Assessing the impact of fertility change and demographic masculinization on population structures in China and India. Century-long forecasts with and without high sex ratios at birth.

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Abstract:

Asia has been the continent most affected by recent fertility decline and the ensuing changes in age structures. At the same time, several Asian countries have seen the proportions of male birth gradually increase since the 1980s. This rise has led to a gradual masculinization of their population, the impact of which will be felt till the second half of the 21st century. This paper uses two different population trajectories for exploring the overall consequences of current masculinization processes in China and India. We first define the most optimistic scenario of future reduction of birth masculinity in the future and use it as a basis for population projections till 2100. We then define a normal-SRB scenario, in which population structures are mostly determined by the tempo of the demographic transition. Results from both sets of population projections are then compared to compute the overall effects of demographic masculinization in terms of population loss, gender imbalances, and differences in total and age specific sex ratios.

Key words:

China, India, Projection, Sex ratio, gender, marriage squeeze.

Asia has been the continent most affected by the recent fertility decline starting from the 1960s. The rapid reduction in birth rates has in particular set off a dramatic transformation of its age structures, a process that has often associated with the parallel economic growth registered in East Asia over the last forty years.[1] At the same time, several Asian countries have seen the proportions of male births gradually increase since the 1980s. While gender discrimination is not a new feature in Asia, the impact of discriminatory practices was earlier restricted to post-birth excess mortality, be it among children (infanticide, neglect) or adults (maternal rates, old age mortality, etc.). But during the last two decades, sex-selective abortions have emerged as the prime method to discriminate against unborn daughters and this technological breakthrough has exacerbated the intensity of demographic imbalances among children.[2]

Like fertility decline, this recent evolution will have a long-lasting impact on population structures since the process of demographic masculinization will affect birth cohorts over almost a century. For multiple reasons, the experiences of China and India are crucial for understanding the mechanisms at work in Asia.[3] First, rising sex ratios in both countries have been recorded since the early 1980s. In other countries, from Georgia to Viet Nam, the rise in sex ratio at birth has been comparatively more recent.[4] Second, the potential contribution of these two countries to the overall masculinization of Asia and, consequently, of the world's population is preeminent in view of their demographic weight.

The analysis of the current trends in China or India usually assumes that all future gender imbalances will be caused by present-day excess proportions of male births. But, as this paper will demonstrate, other, more complex factors may also contribute to present and future demographic outcomes. The short-term effect of fluctuations in birth cohorts and the long-term effect associated to low fertility are potentially important components of the future

[1] On the recent age-structural transitions, see for instance Pool *et al.* (2006)

[2] For an all-Asia perspective, see Gu and Roy (1995); Croll (2000); Miller (2001); Attané and Guilmoto (2007). On the determinants of the sex ratio at birth, see for instance Waldren (1998) and Jacobsen *et al.* (1999).

[3] The Chinese and Indian contexts are in particular described in Banister (2004); Murphy (2003); Sekher and Hatti (2007); Patel (2006).

[4] On the Caucasus and Viet Nam, see Meslé *et al.* (2007) and Guilmoto *et al.* (2009).

transformations in age and sex structures, including marriage squeeze. For this reason, we consider in this paper the impact of high sex ratios at birth (SRB) by comparing projections results based on assumed SRB decline in the future with projections based on the hypothesis of normal SRB levels. By reconstructing over the 2005-2100 period the demographic structure of China and India in the absence of prenatal gender discrimination, we will be able to delineate precisely the extent of sex imbalances that are directly attributable to inordinate SRB levels observed since the 1980s and identify other trends causes by long-term change in mortality and fertility parameters.

The first section presents our methodology for projection China's and India's populations up to 2100. We also discuss the different ways in which their populations could be re-estimated in 2005 in the absence of skews in SRB. In the next section, we discuss some results of these demographic projections. We examine in particular the future consequences of distorted SRBs over the entire population as well as on the population of marriageable age. The last section is devoted to a brief summary and offers a few suggestions for future research.

1. From missing women to distorted age structures

The emphasis has been initially put on the demographic plight of Asian women through the estimation of the number of "missing women". The number of missing women was arrived at by comparing age and sex distributions of different Asian countries with that of countries with no known gender imbalances.[5] As a result, the concept of missing women corresponded mostly to excess female mortality, including adult mortality such maternal mortality rates.

The recent SRB bias, on the contrary, has had so far little effect on the estimated number of missing women, except for the last birth cohorts in the 20th century. Several attempts at simulating the growing gender imbalances have already been conducted for China, yet none for India. Moreover, these studies are based on pre-2005 estimates and do not extend beyond 2030 or 2050. [6]

[5] Initiated by Amartya Sen in the 1990s, the estimation of the number of missing women in Asia has been recently updated by Klasen and Wink (2002).

[6] See Tuljapurkar et al. (1995), Attané (2007), Zeng (2007). These studies of China are based on different sets of parameters at various levels of technical sophistication. They do not estimate what China's populations would have been in the future with normal SRB levels.

Our objectives in this paper are slightly different for three reasons. First, we believe that India's case needs to be examined and that it is as important to world population trends as China's. While SRB levels are lower than in China, India's growth potential is greater as its population will soon be the world's largest. Second, we want to focus on the impact of "missing female births" rather than of excess female mortality, which is on the wane and whose actual demographic implications for the future are limited when compared to sex-selective abortions. As a result, existing mortality differentials between men and women, and their levels in the future, are not taken into account since we are using the same mortality tables for all our projections. Finally, we also want to investigate the complex impact on gender imbalances of past and future demographic structures, shaped in particular by fertility fluctuations and long-term trends. The easiest way to examine this specific aspect of demographic change consists in reconstructing population structures in the absence of prenatal sex selection. This has also prompted us to extend the time horizon beyond 2050 in order to shed light on long-term effects of low fertility in China and India.

