High Sex Ratio at Birth and Female Deficit in China

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Abstract   *Sex ratio at birth (SRB) in China has begun to be higher since 1980's and kept rising singularly, it reached 116.9 in 2000.   Incidence of prenatal sex determination and sex-selective abortion is the main reason of the high SRB. Female deficit of the 0-19 years old population has already reached 1981, and the total amount is apt to increase. It is sure to influence the marriage market.*

Key words   *Sex ratio at birth, female deficit*

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[*] Chinese population in this paper does not include population of Special Administrative Region of Hong Kong, Macao and Taiwan.

Sex preference for children in traditional consciousness and modern ideas, especially boy preference is very common in many developing and developed countries from East Asia, south Asia to Middle East and North Africa, this is the social and cultural basis of high sex ratio. In natural child-bearing state, giving birth to more children is the only way to meet the needs of expected children's sex structure of family. Nowadays, regardless of voluntary or no-voluntary, fertility rate decreasing has already been a common feature globally, giving birth to fewer kids has become people's mode. Technique progress and its popularization in modern contraception, Incidence of prenatal sex determination and sex-selective abortion make it possible for people to meet the needs of both less birth and getting the expected children's sex structure, Incidence of prenatal sex determination and sex-selective abortion is very common in some countries and regions, such as South Korea, China, Japan, India, Bengalese, Pakistan, Taiwan and Hong Kong etc.. SRB has been on the high side and keeps going up in China since 1980's, researchers probe into factors of the process, degree and reasons of high sex ratio in details in quantities of literatures both in Chinese and in foreign languages from the angle of society, economy, culture and child bearing, death and statistics etc. After a period of debate, they reach an agreement: Incidence of prenatal sex determination and sex-selective abortion is the main reason of the high sex ratio. On the base of judging the sex ratio since 1980's synthetically with multiple methods, this paper will give a further analysis on the issue of high sex ratio and its characteristics, then project female deficit in the coming 30 years.

1. Literature review

With data of the Third National Census in 1982 being promulgated, SRB in China has aroused attentions of scholars both at home and abroad. Synthesizing each standpoint, we can get a common point of view on SRB in China: firstly, SRB has deviated from normal scope, it has been on the high side and keeps rising year by year; Secondly, comparing to sex ratios at birth internationally, we can see high SRB is not a unique feature China owns, it occurs commonly in Korea, Japan, Taiwan, India, Pakistan etc. (Gu Baochang , K.Roy, 1996; Zhou Yun, 1997; Cheng Ze, 1994; Park C. B. and Cho N.H., 1995; Monica Das Gupta and P.N.Mari Bhat, 1997; The Goodkind D.1996,1999,2002); Thirdly, high SRB is mainly caused by three reasons: underreporting or misreporting of female baby girls, Incidence of prenatal sex determination and sex-selective abortion, excess female infant mortality and female infanticide and girl adoption. But before the mid 1990's, scholars both at home and abroad held very different opinions on the order of the three factors, foreign scholars commonly believed that Incidence of prenatal sex determination and sex-selective abortion should be the first important factor (Fred A. and Liu Zh.X, 1986; Aird.J, 1990, Hull.T, 1990, Johansson S. & Nygren O., 1991;Barbara A. The and Brain D.S, 1994); Some scholars deemed that excess female infant mortality and female infanticide has been the main cause;(Banister.J, 1992); If this is the case, high SRB in China is ' true', namely, the actually boys are more than girls indeed, sex structure of the total population will be in a state of more males than females consequentially. But Chinese scholars believe that

underreporting and misreporting of girls is the first important factor. (Zen Yi ,Gu Baochang ,Tu Ping, Xu Yi ,Li Bohua ,Li Yongping, 1992;Qiao Xiaochun, 1992;Tu Ping, 1993;Hao Hongsheng, 1993;Gao Ling , 1992, 1995;Gu Baochang ,Xu Yi , 1994;Li Bohua , 1994; Information Centre of Chinese Population, 1995). If high SRB is caused by underreporting and misreporting of girls, then the high sex ratio is 'false', because this part of underreporting and misreporting of girls have already been survival in the world, just without a correct reflection in the life statistical system, they will appear gradually at the time far away from the point of time for statistics.

