On Intriguing Sex Ratios Among Live Births in China in the 1980s

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Abstract: Millions of missing girls are implied by the high sex ratios at birth in China as reported in the three large independent fertility surveys in the 1980s. Our analysis of the 1988 2/1000 fertility survey shows that the higher than normal sex ratio for second and higher order births is related to the stringent family planning policy of China that recommends only one child and does not allow more than two for most families. The shadow of female infanticide cannot be completely dissolved but most of the "missing" girls discussed in previous literature are found by us as adopted children. Excess female infant mortality is estimated at about 45 000 per year. Methodologically we try to establish that the normal sex ratio at birth is between 105 and 106 boys per 100 girls and that circa 130 is the normal sex ratio among infant deaths.

Key words: Normal sex ratio; sex ratio among infant deaths; sex discrimination; female infanticide; family planning policy.

1. Introduction

The sex ratio of a population is defined as the number of males per 100 females. It can vary among population groups because of differential migration, if women or men

have disproportionally migrated, or because of differential mortality.
   The sex ratio among live births is biologically very stable, however. Sweden has a continuous yearly time series on sex ratios among live births since 1749, that is for 240 years (Diagram 1). This series seems to indicate that the expected sex ratio among live births under normal circumstances is between 105 and 106 boys per 100 girls. This ratio seems to vary only randomly between years implying a model of sex selection at conception as a random process although slightly but persistently biased in favor of males. The variation between years in the sex ratio at birth of a population can then be computed on the basis of probability theory as has been done for the Swedish data in Diagram 1. The sex ratio is out of range for eleven of the 239 years in the series, which is
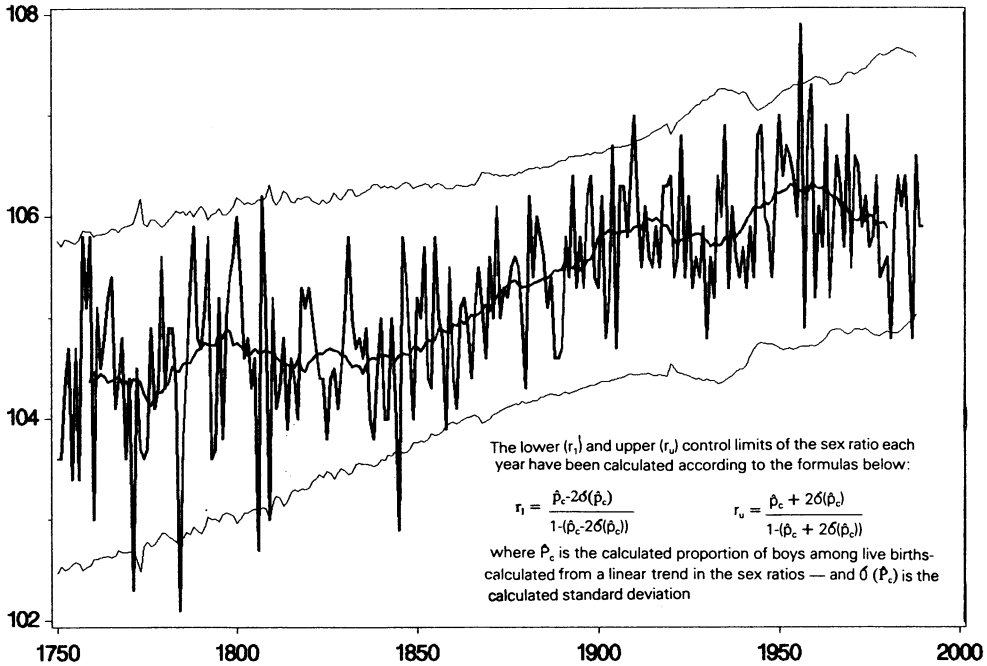
Diagram 1. Sex ratios among live births in Sweden 1750–1989, 21-year moving average and 95% control limits allowing for linear trend

very much what is to be expected with 95% probability.

We have analyzed data on sex ratio among live births for 18 countries that have unbroken time series reported in the UN Demographic Yearbook for the fifteen years 1970–1984 using the same model assuming slight random variation around an underlying trend for those years. Sex ratios for nine countries (Cuba, USA, Bulgaria, Denmark, France, Italy, Netherlands, Norway, and Sweden) fall within their computed range in all fifteen years. Six countries (Japan, Belgium, Finland, Greece, Hungary, and Switzerland) have the sex ratio for one year outside the computed range, two countries (Austria and Czechoslovakia) have two values outside range and one country (Poland) has three. If we regard the 18 countries together we thus find strong confirmation of the model with 13 values out of 270 outside range.

The width of the range should thus decrease with the size of the cohort according to the model. The very large cohorts of China – about 200 times larger than the contemporary birth cohorts of Sweden – should fall in a very narrow interval between 105 and 106 boys per 100 girls if all live births are registered and the sex of all children is registered correctly.

2. Social Factors May Interfere but Not Biological

The sex ratio at birth does not vary between regions, parity of birth, or age of mother in the Swedish data and indeed it would not vary much for biological reasons according to the laws of genetics. These would also rule out large differences between socioeconomic groups and also hereditary differences between races. Japan, for instance, has the expected sex ratio of 105–106 in
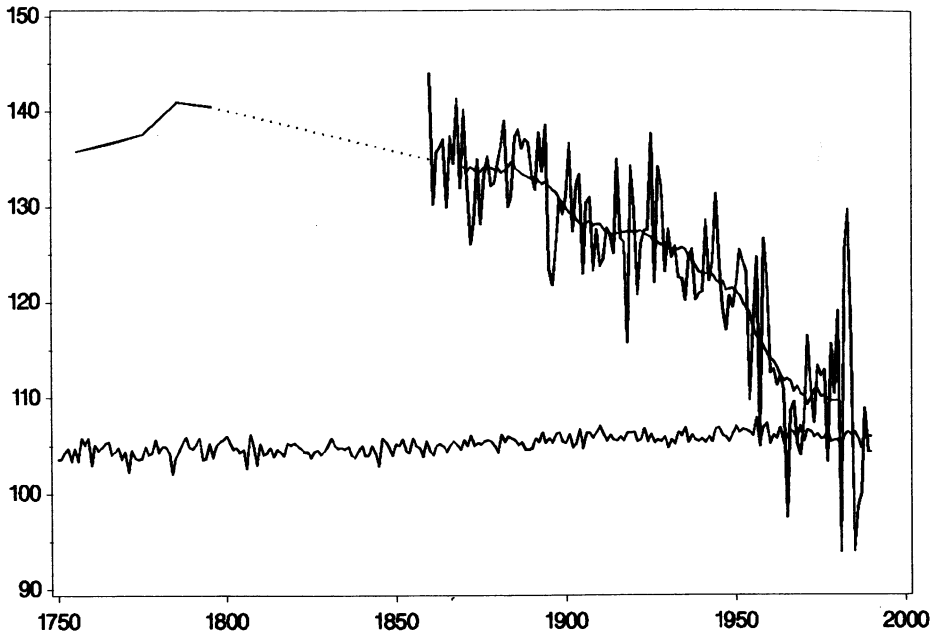
Diagram 2. Sex ratios among still-born and live born in Sweden 1750–1989

recent years but 106.4 as average for 1970–1984 according to the UN Demographic Yearbook (1986, pp. 486–487). Also Cuba (106.1), Sweden (106.3) and Poland (106.2) are slightly above the assumed natural range between 105 and 106, which is possible under the assumption of random change. However, the sex ratio at birth may be indirectly influenced by social factors as the data for Sweden in Diagram 2 illustrate besides random variation.