1.1. Population parameters from 2005 to 2100

Populations of China and India will be projected from 2005 top 2100 using two different SRB scenarios described further below. All other projection parameters will otherwise be the same for each scenario.

India's age and sex distribution is taken from the United Nations estimates.[7] The corresponding TFR and life expectancy levels from 2005 and 2050 are taken from the same source. No effort has been made in this paper to include the recent results from the NFHS-3 round of survey, as the age distribution from the sample may be not be adequate.

For China, we use the age and sex distribution derived from the 1% survey conducted in 2005. The original distribution, however, requires some correction in view of the obvious under-enumeration of men below 50 (a deficiency that the presence of age-wise sex ratios below 100 clearly demonstrates). To do that, we use the cohort sex ratios observed during the 2000 census, which are of better quality: for instance, the sex ratio of the 20-24 age group in 2005 (i.e. the cohort born in 1990-94) is re-estimated as the sex ratio of the 15-19 age group from the 2000 census. This procedure leads to new male and female population totals, which

[7] We use here the latest estimates and forecasts by the United Nations (2007).

are in turn re-adjusted to fit the overall sex ratio in 2005. We use again the United Nations parameters for fertility and mortality for 2005-2050, except for the 2005 fertility levels. For this year, we use the latest "consensus figure" of 1.6 children per woman, based on the estimates by various scholars.[8]

United Nations forecasts do not extend beyond 2050. For the 2050-2100, we therefore decided to use and combine two different sources: the IIASA long-term forecast series and an alternative projection exercise performed by the Population Division.[9] It may be noted that these series differ to some degree, in particular with respect with fertility levels for China and India. Our parameters are closer to the estimate from IIASA, which assumes for 2100 a slightly higher fertility level in China that in India (respectively 2.1 against 1.85 children per woman). As we will see, this difference does have a minor influence on long-term differences in population structure between China and India.

1.2. Sex ratio at birth in transition

The crucial component of our projection exercise remains of course the future SRB trajectory. In the normal-SRB scenario, SRB is taken as 105 during the entire period. But it may be kept in mind that no quality estimate of SRB in both China and India in the absence of pre-birth discrimination exists. All available figures may be biased either by sex differentials in birth registration, sample issues or the impact of both prenatal discrimination and disguised infanticide.

Several high-SRB scenarios have been examined, including scenarios in which SRBs would continue to grow to higher levels as observed in the most affected regions in China and India.[10] But the objective of this paper is not to assess the impact of further degradation of birth masculinity in both countries. What we want to assess is the minimum impact that recent gender imbalances at birth may exert on population structures during the 21st century. We have therefore decided to posit a rather optimistic scenario of SRB change: in this transitional high-SRB scenario, SRB is allowed to decrease back to 105 within the next 15 years (i.e. by 2020). The 2005 SRB levels used in this paper are respectively 120 and 113 male births per

[8] See for instance Lutz et al. (2007); Retherford (2005). An extended discussion is found in Goodkind (2008).

[9] More detail in Lutz et al. (2008) and United Nations (2004).

[10] More detailed projection scenarios are also available in Guilmoto (forthcoming).

100 female births in China and in India.[11] The annual SRB trajectories in 2005-2020 have been fitted by using a polynomial model.

This SRB turnaround is based on South Korea's experience in which birth masculinity did decline back to a normal 106 level in 15 years (Kim 2008). In addition to South Korea's somewhat unique experience, it should be observed that several signs of current SRB transition are perceptible today in both China and India, pointing in particular to the existence of a SRB decline in several Chinese and India regions since 2000.[12] The detailed discussion of the reasons for this downturn is beyond the scope of this paper, but the change may be related to both spontaneous ideational factors towards more gender equity and to the effect of policies recently introduced or strengthened in China and India to monitor sex selective abortions. Since it remains a rather optimistic view, based on a rapid decline of current SRB levels, this high-SRB should be seen as the lowest possible effect of skewed sex ratios on population structures.

1.3. The normal-SRB scenario

Estimating the actual impact of high-SRB levels requires however the comparison with demographic series in the absence of *past* inordinate SRBs. We need therefore to estimate what China's and India's populations would have been *ceteris paribus* if birth masculinity had remained normal instead of gradually increasing from the 1980s onwards. The easiest way to go about it would consist in projecting 1980 populations using observed mortality and fertility levels, but with a constant SRB level of 105. This apparently straightforward method has however two main drawbacks, which we sum up here:

1. Lack of reliable demographic parameters for the period 1980-2005
2. Lack of estimates of net international migration by age

The first problem relates to the absence of direct estimates of demographic parameters for both countries for the last 25 years. This is especially true for TFR estimates, which may vary by no less than 30% according to available sources –the worst case being China in which

[11] Kulkarni (2007) and Goodkind (2008) provides detailed discussion of recent SRB estimates for China and India.