With the data of the 1% national population sampling survey in 1995 being promulgated, some scholars estimate and analyze the number of the underreporting population by using census data from 1982 to 1995, find out that there has been a large number of underreporting population in every population census and the survey since 1980's, but the sex ratio is balanced (the Coal A.J 1991; Coal A.J and Banister J. 1994); Making use of census data in 2000, the calculated result proves the same conclusion once more (Banister J, 2002) . In the meantime, the results of the underreporting and misreporting population survey between 1990 and 1998 organized by State Family Planning Commission (SFPC) in 1999, compared with the annual birth report, there are about 10 million underreporting population during 1990-1998, and they are with a balanced sex ratio, the number of male is even more than that of female in the underreporting population in parts of provinces (China Family Planning Yearbook, 2001). Researches organized by SFPC on SRB in 2000 and parts of scholars (Chun J.H, 2001) come to a common conclusion that the first reason of high SRB in China is Incidence of prenatal sex determination and sex-selective abortion.

Synthesizing the main standpoints of researches concerning SRB in the late 1990's, scholars at home and abroad and Chinese government reach an agreement: it is a fact that SRB has been on the high side since 1980's and keeps rising gradually; high SRB is caused by comprehensive factors, Incidence of prenatal sex determination and sex-selective abortion is the main reason, underreporting also produces an effect on it, it excludes the effect of drowning of and abandoning for girls.

2.　High SRB and its characteristics

1) SRB in reports of population surveys and censuses

The normal scope of SRB is 103 to 107 (female=100). Census data in 1982, however, indicates that SRB is 107.6, which is just slightly higher than the upper limit of the normal scope. From then on, SRB kept going up and reached 116.9 in 2000 (table 1), it has increased by 7.74% within 18 years. Using sex ratio of 106 as the base to calculate the degree of high SRB, it is just 2.36% in 1982, but reached to 10.28% in 2000.

Table 1　　changes of SRB in China（1982～2001 ）

year	SRB	year	SRB
1982	107.6	1990	111.3
1983	107.7	1992	113.0
1984	108.3	1995	115.6
1985	111.2	1998	113.0
1986	112.1	1999	113.0
1987	110.9	2000	116.9
1989	111.3		

Sources：data of censuses in 1982、1990、2000 ; data of 1% population surveys in1987、1995 ;data of SFPC ;Zeng Yi, Qiao

2) Cohort analysis on SRB

In fact, it is a common rule that sex ratio of a cohort decreases steadily as their age increases. SRB is always around 103 to 107, it comes down to 100 in their youth and prime of life, and declines below 100 in their middle and old age. studies on China find out that, the farer the point of time goes, the more accurate the fertility rate is, namely, there is more probability to reflect the undercount (Wang Fen, 1990; Guo Zhigang, 1998). According to this rule, if there are large number of underreporting girls, then they will appear gradually in census register or census data, and the older they are, the more possibility they are reflected, Sex ratio of cohort should decrease as age increases, and even lower than theoretic value. But it is not the case actually (figure 1). SRB of cohort of 1982 is 107.63, sex ratio of this cohort is 107.97 in 1987 when they are 5 years old, 107.75 in 1990 when they are 8 years old, 108.0 in 1995 when they are 13 years old, instead of decreasing as common rules, sex ratio goes up slightly; although it came down to 104.13 when they are 18 years old in 2000, it is still higher than normal value. This occurs in other surveys and census of cohort.
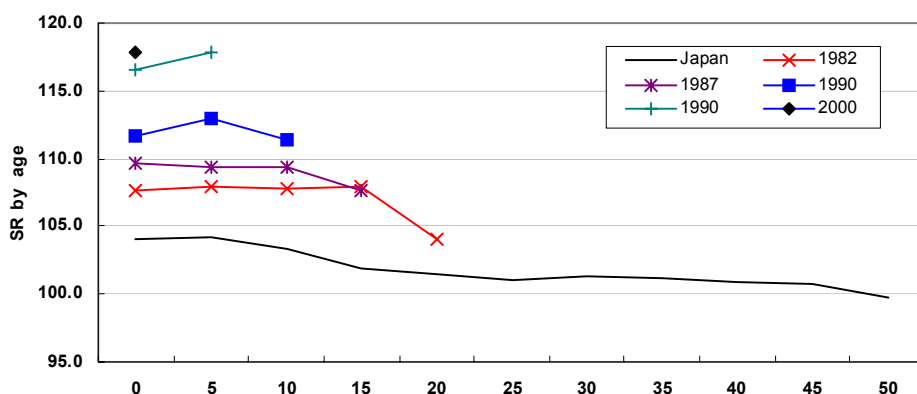