The sex ratio among live births in Sweden has increased from 104.4 in 1751–1760 on the average to 105.8 for 1980–1989. This increase can be related to a decrease in the proportion of stillbirths (Diagram 2 above) with very high sex ratios and probably also to the proportion of miscarriages of all pregnancies. The decrease in the proportion of stillbirths over 235 years of Swedish history can probably be related to the improved nutritional standard of

Swedish mothers over this period of time. The last years of widespread starvation in Sweden occurred in the later half of the 1860s.

Social factors that influence the rate of miscarriage and stillbirth may influence the sex ratio among live births since male fetuses have higher risk to end as miscarriage or stillbirth, owing to the fact that male fetuses suffer from a higher incidence of genetic damage than female fetuses. This sex difference also carries over into infant mortality, which is normally higher among boys than among girls.

Before we present the data for China let us first summarize the assumptions that are firmly based on Swedish data for some 240 consecutive years:

1. The sex ratio at birth should not deviate much from 105 to 106 boys per 100 girls for biological reasons. The larger the cohort, the

smaller the variation in sex ratio between years would be.

2. The sex ratio at birth can be influenced by social and health factors that change the rate of miscarriage and stillbirth. The lower the proportion of pregnancies that end in miscarriage or stillbirth, the higher the sex ratio would be. Conversely, the higher the proportion of pregnancies that end in miscarriage or stillbirth, the lower the sex ratio would be.[2]

3. Perinatal and infant mortality is normally higher among boys than among girls because more boys are born with genetic disorders and are more susceptible to infectious diseases. Sex ratios of China have often been reported as above the normal range (Banister 1987; Coale 1984; Haupt 1983; Hull 1990) that can be inferred from the Swedish data, which are not contaminated by any reporting errors on sex ratios. Such a comparison was made by Johansson (1984) on the basis of data from China's three population censuses in 1953, 1964, and 1982. In this summary report from our joint project, we analyze data on sex ratios in China on the basis of the two-per-thousand fertility survey that was carried out in 1988 by the State Family Planning Commission.

The 2/1000 Fertility Survey gives a remarkably detailed picture of demographic behavior in China. The sample was designed to give good estimates of birth rates and contraceptive prevalence for all provinces. It covers 95% of all counties with a total sample size of 2.15 million individuals from half a million households. About 460 000 married women aged 15–57 were interviewed. This age range makes it possible to describe changes in demographic behavior for women of reproductive age from 1980 to 1987.

3. Two Hypotheses

The biologically based invariance of the sex ratio among live births makes sex ratio into one of the most important analytic tools of demographic science. It can be used to generate two types of hypothesis:

1. Sex ratios that are out of the "normal" range in a census or a survey may indicate that the data are deficient, i.e., that females have been underreported relative to the reporting of males for some reason. In this case sex ratios is an analytic tool to assess the quality of data in a census or a survey.

2. Sex ratios that are out of the "normal" range may indicate important differences in the social situation of males and females. The most dramatic interpretation is that the death rate is different for males and females. A high sex ratio among infants or children is often inferred as evidence of female infanticide or neglect of girls within the family (see WHO/UNICEF 1986), although in many cases, it is only an effect of underreporting of girls. But also the fact of underreporting of girls in a census or a survey is interesting as a social phenomenon in its own right.

4. Sex Ratios Among Live Births in China 1960–1987

With these assumptions in mind we have analyzed sex ratio data for China in the SFPC 1988 2/1000 Fertility Survey. The results are intriguing and invite discussion. At this stage we are not able to offer conclusive explanations based on really firm evidence, but we can contribute for discussion some new estimates as to the balance between underreporting of girls in surveys and censuses and differential gender mortality.

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[2] We are aware that the black population in the US has had a low sex ratio at birth consistently for many years. This is consistent with our model only if blacks in the US have a higher rate of miscarriage and stillbirths than whites. We have not been able to locate such data.
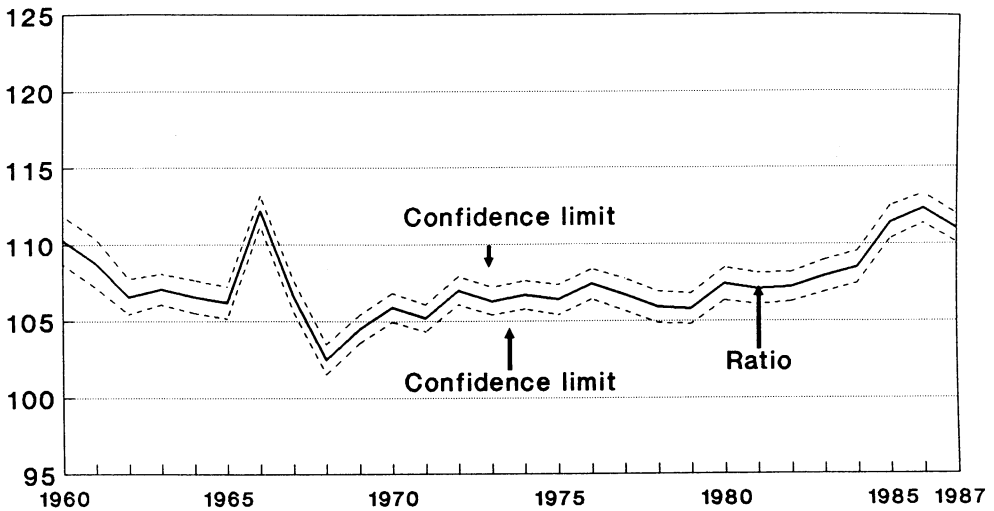
Diagram 3. Reported sex ratio among live births in China 1960–1987 as reported by the families in the 1988 two-per-thousand fertility survey

Diagram 3 shows that the reported sex ratio among live births in China is within the normal range for most cohorts, but also that there are some very intriguing variations over the decades since 1960. Some of these variations are clearly outside the range to be expected from purely random change.

There is thus a very clear peak in 1966 followed by as clear a trough in 1968. However, neither the peak in 1966 nor the trough in 1968 is verified by other sources such as the 1982 1/1000 Fertility Survey for live births[3] or the 1982 census (for 16-year olds).[4] We conclude that these erratic sex ratios indicate that the data on births for the earlier period in the 2/1000 Fertility Survey are less reliable. The survey is not designed to yield reliable data on birth for the decades prior to the 1980s.

[3] See Table 23 on page 38 in the report from the SFPC 1982 1/1000 fertility survey, volume 1, Beijing 1983.

[4] See Table 34 on page 272 in the 1982 Population Census of China (results of computer tabulation) edited by Population Census Office under the State Council and Department of Population Statistics. State Statistical Bureau, People's republic of China. Beijing 1985.
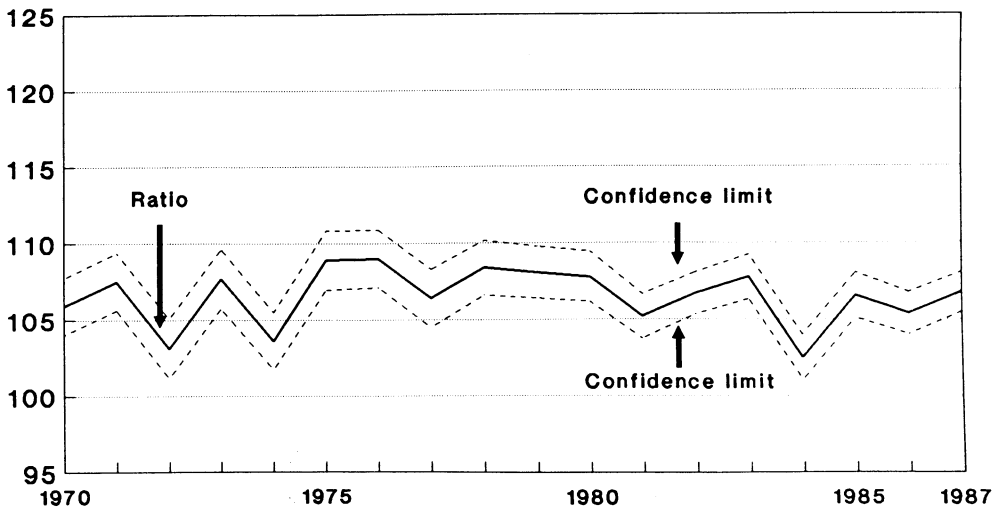
We also note a very clear increase above "normal" from about 1983. Before going into any explanations for these later years we will first look more closely at the data to see among what births we find this variation. We begin by looking at parity of birth in Diagrams 4–6, to see if the sex ratio varies between the first born and the later births.

