Very Low Fertility in South Korea: Patterns and Prospects

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Introduction

Fertility transition in South Korea has been rapid. The total fertility rate (TFR) fell from 6.0 children per woman to the replacement level of 2.1 children per woman between 1960 and 1984. It continued to fall to 1.6 in 1986, rose slightly to 1.8 in 1992, and then fell to 1.5 in 1998, 1.3 in 2001, and 1.2 in 2002. In this paper we examine some of the causes of this trend and what they portend for the future trend in fertility.

Effects of nuptiality change and marital fertility change on the TFR

In South Korea, childbearing outside marriage is very low, constituting about 1 percent of births in recent years (Yi 1998). The change in the TFR can therefore be decomposed into two components, one due to changes in age-specific proportions currently married and one due to changes in age-specific marital fertility rates (Retherford and Ogawa 1978). Declines in marital fertility account for about three-fifths of TFR decline between 1980 and 1990 (Table 1). In contrast, changes in proportions married account for all (actually more than all) of the much smaller decline in the TFR that occurred between 1990 and 2000. During this latter period, changes in marital fertility actually tended to increase the TFR, mainly because postponed births (as a result of later marriage) tended to increase marital fertility rates at the older reproductive ages. Table 1 indicates that an adequate explanation of the TFR decline since 1990 must focus on determinants of age at marriage. Prior to 1980 (not shown in the table), most of the decline in the TFR is accounted for by reduced marital fertility (Choe and Kim 2003).

<Table 1>

Table 2 provides further detail on nuptiality by showing trends in proportions never married by woman's age and the trend in the singulate mean age at marriage (SMAM) among South Korean women since 1980. There is a clear pattern of increasing proportions never married at all ages, especially at ages 20–34. As a result, SMAM

increased by three years between 1980 and 2000. It increased by about 0.6 year every five years between 1980 and 1995, and by 1.1 years between 1995 and 2000. The much steeper rise between 1995 and 2000 probably occurred mainly because of the Asian economic crisis that commenced in 1997 in South Korea.

< Table 2>

Effects of rising educational levels and urbanization on marriage and fertility since 1990

As is well known, education is an important factor affecting both age at marriage and fertility. Table 3 shows that educational attainment increased dramatically between the 1990 and 2000 censuses. Major declines occurred in age-specific proportions of women with less than a senior high education, and major increases occurred in age-specific proportions with more than a senior high education. Proportions of women with a senior high education fell at ages 20–29 and rose at ages above 30, reflecting major shifts from high school to college at age 20–29 and from less than senior high school to senior high school at ages above 30.

<Table 3>

Table 4 shows trends in age-specific proportions never married and the singulate mean age at marriage (SMAM) by education. SMAM increased by 1.6 years for women with less than a senior high education, 0.3 years for those with a senior high education, 1.5 years for those with a junior college education, and 1.2 years for those with college or more. The fact that SMAM increased substantially within education categories indicates that rising levels of education are not the only factor accounting for the upward trend in SMAM. Other likely factors are the Asian economic crisis and shifts in values and attitudes relating to marriage, as will be discussed at greater length later.

<Table 4>

Table 5 provides a more precise estimate of how much of the decline in marriage between 1990 and 2000 is accounted for by changes in age structure, education, and urban/rural residence. The logistic regression analysis shown in the table is based on pooled 0.1 percent samples from the 1990 and 2000 censuses and is restricted to the prime marriage ages 20–34. The response variable is a dummy variable indicating marital status at the time of the census (1if never married, 0 otherwise). The mean of this variable is simply the proportion never married in this age group, which increased from 0.35 to 0.44 between the two censuses. The principal predictor variable is a dummy variable indicating the census in which the woman was enumerated (1 if the 2000 census, 0 if the 1990 census). Model 1 has no controls, Model 2 controls for age, and Model 3 additionally controls for education and residence. In each of the three models, all of the predictor variables have large and statistically significant effects.

<Table 5>

Comparison of Models 1 and 2 shows that changes in age structure increased the odds ratio for the “2000” category of the “year of census” variable, from 1.49 to 2.32. If the odds ratio had instead fallen in the direction of 1.00 (an odds ratio of unity indicates no effect), we would have been able to conclude that changes in age structure explain part of the increase in the proportion never married. But the opposite is true. Comparison of Models 2 and 3 indicates that the addition of controls for education and residence reduces the odds ratio for “2000” from 2.32 to 1.79. With age already controlled in both models, the additional controls for education and residence move the odds ratio 40 percent closer to unity, with the other 60 percent unaccounted for.

