The Demography of Two Chinese Clans in Hsiao-shan, Cheking, 1650-1850

Ts'ui-jung Liu*

This paper was first presented at a conference held August 20-25, 1978, at Wadham College, Oxford. The revised version was published in Susan B. Hanley and Arthur P. Wolf eds., *Family and Population in East Asian History* (Stanford, California: Stanford University Press, 1985), pp. 13-61. (In this text, Chinese characters are added, notes are rearranged under each page, and some figures are redrawn.)

In a previous study of genealogies from Taiwan, I found that despite certain defects Chinese genealogies can be made to yield data valuable to historical demography.[1] In this paper, I shall investigate two genealogies from Hisao-shan (蕭山) county in Chekiang on the China mainland with a view to seeing, among other things, how well they fit the Princeton group's controversial reinterpretation of John Lossing Buck's famous 1929-33 survey of Chinese farm families. In the Princeton group's view, "The demographic picture that emerges is of a population with high mortality, low marital fertility, and a rate of increase little different from zero, characteristics that were of sufficient persistence to have generated a stable age distribution."[2] Do the data from Chinese genealogies support this picture of the demography of pre-modern China?

Source

The genealogies I employ are the *Hsiao-shan Ch'ang-hsiang Shen-shih tsung-p'u* (蕭山長巷沈氏宗譜), published in 1893 by the Shen clan of Hsiao-shan, and the *Hsiao-shan T'ang-wan Ching-t'ing Hsü-shih tsung-p'u* (蕭山塘灣井亭徐氏宗譜), published in 1911 by the Hsü clan of Hsiao-shan. Both genealogies had been revised several times before these editions were published. The Shen genealogies was compiled in 1408 and revised in 1526, 1673, and 1841; the original Hsü genealogies covers eleven generations and was updated in 1789 by a member of the thirteenth generation. The information concerning later generations was probably added when new prefaces were appended in 1805, 1820, 1836, 1859, and 1911. The attention the two clans devoted to their genealogies suggests that they are exemplary products of rules governing their genre. To exploit them the demographer must discover what

*Research Fellow, Institute of Economics, Academia Sinica.

[1] Ts'ui-jung Liu, "Chinese Genealogies as a Source for the study of Historical Demography," *Studies and Essays in Commemoration of the Golden Jubliee of Academia Sinica* (June 1978), pp. 849-870.

[2] George W. Barclay, Ansley J. Coale, Michael A. Stoto, and T. James Trussell, "A Reassessment of the Demography of Traditional Rural China," *Population Index*, 42.4 (1976): 625.

these rules were and how best to translate the data they provide.

The rules governing the treatment of males who died young are particularly important. In general, boys who died before reaching seven *sui* (歲) were neglected entirely, whereas those aged eight to 19 *sui* were entered in the genealogy classified as *hsia-shang* (下殤), *chung-shang* (中殤), or *chang-shang* (長殤). In fact, however, these particular genealogies do not always follow these rules. The Shen genealogy says that in the earlier generations males who died young were commonly thrown together under the label *tsao-shih* (早逝 "died young") because the old records precluded greater precision, and the Hsü genealogy tells us that boys who died before reaching 15 *sui* were not entered at all unless they were married.[3] All we can be certain of is that males who died as infants and small children were not given a place in their clan genealogy, and are therefore lost to the demographer as well as to the clan.

To estimate the fertility of the Shen and Hsü clans I have applied the family reconstitution procedures used in the analysis of parish records in Western Europe. Since this method requires linking children to their mothers, it is important to note that despite frequent male adoption and polygyny among the wealthy, Chinese genealogies do identify the mothers of most male (but not female) children. Instances of adoption are clearly noted because of the strong interest in descent, and the male offspring of polygynous families are usually linked with their own mothers.[4] Problems arise only when the first of two or more wives fails to bear a male child. Under these conditions the male offspring of a concubine may be listed as the son of the first wife. Since concubines are only noted in a clan genealogy if they produce male descendants, the appearance of a concubine who has not borne a son may be taken as evidence of such a transfer. The woman has had to surrender her son to the first wife but has not lost her status as the mother of a clansman.

The format of the Shen and Hsü genealogies is simple. The names of the male members are listed generation by generation, and for each member the genealogy notes his birth and death dates and, if relevant, the names and dates of his wives, the number of sons borne by each wife, and the sons' names. The number of daughters is sometimes noted but not consistently, and daughters' names are never given. Unfortunately, many birth and death dates are missing because they were not known

[3] *Hsiao-shan Ch'ang-hsiang Shen-shih tsung-p'u* (The genealogy of the Shen clan in Hsiao-shan), 1893 ed., ch. 40; *Hsiao-shan T'ang-wan Ching-t'ing Hsü-shih tsung-p'u* (The genealogy of the Hsü clan in Hsiao-shan), 1911 ed., ch. 1. Hereafter cited as *Shen-shih* and *Hsü-shih*.

[4] Though clan rules urged members to adopt children from within the clan, exceptions did occur. Boys adopted from outside (*ming-ling* 螟蛉) were not listed individually in the genealogies, but their names were noted under the adopting father's name. One way to avoid adopting from outside of the clan was to allow one boy to carry two lines of descent (*chien-t'ao* 兼祧). Instances of both practices are to be found in the Shen and Hsü genealogies; I have not tabulated frequency.

to the compilers, but we must not allow this to discourage us from exploiting these sources. Whatever their defects (and they are many), genealogies like those compiled by Shens and Hsüs are almost the only source we have for reconstructing China's demographic history.

Table 1 describes the populations recorded in the Shen and Hsü genealogies. Both contain nineteen generations, the Shen compilation beginning with the eighteenth generation of the Shen descent line and the Hsü with the founding generation of the line. The earliest birth noted in the Shen genealogy is that of an eighteenth-generation member born in 1389; the earliest birth recorded in the Hsü genealogy is that of a fourth-generation member born in 1458. Columns 1 through 12 list by generation the number of males born, their wives and concubines (with wives classified by the order of the husband's marriage), their sons and daughters, and the number of men who died young or unmarried or whose marital status is unknown. These are the major segments of the population that is the subject of the following analysis.

Table 1: Number of Members of Various Statuses Recorded in
the Shen Genealogy (1893) and the Hsü Genealogy (1911)

Shen

Gen.	Male (1)	Marr. male & 1st wife (2)	2nd wife (3)	3rd wife (4)	4th wife (5)	Con-cu-bine (6)	N of sons (7)	N of daugh-ter (8)	Male d. young (9)	Un-marr. male d. -50 (10)	Un-marr. male d. 50+ (11)	Marr. status un-known (12)
18	8	8	1				26	11				
19	27	25	10	1		3	63	31	1			1
20	61	54	13	1		2	119	45	4			3
21	124	89	13	3		2	165	64	6			29
22	63	41	6	1			91	2				22
23	85	57	7	1	1		80	2	1			27
24	102	95	20	3	1	2	157	12			1	6
25	162	128	29	4	3	11	208	11	4	1	1	28
26	274	225	32	5	3	20	418	21		3	2	44
27	452	366	39	4	0	22	686	49	8	3		75
28	702	547	78	12	1	26	978	126	18	7	3	127
29	962	673	111	10	2	29	1,195	256	51	14	9	215
30	1,206	895	147	11	2	30	1,583	476	70	18	8	215
31	1,583	1,019	130	7	1	44	1,659	610	127	53	7	377
32	1,668	968	113	4	0	28	1,603	616	145	75	13	467
33	1,461	640	62	7	2	17	739	364	70	58	5	688
34	749	153	12	1			144	63	48	16		532
35	124	28	1				12	14	6	7		83
36	8	1										7
Total	9,821	6,012	824	75	16	236	9,926	2,773	559	255	49	2,946

Table 1 (Continued)

Hsü

Gen.	Male (1)	Marr. male & 1st wife (2)	2nd wife (3)	3rd wife (4)	4th wife (5)	Con-Cu-bine (6)	N of sons (7)	N of daugh-ter (8)	Male d. young (9)	Un-marr. male d. -50 (10)	Un-marr. male d. 50+ (11)	Marr. status un-known (12)
1	1						?					
2	1	1					2					
3	2	2					5					
4	5	4	3	1			10					1
5	10	9	2	1			34					1
6	39	38	6	1			83		1			
7	77	70	12	3			152	1	1			6
8	129	115	10	2	1	1	209		6			8
9	186	164	20	5		3	310	9	8			14
10	300	271	28	1		3	491	44	8	1		20
11	478	403	59	3		6	641	136	18	21	15	21
12	602	480	71	5		7	773	249	25	60	29	8
13	738	562	87	11	3	15	815	380	10	80	18	68
14	789	532	58	5	1	12	749	365	20	92	10	135
15	740	426	34	1		2	597	239	18	55	4	273
16	577	255	22			4	305	108	1	25	2	294
17	302	82	8	1		5	90	44		5		215
18	89	11					5	3		3		75
19	5											5
Total	5,070	3,425	420	40	5	58	5,271	1,578	116	342		1,143

Though it might be rewarding to compare demography of the component parts of the Shen and Hsü clans (that is, the lineages and their branches), I have not attempted such a comparison in this paper. Moreover, the small numbers and inadequate data have forced me to confine my analysis to persons born between 1650 and 1849 with a birth date given: 4,115 males and 2,380 females from the Shen clan, and 2,965 males and 2,047 females from the Hsü clan. This amounts to approximately half the men and women named in the two genealogies. In the analysis that follows these people are organized into 40 five-year birth cohorts. I present the data in terms of birth cohorts rather than in terms of genealogical generations because generations overlap and thus distort temporal change.

Social Context

The Shen and Hsü clans have lived for centuries in Hsiao-shan, a county located southeast of Hangchow along the bank of the Ch’ien-t’ang (錢塘) River. It was during the Northern Sung dynasty that the first member of the Shen clan, a man named Heng (衡), settled in Hsiao-shan. Heng was a native of Ch'ang-hsiang-li (長巷里), a place near Soochow, and no doubt for that reason named the community he founded Ch'ang-hsiang-li. Though poverty was a common motive for migration in traditional China, Heng and his descendants in Hsiao-shan were not impoverished refugees. On the contrary, the Hsiao-shan branch of the Shen clan was long known as "prominent lineage" (*wang-tsu* 望族). Heng, a member of the fourth generation, earned his *chin-shih* (進士) degree in 1034, and one of his descendants, a member of the fifth generation, earned another degree in 1073.[5] After the sixth generation, however, the fortunes of the clan declined, and it is said that they devoted themselves to farming. There is no further evidence of success in the examination stalls until the early Ch'ing period, six hundred years later.

The Hsü clan traces its descent to a man named Shih (奭), a *chin-shih* of 1012, but the Hsiao-shan branch of the clan was founded by a man named Pen-I (本一), said to be a fifteenth-generation descendant of Hsü Shih. It is not clear when Pen-i was born, but it was recorded that during the early Ming period he moved to Hsiao-shan from his native Shan-yin 山陰 to avoid a population census ordered by the founding emperor. Unlike Shen Heng, who came to Hsiao-shan as the holder of a prestigious *chin-shih* degree, Hsü Pen-i came as a kind of male bride. The records tell us that he married uxorilocally into a family surnamed Wen (溫).[6]

Despite the great differences in the social circumstances attending their move to Hsiao-shan, the social gap between the Shens and the Hsüs appears to have largely disappeared by the beginning of the Ch'ing Period. By then the Shens had regained something of their former eminence, and the Hsüs had overcome their lowly origin and established themselves as a prominent lineage. Table 2 compares the two clans in terms of number and kind of degrees held by clan members. The proportion of degree-holders was larger among the Shens than among the Hsüs, but the difference was not great and should not be seen as evidence of their belonging to different social strata. The two clans were equally successful at the highest levels of the examination system, each earning four *chin-shih* degrees, the Shens in 1685, 1733, 1772, and 1868 and the Hsüs in 1793, 1825, 1850 and 1876. (Three earlier military *chin-shih* of the Shen clan are excluded from the reckoning.) Moreover, the slight advantage the Shens gained in the traditional examination system was probably offset by the fact that the first graduates of the few modern schools established before the end of the Ch'ing period included several of the Hsü clan.

---

[5] *Shen-shih*, ch. 32.
[6] *Hsü-shih*, chs. 1, 3.

Table 2: Degree-Holders recorded in the Shen and Hsü Genealogies

Generation	Chin-Shih*	Chü-jen	Kung-sheng	Sheng-yüan	Kuo-hsüeh-sheng	Total	% of all adult males
				Shen			
18		1				1	12.5
19		1	2			3	11.1
20		1	1	1		3	4.8
21		3	1	5		9	7.3
22					1	1	1.6
23			1	3	1	5	5.9
24	1			2		3	2.9
25		1		2	1	4	2.5
26	2	1**		7	4	14	5.1
27	1	1	1	13	10	26	5.8
28	1	3	3	23	21	51	7.3
29	1	3	2	25	30	61	6.3
30		1	2	13	25	42	3.4
31		1	1	9	23	34	2.1
32	1	3	1	2	23	30	1.8
33		1	3	8	15	27	1.8
34			1	2	2	5	0.7
Total	7	21	19	109	156	318	
				Hsü			
1							
2							
3							
4							
5							
6							
7				3	2	5	6.49
8				1		1	0.78
9				1	1	2	1.08
10				1	3	4	1.33
11			3	3	2	8	1.67
12				3	6	9	1.50
13	1	1	2	0	13	17	2.30
14	2		2	3	15	22	2.79
15		2		4	11	17	2.30
16	1		1	3	6	11	1.91
17			1	3	8	12	3.97
Total	4	3	9	25	67	108	

* The three *chin-shih* in the 24th and 26th generations of the Shen were military *chih-shih*.

** Military *chü-jen*.

Since some descent groups were more powerful and more prestigious than others, one can usefully compare the social status of lineages and clans. However, it is important to remember that the most prominent descent groups included many people who were poor and politically important. The Shen and Hsü genealogies only note the occupations of their members when they achieve official rank, but remarks contained in a few of the biographies give us a glimpse of the diversity characteristic of all Chinese descent groups.

The Shen genealogy mentions several men who became rich through trade, several others who were famed for their skill in medicine, even some who appear to have earned their living as fortune-tellers. And the Hsü genealogy tells us that several of the clan's members supported themselves as shopkeepers, running such establishments as a copper shop, a grain and salt shop, a carpentry shop, a lantern shop, and a noodle shop. Though this evidence does not allow us to determine the social status of more than a handful of the people listed in the two genealogies, it does serve to remind us that Chinese descent groups belonged to a complex society and reflected that complexity. What follows should not be compared with T. H. Hollingsworth's study of the English peerage.[7] The people whose success in the examination took them to the top of Chinese society may have dominated the Shen and Hsü clans, but they were out-numbered 1,000 to one by merchants, shopkeepers, farmers, and farm laborers.

Marriage

Though our genealogies do not provide marriage dates for either men or women, they do yield information that reveals a good deal about marriage practices. Probably because a woman's rights and duties with respect to her husband and his kinsmen varied with the form of her marriage, a number of terms were employed to distinguish the status of in-marrying women. A first wife was termed *p'ei* 配; a second wife (that is, a woman marrying a man who had lost his first wife) *chi* 繼; a third wife, *yu-chi* 又繼; a fourth wife, *san-chi* 三繼. A woman who had herself married previously was dubbed *ch'ü* 娶 regardless of whether or not she was her husband's first wife, and concubines were termed *ts'e* 側 or *fu* 副. The proportion of all Shen and Hsü wives occupying each of these statues is shown in Table 1. These data enable us to estimate the incidence of polygynous unions, the frequency of remarriage, and the rapidity with which widows and widowers married a second or third time.

Consider first the incidence of polygynous unions. Of a total of 7,163 women marrying into the Shen clan, 236 came as concubines; and of 3,948 women taken as wives by members of the Hsü clan, 58 entered as concubines. Concubines accordingly account for 3.3 percent of the Shen wives and 1.5 percent of the Hsü wives. Since concubines were not recorded if they did not bear a son, and since some women who

7 T. H. Hollingsworth, *The Demography of the British Peerage*, supplement to *Population Studies*, 18. 2 (1964).

came as concubines were later elevated to the status of second or third wife,[8] these figures say that whereas monogamy was the rule, polygyny was completely acceptable and was probably very common among the elite. The fact that the Shen men took twice as many concubines as the Hsü men presumably reflects their having achieved prominence earlier and in somewhat greater numbers.

Lumping together the generations displayed in Table 1, we find that 6,012 of the men named in the Shen genealogy married at least once and that 824 of these men took a second wife. In other words, of all the men who married once, 13.7 percent married a second time. And in this case we find almost no difference between the two clans. The Hsü genealogy names 3,425 men who married at least once, 12.3 percent of whom married a second time. Given that the Shens were somewhat wealthier than the Hsüs and took almost twice as many concubines, this suggests that a concubine was a luxury, a wife a necessity. This is also evident in the relative frequency of third marriage. Of all the Shen men who married twice, 9.1 percent married a third time, and of the Hsü men who took a second wife, 9.5 percent took a third wife.

What then of remarriage by women? Though traditional ideology discouraged widow remarriage by elevating the celibate widow to the level of a minor cultural hero, both the Shen and the Hsü genealogies indicate that widows did remarry and not infrequently. We find 120 women listed under the label *ch'ü* in the Shen genealogy and another 51 in the Hsü genealogy. And there is also evidence that women who married into these two clans sometimes married out again after their husbands died. Twenty-eight boys (nine Shens and 19 Hsüs) are listed as *sui-mu-ch'u* (隨母出), that is, as having accompanied their mothers when they married out of the clan. Though these figures indicates that second marriages were far less common among women than among men, it is likely that some second marriages were passed off as first marriage. The most we can conclude with confidence is that the cult of the celibate widow did not succeed in entirely suppressing second marriages by widows.

We do not have the evidence necessary to discover how quickly widows remarried, but we can estimate how long it took widowers to remarry by calculating the interval between the first wife's death and the birth of her replacement's eldest son. The results are shown in Table 3. Needless to say, they are not precise since they depend not only upon the accuracy of our records but also on what assumptions we make about the length of the mourning period and the birth interval. Since mourning would not have exceeded nine months,[9] I have allowed three years for mourning and

[8] In 24 cases of the Shen genealogy indicates that the birth of second or third wife's first son occurred before her predecessor's death. Though these anomalies could be the result of recording errors, it is more likely that a concubine was elevated to the status of wife after the wife's death. In every case of the wife who died had failed to produce a male heir.