According to Diagram 4 the reported sex ratio among the first born is rather "normal" if we look at the average for the whole period. It is slightly elevated in 1975–1980, the lower confidence limits being just above the upper confidence limit for the "normal" value 105.5. It is within the normal range also during the 1980s. However, the variation between years is somewhat larger than would be expected from sampling effects.

Diagram 5 shows that the reported sex ratio among the second born babies in China as reported by their families in 1988 is clearly out of the "normal" range for the last few years. Those years from 1984–1987 with sex ratios as high as 113–115 need an explanation. The curve for the earlier decade is on

Diagram 4. Reported sex ratio among first parity live births in China 1970–1987

the whole very erratic, but the trough in 1978–1980 with ratios down to 102–103 might deserve some notice.

Diagram 6 shows that the reported sex ratio for higher parity births is out of range among all the cohorts born in the 1980s. For the higher parity births the sex ratio is as high as 124 boys per 100 girls in 1986.

The finding of high sex ratios for higher parity live births in China in the 1980s replicate findings made earlier in the 1982 1/1000 Fertility Survey (Liu 1984) carried out by the SFPC and in the 1987 1/100 Population Survey carried out by the State Statistical Bureau (SSB) as analyzed by Hull (1990). We conclude that this finding of non-normal
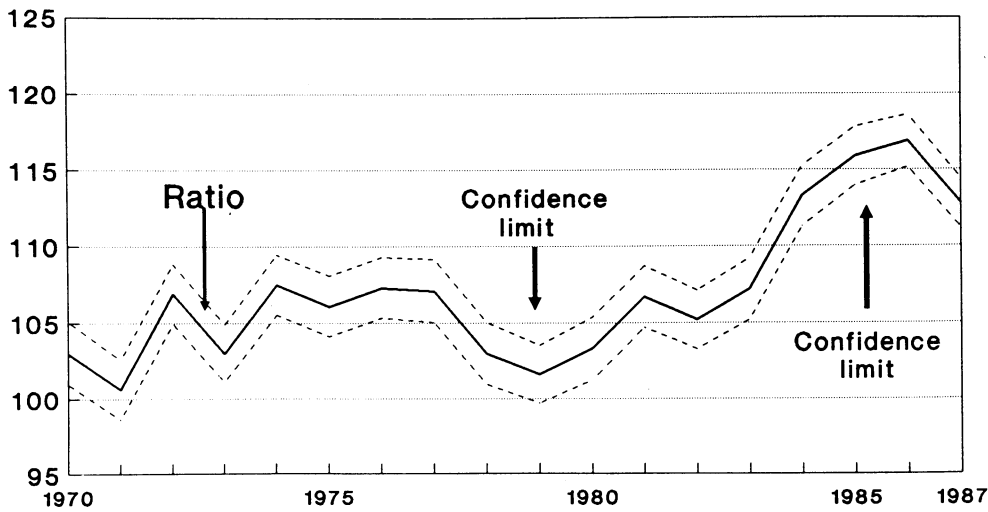

Diagram 5. Reported sex ratio among second parity live births in China 1970–1987
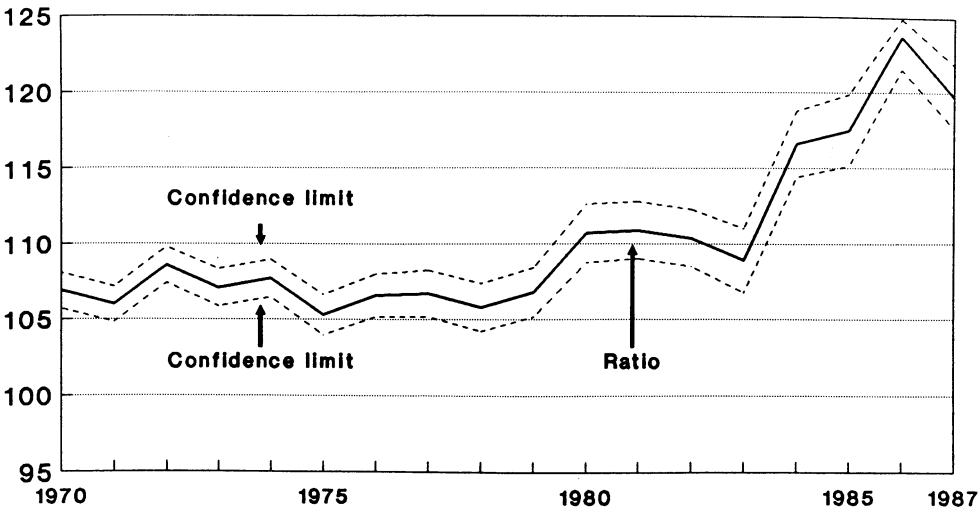
Diagram 6. Reported sex ratio among third and higher parity live births in China 1970–1987

sex ratios among reported live higher parity births in China is reliable since it is confirmed by three independent studies. Abnormally high sex ratios have been reported by three independent surveys in China for third and higher parity births in the 1980s. Two of the surveys also reported high sex ratios for second parity births in the late 1980s.

Diagram 8 shows that sex ratio among live births does not vary by mother's age in the 1960s and 1970s. In the 1980s, however, the sex ratio is out of the normal range for
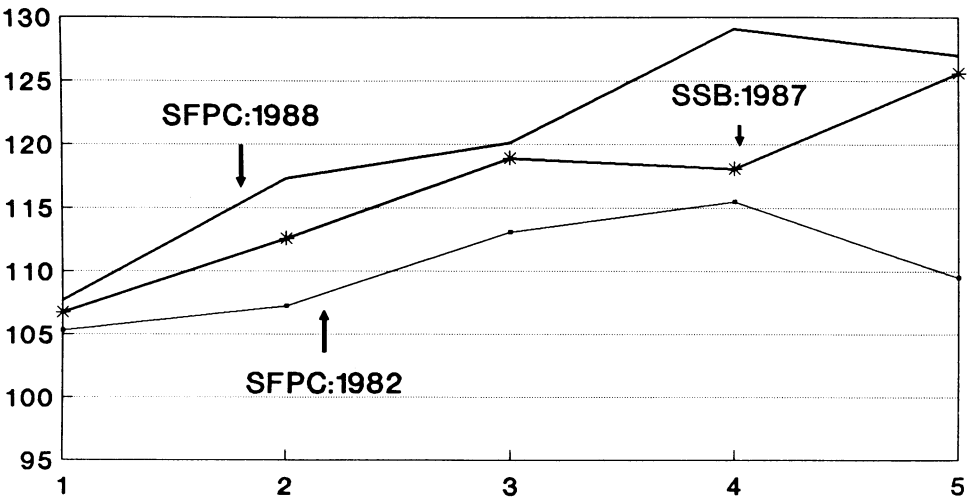