Of course, changes in education and residence undoubtedly have some longitudinal effects that are not detected by the model comparisons in Table 5. One such effect involves diffusion processes. If increases in education induce changes in values and norms about age at marriage that diffuse quickly from opinion leaders to others (which is plausible, given that South Korea is a rather homogenous population who share

a common language and culture), then age at marriage could rise more or less simultaneously in all socioeconomic groups (which is what we observed earlier in Table 4 in the case of education groups). In this case, socioeconomic change could be driving observed changes in age at marriage, but measured effects would show up only in the cross section, not in the longitudinal analysis of changes over time. It is also likely that the Asian economic crisis that commenced in 1997 had some across-the-board effects on age at marriage that also would not show up in the analysis of change over time shown in Table 5.

Table 6 is similar to Table 5, except that the response variable is marital fertility during the 2.5 years before survey, the set of predictor variables is slightly more elaborate, and survey data are used instead of census data. The two surveys are the 1994 and 2000 rounds of the National Survey of Fertility and Family Health, conducted by the Korea Institute for Health and Family Affairs (Kong et al. 1992; Kim et al. 2000). A 2.5-year reference period is used in Table 6 because the two surveys collected birth histories only for the 2.5 years before each of the two surveys.[1] The analysis is limited to women under age 40 who were currently married throughout the 2.5-year reference period. More specifically, the response variable indicates whether the respondent had a birth during the reference period (1 if yes, 0 if no). The mean of this variable was 0.27 in the 1994 survey and 0.23 in the 2000 survey, a decline of 15 percent. Predictor variables are age, age squared (to allow for slowing of the pace of fertility as age increases), education, residence, a composite variable indicating number of living children and their gender, and year of survey. Year of survey is again the principal predictor variable of interest.

Results show that all the predictor variables, except year of survey in Models 2 and 3, have large and statistically significant effects. Comparison of Models 1 and 2 indicates that changes in the demographic variables explain all of the change in marital fertility between the two surveys. Comparison of Models 2 and 3 indicates that the socioeconomic variables explain nothing further—just the opposite since the odds ratio

[1] If complete birth histories had been collected, the multivariate analysis could have been based on parity progression ratios. This could not be done.

for the “2000” category of the “year of survey” variable declines slightly from .96 to .92. Again we see that socioeconomic variables that have strong effects in the cross section have little or no effect on change in the response variable over time. It appears once again that diffusion processes and the Asian economic crisis may have had across-the board effects that mask the effects of the socioeconomic variables on fertility change.

<Table 6>

The first two graphs in Figure 1 further explore the effects of economic conditions on fertility, and in particular the effect of the Asian economic crisis on the TFR. The figure shows that the decline in the TFR tended to level off between 1985 and 1995 when per capita income grew rapidly, indicating that pure income effects (higher income resulting in more children) were fairly substantial during this period. The TFR resumed its decline after 1995 or so and then declined steeply during the Asian economic crisis and its aftermath. The two time series, TFR and per capita income, are correlated at 0.96 for the period 1980–2000. The two graphs thus provide some support for the hypothesis that the Asian economic crisis explains some of the changes in the TFR during the 1990s.

<Figure 1>

Another important socioeconomic change that has occurred in South Korea is rapidly rising female labor force participation (Bumpass and Choe 2004; Choe 2000). Of particular interest is non-farm employment, which tends to reduce fertility because it is less compatible with childrearing than farm employment. We have not been able to find statistics on the trend in non-farm employment for never-married persons, but we do have them for both ever-married women and currently married women, as shown in Table 7. Between 1991 and 2000, the percentage currently working in a non-farm occupation increased from 57 to 90 percent for ever-married women, and from 26 to 37 percent for currently married women. The much steeper upward trend for ever-married women suggests a very large increase in the proportion of never-married women in non-farm employment. It seems likely that the rise in non-farm employment among never-married

women contributed to increases in age at marriage, but we have been unable to investigate this further with the data available to us.

<Table 7>

Changes in values, norms, and attitudes about marriage and fertility

Table 8 shows, for 25–29-year-old never-married men and women, how attitudes about marriage changed since 1991. The first part of the table examines attitudes about the necessity of marriage. Response categories for the question on the necessity of marriage are "necessary," "better to marry," and "not necessary" or some other response. Survey data on this question are available for both men and women for 1991 and for both sexes combined for 2000. In 1991, women were much less likely to respond "necessary" than men (19 percent compared with 41 percent). Between 1991 and 2000 for both sexes combined, the proportion responding "necessary" fell from 30 to 24 percent. The second part of the table shows that between 1991 and 2003 ideal age at marriage rose by 0.7 year for men and 1.4 years for women. The ideal ages at marriage for women shown in this table are close to the SMAM values shown earlier in Table 2. The findings in Table 8 support other research that shows that South Korean women's attitudes toward marriage and gender roles are changing rapidly (Bumpass and Choe 2004; Kong et al. 1992; Kim et al. 2003).

