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The Effect of Sex Preference on Subsequent Fertility in Two Provinces of China

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China's birth control programme did reduce couples' demand for children, but it did not change their attitudes about 'male superiority'

The effects of socio-economic characteristics on the general macro-level fertility in China are well documented (e.g. Tien, 1984; Poston and Gu, 1987; Wang, 1988). However, their role is not clear in the sequential fertility decisions of individual families regarding additional births. The diversity of social and economic characteristics among women with a different number and sex structure of living children also needs to be explored.

This article addresses the impact of sex preference on couples' family-building process at both the micro-level and macro-level. The micro-level analysis begins with the association between sex of the existing surviving children and sequential parity progression, without taking socio-economic conditions into account. The analysis is then extended to incorporate some selected socio-economic and demographic characteristics of women with special reference to those who had two or more living children before or during the period of the one-child policy. This is done in order to evaluate the roles of sex preference and socio-economic characteristics of individual women in determining further childbearing under population policies and programmes of different strengths. The macro-level analysis investigates to what extent, under China's intensified family planning programme and population policy pressure, sex preference still exerts an impact on recent fertility.

Data and methods

The analysis is based on data from the 1985 China In-depth Fertility Survey (IDFS), Phase I, which was organized by the State Statistical Bureau (SSB) of China in co-operation with the International Statistical Institute, Voorburg, the Netherlands. The survey was carried out in three provincial regions of China. The present study uses the data for Hebei and Shaanxi provinces; Shanghai municipality was also covered by the survey. Of the two peasant-dominated regions, Hebei, a north-eastern coastal province, is the more developed; Shaanxi is an inland province on the upper Yellow River. More detailed information on the survey procedures was published in the Principal Report (SSB, 1986).

The first section uses retrospective birth history data for all respondents with one or more living children at the time of the survey to identify the association between the sex of preceding children and subsequent childbearing, without taking socio-economic conditions into account.

In the second section, analysis of variance (ANOVA) and multiple classification analysis (MCA) were applied to ascertain the statistical significance and association between the decision to have another child and the set of social and economic factors when some demographic factors are controlled. Women who have had at least two children were selected rather than all respondents. The sex composition of the first two living children was treated as the independent variable, which was also classified by the variables of residence, education and occupation.[1/] The date of the first marriage and age when the second child was born were treated as covariates. The dependent variable is the proportion of respondents who have had a third child, since a majority of women in the two provinces want at least two children (SSB, 1986) and whether or not to have a third child seems to be a key decision in the family-building process. Women who had their second child were divided into two groups according to the time period of the second birth: before 1979 and 1979 or after. This made it possible to detect the impact of the intensified family planning programme, especially the one-child policy that officially started in early 1979.

The third section assesses the overall effect of sex preference on recent fertility. The proportion of women having at least one birth in the five-year period preceding the survey was chosen as the measure of recent fertility. The approximately longitudinal study design provides a dynamic picture and makes it possible to ascertain the effect of sex preference on recent fertility among the survey cohort women over a five-year period, which coincides with the most powerful period of birth control in China. The proportions of women giving birth are cross-classified by number and sex of the living children at the start of the five-year period, i.e. 1980. This reconstruction of family size and composition was made possible by the survey's birth history data in the standard recode files, which contain detailed information for each birth on the sex, date of birth, birth order and, if applicable, the age at death. Note that the distribution of number of women among the parity and sex composition of children categories is quite different from their distribution of current family size and composition, since the distribution of proportion of women giving birth refers to a time-point five years before the survey.

Chowdhury and Bairagi (1990) suggest an index, the sex preference effect on fertility (SPEF), which is a modification of Arnold's measure (Arnold, 1985). The SPEF index is a method to assess the quantitative impact of sex preference on fertility and it

estimates the expected reduction in the percentages of women who have had at least one birth, in the absence of the effect of sex preference. In this study, the SPEF index is used to test the effect of sex preference on recent fertility by both initial parity level and overall level.