Diagram 7. Reported sex ratio among live births by parity for 1981 according to the SFPC 1982 1/1000 Fertility Survey, for 1986 according to the SSB 1987 1/100 Population Survey and for 1987 according to the SFPC 1988 2/1000 Fertility Survey
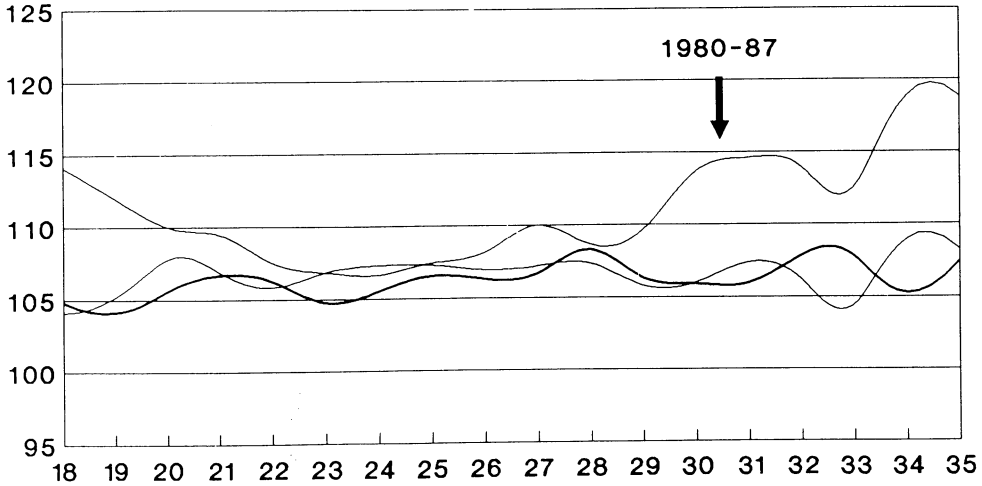
Diagram 8. Reported sex ratio among live births in China by mother's age in 1960–1969, 1970–1979, and 1980–1987

mothers younger than 22 and for those above 25 years of age.

Diagram 9 shows that there is no systematic difference in the sex ratio between urban and rural areas. There is much unsystematic variation between years, however. The emerging difference from 1983 is in the expected direction but is not statistically significant.

Dramatic differences are found only when we compare sex ratio among children born within and outside the local official birth plan in which the couples that are allowed to have a child within the next year are licensed. This distinction is meaningful only for the 1980s since it is connected with the one-child policy that was first launched in 1979. Diagram 10 shows that the reported sex ratio is quite normal, that is within the expected range of 105 to 106 boys per 100 girls for the live births within plan. It is quite clearly far above normal for children born
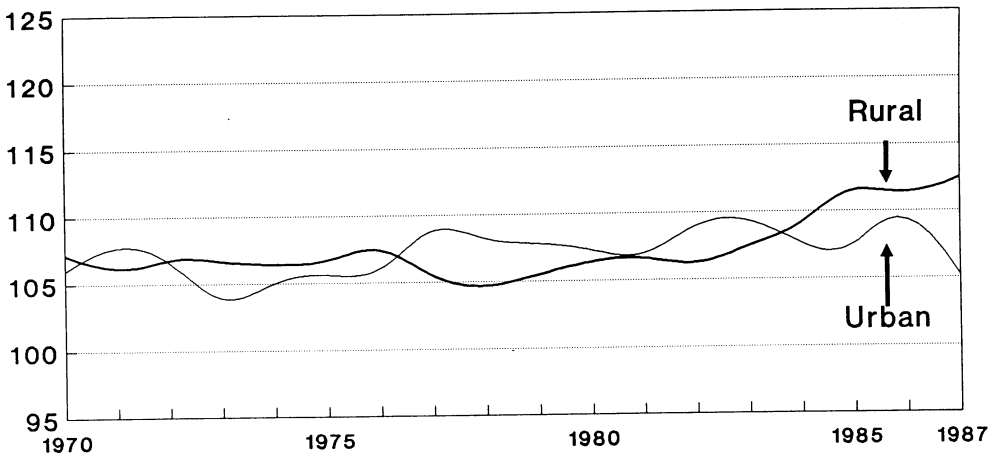

Diagram 9. Reported sex ratio among live births in China 1970–1987 in urban and rural areas
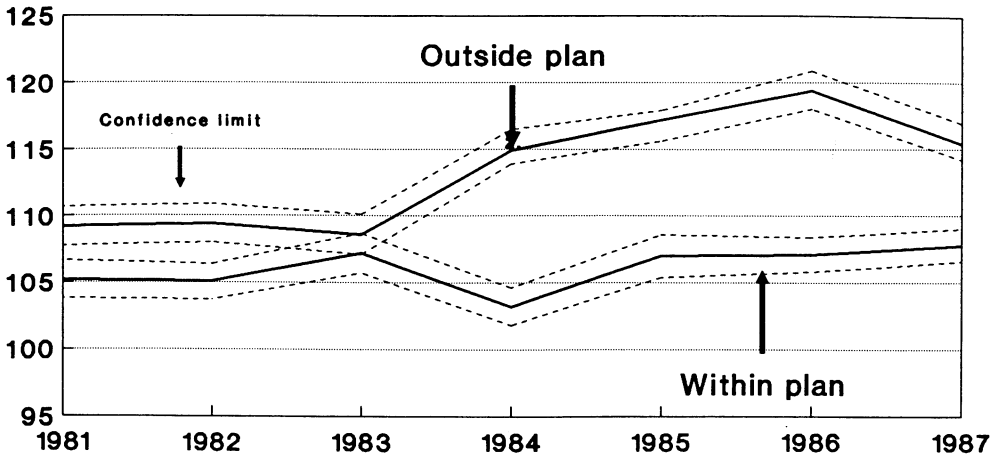
Diagram 10. Reported sex ratio among live births in China 1981–1987 conceived within and outside plan, respectively

outside plan, even as high as 115 to 118 for 1984–1987. That these high sex ratios are related to the stringent family planning policy of the 1980s is then conclusively shown by our data.

5. "Missing" Girls

Assuming that the sex ratio among live births in China should be between 105 and 106 boys per 100 girls we can compute the number of "missing" girls for each year
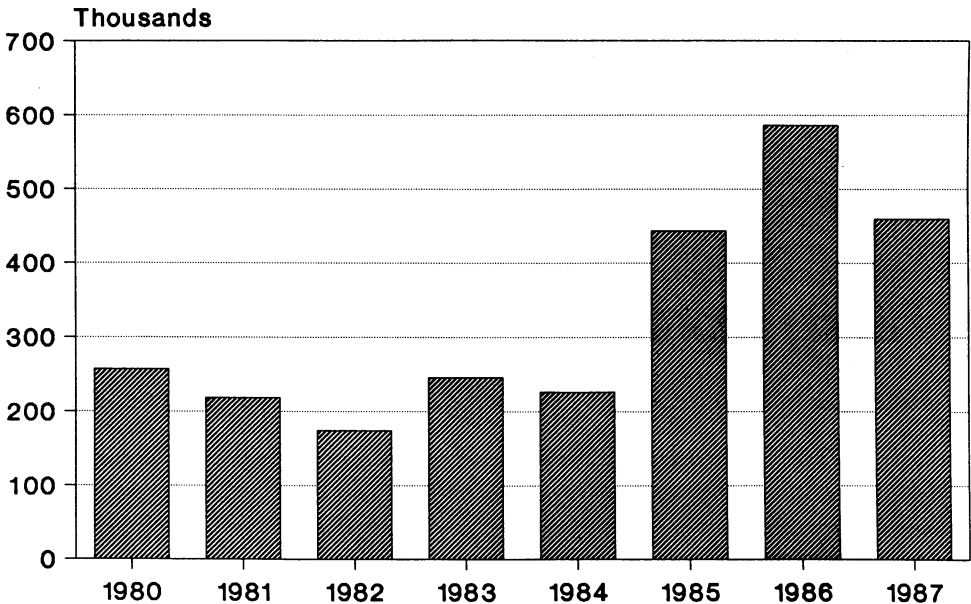

Diagram 11. Number of "missing" girls among live births 1980–1987 as reported in the 1988 two-per-thousand fertility survey in China

from 1980 to 1987. The results are reported in Diagram 11.