Figure 1 comparison between China and Japan in different cohort sex ratio

Japan is a nation with few migrants, its sex ratio of cohort can basically reflect the changing trend of sex ratio as age adds in human life cycle. Taking the cohort of 1950 as a criterion, people of this cohort aged 50 in 2000, changes on their sex ratio with age is a solely sloped down curve. Compare with the age-specific cohort sex ratio of 1982, 1987, 1990 and 1995 in China, each cohort sex ratio in China is higher than that in Japan, and the nearer to present the cohort is, the higher sex ratio is, it reflects not only a high SRB, but also a trend of increasing SRB since 1980's.

3) SRB of stepwise backward

Stepwise backward means by using sex-specific and age-specific surviving population in a certain year and its mortality rate or survival probability, together with model life table, to estimate the population aged 0 by sex in every year of the same stage, and then calculate the sex ratio of aged 0 in every year. We divide the 22 years of period from 1978 to 2000 into 4 stages according to the census and the survey data in China since 1978, namely 1978-1982, 1983-1990, 1991-1995, 1996-2000, taking the year of 1982,1990,1995 and 2000 as the reference year respectively. The calculation formula is:

A.   Boys aged 0 in each year

$$m(0,t) = m(T-t,T)/d_m(T-t-1,T)d_m(T-t-2,T-1)\cdots d_m(0,t)$$

B.   Girls aged 0 in each year

$$f(0,t) = f(T-t,T)/d_f(T-t-1,T)d_f(T-t-2,T-1)\cdots d_f(0,t)$$

C.   Sex ratio of aged 0 in each year

$$SR_0 = 100 \cdot \frac{m(0,t)}{f(0,t)}$$

In the formula, $m(0,t)$ stands for boys aged 0 of year t , $m(T-t,T)$ stands for boys aged T-t of year T , $d_m(x,t)$ stands for mortality probability of boys aged x of year t , $f(0,t)$ stands for girls aged 0 of year t , $f(T-t,T)$ stands for girls aged T-t of year T , $d_f(x,t)$ stands for mortality probability of girls aged x of year t , T stands for a certain reference year。

Table 2   Estimate of sex ratio[*] of   aged 0 from 1978 to 2000

year	sex ratio	year	sex ratio	year	sex ratio
1978	106.34	1986	108.42	1994	120.45
1979	106.87	1987	109.02	1995	116.57
1980	107.55	1988	109.98	1996	116.65
1981	108.05	1989	111.46	1997	116.78
1982	107.91	1990	111.75	1998	115.59
1983	108.77	1991	114.75	1999	115.84
1984	108.67	1992	118.84	2000	117.79
1985	108.64	1993	120.82		

Note : *SRB and sex ratio of aged 0 are two concepts, the later should be lower than the former theoretically.

The result just like it shows in table 2, comparing with the SRB in census and survey report of all previous of the same period, the estimate SRB of aged 0 in 1978-2000 is different slightly in degree of high sex ratio, but they are completely consistent in overall trend, namely, the SRB in 1978-1979 belongs to the normal scope, SRB began to be on the high side from 1980, and the level is higher and higher year by year, it reached to about 120 in mid 1990's and declined slightly in the last few years.

4) Sex ratio of every cohort by life tables

For life table population, calculating method for the total sex ratio（ SR ）and age-specific sex ratio（ SR_x ）means：

$$SR = SRB \times (\sum L_x^m \div \sum L_x^f) \times 100$$
$$= SRB \times (e_0^m \div e_0^f) \times 100$$

$$SR_x = SRB \times (L_x^m \div L_x^f) \times 100$$

in the formula : L_x^m stands for the survival males of aged x , L_x^f stands for the survival females of aged x , e_0^m stands for the life expectancy for male at birth , e_0^f stands for the life expectancy for female at birth. Since the normal value of accepted sex ratio is 103-107 , then normal value of overall sex ratio of life table and sex ratio of every cohort should be :

$$SR^{normal} = 103 \times (e_0^m \div e_0^f) \to 107 \times (e_0^m \div e_0^f)$$

$$SR_x^{normal} = 103 \times (L_x^m \div L_x^f) \to 107 \times (L_x^m \div L_x^f)$$