[9] The mourning period prescribed for a husband was one year (in practice, nine months), but a man

the birth interval. The means, medians, and standard deviations for the distributions shown there are (in years) 6.75, 5.27, and 4.80 for the Shen clan and 7.86, 6.83, and 4.94 for the Hsü clan. If we subtract three years from either the means or the medians, we find that the Shen and Hsü clan males remarried within three or four years. Perhaps the most interesting thing about these figures is that the behavior of the two clans is so similar. Whatever the true interval between marriages, it was the same for the Shens and the Hsüs and thus arguably characteristic of Hsiao-shan in general.

Table 3: Estimated Duration between First and Second Marriages of Males in the Shen and Hsü Genealogies

No. of years between marriages	Number of males		No. of years between marriages	Number of males	
	Shen	Hsü		Shen	Hsü
1	12	5	16	3	1
2	25	9	17	1	1
3	14	7	18	1	4
4	13	9	19	2	0
5	17	10	20	0	1
6	15	12	21	2	1
7	16	6	22	0	1
8	8	10	23	1	0
9	8	5	24	1	0
10	10	7	Total	170	111
11	7	5	Mean (years)	6.75	7.86
12	6	2	Median (years)	5.27	6.83
13	4	5	Standard		
14	2	8	deviation (years)	4.80	4.94
15	2	2	Coef. of variation	0.71	0.63

As we have seen, the founder of the Hsiao-shan branch of the Hsü clan married into his wife’s family. There is other evidence of uxorilocal marriage to be found in the two genealogies. A fifteenth-generation member of the Hsü clan is listed as having married out of his family and the genealogy also notes two men who married into the Hsü descent group. The Shen genealogy contains no evidence of men marrying into the clan, but it does mention four men who married out. Though these few cases may represent only a tiny fraction of all uxorilocal unions, they are interesting as evidence that both clans contained some impoverished families. Only a man too poor to acquire a wife any other way would agree to marry into his wife’s family.

The traditional view of Chinese marriage practices says that marriage was nearly universal and that it occurred at an early age. Was this so? Let us see what our

was free to ignore this obligation if his parents were alive. See *Ch’ing-hui-tien* 清會典 (Statutes of the Ch’ing), 1818 ed., 30: 30a.

genealogies tell us. Columns 10-12 of Table 1 list all adult men who might possibly be considered as never marrying. To calculate the proportion of men never marrying we must decide which of these men died unmarried and beyond the possibility of marriage. The men enumerated in Column 11 obviously qualify, but what of those in Columns 10 and 12? Since there is no clear answer, let us set both groups aside and count only those men whom we know to have died unmarried after age 50. Thus we assume that the men in Column 10 would have married if they had lived, and that those in column 12 either were in fact married or might have married if had lived longer. This leaves us with 49 Shens and 78 Hsüs who never married. Since these calculations involve several questionable assumptions, it is encouraging to see that the results agree with what we know about the relative affluence of the Shen and Hsü clans. The proportion of Shens failing to marry was only 0.5 percent compared to 1.5 percent among the Hsüs.

Since Chinese genealogies do not report age at marriage for either males or females, we have no choice but to resort to indirect methods of estimating the value of this important variable. The most appropriate procedure for men is to estimate the proportions single at given ages and then to apply John Hajnal's method of calculating what he terms the "singulate mean age at marriage" (SMAM).[10] The problem is to decide what assumptions to apply in estimating the proportion of single men in the critical age categories 15-19 and 20-24. One possibility is to assume that all men who did not have sons were single. Another is to assume that the only single men were those who died single. Since the two sets of assumptions produce very different results, I have calculated two sets of figures, one under the high-age-at-marriage assumption and the other under the low-age-at-marriage assumption. Our best estimate of men's age at marriage is probably an average of these two sets of figures.

Table 4 reports the results of my calculations for selected cohorts of the Hsü clan. Under the high-age-at-marriage assumption the average age at marriage for these fifteen cohorts was 25.02 years; under the low-age-at-marriage assumption it was 17.58 years; on the average it is 21.3 years, which is strikingly close to the Princeton group's estimate of 21.39 years for South China in the 1930's.[11] Though this could be nothing more than a happy coincidence, I prefer to view it as support for my assumptions and as evidence that a low age at marriage has been characteristic of China for several centuries.

[10] John Hajnal, "Age at Marriage and Proportions Marrying," *Population Studies*, 7. 2 (1953): 111-136. SMAM = $(15 + S_i - 50S_{50}) / (1 - S_{50})$, where S_i denotes the proportion single at each age group and S_{50} the proportion single at age 50. S_{50} is calculated as the average of S_{45-49} and S_{50-54}.
[11] Barclay et al., p. 609.

Table 4: Proportion Single at Each Age Group and Singulate Mean Age at Marriage (SMAM) for Selected Cohorts of Hsü clan Males, 1700-1844

Cohort	Age								SMAM	
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	High	Low
1700-	25/26	20/26	1/25	1/25	1/24	1/23	1/20	0/19		
1704	.9615	.7692	.0400	.0400	.0417	.0435	.0500	-	24.08	15.99
	.0769	*.0719*								
1710-	23/24	18/24	1/23	1/22	1/22	0/21	0/18	0/16		
1714	.9538	.7500	.0435	.0455	.0455	-	-	-	24.21	16.09
	.0417	*.0417*								
1720-	36/40	26/39	2/38	2/38	1/37	1/34	0/31	0/27		
1724	.9000	.6667	.0526	.0526	.0270	.0294	-	-	23.64	16.44
	.0750	*.0526*								
1730-	31/32	27/32	2/32	2/31	2/30	1/29	1/26	0/22		
1734	.9688	.8438	.0625	.0323	.0666	.0345	.0385	-	24.75	16.15
	.0625	*.0625*								
1740-	62/65	54/64	4/63	3/61	1/58	0/55	0/54	0/46		
1744	.9692	.8438	.0635	.0492	.0172	-	-	-	24.71	16.50
	.0932	*.0781*								
1750-	41/42	39/42	3/42	3/42	2/40	1/36	0/33	0/30		
1754	.9762	.9286	.0714	.0714	.0500	.0278	-	-	25.63	16.81
	.0714	*.0714*								
1760-	50/50	43/47	5/46	4/45	4/45	2/41	1/38	1/32		
1764	1.0000	.9149	.1087	.0889	.0889	.0488	.0263	.0313	25.68	17.41
	.1800	*.1277*								
1770-	55/55	45/54	8/53	8/52	8/51	6/48	5/45	2/34		
1774	1.0000	.8333	.1509	.1538	.1569	.1250	.0178	.0588	26.27	18.56
	.1888	*.1667*								
1780-	67/68	53/66	15/60	10/54	9/51	7/47	4/39	2/28		
1784	.9853	.8030	.2500	.1852	.1765	.1489	.1026	.0714	26.18	19.82
	.3235	*.3030*								
1790-	68/74	50/71	8/68	7/67	4/61	4/57	2/49	2/40		
1794	.9189	.7042	.1176	.1045	.0656	.0702	.0408	.0500	23.93	17.30
	.2077	*.1569*								
1800-	64/67	54/65	13/61	11/57	8/51	4/41	4/31	1/23		
1804	.9552	.8308	.2131	.1929	.1569	.0976	.1290	.0435	25.79	18.99
	.2835	*.2615*								
1810-	65/71	51/59	7/58	4/49	3/48	3/41	2/28	0/11		
1814	.9155	.7391	.1207	.0816	.0625	.0732	.0714	-	24.42	17.73
	.1972	*.1739*								
1820-	55/57	42/54	13/49	8/41	5/28	1/18	0/15	0/13		
1824	.9649	.7778	.2653	.1851	.1786	.0556	-	-	27.19	21.62
	.3333	*.2963*								
1830-	52/54	40/49	5/42	0/33	0/31	0/23	0/20	0/16		
1834	.9630	.8163	.1190	-	-	-	-	-	24.49	18.20
	.2963	*.2245*								
1840-	45/47	37/42	1/39	0/35	0/32	0/31	0/24	0/13		
1844	.9574	.8809	.0256	-	-	-	-	-	24.32	16.11
	.1489	*.0476*								
Average									25.02	17.58

Note: The first cell reads as follows: Out of 26 males in the cohort, 25 (96.15%) were single in the 15-19 age group on the high-age-of-marriage assumption. On the low-age-at-marriage assumption, only 7.79% were single. Italic figures throughout are low age assumptions.

With no way of estimating the proportion of women single at different ages, we cannot apply the Hajnal procedure to solve the problem of estimating age at marriage for women. However, since we know the birth dates of most husbands and wives, we can calculate the average difference in their ages and thus use the husband's age at marriage to estimate the wife's age at marriage.

Table 5 says that on the average the men born into the Shen and Hsü clans in 1650-1804 were 5.2 years older than their wives.[12] If the average age at marriage of man born into the two clans was 21.3 years, the average age at marriage of their wives was approximately 16.1 years. This is considerably lower than the 17.78 years obtained by the Princeton group for South China,[13] but well within the range of possibility in a society in which marriages were arranged by the elderly and in which grandchildren and great-grandchildren were looked on as signs of prosperity and good fortune.

The figures in the last column of Table 5 indicate that a surprisingly large percentage of all wives were older than their husbands. The average for all cohorts is 14 percent (18 percent in the Shen clan and 10 percent in the Hsü clan), with some cohorts exceeding 30 percent. These figures confirm a tendency noted by Michel Cartier in his analysis of Ming biographies,[14] and suggest that a preference for matches in which the wife is younger than he husband is a relatively recent phenomenon.

We can obtain another estimate of women's age at marriage in the Hsiao-shan area by examining the biographies included in the *Hsiao-shan hsien-chih kao* (蕭山縣志稿Draft gazetteer of Hsiao-shan). Age at marriage is noted for 94 of the 546 women mentioned in the biographies.[15] The mean of these 94 reports is 17.83 *sui*, or approximately 16.83 years, a figure comfortingly close to our 16.1 years. I am therefore satisfied that the fertility estimates reported in the following section are not far from the truth in taking 17 years as the mean age at marriage for women in Hsiao-shan.

---

[12] This difference in the age of husband and wife is confirmed by calculating their age at the birth of their eldest son. The average for the Shen clan was 25.17 for wives and 30.51 for husbands; for the Hsü clan the averages were 24.64 and 29.81. One of the Taiwan genealogies I studied yielded average of 21.18 and 26.65; the other, 22.07 and 17.06. Taken together with the statistics showing that the ages of all husbands and wives in Taiwan in 1910 and 1915 differed by 5.3 years and 5 years, see Bank of Taiwan, ed., *The Population in Taiwan* (1949), p. 10. This evidence says that a difference of five years was the rule in late traditional China.

[13] Barclay et al., p.609.

[14] See Michel Cartier, "Nouvelles données sure la demographie chinoise à l'époque des Ming (1384-1644)," *Annales*, 6 (Nov,.-Dec. 1973): 1344-1345.

[15] *Hsiao-shan hsien-chih kao* (Draft gazetteer of Hsiao-shan), 1935 ed., chs. 22-24.

The age distribution of the women by *sui* is as follows:

Sui	14	15	16	17	18	19	20	21	22	23	24	25
N	1	11	15	15	16	19	12	2	0	2	0	1

Table 5: Difference in Age Between Husband and First Wife, Selected Cohorts of Shen and Chü clans, 1650-1804

Cohort	Chan	Difference in years between the age of husband and wife									Mean*	% of Wife older
		Number Wife older			0	Number Husband older						
		10+	6-10	1-5		1-5	6-10	11-15	16-20	20+		
1650-	Shen				1	2		1	1		7.4	0
1654	Hsü					2		1			6.3	0
1660-	Shen			4		7			1		2.3	33
1664	Hsü					1	1				5.5	0
1670-	Shen			3	1	5	4	1	1		4.6	20
1674	Hsü				1	2				1	7.0	0
1680-	Shen			1	4	1		1			1.9	14
1684	Hsü		1	1	0	5	2	1			3.3	20
1690-	Shen	1		4	4	4	2	1			1.1	31
1694	Hsü					6		2			5.5	0
1700-	Shen			1	1	6				1	4.1	11
1704	Hsü			4	0	5	3	2	1		4.7	27
1710-	Shen		2	1	1	12	1	1			3.0	17
1714	Hsü			5	1	7	5	1			3.1	26
1720-	Shen			7	3	7	4	2	1	1	3.9	28
1724	Hsü			4	2	10	10	5	2	1	6.5	12
1730-	Shen			2	2	5	2	2	0	1	5.2	14
1734	Hsü			3	2	7	2	5			4.9	16
1740-	Shen		1	3	1	12	5	7	1		5.6	13
1744	Hsü			2	1	17	10	6	1		5.9	5
1750-	Shen		1	3	3	10	8	3	0	1	4.8	14
1754	Hsü			1	2	4	8	7	1		7.9	4
1760-	Shen	1	2	9	2	13	6	3	1	1	2.9	32
1764	Hsü				2	8	12	13	5		9.5	0
1770-	Shen		1	9	1	16	12	9	2	1	5.6	19
1774	Hsü			2	1	13	21	11			7.2	4
1780-	Shen			6	6	21	15	14	2	2	6.5	9
1784	Hsü			3	3	14	14	11	3		7.1	6
1790-	Shen			11	3	27	18	8	4	1	5.4	15
1794	Hsü			5	3	15	15	4	2	1	5.8	11
1800-	Shen		1	15	7	23	16	9	1		3.9	22
1804	Hsü			7	6	11	15	10	1		5.6	14
Average**											5.2	14

*The mean age of the husbands is in every case higher than the mean age of the wives.

**Cohorts 1810-14, 1820-24, 1830-34, 1840-44 are not included in the table but are counted in the average.

There is one last point about marriage as such before we turn to the question of fertility. We have seen that despite the ideal of the celibate widow, many widows did remarry. We must now ask how many women were widowed during their reproductive years, since the proportion of young widows in a population can have a significant effect on fertility and might account for some of the results reported below.

Table 6 lists the number of marriages under observation (N) and then reports the number of widows and the percent of women widowed for each of two broad age classes. The analysis is limited to the years 1700-1839 because the data for women born before 1700 and after 1840 are incomplete. The results indicate that a large proportion of all women were widowed, and that this was true of both clans. The average for women aged 20-44 was 0.266 in the Shen clan and 0.275 in the Hsü clan; for women age 45 and above, the average was 0.353 among the Shens and 0.337 among the Hsüs. The fact that more than one-fourth of all women were widowed during the reproductive period should be borne in mind when we attempt to explain the relatively low fertility reported in the next section.

Table 6: Number and Proportion of Widows among First Wives
in the Shen and Hsü Clans, 1700-1839

Cohort	Shen					Hsü				
	N	Age 20-44		Age 45+		N	Age 20-44		Age 45+	
		N of widows	% widowed	N of widows	% widowed		N of widows	% widowed	N of widows	% widowed
1700-04	9	3	33	3	33	15	3	20	6	40
1705-09	14	7	50	4	29	12	1	8	7	58
1710-14	18	4	22	5	28	19	5	26	6	32
1715-19	12	1	8	4	33	28	6	21	11	39
1720-24	24	5	21	8	33	34	7	21	12	35
1725-29	22	7	32	6	27	20	6	30	6	30
1730-34	26	9	35	10	39	19	5	26	5	26
1735-39	22	9	41	5	23	25	10	40	8	32
1740-44	29	2	7	15	52	38	12	32	14	37
1745-49	32	10	31	15	47	42	12	29	13	31
1750-54	25	7	28	9	36	23	4	17	10	44
1755-59	44	12	27	10	23	27	9	33	7	26
1760-64	30	4	13	14	47	38	12	32	10	26
1765-69	39	9	23	16	41	40	11	28	18	45
1770-74	34	6	18	19	56	41	8	20	16	39
1775-79	42	8	19	12	29	35	8	23	19	53
1780-84	42	12	29	13	31	43	10	23	15	35
1785-89	41	6	15	19	46	44	13	30	19	43
1790-94	46	13	28	15	33	31	10	32	8	26
1795-99	27	6	22	13	48	22	4	18	5	23
1800-04	52	7	14	28	54	21	5	24	5	24
1805-09	52	16	31	22	42	27	5	19	9	33
1810-14	56	11	20	21	38	22	6	27	8	36
1815-59	51	18	35	13	26	26	11	42	3	12
1820-24	41	15	37	12	29	18	9	50	4	22
1825-29	32	10	31	9	28	18	4	22	7	39
1830-34	21	8	38	6	29	15	6	40	2	13
1835-39	16	6	38	2	13	11	4	36	5	46
Mean			0.266		0.353			0.275		0.337
Standard deviation			0.101		0.104			0.086		0.105
Coef. of variation			0.380		0.295			0.313		0.312

Fertility

The information provided by the Shen and Hsü genealogies allows us to estimate both male and female fertility rates. There are, however, limitations imposed by the data. First, the lack of information on unmarried women (who are not even mentioned in the genealogies) means that our female rates must be limited to marital fertility. Second, the failure to record all second wives and concubines, together with the difficulty of determining their age at marriage, forces us to confine the female rates to the fertility of first wives; as a result, the children of second wives and concubines are reflected in the male rates but not the female rates. Third, the obvious neglect of many female births and the failure to record the dates of those births in the genealogies leaves us no choice but to estimate fertility on the basis of male births. Were we to accept at face value the data presented in Columns 7 and 8 of Table 1, we would be forced to the absurd conclusion that Chinese women bore three times as many sons as daughters. One of the most important unanswered questions about Chinese genealogies is why some female births were noted but not others. Neither the Shen nor the Hsü genealogy offers any clue to a rule or convention in this regard.

A crude estimate of fertility can be obtained directly from Table 2 by calculating the son/mother ratio or the son/father ratio by generation or cohort. A more laborious but ultimately more fruitful approach is to apply family reconstitution techniques to estimate age-specific fertility and total fertility, and this is the procedure I have followed. After designating a family reconstitution sheet for each male who survived to adulthood, I recorded on that sheet his vital dates and those of his wives and sons. Gaps in the data (and fortunately there were very few of these) were filled by applying the conventions that I developed in analyzing the two Taiwanese genealogies.[16] If the birth date of one of several sons, let us say the first-born, was missing, I subtracted three years from the birth date of the second-born son. The birth date of a last-born son was obtained by adding three years to the birth date of the next-to-last born, and a missing date for a boy born in the middle of a series was estimated by taking the midpoint of the interval bounded by the births of the next – oldest and next-youngest sons. Parental dates were complete for the great majority of all people born before 1820, but there were gaps in the record for those born after that date. In the case of a missing death date (the most common problem), childbearing was traced to the birth of the last son but that birth was not counted.

