Methodology: Approaches of Chinese History Population Estimation (1368-1953)

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Standard Times Determination

1. Standard Times

It is generally agreed that a nationwide population census was carried out during Ming Dynasty Hongwu years (1368-1398) according to Ping-Ti Ho's argument. Therefore, year 1391 when the census was taken can be confirmed as the first standard time, although this census is discovered problematic.

As it is indicated by Ping-Ti Ho, the transformation from Baojia System to census register system took place in the 41st year of Qianlong(1776), which can be regarded as one standard time representing initial population census of Qing Dynasty. Then the year 1850, 1880, 1910 can be seen as another three standard times in consideration of population decrease influenced by war and famine. The year 1953 is the beginning of the modern Chinese census.

The revision and speculation of demographic data are very significant, as original data of standard times is not always dependable. I used to propose some methods to distinguish and modify original demographic data which are as followed: 1). Mean household size. 2). Sex ratio. 3). Annual population growth rate. 4). Regional population proportion.

2. Mean Household Size

Our studies showed that the region around capital such as the capital Nanjing, Zhejiang, Jiangxi, Fujian, etc, was observed more accurate original demographic data in the provincial administration units, with mean household size of 5. The majority of provincial administrative areas away from capital, apart from Yunnan, had mean household size more than 6, the greater the distance, the greater the household size.

The same trend was discovered evidently inside provincial administrative areas, the greater the distance away from provincial capital, the more the household size within 6-10.

Was the households underestimated, or was the population overestimated in the areas of Shanxi, Beiping, Shandong where mean household size was apparently high? Household size of prefectures of Huaiqing and Weihui in Henan, for example, was 4.9 and 5.8 respectively in Yuan Dynasty, which can be seen as accurate census. However, until early Ming Dynasty, when households of Huaiqing prefecture increased, while population decreased, whereas things were different in Weihui prefecture, where both population and households decreased by 21%, 33% respectively. Another example might be Anqing prefecture, where there were 55520 households, 325814 population, and household size 5.9 in 1377, then data of households fell to 52038, while population raised to 401644 in 1391. Thus, investigation of households was apparently neglected in 1377's population census.

In a word, the quality of population census in early Ming Dynasty can be broadly reflected in the number of mean household size. We trended to believe the households' data, when household size was relatively low, and modified the population data based on the household scale 5. Simultaneously, we trended to believe the population data, when household size was relatively high. Under normal circumstances, we did not attempt to adjust the households' data, after all, the population was the subject which we tried to discuss.

3. Sex Ratio

Ping-Ti Ho quoted *Households and Population* from *the Records of Yongzhou Prefecture, volume 3* which compiled in 1381, households 73,005, population 411,616 in which there were 135,346 adult males, 123,970 adult females, 94,071 boys, and 58,226 girls. And adult sex ratio was 109, children's was 162, total sex ratio was 125. The problem with this case is the registration omission of girls. Full records of "younger females" were preserved in the Yellow Registers of Anhui area in early

Ming Dynasty, then, the records disappeared in middle Ming Dynasty. Hence we can see that omission of "younger females" had become key factor to influence quality of population census early in Hongwu years. Then the omission became systemized after Yongle years (1403-1424).

4. Annual Population Growth Rate

There were households 1,300,772, population 6,214,195 in Fujian (8 prefecture included) in Yuan Dynasty, calculating mean household size 4.8, according to the Geographical Records of the Yuan History. It is noticed that households' number of Fuzhou prefecture was surprisingly large, accounting for 61% of the total 8 prefectures, and there was a high 62% of the population number as well. However, both households and population decreased to 616,533, 3,353,092 respectively in Qing Dynasty, when households and population of Fujian Province (exclusive of Taiwan) reached high of 3,150,000, 16,750,000. The decrease was unreasonable when the provincial data kept going up. The only reasonable explanation for the paradox is that households and population figures were exaggerated evidently.