[12] On the incipient SRB decline in China and India, see Goodkind (2008), Sharma and Haub (2008); Das Gupta *et al.* (2009).

fertility estimation has become a cottage industry. While there is no dearth of indirect estimates, they differ significantly and would produce diverging projected populations. It would therefore be first necessary to simulate population growth from 1980 to 2005 to select the adequate set of TFR and mortality parameters, using estimated SRB levels. But annual SRB levels are also based on imperfect estimates. This is in particular true for India, as the only figures available data for the five-year periods from 1980 to 2005 are sample-based estimates from the *Sample Registration System*, which may not be entirely reliable.

This initial estimation difficulty is compounded by the absence of detailed estimates of net out-migration from both countries. Since China and India are today the biggest providers of international migrants, the cumulated effect of net international migration over 25 years is far from being negligible. In conclusion, such a projection requires a satisfactory set of demographic parameters -especially TFR, SRB and net migration five-year series–, which would constitute a separate work in itself.

We have therefore decided to limit our exercise to the post-2005 period and not to attempt to re-estimate the impact of high SRB on population totals *before* 2005. Population totals have therefore been kept constant for 2005, which means that normal SRB levels were not supposed to have impacted the size of birth cohorts in the past. As may be noted, our demographic projections are based on the same assumption since we use similar TFR parameters in both our high- and normal-SRB scenarios for the 2005-2100 period. But normal SRB levels in the past require the correction of the 2005 baseline age structure, since its sex distribution is already significantly skewed by excess birth masculinity prior to 2005. To do that, we have estimated “normal” age-specific sex ratios by using other age distributions.by computing the average sex distribution in 2005 by five-year age group for the entire world (save China and India). These age-specific sex ratios were then applied to the population aged less than 25 years in 2005 (i.e. born after 1980), without any change in the total population below 25. This correction leads logically to a consistent increase in the proportion of girls and young women at the base of the age pyramids.

2. Projection results and discussion

Our two SRB scenarios (with corresponding baseline population structures) have been used to project the populations of China and India till 2100. We will now use the results of our

projections by examining population totals, age and sex distributions, as well as preliminary indicators of potential marriage squeeze (Tables 1 and 2).

Insert table 1

2.1. Birth masculinity, population growth and overall sex ratio

The first impact of our different SRB scenarios relate to the net demographic loss caused by the 1980-2020 SRB bulge. This specific population decrease is an interesting phenomenon that often goes unreported. To understand its origin, one has to remember that high SRB levels correspond to a relative decrease in the size of female birth cohorts, which translates after 20 years into a lower proportion of women among the population of child-bearing age. Because of these skewed gender distribution, the adult population tends to be comparatively less fertile than a more balanced adult population. But this lower number of births will later have a multiplying effect by reducing population size in the long run.

Insert table 2

This unintended consequence of the SRB surge from the 1980s has on the whole a substantial impact on projected population structures. High SRB levels till 2020 will reduce the number of women of child-bearing age till 2070. The net population loss reaches already 28 and 24 millions respectively in China and India by 2050. The population gap between the normal-SRB scenario and the high-SRB scenario attains 54 millions in China by 2100 (43 millions in India), a far from negligible figure in view of the low or negative growth postulated for the second half of the century in both countries.

Insert figure 1

The evolution of the overall population sex ratios are influenced mostly by changes in age structures as well as in mortality patterns. As Figures 1 and 2 indicate, the normal population trajectories would have meant a regular decrease in overall sex ratio till 2050 or beyond. The sex ratio crosses the 100 mark in China in 2035, but only in 2060 in India. Interestingly, sex ratio levels tend to increase later on, and both China's and India's populations end up with a majority of men in 2100.

As expected, high SRBs have a major influence on the overall proportion of men and women in the population of both countries. The sex ratio in 2005 is already affected by past birth

imbalances since the observed sex ratios are 2 or 3 percentage points higher than our re-estimated baseline sex structures (without prior excess SRB). Our projections demonstrate that this gap increases only marginally during the first decades of the century and the projected sex ratio of the entire will in fact decrease in spite of excess birth masculinity till 2020. In both countries, it will however take an entire century for the effect of high SRB in 1980-2020 to disappear: by 2100, population sex ratios according our two different scenarios are still not the same. The specific impact of population structures appears therefore considerable. This is due in particular to the low fertility regime postulated for both countries and the relative weight of older birth cohorts in the overall population.

Insert figure 2

The gender gap may also be measured in absolute terms and we see in our Figures 1 and 2 that men outnumber women by almost 45 millions in each country by 2010 or 2015 in the high-SRB scenario. Yet, this male excess decreases rapidly and will be below 10 millions by the end of the century. The net impact of current high SRBs on this gender gap –measured as the difference in gender gaps according to our two scenarios– follows somewhat delayed patterns at it peaks only in 2020. At this period, the net impact of excess birth masculinity on the numerical gap between men and women will be respectively of 24 and 17 millions in China and in India. This excess number of men will decrease very slowly for several decades afterwards as a consequence of low mortality patterns. By 2090, high SRBs in the past correspond finally to less than 5 millions excess men.

The unavoidable conclusion is that slow decrease of sex ratios in China and India followed by stagnation during the second half of the century will probably give the entire world population a male majority during the decades to come.