My next step was to calculate, first, the age of the parents at the birth of each son, and second, the date at which each period of observation terminated. For women in their first marriages (the basis of my female fertility rate) the termination date was

[16] Ts'ui-jung Liu, "Chinese Genealogies," pp. 858-859.

the date of their husband's death, the date of their own death, or their fiftieth birthday, whichever came first; for adult men (the basis of my male fertility rate) it was simply their sixtieth birthday. I then organized my two samples (married women and adult men) into birth cohorts and estimated the two fertility rates by dividing the number of sons born to each cohort by the number of person-years experienced by the members of that cohort. An example of the results obtained is presented in Table 7.

Table 7: Data Used to Estimate Age-Specific Fertility among First Wives of Shen Clan

Cohort	Age 15-19	20-24	25-29	30-34	35-39	40-44	45-59	Period
1650-4	1/25	4/25	1/25	3/25	0/25	0/25	0/25	1695-9
1655-9	2/40	2/40	2/25.32	3/25	0/25	1/25	0/25	1700-4
1660-4	4/65	6/65	5/60.79	4/55	2/53.28	1/44.30	3/34.79	1705-9
1665-9	2/35	8/35	4/32.67	6/30	0/30	1/30	0/27.21	1710-4
1670-4	1/75	6/75	11/75	8/71.02	6/64.44	4/57.82	0/49.13	1715-9
1675-9	4/45	5/45	2/45	5/45	6/37.31	0/34.97	0/30	1720-4
1680-4	1/35	4/35	5/30.96	7/30	1/30	0/27.36	0/15.62	1725-9
1685-9	2/40	3/38.41	4/35	3/25.07	1/25	1/17.66	0/15	1730-4
1690-4	1/80	4/80	7/78.03	9/67.88	3/60.77	2/54.93	1/45.85	1735-9
1695-9	0/90	9/90	11/85.43	9/85.34	3/83.55	4/75	0/67.52	1740-4
1700-4	2/45	9/45	8/45	5/45	5/45	1/32.14	0/20	1745-9
1705-9	3/70	9/67.76	11/61.93	4/46.28	4/30.19	1/26.55	0/12.97	1750-4
1710-4	4/90	5/83.61	10/80	8/80	6/79.04	2/73.19	1/60.13	1755-9
1715-9	1/65	5/62.50	13/58.88	5/54.37	4/47.91	1/37.94	0/34.63	1760-4
1720-4	4/125	14/122.48	8/115	13/100.64	10/96.73	7/77.41	0/67	1765-9
1725-9	1/110	10/108.75	14/100.68	7/100	6/95.3	2/74.06	1/70	1770-4
1730-4	3/135	11/135	13/134.11	18/122.98	7/109.25	2/69.72	0/60.04	1775-9
1735-9	1/115	13/114.97	13/100.15	13/98.24	4/82.56	3/63.49	0/43.18	1780-4
1740-4	10/155	17/150	22/140	17/133.81	10/121.68	5/110.27	0/94.08	1785-9
1745-9	10/170	15/165.37	21/155.5	15/144.41	15/124.13	4/109.89	0/82.66	1790-4
1750-4	5/135	17/132.26	15/125.88	9/125	15/122.81	5/92.62	1/75.22	1795-9
1755-9	8/225	23/215.53	23/207.18	21/173.61	14/139.98	1/108.54	0/87.02	1800-4
1760-4	9/190	14/185.79	27/172.5	14/144.13	10/119.44	6/102.58	1/83.4	1805-9
1765-9	10/245	22/223.94	16/210	15/189.23	21/160.21	8/129.64	1/97.47	1810-4
1770-4	10/255	30/249.37	24/225.16	24/185.76	15/166.49	6/139.89	2/119.22	1815-9
1775-9	11/315	32/310.19	41/298.52	26/249.76	24/184.22	9/144.88	1/113.3	1820-4
1780-4	22/330	36/301.32	36/272.67	25/219.32	23/161	4/108.85	0/90.46	1825-9
1785-9	14/320	39/307.97	36/271.18	36/205.12	15/162.31	9/138.45	1/101.34	1830-4
1790-4	15/360	35/340.97	47/311.31	29/235.71	18/165.91	3/122.03	0/103.76	1835-9
1795-9	6/285	33/275.96	31/248.21	27/205.82	7/158.68	5/110.74	0/86.8	1840-4
1800-4	14/395	37/367.33	45/321.27	40/283.39	24/216.84	9/187.53	1/196.16	1845-9
1805-9	20/460	56/425.22	50/355.56	39/235.15	15/187.5	5/153.85	2/115.03	1850-4
1810-4	19/465	47/456.28	58/366.57	37/287.13	12/226.21	9/189.53	2/128.64	1855-9
1815-9	17/440	62/403.89	39/326.99	35/275.92	17/203.87	2/141.88	0/81.13	1860-4
1820-4	18/400	54/363.27	44/302.42	23/225.26	14/174.95	4/96.55	0/86.41	1865-9
1825-9	21/410	45/378.03	50/330.97	24/232.21	14/131.55	2/91.06	1/52.58	1870-4

Note: The numerators are the number of sons born, the denominators the number of woman-years or years of observation.

The data for the cohorts listed at the left of the Table 7 are read horizontally; those for the periods listed at the right of the table are read obliquely. To save space and deemphasized random fluctuation, the rates presented below are the average of three cohorts or three periods.[17]

A refined estimate of age-specific fertility was obtained by means of the "children-ever-born" technique, or what might better be termed the "sons-ever-born" technique given the limitations of my data. Taking parity (P) to equal the number of sons born to each cohort by the end of each age interval, I calculated cumulative fertility (F) by the formula $F_i = \phi_i + 3f_i$, where f_i is the age-specific fertility rate and ϕ_i is the cumulated fertility up to the lower boundary of the *i*-th age interval), and then used the *P/F* ratios to adjust the age-specific fertility rates.[18] The results obtained for the adult males are reported as the male fertility rate, but the results for married females were divided by 1.06 (the assumed sex ratio at birth) to obtain estimates of the number of daughters born and hence that reflect both male and female births. Total fertility was also calculated for married females by multiplying the sum of the age – specific fertility rates by five.

The results of these procedures are summarized in visual form in Figures 1-3 and are reported in detail in Tables 8-11. Note that *P/F* ratio in Table 8 is about 1.00 for the first age group of most cohorts and that it declines steadily as the cohort ages. Clearly we cannot be far from the truth in taking 17 as the average at marriage, and in lowering our estimates of age-specific fertility among the older age groups.

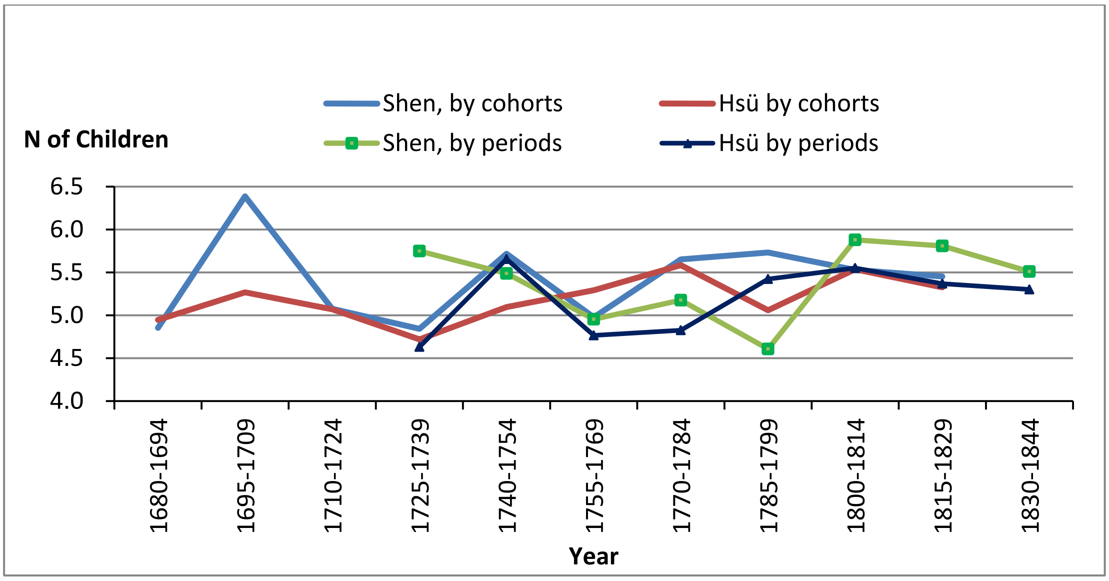
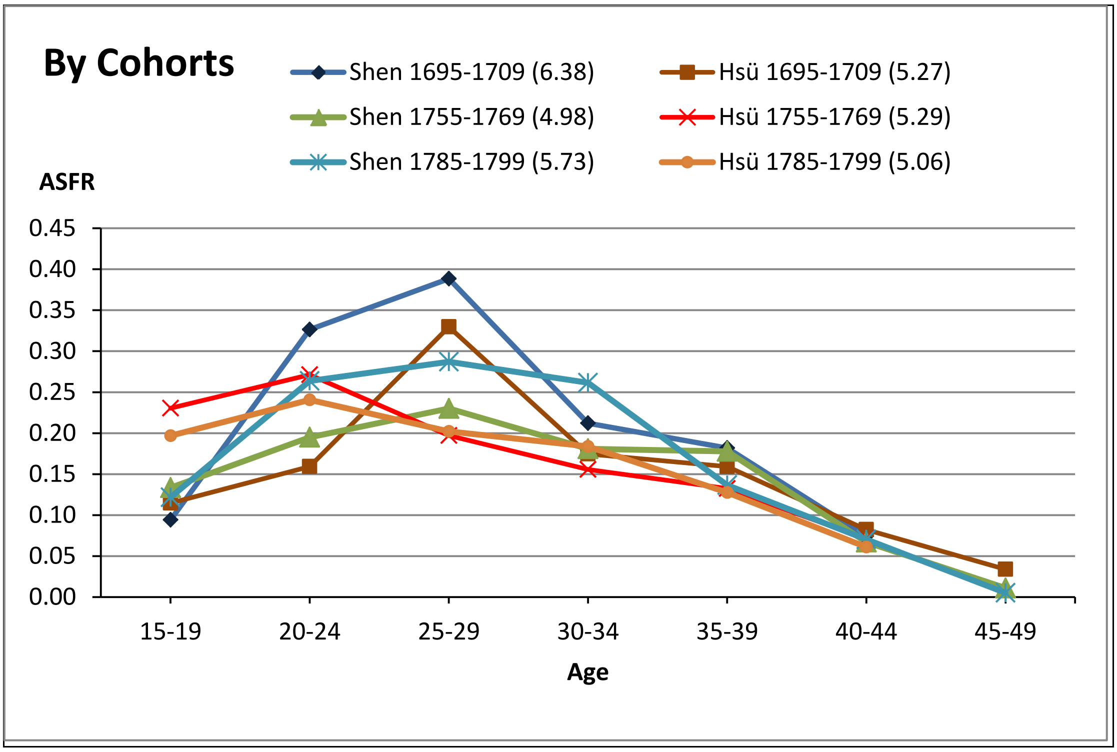


Figure 1: Total fertility of first wives by cohorts and periods,
Shen and Hsü clans, 1690-1840

[17] Because the number of cases is not very large, this procedure is not entirely satisfactory. Some of the remaining irregularities could be smooth by applying techniques developed by William Brass, see "The Graduation of Fertility Distribution by Polynomial Functions," *Population Studies*, 14, 2 (1930): 148-162.

[18] See William Brass et al., *The Demography of Tropical Africa* (Princeton, N. J., 1968), pp. 92-93.



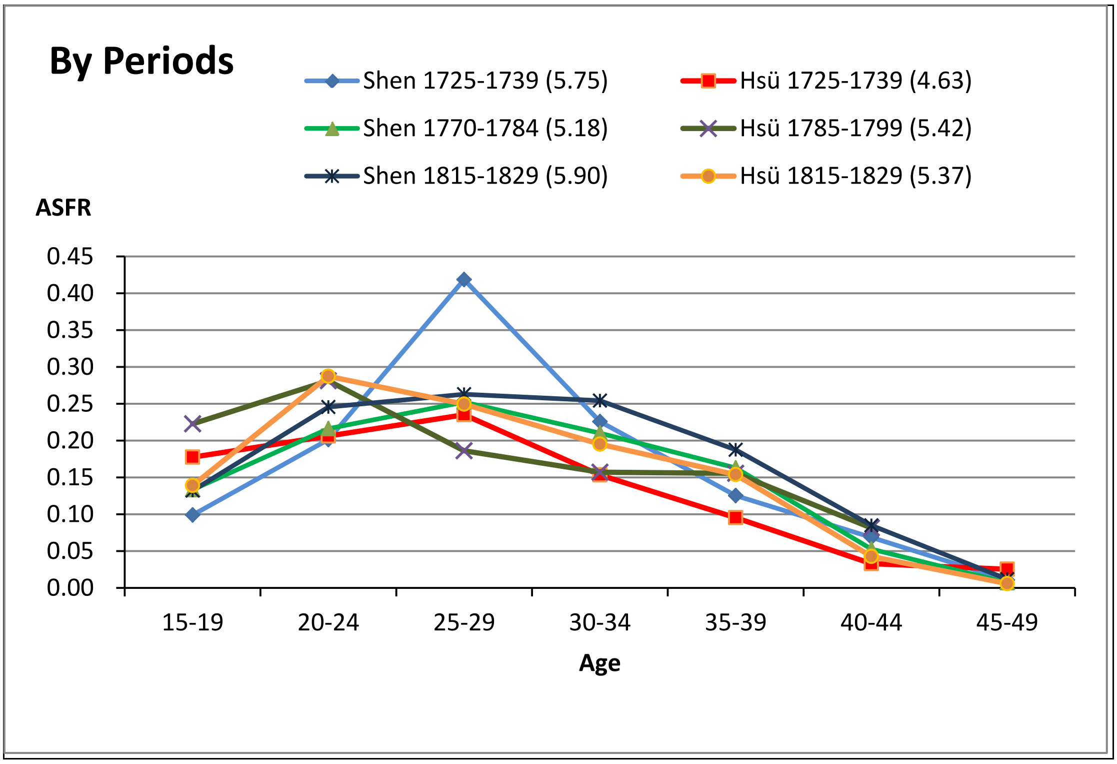
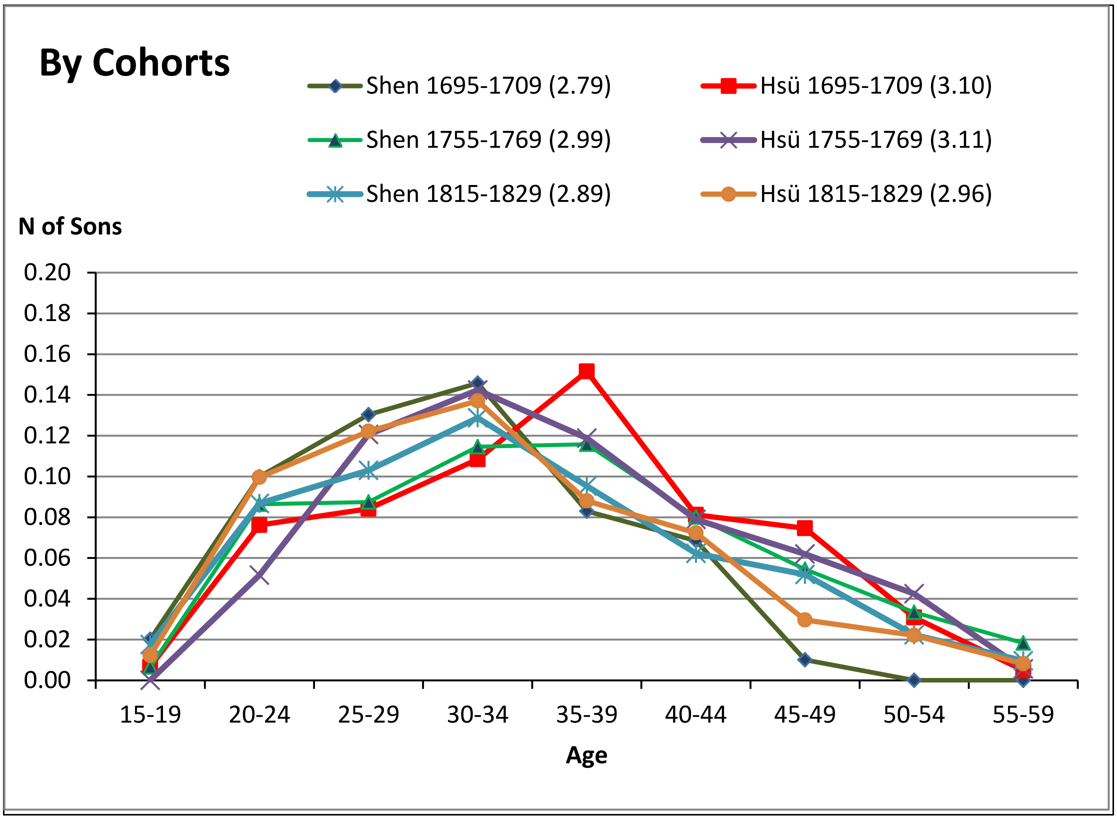


Figure 2: Age-specific marital fertility rates of first wives for selected cohorts and periods, Shen and Hsü clans, 1695-1829
(Total fertility rate in parenthesis)