The exaggeration might be caused by frequent administrative shifts in Yuan Dynasty. Between year 1281 to 1283, city Fuzhou used to be provincial capital of Fujian Province twice, and then became part of Zhejiang Province, which might lead to errors in the population census: that is, there must be a group of household and population figures of Fujian Province mistakenly assumed as data of Fuzhou prefecture, as Fujian Province was abolished. Then the editor of local documents formed the household and population number of Fuzhou prefecture with the figures of Fujian Province mentioned above adding to actual figures of Fuzhou prefecture out of the misunderstanding. Based on the hypothesis, the recorded household and population figures should be regarded as the sum of Fuzhou prefecture figures and the total 8 prefecture figures of Fujian Province. So that we got the reliable figures of Fuzhou prefecture: household 149,263, population 768,048 by taking recorded figures of Fuzhou prefecture, minus by other 7 prefectures' figures of Fujian Province, and divide by 2. Then the ratio of households and population of Fuzhou prefecture to total

8 prefectures had become to 19%, 20% respectively, which are similar to the percentage of Jiaqing years of Qing Dynasty. Mean household size was 5.1.

5. Regional Population Proportion

The case of Fuzhou reminded us of the trend that population of different regions might follow the similar increasing speed without the influence of industrialization and natural disasters. That is, we can speculate the omission population figures based on the principle.

For example, the household and population figures of prefecture Anqing for year of 1820 recorded in *the National Chorography of Jiaqing years* are unavailable. In 1953, population figures of prefecture Anqing and Chizhou were 3,218,000 and 972,000, 76.8% and 23.2% of the total respectively. Population of the two prefectures was influenced a lot in the war of TaiPing Rebellion. Compared with Chizhou, Anqing's population recovered more quickly due to its opening pier, trade, and its position as provincial capital, so that its population percentage of year 1953 might be higher than that of prewar time. In 1393, population figures of prefecture Anqing and Chizhou were 423,000 and 199,000, 68% and 32% of the total respectively. The proportion became to 67% and 33% in consideration of population of guarding posts. I speculated Anqing's population figure for 1820 at 5,552,000 based on Chizhou's figure 2,755,000 in the percentage of 67:33 under the principle mentioned above. Actually, the sum of Anqing's "Original ding" and "Exempt ding" was 5,577,000, close to 5,552,000. However, the two population figures cannot be added together in terms of system history.

I have never thought of that I would have the opportunity to prove my analysis published in *Qing Dynasty, History of China's Population, volume 5*. In 2010, one of my students pointed out in class of Shanghai Jiaotong University that the population of Anqing for 1819 was 5,559,000 recorded in one local works 《皖省志略》（C*horography of Anhui Province*）which I neglected before. The figure 5,559,000 is broadly agreeable with my simulating result 5,552,000. Apparently, annual population

increasing rate might follow the similar speed in vicinity and similar regions.

Estimation of Population Increasing Rate of Ming Dynasty

As it is indicated by Ping-Ti Ho, a substantial portion of population census had transformed to taxation units statistics. However, there were many regions still had maintained original population census and distribution system for quite a long period, which make it possible to discuss population before middle Ming Dynasty.

1. Population Increasing in the North

Take prefecture Kaifeng in Henan province as an example. Population figure for 1391 was 1,183,000, and decreased to 1,133,000 in 1412, then increased to 2,047,000 in 1482, and decreased to 2,039,000 in 1552. The annual population growth rate over years between 1391 and 1482 was averaged 6‰ without taking data for 1412 and 1552 into consideration.

Unfortunately, sex ratio for year 1482 was high of 187, apparently resulted in omission of adult females. We modified the population figure to 2,530,000 according to the sex ratio 110. Similarly, mean household size for 1391 of Henan Province was high of 6.9, which means sex ratio might be high of 130, generally, the greater the household size, the higher the sex ratio. We modified the population figure of prefecture Kaifeng to 1,277,000 based on the sex ratio 110. Therefore, the annual population growth rate modified over years between 1391 and 1482 was about 7.5‰.

The annual population growth rate was 7.6‰ in northern Henan province, but high of 11.3‰ in southern Henan province, such as Nanyang, Runing and Ruzhou, since largely immigrants moved into this region.