The number of "missing" girls approaches 500 000 annually for the period 1985–1987. This is about the same number as Hull calculated as missing among live births 1986–87 on the basis of the 1987 1/100 Population Survey. This is, of course, an impressive number as it is larger than the birth cohorts of many of the Western countries. Even if some 500 000 live births are not reported in the 1988 2/1000 Fertility Survey it would change the reported TFR (Total Fertility Rate) for 1985–1987 for China only slightly because cohort size for each of those years is 22–23 million.

Underreporting of female births, differential abortion, and female infanticide are the three explanations offered to account for the missing girls (Hull 1990). The medical technology for early diagnosis of sex of the fetus to allow for differential abortion was not available to such a wide extent that it could have any effect. Female infanticide could not be the sole explanation since it would mean that the phenomenon would occur on a very large scale. That it does occur on some scale is evidenced by reports in the Chinese press, but the analysis so far does not help us to determine whether it is on a large or a small scale.

To obtain a point of reference, we looked for data on the rate of infanticide in Sweden in its earlier history. One hundred years ago infanticide was officially recorded as the cause of death for 20–30 cases per 100 000 infants in Sweden. In these cases infanticide was proved in court procedures. One should also mention that "suffocation while asleep in bed with mother or siblings" and the like was recorded as cause of death for another 70 cases per 100 000 infants. Many of these cases were suspected infanticide, but they could occur as accidents in overcrowded and badly heated dwellings.

With China's population size this would correspond to about 5 000 cases of infanticide and some 15 000 of this category of "accidental" deaths. This historic rate for Sweden was probably much lower than a "normal" rate to be expected under harsh social and economic conditions because infanticide was severely punished with many years in prison.

Rates of infanticide in Sweden 100 years ago as a point of reference for an "expected" rate of *female* infanticide in China in the present cannot, of course, be used as such in any precise sense. The motives for infanticide in Sweden had no sex bias as far as is known and mostly had to do with illegitimate births under severe poverty. The rate of infanticide in Sweden 100 years ago might only indicate the rate of this type of act when harsh social conditions break through the normal human instinct to care for the newly born.

6. Sex Ratio Among Infant Deaths in China

If infanticide and neglect of girls occurred on a large scale, we would expect some of it to be mirrored in the sex ratio among the infants reported dead before the age of one in the survey.

As was stated earlier, we would expect that the sex ratio under normal conditions would be high among children who die as infants, i.e., more boys than girls would die as infants because more boys are born with genetic disorders and illnesses.

The infant deaths that are reported by the families in the survey have the expected inflated sex ratio. The sex ratio of 112 (with 95% confidence limits 107–116) among infant deaths in China in the 1980s is higher than the ratio in Egypt (95) and comparable to some other Moslem countries like Tunisia (115), Pakistan (118), Jordan (116), Kuwait (117), and Sri Lanka (117).
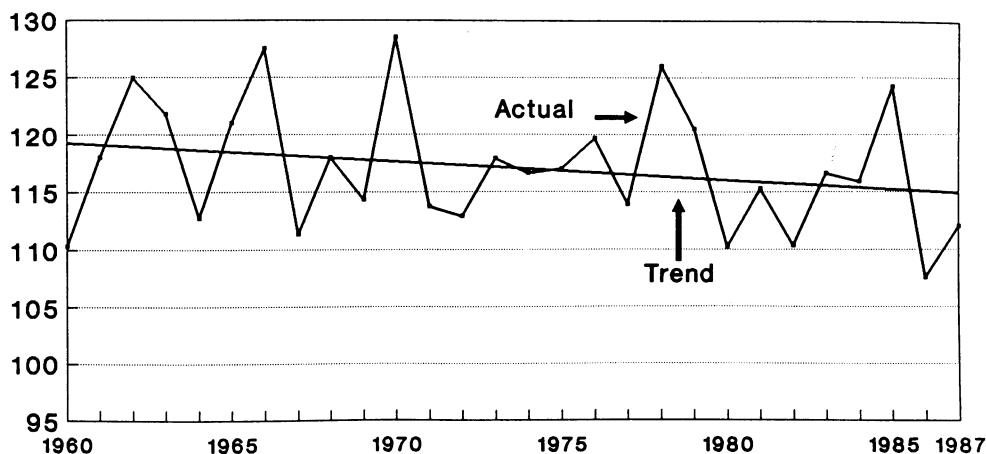
Diagram 12. Sex ratio among infants deaths in China 1960–1987 as actually reported by families in the 2/1000 Fertility Survey: actual data and computed trend

However, it is far lower than in countries like Canada (133), Mexico (128), United States (131), Japan (133), Cuba (128), Malaysia (128), Philippines (128), Hong Kong (129) or the bulk of the countries in Eastern and Western Europe; Austria (131), Belgium (132), Bulgaria (130), France (133), and Sweden (130).[5] Computing the sex ratio among infant deaths for a large number of developed countries as well as for developing countries without strong sex preferences reveals a very steady pattern.

The pattern is so steady that it is possible to suggest 130 as the internationally "normal" sex ratio among infant deaths, give or take one or two points. This assumption is supported by the sex ratios among

infant deaths that have been computed on the basis of the Princeton model life tables.[6]

Substantial deviations downward from such an internationally "normal" sex ratio among infant deaths would be an indication of some differential neglect of infant girls (WHO/UNICEF 1986, pp. 11–14). The sex ratio among infant deaths in China 1985–1987 at 112 with confidence limits at 107–116 would then indicate that there is such differential treatment of girls and boys as to somewhat reduce the survival of infant girls, particularly in rural areas with poor economic conditions, comparable to conditions in Europe a hundred years ago.

The fluctuations in the sex ratio between years is caused by randomness due to the rather small number of infant deaths in the sample. That is why we have combined infant mortality data for 1982-1987 to get narrower confidence limits.

If we use the sex ratio among infant deaths in China in 1982–1987 to calculate the number of "excess" female infant deaths, assuming that 130 is the "normal" ratio, the result would be 44 000 per year or about 6/1000 of live born girls in 1985–1987.

[5] Data for these countries were taken from the United Nations Demographic Yearbook 1985, Table 121, pp. 412–464. Figures reported for the different countries are the average sex ratios among infant deaths for the years from 1976 to 1984, that were available for countries that had at least four years and at least 100 infant deaths of each sex.

[6] Coale, Ansley J. and Demeny, Paul: Regional Model Life Tables and Stable Populations. Princeton, N.J, Princeton University Press 1966. We used the West Model. For $e_0 = 67.5$, the sex ratio among infant deaths is 129. For $e_0 = 70.0$ the ratio is 132.

It would then account for about 3/1000 of the approximately 40/1000 infant mortality rate in present day China. At the higher confidence limit (116) for the sex ratio among infant deaths, the estimate of excess female infant deaths would be 31 000. At the lower limit (107) it would be 57 000.