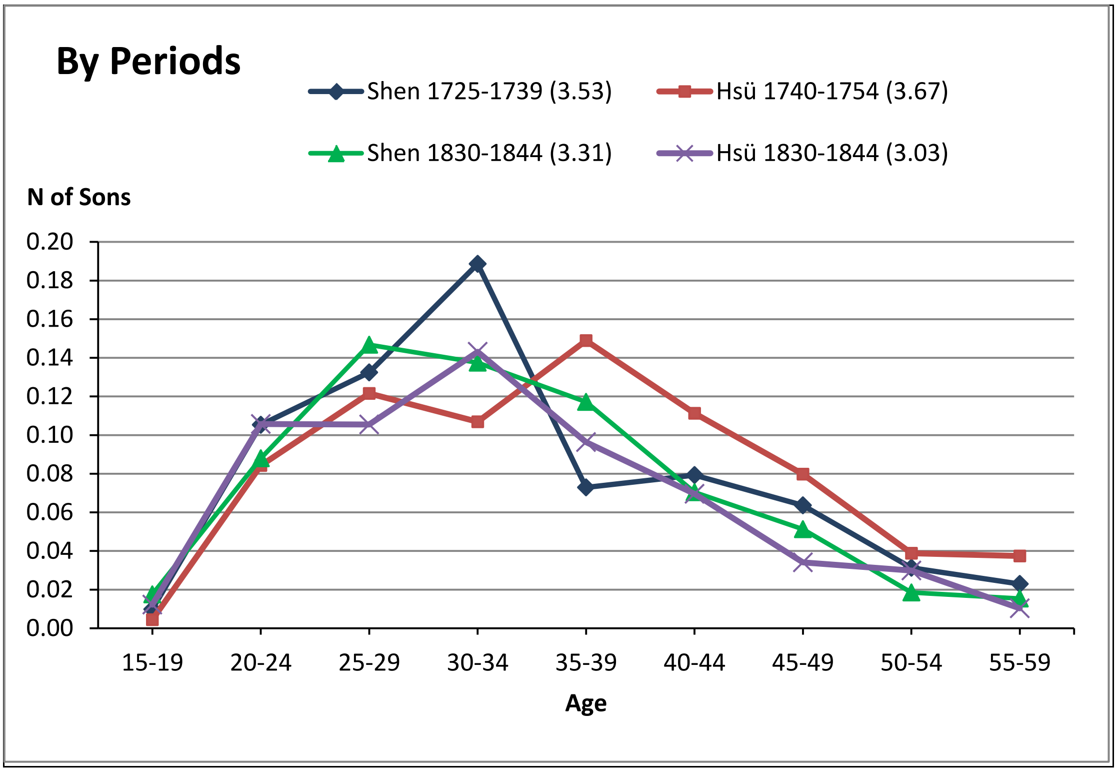


Figure 3: Adjusted male age-specific fertility rates in terms of sons for selected cohorts and Periods, Shen and Hsü clans, 1695-1844
(GRR in parenthesis)

Table 8: Marital Age-Specific Fertility and Total Fertility of First Wives by Cohort, Shen and Hsü Clans, 1680-1829

Shen

Cohort	Measure	Age							Total
		15-19	20-24	25-29	30-34	35-39	40-44	45-549	
1680-1694	Observed fs	0.0506	0.0808	0.1218	0.1618	0.0409	0.0310	0.0073	
	P/F	1.0000	1.1114	1.0771	0.9975	0.8450	0.8354	0.8154	
	Adj. fs	0.0506	0.0898	0.1312	0.1614	0.0346	0.0259	0.0060	2.4975
	SR=1.06, fd	0.0477	0.0847	0.1238	0.1523	0.0326	0.0244	0.0057	2.3560
	Both sexes	0.0983	0.1745	0.2550	0.3139	0.0672	0.0503	0.0117	4.8535
1695-1709	Observed fs	0.0485	0.1143	0.1592	0.1010	0.0932	0.0407	-	
	P/F	1.0000	1.4687	1.2556	1.0814	1.0043	0.9396	-	
	Adj. fs	0.0485	0.1679	0.1999	0.1092	0.0936	0.0382	-	3.2865
	SR=1.06, fd	0.0458	0.1584	0.1886	0.1030	0.0883	0.0360	-	3.1005
	Both sexes	0.0943	0.3263	0.3885	0.2122	0.1819	0.0742	-	6.3870
1710-1724	Observed fs	0.0510	0.0835	0.1367	0.1032	0.0876	0.0480	0.0055	
	P/F	1.0000	1.1088	1.0952	0.9819	0.9286	0.8714	0.8404	
	Adj. fs	0.0510	0.0926	0.1497	0.1013	0.0813	0.0418	0.0046	2.6115
	SR=1.06, fd	0.0481	0.0874	0.1412	0.0956	0.0767	0.0394	0.0043	2.4635
	Both sexes	0.0991	0.1800	0.2909	0.1969	0.1580	0.0812	0.0089	5.0750
1725-1739	Observed fs	0.0222	0.0955	0.1219	0.1162	0.0585	0.0238	0.0048	
	P/F	1.0015	1.3645	1.1564	1.0475	0.9493	0.9118	0.8930	
	Adj. fs	0.0237	0.3303	0.1410	0.1217	0.0555	0.0217	0.0043	2.4910
	SR=1.06, fd	0.0224	0.1229	0.1330	0.1148	0.0524	0.0205	0.0041	2.3505
	Both sexes	0.0461	0.2532	0.2740	0.2365	0.1079	0.0422	0.0084	4.8415
1740-1754	Observed fs	0.0891	0.1108	0.11371	0.1010	0.1084	0.0453	0.0044	
	P/F	1.0135	1.0499	1.0293	0.9554	0.9314	0.8714	0.8451	
	Adj. fs	0.0903	0.1163	0.1411	0.0965	0.1010	0.0395	0.0037	2.9420
	SR=1.06, fd	0.0852	0.1097	0.1331	0.0910	0.0953	0.0373	0.0035	2.7755
	Both sexes	0.1755	0.2260	0.2742	0.1875	0.1965	0.0768	0.0072	5.7175
1755-1769	Observed fs	0.0687	0.0934	0.1146	0.0991	0.1049	0.0431	0.0074	
	P/F	1.0005	1.0734	1.0329	0.9398	0.8724	0.8008	0.7739	
	Adj. fs	0.0687	0.1003	0.1184	0.0931	0.0915	0.0345	0.0057	2.5610
	SR=1.06, fd	0.0648	0.0946	0.1117	0.0878	0.0863	0.0325	0.0054	2.4155
	Both sexes	0.1335	0.1949	0.2301	0.1809	0.1778	0.0670	0.0111	4.9765
1770-1784	Observed fs	0.0782	0.1143	0.1253	0.1157	0.1210	0.0472	0.0085	
	P/F	1.0004	1.0811	1.0080	0.9268	0.8522	0.7808	0.7560	
	Adj. fs	0.0782	0.1236	0.1263	0.1072	0.1031	0.0369	0.0064	2.9085
	SR=1.06, fd	0.0738	0.1166	0.1192	0.1011	0.0973	0.0348	0.0060	2.7440
	Both sexes	0.1520	0.2402	0.2455	0.2083	0.2004	0.0717	0.0214	5.6525
1785-1799	Observed fs	0.0591	0.1162	0.1362	0.1405	0.0817	0.0449	0.0033	
	P/F	1.0598	1.1674	1.0851	0.9579	0.8600	0.8069	0.7810	
	Adj. fs	0.0626	0.1357	0.1478	0.1346	0.0703	0.0362	0.0026	2.9490
	SR=1.06, fd	0.0591	0.1280	0.1394	0.1270	0.0663	0.0342	0.0025	2.7825
	Both sexes	0.1217	0.2637	0.2872	0.2616	0.1366	0.0704	0.0051	5.7315
1800-1814	Observed fs	0.0666	0.1118	0.1463	0.1453	0.0813	0.0426	0.0127	
	P/F	1.0205	1.0996	1.0093	0.8763	0.7754	0.7307	0.7069	
	Adj. fs	0.0680	0.1229	0.1477	0.1273	0.0630	0.0311	0.0090	2.8450
	SR=1.06, fd	0.0642	0.1159	0.1393	0.1201	0.0594	0.0293	0.0085	2.6835
	Both sexes	0.1322	0.2388	0.2780	0.2474	0.1224	0.0604	0.0175	5.5285
1815-1829	Observed fs	0.0749	0.1404	0.1386	0.1108	0.0899	0.0258	0.0063	
	P/F	1.0187	1.1299	0.9737	0.8675	0.7926	0.7425	0.7257	
	Adj. fs	0.0763	0.1586	0.1350	0.0961	0.0713	0.0192	0.0046	2.8055
	SR=1.06, fd	0.0720	0.1496	0.1274	0.0907	0.0673	0.0181	0.0043	2.6470
	Both sexes	0.1483	0.3082	0.2624	0.1868	0.1386	0.0373	0.0089	5.4525

Table 8 (continued)

Hsü

Cohort	Measure	Age							Total
		15-19	20-24	25-29	30-34	35-39	40-44	45-549	
1680-1694	Observed fs	0.0409	0.1154	0.1344	0.0950	0.0551	0.0228	0.0166	
	P/F	0.9992	1.2539	1.0903	0.9738	0.9108	0.8749	0.8597	
	Adj. fs	0.0409	0.1447	0.1465	0.0925	0.0502	0.0199	0.0143	2.5450
	SR=1.06, fd	0.0386	0.1365	0.1382	0.0873	0.0474	0.0188	0.0135	2.4015
	Both sexes	0.0795	0.2813	0.2847	0.1798	0.0976	0.0387	0.0278	4.9465
1695-1709	Observed fs	0.0590	0.0777	0.1531	0.0918	0.0873	0.0478	0.0204	
	P/F	0.9994	1.0536	1.1000	0.9789	0.9378	0.8855	0.8532	
	Adj. fs	0.0590	0.0891	0.1696	0.0899	0.0819	0.0423	0.0174	2.7200
	SR=1.06, fd	0.0557	0.0773	0.1600	0.0848	0.0773	0.0399	0.0164	2.5570
	Both sexes	0.1147	0.1592	0.3296	0.1747	0.1592	0.0822	0.0338	5.2670
1710-1724	Observed fs	0.0914	0.1118	0.1143	0.1100	0.0626	0.0396	-	
	P/F	0.9996	1.0497	1.0099	0.9655	0.9080	0.8739	-	
	Adj. fs	0.0914	0.1174	0.1154	0.1062	0.0568	0.0346	-	2.6090
	SR=1.06, fd	0.0862	0.1108	0.1089	0.1002	0.0536	0.0326	-	2.4615
	Both sexes	0.1776	0.2282	0.2243	0.2064	0.1104	0.0672	-	5.0705
1725-1739	Observed fs	0.0550	0.0978	0.1017	0.0823	0.0878	0.0543	-	
	P/F	1.0000	1.1289	1.0444	0.9824	0.9525	0.8791	-	
	Adj. fs	0.0550	0.1114	0.1062	0.0817	0.0836	0.0477	-	2.4280
	SR=1.06, fd	0.0519	0.1051	0.1002	0.0771	0.0789	0.0450	-	2.2910
	Both sexes	0.1069	0.2165	0.2064	0.1588	0.1625	0.0927	-	4.7190
1740-1754	Observed fs	0.0708	0.0949	0.1163	0.0934	0.1012	0.0495	-	
	P/F	1.0000	1.0673	1.0509	0.9778	0.9433	0.8773	-	
	Adj. fs	0.0708	0.1013	0.1222	0.0913	0.0955	0.0434	-	2.6225
	SR=1.06, fd	0.0668	0.0956	0.1153	0.0861	0.0901	0.0409	-	2.4740
	Both sexes	0.1376	0.1969	0.2375	0.1774	0.1856	0.0843	-	5.0965
1755-1769	Observed fs	0.1186	0.1380	0.1080	0.0890	0.0787	0.0447	-	
	P/F	0.9997	1.0223	0.9389	0.8996	0.8661	0.8181	-	
	Adj. fs	0.1186	0.1396	0.1014	0.0810	0.0682	0.0366	-	2.7225
	SR=1.06, fd	0.1119	0.1317	0.0957	0.0756	0.0643	0.0345	-	2.5685
	Both sexes	0.2305	0.2713	0.1971	0.1557	0.1325	0.0711	-	5.2910
1770-1784	Observed fs	0.1146	0.1315	0.1211	0.1073	0.0848	0.0278	0.0031	
	P/F	1.0003	1.0183	0.9819	0.9315	0.8724	0.8252	0.8094	
	Adj. fs	0.1146	0.1339	0.1189	0.0999	0.0740	0.0229	0.0025	2.8335
	SR=1.06, fd	0.1081	0.1419	0.1122	0.0942	0.0698	0.0216	0.0024	2.7510
	Both sexes	0.2227	0.2758	0.2311	0.1941	0.1438	0.0445	0.0049	5.5845
1785-1799	Observed fs	0.1013	0.1213	0.1097	0.1042	0.0768	0.0390	-	
	P/F	0.9997	1.0205	0.9476	0.9077	0.8545	0.8063	-	
	Adj. fs	0.1013	0.1238	0.1040	0.0946	0.0656	0.0314	-	2.6035
	SR=1.06, fd	0.0956	0.1168	0.0981	0.0892	0.0619	0.0296	-	2.4560
	Both sexes	0.1969	0.2406	0.2021	0.1838	0.1275	0.0610	-	5.0595
1800-1814	Observed fs	0.0716	0.1250	0.1196	0.1271	0.0999	0.0650	-	
	P/F	1.0000	1.1314	1.0067	0.8878	0.7762	0.7100	-	
	Adj. fs	0.0716	0.1414	0.1203	0.1128	0.0775	0.0462	-	2.8490
	SR=1.06, fd	0.0675	0.1334	0.1135	0.1064	0.0731	0.0436	-	2.6875
	Both sexes	0.1391	0.2748	0.2338	0.2192	0.1506	0.0898	-	5.5365
1815-1829	Observed fs	0.0933	0.1256	0.1379	0.1275	0.0924	0.0186	0.0064	
	P/F	0.9996	1.0321	0.9446	0.8285	0.7449	0.6983	0.6873	
	Adj. fs	0.0933	0.1327	0.1303	0.1056	0.0688	0.0130	0.0044	2.7405
	SR=1.06, fd	0.0880	0.1252	0.1229	0.0996	0.0649	0.0123	0.0042	2.5855
	Both sexes	0.1813	0.2579	0.2532	0.2052	0.1337	0.0253	0.0086	5.3260

Table 9: Marital Age-Specific Fertility and Total Fertility of First Wives by Period, Shen and Hsü Clans, 1725-1844

Shen

Period	Measure	Age							Total
		15-19	20-24	25-29	30-34	35-39	40-44	45-549	
1725-1739	Observed fs	0.0510	0.0897	0.1583	0.1010	0.0655	0.0488	0.0073	
	P/F	1.0000	1.1566	1.3605	1.1506	0.9864	0.7742	0.7723	
	Adj. fs	0.0510	0.1037	0.2154	0.1162	0.0646	0.0353	0.0056	2.9590
	SR=1.06, fd	0.0481	0.0978	0.2032	0.1096	0.0609	0.0333	0.0053	2.7910
	Both sexes	0.0991	0.2015	0.4186	0.2258	0.1255	0.0686	0.0109	5.7500
1740-1754	Observed fs	0.0222	0.0959	0.1432	0.1032	0.0973	0.0320	-	
	P/F	1.0015	1.4535	1.1887	1.0119	0.9776	1.0483.	-	
	Adj. fs	0.0222	0.1394	0.1702	0.1044	0.0951	0.0335	-	2.8240
	SR=1.06, fd	0.0209	0.1315	0.1606	0.0985	0.0897	0.0316	-	2.6640
	Both sexes	0.0431	0.2709	0.3308	0.2029	0.1848	0.0651	-	5.4885
1755-1769	Observed fs	0.0891	0.1057	0.1279	0.1162	0.0768	0.0479	0.0055	
	P/F	1.0135	0.9809	0.9347	0.8257	0.7716	0.7701	0.7609	
	Adj. fs	0.0903	0.1037	0.1195	0.0959	0.0593	0.0369	0.0042	2.5490
	SR=1.06, fd	0.0852	0.0978	0.1127	0.0905	0.0559	0.0348	0.0040	2.4045
	Both sexes	0.1755	0.2015	0.2322	0.1864	0.1152	0.0717	0.0082	4.9535
1770-1784	Observed fs	0.0687	0.1035	0.1217	0.1010	0.0838	0.0299	0.0048	
	P/F	1.0005	1.0749	1.0666	1.0715	1.0006	0.9050	0.7699	
	Adj. fs	0.0687	0.1113	0.1298	0.1082	0.0839	0.0271	0.0037	2.6635
	SR=1.06, fd	0.0648	0.1050	0.1225	0.1021	0.0792	0.0256	0.0035	2.5135
	Both sexes	0.1335	0.2163	0.2523	0.2103	0.1631	0.0527	0.0072	5.1770
1785-1799	Observed fs	0.1011	0.1072	0.1131	0.0991	0.1019	0.0332	0.0044	
	P/F	0.7738	0.8870	0.8815	0.8296	0.8560	0.8356	0.8998	
	Adj. fs	0.0782	0.0951	0.0997	0.0822	0.0872	0.0277	0.0040	2.3705
	SR=1.06, fd	0.0738	0.0897	0.0941	0.0775	0.0823	0.0261	0.0038	2.2365
	Both sexes	0.1520	0.1848	0.1938	0.1597	0.1695	0.0538	0.0078	4.6070
1800-1814	Observed fs	0.0591	0.1162	0.1340	0.1157	0.1171	0.0544	0.0074	
	P/F	1.0598	1.2577	1.0896	0.9476	0.8196	0.7331	0.6802	
	Adj. fs	0.0626	0.1461	0.1460	0.1096	0.0960	0.0399	0.0050	3.0260
	SR=1.06, fd	0.0591	0.1378	0.1377	0.1034	0.0906	0.0376	0.0047	2.8545
	Both sexes	0.1217	0.2839	0.2837	0.2130	0.1866	0.0775	0.0097	5.8805
1815-1829	Observed fs	0.0666	0.1173	0.1386	0.1405	0.1147	0.0546	0.0085	
	P/F	1.0205	1.0778	0.9770	0.9320	0.8416	0.7744	0.7197	
	Adj. fs	0.0680	0.1264	0.1354	0.1309	0.0965	0.0437	0.0061	3.0350
	SR=1.06, fd	0.0642	0.1192	0.1277	0.1235	0.0910	0.0412	0.0058	2.8630
	Both sexes	0.1322	0.2456	0.2631	0.2544	0.1875	0.0849	0.0119	5.8980
1830-1844	Observed fs	0.0749	0.1350	0.1393	0.1453	0.0783	0.0392	0.0033	
	P/F	1.0187	1.0971	0.9563	0.8271	0.7464	0.7254	0.7385	
	Adj. fs	0.0763	0.1481	0.1332	0.1202	0.0584	0.0284	0.0024	2.8350
	SR=1.06, fd	0.0720	0.1397	0.1257	0.1134	0.0551	0.0268	0.0023	2.6750
	Both sexes	0.1483	0.2878	0.2589	0.2336	0.1135	0.0552	0.0047	5.5100

