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Urban Systems and Urban Development in the People's Republic of China

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Abstract

The People's Republic of China (PRC) is experiencing a trend toward population concentration in its large coastal cities. However, at the same time, there is also a distortion of city size toward small cities in the country. That is to say, the urban population in the PRC should further concentrate in large cities rather than be more equally spread out. Cross-country analysis indicates that the population size of the primary city in the PRC is smaller than its predicted value. This paper suggests that the PRC government should adjust its policies on future urbanization for fewer restrictions on the further growth of megacities.

JEL Classification: O18, P25, R12

Contents

1. INTRODUCTION

The People's Republic of China (PRC) is a large country with large heterogeneity in regional development. In order to understand urbanization in the PRC, we need to investigate the spatial patterns that lie behind the fast speed of urbanization at the national level. The related policy concern, beyond the speed of urbanization, is whether the PRC should continue to limit its urbanization to megacities in the coastal region as the central government has done for many years. To answer this question, we will test Zipf's law using Chinese data and investigate the determinacy of the primary city based on cross-country data.

2. URBAN SYSTEM

2.1 Distribution of Cities of Different Sizes

In the PRC, a city refers to an administrative area with more than 100,000 residents. Cities in the PRC can be categorized into three administrative levels: county-level cities, prefecture-level cities, and municipalities. Due to the high speed of interregional migration from rural to urban areas, the urban population has been growing at a fast pace since the mid-1990s, when rural migrant workers could find jobs in non-agricultural sectors in urban regions. As Table 1 shows, the number of cities has also been changing, with prefecture-level cities increasing faster due to the administrative upgrading of county-level cities.

Table 1: Number of Chinese Cities by Administrative Level

Year	Total	Municipalities	Prefecture-level Cities	County-level Cities
1990	467	3	182	279
1995	640	3	207	427
2000	663	4	255	400
2005	657	4	282	370
2010	654	4	286	367

Note: Data for Hong Kong, China; Macau, China; and Taipei,China are not included.

Source: National Bureau of Statistics of the PRC, *China City Statistical Yearbook* (1991–2011).

In 2012, the PRC established the prefecture-level city of Sansha in Hannan province and merged Wujiang city (county-level) into Suzhou city (prefecture-level) in Jiangsu province to create the Wujiang district, which increased the number of cities in the PRC to 656. Table 2, which presents statistics on the population size of cities in the PRC, shows that from 1978 to 2012 the number of cities increased more than twofold and the share of larger cities increased by an even greater proportion.

Table 2: Chinese Cities by Population Size

City Population Size	Number of Cities in 1978	% of Total	Number of Cities in 2012	% of Total
More than 10 million people	0	0.00	11	1.68
5 million–10 million people	2	1.04	92	14.02
3 million–5 million people	2	1.04	76	11.59
1 million–3 million people	25	12.95	164	25.00
0.5 million–1 million people	35	18.13	177	26.98
Fewer than 0.5 million people	129	66.84	136	20.73
Total	193	-	656	-

Sources: Data for 2012 is from *China City Statistical Yearbook* (2013). Data for 1978 is from the State Council (2014).

The urban system in the PRC has a clear geographical pattern. Most of the larger cities are located in the eastern part of the country. This is probably the result of two geographical factors. First, the eastern part of the PRC is more productive in agriculture. Second, the eastern part is closer to the country's major seaports, which played an important role when the PRC opened its doors to the rest of the world.

Another feature of the urban system in the PRC is that most of the large cities are provincial capital cities or municipalities because resource allocation was biased toward cities at the higher administrative levels during the planned era before the early 1990s. These cities have also played a significant role in economic growth since the reforms and opening up.

2.2 Geographical Pattern of the PRC's Urbanization

In this section, we further investigate the geographical pattern of the PRC's urbanization. There is no doubt the PRC will continue its fast speed of urbanization in the future. However, whether populations should further agglomerate in the megacities of the eastern PRC's coastal regions still remains a matter of policy debate.

According to Fujita, Krugman, and Mori (1999), international trade plays a very important role in reshaping the spatial pattern of urban systems. The PRC's experience after its reforms and opening up also shows a trend of agglomeration toward coastal regions (Chen and Lu 2008). During the early stages of the reforms and opening up, privileged policies were first applied to coastal cities by means of different types of economic zones. When economic reforms started, the Chinese government implemented an export-oriented strategy, which also benefited coastal regions more than the hinterland. This was reinforced when the PRC joined the WTO in 2001. Coastal regions developed faster also because they attracted more foreign direct investment due to their advantage in location. As a result, many new cities emerged in regions close to major seaports, for example, in the Pearl River Delta near Hong Kong, China (Wei 1995; Anderson and Ge 2005). As a result, the spatial pattern of the urban system in the PRC shows a core–periphery structure. In Table 3, we show the number of cities categorized into two groups according to their distance from the nearest of the three major ports—Hong Kong, China; Shanghai; and Tianjin. We can see from the table that for cities with nonagricultural populations of more than 1 million and 2 million people, those regions closer to a major port witnessed faster increases in the number

of large cities. In particular, from 2005 to 2009, the number of large cities in regions further from the major ports even decreased, reflecting the interregional migration of labor from the hinterland to coastal areas.

Table 3: Number of Large Cities according to Distance from Major Port

Year	Nonagricultural Population>2 million		Nonagricultural Population>1 million	
Distance from Major Port	<500 km	≥500 km	<500 km	≥500 km
1990	5	4	13	18
1995	5	5	13	19
2000	6	7	16	22
2005	14	7	30	23
2009	16	6	34	22

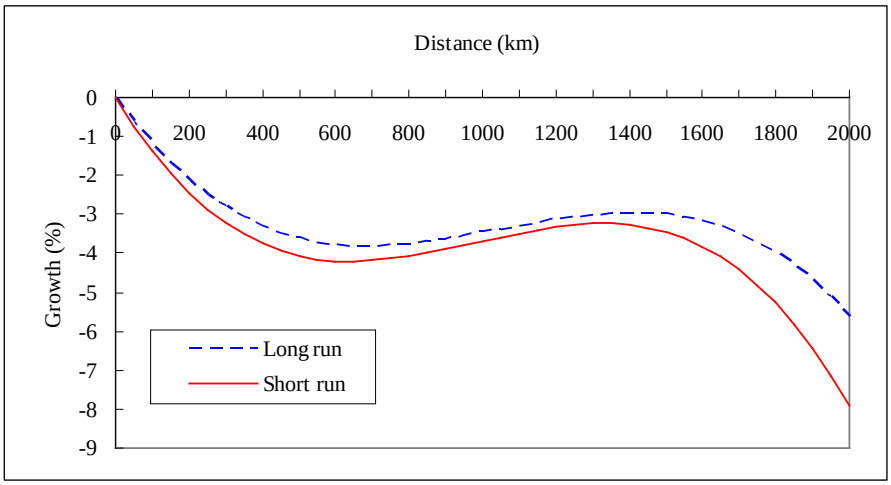
Note: Distance is calculated as the distance from the closest of the three major ports: Hong Kong, China; Shanghai; and Tianjin

Sources: National Bureau of Statistics of the PRC, *China City Statistical Yearbook* (1991–2010), and author's statistics.

There are two hierarchical monocentric urban systems in the PRC. The first is the national urban system, the core of which are the major ports, like Shanghai and Hong Kong, China. The distance to these ports is a measure of the remoteness of cities to the global market. The second is the regional urban system(s), the core of which is large cities like Guangzhou, Chongqing, and Wuhan. The spatial interaction within each urban system exhibits the core–periphery structure. We use the distance to the nearest "big" city to measure interactions within regional urban systems, and the distance to the nearest major port to measure interactions within national urban systems.