<Table 8>

Perhaps the most commonly used measure of fertility values is ideal number of children, the trend in which is also graphed in Figure 1. As in the case of the TFR, the trend in ideal number of children also tends to track the trend in per capita income, although the fluctuations in ideal number of children are much smaller than the fluctuations in per capita income. Ideal family size fell from 2.5 to 2 children per woman between 1980 and 1985 when per capita was fairly constant and then rose to 2.3 in 1997 when per capita income grew rapidly, before starting to decline again. The figure also

shows that ideal family size is higher than the TFR, and that the gap between them grew fairly steadily between 1980 and 2000. After 1980, ideal family size did not change much even as fertility fell to very low levels.

Ideal number of children is not necessarily the same as the number of children that women plan to have, because the planned number of children is more constrained by the respondent's personal circumstances. In Table 9, mean planned number of children is calculated for a synthetic cohort of women from data on proportions of currently married women under age 40 who say they plan to have another child at any time in the future, classified by number of living children at the time of the survey. These proportions, specific by number of living children, are viewed as "progression ratios" for going on to have another child. The calculation pertains to a hypothetical currently woman with no living children to start with who lives through the rest of her life experiencing these progression ratios, assuming no mortality among either women or their future births. The result of the calculation is that mean planned number of children declined from 1.53 in 1994 to 1.40 in 2000—considerably lower than mean ideal number of children, which remained unchanged at 2.2, as reported by these same respondents. The proportion planning to have another child declined at all numbers of living children, but especially at one living child, where it declined from 0.59 to 0.51. Thus, by the year 2000, only slightly more than half of the women with one living child planned to have a second. This finding suggests that the TFR (which is based on all women, not just currently married women) is unlikely to rebound much above 1.4 as economic conditions continue to improve, at least in the short run. Recent studies have indicated that the high cost of children's education and the difficulty women experience combining work and family life are some of the reasons why such a high proportion of women plan to stop at one child (Tsuya and Choe 2004; Choe, Bumpass, and Tsuya 2004).

<Table 9>

Table 10 presents results of a logistic regression analysis of planning to have another child (1 if yes on having another child, 0 otherwise) among currently married

women under age 40. Two models are shown, again based on pooled data from the 1994 and 2000 surveys. Again year of survey (1 if 2000, 0 if 1994) is the principal variable of interest. Model 1 has no controls, Model 2 controls only for demographic variables, and Model 3 additionally controls for socioeconomic variables. The objective of the table is to test whether the controls explain away the effect of year of survey on planning to have another child. But the result of controlling for these variables is just the opposite. Controlling for the demographic variables reduces the odds ratio for "2000" from 0.71 to 0.49 instead of moving it closer to 1.00, and additionally controlling for the socioeconomic variables leaves the odds ratio virtually unchanged. Again it appears that diffusion processes and the Asian economic crisis had across-the-board effects that mask the effects of the socioeconomic variables on change in the number of children that women plan to have.

<Table 10>

Table 11 shows trends in attitudes about motherhood among currently married women age 15–44. Between 1991 and 2000, the proportion of these women who think it is necessary to have children declined from 90 to 58 percent, and the proportion who think it is necessary to have sons declined from 41 to 16 percent. Over the same period, mean ideal number of children increased from 2.1 to 2.2. It is evident from this table and earlier tables that ideal number of children is not a good indicator of the major changes in fertility behavior and attitudes that occurred during the 1990s.

<Table 11>

Discussion and conclusion

Our logistic regression models indicate that socioeconomic variables go a long way toward explaining cross-sectional variation in age at marriage and marital fertility in South Korea during the 1990s, but the models do not explain the changes in marriage and fertility that occurred over the decade. It is likely, however, that socioeconomic change

had longitudinal effects on marriage and fertility that are not detected by our models. One likely mechanism is diffusion processes whereby socioeconomic change has delayed effects through sudden shifts in values, norms, and attitudes about marriage and fertility that diffuse quickly from opinion leaders throughout the population, regardless of socioeconomic status. Major changes in values, norms, and attitudes about marriage and fertility did in fact occur during the 1990s. Our results also show that ideal family size, which varied little over the 1990s, does a poor job of capturing these changes in values, norms, and attitudes.