Table 9 (Continued)

Hsü

Period	Measure	Age							Total
		15-19	20-24	25-29	30-34	35-39	40-44	45-549	
1725-1739	Observed fs	0.0914	0.1110	0.1349	0.0918	0.0588	0.0217	0.0166	
	P/F	0.9996	0.9556	0.8969	0.8604	0.8350	0.7872	0.7836	
	Adj. fs	0.0914	0.1061	0.1210	0.0790	0.0491	0.0170	0.0130	2.3830
	SR=1.06, fd	0.0862	0.1001	0.1142	0.0745	0.0463	0.0160	0.0123	2.2480
	Both sexes	0.1776	0.2062	0.2352	0.1535	0.0954	0.0330	0.0253	4.6310
1740-1754	Observed fs	0.0550	0.0936	0.1177	0.1100	0.0620	0.0613	0.0204	
	P/F	1.0000	1.2753	1.2328	1.1143	1.0369	0.9391	0.8817	
	Adj. fs	0.0550	0.1194	0.1451	0.1226	0.0643	0.0576	0.0180	2.9100
	SR=1.06, fd	0.0519	0.1126	0.1369	0.1157	0.0607	0.0543	0.0170	2.7455
	Both sexes	0.1069	0.2320	0.2820	0.2383	0.1250	0.1119	0.0350	5.6555
1755-1769	Observed fs	0.0708	0.1056	0.0951	0.0832	0.1051	0.0329	-	
	P/F	1.0000	1.0720	0.9411	0.9332	0.0178	0.9852	-	
	Adj. fs	0.0708	0.1132	0.0895	0.0776	0.1070	0.0324	-	2.4525
	SR=1.06, fd	0.0668	0.1068	0.0844	0.0732	0.1009	0.0306	-	2.3135
	Both sexes	0.1376	0.2200	0.1739	0.1508	0.2079	0.0630	-	4.7660
1770-1784	Observed fs	0.1186	0.1126	0.1208	0.0934	0.0640	0.0547	-	
	P/F	0.9997	0.9414	0.8884	0.8101	0.7727	0.7205	-	
	Adj. fs	0.1186	0.1060	0.1073	0.0757	0.0495	0.0394	-	2.4825
	SR=1.06, fd	0.1119	0.1000	0.1012	0.0714	0.0467	0.0372	-	2.3420
	Both sexes	0.2305	0.2060	0.2085	0.1471	0.0962	0.0766	-	4.8245
1785-1799	Observed fs	0.1146	0.1435	0.1020	0.0890	0.0965	0.0533	-	
	P/F	1.0003	1.0085	0.9390	0.9094	0.8296	0.7854	-	
	Adj. fs	0.1146	0.1447	0.0958	0.0809	0.0801	0.0419	-	2.7900
	SR=1.06, fd	0.1081	0.1365	0.0904	0.0763	0.0756	0.0395	-	2.6320
	Both sexes	0.2227	0.2812	0.1862	0.1572	0.1557	0.0814	-	5.4220
1800-1814	Observed fs	0.1013	0.1276	0.1228	0.1073	0.0849	0.0429	-	
	P/F	0.9997	1.0245	1.0243	0.9662	0.9094	0.7898	-	
	Adj. fs	0.1013	0.1307	0.1246	0.1037	0.0772	0.0339	-	2.8570
	SR=1.06, fd	0.0956	0.1233	0.1175	0.0978	0.0728	0.0320	-	2.6950
	Both sexes	0.1969	0.2540	0.2421	0.2015	0.1500	0.0659	-	5.5520
1815-1829	Observed fs	0.0716	0.1199	0.1180	0.1042	0.0839	0.0230	0.0031	
	P/F	1.0000	1.2338	1.0882	0.9633	0.9444	0.9625	0.9124	
	Adj. fs	0.0716	0.1479	0.1284	0.1004	0.0792	0.0221	0.0030	2.7630
	SR=1.06, fd	0.0675	0.1395	0.1211	0.0947	0.0747	0.0208	0.0028	2.6055
	Both sexes	0.1391	0.2874	0.2495	0.1951	0.1539	0.0429	0.0058	5.3685
1830-1844	Observed fs	0.9333	0.1340	0.1205	0.1271	0.0859	0.0608	-	
	P/F	0.9996	1.0043	0.8809	0.8214	0.7515	0.7004	-	
	Adj. fs	0.0933	0.1346	0.1061	0.1044	0,0646	0.0426	-	2.7280
	SR=1.06, fd	0.0880	0.1270	0.1001	0.0985	0.0609	0.0402	-	2.5735
	Both sexes	0.1813	0.2616	0.2061	0.2029	0.1255	0.0828	-	5.3015

Table 10: Male Age-Specific Fertility Rates for Sons and
Gross Reproductive Rate (GRR) by Cohort, Shen and Hsü Clans, 1680-1829

Shen

Cohort	Measure	Age									GRR
		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	
1680-1694	Obs. fs	.0086	.0483	.0787	.1086	.0844	.0775	.0403	.0177	.0183	
	P/F	-	1.788	1.396	1.267	1.131	1.075	1.017	.988	.972	
	Adj. fs	.0086	.0863	.1098	.1376	.0954	.0834	.0410	.0175	.0178	2.9870
1695-1709	Obs. fs	.0201	.0977	.1038	.1240	.0754	.0654	.0102	-	-	
	P/F	-	1.023	1.255	1.176	1.100	1.047	.994	-	-	
	Adj. fs	.0201	.0999	.1303	.1458	.0830	.0685	.0101	-	-	.27885
1710-1724	Obs. fs	.0098	.0406	.0819	.0993	.0991	.0639	.0388	.0251	.0203	
	P/F	-	1.617	1.417	1.250	1.157	1.068	1.015	.985	.961	
	Adj. fs	.0098	.0657	.1161	.1241	.1146	.0682	.0394	.0247	.0194	2.9100
1725-1739	Obs. fs	.0048	.0380	.0859	.0980	.1095	.0734	.0492	.0395	.0139	
	P/F	-	2.009	1.417	1.260	1.168	1.065	1.012	.978	.951	
	Adj. fs	.0048	.0763	.1217	.1235	.1279	.0782	.0498	.0386	.0132	3.1700
1740-1754	Obs. fs	.0063	.0467	.0632	.0971	.0912	.0651	.0415	.0458	.0181	
	P/F	-	1.962	1.360	1.271	1.152	1.068	.960	.913	.882	
	Adj. fs	.0063	.0916	.0847	.1234	.1051	.0695	.0398	.0418	.0160	2.8910
1755-1769	Obs. fs	.0065	.0545	.0681	.0953	.1039	.0778	.0559	.0357	.0199	
	P/F	-	1.592	1.285	1.202	1.115	1.030	.975	.936	.918	
	Adj. fs	.0065	.0864	.0875	.1146	.1158	.0801	.0545	.0334	.0183	2.9875
1770-1784	Obs. fs	.0083	.0464	.0865	.0899	.1042	.0908	.0788	.0320	.0247	
	P/F	-	1.595	1.373	1.190	1.110	1.024	.948	.888	.867	
	Adj. fs	.0083	.0740	.1188	.1070	.1157	.0930	..0747	.0248	.0214	3.1885
1785-1799	Obs. fs	.0090	.0402	.0847	.1101	.1047	.0874	.0632	.0223	.0135	
	P/F	-	1.630	1.421	1.240	1.111	1.003	.926	.875	.857	
	Adj. fs	.0090	.0655	.1204	.1365	.1163	.0877	.0585	.0195	.0116	3.1250
1800-1814	Obs. fs	.0119	.0525	.1114	.1174	.1047	.0618	.0298	.0231	.0099	
	P/F	-	1.653	1.411	1.184	1.047	.957	.681	.885	.867	
	Adj. fs	.0119	.0868	.1572	.1390	.1096	.0591	.0203	.0204	.0086	3.0645
1815 1829	Obs. fs	.0175	.0545	.0765	.1060	.0882	.0631	.0580	.0255	.0113	
	P/F	-	1.593	1.346	1.215	1.080	.988	.895	.876	.852	
	Adj. fs	.0175	.0868	.1030	.1288	.0953	.0623	.0519	.0223	.0096	2.8875

Table 10 (Continued)

Hsü

Cohort	Measure	Age									GRR
		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	
1680-1694	Obs. fs	.0188	.0465	.0633	.0680	.0773	.0694	.0526	.0252	.0350	
	P/F	-	1.413	1.252	1.165	1.120	1.061	1.006	.961	.949	
	Adj. fs	.0188	.0657	.0793	.0792	.0866	.0736	.0529	.0242	.0332	2.5675
1695-1709	Obs. fs	.0067	.0475	.0647	.0902	.1287	.0763	..0736	.0335	.0052	
	P/F	-	1.605	1.302	1.213	1.177	1.065	1.014	.961	.943	
	Adj. fs	.0067	.0762	.0842	.1084	.1515	.0812	.0746	.0309	.0049	3.0980
1710-1724	Obs. fs	.0149	.0556	.0796	.0686	.1095	.0633	.0372	.0117	.0172	
	P/F	-	1.734	1.426	1.253	1.232	1.113	1.062	1.028	1.018	
	Adj. fs	.0149	.0964	.1135	.0860	.1349	.0705	.0395	.0210	.0175	2.9260
1725-1739	Obs. fs	.0044	.0269	.0534	.0736	.0889	.0769	.0413	.0248	.0145	
	P/F	-	1.828	1.615	1.480	1.383	1,301	1,208	1.165	1.138	
	Adj. fs	.0044	.0492	.0862	.1089	.1234	.1000	.0499	.0289	.1615	2.8370
1740-1754	Obs. fs	.0050	.0242	.0415	.0926	.0918	.0851	.0415	.0304	.0090	
	P/F	-	1.803	1.549	1.503	1.291	1.187	1.095	1.060	1.030	
	Adj. fs	.0050	.0436	.0643	.1392	.1185	.1010	.0454	.0322	.0093	2.7925
1755-1769	Obs. fs	-	.0239	.0674	.0924	.0859	.0620	.0512	.0368	.0050	
	P/F	-	2.158	1.790	1.541	1.383	1.273	1.211	1.156	1.118	
	Adj. fs	-	.0516	.1206	.1424	.1188	.0789	.0620	.0425	.0056	3.1120
1770-1784	Obs. fs	.0040	.0420	.0774	.0883	.0837	.0450	.0401	.0228	.0103	
	P/F	-	2.297	1.830	1.582	1.442	1.321	1.271	1.219	1.184	
	Adj. fs	.0040	.0965	.1416	.1397	.1207	.0594	.0510	.0278	.0122	3.2645
1785-1799	Obs. fs	.0141	.0415	.0651	.0945	.0733	.0632	.0347	.0365	.0058	
	P/F	-	2.026	1.661	1.486	1.308	1.208	1.125	1.094	1.041	
	Adj. fs	.0141	.0841	.1081	.1404	.0959	.0764	.0391	.0399	.0060	3.0200
1800-1814	Obs. fs	.0120	.0396	.0628	.1027	.1017	.0767	.0524	.0194	.0055	
	P/F	-	1.837	1.556	1.362	1.175	1.044	.956	.902	.886	
	Adj. fs	.0120	.0727	.0977	.1399	.1195	1.801	.0501	.0175	.0049	2.9720
1815 1829	Obs. fs	.0122	.0523	.0800	.1091	.0839	.0788	.0354	.0275	.0105	
	P/F	-	1.904	1.528	1.257	1.049	.918	.837	.802	.779	
	Adj. fs	.0122	.0996	.1222	.1371	.0880	.0723	.0296	.0221	.0082	2.9565

Table 11: Male Age-Specific Fertility Rates for Sons and
Gross Reproductive Rate (GRR) by Period, Shen and Hsü Clans, 1725-1844

Cohort	Measure	Age 15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	GRR
Shen											
1725-1739	Obs. fs	.0098	.0603	.0844	.1240	.0598	.0739	.0657	.0335	.0265	
	P/F	-	1.747	1.569	1.521	1.219	1.073	.969	.933	.864	
	Adj. fs	.0098	.1053	.1324	.1886	.0729	.0793	.0636	.0313	.0229	3.5305
1740-1754	Obs. fs	.0048	.0390	.0909	.0993	.0968	.0759	.0102	.0106	.0183	
	P/F	-	1.440	1.545	1.234	1.190	1.229	1.186	1.140	1.054	
	Adj. fs	.0048	.0561	.1404	.1226	.1152	.0933	.0121	.0121	.0193	2.8795
1755-1769	Obs. fs	.0063	.0426	.0733	.0980	.1104	.0582	.0388	.0201	.0035	
	P/F	-	1.657	1.306	1.306	1.133	1.112	1.034	.997	1.089	
	Adj. fs	.0063	.0706	.0957	.1280	.1250	.0647	.0401	.0200	.0038	2.7710
1770-1784	Obs. fs	.0065	.0549	.0669	.0971	.1025	.0792	.0495	.0296	.0243	
	P/F	-	1.850	1.266	1.182	1.151	1.060	1.018	.940	.942	
	Adj. fs	.0065	.1016	.0847	.1148	.1180	.0840	.0504	.0278	.0229	3.0535
1785-1799	Obs. fs	.0083	.0478	.0788	.0953	.0955	.0602	.0415	.0501	.0101	
	P/F	-	1.558	1.317	1.166	1.094	.971	.971	1.013	1.000	
	Adj. fs	.0083	.0745	.1038	.1111	.1044	.0584	.0403	.0508	.0101	2.8085
1800-1814	Obs. fs	.0090	.0478	.0826	.0899	.1096	.0972	.0559	.0270	.0218	
	P/F	-	1.633	1.435	1.201	1.129	1.028	.913	.846	.776	
	Adj. fs	.0090	.0781	.1185	.1080	.1238	.0999	.0510	.0228	.0169	3.1400
1815-1829	Obs. fs	.0352	.0432	.0858	.1101	.0968	.0794	.0788	.0414	.0213	
	P/F	-	1.014	1.066	1.077	1.020	.958	.902	.855	.846	
	Adj. fs	.0352	.0438	.0915	.1185	.0987	.0761	.0711	.0354	.0180	2.9415
1830-1844	Obs. fs	.0175	.0564	.1047	.1174	.1227	.0838	.0632	.0231	.0196	
	P/F	-	1.560	1.402	1.171	.955	.840	.812	.801	.786	
	Adj. fs	.0175	.0880	.1468	.1375	.1172	.0704	.0513	.0185	.0154	3.3130
Hsü											
1725-1739	Obs. fs	.0177	.0614	.0773	.0902	.1151	.0298	.0526	.0091	-	
	P/F	-	1.472	1.168	.998	1.034	.804	.891	.949	.965	
	Adj. fs	.0177	.0904	.0903	.0901	.1190	.0239	.0469	.0086	-	2.4345
1740-1754	Obs. fs	.0044	.0413	.0670	.0686	.1091	.0910	.0730	.0413	.0470	
	P/F	-	2.040	1.814	1.558	1.365	1.223	1.093	.941	.795	
	Adj. fs	.0044	.0843	.1216	.1069	.1489	.1113	.0798	.0388	.0374	3.6670
1755-1769	Obs. fs	.0050	.0265	.0519	.0736	.0990	.0694	.0372	.0128	.0224	
	P/F	-	1.767	1.509	1.495	1.504	1.480	1.264	1.249	1.283	
	Adj. fs	.0050	.0468	.0783	.1101	.1489	.1027	.0470	.0160	.0287	2.9175
1770-1784	Obs. fs	-	.0169	.0480	.0926	.0770	.0763	.0413	.0228	.0040	
	P/F	-	2.270	2.031	1.576	1.309	1.231	1.256	1.198	1.298	
	Adj. fs	-	.0384	.0975	.1459	.1008	.0939	.0519	.0273	.0052	2.8045
1785-1799	Obs. fs	.0040	.0369	.0701	.0924	.0883	.0748	.0415	.0248	.0139	
	P/F	-	2.178	1.488	1.358	1.192	1.107	1.021	1.007	.955	
	Adj. fs	.0040	.0804	.1043	.1255	.1053	.0828	.0424	.0250	.0133	2.9150
1800-1814	Obs. fs	.0141	.0495	.0786	.0883	.0846	.0588	.0512	.0481	.0057	
	P/F	-	1.766	1.636	1.429	1.312	1.137	1.040	.994	.939	
	Adj. fs	.0141	.0874	.1286	.1262	.1110	.0668	.1533	.0478	.0054	3.2030
1815-1829	Obs. fs	.0120	.0283	.0544	.0945	.0827	.0454	.0401	.0210	.0074	
	P/F	-	2.115	1.294	1.741	1.528	1.432	1.357	1.310	1.240	
	Adj. fs	.0120	.0599	.0704	.1645	.1264	.0650	.0544	.0275	.0092	2.9465
1830-1844	Obs. fs	.0122	.0554	.0739	.1027	.0927	.0686	.0347	.0296	.0103	
	P/F	-	1.907	1.428	1.180	1.039	1.014	.983	1.012	1.001	
	Adj. fs	.0122	.1057	.1055	.1431	.0964	.0696	.0341	.0299	.0103	3.0340

One conclusion to be drawn from Tables 8-11 is that the fertility of the Shen and Hsü clans was quite similar and conformed closely to the age pattern found in human populations in general. Not only does this give us confidence in our sources, but our estimate of marital fertility is remarkably close to that obtained by the Princeton group. Like the wives of the Chinese farmers included in Buck's surveys, the women taken as first wives by the Shen and Hsü clans bore an average of five children.[19] Taken together with the stability displayed by both male and female fertility rates, this finding argues that Chinese reproductive behavior did not change markedly until the introduction of family planning in the 1950's. Considering the massive and often violent social changes that shook Chinese society in the eighteenth and nineteenth centuries, one expects to find sharp fluctuations in fertility. What one finds in fact is impressive continuity.

Mortality

As we have seen, patrilineal descent did not ensure a person a place in his or her father's genealogy. Sons were certain of notice only if they survived to age 15, and daughters were normally excluded no matter how long they lived. Thus we have no choice but to base our estimates of male mortality on the experience of those men who survived to age 15, and our estimates of female mortality on the experience of the only women regularly noted in the genealogies, their wives.

