Misconceptions and Complexities in the Study of China's Cities: Definitions, Statistics, and Implications

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Abstract: A noted American authority on urbanization and the household registration system in China reviews and clarifies factors leading to misunderstanding and misconceptions regarding the number of inhabitants of China's major cities. Principal sources of confusion linked to reliance on official statistical sources are the multi-layered meanings of the term "city" and, consequently, simultaneous publication and use of a multitude of official population statistics for the country's "cities." Other complicating factors analyzed by the author include the effects of the Chinese *hukou* (household registration) system and the rapid rate of urban growth and change over the last three decades. Systematic population and per capita GDP data for the years 2000 and 2005, all based on the multiple boundaries and systems for five major cities (Beijing, Shanghai, Chongqing, Guangzhou, and Shenzhen), are collected to illustrate both the countrywide situation and specific cases. Also included is a critique of several studies and popular accounts of Chinese cities to highlight misstatements and areas of misunderstanding based on inappropriate use of statistical data. *Journal of Economic Literature*, Classification Numbers: O18, O53, P20, R12. 2 figures, 6 tables, 130 references. Key words: China, cities, mega-cities, urban population statistics, *hukou* system, household registration, per capita GDP, Beijing, Shanghai, Chongqing, Guangzhou, Shenzhen.

INTRODUCTION

Which of China's cities is the largest, how large is its population, and which city has the highest per capita GDP? As simple and elementary as such questions may seem, they underlie the basic, fundamental issue of measuring populations in urban studies of China that use numbers.[2] These studies range from "simple" analyses of urban trends in China (or even in the entire world due to China's heavy weight in the global urban population), or learned debates on the nation's "underurbanization," to relatively complicated quantitative analyses of cities probing their "competitiveness." The studies often involve, and also critically depend on, city population and/or various per capita metrics of cities. The methodological question of "city population" versus "non-city population" (peasants) is indeed intricately linked with the larger issue of addressing rural-urban inequality and forging a "harmonious society" currently on the agenda of the Chinese Communist 17th Party Congress, as a recent issue of *The Economist* (China, Beware, 2007) reasoned in its cover story. Perhaps because of its mystique (and allegedly "unique" model),[3] China's urbanization has fascinated

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[2]For a similar line of enquiry at a global scale, see Forstall et al. (2007).

[3]See Murphey (1975) and Ma (1976), as well as the critiques and debates in Chan (1994) and Lin (1998).

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scholars for many decades. With the country's rapid urbanization and rising prominence in the global economy, a large body of geographic and economic literature on Chinese cities has been generated, a significant portion of it based on statistical analysis of data. The numbers, while important in their own right, are also central to constructing urbanization theories and assessing policies, as explained in one of the earliest works by Chan and Xu (1985). Failure to grasp this complexity, or imprudent use of the statistics by simply accepting them at face value, can result in erroneous interpretations that mislead both scholars and the public at large, as Zhou and Ma (2005) have already observed. Indeed, some previous assertions about Chinese cities are so absurd that Hu and Foggin (1994, p. 2) once likened them to "tales of the Arabian Nights." The flood of numbers forthcoming from China since the 1980s has undoubtedly opened up abundant opportunities for social scientists to understand a country that once was closed, but the expanding and increasingly complex statistical data also have posed challenges to investigators less familiar with operation of a "socialist market economy" and its constituent statistical system (see Keidel, 1984). There are indeed many muddled and treacherous waters in the China sea of statistics before us today (e.g., Schmetzer, 1994; Rawski, 2001; Holz, 2002).

Confusion and contradictions surrounding the size of the population or number of inhabitants of Chinese cities abound in both the popular media and in more serious academic and official publications. In fact, frustrated observers over the last quarter of the 20th century proclaimed the Chinese urban population to be an insoluble "enigma" (Orleans and Burnham, 1982), or at the very least an "immense puzzle" (Forstall, 1989).[4] The situation has not improved tangibly in the early 21st century, as new definitional issues have emerged (Chan and Hu, 2003). To briefly illustrate the point by citing examples from generally respected sources, the case of Chongqing deserves to be noted. Citing a population of 13.89 million, a *Time* magazine reporter in 2005 pronounced Chongqing, "The World's Largest City" in the title of his article, and by default, the largest in China (Davidson, 2005). The same claim for Chongqing also has been advanced by others, such as the current U.S. Government's trade website (U.S. Commercial Service, 2007), which confusingly refers to a far greater population of 32 million. Moreover, this assertion runs directly counter to the generally accepted understanding that Shanghai is the country's largest city.[5] Shanghai's primacy is taken for granted by such widely used sources as the Microsoft Encarta encyclopedia (MSN Encarta, 2007) and the databooks issued by the United Nations Population Division (UNPD, 2004, 2006). To further confound, *Agence France-Presse* (2007) has just issued a dispatch entitled "Beijing's population to hit 20 million by 2020," based on a current population of 17 million—a figure that is obviously far greater than Chongqing's 13.89 million cited above. Is Beijing therefore also a contender for the apex of China's city population hierarchy?

What is the actual (correct) city population of Chongqing: 13.89 million or 32 million? And is Shanghai, Beijing, or Chongqing China's largest city? Inquiries intended to shed light onto these questions reveal a highly complex system of urban definitions used in Mainland China[6]—a system that appears to be the world's most complicated and confusing. The

[4]Understandably, definitions of "rural population" (the reverse of "urban population") in China are no less complicated (see Chan and Tsui, 1992; Martin, 1992).

[5]In covering the current 17th Party Congress in China, Associated Press reporter Christopher Bodeen (2007) describes Shanghai as China's "biggest and wealthiest city." In another recent example, Shanghai was described as China's largest city by a Canadian TV broadcaster covering the 2007 Women's Football World Cup in the city in September (CBC, 2007).

[6]In this context, Hong Kong, Macau, and Taiwan are excluded. Hereafter, we simply refer to "China."

sources are multiple and multi-layered due to the presence of several meanings of "city" and, consequently, several official population statistics derived and used legitimately for different purposes—all presented under the same label of "city." Even more perplexing, as will be shown below, is that the overstatement and understatement of Chinese city sizes actually coexist. The complexity is compounded by the Chinese *hukou* or *huji* (household registration) system, which excludes *de facto* residents (mostly migrants) who do not have local *hukou* (that is, are not registered locally) from the regular local population counts of the city.[7] The rapid pace of change in the country, including a variety of urban definitional changes during the last three decades, have also added difficulties to our understanding of the statistics.

While problems created at the aggregate level (national or provincial) have become a topic discussed by many scholars (e.g., Chan and Xu, 1985; Chan and Hu, 2003; Kirkby, 1985; Ma and Cui, 1987; Pannell, 2003; Zhou and Ma, 2003; Shen, 2006), investigations at the individual-city level remain relatively scant.[8] Zhou and Ma (2005) recently proffered an excellent review of the different sources of China's city population statistics, but their analysis covered the national aggregate level rather than the individual-city level. Equally important, their review of statistical sources essentially focused on those generated by the *hukou* system, which, as I discuss below, are generally not very useful for most of the urban research of interest to scholars.

This paper attempts to unravel some of the complexities of Chinese city population statistics at the city level, particularly with regard to large cities. The subsequent sections explain the main structure of the country's relevant city population statistics by looking at the multiplicity of city boundaries and the two statistical systems in use within a broader political/administrative context. Systematic data for the years 2000 and 2005 based on the multiple boundaries and systems for five selected major cities (Beijing, Shanghai, Chongqing, Guangzhou, and Shenzhen) are collected to illustrate the general background and specific circumstances in order to provide a relatively comprehensive picture. This paper is not about the accuracy of China's census enumeration or its city population statistics,[9] although some comments will be made in passing when relevant. The new urban definition adopted by China's National Bureau of Statistics (NBS) in the 2000 Census as well as the generated and released statistics afford an opportunity to study Chinese cities in a more meaningful manner. Accordingly, I will compare the different numbers and comment on their nuances and legitimate uses. The section that follows the discussion of statistical systems attempts to answer several significant questions, beginning with direct and "simple" ones such as the aforementioned "Which is the largest city in China?" and "Which large city has the highest per capita GDP?," and extending to questions more specifically relevant for urban studies. I will then

[7]During the years of the Maoist regime, rural to urban migration was strictly prohibited and mainly controlled through the *hukou* system. By law, anyone seeking to migrate had to secure the approval of one of the public security bureaus, which restricted mobility and rarely granted permits to move to a city. Since the advent of economic reform in the late 1970s, the demand for cheap labor for sweatshops producing for the global market has led to relaxation of some controls on migration. Peasant migrants are now allowed to work in cities in low-end jobs, albeit without eligibility for urban social services and education. It is estimated that in 2005 about 150 million people were in this category (of the so-called floating population), most living in the cities.

[8]Most discussions about city population statistics are treated in passing in analyses of national aggregate urban population figures and trends.