It is also likely that the Asian economic crisis that commenced in 1997 had across-the-board effects on marriage and fertility that one does not expect to show up in our logistic regression models of change in marriage and fertility. The Asian economic crisis and its aftermath are undoubtedly partly responsible for the rapid rise in age at marriage and the rapid fall in fertility to very low levels that have followed the crisis.

Currently the TFR and the planned number of children among married women are both well below the mean ideal number of children, suggesting that women would have more children if their socioeconomic circumstances were also ideal. It therefore seems likely that, if economic conditions continue to improve, the upward trend in age at marriage will slow or even reverse and that both planned fertility and actual fertility will rise. How far it will rise is a question that we are unable to answer.

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Table 1. Percentage decomposition of change in the total fertility rate (TFR) due to changes in marital status and marital fertility, South Korea, 1980–2000

Period	Marital status	Marital fertility	Total (change in TFR)
1980 – 1990	39	61	100 (–1.099)
1990 – 2000	195	–95	100 (–.140)

Source: Calculated from 2% sample data from the 1980, 1990, and 2000 Population and Housing Censuses of Korea. TFR declined from 2.734 in 1980 to 1.635 in 1990 and 1.465 in 2000.

Table 2. Percent never married by age and singulate mean age at marriage (SMAM), South Korean women, 1980 – 2000

	1980	1985	1990	1995	2000
15–19	98	99	100	99	99
20–24	66	72	81	83	89
25–29	14	18	22	29	40
30–34	3	4	5	6	11
35–39	1	2	2	3	4
40–44	1	1	1	2	3
45–49	0	0	0	1	2
SMAM	24.1	24.7	25.4	26.0	27.1

Source: Korea National Statistical Office, various years.

Table 3. Percent distribution by educational attainment among women classified by age, South Korea 2000

Year of census and age	< Sr. high	Sr. high	Jr. college	College+	Total
1990					
20 – 24	10	61	8	21	100
25 – 29	24	55	5	17	100
30 – 34	41	46	3	11	100
35 – 39	57	34	2	8	100
40 – 44	64	28	1	7	100
2000					
20 – 24	1	36	30	33	100
25 – 29	3	51	21	25	100
30 – 34	6	57	12	25	100
35 – 39	19	55	9	17	100
40 – 44	38	45	5	12	100

Source: Calculated from 2% sample data from the 2000 Population and Housing Census of Korea.

Table 4. Percentage never married by five-year age group and singulate mean age at marriage (SMAM) among women with different levels of education, South Korea 1990 and 2000

Age group	< Sr. high	Sr. high	Jr. college	College+
1990				
15–19	99	100	100	100
20–24	54	77	93	94
25–29	10	20	35	38
30–34	3	5	9	11
35–39	1	3	6	7
40–44	1	1	2	4
45–49	0	1	5	2
SMAM	23.2	25.2	26.3	27.3
2000				
15–19	99	99	100	100
20–24	62	77	94	97
25–29	27	28	50	56
30–34	8	7	14	16
35–39	3	4	6	8
40–44	1	2	4	6
45–49	1	1	3	3
SMAM	24.8	25.5	27.8	28.5

Source: Calculated from 2% sample data from the 1990 and 2000 Population and Housing Censuses of Korea.

Table 5. Estimated effects (odds ratios) of age, education, urban residence, and year of census on the probability of being never married among women age 20 – 34 in South Korea: pooled data from the 1990 and 2000 censuses

Covariates	Model 1	Model 2	Model 3
Age group			`
20–24†		1.00	1.00
25–29		.08*	.08*
30–34		.01*	.02*
Education			
Less than senior high†			1.00
Senior high			2.38*
Junior college			6.72*
College+			8.67*
Residence			
Rural†			1.00
Urban			1.71*
Year of census			
1990†	1.00	1.00	1.00
2000	1.49*	2.32*	1.79*

Source: Estimated by logistic regression from 0.1% sample data from the 1990 and 2000 Population and Housing Censuses of Korea (pooled samples).

Note: The raw proportion of never-married women among 20–34-year-olds increased from 0.35 to 0.44 between the 1990 and 2000 censuses.