2.2. Gender imbalances among adults

The consequences of high birth masculinity are expected to be especially significant for future adult populations in view of the growing imbalances among people of marriageable age. To explore this aspect, we first examine the overall adult sex ratio computed over the 15-49. We then use a less crude indicator of potential marriage squeeze, i.e. the adult sex ratio weighted by marriage rates. This weighted sex ratio reflects more accurately the consequences of age structures on the pool of men and women at time of marriage. It is computed by using

marriage rates by sex computed for both China and India in 2005 and correspond therefore to the comparative number of men and women expected to marry during each year *if nuptiality patterns were to remain the same as today*.[13]

According to the normal-SRB scenario, this sex ratio remains almost constant in China during the entire period within the 104-107 interval (Figure 3). A slight increase during the second half of the century is visible, caused by age-structural change. But the high-SRB scenario generates a rapid swelling in this sex ratio which reaches 114 in 2040 and decreases afterwards. As expected, both scenarios converge in 2065 when the last 2015-2020 cohort affected by inordinate sex ratio at birth reaches 50.[14]

Insert figure 3

The use of the weighted indicator displays however a more dramatic demographic evolution caused by previous high SRB levels as well as fluctuations in birth cohort sizes that are a legacy of China's turbulent demographic past. In the high-SRB scenario, the weighted adult sex ratio first decreases, but records subsequently a brutal increase from 102 in 2010 to 121 in 2025. This corresponds, in 2025, to an excess of about 22% of prospective grooms compared to available brides, which can also converted into yearly marriage cohort size: the number of men expected to marry in the year 2020 will for instance exceed that of expected female brides by about 1.5 million. This excess volume of prospective grooms will remain above one million for more than 10 years. In the absence of high SRB, the excess of marriageable men would on average three times lower during this period.

Needless to say that delayed marriage among women, a rather plausible nuptiality scenario in China, would seriously aggravate the picture. Similarly, the accumulation of unmarried men during this period is also most likely to lower the marriage prospects of younger male cohorts ("queuing effect").

[13] The average age at marriage was of 25.7 years for men and 23.5 for women in China (respectively 24.8 and 19.8 for India). The proportion unmarried at age 50 is low in both countries: 3.5% for men and 0.2% for women in China (respectively 1.1% and 0.6% for India). See Jiang *et al.* (2007) for a better squeeze indicator for China that includes the effect of remarriage.

[14] Most indicators are also reproduced in Tables 1 and 2.

After 2025, the weighted adult sex ratio in China declines almost as fast, returning to 110 in 2035 and oscillating around levels 105 during the second half of the century. The tensest period for men of marriageable age appears therefore to extend over about two decades, starting from 2015. During that period, a share of unmarried men will have to delay marriage and some may find themselves unable to marry at all. Even the normal-SRB scenario shows the adult sex ratio to increase in China by more than 10 per 100 in 2010-2020, a consequence of past fluctuations in birth cohorts.

Trends in adult sex ratio are slightly different in India. The overall sex ratio among the 15-49 starts from a rather high level (108) in 2005, but is expected to decline gradually till mid-century. Figure 4 shows that in the high-SRB scenario, this decline would be delayed by 30 years to 2030, as a consequence of the skewed sex ratio of the new male adult cohorts, but the adult sex ratio never exceeds 108. During the second half of the century, changing age structures cause the adult sex ratio to increase again above 105. This is the result of the shrinking cohort size combined with earlier marriage among women.

Insert figure 4

The broad adult sex ratio appears once gain to be a poor indicator of the actual intensity of marriage squeeze. When corrected for age-specific marriage rates, the adult sex ratio displays a radically different picture. First of all, marriageable men appear to be in a minority in 2005, a fact that has been often related to the adverse marriage squeeze against women perceived in India (Bhat and Halli 1999). But during the next 50 years, the weighted sex ratio records a continuous increase up to 107 by 2050. The surge is more rapid in the high-SRB scenario, in which the adult sex ratio reaches already 108 by 2025. Later on, the sex ratio remains above 105, at a level comparatively higher than China during the second half of the century. This difference is, to a large extent, a reflection of the lower fertility assumption for India and its impact on the sex distribution of prospective spouses.[15]

It should however be stressed that the projected marriage squeeze in India will never reach the levels observed in China, a direct consequence of the more moderate SRB levels observed in India today and of its more regular age structures. In terms of marriage cohort size, the excess

[15] It may be added that the difference in mean age at marriage between men and women (5 years today) exacerbates the effect of differences in cohort size.

of men will never reach one million per year. Though far less acute than in China, the gender crisis will last longer in India where the weighted sex ratio will not return to 105 before 2060.

3. Conclusion: the future costs of current excess birth masculinity

The methodology followed here has allowed us to delineate the exact impact of high SRB levels observed today in China and India. By comparing projection results based on the most optimistic SRB trends with population dynamics if SRB levels had remained normal throughout, we can distinguish the specific demographic consequences of high SRBs from that of more complex factors such as past variations in birth cohort size in China and future fertility decline in India.[16] Beyond the specific effects of current skews in SRB, fluctuations and long-term decline in the average size of birth cohorts appear to contribute to some extent to imbalances in the marriage market.

The sequels of skewed SRBs appear multifarious in both China and India. We have seen in particular that high birth masculinity slows down population growth and the total impact by the end of the 21st century may be on average of a reduction of 50 million in both countries' population. Moreover, distorted sex ratios at birth today will ensure that both populations remain overly masculine during the entire century, with a direct impact on the world population totals. If the sex ratio at birth had remained at its standard 105 level, the sex ratio of these two populations would have finally decreased below 100 in the coming decades, but this appears now a remote possibility.