[9]That topic deserves a full-length article of its own. Attempts to reconstruct the annual national urban population series for the 1990s because of the serious problems in the published series have been made by Chan and Hu (2003) and Zhou and Ma (2003). An evaluation of the accuracy of the 2000 Census data can be found in Qiao (2002), Yu (2002), Zhang (2002), Chan (2003), and Zhang and Cui (2003).

present several competing lists of the largest and "wealthiest"[10] cities in China and then examine them. Also included will be a critique of sample writings found in the literature to highlight misstatements and areas of misunderstanding based on inappropriate use of statistical data—areas where new insights may be gained in the future. The concluding section summarizes the major findings and points to the need to reassess some assertions in the literature in light of the arguments advanced in this paper.

ADMINISTRATIVE BOUNDARIES OF CITIES

Before explaining the statistical indicators and the data, one needs to explicate the rather complicated multiple boundaries of cities (and their constituent components). Given that most of the confusion and problems with urban population statistics involve the largest cities (at or above the prefecture rank), the focus of this paper is confined to this group.[11] For ease of exposition, they are referred to here as "large cities." Officially, these large cities consist of provincial- and prefecture-level cities, constituting the first and second tiers of the formal administrative hierarchy (Chan, 2007).[12]

In order to study city development properly in any country, it is necessary to delimit cities within meaningful geographical boundaries. Almost all cities of any size contain a continuous built-up area, and many also have nearby residential and industrial suburbs. In addition, many cities, especially in developed countries, have an extensive daily commuting zone closely related functionally to the urban core (Simmons and Bourne, 1978). The urban core and the commuting zone combine to form the "metropolitan area" as it is commonly known. The United Nations uses the concept of "urban agglomeration," referring to continuous urban areas, although data based on metropolitan areas are also used for "urban agglomerations" (UN Habitat, 1996). It appears that in the decades before 1949, the administrative boundaries of Chinese cities were basically confined to the urbanized, built-up areas (Chen and Chen, 2003). Since the early 1950s, the city unit has increasingly, through successive changes, included rural counties within its administrative boundary and become essentially an administrative unit rather than an urban entity. By the 1990s, many cities already had an administrative area far larger than the urbanized area *per se*.

There are several models of spatial administrative structures of cities in China. Figure 1 presents a conceptual diagram of a typical large Chinese city. The outer boundary (denoted by A) is the limit of the city (*shi*) administrative unit, which generally comprises both city districts and counties. Thus, this "city" includes both an urbanized core (high-density built-up area) and extensive rural areas, primarily agricultural but with occasional towns (*zhen*). The urban core, together with some close-in areas, is administratively divided into "city districts" (*shiqu*), and the surrounding rural areas (with towns) into counties (*xian*).[13] The city districts comprise the *administratively* defined urban area, meaning that local governments, social services, etc. are organized along urban lines, while the counties are *administratively*

[10]In other word, cities with the highest per capita GDP.

[11]Statistical data devoted to the remaining smaller, county-level cities are still not as complete and as readily available as for their larger counterparts (NBS, 2001b). Thus county-level cities require separate analysis.

[12]In the year 2000, they numbered 263, out of a total of 663 administratively defined cities nationwide (NBS, 2001a); by the end of 2006, these numbers had changed to 287 out of a total of 661 (NBS, 2007). Because the cities in this group are the largest, they accounted for 56 percent of the population living in the country's cities in the country in 2000 (based on the 2000 Census population data of city districts [Statistic M in Table 2]. The economic share of these large cities would be even larger.

[13]Increasingly, and more confusing to outside urban researchers, predominantly rural areas also are being designated administratively as city districts in recent years (Chan, 2006).

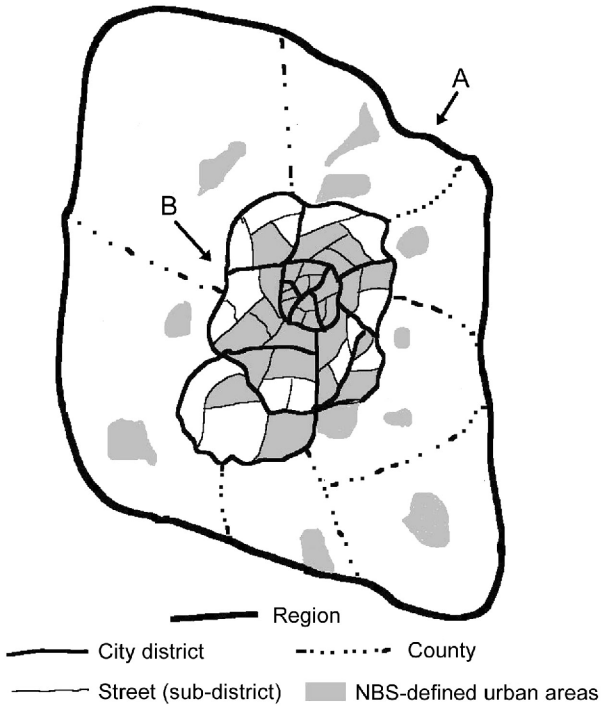

Fig. 1. Conceptual diagram of the spatial/administrative structure of a typical large city in China.

rural. Together the city districts and counties form a single administrative unit administered from, and bearing the name of, the main city. In this paper, this conceptualization of the "city" is referred to, for accuracy and clarity, as the "region."[14]

The area denoted by B in Figure 1 comprises the city districts portion of the region (administered by the city). Generally, the boundary of B may correspond very loosely to the "city proper" concept as understood in the United States, or the "urban administrative area" used in United Nations publications.[15] The shaded areas are *NBS-defined* urban areas, according to criteria principally reflecting physical features and *de facto* population density—more specifically, an average population density of at least 1,500 per sq km or contiguity of the built-up area.[16] The NBS-defined urban areas therefore are rarely in total congruence with the *administratively defined* urban areas (city districts).[17]

Other models are basically variants of the one above. In one such variant adopted by many cities such as Chongqing, some of the former counties have been administratively

[14]In many Chinese statistical publications, this entire "city" unit (city districts and counties) is also referred to as "*diqu*," literally meaning "region" (NBS, 2001b).

[15]Even this "city proper" territory typically has a very large area, compared to most large Western/Japanese "city propers." For example, in 2000 the area of Shanghai city proper was larger than New York, Chicago, and Los Angeles "city propers" combined. I am grateful to Richard Forstall for pointing this out.

[16]Others include "contiguous built-up area," location of the local government, being a "street," or having a Resident Committee. For a summary in English, see Chan and Hu (2003, Appendix 1). The full text is in NBS (2000).

[17]As shown in Figure 1, some of NBS-defined urban areas lie within city districts and some (towns) in counties.

reclassified as cities (called "county-level cities") but are still administered by Chongqing and situated within Chongqing's administrative boundary. This has led to an awkward (perhaps even unconstitutional) situation of "one city administering another" (Chan, 1997). An extreme variant is in place in cities such as Wuhan and Shenzhen, where all counties (even some that remain predominantly rural) have been reclassified administratively into "city districts." In this situation, A and B in Figure 1 converge to form the same boundary.

Most large cities described above are so large in area that they amount to small regions or provinces. Indeed, four of the largest (Beijing, Tianjin, Shanghai, and Chongqing) have an administrative status of a province and are such in many respects. The most extreme case is Chongqing, which has a vast administrative area of 82,300 sq. km (almost the size of the entire country of Austria) and a resident population of 31.69 million in 2005, according to the most recent population survey (SC and NBS, 2007). In that year, those 31.69 million "residents of Chongqing" were scattered across 15 city districts, 21 counties, and 4 county-level cities (MCA, 2006). This number of 31.69 million, however, cannot be taken as the population of the "metropolitan area" or "urban agglomeration," as often mistakenly labeled by the less informed.[18] The 2000 Census data also show that the share of total employment in this Chongqing region (or province) accounted for by agriculture was 72.8 percent.[19] It is likely that three quarters of the land area even today is rural. Indeed, based on the Census urban criteria, the urban population's share for the entire region (province) in 2000 was only 36.09 percent. Many counties within this Chongqing "city" are very poor and not even very accessible,[20] and there is no reason to consider them as belonging to a "metropolitan area." The same situation, perhaps not as extreme, also applies to Beijing, Shanghai, and a few other large cities.

It is clear from the above that the current administrative boundaries of a great majority of large Chinese cities extend far beyond the familiar "metropolitan area" or "city proper" patterns by including rural counties, some with dense farming populations. This broad geographical reach of city was created in the 1950s first for a few very large cities (such as Beijing and Shanghai) to enhance economic planning centered on the city. More specifically, nearby counties were placed under city administrative jurisdiction in order to ensure a sufficient supply of vegetables and other foodstuffs from such counties to the "city proper" (Skinner, 1978).[21] In many respects, this approach and arrangement are very much within the traditional socialist (Soviet-type) regional economic planning framework involving the use of an administrative tool to secure necessary commodities or achieve other planning objectives (Liu, 1996; Chan et al., 2008). Although reclassification ostensibly transforms these

[18]Many examples of this type of error exist in journalistic reports and some scholarly writings, the earliest of which I believe is Ullman (1961), who compares the entire Beijing region (including counties) to a standard metropolitan statistical area in the United States. Subsequent interpretations in influential publications such as UN Habitat (1996) and many of the UN databooks (UNPD, 2001, 2004) probably helped to propagate this error more widely. Even some China scholars, perhaps indiscreetly, have equated city unit (administrative city) with "metropolitan area."

