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Chinese Census 2000: New Opportunities and Challenges[*]

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The voluminous data generated by China's latest census have provided almost infinite opportunities for social scientists to study many aspects of the world's largest population and to gain a fuller picture of China's rapidly changing society. The articles in this special issue of *The China Review* represent a selection of works on demography, society and economy by some of the most active scholars in these fields, who have been quick to take advantage of this opportunity. Earlier versions of all the articles, with one exception, were presented in 2002 at one or both of the two international meetings held in Hong Kong and Seattle, both of which devoted substantial or exclusive attention to the Chinese Census 2000.[1] Individually and collectively, these articles present many exciting research findings based on this great resource. The works contained in this issue include the latest and most comprehensive estimates of the number of "truly missing girls" by Cai and Lavely; analysis of mortality by Li and Sun; of the urbanization trend by Chan and Hu; of the relationship between migration and unemployment by Cai and Wang; and of the latest elderly living arrangements by Zeng and Wang. Furthermore, Wang explores the possibilities of using the Census data to study housing inequality and related issues, while Yang's research note compares the sectoral and occupational structures of migrants and locals in Wuhan.

To set the context for reading the articles which follow, we will begin with the most fundamental part of a census, the population count.

* Communications with Kai-yuen Tsui and Ying Hu on China's provincial population statistics have greatly helped my understanding of the issue. William Lavely and Kai-yuen Tsui commented on a draft of this introduction before. I am thankful to all of them. Any remaining errors are, of course, my responsibilities.

Perhaps the most valuable aspect of the Census 2000 data, in addition to the universal coverage, is that they are probably the only major systematic set of population statistics which are not used by supervisors to assess the performance of local governments.[2] This provides an extraordinary window for us to have more "independent" counts of population and obtain a more accurate picture of the latest demographic and other changes in China, something which is normally impossible on the basis of routine government statistics. Several newly added features in the Census 2000 also enhance the scholarly value of the Census data.[3] For example, following international practice, the Census 2000 is the first Chinese census to use a combination of short-form questionnaires (covering 90% of the population) and long-form questionnaires (administered to the other 10%). This allows the long-form questionnaire to survey in greater depth various aspects of employment (including unemployment), mobility, and housing. Potentially, the data are a great resource for studying many related topics.

The Census 2000 also has two other major new features that deserve attention, related to topics with which I am quite familiar.[4] First, it is the first time that a Chinese census in the last three decades has enumerated *all* the population — both "permanent" and "temporary" — in the place they are staying. Second, the Census is also the first to define migrants based on a much smaller geographical unit, at the "street" (*jiedao*) or township (*xiang zhen*) level. These two features present great opportunities for migration research with a level of spatial precision and comprehensiveness that was not feasible in the past. In particular, it is now theoretically possible to generate comprehensive headcounts by locale — perhaps *the* most important function of a census — and to study the mobility patterns relating to the "temporary" migrants (examined below) and residential mobility within cities (such as through suburbanization).

Allow me to explicate the above point. In the preceding two censuses, people who did not have a local *hukou* (household registration) and who had stayed less than one year in the survey place (a city or a county) were *not* enumerated at all at the survey place. In the Census 2000, a new *zanzhu renkou* ("temporary population") form was introduced to record this population (the length of stay was reduced to less than six months), whereas the remaining, "ordinarily resident"[5] population (*changzhu renkou)* was recorded in the regular census form. The survey of *zanzhu renkou* is in essence a census of the "floating population," which China has never had before for the whole nation, and which, supposedly, will have

gathered a good deal of precious information for scholars and policy-makers. The counting of *zanzhu renkou,* desirable from many policy and research perspectives, increased immensely the logistical difficulties of the Census and contributed greatly to the much higher undercounting rate of the exercise.

The *changzhu renkou* information from the Census, by including the population without local *hukou* but who have stayed in the survey place for more than six months, is a much superior population count to the population counts obtainable from regular government statistics (examined below). Furthermore, by adding up the numbers of *zanzhu renkou* and *changzhu renkou* surveyed at the same time, theoretically one can also get data relating to the "true" population number in any locales (such as in certain cities), at least for one benchmark year, 2000. The above two pieces of important information, however, have been lacking for quite some years due to China's peculiar system of regular population reporting: very few of the regular sources of population statistics by sub-national unit (province, city, county, town, township etc.) include the population without local *hukou,* but they do often include the population with local *hukou* but who have already moved out.