According to the above formula and census data of 1982、1990 and 2000 , can calculate and get the normal fluctuant scope of sex ratio of cohort aged 0-20 in every census year (figure 2)。

Census in 1982 and 1990 both shows that SRB every year is beyond the upper limit of the normal value set since 1980, and the beyond part becomes increasingly outstanding, namely, the higher degree becomes ever more violent. The characteristics of age-specific sex ratio of aged 0-20 of census in 2000 are :firstly, the level of sex ratio of lower age cohort is increasing on the high side , sex ratio of aged 1-3 is above 120 , sex ratio of cohort before 10 years old is above 110 , all these reflect SRB is higher and higher year by year ; Secondly, sex ratio of population

Figure 2   comparison between normal value scope of age-specific sex ratio aged 0-20 in census years by life table and actual values

born before 1984（more than 16 years old）come back to the normal value scope, differing from the conclusion reflected by census in 1990 and 1982 that sex ratio began to go on the high side since 1980, this may embodies the principle that the underreporting have more probability to be reflected as the point of time of survey goes, even so, it can only explain that sex ratio of   above
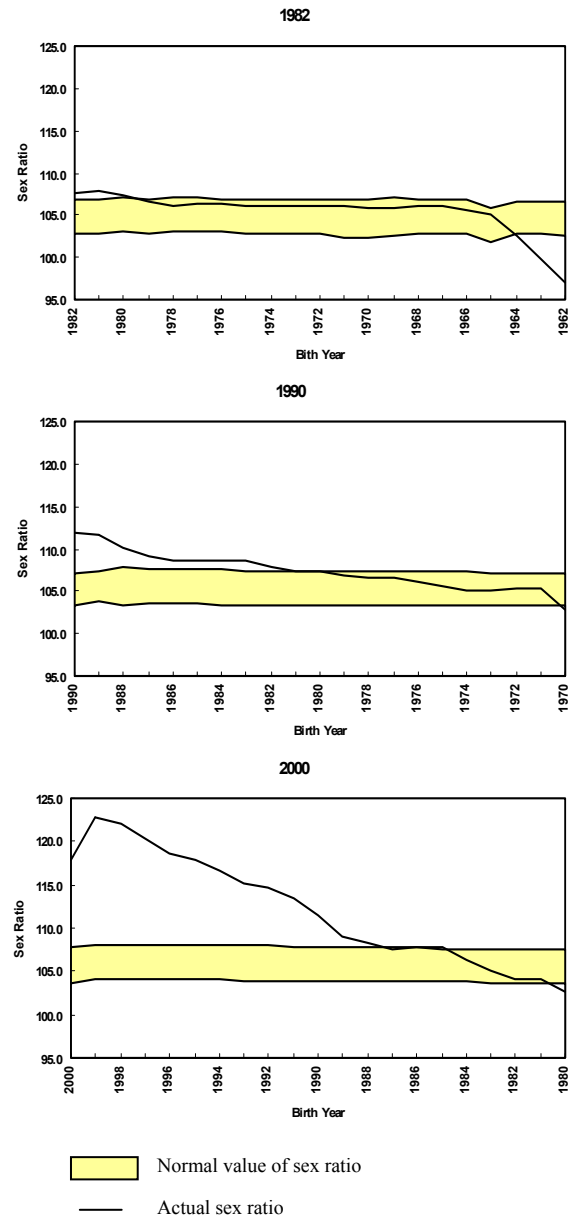
15 years old cohort reaches normal value on the whole, but cannot cancel the conclusion that the SRB before 1985 is on the high side.

5) Regional distribution of SRB

The regional and level of high sex ratio extends gradually and increases commonly (table 3). SRB in 18 provinces is on the high side according to census in 1982 which accounts for 78.58% of the total population. But, no province has a SRB of above 115. SRB of all provinces except Tibet and Xinjiang is beyond normal value in 2000, which cover more than 98% of the total population. Altogether 9 provinces with a sex ratio higher than the national average level, they are Fujian, Henan, Shanxi, Guangxi, Hunan, Anhui and Hubei, among which there are 7 provinces with a SRB above 120, the highest SRB is in Hainan and Guangdong province which reaches to 135.6 and 130.3 respectively. Regions with high SRB mainly locates in the east, central area which is relative developed in economy and society, they are both provinces with large population and areas with strictly implemented policies of family planning; SRB in the relatively less developed area and municipalities in northwest and southwest is also beyond normal value, but relatively lower.