[19]Calculations were performed by Richard Forstall.

[20]Many towns in those counties have no daily commuting linkage with the core city, and a trip by car or bus to some from the urban core could take several hours.

[21]This practice has intensified since the 1980s, with many of these counties recently being administratively reclassified as city districts as well. Such reclassification is not necessarily related to the predominance of nonagricultural activities in the affected counties, but may instead reflect important administrative and economic planning goals such as securing control over land to accommodate future expansion of the urbanized area, as well as to increase fiscal revenues through expropriation of rural land and eventual sales of it (Chen, 2003; Su and Chan, 2005).

new city districts into "urban" administrative entities, many in reality are very different, resulting in demographic statistics for the "city" that are often quite misleading (see below).

SYSTEMS OF CITY POPULATION STATISTICS

China currently has two systems for the collection and reporting of statistical data. The first, the "regular" system (Taylor and Banister, 1989), is often referred to as the *baobiao* ("reports and tables"). It was developed to serve the traditional, Soviet-type planned economy characteristic of pre-reform socialist China. Here the statistical system is part of the apparatus of economic planning, which relies heavily on use of quantitative indicators to monitor the economy, society, as well as the performance of local officials. Essentially, the system is closely aligned with the "planning" needs of the government. It generates statistical data that are primarily designed to serve economic planners, and not necessarily to facilitate research as understood in the West (Keidel, 1984). The *baobiao* system relies almost totally on statistical reports submitted at regular intervals by all production as well as non-production units. Local governments/agencies receive their numbers from these work units and enterprises (and, previously, communes) in various sectors and aggregate and submit them successively to the next higher level of the government (Holz, 2002). For population statistics, the primary output from this system are the counts based on the country's *hukou* system, administered by the Ministry of Public Security (Chan and Zhang, 1999). With the implementation of the one-child policy from the early 1980s, which ties population growth indicators to work performance of local family planning officials, and with rising geographical mobility of the population in the last three decades, the household registration population statistics have become seriously problematic in reflecting the actual population in a locale (Hu and Foggin, 1993).

The other system is based on surveys carried out somewhat more independently by the National Bureau of Statistics (NBS), although frequently in cooperation and/or collaboration with ministries and local governments, to ascertain the real situation, so as to remedy some of the inadequacies of the *baobiao* data. Specifically, in generating population statistics, this system now relies upon annual national "one per 1000" sample surveys, decennial censuses (such as in 1990 and 2000), and one percent population sample surveys (as in 1985, 1995, and 2005) to produce more useful and trustworthy sets of numbers. In order to increase data accuracy and reduce understating and local government interference (for example, in the 2000 Census), the State Council (2000) decreed that the individual-level data collected could not be used to prosecute anyone.[22] The government also told local officials that they would not be penalized if the Census resulted in population numbers that exceeded the local birth quota (Walfish, 2000).[23]

Because of their differing character, the two systems inevitably generate numbers that differ, at times starkly so. In the population counts, interestingly (although not surprisingly), the data generated through the two channels can quite neatly be categorized as the *de jure* population and *de facto* population counts, as shown in Tables 1 and 2. Crossed with the multiplie "city" boundaries (and the "agricultural"/"non-agricultural" division explained below), we have an array of no less than eight "city" population indicators or statistics for any large

[22]This was mainly in reference to persons demonstrated by their census return to be in violation of China's "one-child" policy (Fan, 2002).

[23]Whether the Census achieved its quality guarantee is another matter (see Chan, 2003).

Table 1. *De Jure* Population and Area of Selected Large Cities in China, 2000 and 2005 (population in millions[a]

City	Year	Region[b]				City districts			
		Area, sq. km	*Hukou* population		Registered temporary population[c]	Area, sq. km	*Hukou* population		Registered temporary population[c]
			Total	Non-agricultural			Total	Non-agricultural	
			E	F	I		G	H	J
Shanghai	2000	6,340	13.22	9.86	1.61	3,924	11.37	9.38	
	2005	6,341	13.60	11.49	5.21	5,185	12.90	11.28	
Beijing	2000	16,592	11.14	7.63	1.94	8,132	9.74	7.26	1.90[d]
	2005	16,578	11.84	8.83	3.58	12,358	11.14	8.58	3.55
Chongqing	2000	82,300	30.91	6.61	0.57	14,876	8.96	3.82	0.55[d]
	2005	82,300	31.69	8.17	0.58	16,291	10.30	4.78	0.67
Guangzhou	2000	7,434	7.01	4.36		3,548	5.67	4.01	2.87[d]
	2005	7,435	7.51	6.71		3,836	6.17	6.17	3.31
Shenzhen	2000	2,050	1.25	1.00	3.08	2,050	1.25	1.00	3.08
	2005	2,050	1.82	1.82	6.46	2,050	1.82	1.82	6.46

[a]At end of year.
[b]City districts + counties and/or county-level cities.
[c]As of June 30 of respective years.
[d]Data for 2001.
Sources: Compiled by the author from Ministry of Public Security, 2000, 2005; NBS, 2001b, 2006; Ministry of Construction, 2002, 2006; MCA, 2001, 2006.

city. Each of these has been used, rightly or wrongly, to represent the city population by officials, journalists, and even scholars.

I will explain the two major sets of population statistics below, using actual recent examples drawn from 2000 and 2005 data—the two years for which almost complete and comparable data from the two systems are available. Numbers for five cities—Beijing, Shanghai, Chongqing, Guangzhou, and Shenzhen—are used to illustrate the general points. The emphasis here is not on determining precise "city" population sizes for these locales, but rather on interpreting and clarifying their meanings in the hope of helping to identify workable practical indicators that can be employed for all of China's large cities for a variety of purposes.

De Jure Population from *Hukou* Statistics

Table 1 present six population statistics (E–J) in the *de jure* category, including some reproduced in *City Statistical Yearbooks* (such as NBS, 2001b) and often used by scholars to represent "city population" in their analysis. All six indicators are generated from the *hukou* registration statistics administered by the public security authorities. The *hukou* population (E and G) refers to the number of individuals who have permanent *hukou* registered in the respective administrative area (region or city districts). The registration is generally

equivalent to local "citizenship" in determining eligibility for exclusive urban "benefits."[24] The numbers generally are used by officials of the various levels and branches of government for a variety of purposes, mostly in fiscal accounting.[25] As such, these numbers are truly registration counts instead of actual population counts; they include many people who are registered but no longer live in the locale, and exclude those who live in the locale but who lack local *hukou* registration (Chan, 2003).

The "agricultural" or "non-agricultural" population refers traditionally to a major aspect of the *hukou* classification that forms the basis of a fundamental socioeconomic division in China (Chan and Tsui, 1992; Chan and Zhang, 1999). Although it might well have been the case in the 1950s, when the *hukou* classification began to be used, that "agricultural population" referred to workers engaged in agriculture and their dependents, by the 1970s the term did not necessarily have the same meaning. From the 1960s, the agricultural/non-agricultural division was mainly used for determining eligibility for "commodity food grain" and, more generally, urban social welfare and benefits from the state. Only the non-agricultural population (F and H), a subset of the *hukou* population, is eligible for those benefits. Data in NBS and MPS (1988) show that in 1982, an agricultural population of 48.04 million was registered in the city districts of all cities.[26] In fact, for a long time, this subset of the *hukou* population was labeled the "urban population" (*chengzhen renkou*) officially (Chan and Xu, 1985; Zhou and Ma, 2005), and this undoubtedly added one more source of confusion. The division between non-agricultural population (H) in city districts and agricultural population (not shown in Table 1) is gradually fading in some cities (e.g., Shenzhen and Guangzhou) under the recent *hukou* reforms.[27] By 2005 there was no agricultural population in the city districts of those two cities, so that the magnitude of G is now the same as that of H (Table 1).

The number of inhabitants who do not have local *hukou* registration but have registered with the local police for a temporary residential permit is tabulated under the category of "temporary residents" (*zanzhu renkou*, I or J, depending on the location) (Solinger, 1985). Temporary residents, as "outsiders," are not eligible for most urban benefits available to those with local *hukou*. Furthermore, as registration data, the statistics on temporary population miss a large number of persons who do not comply with the requirements to register, even though they may have lived in the place for quite a few years (*Renmin Ribao*, July 9, 1995). Despite the enormous size of the registered temporary population in many cities (e.g., 5.21 million in Shanghai in 2005), the data are often omitted from the city's official statistical

[24]These benefits range from small matters such as purchasing a bus pass to far more important issues (such as obtaining public education for one's children and eligibility for employment) controlled by the local governments (see Wang, 2005).