The partial nature of such information is clearly unsatisfactory, and it often misleads less prudent observers. An obvious, perhaps extreme, example of that occurs in Shenzhen City. In *Zhongguo chengshi tongji nianjian 2001*, one of an annual statistical yearbook series containing data routinely used by researchers to study Chinese cities, the 2000 year-end population total for Shenzhen is 1.25 million,[6] whereas the Census 2000 reports, based on exactly the same geographic boundary, a *changzhu renkou* of 7.0 million, plus a *zanzhu renkou* of 923,619, on 1 November 2000.[7] Needless to say, the difference between the two population totals, 1.25 million and 7.0 million (or 7.923 million if the *zanzhu renkou* are included) is colossal. The fallacy of Shenzhen's absurdly high per capita GDP often cited and used (for example, at RMB115,060 in 1998, more than four times that of Shanghai[8]), based on the smaller population denominator (about 1.2 million) is immediately apparent. It is also evident that previous studies and findings about Chinese cities based directly on those distorted city population figures available in various yearbooks will have to be re-assessed.[9] And the Census 2000, for all the billions of RMB it costs, does provide a unique window for achieving a more realistic count of the population in each locale!

While opportunities created by the Census for doing interesting

research abound, two major challenges are faced by Census users or potential users: data availability and data quality, broadly defined. The accessibility of information, of course, has often dictated the types of research on China which are feasible for Western scholars.[10] Since Spring 2001, there has been a steady, "healthy" public release of tabulated data by China's National Bureau of Statistics (NBS). Several volumes of national-level Census tables, tens of volumes for all the provincial-level units,[11] and hundreds of volumes for prefectural and county-level units have been published. These national volumes and provincial volumes are also available in electronic form, with most tables in convenient Excel spreadsheet format. One would expect that ultimately, more tabulated data will be available for other county-level units and, perhaps even township/street-level units. Furthermore, a 1% national sample microdata set from the long-form questionnaires was also made available in late 2002 to some researchers within China, including some of the authors of articles in this issue. We hope that soon outside researchers too will be able to access that very useful microdata set.

The greater challenge lies in the quality of the Census 2000 data. The problem is also related to a host of other issues, including definitions and operational difficulties in the survey, and underreporting and misreporting. Since data quality is a central issue in using and interpreting the Census data and the analysis based on them, it deserves some examination here.

Among the many dimensions of the data quality issue, a major one is the underreporting of the population in the Census 2000. As Zeng and Wang in this issue point out, while China's earlier censuses, such as the one in 1982, have been shown to have high accuracy and consistency with regard to the numbers of persons by sex and age, undercounting of population became more serious in the 1990s in many population surveys and in the Census 2000. Based on the post-Census sampling checks, the NBS has estimated an undercount rate of 1.81% (22.46 million), not very high by international standards, but considerably higher than in the previous censuses.[12] Government statisticians and researchers are rightly concerned about the deteriorating data quality of the Census. From another perspective, this decline in quality is expected and quite natural. While insufficient financial support and the survey design have played a role in the higher undercounting rate, as Zhang points out,[13] other factors were at least as important. The higher rate could well reflect a freer, and more diverse and mobile Chinese population in 2000 than in 1990. Instead of the

population obediently queuing up to be counted, as perhaps occurred in 1982 to achieve an amazingly high accuracy of headcount, an increasing but still small proportion of people probably reacted to the census in 2000 in a less cooperative way. They gave inaccurate answers unintentionally or intentionally, or simply refused to answer some questions.[14] Still others, like the "above-quota birth" children, or the homeless and itinerant commercial sex workers, were by nature hard for the census workers to locate. The emergence of these problems in 2000 also tells us that China is becoming more like other societies.