To estimate mortality with these data I first organized my population into five-year birth cohorts and then assigned all deaths to one of 14 five-year age groups (15-19 to 80 and above). There were, of course, a number of persons whose exact age at death could not be determined. Under what I term the low-mortality condition, they were assigned to the age groups 60-64 and above, with the undated deaths distributed across the age classes in the same proportions as the dated deaths. Under the alternative high-mortality condition, the undated deaths were assigned to the age groups fewer than 60, and again the distribution of the undated deaths followed that of the dated deaths.[20] Where the number of undated deaths is small, as it is for the

[19] Barclay et al., p. 614, Table 5.

[20] For a description of the method see Louis Henry, *Manuel de demographie historique* (Genève-Paris, 1970), pp. 113-115; E. A. Wrigley, "Mortality in Pre-Industrial England: The Example of Colyton, Devon, Over Three Centuries," *Daedalus* (Spring 1968), pp. 553-555.
The result obtained for the Shen wives born in the years 1760-64 are given in the accompanying table.

Age	Known	Unknown	Low	High	Age	Known	Unknown	Low	High
15-19	0	1	0	1	50-54	7	-	7	10
20-24	3	0	3	3	55-59	2	-	2	3
25-29	3	3	3	4	60-64	10	-	12	10
30-34	4	3	4	5	65-69	12	-	15	12
35-39	4	1	4	5	70-74	13	-	16	13
40-44	3	2	3	4	75-79	3	-	4	3
45-49	3	-	3	4	80+	6	-	7	6

cohorts born before 1760, I have based my final calculations on dated death only. Where the number of undated deaths is larger, I have taken the average of the values obtained under the high and low mortality conditions. This has the effect of modifying an otherwise unbelievably sharp increase in mortality in the late eighteenth and early nineteenth centuries.

Having assigned all the people in my sample to birth cohorts and their deaths to age groups, I then proceeded to construct life tables for the males and females in each of the clans. The actual numbers employed in calculating the q_x (probability of dying) values of the Shen males are given in Table 12 by way of illustration.[21]

Table 12: Observed Number of Deaths in the Shen Clan by Age and Cohort

Cohort: 1650-54, 1655-59, 1660-64, 1665-69, 1670-74, 1675-79, 1680-84, 1685-89, 1690-94, 1695-99, 1700-04, 1705-09, 1710-14, 1715-19

Age	1730-34	1735-39	1740-44	1745-49	1750-54	1755-59	1760-64	1765-69	1770-74	1775-79	1780-84	1785-89	1790-94	1795-99	1800-04	1805-09
80	/ 0	0 / 1	1 / 2	2 / 1	1 / 2	2 / 1	1 / 0	0 / 5	5 / 3	3 / 2	2 / 1	1 / 2	2 / 3	3 / 3	3 / 8	8 /
75	/ 4	3 / 4	2 / 2	1 / 2	0 / 2	1 / 1	1 / 7	2 / 5	2 / 5	3 / 4	3 / 7	5 / 8	5 / 7	4 / 12	4 / 8	5 /
70	/ 7	3 / 5	3 / 3	1 / 7	5 / 4	3 / 11	4 / 7	2 / 7	2 / 5	1 / 12	5 / 15	7 / 10	3 / 21	9 / 14	6 / 12	3 /
65	/ 6	1 / 4	1 / 10	3 / 6	2 / 14	3 / 10	3 / 9	2 / 11	6 / 13	1 / 18	3 / 12	2 / 30	9 / 22	8 / 20	8 / 21	9 /
60	/ 6	2 / 15	5 / 12	6 / 15	1 / 12	2 / 10	1 / 16	5 / 17	4 / 20	2 / 16	4 / 37	7 / 29	7 / 31	11 / 26	5 / 24	7 /
55	/ 19	4 / 14	2 / 19	4 / 19	7 / 19	9 / 20	4 / 22	5 / 25	5 / 20	4 / 44	7 / 35	6 / 41	10 / 33	7 / 36	12 / 36	11 /
50	/ 18	4 / 22	3 / 21	2 / 20	1 / 24	4 / 25	3 / 26	1 / 25	5 / 49	5 / 41	6 / 45	4 / 39	6 / 47	11 / 39	3 / 54	15 /
45	/ 24	2 / 24	3 / 28	8 / 24	0 / 27	2 / 30	4 / 30	5 / 52	3 / 49	8 / 51	6 / 45	6 / 52	5 / 48	9 / 62	8 / 57	5 /
40	/ 28	4 / 29	1 / 27	3 / 31	4 / 31	1 / 31	1 / 54	2 / 55	6 / 52	1 / 51	6 / 56	4 / 54	6 / 66	4 / 62	5 / 82	9 /
35	/ 31	2 / 29	2 / 34	3 / 33	2 / 35	4 / 58	4 / 63	8 / 59	7 / 54	3 / 56	0 / 55	1 / 72	6 / 70	8 / 86	4 / 76	5 /
30	/ 31	2 / 38	4 / 36	3 / 36	1 / 62	4 / 65	2 / 61	2 / 55	1 / 59	3 / 58	3 / 76	4 / 75	5 / 89	3 / 80	4 / 85	3 /
25	/ 39	1 / 39	3 / 38	2 / 63	1 / 67	2 / 63	2 / 59	4 / 61	2 / 59	1 / 78	2 / 75	0 / 94	5 / 84	4 / 86	1 / 82	3 /
20	/ 42	3 / 39	1 / 64	1 / 67	0 / 63	0 / 62	3 / 64	3 / 59	0 / 79	1 / 76	1 / 96	2 / 86	2 / 89	3 / 83	0 / 89	1 /
15	/ 39	0 / 67	3 / 69	2 / 66	3 / 62	0 / 64	0 / 59	0 / 89	1 / 77	1 / 97	1 / 87	1 / 90	1 / 83	1 / 90	1 / 85	2 /

Period of observation

The figures shown in each parallelogram are the number of persons surviving to that age and the number of deaths occurring during the age interval. Though life tables based on q_x values of each cohort might have revealed interesting temporal trends, I

[21] The method employed is described in Henry, p. 108.

did not prepare such refined figures for this paper. Instead, I bunched cohorts and periods in groups of three and took the average value. This had the advantage of smoothing the mortality schedules, but further graduation was required before I could proceed. This was accomplished by applying the polynomial function:
$\log q_x = a + bx + bx^2$.[22]

When these procedures produced what appear to be regular and plausible adult mortality estimates for both the Shen and Hsü clans, I was encouraged to try to estimate child mortality by extrapolating backward for the adult q_x values. I first selected from the Coale and Demeny series two model life tables for each set of adult q_x values, and then estimated childhood values on the basis of the observed values of the adults.[23] In most cases I accepted the observed values for persons over age 15 and extrapolated the values of those under 15, but in a few cases the observed values for persons aged 15-19 and 20-24 appeared too low, probably because people who died unmarried at these young ages were never recorded. In these cases I took age 30 as my empirical base and estimated the q_x values for all persons under 30.

The results obtained for the Shen and Hsü clans are presented in full detail in Tables 13-16, but the reader who is not adept at visualizing the shape of q_x curves should look first at Figures 4 and 5. These figures compare the observed values of one cohort and one period with the corresponding life table values. Generally speaking, the two curves are very similar, but note that the observed values usually rise above the life table values after age 45. This could be an artifact introduced by the polynomial chosen to smooth the mortality schedules; but there is also the possibility that as the population of China grew and pressed on available resources, the elderly were the first to suffer the consequences.[24] I hope to explore this hypothesis in my future research.[25]

Figure 6 compares male and female mortality for selected cohorts and periods. Whether the comparison is made in terms of cohorts or periods, the data say that adult males had far lower chances of surviving to the next age interval than adult females. But for children the situation is less clear. With the striking exception of the Hsü clan in the years 1725-39, the period comparisons say that male mortality exceeded female mortality at most ages up to about 18, but the cohort comparisons argue for the

---

[22] I use this equation because it was employed in another study of Chinese genealogies. See I-chin Yüan, "Life Tables for a Southern Chinese Family from 1365 to 1849," *Human Biology*, 3.2 (1931): 157-179.

[23] Ansley J. Coale and Paul Demeny, *Regional Model Life Tables and Stable Populations* (Princeton, N. J., 1968).

[24] For discussion of food supply during this period, see Ping-ti Ho, *Studies on the Population of China, 1368-1953* (Cambridge, Mass., 1959), pp. 169-19; and Dwight H. Perkins, *Agricultural Development in China, 1368-1968* (Cambridge, Mass., 1969), pp. 13-19.

[25] Suffice it to note here that Taiwan life Tables show a sharp rise in mortality after age 45. See Department of Statistics of Provincial Government of Taiwan, *Life Tables of Taiwan, 1936-1949*, p. 30.

opposite conclusion. Why this difference exists is not clear. All I can do at present is to remind the reader that whereas the adult comparisons are based on observed values, the child comparisons are based on extrapolations from model life tables. The dilemma could probably be resolved by obtaining better estimates of childhood mortality.

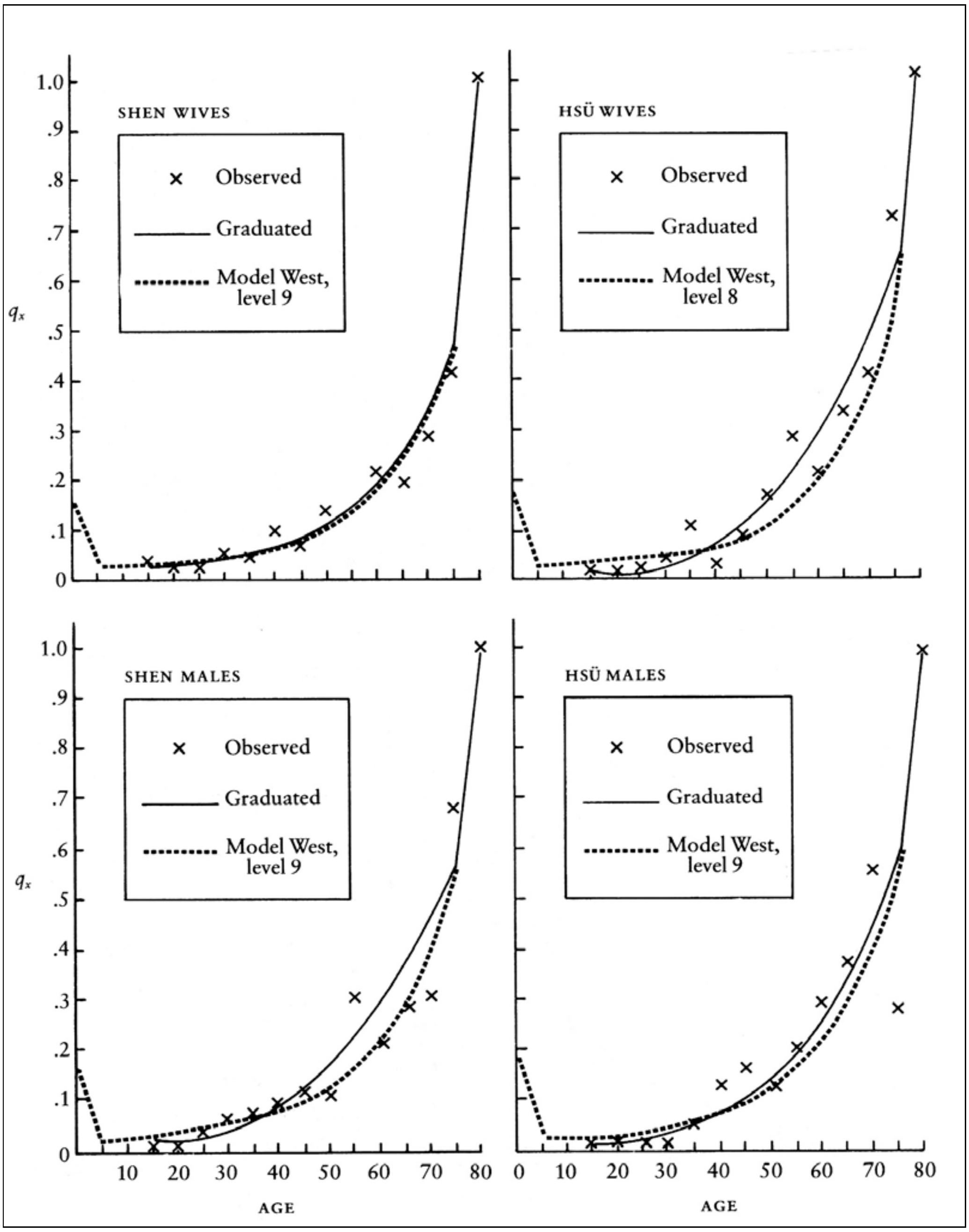


Figure 4: Mortality curves (q_x), Shen and Hsü clans, for 1695-1709 cohorts

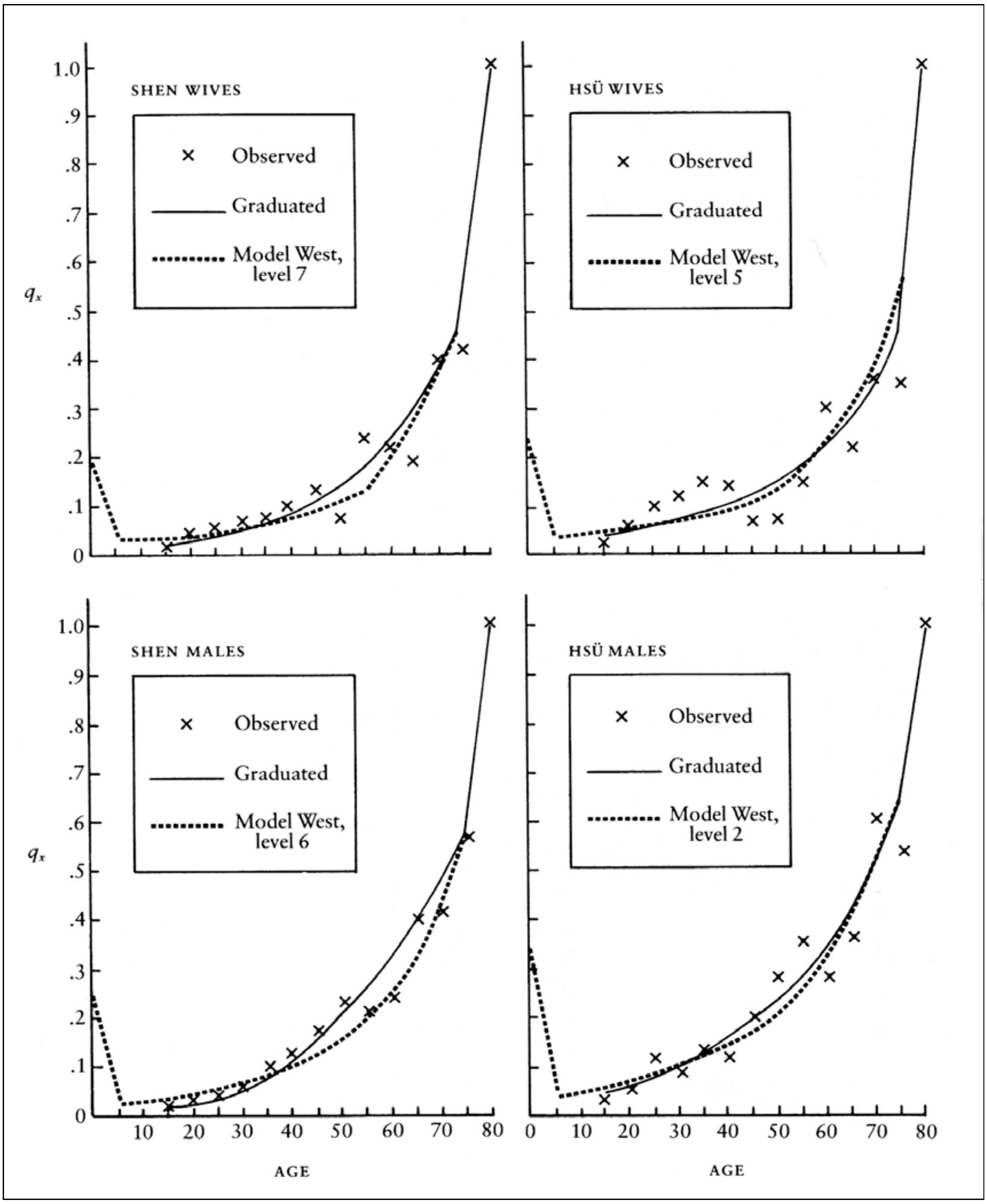
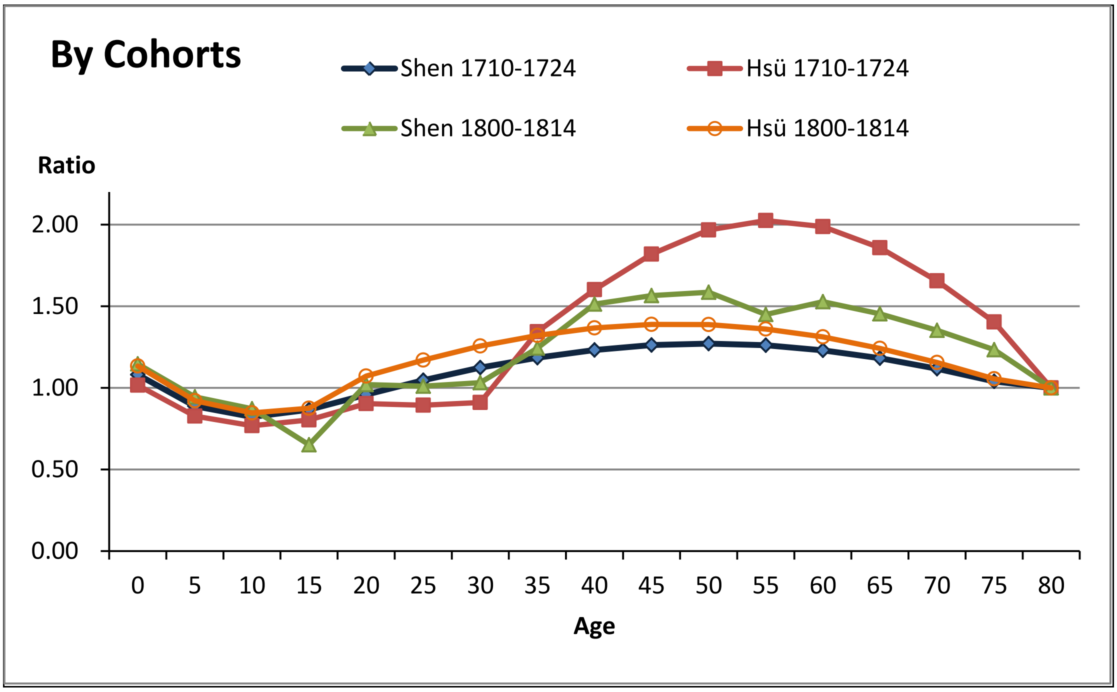