Table 3   Regional distribution of SRB of 1982、1990、2000 and population component

SRB	Jan 1 –Dec 31, 1981		July 1,1998 – Jun 30, 1990		Nov 1,1999 – Oct 31,2000	
	Number of province	Population proportion（%）	Number of province	Population proportion（%）	Number of province	Population proportion（%）
>120	0	0	0	0	7	28.50
115-120	0	0	5	23.01	5	33.30
110-115	4	21.89	5	29.29	12	25.02
107-110	14	56.69	13	37.49	5	11.44
103-107	10	21.23	6	7.34	1	1.53
<103	1	0.19	1	1.87	1	0.21

Sources：data of censuses of 1982, 1990 and 2000

SRB in early 1980-90's influences mainly the counties, but currently, evidence shows that SRB in cities go up continuously. In 1990, SRB is 108.9 in cities, 112.1 in towns, 111.7 in counties; But in 2000, SRB is 112.8 in cities, 116.5 in towns, 118.1 in counties, they all went up at some degree. The general rule is that, SRB in countries is higher than that in towns, and SRB in towns is higher than that in cities, SRB in cities is the lowest.

6) Different SRB by birth order

The higher birth order comes, the more abnormal SRB is. From data of census in 1990 and 2000, and 1% national sampling survey in 1995, we can easily find out that, though evidence shows the SRB of the first child is rising,

Table 4   SRB by birth order

year	total	The first child	The second child	The third child and upward
1990	111.3	105.2	121.0	127.0
1995	115.6	106.4	141.1	154.3
2000	116.9	107.1	151.9	159.4

Sources：data of censuses of 1990 and 2000 ; data of population survey in 1995

still it is within normal value, from the second child on, it goes up dramatically, and SRB of the third child or of higher birth order is much higher (table 4).

To sum up the above, conclusions on SRB drawn according to each censuses and the population survey report and calculation with different methods since 1980's is consistent: SRB is on the high side, the characteristics on high SRB is highly consistent, the level of high SRB is from lower degree to higher degree, the region of high SRB is from point of places to areas, from countries to cities, and then covers the almost whole country, SRB increase obviously as the birth order increases. High SRB has already become one of the important phenomena of China population, society and economy.

4．Female deficit in the high SRB

China population has already experienced high SRBs for 20 years until 2000, according to the data of census in 2000, deficit females aged 0-19 has already reached 21.16 million, it is 19.81 million without the misreporting effect (Wang Jinying, 2003), among which 3/4 is in rural areas, 1/4 in urban areas (figure 3), this has already be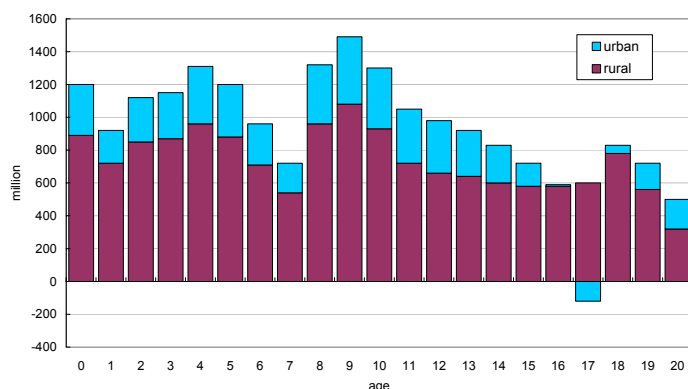en an unchangeable fact. Sex ratio of aged 0-4 is still as high as 122.7 in 2004, shortage of female aged 0-24 is 23.79 million (SSB, 2005) .

Figure 3 The urban and rural female deficit by age in 2000

In fact, female shortage will be a social phenomena for a long period of time in China. With the hypothesis of the same fertility and mortality in urban and rural areas and urbanization level [1] , we have designed 4 sorts of SRB to simulate the size, age structure, distribution between urban and rural areas of female deficit in China in the coming 30 years from 2000-2030 with high SRBs cohorts since 1980's.