The underreporting obviously affects the total number of mainland China's reported population. While the total raw counts in the Census is 1,245.11 million,[15] the final figure for the country, after adjusting for undercounting by the NBS, is 1,265.83 million.[16] A recent study by Zhang and Cui[17] suggests that undercounting is serious for ages 0–9, and there is serious undercounting and overcounting for ages 20–45. The issue of undercounting of children has also been analysed in the "missing girls" and "mortality" articles in this issue and will not be repeated here. The miscounting of adults aged 20–45 is more related to adult "migrants" and/or those without local *hukou*. Two main points have led me to question the number of migrants (and hence, the number of residents and *zanzhu renkou*) reported in the Census 2000. First, the size of the stock of the non-*hukou changzhu* population[18] in the Census 2000, at 144.3 million, came as a great surprise. Presumably based on the same definition, this figure was consistently much lower, around 60–64 million from 1996 to 1999, according to NBS nationwide annual population surveys.[19] Secondly, there appeared to be significant operational difficulties in the Census in differentiating whether a migrant had stayed in the survey site less than six months (and was hence counted as *zanzhu renkou*, rather than *changzhu renkou*) or six months or more (and was hence counted as *changzhu renkou*).[20] Despite the use of a *zanzhu renkou* questionnaire form in the Census, so far no figures for the nation and provinces have been released about that group, an indication of possible serious problems in aggregating the numbers.[21] Moreover, unlike all the other Census questionnaire forms, which are now appended in the last of the three main national volumes, this form is not.[22] All these suggest that prudence and more careful work are needed before we take the migration numbers at face value and jump to findings and conclusions.

The undercounting also affects the population totals by sub-national unit, especially individual provincial population totals, a problem which

affects calculations of all kinds of provincial per capita indicators, similar to the case of Shenzhen's per capita GDP discussed above. I have put together three provincial series pertaining to the period between 1999 and 2001 in Table 1 for illustration and comparison purposes. The three series are Census figures for 2000 (both direct counts and adjusted, Columns C and D); NBS annual population sample survey figures for year-end 1999 and 2001 (Columns A and F); and the *implied* population totals for 2000 and 2001 (presumably mid-year, Columns B and E) derived from the provincial per capita GDP figures[23] published in respective volumes of the *Zhongguo tongji nianjian* (*TJNJ, Statistical Yearbook of China*).

The NBS has for the first time adjusted the Census provincial population totals for undercounting. While the national undercounting rate is 1.81%, the NBS has brought up the original provincial raw count figures by differential rates for different provinces (Columns C, D and H). The rationale for the provincial variation is still not known and has been questioned by Qiao Xiaochun, a well-respected demographer at the Population Institute of Renmin University of China in Beijing.[24] For researchers interested in studying the provincial variation of population growth, this is an issue that requires more examination. Nevertheless, the Census provides an opportunity for us to cross check the various existing provincial population series and perhaps to begin understanding better China's current population statistics, and their uses and limitations.

A comparison of several of the pairs of columns in Table 1 yields some initial surprises. All the negative numbers in Columns I, J, and K are totally unexpected, as one would assume the population numbers to be larger in a later year than in an earlier one, given the general positive population growth in China.[25] Most interestingly, the Census figures (Columns C and D) tend to be the highest among the three series, adjusting for the differences in time. On the other hand, the implied population totals used in the calculations of per capita GDP (Columns B and E) tend to be generally the smallest (sometimes, much smaller than the Census figures). This is especially obvious when comparing the "Implied" 2001 mid-year figure (Column E) and the Census 2000 adjusted figure (Column D). In an extreme case, Guangdong's "Implied" mid-year population in 2001 is actually 8.87 million (Column J) less than the Census 2000 adjusted figure of eight months earlier! Similar large unexpected negative numbers in Column J are also found for Shanghai (–3.5 million) and Beijing (–2.67 million). These anomalies appear to be related to the different population

numbers that are reported or negotiated for different purposes. Given that per capita GDP and population (and fertility) control are some of the major performance indicators used in the evaluation of local (including provincial) officials by their supervisors,[26] it is not too surprising to see local officials favour lower population figures when there is room for negotiation between the national and provincial authorities as to what numbers to use.[27] If the Census adjusted figure were to be used to compute Guangdong's per capita GDP — as it probably should be[28] — the province's per capita GDP for that year would be brought down by 13.23%! Interestingly, from a broader comparative perspective, the politics of local population numbers in China is working in the reverse direction to that in the USA, where local governments often favour higher population numbers so that they can make claims for more disbursement of federal money and electoral power (e.g. congressional seats).[29]