Figure 5: Mortality curves (q_x), Shen and Hsü clans, for the period 1830-1844



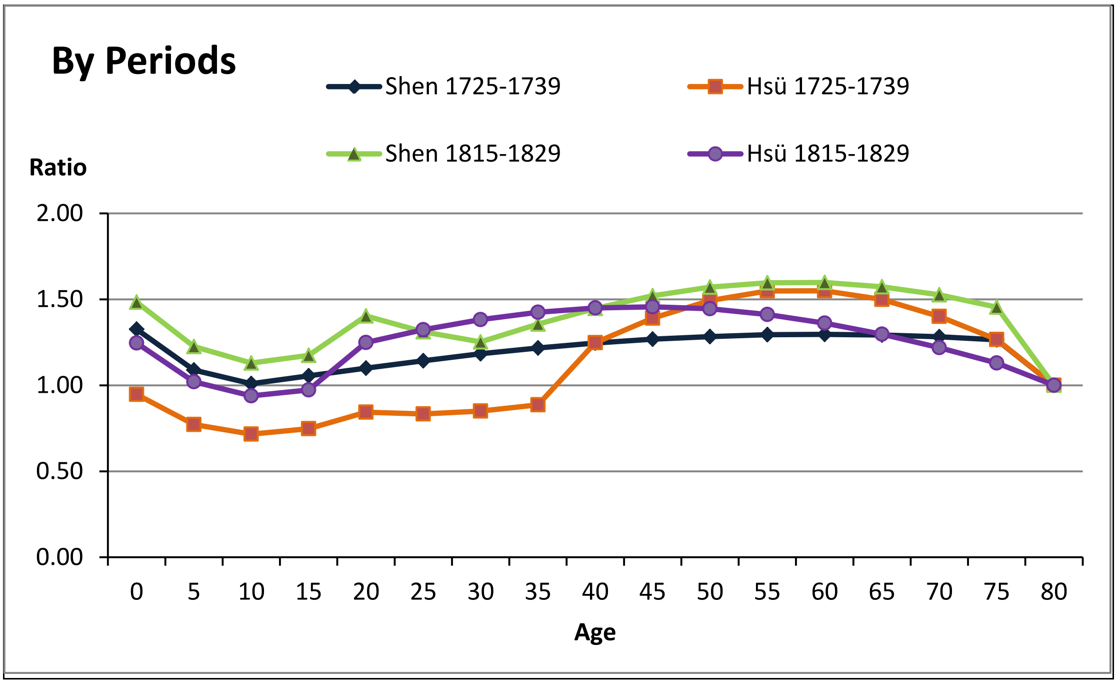


Figure 6: Excessive male mortality (q_x Male / *qx* Female), for selected cohorts and periods, Shen and Hsü clans, 1710-1829

Table 13: Probability of Dying (q_x) for Females by Age Groups and Cohort, Shen and Hsü Clans, 1680-1829

Age	Cohort									
	1680-1694	1695-1709	1710-1724	1725-1739	1740-1754	1755-1769	1770-1784	1785-1799	1800-1814	1815-1829
Shen										
0-1	0.1218	0.1525	0.1770	0.1051	0.1093	0.1041	0.1650	0.1829	0.1992	0.1064
1-4	0.0802	0.1003	0.1145	0.0680	0.0707	0.0695	0.1117	0.1252	0.1330	0.0728
5-9	0.0231	0.0288	0.0331	0.0197	0.0205	0.0199	0.0318	0.0355	0.0381	0.0207
10-14	0.0180	0.0225	0.0259	0.0153	0.0161	0.0155	0.0248	0.0278	0.0297	0.0161
15-19	0.0239	0.0303	0.0345	0.0205	0.0213	0.0205	0.0327	0.0364	0.0393	0.0212
20-24	0.0301	0.0346	0.0359	0.0259	0.0259	0.0258	0.0390	0.0438	0.0494	0.0265
25-29	0.0339	0.0402	0.0385	0.0292	0.0318	0.0343	0.0468	0.0530	0.0555	0.0382
30-34	0.0436	0.0476	0.0428	0.0330	0.0396	0.0454	0.0568	0.0646	0.0627	0.0543
35-39	0.0565	0.0573	0.0492	0.0457	0.0499	0.0599	0.0693	0.0794	0.0692	0.0760
40-44	0.0738	0.0702	0.0585	0.0628	0.0637	0.0787	0.0855	0.0981	0.0752	0.1048
45-49	0.0971	0.0875	0.0719	0.0857	0.0822	0.1030	0.1063	0.1224	0.0956	0.1425
50-54	0.1286	0.1110	0.0914	0.1164	0.1074	0.1343	0.1333	0.1536	0.1234	0.1909
55-59	0.1718	0.1432	0.1202	0.1572	0.1419	0.1746	0.1684	0.1943	0.1618	0.2520
60-64	0.2310	0.1880	0.1636	0.2109	0.1897	0.2260	0.2148	0.2478	0.2154	0.3282
65-69	0.3131	0.2513	0.2301	0.2813	0.2569	0.2917	0.2760	0.3182	0.2914	0.4206
70-74	0.4278	0.316	0.3348	0.3726	0.3516	0.3749	0.3580	0.4114	0.4004	0.5321
75-79	0.5891	0.4723	0.5040	0.4911	0.4872	0.4799	0.4681	0.5357	0.5587	0.6623
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	9-10	9-10	9-10	9-10	9-10	8-9	7-8	6-7	8-9	6-7
Hsü										
0-1	0.1253	0.1269	0.1213	0.1322	0.2304	0.1293	0.1045	0.2540	0.2835	0.1886
1-4	0.0837	0.0848	0.0810	0.0894	0.1577	0.0864	0.0698	0.1772	0.1995	0.1316
5-9	0.0239	0.0243	0.0232	0.0255	0.0448	0.0247	0.0200	0.0500	0.0561	0.0371
10-14	0.0187	0.0189	0.0181	0.0199	0.0350	0.0193	0.0156	0.1309	0.0438	0.0290
15-19	0.0247	0.0250	0.0239	0.0261	0.0459	0.0255	0.0206	0.0509	0.0570	0.0378
20-24	0.0310	0.0314	0.0301	0.0328	0.0574	0.0314	0.0259	0.0635	0.0660	0.0464
25-29	0.0348	0.0353	0.0338	0.0420	0.0593	0.0390	0.0344	0.0687	0.0768	0.0572
30-34	0.0393	0.0399	0.0382	0.0538	0.0633	0.0486	0.0456	0.0763	0.0899	0.0707
35-39	0.0434	0.0441	0.0421	0.0690	0.0697	0.0611	0.0606	0.0868	0.1061	0.0879
40-44	0.0472	0.0689	0.0553	0.0885	0.0794	0.0773	0.0805	0.1014	0.1259	0.1097
45-49	0.0614	0.1043	0.0733	0.1136	0.0932	0.0983	0.1070	0.1217	0.1503	0.1373
50-54	0.0824	0.1527	0.0982	0.1460	0.1132	0.1259	0.1424	0.1497	0.1805	0.1727
55-59	0.1145	0.2163	0.1329	0.1876	0.1419	0.1621	0.1895	0.1890	0.2180	0.2182
60-64	0.1643	0.2967	0.1815	0.2413	0.1839	0.2103	0.2523	0.2446	0.2650	0.2769
65-69	0.2436	0.3937	0.2505	0.3105	0.2461	0.2744	0.3362	0.3253	0.3243	0.3532
70-74	0.3734	0.5056	0.3495	0.3998	0.3399	0.3605	0.4479	0.4435	0.3989	0.4511
75-79	0.5915	0.6287	0.4926	0.5152	0.4852	0.4761	0.5975	0.6202	0.4941	0.5792
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	8-9	8-9	8-9	7-8	6-7	8-9	8-9	4-5	3-4	4-5

Table 14: Probability of Dying (q_x) for Females by Age Groups and Period, Shen and Hsü Clans, 1725-1844

Age	Period							
	1725-1739	1740-1754	1755-1769	1770-1784	1785-1799	1800-1814	1815-1829	1830-1844
Shen								
0-1	0.1489	0.1270	0.1221	0.1102	0.1660	0.1922	0.1603	0.1448
1-4	0.0980	0.0806	0.0790	0.0713	0.1123	0.1284	0.1070	0.0980
5-9	0.0282	0.0231	0.0229	0.0206	0.0320	0.0367	0.0306	0.0279
10-14	0.0220	0.0180	0.0178	0.0161	0.0250	0.0278	0.0239	0.0218
15-19	0.0292	0.0238	0.0238	0.0215	0.0329	0.0379	0.0316	0.0287
20-24	0.0339	0.0299	0.0275	0.0272	0.0383	0.0421	0.0374	0.0360
25-29	0.0400	0.0336	0.0325	0.0306	0.0452	0.0477	0.0446	0.0453
30-34	0.0478	0.0380	0.0392	0.0375	0.0540	0.0550	0.0538	0.0570
35-39	0.0581	0.0539	0.0482	0.0467	0.0656	0.0646	0.0657	0.0720
40-44	0.0716	0.0754	0.0604	0.0589	0.0809	0.0774	0.0809	0.0911
45-49	0.0897	0.1042	0.0773	0.0754	0.1012	0.0946	0.1007	0.1155
50-54	0.1141	0.1423	0.1009	0.0979	0.1286	0.1176	0.1268	0.1466
55-59	0.1472	0.1919	0.1341	0.1289	0.1658	0.1491	0.1612	0.1863
60-64	0.1928	0.2554	0.1820	0.1722	0.2167	0.1928	0.2072	0.2371
65-69	0.2564	0.3355	0.3518	0.2331	0.2879	0.2538	0.2690	0.3024
70-74	0.3461	0.4356	0.3556	0.3204	0.3882	0.3406	0.3527	0.3863
75-79	0.4743	0.5582	0.5122	0.4466	0.5309	0.4657	0.4676	0.4046
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	9-10	9-10	9-10	9-10	7-8	8-9	8-9	7-8
Hsü								
0-1	0.1444	0.1444	0.1512	0.1817	0.1521	0.2690	0.2246	0.2352
1-4	0.0964	0.0964	0.1010	0.1229	0.1016	0.1604	0.1537	0.1626
5-9	0.0276	0.0276	0.0289	0.0350	0.0291	0.0426	0.0436	0.0460
10-14	0.0215	0.0215	0.0225	0.0274	0.0227	0.0307	0.0341	0.0359
15-19	0.0285	0.0285	0.0298	0.0360	0.0299	0.0429	0.0447	0.0470
20-24	0.0358	0.0358	0.0342	0.0424	0.0377	0.0593	0.0494	0.0587
25-29	0.0402	0.0402	0.0401	0.0504	0.0423	0.0662	0.0556	0.0661
30-34	0.0454	0.0454	0.0477	0.0608	0.0478	0.0700	0.0638	0.0755
35-39	0.0501	0.0501	0.0578	0.0741	0.0527	0.0766	0.0746	0.0874
40-44	0.0545	0.0545	0.0714	0.0917	0.0643	0.0868	0.0889	0.1025
45-49	0.0728	0.0719	0.0896	0.1148	0.0800	0.1017	0.1079	0.1219
50-54	0.0978	0.0963	0.1145	0.1455	0.1016	0.1235	0.1334	0.1470
55-59	0.1319	0.1309	0.1489	0.1869	0.1317	0.1552	0.1683	0.1796
60-64	0.1790	0.1806	0.1970	0.2429	0.1741	0.2018	0.2163	0.2222
65-69	0.2438	0.2530	0.2653	0.3201	0.2345	0.2717	0.2830	0.2788
70-74	0.3338	0.3598	0.3637	0.4265	0.3227	0.3787	0.3775	0.3545
75-79	0.4579	0.5194	0.5074	0.5763	0.4524	0.5466	0.5137	0.4570
0.457080+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	8-9	8-9	8-9	7-8	8-9	5-6	6-7	5-6

Table 15: Probability of Dying (q_x) for Males by Age Groups and Cohort, Shen and Hsü Clans, 1680-1829

Age	Cohort									
	1680-1694	1695-1709	1710-1724	1725-1739	1740-1754	1755-1769	1770-1784	1785-1799	1800-1814	1815-1829
Shen										
0-1	0.1495	0.1274	0.1914	0.1644	0.1253	0.1569	0.1782	0.2026	0.2284	0.2065
1-4	0.0830	0.0708	0.1063	0.0930	0.0709	0.0887	0.1038	0.1195	0.1347	0.1244
5-9	0.0229	0.0195	0.0294	0.0254	0.0194	0.0243	0.0279	0.0319	0.0360	0.0328
10-14	0.0166	0.0142	0.0213	0.0184	0.0140	0.0176	0.0201	0.0230	0.0259	0.0236
15-19	0.0234	0.0199	0.0299	0.0257	0.0196	0.0245	0.0278	0.0316	0.0256	0.0321
20-24	0.0331	0.0282	0.0344	0.0364	0.0278	0.0347	0.0394	0.0447	0.0504	0.0455
25-29	0.0365	0.0312	0.0403	0.0403	0.0307	0.0384	0.0438	0.0498	0.0561	0.0509
30-34	0.0420	0.0358	0.0481	0.0463	0.0353	0.0442	0.0504	0.0574	0.0647	0.0587
35-39	0.0568	0.0563	0.0583	0.0624	0.0561	0.0630	0.0739	0.0831	0.0861	0.0928
40-44	0.0766	0.0851	0.0721	0.0837	0.0864	0.0885	0.1055	0.1175	0.1138	0.1400
45-49	0.1035	0.1241	0.0908	0.1121	0.1286	0.1227	0.1464	0.1623	0.1497	0.2018
50-54	0.1394	0.1744	0.1162	0.1495	0.1852	0.1676	0.1978	0.2191	0.1957	0.2777
55-59	0.1878	0.2364	0.1516	0.1988	0.2582	0.2253	0.2602	0.2890	0.2346	0.3645
60-64	0.2528	0.3091	0.2012	0.2639	0.3481	0.2990	0.3332	0.3723	0.3292	0.4570
65-69	0.3399	0.3890	0.2719	0.3488	0.4542	0.3906	0.4256	0.4690	0.4235	0.5471
70-74	0.4570	0.4723	0.3741	0.4602	0.5729	0.5035	0.5045	0.5775	0.5417	0.6250
75-79	0.6132	0.5532	0.5241	0.6053	0.6997	0.6395	0.5963	0.6941	0.6893	0.6818
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	9-10	9-10	9-10	9-10	9-10	9-10	7-8	6-7	6-7	6-7
Hsü										
0-1	0.1093	0.1253	0.1233	0.1602	0.1280	0.1577	0.2192	0.1888	0.3215	0.3281
1-4	0.0619	0.0696	0.0708	0.0933	0.0746	0.0906	0.1320	0.1147	0.1983	0.1994
5-9	0.0169	0.0192	0.0192	0.0251	0.0200	0.0246	0.0349	0.0301	0.0517	0.0524
10-14	0.0123	0.0139	0.0139	0.0181	0.0145	0.0178	0.0251	0.0217	0.0371	0.0376
15-19	0.0171	0.0196	0.0192	0.0250	0.0199	0.0246	0.0341	0.0293	0.0499	0.0510
20-24	0.0239	0.0277	0.0272	0.0354	0.0283	0.0320	0.0453	0.0416	0.0708	0.0723
25-29	0.0338	0.0306	0.0302	0.0393	0.0314	0.0416	0.0598	0.0596	0.0899	0.0834
30-34	0.0389	0.0352	0.0348	0.0453	0.0362	0.0543	0.0785	0.0835	0.1130	0.0972
35-39	0.0458	0.0515	0.0566	0.0673	0.0602	0.0709	0.1025	0.1148	0.1402	0.1145
40-44	0.0559	0.0740	0.0886	0.0975	0.0949	0.0928	0.1331	0.1544	0.1722	0.1361
45-49	0.0857	0.1044	0.1334	0.1380	0.1427	0.1217	0.1722	0.2037	0.2088	0.1634
50-54	0.1266	0.1448	0.1932	0.1905	0.2039	0.1599	0.2215	0.2631	0.2505	0.1982
55-59	0.1797	0.1973	0.2692	0.2569	0.2772	0.2105	0.2833	0.3328	0.2967	0.2426
60-64	0.2453	0.2642	0.3609	0.3379	0.3584	0.2777	0.3605	0.4127	0.3478	0.3002
65-69	0.3220	0.3474	0.4657	0.4338	0.4413	0.3671	0.4565	0.5010	0.4029	0.3753
70-74	0.4065	0.4488	0.5786	0.5433	0.5163	0.4867	0.5757	0.963	0.4611	0.4733
75-79	0.4936	0.5700	0.6914	0.6649	0.5752	0.6459	0.7210	0.6948	0.5215	0.6035
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	9-10	9-10	8-9	7-8	7-8	8-9	4-5	3-4	3-4	3-4

Table 16: Probability of Dying (q_x) for Males by Age Groups and Period, Shen and Hsü Clans, 1725-1844