Results

Sex composition and family building

Table 1: Proportional distribution of family size for women with two or more children according to sex composition of first two children in family, Hebei and Shaanxi provinces, China, 1985

(per cent)

Sex composition of first two children	Total number of living children				Sum	N
	2	3	4	5+		
Hebei Province						
DD	29.6	32.1	21.1	17.2	100.0	(795)
DS	48.3	27.0	17.2	7.5	100.0	(889)
SD	42.9	29.9	15.5	11.7	100.0	(921)
SS	48.6	28.0	13.5	9.9	100.0	(882)
Shaanxi Province						
DD	23.7	30.8	23.9	21.6	100.0	(620)
DS	39.1	26.7	21.0	13.2	100.0	(797)
SD	36.5	29.6	18.5	15.3	100.0	(756)
SS	37.3	29.7	20.2	12.9	100.0	(762)

*Source:*China 1985 IDFS survey data tape.

Note: D = Daughter, S = son

Table 2: Proportional distribution of family size for women with three or more children according to sex composition of first three children in family, Hebei and Shaanxi Provinces, China, 1985

(per cent)

Sex composition of first three children	Total number of living children				Sum	N
	3	4	5	6+		
Hebei Province						
DDD	34.8	33.2	19.0	13.0	100.0	(253)
DDS	54.4	27.4	13.0	5.2	100.0	(307)
DSD	45.5	37.4	12.2	5.0	100.0	(222)
DSS	58.4	29.4	8.0	4.2	100.0	(238)
SDD	46.5	29.9	16.2	7.4	100.0	(271)
SDS	58.4	24.3	9.8	7.5	100.0	(255)
SSD	60.2	21.9	11.4	6.5	100.0	(201)
SSS	50.0	29.8	14.7	5.6	100.0	(252)
Shaanxi Province						
DDD	29.1	34.5	22.2	14.3	100.0	(203)
DDS	48.9	28.9	12.6	9.6	100.0	(270)
DSD	42.7	35.1	13.8	8.4	100.0	(225)
DSS	45.0	33.8	12.7	8.5	100.0	(260)
SDD	38.1	35.3	15.1	11.5	100.0	(218)
SDS	53.8	24.0	14.5	7.6	100.0	(262)
SSD	43.3	33.3	17.9	5.4	100.0	(240)

SSS	51.3	31.1	11.8	5.9	100.0	(238)

Source: China 1985 IDFS survey data tape.

Note: D = daughter, S = son

Tables 1 and 2 illustrate the impact of the sex composition of the first two or three children on subsequent childbearing. An examination of the proportions for the first two children (table 1) indicates that women are much more likely to go on to have more children if their first two children are daughters, in contrast to those who have had at least one son or whose first two children are sons. First daughter-daughter (DD) combinations in the initial family formation are likely to lead to a larger family than other combinations. It is interesting to note that women with the sex combination of son-daughter (SD) seem more likely to continue childbearing than those with DS (daughter-son) combinations. (Hereafter, analogous abbreviations are used to describe these relationships).

Among the women who have had three or more children (table 2), the differences in family-building between DDD and SSS families are also marked. But the data seem to show that women's preference is not simply for sons. The highest proportions of women who had stopped childbearing are among mothers with combinations of SSD, SDS, DSS and DDS (and SSS in Shaanxi). It is also observed that women with two daughters and one son, especially in the order SDD or DSD, would try again. It appears that the sex of the third order child plays an important role in the decision about further family building if the first two children are a son and a daughter.