It should be noted that the confidence limits only mirror the statistical uncertainties related to having a sample instead of a total count. However, estimates from other sources coincide with our estimate. The sex ratio among infant deaths during three six-month periods 1986–1987 reported in the SSB 1987 1/100 Population Survey was 113.4. In the 1982 census the ratio was 114.1 among infants who died during 1981. Non-sampling errors such as underreporting of infant deaths accrue to all three sources and thus should be kept in mind.

Also, we cannot assume that any real cases of infanticide are reported in the survey. The excess female infant deaths do not explain the "missing" girls in the high sex ratio among reported higher parity live births in the 1988 2/1000 Fertility Survey. We must therefore look for some other explanations.

7. Two Other Explanations

From our discussion of possible explanations for the "missing" girls among reported live births we would like to mention only the following two:

1. The birth of a girl may not be reported to the authorities by the parents or be reported as a stillbirth and the child may then be given away for adoption. This may be done in order to avoid disapproval by the authorities and their sanctions against births not allowed under the one-child-per-family policy of the 1980s.

If such "adoptions" are fairly common, this will be registered as a higher than

normal sex ratio at birth. We would then find that the sex ratio is very low among adopted children (low is defined as few boys per 100 girls). We would also find a low sex ratio among stillbirths because the reported stillbirths would include many girls falsely classified as stillbirths.

2. The birth of a girl may not be reported until the parents believe that no sanctions will be applied. The girl would then be with her family but not be reported in the survey. This hypothesis can only be tested with future census data when female cohorts may show very low attrition rates or even increase in size. Such underreporting of small girls in the 1964 census was revealed in the 1982 census, when the cohorts born in 1959–60 and 1961–62 proved to have increased in size as analyzed by Johansson (1984, p. 423).

These two explanations are, of course, not in conflict with each other. They are complementary; that is, they might both be true and together explain some or all of the non-normal sex ratio among the children born outside plan.

8. Sex Ratio Among Adopted Children

The data from the fertility survey includes data on adopted children but does not include data on the sex of stillborn fetuses.

There are two procedures for adoptions in China, one formal as to administrative procedures and the other informal. The formal procedure is applicable when the child has been registered as a live birth with the family or the mother who is giving the child away to some other family for adoption. Then both parties apply for the adoption of the child at the local civil administration and the adopting parents also register the child with the population register at the public security administration. The informal procedure is applied when the
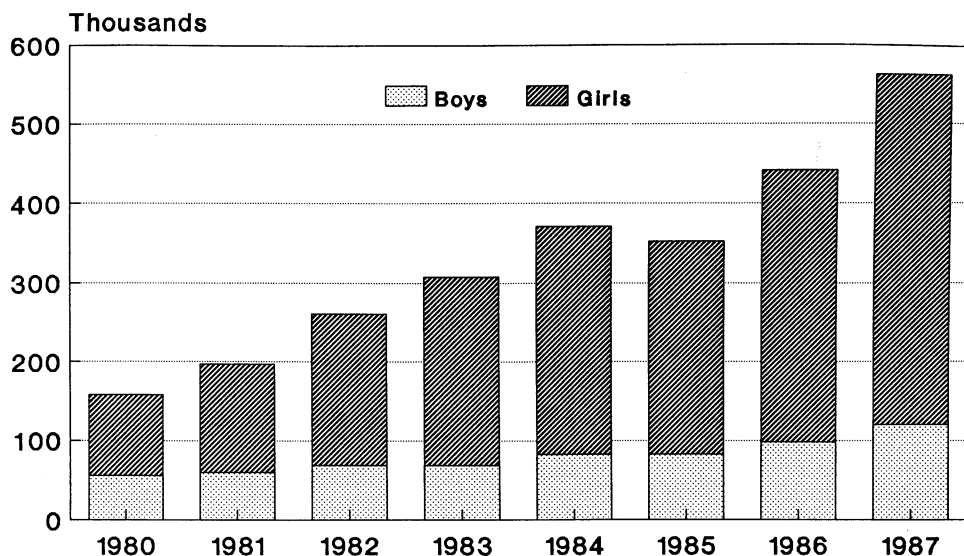
Diagram 13. Number of adopted children in China 1980–1987 according to the 2/1000 Fertility Survey

child has not been registered as a live birth. It is then given away for adoption by friends or relatives or unknown persons in some other village or township. Sometimes the pregnant women will have given birth to the child while away from her village.

Adopted children are separately reported in the 2/1000 fertility survey and only by the adopting parents – not by their real mothers. According to the survey the number of adoptions has risen sharply in recent years, from about 200 000 in the 1970s to about 400 000 1984–1986 and over 500 000 in 1987, that is from about 1% of live born to about 2.5%.

When calculating sex ratios among live births the adopted children must be added to those *reported* as live births in the survey. As can be seen from Diagram 13 the number of girls far outnumber the boys given away for adoption in the 1980s. In the calculations we have to assume that the year of adoption is in fact also the year of birth. This should add only some very minor

random error since most adoptions in China seem to be done in infancy.

The sex ratio among adopted children is indeed very low and is progressively lower for the cohorts of adopted children in the 1980s as is reported in Diagram 14.

If adopted children are added to the live births, assuming that the adopted children are not reported among the live births, some part of our riddle is solved. The sex ratio at birth becomes much closer to normal for most of the years in the 1980s.

Sex ratios are much closer to normal also for the peak sex ratio years of the 1980s that were noticed in Diagrams 3 and 10 earlier; that is, when live births and adopted children are counted together, although 1980 and 1985–1986 remain out of the normal range. The number of "missing" girls is now also much reduced.

After adding the adopted children to live births the number of missing girls is about half as many. Underreporting of girls in the
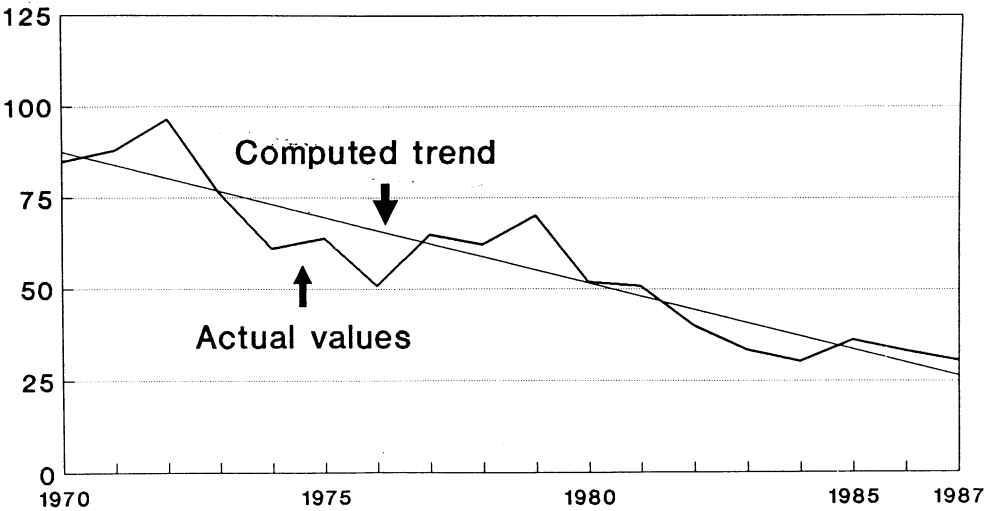
Diagram 14. Sex ratio among adopted children in China 1970–1987

survey that have remained with their parents cannot be estimated on the basis of available data but may be substantial. The State Statistical Bureau assumed that such concealed children born outside the plan would be a major source of error in the 1990 census. Some estimates may become possible when the detailed results from the 1990 census are available.