Age	Period							
	1725-1739	1740-1754	1755-1769	1770-1784	1785-1799	1800-1814	1815-1829	1830-1844
Shen								
0-1	0.1975	0.1498	0.1335	0.1097	0.1651	0.1711	0.2379	0.1881
1-4	0.1135	0.0847	0.0741	0.0620	0.0934	0.0983	0.1403	0.1110
5-9	0.0307	0.0232	0.0205	0.0170	0.0255	0.0266	0.0375	0.0296
10-14	0.0222	0.0168	0.0149	0.0123	0.0185	0.0193	0.0270	0.0214
15-19	0.0308	0.0234	0.0209	0.0171	0.0258	0.0267	0.0371	0.0293
20-24	0.0373	0.0331	0.0295	0.0243	0.0365	0.0378	0.0525	0.0415
25-29	0.0457	0.0367	0.0326	0.0269	0.0404	0.0420	0.0585	0.0462
30-34	0.0566	0.0422	0.0375	0.0309	0.0465	0.0483	0.0674	0.0533
35-39	0.0707	0.0607	0.0549	0.0425	0.0672	0.0674	0.0891	0.0809
40-44	0.0892	0.0856	0.0787	0.0584	0.0934	0.0928	0.1171	0.1183
45-49	0.1138	0.1185	0.1104	0.0802	0.1286	0.1261	0.1532	0.1666
50-54	0.1464	0.1610	0.1519	0.1102	0.1734	0.1696	0.1992	0.2258
55-59	0.1905	0.2145	0.2045	0.1513	0.2294	0.2253	0.2574	0.2949
60-64	0.2500	0.2805	0.2698	0.2076	0.2976	0.2958	0.3312	0.1708
65-69	0.3315	0.1595	0.3488	0.2850	0.3787	0.3836	0.4231	0.4488
70-74	0.4439	0.4524	0.4413	0.3910	0.4728	0.4911	0.5384	0.5236
75-79	0.5998	0.5582	0.5471	0.5357	0.5781	0.6218	0.6804	0.5886
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	8-9	9-10	9-10	9-10	8-9	8-9	6-7	6-7
Hsü								
0-1	0.1368	0.1662	0.1158	0.1337	0.1745	0.1891	0.2799	0.2897
1-4	0.0786	0.0968	0.0666	0.0788	0.1017	0.1127	0.1686	0.1775
5-9	0.0213	0.0260	0.0180	0.0211	0.0273	0.0299	0.0445	0.0464
10-14	0.0154	0.0188	0.0130	0.0152	0.0197	0.0216	0.0320	0.0333
15-19	0.0213	0.0259	0.0181	0.0208	0.0272	0.0294	0.0435	0.0450
20-24	0.0302	0.0367	0.0256	0.0295	0.0345	0.0417	0.0617	0.0638
25-29	0.0335	0.0408	0.0284	0.0412	0.0440	0.0537	0.0736	0.0804
30-34	0.0386	0.0470	0.0327	0.0570	0.0565	0.0690	0.0882	0.1009
35-39	0.0444	0.0653	0.0507	0.0780	0.0730	0.0886	0.1063	0.1261
40-44	0.0680	0.0895	0.0765	0.1055	0.0948	0.1137	0.1289	0.1570
45-49	0.1012	0.1209	0.1118	0.1409	0.1239	0.1457	0.1572	0.1947
50-54	0.1460	0.1613	0.1585	0.1863	0.1630	0.1867	0.1928	0.2405
55-59	0.2043	0.2122	0.2180	0.2436	0.2158	0.2390	0.2376	0.2958
60-64	0.2774	0.2752	0.2911	0.3150	0.2873	0.3057	0.2946	0.3624
65-69	0.3656	0.3520	0.3771	0.4025	0.3848	0.3906	0.3671	0.4421
70-74	0.4676	0.4444	0.4737	0.5086	0.5189	0.4985	0.4602	0.5379
75-79	0.5798	0.5537	0.5775	0.6357	0.7039	0.6363	0.5804	0.6511
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Model West level	8-9	7-8	8-9	6-7	7-8	5-6	4-5	2-3

The general trend of mortality during the period covered by the Shen and Hsü genealogies is best described as one of stability followed by a fairly sharp rise in mortality in the late eighteenth and early nineteenth centuries. This is evident in the q_x values reported in Tables 13-16, the l_x (survivorship) curves displayed in Figure 7 and the e_x (life expectancy) levels shown in Figure 8. There are, however, several interesting (and somewhat puzzling) departures from this general trend. Whereas the Hsü l_x curves, whether male or female, show a steady pattern of increasing mortality over time, none of the Shen curves show this pattern. And whereas the e_{15} values for the Shen clan change over time but display little short-term variation, those of the Hsü clan, and particularly those of the Hsü wives, fluctuate markedly. The shapes of the curves shown in Figure 8 seem to point to a natural disaster in the early 1770's.

Though it is premature (and perhaps even foolhardy) to attempt to explain all the shifts in mortality evident in Figures 7 and 8, some of the more striking changes are clearly the result of historical events. The general decline in life expectancy among cohorts born after 1785 is at least partly attributable to the ravages of the Taiping Rebellion, which struck the Hsiao-shan area in force in 1860-61 and is frequently mentioned in the two genealogies as the cause of a clan member's death. And the differences between the Shen and Hsü clans were partly if not wholly caused by a disastrous flood in 1770, which the Hsü genealogy repeatedly invokes as a cause of death but the Shen genealogy never mentions.[26] Why, one wonders, did the flood affect Hsü females so much more than Hsü males? For some reason peculiar to this particular situation? A satisfactory answer to this question is essential to understanding long-term population trends in a country in which natural disasters struck with frightening regularity.

At the end of the seventeenth century the mortality of the Shen and Hsü clans was at about Level 9 in the Model West life tables (female e_0 = 40, male e_0 = 37.3). By the end of the eighteenth century it had risen markedly, and more among the Hsüs than among the Shens. The life chances of the Shens declined to Level 6 in the Model West tables (female e_0 = 32.5, male e_0 = 30), those of the Hsü to Level 5 (female e_0 = 30, male e_0 = 27.6). Yet if the mortality of the Shen and Hsü clans was high, it was not as high as that estimated by the Princeton group for Chinese farmers in the 1930's.[27] Does this mean that mortality was generally lower in the seventeenth and eighteenth centuries than in the twentieth? Obviously we cannot say for certain, but the available evidence all points in that direction. The mortality of the Shen and Hsü clans is very similar to that found among the Kwangtung clan investigated by I-chin Yüan.[28] The estimates from Kwangtung and Chekiang genealogies diverge only in the nineteenth

[26] The flood is mentioned in *Hsiao-shan hsien-chih kao*, 5: 27b.
[27] Barclay et al., p. 620, Table 13.
[28] I-chin Yüan, pp.168-169.

century, when Chekiang was struck by the Taiping Rebellion.

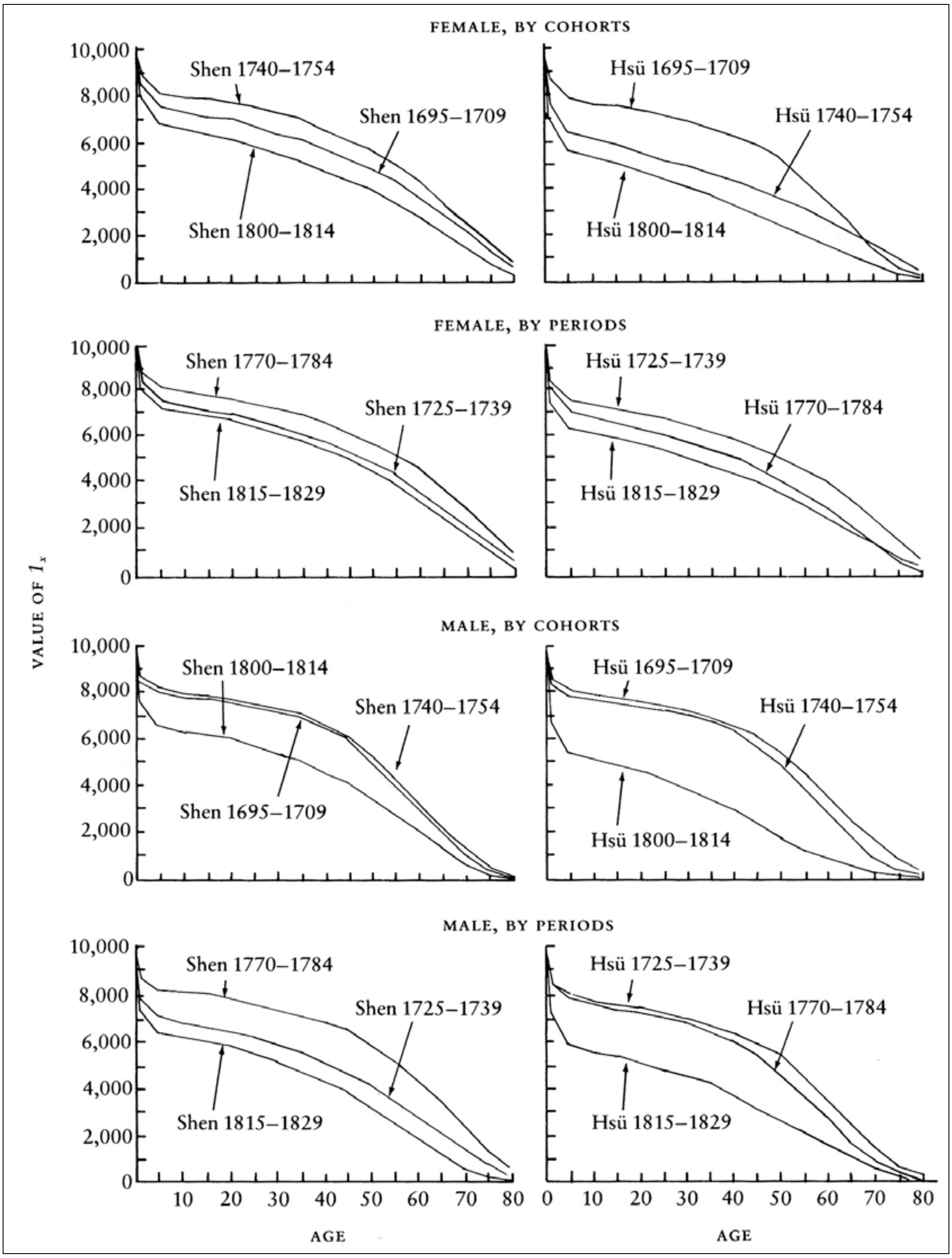


Figure 7: Survivorship at each age group (lx) for selected cohorts,
Shen and Hsü clans, 1695-1829

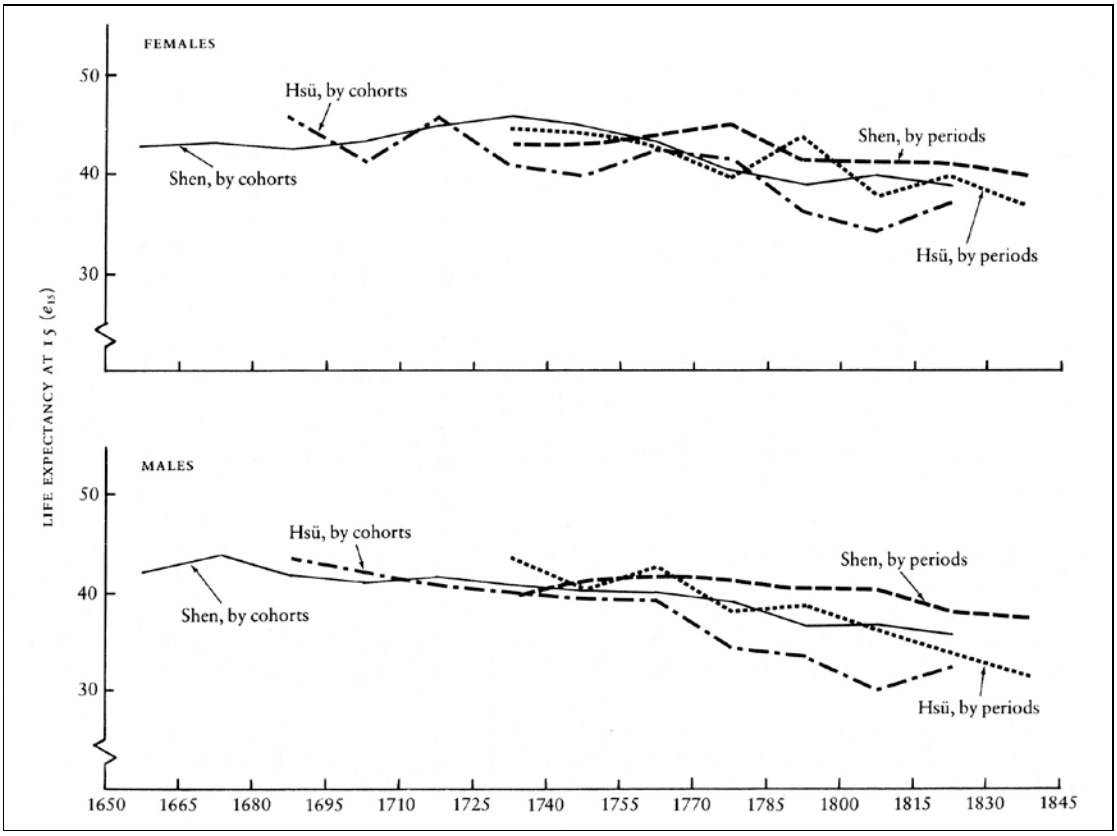


Figure 8: Life expectancy of age 15 (e_{15}) for selected cohorts and periods, Shen and Hsü clans, 1660-1840

Plausibility of the Findings

We have shown that it is possible to derive estimates of fertility and mortality from Chinese genealogies. Now we must ask whether these estimates are plausible. Do they produce growth rates that are believable, given conditions in late traditional china? These questions are best addressed by calculating the intrinsic rate of growth and then comparing the results with those obtained from an appropriate model of a stable population.[29] I have selected for this test the cohorts born in the years 1695-1709 and 1785-1799 and the periods spanning the years 1725-39 and 1840-44. The data used in calculating the intrinsic rate of growth are shown in Tables 8-11 and Table 17.

[29] See Henry Shryock et al., *The Methods and Materials of Demography* (Washington, D.C., 1971), p. 528, for the method of calculating the intrinsic rate of increase.

Table 17: Life Table Survivorship (l_x) Values for the Shen and Hsü Clans for Selected Cohorts and Periods

Age	Cohort				Period			
	1695-1709		1785-1799		1725-1739		1830-1844	
	Shen	Hsü	Shen	Hsü	Shen	Hsü	Shen	Hsü
Females								
15-19	35643	37773	32900	27308	35953	36255	36153	28758
20-24	34488	36710	31583	25750	34820	35090	34983	27243
25-29	33200	35488	30058	24050	33468	33758	33563	25548
30-34	31745	34155	28295	22310	31933	32315	31850	23743
35-39	30083	32723	26265	20495	30245	30775	29803	21813
40-44	28170	30883	23920	18573	28290	29168	27383	19748
45-49	25958	28228	21273	16510	26018	27318	24570	17543
Males								
15-19	38795	38970	32680	33575	33195	37918	33768	26320
20-24	37863	38050	31438	32388	32065	36943	32573	24895
25-29	36738	36940	29955	30755	30738	35765	31148	23108
30-34	35508	35725	28353	28655	29170	34478	29600	21023
35-39	33878	34183	26373	25753	27320	33050	27625	18650
40-44	31495	32048	23748	22145	25145	31203	24895	16030
45-49	28228	29208	20458	18368	22605	28583	21388	13238
50-54	24063	25603	16608	14143	19685	25085	17250	10390
55-59	19193	21278	12460	10003	16405	20750	12835	7643

Table 18 compares our selected cohorts and periods with the Model West stable population, reporting the intrinsic rate of increase (*r*), the gross reproduction rate (GRR), and the mean age at childbearing (*m*). Four points should be noted. First, all the *r* values derived from the genealogies decline steadily as we approach the middle of the nineteenth century, but the change is much greater among the Hsüs than among the Shens. This confirms our discovery of an ever-increasing difference in the mortality of the two clans. Second, the Chinese GRRs appear to be somewhat lower than those of the model populations (note the ratios). This could mean that our adjusted fertility rates underestimate the extent to which births went unrecorded, but it could also mean that low martial fertility was characteristics of the Chinese. Third, although the Chinese GRRs are lower than those of the stable populations, they remain stable through time. Obviously, the decline in the intrinsic rate of increase is almost entirely a result of deteriorating life chances. Fourth – and most important – the intrinsic growth rates calculated from the genealogies and those provided by the model populations are in close agreement. This does not prove that the estimates based on the genealogies are accurate, but is does argue that are plausible.

Table 18: Intrinsic Rate of Increase (*r*), Mean Age at Childbearing (*m*), and Gross Reproductive Rate (GRR) for Selected Cohorts and Periods, Shen and Hsü Clans, 1695-1844

		Cohort				Period			
		1695-1709		1785-1799		1725-1739		1830-1844	
		Shen	Hsü	Shen	Hsü	Shen	Hsü	Shen	Hsü
Female									
Obs.	*r*	0.0255	0.0199	0.0179	0.0062	0.0216	0.0156	0.0214	0.0098
	GRR	3.1005	2.5570	2,.7825	2.4560	2.7910	2.2480	2.6750	2.5733
	m	28.61	29.81	28.63	27.44	28.92	27.41	27.78	27.87
Model West	Level	9	9	6	5	9	9	7	5
	r	0.025	0.020	0.020	0.010	0.020	0.020	0.020	0.010
	GRR	3.339	2.910	3.484	2.704	3.484	2.745	3.066	2.704
	m	29	29	29	27	29	27	27	27
Male									
Obs.	*r*	0.0225	0.0212	0.0153	0.0147	0.0209	0.0161	0.0196	0.0063
	GRR	2.7885	3.0980	3.1250	3.0200	3.5305	2.4345	3.3130	3.0340
	m	31.24	35.96	35.10	34.46	34.55	32.68	33.92	33.78
Model West	Level	9	9	6	5	9	9	7	5
	r	0.020	0.020	0.015	0.015	0.020	0.015	0.020	0.005
	GRR	3.201	3.418	3.570	3.871	3.418	2.915	3.886	2.815
	m	31	33	33	33	33	33	33	33

Given a declining growth rate as a result of increasing mortality, the age structure of the Chinese population could not have remained stable. To this extent the conclusions drawn by the Princeton group from Buck's survey of Chinese farmers may have to be modified. Otherwise, the genealogies tend to bear out the Princeton group's findings. The population of late traditional China was characterized by high (and probably increasing) mortality, nearly universal marriage, and surprisingly low marital fertility. This conclusion is important not only for what is says about the history of the eighteenth and nineteenth centuries, but also for what is implies about the role genealogical research has to play in reconstructing that history.

Comparing the genealogy populations with model populations shows that the estimates obtained from the genealogies are plausible; comparing these estimates with those obtained from a very different source suggests that they are also reasonably complete and accurate. In a word, Chinese demographic history is possible.