We calculate the correlation between the distance to the major ports and the urban economic growth rate (Xu, Chen, and Lu 2010). A core–periphery pattern of urban system can be seen in Figure 1.

Figure 1: Distance to Major Ports and Urban Economic Growth



km = kilometer.

Note: the horizontal axis represents the distance from the nearest major port (Hong Kong, China or Shanghai), and the vertical axis is the urban economic growth rate.

Source: Author's estimations based on original data from *China City Statistical Yearbook* (1991–2007).

The dashed line in Figure 1 suggests that the impact of distance to the major ports on urban economic growth has basically the same shape as the market potential curve of the core–periphery model in the urban system (Fujita and Mori 1997; Fujita, Krugman, and Mori 1999). The solid line simulates the short-run relationship between the distance to ports and growth. The two curves lie close to each other, showing that the long-run relationship between distance and growth is the accumulative effect of that in the short run.

When a city is located within around 600 km of a major port, the closer it is to the major port and international markets, the greater its market potential and economic growth rate are. When the distance is greater than 600 km, international market access is no longer so important. Therefore, a location far away from a port may promote the accumulation of regional and domestic market potential, as well as the development of local economies. When the distance is sufficiently long (more than 1,500 km from a port), cities remote from both domestic and international markets suffer from low market potential and lower economic growth rates.

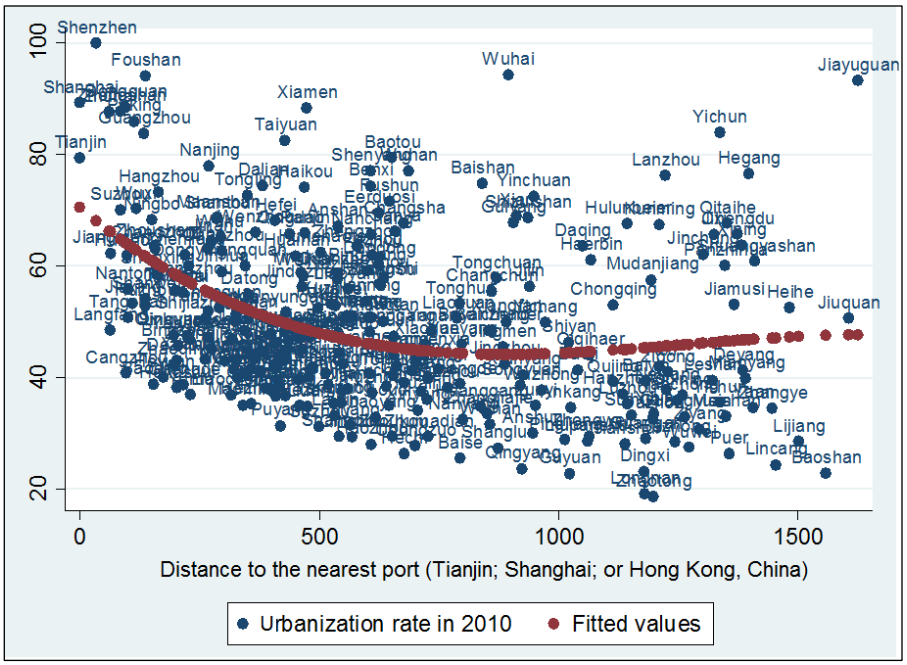
Based on the above discussion, we can safely conclude that the national urban system in the PRC is characterized entirely by a core–periphery structure because of the adjustment of urban economies to international markets. We also find evidence for the agglomeration shadow modeled by Krugman (1993) in the Chinese urban system. This suggests that being closer to an agglomeration center is not always good for the local economy.[1]

2.3 Trends toward Concentration of the Urban Population in Large Cities

The PRC is also characterized by the trend of the urban population being concentrated in coastal cities. The correlation between the urbanization rate and the distance to the nearest port (Tianjin; Shanghai; or Hong Kong, China) in 2010 is shown in Figure 2. We can see that cities closer to the major ports have a higher level of urbanization. Figure 3 further verifies that cities closer to the major ports are more likely to be larger.

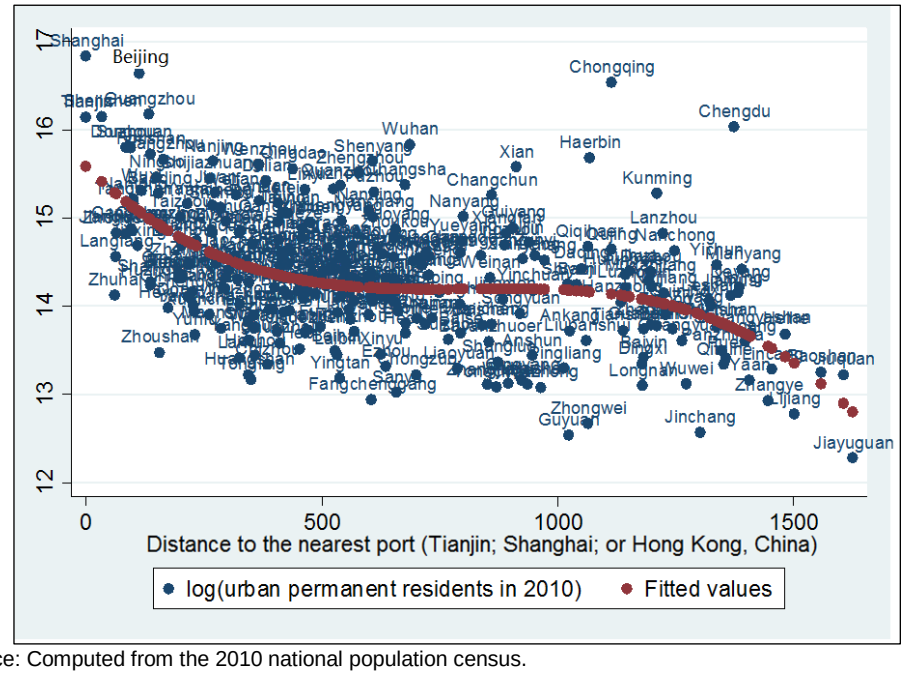
[1] This finding adds new evidence in helping solve the paradox that Partridge et al. (2009) found between the positive closeness–growth relationship when using real data and the theoretical hypothesis of an "agglomeration shadow."

Figure 2: Correlation between the Urbanization Rate and the Distance to the Nearest Port (Tianjin; Shanghai; or Hong Kong, China) in 2010



Source: Computed from the 2010 national population census.

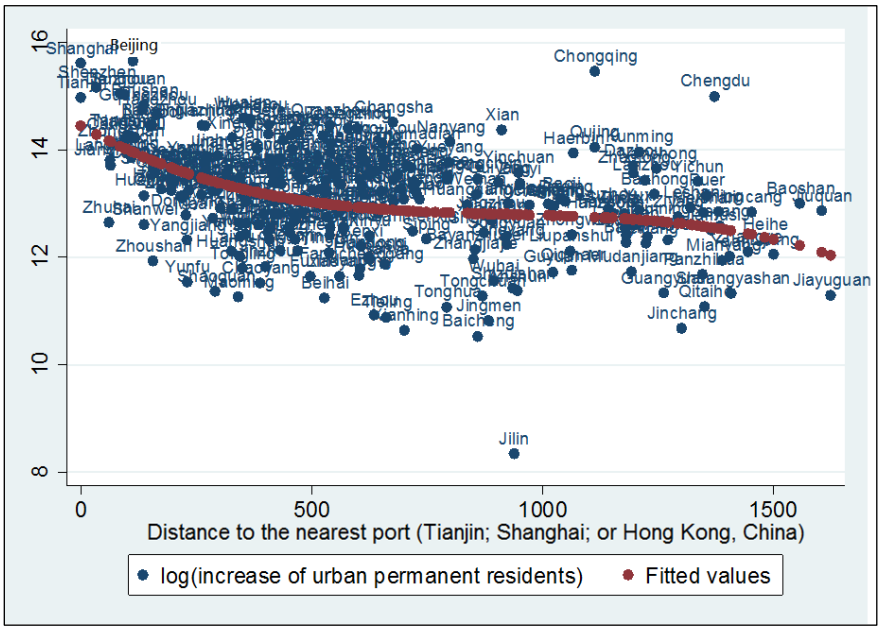
Figure 3: Correlation between Urban Permanent Residents and Distance to the Nearest Port (Tianjin; Shanghai; or Hong Kong, China) in 2010



Source: Computed from the 2010 national population census.