Table 3: Probability of having and (N + 1)th child for women with N or more children, for N=1,2,3 and 4, according to number of living children and sons of the women, Hebei and Shaanxi provinces, China, 1985

Number of first N living children & sons	Hebei Province		Shaanxi Province	
	Probability of having (N+1)th child	Number of women	Probability of having (N+1)th child	Number of women
(N=1)				
No son	77.0	2,186	80.1	1,770
One son	71.2	2,533	76.8	1,976
Total	73.9	4,719	78.4	3,746
(N=2)				
No son	70.4	795	76.3	620
One son	54.5	1,810	62.1	1,553
Two sons	51.4	882	62.7	762
Total	57.3	3,487	65.3	2,935
(N=3)				
No son	65.2	253	70.9	203
One son	50.8	800	56.4	713
Two sons	41.1	694	52.5	762
Three sons	50.0	252	48.7	238
Total	49.2	1,999	55.4	1,916
(N=4)				
No son	65.3	75	67.2	61
One son	44.1	290	47.9	282
Two sons	33.4	344	38.2	393
Three sons	37.1	210	38.8	278
Four sons	46.0	63	39.6	48
Total	40.6	982	42.7	1,062

Source: China 1985 IDFS survey data tape.

Table 3 is a summary from the survey data of the probabilities of families with different size and sex distribution having an additional child. As table 3 shows, of the women who have had at least one living child, about three quarters in the two provinces would probably proceed to the second or higher parity by the survey date, and considerably more than 50 per cent of women with at least two living children are likely to progress to third or higher-order births. Even of those with at least three living children, more

than half in Shaanxi and about half in Hebei, are likely to continue bearing children.

In the two provinces, if couples did not have a son, impressively large proportions would continue bearing children until they got a son. This tendency is consistent over different stages of family-building (from family size one to four), although the proportions are slightly lower at later stages. Relatively small differences exist between first-daughter and first-son families, which may reflect the fact that most parents want to have more than one child. With further increases in family size, however, depending on the sexes of the preceding children, the probabilities are substantially different between no-son and at least one-son families. When the first three or four children are considered, the data also indicate some differences in the effect of an excess of sons compared with an excess of daughters. The results suggest that women would be more likely to have another child if they had an excess of daughters in the first three or four births. There is no indication that couples seek at least one daughter, although among families with three or more children, two sons plus one or two daughters appears to be a favourite choice.

Socio-economic differentials in family-building

Table 4: Analysis of variance of probability of having third child for women with two children, according to sex composition of living children, year of the second birth and selected characteristics of women, Hebei Province, China

	Second child born before 1979				Second child born 1979 or after			
Source of variation	Sum of squares	DF	Mean squares	F	Sum of squares	DF	Mean squares	F
Covariates	84.17	2	42.08	302.00 * * *	7.03	2	3.514	29.45 * * *
Date of first marriage	69.29	1	69.29	497.21 * * *	5.15	1	5.15	43.12 * * *
Age at second birth	14.88	1	14.88	106.79 * * *	1.88	1	1.88	15.78 * * *
.								
Main effects	28.7	7	4.1	29.43 * * *	7.49	7	1.07	8.97 * * *
Residence	6.39	1	6.39	45.84 * * *	0.62	1	0.62	5.16 *
Education	1.9	2	1.9	6.80 * * *	1.19	2	1.19	4.97 * * *
Occupation	4.5	1	4.5	32.28 * * *	0.37	1	0.37	3.11
Sex composition	15.92	3	5.31	38.09 * * *	5.32	3	1.77	14.87 * * *
.								
Explained	121.71	49	2.48	17.83 * * *	17.2	46	0.37	3.13 * * *
Residual	333.46	2,393	0.14		118.97	997	0.12	
Total	455.17	2,442	0.19		136.17	1,043	0.13	
.								
Covariates	Raw regression coefficient				Raw regression coefficient			
Date of first marriage			-0.002				-0.002	
Age at second birth			-0.026				-0.017	

Source: China 1985 IDFS survey data tape.

Notes: * p<0.05; * * p<0.01; * * * p<0.001; DF = degree of freedom; and F = Fisher (R.A. Fisher (1924). Proc. Int. Math. Conf. Toronto, 805).