More refined indicators of marriage squeeze demonstrate the severity of the crisis in China within the next two decades. The number of excess males, many of them condemned to delay or forego marriage, will be greater than one million per year from 2015 onwards. In the absence of high SRBs, the intensity of the marriage squeeze would have been almost three times less pronounced. The further social implications of this crisis are not at all examined in this paper.[17] Nor did we explore the potential consequence on family structure, employment or education. But it is fair to say that our results are based somewhat optimistic parameters. We have in particular assumed that SRB levels would come back to normal by 2020, in spite

[16] The impact of long-term changes in population structures on the marriage market has been already noted by McDonald (1995), and Esteve and Cabré (2005).

[17] See Hudson and Boer (2004) ; Poston and Glover (2005).

of the fact that South Korea is the only example of such a rapid downturn in SRB levels. Any delay in the expected SRB decline in the future –not to mention any further temporary rise in SRB levels–would invariably correspond to a further degradation of the gender imbalances computed here. Moreover, our marriage squeeze computations are based on fixed nuptiality patterns. Any further increase in the average age at marriage among women will exacerbate the squeeze effect. Similarly, if a growing proportion of women in China and India withdraws from marriage, as is observed today in East Asia (Jones 2007), the number of men unable to marry in the future will further increase.

Finally, it may be observed that our simulations pertain to the entire populations of China and India. Had we restricted our projections to specific regions, the results might have been more dramatic. As a matter of fact, a few provinces in East China and states in Northwest India have reported record SRB levels above 125 or 130, while other demographic parameters such as mortality and fertility levels are roughly similar to national averages. It may therefore be inferred that the net effect of such high SRBs in these regions will be even more severe than in each country as a whole.

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China	Total population	Overall sex ratio	Gender gap	Adult sex ratio	Weighted adult sex ratio
High-SRB scenario					
2005	1 306 279 936	106.8	42 837 952	105.8	102.8
2010	1 319 118 464	106.7	43 039 040	106.5	101.6
2020	1 336 137 600	105.6	36 542 784	109.9	119.0
2030	1 309 946 368	104.1	26 273 088	113.3	115.8
2040	1 252 846 208	103.0	18 770 304	113.7	107.1
2050	1 186 207 232	102.9	16 919 104	110.8	106.5
2060	1 112 521 472	103.2	17 451 264	106.8	102.3
2070	1 050 447 552	103.2	16 581 344	105.8	103.7
2080	997 839 488	103.0	14 725 920	106.0	104.4
2090	962 317 632	102.4	11 203 104	106.2	102.8
2100	937 823 744	102.1	9 786 048	106.4	103.9
Normal-SRB scenario					
2005	1 306 279 936	104.0	25 336 384	104.6	100.8
2010	1 319 912 320	103.3	21 381 504	104.1	96.9
2020	1 341 694 976	101.9	12 355 008	104.0	108.0
2030	1 322 843 392	100.4	2 437 632	104.4	103.3
2040	1 273 471 744	99.3	-4 542 464	105.5	102.5
2050	1 213 482 496	99.1	-5 441 088	105.6	105.7
2060	1 146 822 528	99.5	-2 966 848	105.5	102.4
2070	1 091 374 848	100.0	62 080	105.8	103.7
2080	1 044 328 640	100.8	4 089 120	106.0	104.3
2090	1 013 238 912	101.3	6 393 504	106.2	102.8
2100	991 035 328	101.7	8 560 160	106.4	103.9

Notes :

- Sex ratio as men per 100 women
- Gender gap: difference between male and female populations
- Adult sex ratio computed over the 15-49 age group
- Weighted adult sex ratio described in the text (age-specific marriage rates used as weights).

Table 1: Projection results according to two different SRB scenarios, China, 2005-2100

India	Total population	Overall sex ratio	Gender gap	Adult sex ratio	Weighted adult sex ratio
High-SRB scenario					
2005	1 134 403 200	107.5	40 832 640	108.7	99.5
2010	1 222 345 344	107.5	44 394 560	108.7	101.0
2020	1 380 781 824	106.6	43 943 360	108.5	106.1
2030	1 506 996 736	105.2	38 202 816	108.4	108.0
2040	1 595 521 152	103.9	30 787 264	106.9	106.8
2050	1 655 432 064	102.9	23 400 320	105.3	107.4
2060	1 677 060 864	101.9	15 946 880	103.8	104.7
2070	1 664 183 040	101.1	9 481 856	103.6	106.0
2080	1 627 882 752	100.7	5 464 384	104.2	107.3
2090	1 577 644 416	100.5	4 153 792	105.0	107.1
2100	1 523 437 440	100.8	5 856 000	105.8	108.4
Normal-SRB scenario					
2005	1 134 403 200	105.3	29 535 872	107.8	97.8
2010	1 223 622 656	104.9	29 133 888	107.1	98.2
2020	1 386 151 552	103.9	26 547 200	105.4	101.3
2030	1 518 445 184	102.8	21 060 864	104.0	102.3
2040	1 613 764 864	101.8	14 013 184	103.2	104.9
2050	1 679 347 072	100.9	7 299 328	102.8	106.7
2060	1 706 600 832	100.1	1 222 272	103.2	104.7
2070	1 699 206 656	99.7	-2 611 072	103.6	106.1
2080	1 667 166 848	99.7	-2 832 768	104.2	107.2
2090	1 619 869 056	100.0	88 704	105.0	107.1
2100	1 566 839 680	100.6	4 654 016	105.8	108.5

Notes :

- Sex ratio as men per 100 women
- Gender gap: difference between male and female populations
- Adult sex ratio computed over the 15-49 age group
- Weighted adult sex ratio described in the text (age-specific marriage rates used as weights).