The following two figures show that this pattern is still being reinforced. Figure 4 indicates that cities closer to the major ports have a faster speed of increase in urban permanent residents. This is because cities closer to the major ports have a higher per capita GDP as well as better local public services, where most of the graduate students find their first job. Coastal cities are also the industrial agglomeration centers in the PRC, and are where most of the rural migrant workers find jobs.

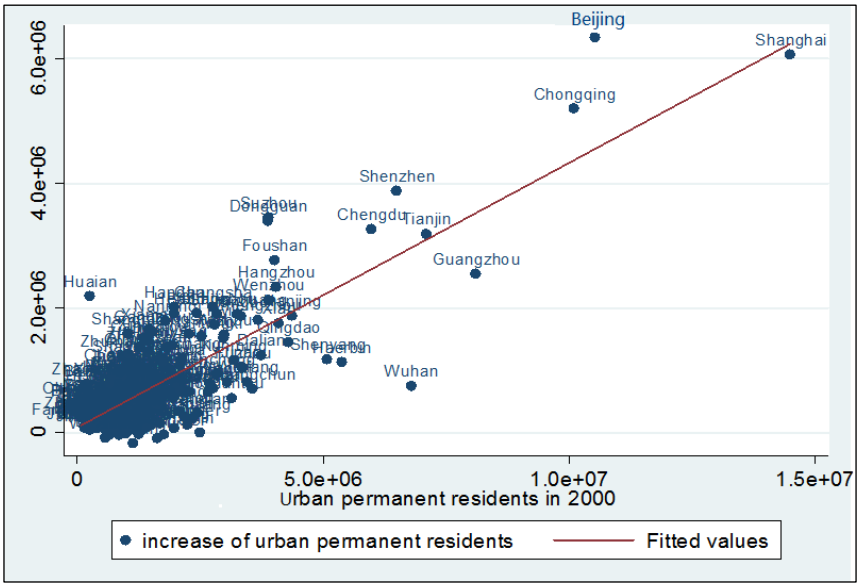
Figure 4: Correlation between Increase in Urban Permanent residents from 2000 to 2010 and Distance to the Nearest Port (Tianjin; Shanghai; or Hong Kong, China)



Source: Computed from the 2000 and 2010 national population census.

Since cities closer to the major ports are on average larger than those farther away, the correlation in Figure 4 suggests that larger cities in the PRC will have a faster speed of population growth. Figure 5 shows that cities with more residents have a faster speed of increase in urban permanent residents.

Figure 5: Correlation between Increase in Urban Permanent Residents from 2000 to 2010 and Urban Permanent Residents in 2000



Source: Computed from the 2000 and 2010 national population census.

3. RANK-SIZE RELATIONSHIP IN THE URBAN SYSTEM

An important question that policy makers grapple with in the context of urbanization is what the urban system in the PRC should be like. In this section, we first test whether Zipf's law, a statistical rule describing an urban system in a country, exists in the PRC. We then answer the same question by undertaking a cross-country comparison.

3.1 Test of Zipf's Law

Zipf's law can be expressed as the rank-size rule: the *r*th largest city has a size equal to *s*=*r* times the size of the *s*th largest city. That is to say, the following equation holds if Zipf's law exists:

$$\ln \text{POP}i = \text{POP}_1 - \ln i,$$

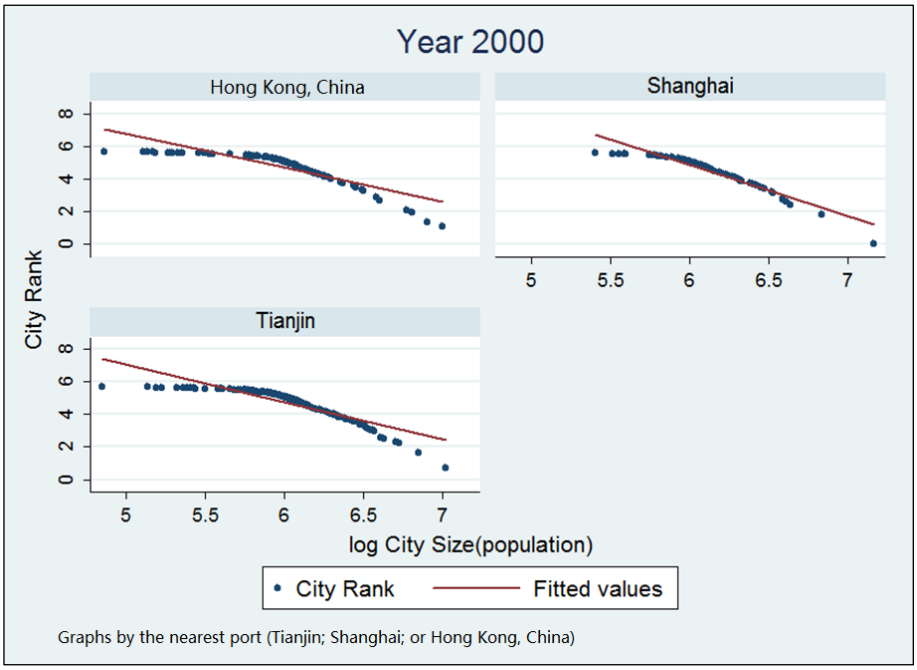
where POP*i* is the population of the *i*th largest city and POP_1 is the population of the largest city in the country.

So, we can simply test Zipf's law by drawing the log value of city rank and the log value of city population in one figure. The closer the coefficient is to –1, the more likely it is that Zipf's law holds. We depict this in Figure 6(a) by using census data from 2000 and 2010. We can see from the figure that in order to fit Zipf's law, the population size in larger cities should be larger (as is the case), while those in smaller cities should be smaller (as it is).

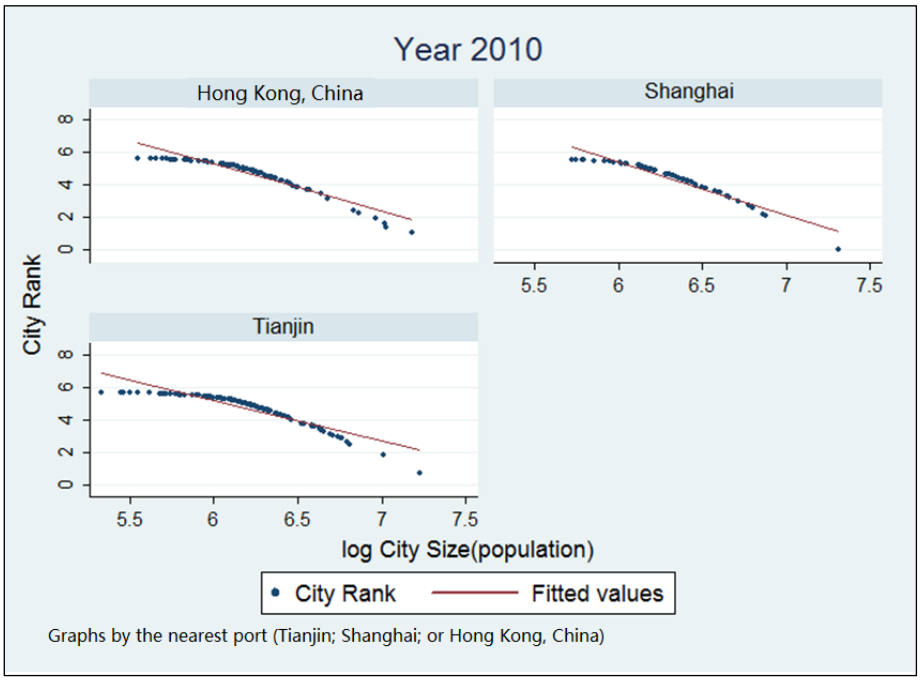
Figure 6: Testing Zipf's Law

(a) All cities (2000 and 2010)

(b) Cities grouped into three subgroups (2000)



(c) Cities grouped into three subgroups (2010)



Source: Computed from the 2010 national population census.