Table 5: Analysis of variance of probability of having third child for women with two children, according to sex composition of living children, year of the second birth, and selected characteristics of women, Shaanxi Province, China

Source of variation	Second child born before 1979				Second child born 1979 or after			
	Sum of squares	DF	Mean squares	F	Sum of squares	DF	Mean squares	F
Covariates	54.49	2	29.75	245.81 * * *	7.55	2	3.78	28.52 * * *
Date of first marriage	45.5	1	45.5	376.02 * * *	2.97	1	2.97	22.41 * * *
Age at second birth	13.99	1	13.99	115.59 * * *	4.58	1	4.58	34.63 * * *
Main effects	9.26	7	1.32	10.94 * * *	9.59	7	1.37	10.35 * * *
Residence	1.36	1	1.36	11.21 * *	0	1	0	0.002
Education	1.43	2	0.72	5.91 * *	0.46	2	0.23	1.73
Occupation	1.76	1	1.76	14.57 * * *	0.44	1	0.44	3.31
Sex composition	4.71	3	1.57	12.98 * * *	8.69	3	2.9	21.90 * * *
Explained	75.87	49	1.55	12.80 * * *	21.77	43	0.51	3.82 * * *
Residual	258.48	2,136	121		93.31	705	0.132	
Total	334.35	2,185	0.15		115.08	748	0.15	
Covariates	Raw regression coefficient				Raw regression coefficient			
Date of first marriage			-0.002				-0.002	
Age at second birth			-0.028				-0.03	

Source: China 1985 IDFD survey data tape.
Note: See notes from table 4.

The analysis of variance in tables 4 and 5 shows that the raw regression coefficients of the two demographic covariates are both negative. The effect on bearing a third child of the date at first marriage and age at the birth of the second child are both negative and statistically significant. The two covariates account for about 70 per cent of the total explained variation in the period before 1979, while the figures drop to 40 per cent or less in 1979 or after. The date at first marriage, or the marriage cohort as mentioned previously, is the more important covariate because it captures more than 80 per cent of the variation explained by the covariates in both the regions before 1979, while the age at the birth of the second child accounts for less than 20 per cent.

It may be worth noting that the pattern changes to the opposite after 1979 in Shaanxi Province, that is, about 40 per cent of the covariance is accounted for by the date of first marriage, and 60 per cent by the age at the second birth, while the same pattern holds in Hebei but with a 10-percentage-point reduction in the explanatory power of date of first marriage. The levels of significance of these covariates for the period 1979 and after are higher than those in the earlier period.

Among the four demographic and socio-economic variables, sex composition accounts for 50 per cent or more of the main effects on continuing childbearing in the two provinces before 1979. It is more interesting to note that the percentages increase to 71 per cent for Hebei and even 91 per cent for Shaanxi in the period 1979 and after. This change is also reflected in the F (Fisher) ratios. Although all the four characteristics are substantially significant in the first period, in the later period the residence and occupation variables become rather weak or even no longer significant in Hebei, and all three other socio-economic variables are insignificant, except sex composition in Shaanxi. Only the sex of living children remains as the most significant variable throughout the two periods.

Table 6: Multiple classification analysis of probability of having third child for women with two children, according to sex composition of living children, year of second birth, and selected characteristics of women, Hebei Province, China

Variables	N	Second child born before 1979				N	Second child born 1979 or after			
		Unadjusted		Adjusted			Unadjusted		Adjusted	
		Proba-bility	Eta	Probability	Beta		Probability	Eta	Proba-bility	Beta
Residence										
Urban	(443)	66		68		(126)	8		10	
Rural	(2,000)	77	0.10	76	0.07	(918)	16	0.07	16	0.06
Education										
No schooling	(1,136)	79		74		(458)	19		18	
Primary	(1,017)	75		77		(384)	11		11	
Secondary & higher	(290)	59	0.14	71	0.05	(202)	13	0.11	16	0.08
Occupation										
Non-agriculture	(277)	58		62		(75)	5		8	
Agriculture	(2,166)	77	0.14	77	0.11	(969)	16	0.08	16	0.05
Sex of living children										
DD	(545)	90		90		(250)	27		27	
DS	(614)	70		71		(275)	10		11	
SD	(663)	73		73		(258)	15		14	
SS	(621)	69	0.19	68	0.19	(261)	9	0.20	9	0.20
Total women	(2,443)					(1,044)				
Grand mean		75					15			
Multiple R squared	0.25					0.11				