2. Population Increasing in the South

Households and population figures of majority prefectures in Nanjing Province were discovered tumultuous and showing a downward tendency. Things are different in

several regions, such as prefecture Fengyang, of which annual population rate was 5‰ from 1393 to 1491, and 3‰ from 1491 to 1587. And in prefecture Xuzhou, annual population rate was 6.9‰ for 1393-1491. Actually, the two prefectures, which were scarcely populated according to records of middle Ming Dynasty, were more part of northern region rather than the south. The annual population rate was 2.7‰ for 1393-1497, 3‰ for 1497-1578 in prefecture Luzhou, and the ratio was 3.7‰ for 1393-1491 in prefecture Anqing. The population increasing speed varied considerably from the north to the south, even inside the province.

It's hard for us to speculate population growth rate for other southern regions since there was no detailed population record discovered. Fortunately, we found some reliable population data in two counties established in middle Ming dynasty.

County Guihua were established in 1471, and its households and population figures for 1472 were kept in *Record of Food and Commodities, Chorography of Tingzhou Prefecture,* that is households 5157, population 32,152, and mean household size 6.2 calculated. The figures then increased to households 5,588, population 34015 in 1492, and household size 6.1 calculated. The annual growth rate over the two decades averaged 4‰. Based on records of local documents, Yongding county was established in 1481, and the annual growth rate of which over 1482-1492 averaged 3.9‰.

In a word, we set population increasing rate in the north at 4‰-8‰, which would be a little higher in regions where largely immigrants moved in. In the south, the ratio was about 3‰-4‰. Population of prefectures can be rebuilt based on the ratios.

Population Increasing Rate of Qing Dynasty

It is possible to discuss districted population increasing rate of Qing Dynasty out of abundance materials, which is different from conditions of Ming Dynasty. There are two ways for us to discuss population increasing rate of Qing Dynasty: Firstly, we began our work with determining standard time points' population in regions where

population was influenced by wars in late Qing Dynasty. Secondly, in other regions, we sorted out annual growth rate of appropriate counties in a prefecture as the ratio of whole prefecture.

1. A Case of Jiangsu Province: Population Influenced by War of Taiping Rebellion

Mass mortality of population of Jiangsu province was caused by War of Taiping Rebellion in late Qing Dynasty. Therefore, we adopted the first method —— determining standard time points' population.

Two kinds of connotations were involved in the investigation unit "Ding" in Jiangsu province, which was different from other provinces. One was the taxation unit, the other, usually recorded as "Ding Nan", which means "adult males", was the actual population unit. We compared population ratios of different counties recorded in *chorography of Jiangning Prefecture* compiled in Jiaqing Years (1795-1820) and population census in 1953. The result showed that ratios of the two standard time points were broadly agreeable with each other. So that it can be said with certainty that the unit "Ding" of Jiangning prefecture had the character of population census.

In system, Jiangsu province was composed by two chief secretaries named Jiangsu and Jiangning respectively. In *the National Chorography of Jiaqing years*, total population of Jiangsu province was 26,458,000, then minus population of Jiangsu chief secretary 16,030,000[1]. We got the figure 10,428,000. Here involved a question: Is this figure 10,428,000 the number of taxpayers or the population? It is recorded in *the Huidian of Qing Dynasty (A Book on Regulations of Qing Dynasty)* that population of Jiangsu province for 1812 was 37,844,000, minus population of Jiangsu chief secretary 16,030,000 was 21,814,000, which was the population of Jiangning chief secretary and was 2.09 times of the figure 10,428,000 mentioned above. Thus, the figure 10,428,000 should be the number of taxpayers rather than the whole population. Similarly, it was recorded in palace archives population of Jiangsu

[1] The figure was confirmed to be the population including males and females, as both males and females were recorded in *Chorography of Suzhou Prefecture* compiled in Tongzhi years (1861-1875).

province was 39,510,000, minus the figure of Jiangsu chief secretary was 23,480,000, which was 2.25 times of the figure 10428000. However, we still utilized the figure of "Ding" kept in *chorography of Jiangning Prefecture* compiled in Jiaqing Years as number of all the males, and estimated the whole population in the ratio of 110, hence that both records of *the National Chorography of Jiaqing years* and the palace archives were not listed by prefecture.

In Jiangning prefecture, the annual growth rate of "Min Ding" over year 1775-1809 averaged 7.2‰, and "Jun Ding" averaged 4.6%. I took the latter ratio as the final result in consideration of other prefectures.