Hypothesis SBR decreases to 106 in 2005 and keeps it fixed, we simulate female deficit when SRB becomes to normal; Hypothesis SRB decreases 110 in 2005 and keeps fixed, simulate the female deficit when SRB decreases but still above the normal value; Hypothesis SRB maintains 115, simulate female deficit when SRB maintains the current value; Hypothesis SRB rise to 120 in 2005 and keeps fixed, simulate female deficit when SRB keeps rising.

1) The size of female deficit

If SRB=120, the size of deficit females aged 0-19 will increases from 19.81 million in 2000 to 29.76 million in 2030, the deficit increases 9.95 million. Female deficit of high SRB cohorts

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[1] TFR=1.305 in urban areas in 200，TFR=2.06 in rural areas. Hypothesis TFR in urban increases linearly to 1.65 in 2015，then keeps it till 2030；TFR in rural areas keeps 2.06. The life expectancy at birth of male and female in urban areas is 71.2 and 73.8 respectively in 2000, 76.0 and 80.06 in 2030；The life expectancy at birth of male and female in rural areas is 68.10 and 68.91 respectively in 2000, 72.13and 75.36 in 2030. Fertility and mortality pattern keep the same with 2000.Urbanization level is 36.84% now，it will be 68% in 2030, if it increases by 1 point percentage per year.

aged 0-49 will reach 62.47 million in 30 years. If SRB=115, deficit females aged 0-19 will be 23.03 million in 2030, which is 3.22 million higher than the female deficit of the same age in 2000, deficit females aged 0-49 is 52.04 million. If SRB=110, deficit females aged 0-19 is 15.85 million in 2030, which is 3.96 million lower than the female deficit of the same age in 2000, deficit size decreases. But deficit females aged 0-49 will be as high as 41.00 million in 2030 as the law of inertia of the former high peak female deficit functions as time goes. If SRB=106, deficit females aged 0-49 will still be 31.73 million in 2030.

In fact, among 31 provinces all over the country, 24 provinces have SRBs above 110 according to the census in 2000, which covers 87% of the national populations (table 2) . It needs time to stop SRB rising and turn it normal, a rush for quick results is impossible. China has 25 years history of high SRBs, even if we can make the SRB recover to the normal value effectively within 30 years, the size of female deficit is probably between the results of the projection on SRB between 110 and 120.

2) Female deficit of high marriage age group

High marriage age group means the group aged 20-35 with a relatively high matrimony occurrence probability. Currently, population born in 1980's in a high SRBs state has already been in the marriage stage, female deficit means there are always a part of males without the other half of marriage congenitally. There are 13.23 million of female deficit of population aged 20-35 in high marriage age in 2015, and the deficit number will be even higher if we calculate it according to the traditional marriage age pattern, namely, males are 1-4 years older than females, deficit will be 11.85 million with difference of 1 year, 15.88 million with difference of 2 years, 18.32 million with difference of 3 years, and 20.74 million with difference of 4 years. Female deficit in high marriage age group will be 10.16 million, 13.42 million, 17.28 million and 20.98 million respectively corresponding to the four different SRBs in 2030, together with the age differences between males and females in choosing spouse, deficit numbers will be even higher. Such female deficit results will be sure to have an impact on families and marriages in China society, and on social stability seriously.

Table 5　Female deficits by years

SRB	2030		2025		2020		2015		2010		2005		2000	
	aged 20-34	aged 0-49	aged 20-34	aged 0-44	aged 20-34	aged 0-39	aged 20-34	aged 0-34	aged 20-29	aged 0-29	aged 20-24	aged 0-24	婚龄 赤字	aged 0-19
106	10.16	31.73	13.06	30.46	15.48	28.86	13.23	26.79	8.02	24.37	3.24	22.07	334	19.81
110	13.42	41.00	14.65	38.45	15.48	35.47	13.23	31.82	8.02	27.65	3.24	23.67	3.34	19.81
115	17.28	52.04	16.54	47.99	15.48	43.37	13.23	37.84	8.02	31.56	3.24	25.58	3.34	19.81
120	20.98	62.47	18.36	57.10	15.48	50.94	13.23	43.57	8.02	35.30	3.24	27.41	3.34	19.81

3) Age structure of female deficit

The peak of female deficit will put off gradually with the age structure as time goes, and the peak value increases as the sex ratio increases step by st ep.