Since the PRC is such a large country, we further separate all the cities into three subgroups according to which major port they are closest to (Hong Kong, China; Shanghai; or Tianjin). Based on these subsamples, we have Figures 6(b) and 6(c). We can see that the dotted lines now become closer to the red lines, which implies that in order to understand the urban system in the PRC, it is important to group all the cities into different groups according to their location.

Figures 6(b) and 6(c) also indicate that if Zipf's law is a general law for all countries, there must have been some policy constraints that limited population size in the larger

cities of the PRC. We will provide more evidence on the distortion of city size in the PRC in the following section.

3.2 Description of the Distortion of City Size

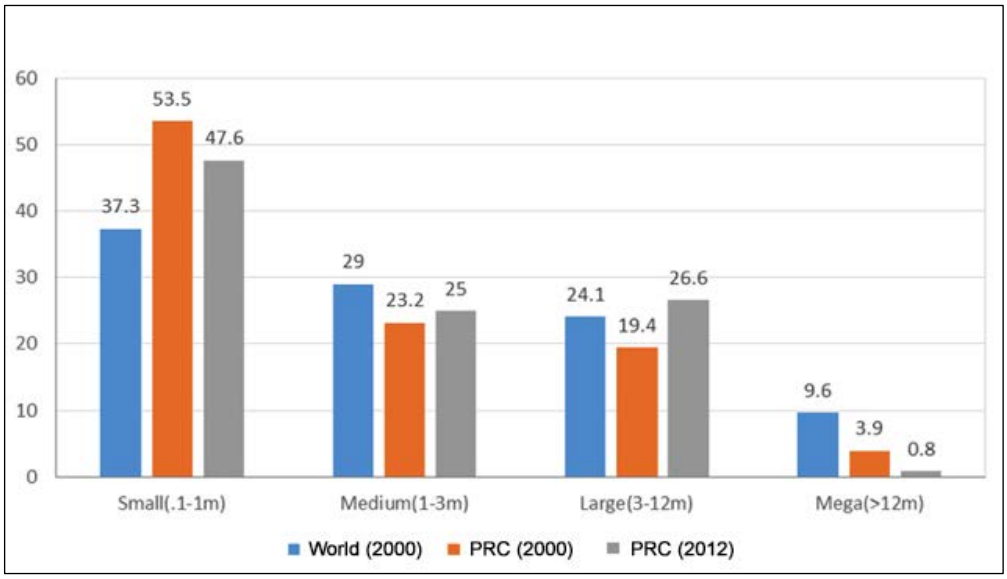
Modern urban economies are mainly composed of secondary and tertiary industries. As an economy transitions to the post-industrial phase, big cities become even more important in the development of services. There is a misconception in Chinese society that the population density in the big cities is too high. The truth is that in terms of international standards, other than the Chinese megacities with populations of over 10 million, the average Chinese "big" city still has much room for growth.

Though the PRC has megacities such as Shanghai, Beijing, and Guangzhou, Au and Henderson (2006) suggest that in 1997, many prefecture-level cities were about half their efficient sizes. They estimated that a doubling of the population in such cities would lead to a 20%–35% increase in real output per worker. Although some cities have experienced heavy migration from rural regions in the last few years, it seems that much of the PRC still has too many cities with too few people.

Henderson and Wang's (2007) study of 142 countries found that there were 94 cities with an urban population of over 3 million in 2000, and 324 cities with an urban population of 1 million–3 million, or a ratio of 0.29. When we performed the same calculation with Chinese data, we arrived at a ratio of 0.12 in 2000 and 0.17 in 2009. From Figure 7, we can see that the relative number of cities in the megacity group is much smaller than that of the world average, while that of cities in the small city group is larger than the world average.

Figure 7: Share of Cities by Population Size: World versus the PRC

(%)



m = million, PRC = People's Republic of China.

Sources: Data for 2000 is from Henderson (2009); 2012 data is calculated by the author from *China City Statistical Yearbook* (2013).

Henderson and Wang (2007) pointed out that the distribution of the Chinese urban population is not concentrated enough. In their study, the spatial Gini coefficient for the global urban population in 2000 was 0.5619. Among the seven countries with the largest populations—namely the PRC, India, the United States, Indonesia, Brazil, the

Russian Federation, and Japan—Japan has the highest spatial Gini coefficient at 0.6579, while the PRC has the lowest spatial Gini coefficient at 0.4234. According to calculations by Fujita et al. (2004), the differences in population size among Chinese cities is far lower than other market economies and is only close to that of Central Asian and other former planned-economy countries. In short, Chinese big cities are not large enough and the number of Chinese big cities is inadequate.

With respect to megacities, the conclusion that their size has become too big cannot be simply drawn from the total population statistics. Chinese cities are defined according to administrative jurisdiction. Megacities (especially the municipalities with province-level status) have a very large area and, strictly speaking, are city clusters instead of individual cities. Thus, when making comparisons, distinctions should be made between the core urban district, suburbs, and satellite cities. To this end, we regard Beijing, Shanghai, and Guangzhou as the core region of the Bohai Rim, Yangtze Delta, and Pearl Delta city clusters, respectively, and compare them with Tokyo and New York.

It can be observed from Table 4 that if the population densities of Shanghai, Beijing, and Guangzhou are calculated simply using statistical figures, then the population densities of these cities will be significantly lower than that of Tokyo and New York. However, the jurisdiction areas of these Chinese cities far exceed those of Tokyo and New York. Therefore, we calculated the population densities of the core urban districts of these cities using an area comparable to Tokyo and New York. It was discovered that Beijing and Shanghai's central urban district population densities are basically equivalent to those of Tokyo and New York's, though Guangzhou's population density is still low. If the Tokyo metropolitan area is used as the comparison, then it would be more or less equivalent to the area of Beijing's jurisdiction, Shanghai plus Suzhou, or Guangzhou plus Foshan. It can be observed that the population density within Shanghai and Suzhou's boundaries is already equivalent to that of the Tokyo metropolitan area, while there is still an obvious gap between the population density of Beijing's jurisdiction and Guangzhou plus Foshan and that of the Tokyo metropolitan area. This gap mostly comes from the area outside the central urban area.[2]

[2] It needs to be mentioned that the source of Chinese urban development lies in the population distribution of the planned economy era. During the process of urban expansion, new population enters the city, while the original population does not sufficiently disperse toward the urban periphery or other areas. If the PRC's future provision of public services between cities and within cities can be further equalized, then a portion of the original downtown population in big cities can disperse toward the urban periphery or other areas and there will still be room in the downtown area to accommodate the newly arrived population.