Source: China 1985 IDFS survey data tape.
Note: S = son; D = daughter

Table 7: Multiple classification analysis of probability of having third child for women with two children, according to sex composition of living children, year of second birth, and selected characteristics of women, Shaanxi Province, China

Variables	N	Second child born before 1979				N	Second child born 1979 or after			
		Unadjusted		Adjusted			Unadjusted		Adjusted	
		Proba-bility	Eta	Probability	Beta		Probability	Eta	Proba-bility	Beta
Residence										
Urban	(443)	76		81		(110)	15		22	
Rural	(1,743)	80	0.07	81	0.00	(639)	20	0.05	18	0.03
Education										
No schooling	(1,088)	84		80		(335)	25		21	
Primary	(821)	82		84		(199)	17		16	
Secondary & higher	(277)	68	0.13	77	0.05	(215)	12	0.14	18	0.06
Occupation										
Non-agriculture	(338)	71		73		(59)	7		10	
Agriculture	(1,848)	83	0.10	83	0.09	(690)	20	0.09	20	0.07

Sex of living children										
DD	(452)	90		90		(168)	39		39	
DS	(578)	79		79		(219)	13		14	
SD	(571)	79		79		(185)	14		13	
SS	(585)	78	0.12	78	0.12	(177)	12	0.28	13	0.28
Total women	(2,186)					(749)				
Grand mean	81					19				
Multiple R squared	0.21					0.15				

Source: China 1985 IDFS survey data tape.
Note: S = son; D = daughter

As also can be seen in the MCA tables (tables 6 and 7), the highest values of beta for the sex composition factor indicate that the sex of the first two living children, after adjustment is made for the demographic covariates and the other three socio-economic factors, has the most significant effect on bearing the third child. The beta value of sex of children in Hebei remained the same during the two periods, but in Shaanxi, the beta value more than doubled in the later period compared with the earlier period. These findings may suggest that among the four social and economic variables, sex preference is the strongest driving force for bearing the third child for women with two children. When the women are grouped by the year of the second birth, before or after the one-child policy was announced, the vigorous population control policies greatly reduced the probability of having a third child. An approximately 60-percentage-point decrease is found when comparing the grand means between two periods in the two provinces. It seems that the policy pressure has suppressed the effect of social and economic factors but not the sex composition of children, which continued to exert a great influence, even during the one-child campaign.

The overall effect of sex preference on fertility

Table 8: Percentage of women having at least one birth over 5 years, by number of living sons at start of study and values of index of sex preference effect on fertility (SPEF), Hebei and Shaanxi provinces, China, 1980-1985

Number of living children	Number of living sons	Hebei			Shaanxi		
		Number of women	Per cent giving birth	SPEF	Number of women	Per cent giving birth	SPEF
0		1,676	79.2	0.0	1,250	73.8	0.0
1		740	65.0	11.0	489	65.2	12.2
	0	332	73.8		222	74.8	
	1	408	57.8		267	57.3	
2		987	26.6	25.6	667	27.1	30.7
	0	155	54.8		129	55.0	
	1	544	22.2		352	21.3	
	2	288	19.8		186	18.8	
3		822	15.6	37.6	688	11.0	46.5
	0	65	44.6		46	34.8	
	1	315	17.1		232	12.9	
	2	330	9.7		304	5.9	
	3	112	11.6		106	11.3	
4		484	5.6	67.6	564	7.6	40.9
	0	26	34.6		18	11.1	
	1	127	5.5		130	13.8	
	2	192	3.6		222	4.5	
	3	111	1.8		167	6.0	
	4	28	7.1		27	11.1	
5+		371	3.0	96.6	426	8.0	43.6
	0	17	5.9		16	43.8	

	S<D	181	2.2		193	4.7	
	S=D	21	4.8		166	9.0	
	S>D	144	3.5		44	4.5	
	5 more S	8	0.1		7	14.3	
Total		5,080	44.0	8.8	4,084	38.6	10.3
				21.4 *			23.6 *

Source: China 1985 IDFS survey data tape.