Table 2: Projection results according to two different SRB scenarios, India, 2005-2100

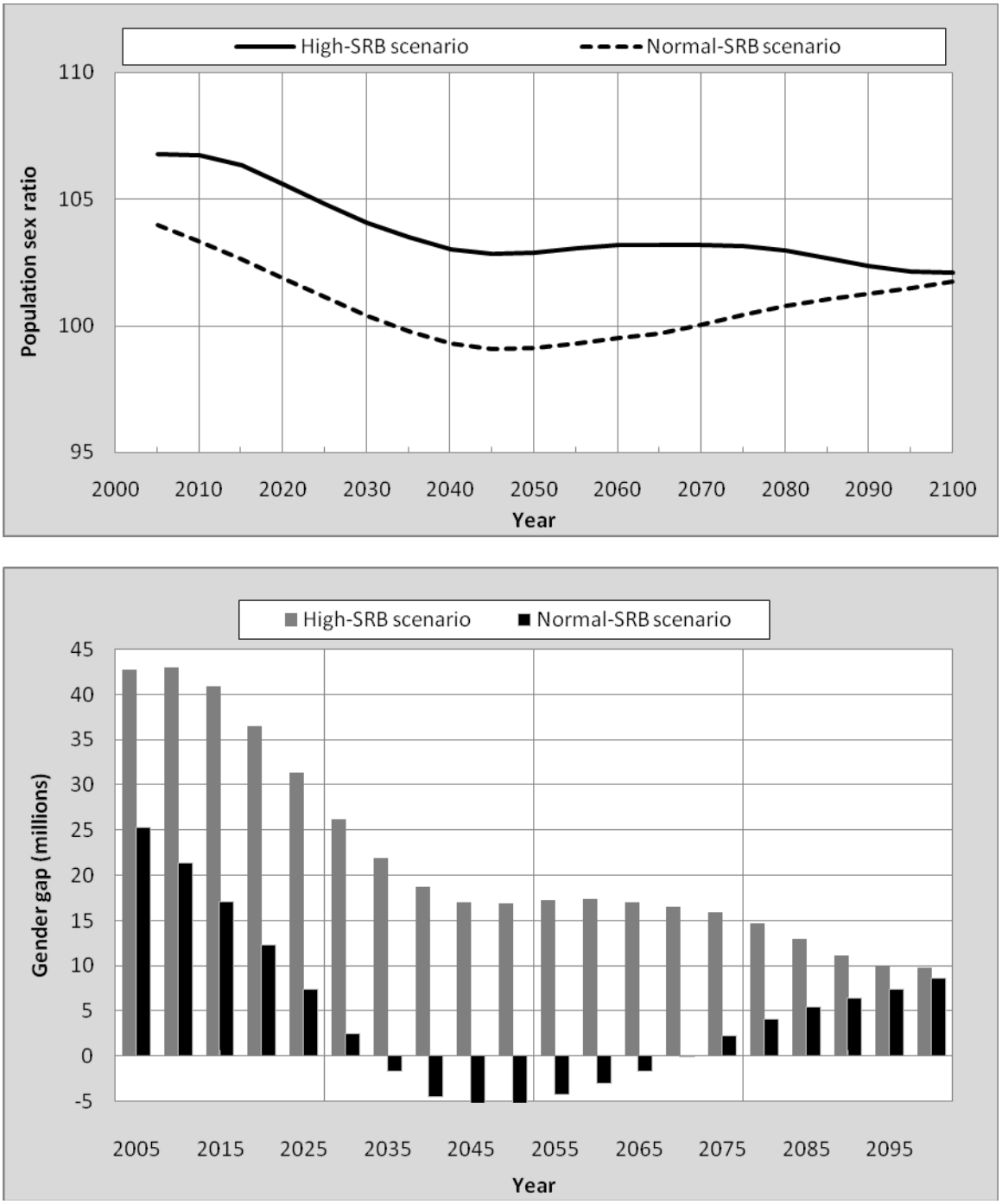

Figure 1: Overall sex ratio and gender gap according to two SRB scenarios, China, 2005-2050