9. A Further Test

We may conclude that adoptions that are not reported among live births used as the
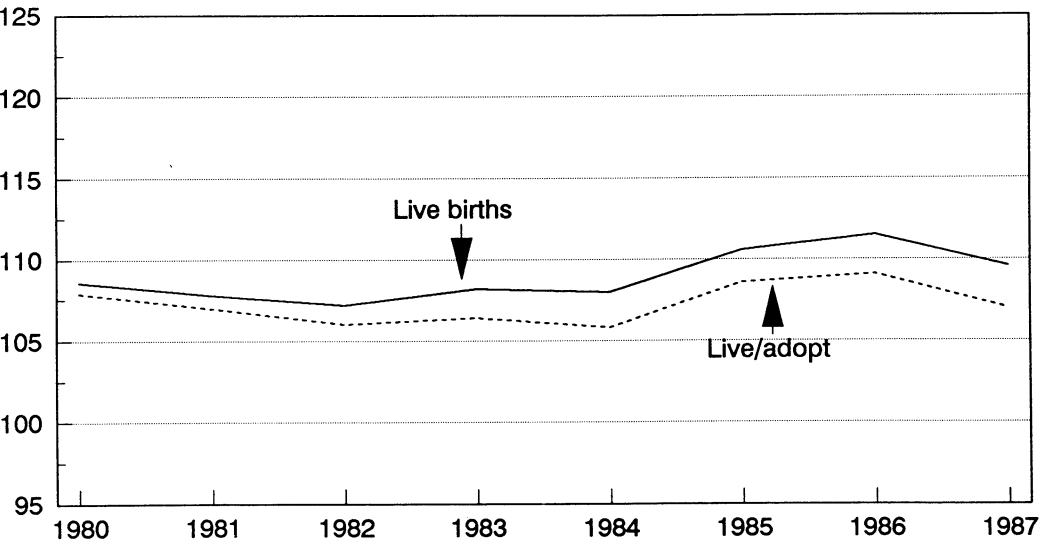

Diagram 15. Sex ratio among live births in China 1980–1987 with and without adopted children
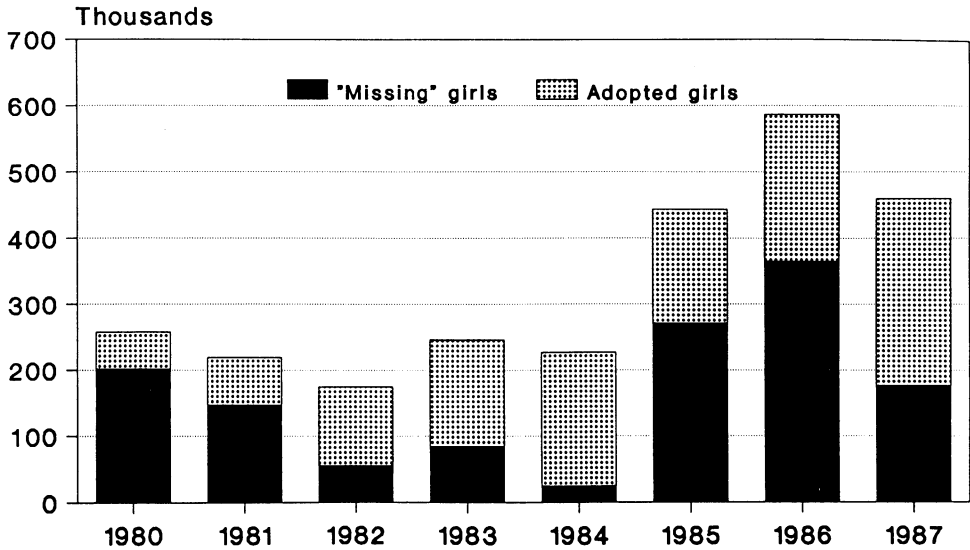
Diagram 16. Number of "missing" girls when adopted children are added to the reported live births in the 1988 2/1000 Fertility Survey and the "normal" sex ratio is assumed to be 105.5 boys per 100 girls

basis for calculating the sex ratio explain most of the "missing" girls that have been discussed as potential number of female infanticide in China in earlier writings on the subject.

We would, however, like to submit this conclusion to a further test at the provincial level. Sex ratios among live births as reported in the 1988 2/1000 Fertility Survey vary much between provinces. In Diagram 17 a very high ratio at over 120 is noted for Hebei as well as very low ratios close to 100 for Beijing and Xinjiang.

When adoptions are added to reported live births sex ratios are lowered in most provinces as Diagram 18 demonstrates. This is particularly true for Fujian, Henan, and Jiangsu.

However, to support the conclusion that adoptions explain most of the intriguing sex ratios reported for China, we would expect that adoptions are more frequent in the provinces reporting high sex ratios.

The regression line in Diagram 19 demonstrates that there is a relationship between high sex ratios and high adoption rates but the relationship is not particularly impressive. This leaves room for some differences in adoption practices between provinces, which cannot be explored here.

However, we also need to look at the data in more detail. The sex ratios based on the 1988 2/1000 Fertility Survey can be compared to the ratios calculated for the provinces by Hull on the basis of the SSB 1987 1/100 Population Survey. The ratios are rather similar for most provinces but we also note some differences.

Some of the differences for small provinces might be explained by statistical uncertainty due to different sampling designs in the two surveys. There is room, however, for rather large nonsampling errors for some of the provinces, notably Liaoning, Fujian, Anhui, and Yunnan provinces.
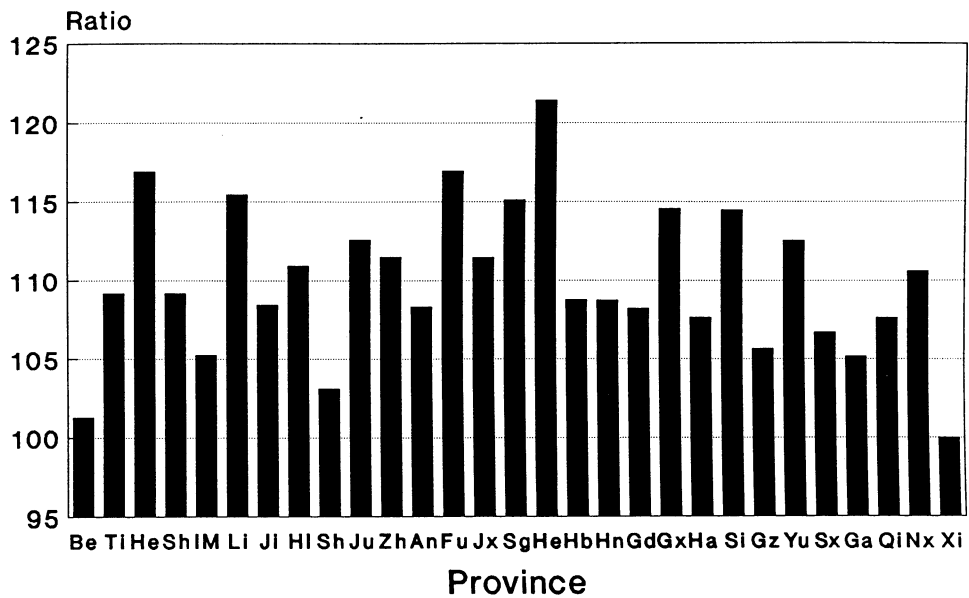
Ratio