The peak of female deficit appears in aged 0-4 in 2000 when SRB is 106 and 110, the deficit size is 5.70 million. Peak value will shift to the next cohort in every 5 years afterwards, and it will decrease gradually as well, this is the result of a higher male mortality has than female's. Peak value will be in the aged 30-34 in 2030, the number is 5.31 million.

Peak of female deficit will also appear in aged 0-4 in 2000 when SRB is 115 and 120, the deficit number is 5.70 million. The peak will keep for 15 years and the value keeps rising, it will be 7.87 million in 2005, 8.27 million in 2010, 8.76 million in 2015, then the peak begins to put off, and the value decreases, it will decrease to 8.65 million in 2030. The difference in peak value shifting between high and low SRB is mainly caused by the fertility level in urban area which keeps increasing during 2000-2015, together with the increasing level of urbanization, a great deal of rural population become urban population, it changes age and sex structure of urban population, makes the peak keep rising continuously. For example, with the SRB of 115, female deficit is 2.77 million in urban areas, 3.59 million in rural areas in 2010, and female deficit will be 3.10 million in urban areas, 3.64 million in rural areas in 2015. Female deficit aged 0 increases 3.3 million in urban areas, 5.0 million in rural areas within 5 years, but the total deficit size increases.

In addition, female population born in 1980's with high SRB have been in to stage of marriage and childbearing after 2000, they have joined a new round of "abnormal" reproduction again, making the imbalanced SRB even worse, the number of female deficit is even bigger. But this group of female will be in their 40 year old after 2020s, they will leave child-bearing group, it will decrease the peak of female deficit.

4) Distribution of female deficit between urban and rural areas

When SRB is 106 or 110, the nearer to the base year of the project, the more female deficit in rural areas. Rural deficit female aged 0-20 in 2000 is 15.11 million, 4.70 million in urban areas which accounts for 23.73%. Female deficit in urban and rural areas will be equal in 2020, and deficit female aged 0-40 will be 15.00 million at that time. Then deficit size in urban and rural areas differs, deficit female aged 0-50 will be 10.05 million in rural areas, 21.68 million in urban areas in 2030 which accounts for 64-68%. The fast increment of the urban female deficit is the result of acceleration to urbanization and the fertility rate in urban areas rises.

Table 6   Female deficit of cohorts under different SRB assumptions in rural areas

age	SRB=106							SRB=110						
	2000	2005	2010	2015	2020	2025	2030	2000	2005	2010	2015	2020	2025	2030
0-4	429	154	148	151	122	87	68	429	254	244	248	199	140	110
5-9	417	411	139	134	138	110	75	417	411	239	230	234	187	128
10-14	355	397	392	121	116	121	93	355	397	392	221	211	217	170
15-19	310	319	362	359	88	85	91	310	319	362	359	188	180	186
20-24		259	267	312	310	43	42		259	267	312	310	143	137
25-29			210	217	263	266	2			210	217	263	266	101
30-34				171	175	227	232				171	175	227	232
35-39					140	144	198					140	144	198
40-44						114	114						114	114
45-49							90							90
total	1511	1540	1518	1465	1352	1197	1005	1511	1640	1714	1758	1720	1618	1466
age	SRB=115							SRB=120						
	2000	2005	2010	2015	2020	2025	2030	2000	2005	2010	2015	2020	2025	2030
0-4	429	375	359	364	293	204	156	429	490	469	474	381	264	197
5-9	417	411	359	344	349	280	192	417	411	474	453	459	368	251
10-14	355	397	392	341	325	331	263	355	397	392	455	434	441	351
15-19	310	319	362	359	306	294	301	310	319	362	359	421	403	411
20-24		259	267	312	310	262	251		259	267	312	310	376	359

age	2000	2005	2010	2015	2020	2025	2030	2000	2005	2010	2015	2020	2025	2030
25-29			210	217	263	266	219			210	217	263	266	332
30-34				171	175	227	232				171	175	227	232
35-39					140	144	198					140	144	198
40-44						114	114						114	114
45-49							90							90
total	1511	1761	1949	2108	2161	2122	2016	1511	1876	2174	2441	2583	2603	2535

When SRB is 115 and 120, female deficit increases in urban areas and decreases in rural areas as time goes. Female deficit will be equal in urban and rural areas in 2015. If SRB is 120 in 2030, deficit females aged 0-49 will be 37.12 million in urban areas and 25.35 million in rural areas, with a SRB of 115 in the same year, deficit females aged 0-50 will be 31.88 million in urban areas and 20.16 million in rural areas (table 6, table 7).