Table 4: PRC's Three City Clusters Compared with the Tokyo Metropolitan Area and New York

	Tokyo	New York	Tokyo's 23 Core Districts	Tokyo Metropolitan Area	Tokyo Metropolitan Area, excluding Tokyo
Population	1,298.88	817.51	880.21	3,500.00	2,201.12
Area	2,187.65	783.84	621.9	13,400.00	11,212.35
Population Density	5,937.33	10,429.63	14,151.69	2,611.94	1,963.12
	Shanghai	**Shanghai's Densest Districts, including Pudong**	**Shanghai's 12 Core Districts, excluding Pudong**	**Shanghai and Suzhou**	**Beyond Shanghai's 12 Core Districts and Suzhou**
Population	2,302.66	1,784.15	1,279.42	3,239.61	1,960.19
Area	6,340.50	2,065.97	855.56	11,219.92	10,364.36
Population Density	3,631.67	8,635.90	14,954.18	2,887.37	1,891.28
	Beijing	**Beijing's 6 Core Districts**		**Beijing**	**Beyond Beijing's 6 Core Districts**
Population	1,961.20	1,171.60		1,961.20	789.60
Area	16,410.54	1,368.32		16,410.54	15,042.22
Population Density	1,195.09	8,562.32		1,195.09	524.92
	Guangzhou	**Guangzhou's 10 Districts**	**Shenzhen**	**Guangzhou and Foshan**	**Beyond Guangshou's 10 Districts and Foshan**
Population	1,270.08	1,107.07	1,035.79	1,989.08	882.01
Area	7,434.40	3,843.43	1,952.80	11,282.89	7,439.46
Population Density	1,708.38	2,880.41	5,304.13	1,762.92	1,185.59

Note: Other than Tokyo and Suzhou's population figures being from 2009, the rest are from 2010 data. Suzhou's jurisdiction area is 8,488.42 square kilometers with 3,609 square kilometers in territorial waters. The unit of population is 10,000 persons, unit of area is square kilometers, and unit of population density is persons per square kilometer.

Sources: New York data is from http://quickfacts.census.gov/qfd/states/36/3651000.html; Shanghai's data is from *Shanghai Statistical Yearbook* 2011; the rest are from the respective city official websites and the PRC's 2010 national population census.

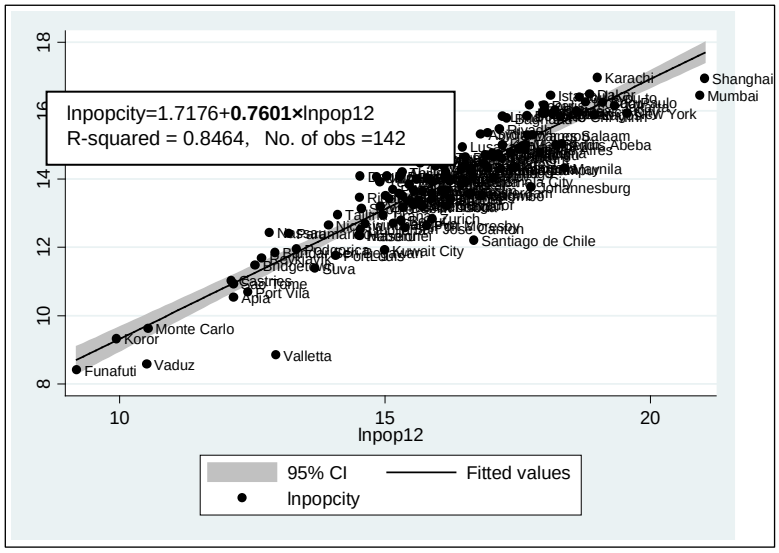
4. THE PRIMARY CITY

We now look at the question of how large a country's urban primacy should be. This is particularly important for policy makers in the PRC since officials in megacities such as Shanghai, Beijing, or Guangzhou all want to control the city's population size.

4.1 A Country's Total Population and Urban Primacy

Countries have diverse political systems, economic systems, and cultures. However, the determinant of the population size of a country's primary city is basically the same—it is linked to how the total population is distributed within the country. The size of the primary city requires a balancing of the positive and negative marginal effects of population size. So it is natural that we first look at the relationship between the population of a primary city and that of the whole country, as shown in Figure 8.

Figure 8: Country and Primary City Populations



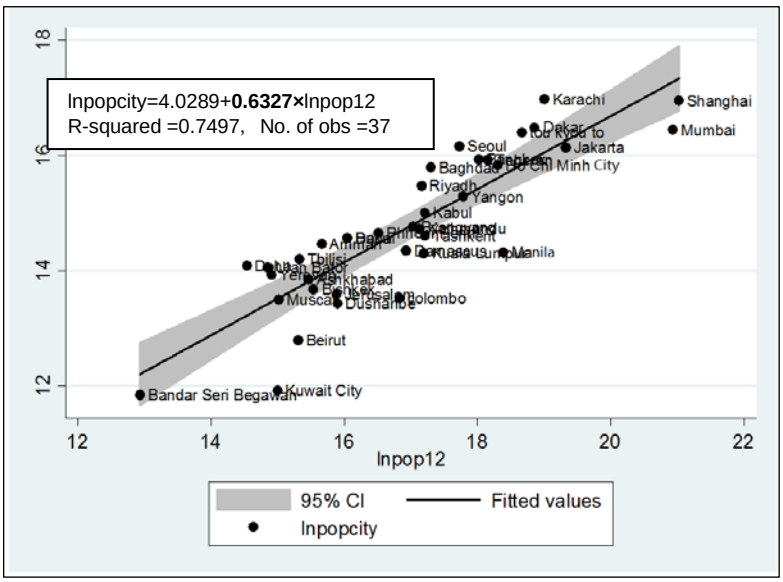
CI = confidence interval.

Source: World Bank (http://data.worldbank.org.cn/indicator) and Wikipedia information for each city. For example, for Shanghai see: https://en.wikipedia.org/wiki/Shanghai#Demographics.

From Figure 8, it is surprising that the populations of primary cities are so highly correlated with their countries' populations. If we use the log value of a country's total population as a single independent variable, based on observations from 142 countries or economies where we could find data, the R^2 value is as high as 0.85. Therefore, to a large extent, we can predict the population size of a country's primary city from the country's total population.

Since Asian countries or economies might be different, Figure 9 presents observations from subsamples from Asia. Here, too, we find that the primary city populations and whole country populations are highly correlated.

Figure 9: Country and Primary City Populations in Asia

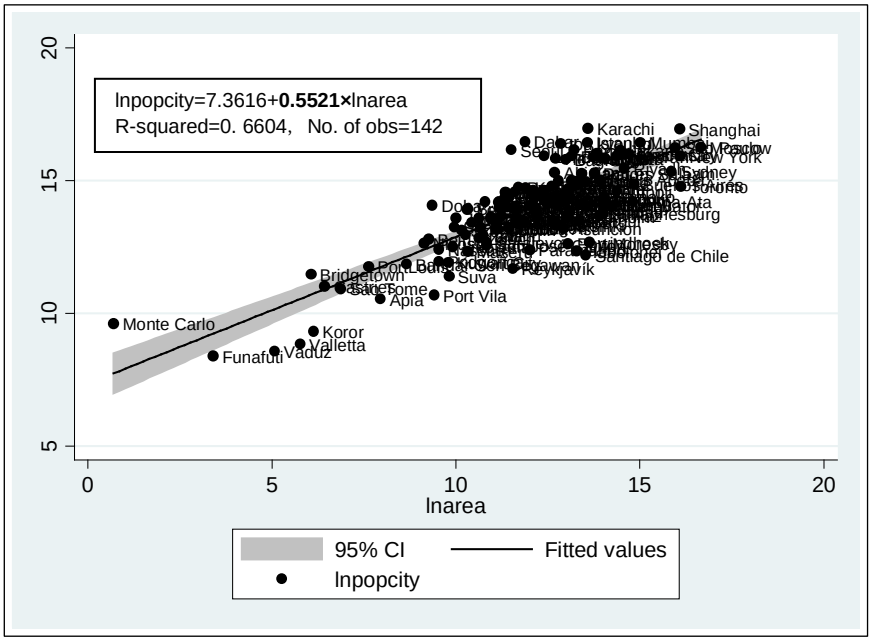


CI = confidence interval.

