph in Figure 8 includes 91 countries in 1964 (panel a) and 169 countries in 2014 (panel b).

[7] It should be noted, however, that we arrive at the same conclusions below if we restrict attention to the 91 countries for which information from 1960 onwards is available.

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