Province

Diagram 17. Sex ratio among reported live births by province in China 1985–1987

10.   Summary and Conclusions

1. The sex ratio among live births is assumed to be between 105 and 106 boys per 100 girls under normal circumstances on the basis of Swedish data for 230 years. The sex ratio among infants who die before age one is assumed to be around 130 on the basis of contemporary data for many countries and
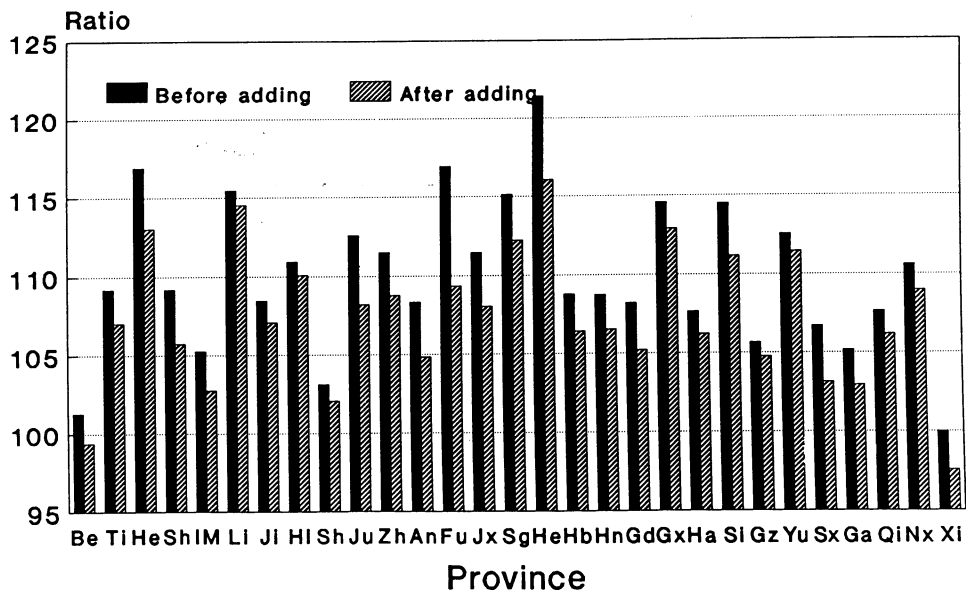
Ratio

Province

Diagram 18. Sex ratios among live births by province in China 1985–1987 when adopted children are added
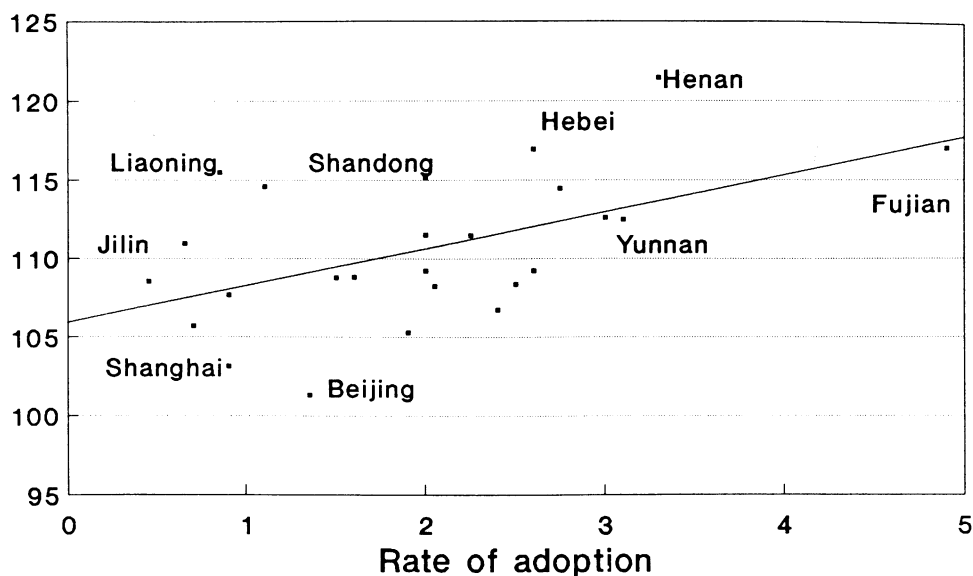
Diagram 19. Sex ratio and rate of adoptions 1985–1987 by province

the Princeton model life tables. More boys than girls die as infants because infant boys are more susceptible to genetic damage and infectious diseases.

2. On the basis of three large independent demographic surveys it is established that the sex ratio is normal for reported first parity live births but higher than normal for reported higher parity births in China in the 1980s. We have further established that the sex ratio is normal for reported live births within the plan but higher than normal for reported live births outside the plan.

3. Underreporting of girls, differential abortion, and female infanticide have been the three hypothesized explanations for the higher than normal sex ratios among reported live births in China in the demographic literature. Like other researchers we rule out differential abortions as other than very marginal because the required medical technology has not been widely available in China.

4. The sex ratio among infant deaths in China 1982–1987 as reported in the 2/1000

Fertility Survey is 112 (with 95% confidence limits 107–116). It is thus clearly lower than the assumed internationally normal ratio at 130, implying some excess female infant deaths. We have calculated the excess female infant deaths to about 44 000 per year or about 6/1000 live born girls. This excess rate would then account for about 3/1000 of the about 40/1000 infant mortality rate of China. The excess female infant death rate for China is about the same as the rate that can be calculated for some of the Moslem countries.

5. The SFPC 1988 2/1000 Fertility Survey includes data on adopted children in China, which are not reported among the live births by their real mothers. According to the survey the number of adopted children has increased very much in China during the 1980s. The sex ratio among adopted children has become progressively lower; that is, more girls than boys are given away for adoption. When adopted children are added to the reported live births the sex ratio among births in China becomes much closer
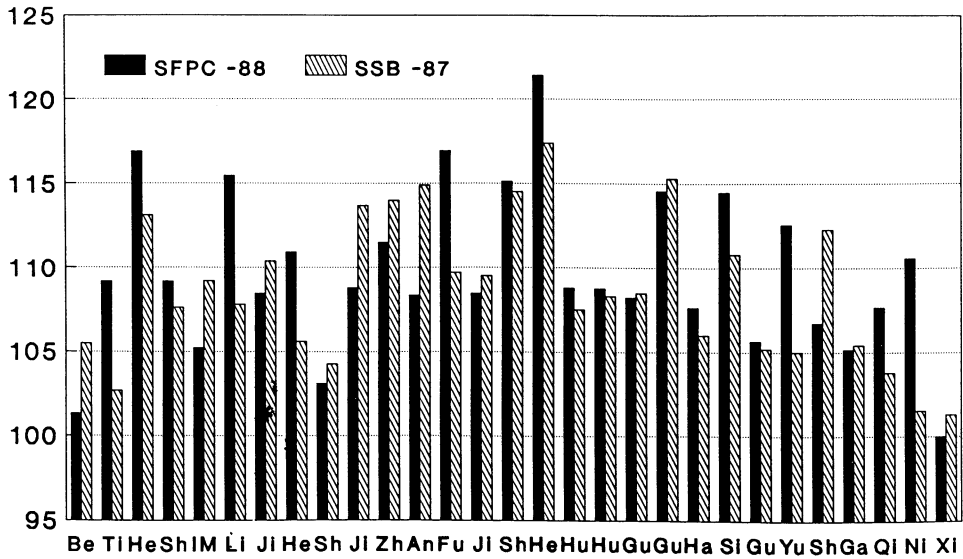
Diagram 20. Sex ratios by province among reported live births in the 1987 SSB 1/100 Population Survey and the SFPC 1988 2/1000 Fertility Survey

to normal, although it remains above the confidence limits for some of the years in the 1980s. We conclude that the adopted children account for about half of the "missing" girls in the demographic surveys of the 1980s. Underreporting of girls who have remained with their parents cannot be estimated from the survey data.

6. A further test of the conclusion that adopted children account for some of the "missing" girls has been made at the provincial level. We have found that provinces with high sex ratios among reported live births tend to have higher rates of adopted children but that the relationship is not very strong. This leaves room for some difference in adoption practices between provinces and also some uncertainty in the data.

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