[25]As one might expect, some of the more specialized branches of government may use sets of slightly different *hukou* population statistics in their planning and accounting, presumably due to necessary adjustments for the nature of their work (compare the *hukou* population statistics in NBS (2001b), Ministry of Finance (2001), and Ministry of Public Security, 2001)—they are generally quite close but are not always exactly the same.

[26]This accounted for 32.2 percent of the total *hukou* population (149.4 million) in all cities (NBS and MPS, 1988, p. 149). A significant portion of the agricultural population was engaged in non-agricultural employment.

[27]In recent years, China has instituted a variety of reforms to its *hukou* system. There is a general perception that the most recent round of reform initiatives intended to abolish the *hukou* system, and that rural residents would soon be "granted urban rights." A forthcoming paper by the present author and Will Buckingham will clarify the basic operations of *hukou* in light of the recent reforms and the validity of prospects for abolition. The paper points out that confusion over the functional operations of the *hukou* system and the subtleties of the *hukou* lexicon have contributed to overstated interpretations of the initiatives. The effect of the intended reforms is not the abolition of *hukou*, but rather a devolution of responsibility for *hukou* policies to local governments, which in many cases actually makes permanent migration of peasants to cities more difficult than in the past.

Table 2. *De Facto* Population and Area of Selected Large Cities in China, 2000 and 2005 (population in millions)[a]

Cities	Year	Region[b]			City districts		
		Urban and rural areas		Population of urban areas only[c]	Urban and rural areas		Population of urban areas only[c]
		Area, sq. km	Population K	L	Area, sq. km	Population M	N
Shanghai	2000	6,340	16.41	14.49	3,924	14.35	13.46
	2005	6,341	17.78	15.84	5,185	17.12	
Beijing	2000	16,592	13.57	10.52	8,132	11.51	9.88
	2005	16,578	15.36	12.84	12,358	14.66	
Chongqing	2000	82,300	30.51	10.10	14,876	9.69	6.17
	2005	82,300	27.97	12.66	16,291		
Guangzhou	2000	7,434	9.94	8.09	3,548	8.52	7.55
	2005	7,435	9.49	8.68	3,836		
Shenzhen	2000	2,050	7.01	6.48	2,050	7.01	6.48
	2005	2,050	8.27	8.27	2,050	8.27	8.27

[a]On November 1.
[b]City districts + counties and/or county-level cities.
[c]As defined by the National Bureau of Statistics on the basis of density and related criteria.
Sources: Compiled by the author from SC and NBS, 2002, 2007.

yearbooks, as if they do not exist.[28] Accordingly, less experienced investigators searching for some readily available statistics can thus easily totally overlook the existence of that particular segment of the population.

De Facto Population from Censuses and Surveys

Corresponding to the administrative geography of the city depicted in Figure 1, four population statistics, K–N, in this category are presented in Table 2. The numbers are derived from the 2000 Census and the 2005 "One Percent" Population Survey. In line with international practice, both the Census and the Survey enumeration adopted *de facto* rather than *de jure* criteria for counting the population. The numbers in Table 2 are based on inhabitants present at the locale in accordance with *changzhu renkou* ("ordinarily resident") criteria, but not on those simply having the local *hukou*.[29] For the 2000 Census, the NBS has established relatively reasonable criteria for defining urban areas that are acceptable to many observers (Chan and Hu, 2003; Zhou and Ma, 2005). The criteria include an average population density of at least 1,500 per sq. km or the contiguity of built-up areas, as noted earlier. Diagrammatically, these NBS-defined urban areas are shaded grey in Figure 1. It is also interesting and surprising to observe

[28]See *Shanghai tongji nianjian* for 2000–2004 at http://www.shanghai.gov.cn/shanghai/node2314/node16085/index.html.

[29]The main criteria are: (1) those who have local *hukou* and are physically present in the locale at the time of the Census; and (2) those who do not have local *hukou* but have stayed in the locale for more than six months. See details in SC and NBS (2003), and discussions in Zhang (2002) and Chan (2003).

Table 3. Population of China's 20 Largest Cities, 2000 (in millions)[a]

Rank	City	*De facto* regional population[b,c]	City districts only			
			De facto population in urban and rural areas[c]	***De facto* population in urban areas only[c]**	Total *hukou* population[d]	*Hukou* non-agricultural population[d]
		K	M	**N**	G	H
1	Shanghai	16.41	14.35	**13.46**	11.37	9.38
2	Beijing	13.57	11.51	**9.88**	9.74	7.27
3	Guangzhou	9.94	8.52	**7.55**	5.67	4.01
4	Wuhan	8.31	8.31	**6.79**	7.49	4.41
5	Tianjin	9.85	7.50	**6.76**	6.82	4.99
6	Shenzhen	7.01	7.01	**6.48**	1.25	1.00
7	Chongqing	30.51	9.69	**6.17**	8.96	3.82
8	Shenyang	7.20	5.30	**4.60**	4.85	3.95
9	Chengdu	11.11	4.33	**3.96**	3.36	2.28
10	Dongguan	6.45	6.45	**3.87**	1.53	0.40
11	Xi'an	7.27	4.48	**3.76**	3.93	2.53
12	Nanjing	6.13	3.62	**3.51**	2.90	2.56
13	Harbin	9.41	3.48	**3.46**	3.04	2.64
14	Dalian	5.89	3.25	**2.87**	2.68	2.08
15	Changchun	7.14	3.23	**2.75**	2.93	2.17
16	Qingdao	7.49	2.72	**2.72**	2.35	1.84
17	Kunming	5.78	3.04	**2.64**	2.11	1.50
18	Jinan	5.92	3.00	**2.63**	2.64	1.80
19	Taiyuan	3.34	2.58	**2.54**	2.33	1.85
20	Zhengzhou	6.66	2.59	**2.50**	2.19	1.59

[a]Ranked by *de facto* population of urban areas in city districts (N).
[b]City districts + counties.
[c]See Table 2.
[d]See Table 1.
Sources: Compiled by the author from NBS, 2001b; SC and NBS, 2002.

that while all data of K, L, M, and N at the county level are readily available from NBS (2003), the data at the level of the city proper (which is the most useful scale, as argued below) for all large cities except a few must be tabulated by the author from the original county-level population numbers. The fact that this "city proper"–level data (as shown in Table 3 above) is not readily available or published officially in China[30] seems to suggest that *de facto* city proper data, such as those derived from the Census, are still not used by mainland Chinese officials and researchers.[31]

[30]To the best of this author's knowledge, only Zhou and Yu (2004) have produced a city population series very similar to the series N in Table 3.

[31]In field surveys in 1994, when I had the opportunity to interview local city planning officials in cities in Shandong and Guizhou, I was surprised to learn that often data of the *hukou* population, instead of the *de facto* population (or estimates), were used in planning the construction of urban infrastructure.

A Brief Comparison

Because registration counts include people who no longer live in the locale but exclude those who live in that locale without local *hukou* registration, a difference exists between *de facto* and *de jure* counts for the same geographical area. The difference can be small, or immensely large, as demonstrated by the data in Tables 1 and 2. In the period between 1950 and 1978, the difference between the two counts was likely to be small, because there was low geographical mobility of the population, especially of those without local *hukou*. Now, in the reform era, the city districts of most large cities have more in-migrants from the outside than out-migrants (Chan, forthcoming). As a result, the *hukou* population counts will certainly be smaller than the *de facto* counts (cf. G and M) in most cases. In some cases, such as in the well-known migrant city of Shenzhen, the difference can be enormous. The 2000 year-end *hukou* population total for that city was 1.25 million, whereas the 2000 Census, based on exactly the same geographic boundary, reported a *de facto* resident population of 7.0 million (including 6 million without local *hukou*)[32] on November 1, 2000 (see Chan, 2003, p. 3). The difference between the two in the year 2000 was 5.75 million, growing even larger in 2005, to 6.45 million. Such differences pose a variety of potential distortions in interpretation and research (see below).

IMPLICATIONS FOR RESEARCH

It is nearly impossible to elaborate fully on the implications of misusing city population statistics in scholarly writings and presentations, given the intrinsic importance of these statistics to social and economic research and the voluminous literature involved. Bearing also in mind the limitations of space allocated to articles in this journal, I will address two sets of the most basic questions, as well as other related issues that, I believe, may point out directions for future work.

Which Is the Most Populous City in China?

To revisit the question posed at the beginning of this paper, we need to choose, among all the existing and available statistics examined above, the most relevant one to represent city size. This is quite different from an ideal situation, in which one might have all the necessary tools and information to derive a set of city population counts or estimates[33] tailored exactly to the researcher's needs, for all the country's 267 or more large cities. Such a task is too massive in scope to be feasible at present. In other words, we must continue for the time being to rely on published statistics that are available to us, constrained as they are by the country's administrative geography. Consequently, more important and useful than simply

[32]In addition, the 2000 Census reported an additional "*de facto* temporary population" of 923,619 (Population Census Office, 2002). This is different from the "registered [*de jure*] temporary population" reported in Table 1. The census-defined temporary population refers to persons without local *hukou* who had resided less than 6 months in Shenzhen prior to the census enumeration. This number for the national aggregate and for most cities has not been disclosed (e.g., see Chan, 2003).