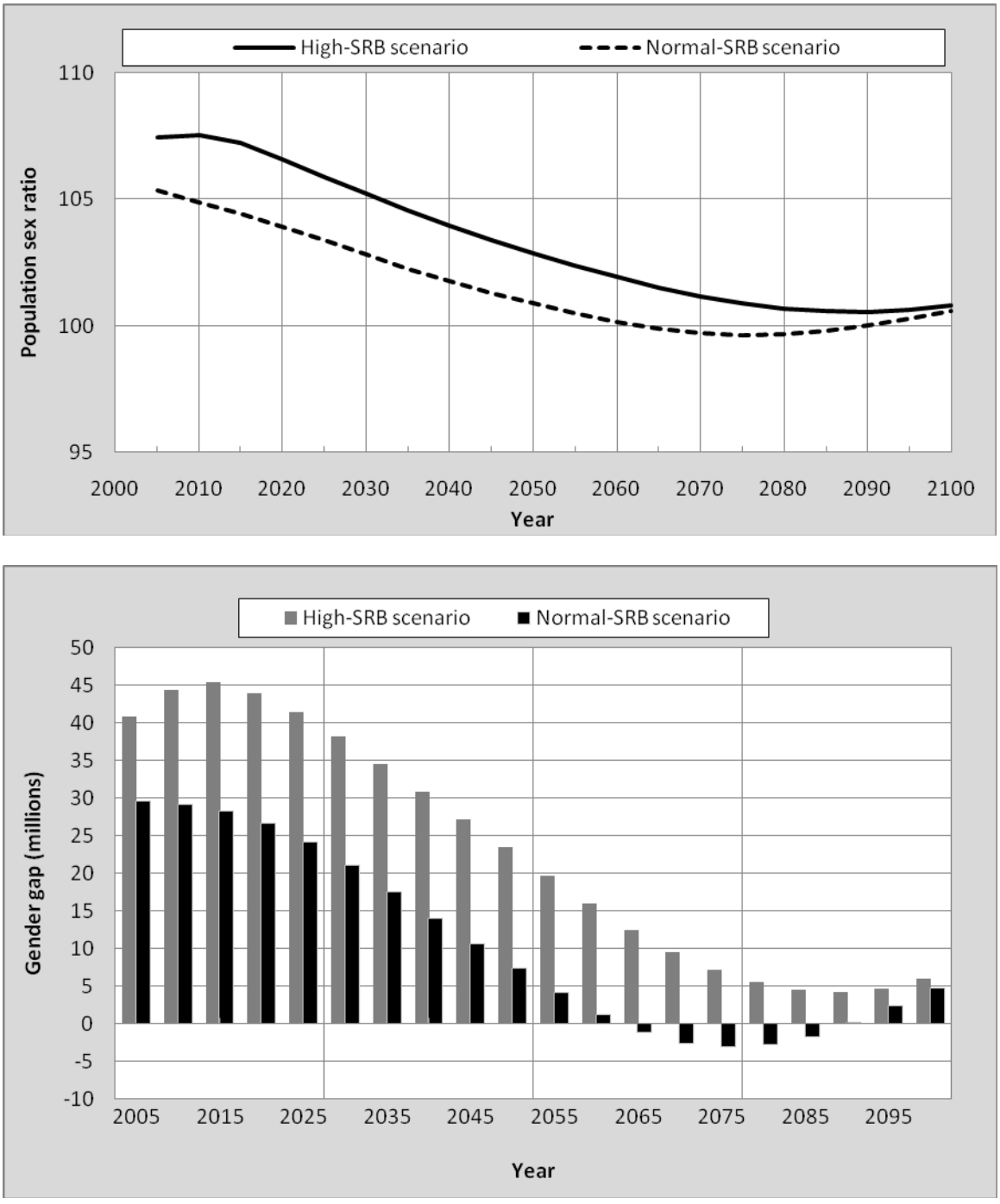

Figure 2: Overall sex ratio and gender gap according to two SRB scenarios, India, 2005-2050