Source: World Bank (http://data.worldbank.org.cn/indicator) and Wikipedia information for each city (https://en.wikipedia.org/wiki/Main_Page).

One might argue that a primary city has a large population size because the total area of the country is limited. Alternatively, a country's population might be more equally distributed among small and medium-sized cities if it has a larger total area. As a result, the population size of the primary city might be smaller in this case. However, as shown in Figure 10, there also exists a positive correlation between the population size of the primary city and the country's total area. There are two possible explanations for this finding. First, countries with larger areas have larger total populations, which make the primary cities larger (as shown in Figure 8 and Figure 9). Second, the area of the primary city will also be larger for countries with larger total areas. As a result, primary cities with larger areas could have larger population sizes. In the case of the PRC, since quite a lot of its area is not feasible for dwelling, a larger total area does not necessarily mean the population will be more equally distributed throughout the country.

Figure 10: Country Areas and Primary City Populations in Asia



CI = confidence interval.

Source: World Bank (http://data.worldbank.org.cn/indicator) and Wikipedia information for each city (https://en.wikipedia.org/wiki/Main_Page).

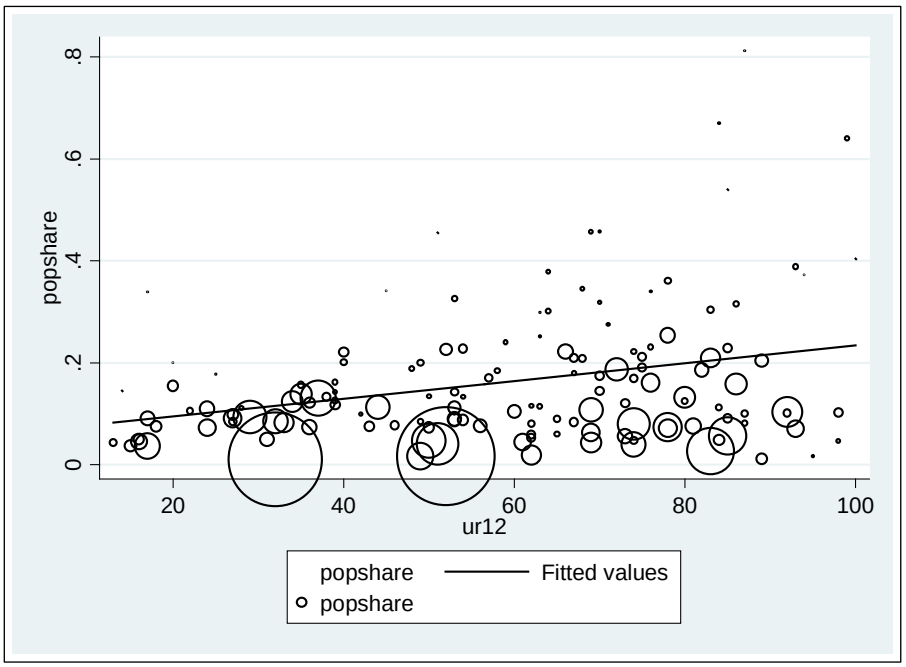
4.2 Urbanization, Openness, and Primacy

Two other factors, urbanization and openness, might affect the size of a primary city. A higher level of urbanization means larger agglomeration effects and higher labor productivity (World Bank 2009; Lu 2013), which result in larger megacities. During the process of urbanization, the size of the primary city increases as more migrants settle down in large cities, where they are more likely to find promising jobs because of human capital externalities. More openness means a higher ratio of trade to GDP, which implies that the services sector will be more important for the whole country. In reality, most primary cities are also trade centers, especially in the case of cities with seaports or river ports. Among the primary cities in the 142 sample countries (or economies), about one-third are cities with seaports and 7.5% have river ports.

Figure 11 shows the relationship between the population share and urbanization level of primary cities. The higher the population share of the primary city, the more

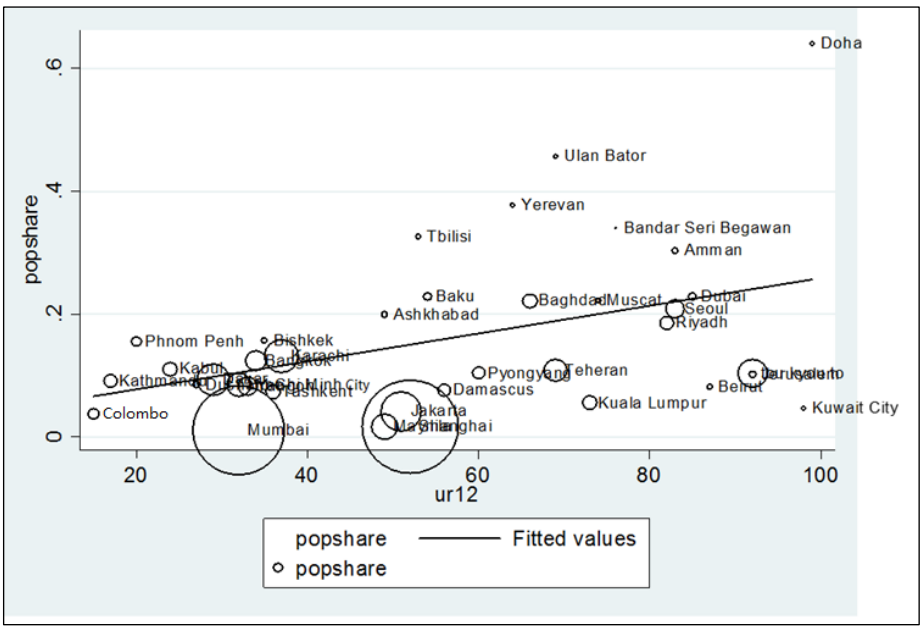
population is concentrated within it. Figure 11 shows a positive correlation with limited fitness. This is mainly because a country's total population is the most important factor affecting the size of its primary city. In Figure 11, economies with a larger total population are depicted with larger circles. From the figure, we can see that most of the large circles are below the linear fitted line, which indicates that the population shares of primary cities in larger countries are below average. Figure 12 shows the same result when we use only Asian subsamples.

Figure 11: Urbanization and Population Shares of Primary Cities



Source: World Bank (http://data.worldbank.org.cn/indicator) and Wikipedia information for each city (https://en.wikipedia.org/wiki/Main_Page).