[33]An example might include data derived from various kinds of remote sensing imagery combined with ground data, such as in the work on China by Lo (2002) and Seto and Fragkias (2005), and on Russia by Perepechko et al. (2005). Another reasonable approach is to use more detailed information about the population of each city, especially of towns, to make fine adjustments to the NBS census data (city by city), as done at Beijing University (2005); this type of information is not available outside of China.

answering the question about the "largest city" (and especially from a social science perspective) is to develop a statistical indicator that can be reasonably derived from the existing and available information. Such an indicator should represent, and also facilitate comparison among, the population sizes of all of China's large cities.

To address the above question, I have elected to focus on data from the year 2000, the latest year for which detailed, systematic, and comparable information is available for all cities and city districts, as well as other related social and economic data from the 2000 Census (Chan, 2003). The rapid pace of urbanization and changes in urban definitions and administrative boundaries in China suggest that it is quite impossible to choose a single existing indicator that will work for all years, as Zhou and Ma (2005) have demonstrated. In other words, modifications may be necessary in order to apply the discussion below to data for past years (such as 1990) or for more recent ones (such as 2005). Because it is only a one percent sample, information from the 2005 National Population Survey, now slowly becoming available (e.g., SC and NBS, 2007), will be more limited and may not be as useful as data from the 2000 Census.

Among the eight arguably "city" population statistics shown in Tables 1 and 2, it is quite clear that the four *hukou* population data (E–H) are not suitable, as they count only the *de jure* population and exclude the large numbers of both registered and unregistered "temporary population." This leaves the four statistics (K–N) in Table 2, which are more plausible because they refer to the *de facto* population. I have already shown that the statistics for "region" (A in Fig. 1, and K and L in Table 2) refer to much too large an area to be regarded as a "city."

This leaves only two indicators, M and N, both based on the city districts (B in Fig. 1). At a general level, the boundary of B corresponds loosely to the "city proper" concept. In the case of China, because many city districts also include NBS-defined rural areas (and increasingly so), it is desirable to exclude those rural areas when representing the city. As a result, N (covering only NBS-defined urban areas) is a more reasonable choice than M (covering both NBS-defined urban and rural areas), although N does not necessarily represent a continuous built-up area.

N, and not M, is also a component of the national urban population figure—458.44 million (or 36.22 percent of the national total)[34] in 2000—which is widely accepted as reasonable (Chan and Hu, 2003; Zhou and Ma, 2003), although at the individual city level, especially for large cities, N is still on the high side, an issue to which I return later. At this moment, the N statistic can only be derived for the year 2000, through the data set in SC and NBS (2003). For any temporal analysis, one may have to resort to the M statistic, which is available for 1990 and 1982 as well.[35]

Table 3 ranks the largest 20 cities in China by N, and also provides additional statistical data (some of the population categories used in Tables 1 and 2). A quick glance at the ranking suggests that it is reasonable, and consistent with the common perception. Shanghai is China's largest city in population, not Chongqing. The latter, instead of being the largest city, ranks seventh, with a city populaiton of only 6.17 million. This is far smaller than the numbers used by the media sources cited earlier, 13.89 or 32 million. In fact, the difference between 6 million and 32 million is close to an order of magnitude. Such an overstatement of the population of Chinese metropolises is quite common in many reports appearing in the international media. Indeed, given the large size of China's population, and the rapid urbanization and economic growth in the past three decades, it is not unreasonable to expect

[34]This is the sum of the *de facto* population in all NBS-defined urban areas in the country—both those within city districts and those in counties/county-level cities (some of which are not administered by cities). The national aggregate is 455.94 million, or 36.09 percent, if the 2.5 million in military service are excluded.

[35]For an analysis of city population growth based on M, see Li et al. (2005) and Chan et al. (2008).

that some Chinese cities will join the ranks of the world's largest. It should be noted here, however, that the widely used population figures for the largest Chinese cities often grossly inflate their populations, a situation partly caused by erroneous interpretations by previous UN analysts, who equated the Chinese "region" (although still called "city") with "city."

For example, citing a United Nations' study, a *Los Angeles Times* journalist penned an article entitled "500 Million Either Homeless or in Unfit Housing, the UN Says," stating that many super-large cities, most of which would be located in the developing countries, are forecast to come into being in the next two decades (Wright, 1995). These cities included Beijing (whose 1995 population was said to be 12.4 million), predicted to have as many as 19.4 million people in 2015, and Shanghai (15.1 million in 1995, 23.4 million in 2015). A check of the original UN source[36] indicates that the data listed for the three Chinese cities (Shanghai, Beijing, and Tianjin) on the UN's list of the world's 30 largest cities/urban agglomerations were all close to the population counts based on the region (also province), rather than the city as we understand it. This practice was repeated in later UN urban databooks (e.g., UNPD, 2001, 2002), at least for the country's several largest cities.[37]

It is rather interesting that the inflated population figures for Chinese cities (and consequently exaggerated forecasts of their future size) quite conveniently fed the fashionable "gloom and doom" prognoses of the urban future of the day. Such stories are easily found in many places, as the UN urban population data are widely and frequently used by journalists as well as in many global urbanization analyses and forecasts.

Ironically, while journalists and scholars focusing on global urbanization tend to rely upon a set of population figures that overstates the actual population of Chinese cities, in the scholarly community studying Chinese cities, the opposite is true. In fact, almost of all researchers tend to use figures that understate the size of Chinese cities.[38] Their studies are customarily based on the total *hukou* population or, more often, non-agricultural *hukou* population in the city districts (i.e., statistics G or H), mainly due to the lack of better data, or acceptance of those statistics at their face value, or, perhaps, convenience.[39] It is quite clear from their published work that some scholars are not fully aware of the severe limitations of the data they are using,[40] and seldom discuss the limitations and implications of using such data in their analyses. The outcome is that because city size is central to their analyses and arguments, those studies based on understated city population statistics are problematic, and their findings questionable. Several points, applicable in general to most of those studies, can be made with reference to their findings.

1. Because of the understating of city population (in some cases, quite serious), some cities can be totally omitted from consideration. For example, in Lin's (2004) study of the

[36]The original 1995 UN study was published in 1996 (see UN Habitat, 1996, pp. 16 and 451–452 for the data used).

[37]UN Habitat (1996) does discuss the difficulties in selecting a consistent population indicator to represent city population, especially for large cities, internationally. Its choice of the high figures for Shanghai and Beijing seems to have relied on a background report written by a China expert, Richard Kirkby, who had misinterpreted the Chinese statistics (see UN Habitat, 1996, p. 76). For smaller cities in China, the UN (UN Habitat, 1996; UNPD, 2001) appears to have adopted a narrower definition for cities. The problem of choosing the wrong statistical unit (region, not city) for the largest cities has been partially corrected in the most recent UN city population data base (UNPD, 2006).

[38]An exception is Fan (1988), whose city population data for 1970 and 1982 are based on the region concept.

[39]These studies include works in Chinese and English. Examples include Han and Wong (1994), Hsu (1994), Xu et al. (1995), Wei (1997), Fan (1999), Chen and Coulson (2002), and Song and Zhang (2004). There are relatively complete *de jure* time-series population data for almost all cities for a long period (e.g., in NBS, 1999), whereas the *de facto* data are only available for 1982, 1990, and 2000, with different urban definitions (see Zhou and Ma, 2005).

[40]An exception is Fan (1999).

Table 4. China's 20 Cities with the Lowest Ratio of *De Jure* to *De Facto* Population, 2000[a]

Rank	City	Province	*De jure huji* population	*De facto* census count	Ratio`
1	Shenzhen	Guangdong	1.25	7.01	0.178
2	Dongguan	Guangdong	1.53	6.45	0.237
3	Jinhua	Zhejiang	0.36	0.90	0.398
4	Liupanshui	Guizhou	0.42	1.00	0.420
5	Quanzhou	Fujian	0.58	1.19	0.485
6	Zhuhai	Guangdong	0.44	0.83	0.523
7	Zhongshan	Guangdong	1.34	2.36	0.566
8	Wenzhou	Zhejiang	1.19	1.92	0.622
9	Huizhou	Guangdong	0.37	0.59	0.633
10	Fuoshan	Guangdong	0.49	0.77	0.636
11	Xiamen	Fujian	1.31	2.05	0.639
12	Lhasa	Tibet	0.14	0.22	0.641
13	Guangzhou	Guangdong	5.67	8.52	0.665
14	Haikou	Hainan	0.57	0.83	0.691
15	Kunming	Yunnan	2.11	3.04	0.695
16	Fuzhou	Fujian	1.48	2.12	0.699
17	Hangzhou	Zhejiang	1.79	2.45	0.731
18	Liuzhou	Guangxi	0.91	1.22	0.743
19	Yangzhou	Jiangsu	0.54	0.71	0.753
20	Huhehaote	Nei Mongol	1.06	1.41	0.755

[a]For city district populations in the same geographical boundaries.
Source: Computed by the author from NBS, 2001b; SC and NBS, 2002.

country's major globalizing cities, his map of the "10 largest cities in China" does not include Shenzhen and Dongguan—ranked fifth and tenth in 2000 according to N in this study (Table 3)—because of his reliance on the *hukou* non-agricultural population statistic (H). This omission is unfortunate, because Shenzhen and Dongguan are unequivocally among the most "globalized" cities in China, especially in view of the very high level of exports and FDI in the two cities, as noted by Lin elsewhere (Lin, 2006, p. 32).