2. A Case of Sichuan Province: Regions not Affected by Wars and Famine

G. William Skinner used to make elaborate research about population recorded in *Sichuan Province Population Register*. As it was convincingly emphasized by Skinner, a considerable amount of figures were falsified by government officials, which led to quite a lot of mistakes when casting up the figures, and some of mistakes were very serious. Skinner made a deduction that population figures of Sichuan Province were basically true around 1812.

I utilized *Sichuan Province Population Register 1795* which was not neglected by Skinner, and compared the recorded figures with that of *chorography of Sichuan Province* compiled in 1812 and other county's chorography, and *the National Chorography of Jiaqing years.* Something different was discovered and help to reconstruct population of Sichuan Province by prefecture.

Chongqing prefecture, for example, of which households 958,000, population 3018000 recorded in *the National Chorography of Jiaqing years*, were much more than the figures recorded in *chorography of Sichuan Province* households 690,000, population 2,366,000 and were almost 2 times of figures recorded in *Sichuan Province Population Register 1795* households 340,000, population 1,333,000. Then I checked figures of county Chorography, either the same as or much smaller than that of *chorography of Sichuan Province.* Thus, the four kinds of materials mentioned

above belonged to different systems.

In chorography of Sichuan Province, records of counties Dingyuan, Bishan and Fuzhou were more reliable, with annual growth rate from 1812 to 1953 was 7‰. Simultaneously, a considerable amount of counties growth rate reached high of 11‰. While, county population figures appeared to be much lower, and annual growth rate was higher. The reason might lie in that household and population figures recorded in county chorography were only part of the population (Liang Hu), but not the whole (Yan Hu). I go backwards in time from 1953 to reconstruct the population for 1820 according to the annual growth rate 7‰., and go on stretching back to 1776 according to the annual growth rate 8‰.

Another case is Chengdu prefecture. There were households 1,167,000 and population 3,837,000 which were recorded in *chorography of Sichuan Province.* The annual growth rate was merely 3.3‰ calculated from 1812 to 1953. Moreover, in *the National Chorography of Jiaqing years,* the figure were households 1,707,000, population 5,484,000, a very close approach to population for 1953 5,902,000. It is impossible for the population barely growing within 133 years. If we inspected county population figures recorded in *chorography of Sichuan Province,* it was discovered that population of county Wenjiang, Xinfan, Xindu, Pixian, Shuangliu, Chongning, Xinjin even decreased within 133 years, which offends against law of population development.

According to *chorography of Shuangliu County* compiled in Republic Period, households and population only accounted for 53% of figures recorded in *chorography of Sichuan Province,* as it was of the other counties such as Shifang, Hanzhou, Wenjiang. The constant repetition of the ratio enlightened me that figures of *chorography of Sichuan Province* might be fabricated based on *Sichuan Province Population Register* or local documents like chorography. The mass households except “Taxpaying Household” might be omitted since data of local documents were incomplete. Conventionally, the number of taxpaying —non-taxpaying households were approximately the same. Editors of *chorography of Sichuan Province* might

fabricate figures based on the rule. However, what they didn't realize was that the whole population, not only the taxpaying households was recorded in local documents, even *Sichuan Province Population Register* in some counties of Chengdu prefecture. When editors doubled the whole population, which they erroneously believed as taxpaying households, the results would become extremely large, even more than population figures for 1953. From 1812 to 1953, the annual population growth rate was 4.2‰ for Shuangliu county based on *Chorography of Shuangliu County*, was 4.4‰ for Manchuria Mongolia and Han nationality in Chengdu county based on *Chorography of Chengdu County*, was 5.3‰ for 1795-1953 of Sichuan province based on *Sichuan Province Population Register.* All of the ratios were in proximity and reasonable.

Conclusion

When estimating annual growth rate of Ming Dynasty, I usually substituted point data for wide region, which is relatively rough. Somewhat differently, I estimated the rate of Qing Dynasty by prefectures, which is more accurate. Therefore, there are only annual growth rate by prefectures estimated in Qing Dynasty, without the rate of nationwide or by south or north.