To conclude, the Chinese Census 2000 and the massive amount of information it has generated provide a precious and unique opportunity for scholars not only to take a snapshot of China's demography and society in 2000 and study several important topics that were not feasible before, but also to obtain more realistic counts of population and especially migrants at the local level. Clearly, the new Census data will permit us to reevaluate previous work based on distorted population figures. Furthermore, cross-checking the Census data against other existing population statistics also allows us to begin to understand a more complex system of population statistical classifications, reporting and uses than we knew before. The brief examination of various statistics in this introduction, triggered by a desire to set a context for readers of this special issue, in many ways parallels and complements the literature on China's GDP statistics and the systems for reporting them.[30] The enormous amounts of data from the Census 2000 are no doubt a gold mine for interested scholars, but there will also be more work, and more challenges, ahead if we wish to use them properly and fully.

Finally, to close this introduction, I would like to thank the following people, without whose support and assistance this special project would not have come to fruition: the authors, for working diligently to meet tight submission and revision schedules; the anonymous referees for helping raise the quality of the articles; the editorial board, especially Drs. Jianfa Shen and Kai-yuen Tsui, for their continuing advice and encouragements; and Mr. Wai Keung Tse, for his able administrative and editorial assistance.

Table 1: Provincial Population Figures 1999–2001, Different Series (in 10,000)

	1999	2000			2001		Comparisons				
	NBS survey, year-end	Implied, mid-year	Census direct count, (Nov 1)	Census adjusted, (Nov 1)	Implied, mid-year	NBS survey, year-end	D – C	G/D (%)	B – A	E – D	F – D
	A	B	C	D	E	F	G	H	I	J	K
Beijing	1257	1104	1356.9	1382.0	1115	1383	25.1	1.81	–153	–267	1
Tianjin	959	911	984.9	1001.0	913	1004	16.1	1.61	–48	–88	3
Hebei	6614	6641	6668.4	6744.0	6670	6699	75.6	1.12	27	–74	–45
Shanxi	3204	3200	3247.1	3297.0	3260	3272	49.9	1.51	–4	–37	–25
Inner Mongolia	2362	2386	2332.3	2376.0	2392	2377	43.7	1.84	24	16	1
Liaoning	4171	4159	4182.4	4238.0	4180	4194	55.6	1.31	–12	–58	–44
Jilin	2658	2660	2680.2	2728.0	2660	2691	47.8	1.75	2	–68	–37
Heilongjiang	3792	3800	3623.8	3689.0	3809	3811	65.2	1.77	8	120	122
Shanghai	1474	1317	1640.8	1674.0	1324	1614	33.2	1.98	–157	–350	–60
Jiangsu	7213	7290	7304.4	7438.0	7361	7355	133.6	1.80	77	–77	–83
Zhejiang	4475	4484	4593.1	4677.0	4605	4613	83.9	1.79	9	–72	–64
Anhui	6237	6242	5900.0	5986.0	6302	6328	86.0	1.44	5	316	342
Fujian	3316	3379	3409.8	3471.0	3441	3440	61.2	1.76	63	–30	–31
Jiangxi	4231	4129	4039.8	4140.0	4167	4186	100.2	2.42	–102	27	46
Shandong	8883	8940	8997.2	9079.0	9019	9041	81.8	0.90	57	–60	–38
Henan	9387	9438	9123.7	9256.0	9522	9555	132.3	1.43	51	265	299
Hubei	5938	5949	5950.9	6028.0	5967	5975	77.1	1.28	11	–61	–53
Hunan	6532	6547	6327.4	6440.0	6579	6596	112.6	1.75	15	139	156
Guangdong	7270	7499	8522.5	8642.0	7755	7783	119.5	1.38	229	–887	–859