2. A more general point can be made from examining Table 4, which shows the 20 large cities with the lowest ratio of the *hukou* population (G) to the *de facto* population (M) based on the same geographical boundaries (city districts). The group with lowest ratios (only about 20 percent) includes cities whose size and population growth rates would have been most seriously understated by previous studies using the *hukou* population. For example, Shenzhen's *hukou* population rose from 395,000 in 1990 to 1.25 million in 2000, an increment of less than one million people over the decade (NBS, 1991, 2001b), while census figures indicate that the city grew from 875,000 in 1990 to 7 million in 2000 (SC and NBS, 1993, 2002), an increase of more than 6 million during the same period. At least 80 percent of the cities in Table 4 are in the coastal region, especially in Guangdong (6 of the top 10). A glance at the list shows that these cities are among the most dynamic and rapidly growing in China, most with an export-processing economy. Previous studies using the *hukou* population would most likely have missed this group and this dimension of change.

3. Another related point is that the component of migration in population growth would also be understated, as the *hukou* population statistics capture none of the migration of individuals failing to obtain local *hukou*. A rather misleading and ironic aspect of Shanghai's population change can be used to illustrate this point. Over the past few years, Chinese journalists have been reporting on Shanghai's population "crisis,"[41] despite the region being one of China's major migration destinations (Chan, 2001). Careful investigation reveals that this assertion is only true if only *hukou* population is considered. The reality is that Shanghai's *de facto* population grew from 13.34 million to 16.41 million between 1990 and 2000, and climbed again to 17.78 million in 2005, according to NBS surveys (SC and NBS, 1993; Table 2). In other words, in the 10 years prior to 2005, the population grew by roughly one-third—hardly a region experiencing net population losses!

4. This point of understating is particularly relevant and sensitive to studies assessing the Chinese urban development policy of "controlling the growth of large cities" and "promoting the growth of small cities," as city size is central to such studies. This topic has been the focus of a dozen or more studies, all based on *hukou* population data (e.g., Chang and Kim, 1994; Han and Wong, 1994; Hsu, 1994; Xu et al., 1995; Zhao and Zhang, 1995; Wei, 1997), and curiously with a few rather contradictory findings. If the preferred, more appropriate statistics are used, how would such use change their conclusions? Is it really true that the largest cities have not been growing as rapidly as others, as some of the previous studies have claimed (e.g., Han and Wong, 1994, p. 558)? Given the discussion above, such findings should be scrutinized again in the future.

Before leaving this topic, the issue of the "overbounding" of the N statistic should be briefly addressed. Beijing, for which a detailed population breakdown in 2000 (by district and county, Table 5) and other relevant information are available, is used as an example. Figure 2 depicts the administrative divisions in Beijing in 2000 and the relative location of the third, fourth, and fifth "ring roads" (express motorways), with the last one being located close to the areas of new urban development in 2000. A preliminary analysis[42] suggests that the contiguous built-up area is substantially smaller than the "city proper" (city districts). Based on this information, it is certain that N is still slightly "overbounded," possibly by 5 percent in the Beijing case.[43] This situation is likely to exist in varying degree in other cities as well, depending on the (also-changing) administrative geography. Nevertheless, it is certain that N is still the closest available indicator of "city size" of the "urban agglomeration" that can be derived from existing 2000 Census data. N can thus be tabulated for all cities in China in 2000.

Which Large City Has the Highest Per Capita GDP?

Per capita GDP is likely the most basic economic indicator used in human geography and economics, usually employed as a yardstick to measure the economic well-being of a country or a locale. China's national GDP statistics are fraught with problems that are well known and equally well studied (Rawski, 2001; Holz, 2002, 2004). It is not difficult to imagine that such problems are

[41]An example is an article with the rather alarming title, "Shanghai Continues to Experience Negative Population Growth for the Last Ten Years" (*Jiefang ribao*, 2004).

[42]Based on LANDSAT and nighttime images supplied by Michael Patrick, pertinent literature such as Tan et al. (2005), and Zhao et al. (2004), and Feng et al. (2007), and Census data showing a substantial share of employment in agriculture in the two outlying districts of Fangshan and Tongzhou (28.1 and 30.5 percent, respectively; Beijing Population Census Office, 2002).

[43]After discounting by five percent, the city's population comes close to that used in Zhou and Yu (2004).

Table 5. Population Indicators of Beijing, 2000[a] (Based on Census data)

Administrative units	Population		
	Total (urban and rural areas)	Urban areas	Rural areas
	City districts		
Dongcheng	535,558	535,558	0
Xicheng	706,691	706,691	0
Chongwen	346,205	346,205	0
Xuanwu	526,132	526,132	0
Chaoyang	2,289,756	2,289,756	0
Fengtai	1,369,480	1,369,480	0
Shijingshan	489,439	489,439	0
Haidian	2,240,124	2,240,124	0
Mentougou	266,591	187,616	78,975
Fangshan	814,367	379,882	434,485
Tongzhou	673,952	346,645	327,307
Shunyi	636,479	207,341	429,138
Changping	614,821	251,792	363,029
All city districts[b]	11,509,595[c]	9,876,661[d]	1,632,934
	Counties		
Daxing	671,444	188,109	483,335
Pinggu	396,701	119,053	277,648
Huairou	296,002	116,900	179,102
Miyun	420,019	128,999	291,020
Yanqing	275,433	92,742	182,691
All counties	2,059,599	645,803	1,413,796
Beijing region[e]	**13,569,194[f]**	**10,522,464[g]**	**3,046,730**

[a]All indicators are based on data from the 2000 Census (SC and NBS, 2003). Definitions of urban and rural areas are based on NBS criteria used in the 2000 Census.
[b]Area = 8,132 sq. km.
[c]Indicator M.
[d]Indicator N.
[e]All city districts and all counties in an area of 16,592 sq. km.
[f]Indicator K.
[g]Indicator L.

even more serious at the level of individual localities, given the nearly impossible task of disaggregating GDP in many sectors (e.g., transportation and telecommunication) to separate units, and the conceptual and technical sophistication required to execute such an exercise. Actually, very few countries in the world, including all advanced Western nations, supply official GDP statistics at the individual-city/metropolitan level.[44] China is special in this regard, for the country's official GDP (and per capita GDP) statistics are generally available at the local level, down to the county units. This is partly due to the fact that GDP statistics are the primary indicators used to assess the

[44]Some experimental estimates at the metropolitan-area level are now provided by the U.S. Bureau of Economic Analysis (see http://www.bea.gov/newsreleases/regional/gdp_metro/gdp_metro_newsrelease.htm], accessed October 20, 2007.

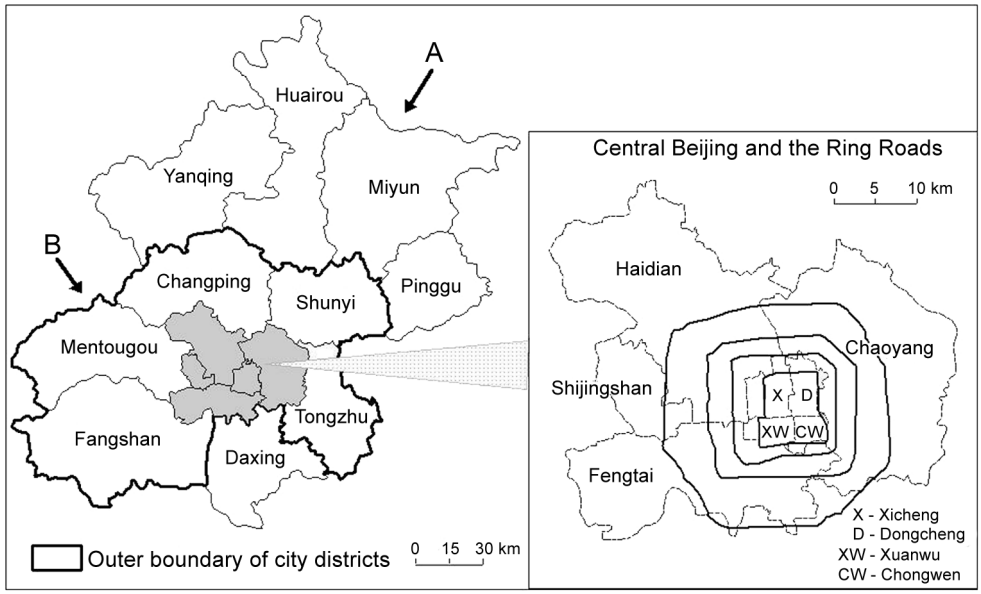

Fig. 2. Beijing: Boundaries of the region and city districts, 2000. Map prepared by Enru Wang.

performance of local government officials (Whiting, 2000; *Sing Tao Daily*, 2004b). The "performance-assessment" function of GDP statistics inevitably introduces more problems into the data, as local officials tweak and manipulate the numbers to their advantage, when possible and when under pressure (Holz, 2002; *Sing Tao Daily,* 2004c; Xinhua Net, 2005).