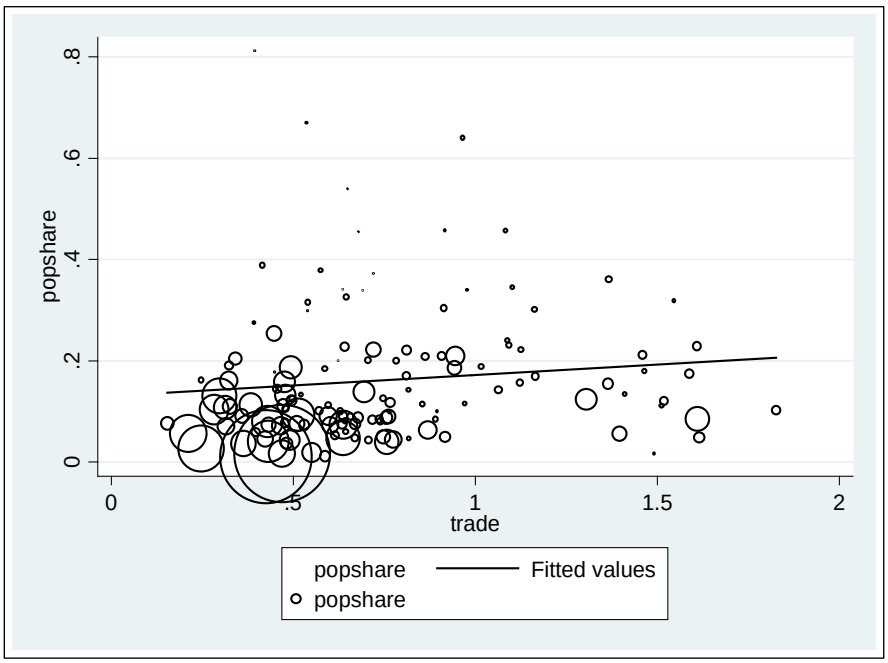
Figure 12: Urbanization and Population Shares of Primary Cities in Asia



Source: World Bank (http://data.worldbank.org.cn/indicator) and Wikipedia information for each city (https://en.wikipedia.org/wiki/Main_Page).

A similar pattern holds for the correlation between openness and population share of primary cities. We can see from Figure 13 that countries with higher levels of openness, measured by the trade/GDP ratio, have a higher share of their population in primary cities. Again, the R^2 value for the ordinary least squares (OLS) regression is quite small because total population is the most powerful explanatory factor. Similarly, larger countries (with larger circles) are below the fitted line.

Figure 13: Openness and Population Shares of Primary Cities



Source: World Bank (http://data.worldbank.org.cn/indicator) and Wikipedia information for each city (https://en.wikipedia.org/wiki/Main_Page).

4.3 Regional Primacies—Trends over Time

The PRC is a large country with different regions at different development stages, and cities in the PRC's hinterland are less developed than cities in the coastal region. So we investigate the regional primacies for different provinces and their trend over time. Table 5 shows the primary city for each province and its population share in the province for 2000 and 2010. The basic finding is that there was further concentration in some of the regional primary cities, while others had a smaller population share in 2010 than in 2000.

Table 5: Population Proportions of the Most Populous Prefecture-level Cities in the PRC

Province	Primacy City in 2000	Proportion in 2000	Primacy City in 2010	Proportion in 2010
Hebei	Shijiazhuang	18.44%	Shijiazhuang	16.29%
Shanxi	Taiyuan	24.11%	Taiyuan	20.21%
Inner Mongolia Autonomous Region	Hulunbuir	17.58%	Baotou	15.36%
Liaoning	Shenyang	22.06%	Shenyang	22.98%
Jilin	Changchun	26.69%	Changchun	29.07%
Heilongjiang	Tsitsihar	28.76%	Tsitsihar	30.49%
Jiangsu	Nanjing	14.11%	Suzhou	15.47%
Zhejiang	Hangzhou	18.04%	Hangzhou	18.99%
Anhui	Hefei	12.46%	Hefei	15.20%
Fujian	Fuzhou	23.48%	Fuzhou	22.55%
Jiangxi	Nanchang	18.91%	Nanchang	16.99%
Shandong	Qingdao	12.48%	Qingdao	12.04%
Henan	Zhengzhou	17.14%	Zhengzhou	15.12%
Hubei	Wuhan	28.18%	Wuhan	26.51%
Hunan	Changsha	15.77%	Changsha	16.75%
Guangdong	Guangzhou	17.06%	Guangzhou	15.42%
Guangxi Zhuang Autonomous Region	Nanning	14.46%	Nanning	19.43%
Hainan	Haikou	24.64%	Haikou	35.22%
Sichuan	Chengdu	26.75%	Chengdu	28.56%
Guizhou	Guiyang	26.93%	Guiyang	24.98%
Yunnan	Kunming	32.08%	Kunming	27.18%
Tibet Autonomous Region	Lhasa	37.48%	Lhasa	35.40%
Shaanxi	Xi'an	35.93%	Xi'an	34.25%
Gansu	Lanzhou	34.41%	Lanzhou	30.01%
Qinghai	Sining	65.71%	Sining	55.91%
Ningxia Hui Autonomous Region	Yinchuan	36.76%	Yinchuan	47.83%
Xinjiang Uygur Autonomous Region	Urumchi	27.83%	Urumchi	30.69%

PRC = People's Republic of China.

Source: Computed from the 2000 and 2010 national population censuses.

In Table 6, we use the population share of the top two populous prefecture-level cities instead of the regional primary city. The result is almost the same as for Table 5. The trend of the change in population proportion varies over different provinces.

Table 6: Population Proportions of the Top Two Most Populous Prefecture-level Cities in the PRC

Province	Top Two Cities in 2000	Proportion in 2000	Top Two Cities in 2010	Proportion in 2010
Hebei	Shijiazhuang	32.22%	Shijiazhuang	30.04%
	Baoding		Baoding	
Shanxi	Taiyuan	35.53%	Taiyuan	31.45%
	Datong		Yucheng	
Inner Mongolia Autonomous Region	Hulunbuir	29.85%	Baotou	28.41%
	Hohhot		Hohhot	
Liaoning	Shenyang	38.32%	Shenyang	41.29%
	Dalian		Dalian	
Jilin	Changchun	45.34%	Changchun	46.04%
	Jilin		Jilin	
Heilongjiang	Harbin	40.75%	Harbin	41.59%
	Tsitsihar		Tsitsihar	
Jiangsu	Nanjing	26.68%	Suzhou	28.64%
	Suzhou		Nanjing	
Zhejiang	Hangzhou	35.45%	Hangzhou	36.94%
	Wenzhou		Wenzhou	
Anhui	Hefei	23.61%	Hefei	24.55%
	Fuyang		Fuyang	
Fujian	Fuzhou	43.30%	Fuzhou	43.48%
	Quanzhou		Quanzhou	
Jiangxi	Nanchang	32.49%	Nanchang	33.10%
	Ganzhou		Ganzhou	
Shandong	Qingdao	22.52%	Qingdao	21.54%
	Weifang		Linyi	
Henan	Zhengzhou	26.16%	Zhengzhou	24.33%
	Nanyang		Nanyang	
Hubei	Wuhan	38.26%	Wuhan	36.19%
	Xiangfan		Xiangfan	
Hunan	Changsha	26.18%	Changsha	27.93%
	Hengyang		Hengyang	
Guangdong	Guangzhou	30.72%	Guangzhou	30.42%
	Shenzhen		Shenzhen	
Guangxi Zhuang Autonomous Region	Nanning	25.29%	Nanning	31.23%
	Yulin		Yulin	
Hainan	Haikou	34.72%	Haikou	45.75%