† Reference category
* $p<.05$

Table 6. Estimated effects (odds ratios) of covariates on the probability of having a birth during the 2.5 years before the survey among currently married women under age 40 who were married throughout the 2.5-year reference period, South Korea, 1994 and 2000

	Model 1	Model 2	Model 3
Age		1.92*	1.74*
Age squared		.99*	.99*
Number of living children and sons 2.5 years before survey			
0†		1.00	1.00
1 daughter		.44*	.43*
1 son		.31*	.31*
2+ children with no sons		.09*	.09*
2+ children with sons		.02*	.02*
Education			
< Sr. High			.79*
Sr. High†			1.00
Jr. College			1.29
Four-year college			1.50*
Residence			
Rural†			1.00
Urban			.66*
Year of survey			
1994†	1.00	1.00	1.00
2000	.82*	.96	.92

Source: Computed from the 1994 and 2000 rounds of the National Survey of Fertility and Family Health, conducted by the Korea Institute of Health and Social Affairs.

Note: The raw proportion having a birth during the 2.5 years before the survey among currently married women under age 40 who were married throughout the 2.5-year reference period declined from 0.27 to 0.23 between the 1994 and the 2000 survey.

† Reference category
* $p<.05$

Table 7. Percentage of ever-married women age 30–34 who ever worked in a non-farm occupation and percentage who currently work in a non-farm occupation, selected years

	1991	1994	1997	2000
Ever worked	57	--	87	90
Currently working	26	34	37	37

Source: Kong et al. 1992, pp. 234, 236; Hong et al.1994, pp. 55–57; Cho et al. 1997, pp. 232, 234; Kim et al. 2000, 364–365.

-- Not available.

Table 8. Attitude about marriage among 25–29-year-old never-married men and women, South Korea, 1991 and 2003

	Attitude about the necessity of marriage			
	Necessary	Better to marry	Not necessary/ other responses	Total percent
1991				
Men	41	43	14	100
Women	19	50	31	100
Both sexes	30	47	23	100
2000				
Both sexes	24	51	25	100
	Ideal age at first marriage			
1991				
Men		29.0		
Women		25.3		
2003				
Men		29.7		
Women		26.7		

Source: Kong et al. 1992, pp. 251, 264; Kim et al. 2003, pp. 186–187.

Table 9. Mean planned number of children, derived from number-of-living-children-specific proportions of currently married women who plan to have more children, South Korea, 1994 and 2000

Number of living children	1994		2000	
	Proportion who plan to have more children	Proportion of women who would reach each specified number of living children	Proportion who plan to have more children	Proportion of women who would reach each specified number of living children
0	.9371	1.0000	.9173	1.0000
1	.5875	.9371	.5073	.9173
2	.0694	.5505	.0350	.4653
3	.0272	.0382	.0174	.0163
4	.0341	.0010	.0000	.0003
5	.0537	.0000		.0000
6		.0000		
Mean planned number of children		1.53		1.40

Source: Computed from the 1994 and 2000 rounds of the National Survey of Fertility and Family Health, conducted by the Korea Institute of Health and Social Affairs.

Note: Each entry in the second and fourth columns (except for the first entry of 1.0000) is calculated as the product of the two numbers in the previous row pertaining to the specified survey. For example, the value of 0.5505 in the second row is calculated as (0.5875)(.9371). The entries for 1–6 living children in the second and fourth columns may also be viewed as expected numbers of planned births. Adding these entries yields the mean planned numbers of children in the last row.

Table 10. Estimated effects (odds ratios) of covariates on planning to have more children among currently married women under age 40, South Korea, 1994 and 2000

	Model 1	Model 2	Model 3
Age		1.62*	1.56*
Age squared		.99*	.99*
Living children and sons 2.5 years before survey			
0†		1.00	1.00
1 daughter		.21*	.21*
1 son		.14*	.14*
2+ with no sons		.04*	.04*
2+ with sons		.01*	.01*
Education			
< Sr. High			.90
Sr. High†			1.00
Jr. College			1.18
Four-year college			1.22
Residence			
Rural†			1.00
Urban			.75*
Year of survey			
1994†	1.00	1.00	1.00
2000	.71*	.49*	.48*

Source: Estimated by logistic regression from the1994 and 2000 rounds of the National Survey of Fertility and Family Health, conducted by the Korea Institute of Health and Social Affairs.

Note: The raw percentage planning to have more children among currently married women under age 40 declined from 0.28 to 0.22 between the 1994 and 2000 surveys.

† Reference category
* $p<0.05$

Table 11. Trends in selected attitudes about motherhood among currently married women age 15–44 from selected surveys

Year of survey	Percent who think it is necessary to have children	Percent who think it is necessary to have sons	Ideal number of children
1991	90	41	2.1
1994	--	26	2.2
1997	74	25	2.3
2000	58	16	2.2

Source: Kim et al. 2003, pp. 303, 307, 311.

-- Not available.

Figure 1. Trends in total fertility rate, ideal number of children, and per capita income