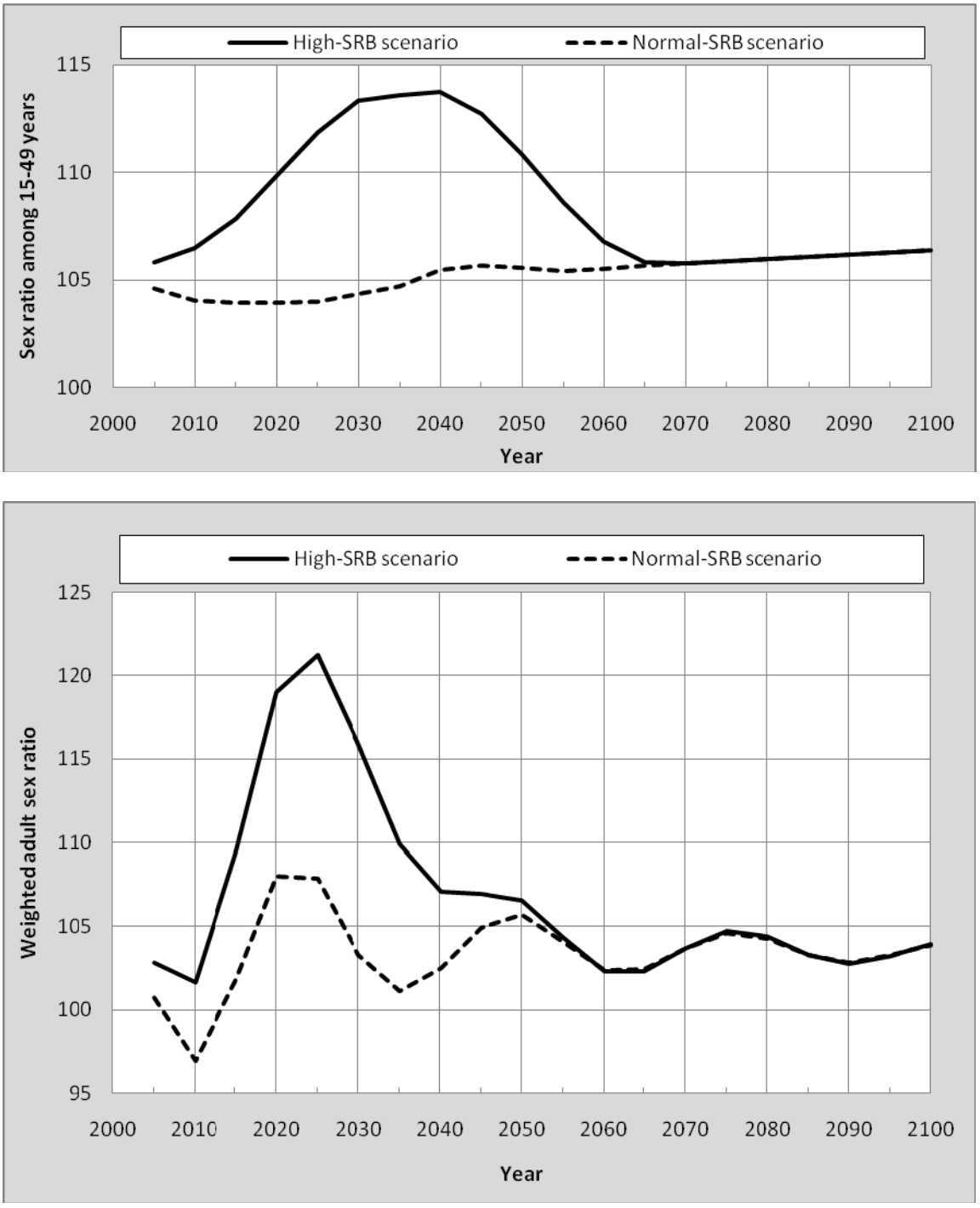

Figure 3: Unweighted and weighted adult sex ratio according to two SRB scenarios, China, 2005-2050

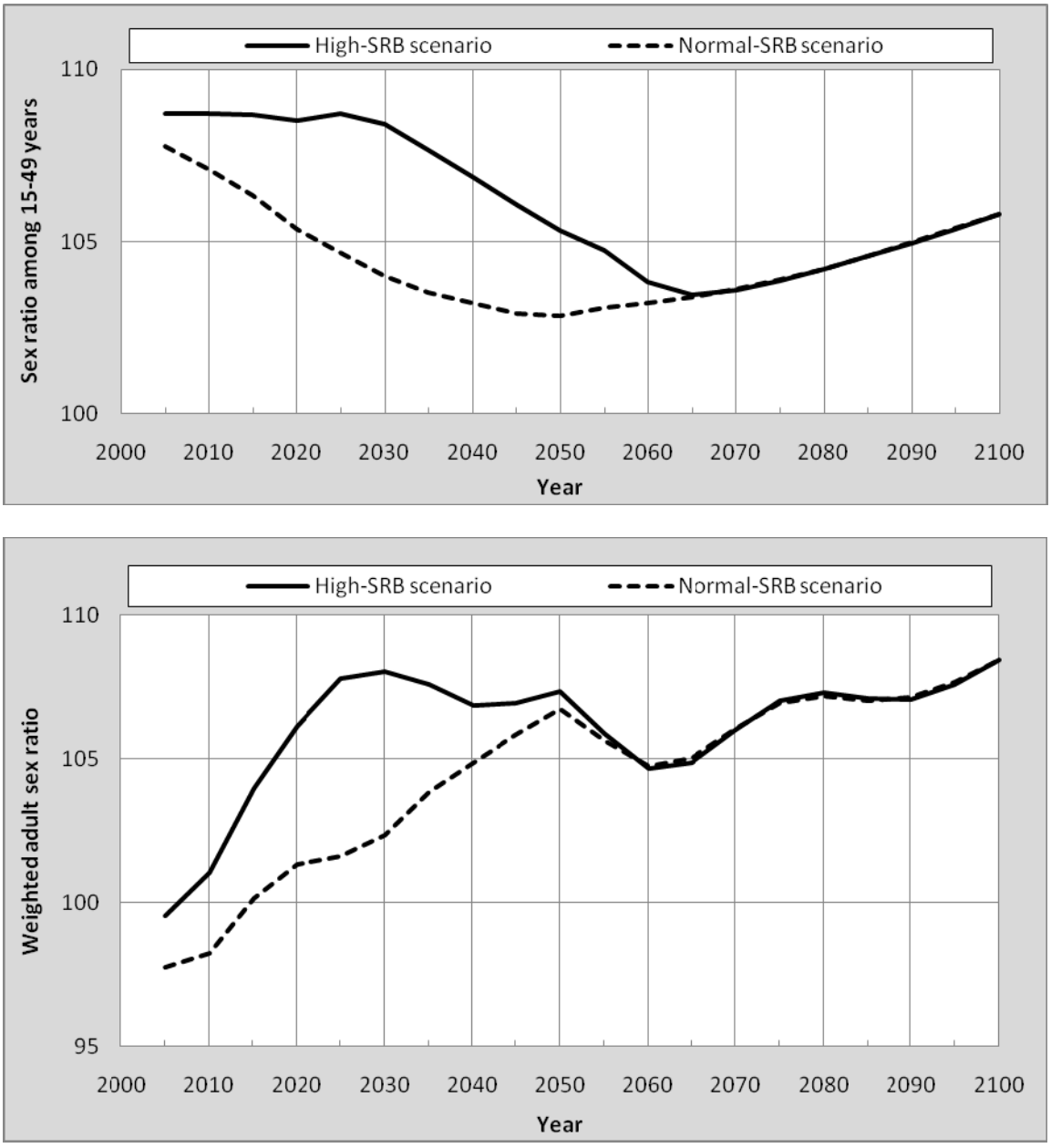

Figure 4: Unweighted and weighted adult sex ratio according to two SRB scenarios, India, 2005-2050