The focus here is not on assessing the quality of China's GDP statistics *per se,* as this has been done elsewhere (Rawski, 2001; Holz, 2004). Instead, our concern is with the denominator used in computing the per capita GDP statistics at the city level. As in the case of city population statistics, at least two sets of GDP statistics are used for individual cities; for the year 2000, for instance, one can be found in Ministry of Finance (2001) and another in NBS (2001b). The two are not exactly the same. For our purposes, we will use the set appearing in NBS's *City Statistical Yearbook*, (NBS, 2001b), which is known as the government's official publication. Unlike city population statistics that can be tabulated using either *de jure* or *de facto* criteria, the system of GDP data at the city level is simpler: they are only tabulated for the area of the region (A in Fig. 1) and for city districts (B). In other words, there is a GDP figure for the region and another one for the city districts for cities where the two boundaries are different. For urban analysis and studies, the obvious GDP statistic to use is the one for the city districts, which almost all previous studies have employed. The problem, however, is which one of the population statistics to use in order to standardize GDP for all cities in China. On this score, the only GDP statistic that is appropriate is the one for the city districts (including both urban and rural areas). And, more specifically and again based on our earlier analysis, the *de facto* city district population statistic (i.e., M in Table 2) is the best available one to use.[45] The per capita GDP generated is denoted by PCGDPM in Table 6.

[45]Ideally, we would want to be able to use N, as before, to generate a corresponding per capita GDP for cities (by covering only the NBS-defined urban areas). However, the GDP data available do not match this particular "urban area" geography.

Table 6 identifies the 30 large cities (i.e., province- and prefecture-level ones) with the highest total GDP (for city districts only), as reported in NBS (2001b). These 30 cities include all of China's largest listed in Table 3 except Taiyuan, which is generally consistent with our expectations.[46]

For those 30 cities, the table also shows three versions of per capita GDP—PCGDPG, PCGDPH, and PCGDPM—computed by dividing GDP produced within the city districts by the city population numbers G, H, and M, respectively (see Tables 1 and 2), along with some basic summary statistics. In terms of both PCGDPG and PCGDPH, the No. 1–ranked city is Shenzhen. Daqing ranked second according to PCGDPG, and Dongguan second according to PCGDPH. On the other hand, the PCGDPM statistics rank Daqing and Dongying as No. 1 and No. 2, respectively.[47] Unlike Daqing, the rankings of Shenzhen and Dongguan vary markedly.[48]

Inasmuch as the only correct way to derive a GDP per capita indicator is to divide GDP by the *de facto* population in the same geographical unit, the other two per capita GDP statistics (PCGDPG and PCGDPH) are flawed because the total output (GDP) is divided by the *de jure* population, generally resulting in an overstating of this economic quantity for the cities in Table 6. A look at columns k and l discloses that all ratios exceed 1.0. On average, for example, PCGDPH overstates PCGDPM by a very substantial margin, namely by 138 percent for the 30 cities (Table 6). This large average deviation is skewed by the two extreme cases, Shenzhen and Dongguan, but the median overstating ratio still comes up to be 64 percent. PCGDPG also overstates the true indicator (PCGDPM), but to a lesser extent. In any event, the magnitude of deviation is by no means small.

In the extreme cases of Shenzhen and Dongguan, PCGDPH and PCGDPG reach levels of outright absurdity, 4–16 times that of PCGDPM in Dongguan, and ca. 6–7 times in Shenzhen. These differences between the two groups of per capita GDP statistics, one based on *de jure* and one on *de facto* population, are colossal. The fallacy of Shenzhen's nearly astronomically high per capita GDP, oft-cited and widely used (133,305 yuan in 2000 as shown in Table 6 based on PCGDPG), is immediately apparent. Indeed, based on data in the most recent *Statistical Yearbook of China 2006*,[49] Shenzhen's per capita GDP in 2005 was 272,131 yuan (NBS, 2006). This level of per capita GDP, translated into comparable dollar terms (even simply based on the official exchange rate without factoring in purchasing power parity), would amount to roughly $35,000—a level comparable to that of Germany or France![50] Unfortunately, such misleading per capita GDP statistics are common in the Chinese official media, partly because the *hukou* population is considered to be the "official" resident population.

As a case in point, a Chinese financial newspaper recently proclaimed Guangzhou to be "the first city in China to exceed a per capita GDP of US$10,000" in 2006 and "the first . . .

[46]Our preliminary analysis indicates that if county-level cities were to be included in the comparison, only Nanhai in Guangdong would have made to the list, ranking 30th (replacing Suzhou). This provides additional evidence of the importance of these large cities in the Chinese urban economy.

[47]Both cities are among China's leading oil and natural gas producers, and Daqing Oilfield Co. was China's largest industrial enterprise (by revenue) in 2004 (*Sing Tao Daily*, 2004a).

[48]For example, Dongguan ranks second in terms of PCGDPH, but drops to the bottom (30th) according to PCGDPM.

[49]See Table 11.3 in the yearbook.

[50]Shenzhen's actual per capita GDP in 2005 was ca. $7,700, on a par with such lower-middle income countries as Russia and Mexico.

Table 6. Selected Indicators for China's 30 Cities with Largest GDP, 2000[a]

	City	GDP, bill. yuan	Total *hukou* population[b]	Non-agricultural *hukou* population[c]	NBS urban population[d]	PCGDPG[e], yuan	Rank	PCGDPH[f], yuan	Rank	PCGDPM[g], yuan	Rank	Ratio[h]		Difference in rank[i]	
		a	b	c	d	e	f	g	h	i	j	k	l	m	n
1	Shanghai	409.86	11.37	9.38	14.35	36,054	8	43,696	9	**28,565**	4	1.26	1.53	4	5
2	Beijing	233.23	9.74	7.27	11.51	23,942	18	32,081	18	**20,264**	17	1.18	1.58	1	1
3	Guangzhou	216.51	5.67	4.01	8.52	38,207	5	53,993	7	**25,398**	7	1.50	2.13	-2	0
4	Shenzhen	166.52	1.25	1.00	7.01	133,305	1	166,524	1	**23,759**	11	5.61	7.01	-10	-10
5	Tianjin	139.29	6.82	4.99	7.50	20,422	22	27,913	24	**18,574**	20	1.10	1.50	2	4
6	Wuhan	120.68	7.49	4.41	8.31	16,109	27	27,366	25	**14,518**	26	1.11	1.88	1	-1
7	Daqing	98.76	1.11	0.84	1.38	89,215	2	117,573	3	**71,563**	1	1.25	1.64	1	2
8	Shenyang	93.79	4.85	3.95	5.30	19,336	25	23,744	27	**17,686**	22	1.09	1.34	3	5
9	Dalian	79.01	2.68	2.08	3.25	29,506	13	37,986	12	**24,347**	10	1.21	1.56	3	2
10	Chongqing	78.62	8.96	3.82	9.69	8,770	30	20,581	30	**8,112**	29	1.08	2.54	1	1
11	Nanjing	77.56	2.90	2.56	3.62	26,789	15	30,297	19	**21,400**	15	1.25	1.42	0	4
12	Hangzhou	67.78	1.79	1.44	2.45	37,831	6	47,073	8	**27,652**	6	1.37	1.70	0	2
13	Chengdu	66.99	3.36	2.28	4.33	19,944	23	29,380	20	**15,457**	25	1.29	1.90	-2	-5
14	Jinan	66.14	2.64	1.80	3.00	25,010	17	36,745	14	**22,047**	13	1.13	1.67	4	1
15	Qingdao	62.89	2.35	1.84	2.72	26,808	14	34,180	16	**23,114**	12	1.16	1.48	2	4
16	Changchun	61.82	2.93	2.17	3.23	21,110	21	28,487	23	**19,164**	19	1.10	1.49	2	4
17	Xi'an	60.15	3.93	2.53	4.48	15,288	29	23,776	26	**13,422**	27	1.14	1.77	2	-1
18	Ha'erbin	54.99	3.04	2.64	3.48	18,106	26	20,831	29	**15,796**	24	1.15	1.32	2	5
19	Zibo	52.26	2.69	1.48	2.82	19,464	24	35,312	15	**18,549**	21	1.05	1.90	3	-6