Appendix

Table 1 Average Increasing Rate by Provinces in 1776-1953

表 16－3　1776 年至 1953 年分省人口年平均增长率(‰)

省　区	1776—1819 年	1820—1850 年	1851—1879 年	1880—1909 年	1910—1953 年
江　苏	4.45	4.06	−14.25	3.09	8.97
安　徽	4.90	4.96	−19.07	5.47	4.52
浙　江	4.57	3.30	−21.69	4.77	4.91
江　西	3.96	2.69	−20.51	3.89	2.44
湖　南	4.98	4.49	1.09	5.22	5.43
湖　北	4.24	4.20	−5.39	5.08	5.08
福　建	4.17	3.45	−8.99	2.94	6.83
广　东	3.39	3.51	3.56	3.60	3.66
广　西	4.80	4.76	4.79	4.79	4.83
云　南	6.09	6.72	−2.92	4.86	6.28
贵　州	6.30	5.24	5.31	5.39	5.48
四　川	7.71	7.23	7.37	7.51	8.30
直　隶	5.92	5.14	5.35	5.58	5.93
河　南	3.92	3.64	−5.51	5.69	7.70
山　东	3.35	3.10	3.15	3.96	2.70
山　西	3.56	3.21	−19.96	9.91	7.28
陕　西	9.61	2.89	−21.45	10.03	11.84
甘　肃	2.46	2.45	−45.27	12.35	15.90
新　疆	5.66	6.79	0.73	14.89	18.46
辽　东	24.33	12.50	15.99	32.56	12.88
吉　林	15.04	25.51	25.49	25.56	16.96
黑龙江	10.09	25.80	25.82	25.78	46.82
青　海	1.57	1.47	1.61	1.49	1.51
西　藏	0.98	1.09	1.08	1.09	1.07
内蒙古	4.80	4.79	4.80	4.55	4.55
外蒙古	1.38				
合　计	4.72	4.19	−6.17	6.00	7.00

资料来源：据本卷表 16－2 计算。

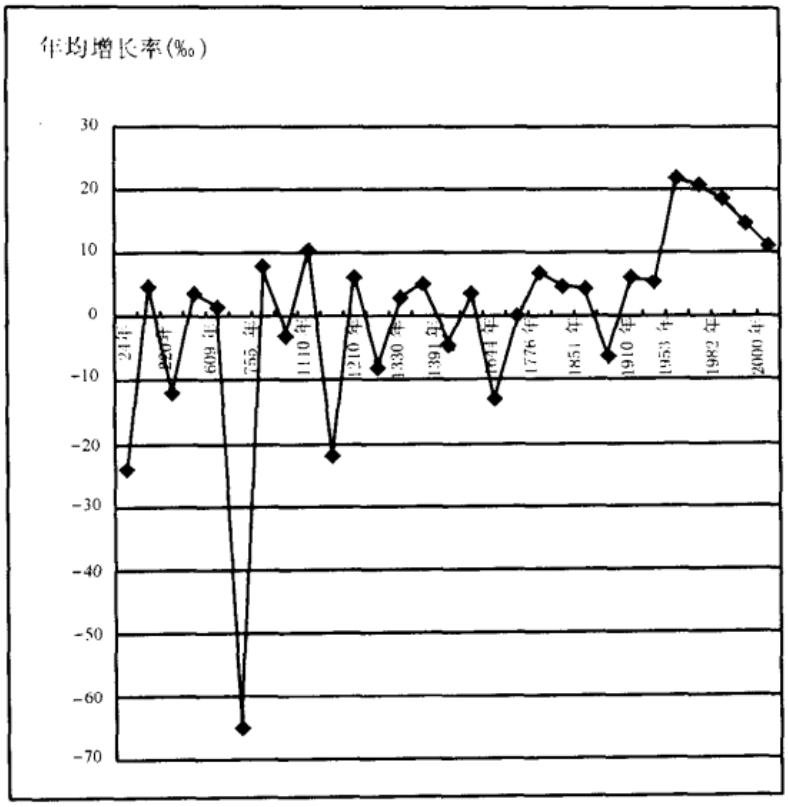

图 19－2　中国人口增长速度的变化

Figure 1 Population Increasing Rate of China Changing in Periods