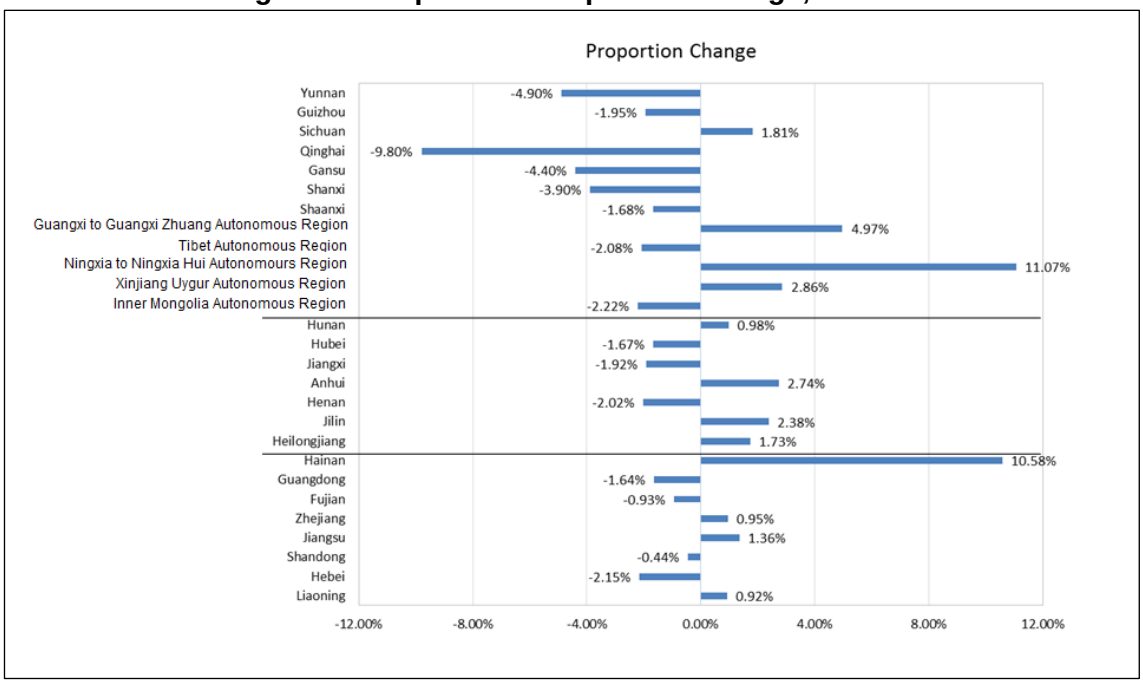
	Sanya		Sanya	
Sichuan	Chengdu	34.30%	Chengdu	35.53%
	Mianyang		Nanchong	
Guizhou	Guiyang	44.72%	Guiyang	43.26%
	Zunyi		Zunyi	
Yunnan	Kunming	42.47%	Kunming	41.58%
	Qujing		Qujing	
Tibet Autonomous Region	Lhasa	37.48%	Lhasa	35.40%
Shaanxi	Xi'an	50.17%	Xi'an	46.35%
	Xianyang		Xianyang	
Gansu	Lanzhou	43.92%	Lanzhou	40.00%
	Tianshui		Tianshui	
Qinghai	Sining	65.71%	Sining	55.91%
Ningxia Hui Autonomous Region	Yinchuan	68.40%	Yinchuan	64.31%
	Wuzhong		Shizuishan	
Xinjiang Uygur Autonomous Region	Urumchi	32.16%	Urumchi	34.48%
	Karamay		Karamay	

Note: From top to bottom, provinces are grouped into western, central, and eastern locations.

Source: Computed from the 2000 and 2010 national population censuses.

In order to find how the population proportion changes for the regional primary cities in different provinces, we examine Figure 14, where the horizontal axis is the proportion change and the vertical axis shows the province name. Provinces are listed according to their location.

Figure 14: Population Proportion Change, 2000–2010



Source: Computed from the 2000 and 2010 national population censuses.

We can see from Figure 14 that most western provinces have experienced a decrease in the population proportion of the regional primary city. In central and eastern provinces, on the other hand, the average trend is further population concentration toward the regional primary city. This is in line with the core–periphery pattern of the urban system we discussed before.

5. POLICY RECOMMENDATIONS

Since the reforms and opening up, the urban system in the PRC has reflected a core–periphery pattern, with cities in coastal regions showing greater population concentrations those in the PRC's hinterland. Compared with Tokyo (circle) and New York, there is no evidence that the PRC's three city clusters are too large in population size. Cross-country analysis also indicates that the population size of the primary city in the PRC is smaller than its predicted value. Moreover, there is a distortion of city size toward small cities in the PRC. That is to say, the urban population in the PRC should further concentrate in large cities rather than be so dispersed.

However, in reality, there exist restrictions on the population size of big cities in the PRC. For example, the 12th Five Year Plan (12-FYP) promotes the development of small and mid-sized cities and towns, and restricts the development of megacities. This paper suggests that the PRC's government should adjust its policies on future urbanization with fewer restrictions on the further growth of megacities. The policy guidelines should allow free factor mobility among regions, especially toward megacities. This means fewer restrictions with *hukou* barriers against migrant workers and providing megacities with more discretion in converting agricultural land into non-agricultural land on the basis of market prices rather than quotas by the central government. Given the sharp disparity in the quality and quantity of local public services among different regions in the PRC, the central government should promote a more equal distribution of local public services to ease the burden faced by megacities in providing local public services to the fast-increasing numbers of migrants.

REFERENCES*

Anderson, G., and Y. Ge. 2005. The Size Distribution of Chinese Cities. *Regional Science and Urban Economics* 35(6): 756–776.

Au, C. C., and J. V. Henderson. 2006. How Migration Restrictions Limit Agglomeration and Productivity in China. *Journal of Development Economics* 80: 350–388.

Chen, Z., and M. Lu. 2008. Is China Sacrificing Growth when Balancing Interregional and Urban-Rural Development? In *Reshaping Economic Geography in East Asia*: 241-257, edited by Y. Huang and A. M. Bocchi. World Bank, Washington, DC.

Fujita, M., and T. Mori. 1997. Structural Stability and Evolution of Urban System. *Regional Science and Urban Economics* 27: 399–442.

Fujita, M., P. R. Krugman, and T. Mori. 1999. On the Evolution of Hierarchical Urban Systems. *European Economic Review* 43: 209–251.

Fujita, M., J. V. Henderson, Y. Kanemoto, and T. Mori. 2004. Spatial Distribution of Economic Activities in Japan and China. In *Handbook of Urban and Regional Economics* Vol.4: 2911–2977, edited by V. Henderson and J. F. Thisse. Amsterdam.

Henderson, J. V., and H. G. Wang. 2007. Urbanization and City Growth: The Role of Institutions. *Regional Science and Urban Economics*, 37: 283–313.

Henderson, J.V. 2009. Urbanization in China: Policy Issues and Options. Report for the China Economic Research and Advisory Program. Available at http://www.s4.brown.edu/china2012/Papers/Final%20Report%20format1109summary.pdf (accessed 13 May 2014).

Krugman, P. 1993. First Nature, Second Nature, and Metropolitan Location. *Journal of Regional Science* 33: 129-144.

Lu, M. 2013. The Power of Space: Geography, Politics and Urban Development, (in Chinese). Shanghai People's Press.

National Bureau of Statistics of the PRC. 1991-2013. *China City Statistical Yearbook*, Beijing: China Statistics Press.

Partridge, M. D., D. S. Rickman, K. Ali, and M. R. Olfert. 2009. Do New Economic Geography Agglomeration Shadows Underlie Current Population Dynamics across the Urban Hierarchy? *Papers in Regional Science* 88: 445–466.

Shanghai Municipal Statistics Bureau. 2011. *Shanghai Statistical Yearbook*. Beijing: China Statistics Press.

The State Council. 2014. *The State's Plan on New Urbanization* (2014-2020), State Council, PR.

Wei, S.-J. 1995. The Open Door Policy and China's Rapid Growth: Evidence from City-Level Data. In *Growth Theories in Light of the East Asian Experience*, NBER-East Asian Seminar on Economics, edited by T. Ito and A. O. Krueger. University of Chicago Press.

* The Asian Development Bank refers to China by the name People's Republic of China.

World Bank. 2009. *World Development Report 2009: Reshaping Economic Geography*. Washington, DC: World Bank.

Xu, Z., Z. Chen, and M. Lu. 2010. The Core-periphery Model of China's Urban System, An Empirical Study on Geography and Economic Growth, (in Chinese). *The Journal of World Economy* 7: 144–160.