20	Xiamen	50.19	1.31	0.66	2.05	38,232	4	76,041	4	**24,445**	9	1.56	3.11	-5	-5
21	Dongguan	48.97	1.53	0.40	6.45	32,091	10	122,433	2	**7,598**	30	4.22	16.11	-20	-28
22	Kumming	48.33	2.11	1.50	3.04	22,926	20	32,221	17	**15,923**	23	1.44	2.02	-3	-6
23	Fuzhou	46.41	1.48	1.12	2.12	31,254	11	41,437	11	**21,846**	14	1.43	1.90	-3	-3
24	Ningbo	43.61	1.24	0.77	1.57	35,152	9	56,631	6	**27,819**	5	1.26	2.04	4	1
25	Wuxi	42.64	1.13	0.99	1.43	37,741	7	43,074	10	**29,909**	3	1.26	1.44	4	7
26	Shijiazhuang	41.77	1.67	1.45	1.97	25,044	16	28,809	22	**21,205**	16	1.18	1.36	0	6
27	Changsha	41.52	1.75	1.43	2.12	23,673	19	29,038	21	**19,561**	18	1.21	1.48	1	3
28	Dongying	37.93	0.75	0.50	0.79	50,774	3	75,867	5	**48,087**	2	1.06	1.58	1	3
29	Zhengzhou	34.35	2.19	1.59	2.59	15,686	28	21,602	28	**13,265**	28	1.18	1.63	0	0
30	Suzhou	33.54	1.11	0.89	1.34	30,275	12	37,687	13	**24,943**	8	1.21	1.51	4	5
Unweighted mean		89.20	3.39	2.39	4.41	32,269		46,746		**22,800**		1.47	2.38		
Median		62.35	2.50	1.70	3.13	25,916		34,746		**21,303**		1.21	1.64		
Sum		2,676	101.83	71.79	132.43										

[a]City district populations in millions and GDP in current (2000 year) yuan.
[b]Also G in Table 3
[c]Also H in Table 3.
[d]De facto urban population as defined by 2000 Census; see also M in Table 3.
[e]GDP produced within city district divided by population G.
[f]GDP produced within city district divided by population H.
[g]GDP produced within city district divided by population M.
[h]Ratio k denotes PCGDPG/PCGDPM; ratio l denotes PCGDPH/PCGDPM.
[i]Difference m denotes PCGDPG – PCGDPM; difference n denotes PCGDPH – PCGDPM.
Sources: Compiled and computed by author from NBS, 2001b; SC and NBS, 2002.

to enter the stage of affluence" (*Caijing ribao*, 2007). On closer examination, however, it turns out that the per capita figure was derived by using the *hukou* population of about 7 million, which is much less than the actual population (about 10 million).[51] Thus, the claim of $10,000 would need to be discounted by as much as even 30 percent.[52]

A lamentable fact is that this set of obviously questionable, if not erroneous, numbers has also been used indiscriminately by scholars, leading to flawed findings and interpretations. The errors may not be as easily detected as the ones noted above, as the definitions and data are often buried within complicated quantitative analyses and modeling. In one case, in which Lin and Song (2002) regressed a number of independent variables against the dependent variable (per capita GDP) to ascertain the determinants explaining the economic growth of cities in China in the 1990s, the authors observed in passing that the 1998 per capita GDP figure for Shenzhen of 112,480 yuan was incredibly high (p. 2256).[53] Although this figure was roughly three times higher than Shanghai's (27,771 yuan), they did not examine any possible data problems, but rather accepted the numbers at face value.

In general, research that is probably most seriously affected by data problems involving per capita GDP involves the use of cross-sectional city-level per capita GDP based on *de jure* (*hukou*) population. Examples would include studies of urban productivity in China (e.g., Wang, 1985; Zhou, 1988; Pan and Zhang, 2002) and of agglomeration economies (e.g. Pan and Zhang, 2004; Au and Henderson, 2005). Studies that probe urban competitiveness also have seriously suffered from using highly distorted per capita GDP statistics. It is no great surprise, for instance, to find that Shenzhen is the most "competitive" city in China in 2000 (So and Shen, 2004), because of the immense bias in almost all per capita indicators introduced by using Shenzhen's much smaller population denominator. The same seriously biased approach is apparent in the highly publicized yearly studies of China's "city competitiveness" (see, e.g., Ni, 2003, 2004, 2005).[54] In each of these three consecutive yearly studies, Shenzhen always ranked at the very top, second only to Shanghai in mainland China in "overall comprehensive competitiveness." Given what is now known about per capita GDP, can we take these findings seriously?

Distortions resulting from inappropriate use of the *hukou* population also are embedded in many other indicators and can easily produce many misleading interpretations. Most recently, Dongguan was ranked as the city having the highest per capita disposable 2006 income of 25,320 yuan (or about $3,288) in China (*Yangcheng wanbao*, 2007). A dose of skepticism and some cursory investigative work revealed that the ranking almost certainly was generated by use of the *hukou* population, and by excluding inhabitants without local *hukou*. Similarly, at the national scale, news articles claiming that Chinese urban residents

[51] *Nanfang Dushi Bao* (2007) and *Xinjing Bao* (2007) report that Guangzhou's population has reached 12 million.

[52] It is likely that in most places, especially in the economically prosperous coastal region, local officials would prefer to use a smaller population denominator so as to generate a higher per capita GDP in order to look better in the performance evaluations. The NBS in fact stipulated that from 2004 on, all per capita GDP reported at the local level has to be based on the resident population, including migrants without local *hukou,* and that the reporting of per capita GDP based on the *hukou* population be phased out entirely by the end of 2005 (*Beijing Qingnian Bao,* 2003). Interestingly, viewed from a broader comparative perspective, the politics of local population numbers in China works in the reverse direction from that in the United States, where local governments often favor larger population numbers so as to increase their claims for disbursement of federal money and electoral power (e.g., congressional seats) (Prewitt, 2000).

[53] The same figure based on *hukou* population computed from NBS (1999) for 1998.

[54] These studies are based on a vast pool of socio-economic and business statistics, conducted by a large team of authoritative Chinese experts, including most participants from academia.

already had an average housing space of 27 sq. m per person (as reported in the official website China.com, 2007), should not be taken at face value, because the statistic is computed without taking into account persons without *hukou*. These varieties of distortions and misunderstandings are ubiquitous in the Chinese media, and academic writings as well. It would not be too difficult, for example, to envision that such problems might also affect statistics measuring China's rural-urban income disparities, a topic of considerable significance in light of the country's development and policy.[55]

CONCLUDING NOTE

The purpose of this paper was to explain and review the very complicated, multiple systems of population statistics in China for province- and prefecture-level cities, using 2000 and 2005 data and more detailed statistics for five sample cities. The numbers are difficult to understand and often extremely confusing to many users. After almost 30 years of reforms to convert the Chinese economy into a market-oriented power, the mainstay of the statistical method for enumerating population is still the adminstrative system, especially the *hukou*. In addition to insufficient technical and professional expertise to define and collect information, as one might expect in a developing country (Taylor and Banister, 1989), the inherently dysfunctional aspects of the administrative statistical system, marred by its close ties with the evaluation of local cadres and incompatibility with a market-oriented approach, have contributed to the complexities and confusion in the use of statistics.

Because the population numbers are fundamental in calculating important per capita social and economic indicators, China's systems of population statistics need to be simplified and made more comprehensible. To reduce confusion, China's government should revise the current terminology and setup, as suggested by Chinese scholars such as Zhou and Shi (1995). This undertaking can start with different terms to refer to administrative units of different scales, such as efforts to differentiate "region" from "city districts," instead of calling both "city."

Given the complexity of the Chinese system, it is imperative that the country's population statistics not be taken at face value or assumed to be what they appear to most Western observers (Holz, 2007). As demonstrated in this paper, improper use of city population statistics has led to significant misunderstanding of China's cities in the large number of writings by journalists and scholars that are based (quite inappropriately) on *hukou* population data. This systematic bias has affected studies ranging from the ones addressing simple questions, such as which city is the largest or which has the highest per capita GDP, to sophisticated analyses evaluating the success or failure of China's urban development strategy, or assessing whether Chinese cities are too large or small in terms of significant economic criteria. In light of the findings presented in this paper, the conclusions drawn by many previous studies may have to be revisited and scrutinized.

The detailed and systematic review and explanations of the array of city population statistics used in China hopefully will alleviate confusion in this area of research, at least in studies pertaining the recent benchmark year of 2000. This paper also points to a source of very useful statistical information on city population that can be derived from the *de facto* count incorporated in the 2000 Census (e.g., to obtain meaningful per capita statistics for

[55]This is another important topic that deserves additional treatment (the main problems will be discussed in Chan (forthcoming).

GDP or other measures of economic development). These sets of numbers, when correctly employed, can generate answers to many important questions of vital interest to geographers and economists engaged in advancing the frontier of knowledge about China's cities to a new level.

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