Guangxi	4713	4747	4385.5	4489.0	4780	4788	103.5	2.31	34	291	299
Hainan	762	752	755.9	787.0	765	796	31.1	3.95	–10	–22	9
Chongqing	3075	3082	3051.3	3090.0	3095	3097	38.7	1.25	7	5	7
Sichuan	8550	8383	8234.8	8329.0	8422	8640	94.2	1.13	–167	93	311
Guizhou	3710	3733	3524.8	3525.0	3747	3799	0.2	0.01	23	222	274
Yunnan	4192	4217	4236.0	4288.0	4264	4287	52.0	1.21	25	–24	–1
Tibet	256	258	261.6	262.0	261	263	0.4	0.14	2	–1	1
Shaanxi	3618	3651	3536.5	3605.0	3671	3659	68.5	1.90	33	66	54
Gansu	2543	2562	2512.4	2562.0	2576	2575	49.6	1.93	19	14	13
Qinghai	510	518	482.3	518.0	525	523	35.7	6.89	8	7	5
Ningxia	543	549	548.6	562.0	559	563	13.4	2.38	6	–3	1
Xinjiang	1774	1827	1846.0	1925.0	1877	1876	79.0	4.11	53	–48	–49
I. Sum of all provinces	124219	124352	124261	126228	125584	126783	1967	1.56	133	–644	555
II. Reported national total	125909**	124597	124261*	126333*	125078	127627**	2072	1.64	–1312	–1255	1294
III = II – I	1690	245	0	105	–506	844					

Notes: Provincial figures in Columns A, C, D, and F exclude military personnel. It is very likely that those in Columns B and E also exclude military personnel.

* excluding military personnel. ** including military personnel.

Sources:

Column A: *TJNJ 2000*, Table 4-3.

Column B: Computed from *TJNJ 2001*, Table 3-9.

Column C: *Tabulation on the 2000 Population Census of the PRC*, Vol. 1, Table 1-1.

Column D: *TJNJ 2001*, Table 4-5.

Column E: Computed from *TJNJ 2002*, Table 3-9.

Column F: *TJNJ 2002*, Table 4-3.

Notes

1. These two meetings are: Conference on Chinese Population and Socioeconomic Studies: Utilizing the 2000/2001 Round Census Data, held at Hong Kong University of Science and Technology, 19–21 June 2002; and Workshop on Chinese Census 2000, held at the University of Washington, Seattle, 22–23 August 2002.
2. The State Council stipulates that the Census 2000 data cannot be used as performance indicators of local governments. See Chen Hua and Zheng Xiaodong, "Juda chenggongzhong de shaoxu yihan" (Small Regrets in the Big Success), *Renkou yanjiu* (Population Research), Vol. 26, No. 2 (2002), pp. 23–28.
3. Examinations of the new features of the Census 2000 are found in William Lavely, "First Impressions from the 2000 Census of China," *Population and Development Review*, Vol. 27, No. 4 (2001), pp. 755–68; and Zhang Weimin, "Census 2000: Problems and Proposal for Improvement," paper presented at Conference on Chinese Population and Socioeconomic Studies, Hong Kong University of Science and Technology, 19–21 June 2002.
4. In addition to reviewing many Chinese Census volumes in the collection of the East Asian Library in the University of Washington, I was fortunate to have the experience of examining some of the preliminary census results in Wuhan in December 2000, just after the Census was conducted in the city.
5. I borrow this term from Hong Kong's immigration law; I think it is the closest English translation of the Chinese concept of "*changzhu*" in "*changzhu renkou*."
6. National Bureau of Statistics (NBS), *Zhongguo chengshi tongji nianjian 2001* (Urban Statistical Yearbook of China 2001) (Beijing: Zhongguo tongji chubanshe, 2001), p. 42. Though not explained in the volume, the figure apparently refers to only Shenzhen *huji renkou* (population with Shenzhen *hukou*).
7. See Population Census Office of Guangdong Province, *Tabulation on the 2000 Population Census of Guangdong Province (Shenzhen)* (Guangzhou: Guangdong jingji chubanshe, 2002), pp. 2 and 308.
8. Both Shenzhen's and Shanghai's per capita GDP figures are direct quotes from NBS, *Xinzhongguo chengshi 50 nian* (Cities in New China in the Last 50 Years) (Beijing: Xinhua chubanshe, 1999), pp. 359 and 363.
9. The body of especially quantitative research based on unadjusted city population data directly drawn from those yearbooks is huge. Here are some random examples from one journal, *Urban Studies*: Xiaobin Zhao and Li Zhang, "Urban Performance and the Control of Urban Size in China," Vol. 32, Nos. 4–5 (1995), pp. 813–45; Shuanglin Lin and Shunfeng Song, "Urban Economic Growth in China: Theory and Evidence," No. 39, No. 12 (2002), pp.

2251–66; Zuohong Pan and Fan Zhang, "Urban Productivity in China," Vol. 39, No. 12, pp. 2267–81. Interestingly, Lin and Song, in their sophisticated modelling exercise, noted that huge disparities between per capita GDP of Shenzhen and many other cities, but did not explore the simple question of population definition and coverage.