Notes: S = son; D = daughter

* Assuming that childless women follow the preference pattern that other women followed.

Table 8 shows that, as expected, during the period of rapid fertility decline and the intense birth control campaign, the percentage of women giving birth substantially decreased in the five-year interval. The major aim of China's current population policy is to eliminate all births equal to three or more per couple, and to encourage most couples to have no more than one child. The policy impact is clearly visible in the pattern of the percentages according to parity. About 65 per cent of women in the two provinces with one living child have had at least one birth during the five-year period, while the proportion drops sharply to about one quarter among women with two living children, and then decreases as the family size becomes larger.

The result also confirms the previous findings by using different measures, which indicate a very strong desire in the two provinces to have at least one son. As can be seen in table 8, at each family size, the percentage giving birth is substantially higher among women with only daughters than among women with at least one son. Up to parity two, the more sons the women have, the smaller the proportion of them giving birth. In addition, women with no daughters among parity three and four are more likely to give birth than women who have had one daughter. This pattern is also found in Bangladesh (Chowdhury and Bairagi, 1990: 754), which may suggest that there is a general desire to have a daughter but probably not before two sons are born.

An inverse relationship is also found between the percentage giving birth and the level of the SPEF index. The SPEF values generally go up as the family size increases. The overall effect of sex preference on recent fertility, estimated from the SPEF index, is about 9 per cent for Hebei and 10 per cent for Shaanxi, both of which are substantial percentages in the case of China. Moreover, the SPEF index assumes that there is no sex preference among the childless women who account for 33 and 31 per cent of the total respondents for Hebei and Shaanxi, respectively. However, in the calculation of overall SPEF index these women are included in the denominator. This is why the overall index is substantially lower than the value in each parity level. Therefore, if it were assumed that the women who were childless at the start of the study would follow the preference pattern that other women followed, the effect might increase remarkably. As indicated in the bottom of table 8, the overall impact would increase to 21 for Hebei and 24 for Shaanxi.

Conclusion

The evidence in this study documents the strong, pervasive son preference which persisted during the powerful family planning programme period in the two provinces, while their fertility dramatically declined. This might imply that the great effort of China's birth control programme did, to some extent, reduce couples' demand for children, but did not change their attitudes towards "male superiority", which is deeply rooted in the traditional cultural and social structures of China. This attitude, however, did not prevent the average number of children per family from decreasing from as high as six children to around three children, partly because the impact of son preference is relatively weak among higher birth orders. It will have a more powerful influence on fertility as the average family size decreases further.

In China, the critical family size, from the point of view of population policy, is two children for rural couples. Whether or not the third or higher order births can be eliminated is crucial to the success of any further reduction in fertility. The present study found that, compared with some major socio-economic characteristics, son preference is the most significant factor which, even during the period of vigourous control of population growth, continued to exert a great influence on bearing the third child. It also found that the overall quantitative effect of sex preference on recent fertility is substantial.

There is also empirical evidence that sex preference affects other reproductive behaviour such as length of breast-feeding, birth intervals and abortion (Arnold and Liu, 1986; Tu, 1990, 1991), that is, both the level and the tempo of childbearing. When all the factors are considered, it may be argued that the efforts both to improve the level of socio-economic development and to change the sex preference will exert a substantial impact on future fertility.

Footnote

1. The occupation factor was regrouped into two broad categories: (a) non-agriculture, including professional, service and industry; and (b) agricultural, including agriculture and those who reported having never worked, since most women in rural areas reported them- selves as having never worked instead of having worked part-time in agriculture or in their household (Tu, 1991:

262). Child deaths were also included as one of the independent variables in the preliminary analysis. However, the results showed that child deaths were insignificant in the decision to bear the third child during the second time period for both the provinces. Although the variable was significant in the first period, it interacted with occupation and sex composition of children in Shaanxi Province. Therefore, child deaths were not fitted in the final model.

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