Table 7   Female deficit of cohorts under different SRB assumptions in urban areas

age	SRB=106							SRB=110						
	2000	2005	2010	2015	2020	2025	2030	2000	2005	2010	2015	2020	2025	2030
0-4	141	99	119	134	139	141	151	141	159	191	214	222	225	239
5-9	152	153	111	132	147	150	153	152	153	171	203	227	233	237
10-14	153	168	168	127	147	161	165	153	168	168	186	219	241	247
15-19	24	182	196	198	157	174	188	24	182	196	198	215	246	268
20-24		65	223	237	240	195	212		65	223	237	240	254	284
25-29			102	259	275	275	229			102	259	275	275	289
30-34				127	285	300	299				127	285	300	299
35-39					144	301	315					144	301	315
40-44						152	307						152	307
45-49							149							149
total	470	667	919	1214	1534	1849	2168	470	727	1051	1424	1827	2227	2634
age	SRB=115							SRB=120						
	2000	2005	2010	2015	2020	2025	2030	2000	2005	2010	2015	2020	2025	2030
0-4	141	229	277	310	320	325	344	141	297	358	402	416	420	441
5-9	152	153	241	289	323	332	337	152	153	309	370	413	427	431
10-14	153	168	168	256	303	337	346	153	168	168	323	385	428	440
15-19	24	182	196	198	286	331	364	24	182	196	198	353	412	454
20-24		65	223	237	240	324	368		65	223	237	240	392	450
25-29			102	259	275	275	359			102	259	275	275	426
30-34				127	285	300	299				127	285	300	299
35-39					144	301	315					144	301	315
40-44						152	307						152	307
45-49							149							149
total	1511	1761	1949	2108	2161	2122	2016	1511	1876	2174	2441	2583	2603	2535

Furthermore, the difference in increasing pace of female deficit in urban and rural areas will be a tremendous challenge to the population in marriage market. When SRB is 106, deficit females in high marriage age group is 7.40 million in urban areas and 2.76 million in rural areas respectively; when SRB is 110, it is 10.26 million and 9.00 million correspondingly, when SRB is 120, it is 11.75 million and 9.23 million correspondingly. Deficit in urban areas is much more than that in rural areas, namely, female in urban areas is more scare than it in rural areas, marriage market will be more competitive, and the urban males may probably compete with the rural males resorting to

their better economic regional advantages and city status, which will make female in rural areas much more scarce, and much more surplus males.

5. Conclusion

1) China has had 25 years history of high SRB, female deficit has already been an accomplished fact. It needs time to solve the high SRB problem that can not be accomplished in an action. So, female deficit in China will be a social phenomenon that exists over a long period of time. For the total amount, deficit female aged 0-50 will reach 40 –50 million in 2030.

2) With a faster step of urbanization, the mode of female deficit between urban and rural areas will reverse. At present, female deficit in urban area is over 1/4, female deficit in urban and rural area will be equal in 2015, and female deficit in urban area will accounts for 5/3-1/3 in 2030.

3) Female deficit will aggravate the competitive of marriage market. Because females are absolute less than males, the number of males who have no chance to marry will increase greatly. A long-term of high SRBs and low fertility rate makes the squeeze on marriage can not function. At the same time, it may cause the regional squeeze transferring even worse, the pattern that urban males look for their spouses in rural areas has already existed, and female deficit will make it even worse.

4) The result of high SRB is a difficult problem without any solutions. The absolute surplus of male over female in marriage stage caused by high SRBs is a difficult problem without any solutions! Can we import brides? It isn't realistic obviously for China with such a huge female deficit. Can we export bridegrooms? On one hand, the most countries (developed or less developed) have set very high thresholds for Chinese immigration, so emigration is not easy, on the other hand, every country have selective aims when they receive immigrants, developed countries just receive so-called "elite" with skills from developing countries, it causes an outflow of intelligence, the rather that, immigrants are not pure males. The actual female deficit is an unchangeable fact, childbearing in the future will in a high SRBs state if people cannot give birth to child/children as they like, if production pattern and productivity of social economy doesn't change ultimately in rural areas, if the traditional idea of childbearing still exists, if the national family planning policy contradicts peoples' childbearing ideas.

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