10. See a discussion of this on urban studies by Dorothy Solinger and Kam Wing Chan, "The China Difference: City Studies Under Socialism and Beyond," in *Understanding the City: Contemporary and Future Perspectives*, edited by John Eade and Christopher Mele (Oxford, UK: Blackwell Publishers, 2002), pp. 204–21.
11. Some provinces (such as Guangdong) produced multiple volumes of the provincial-level tabulations.
12. For example, the undercount rate for 1990 is 0.06%. See State Council Population Census Office, *Zhongguo disici renkou pucha de zhuyao shuju* (Major Figures of the Fourth Population Census of China) (Beijing: Zhongguo tongji chubanshe, 1991), p. 43. The 1990 rate refers to the "net undercount rate," the balance of undercount rate (0.07%) and overcount rate (0.01%). Qiao has pointed out the 2000 "undercount rate" and the 1990 "net undercount rate" are not truly comparable and questioned the validity of the 2000 rate. See Qiao Xiaochun, "Cong 'zhuyao shuju gongbao' kang diwuci renkou pucha cunzai de wenti," *Zhongguo renkou kexue* (Population Science of China), No. 4 (2002), pp. 48–56.
13. Zhang (Note 3).
14. Daniel Walfish, "A Billion and Counting: China's Tricky Census," *Science*, Vol. 290 (2000), pp. 1288–89; China's various news websites in November 2000 also carried many reports of problems encountered in conducting the Census in different locales.
15. This is the sum of 1,242.61 million civilians and 2.5 million military personnel. State Council and NBS, *Tabulation on the 2000 Population Census of the People's Republic of China*, Vol. 1, p. 10.
16. Computed from NBS, *2000 nian diwuci quanguo renkou pucha zhuyao shuju gongbao (di er hao)* (Communiqué on Major Figures of the 2000 Population Census [No. 2]), 1 April 2001.
17. Zhang Weimin and Cui Hongyan, "Dui Zhongguo 2000 nian renkou pucha zhunque xing de guji" (An Estimation of the Accuracy of China's 2000 Population Census), *Renkou yanjiu*, Vol. 27, No. 4 (2003), pp. 25–35.
18. These are the people (migrants) who did not have the local *hukou*, and who had been at the survey place for more six months or who had left the original *hukou* registration place for more than six months.
19. See Kam Wing Chan, "Recent Migration in China: Patterns, Trends, and Policies," *Asian Perspectives*, Vol. 25, No. 4 (2001), pp. 127–55, especially Table 1.

20. See discussions in Zhang (Note 3), and Qiao (Note 12).
21. After reviewing several national volumes and some twenty provincial and city volumes, I have only managed to find a small section on *zanzhu renkou* in the Shenzhen and Beijing Census volumes. On the other hand, both Guangdong and Shanghai have published separate Census volumes on *wailai renkou* (outside population), presumably covering also *zanzhu renkou*.
22. The form is, however, appended in the Shanghai's and Beijing's volumes.
23. The implied provincial population figures are derived from the available provincial GDP and per capita GDP data in *TJNJ*. Generally, the population figure used to derive per capita GDP is the average population of the year. The mid-year population figure is taken as an approximation.
24. Qiao (Note 12).
25. It is extremely unlikely that net migration outflows would generate absolute population decreases at the provincial level.
26. See Kai-yuen Tsui and Youqiang Wang, "Between Separate Stoves and A Single Menu: Fiscal Decentralization in China," *The China Quarterly*, forthcoming.
27. See a discussion of this in Qiao (Note 12).
28. The Census figures include migrants staying in the province for more than six months, while other figures often do not. Migrants are not only residents, most of them are also productive labour.
29. See Kenneth Prewitt, "The US Decennial Census: Political Questions, Scientific Answers," *Population and Development Review*, Vol. 26, No. 1 (2000), pp. 1–16.
30. See, for example, Thomas Rawski, "What's Happening to China's GDP Statistics?" *China Economic Review*, Vol. 12, No. 4 (2001), pp. 347–54. Carsten Holz, "Instititional Constraints on the Quality of Statistics in China," *China Information*, Vol. 16, No. 1 (2002), pp. 25–67.