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Fertility Decline in East Asia

Griffith Feeney

With the fall of fertility in China to near or below replacement levels in the early 1990s, the whole of East Asia may now be said to have completed a demographic transition. Its experience lies between that of the West and the many developing countries in which demographic transition is now under way. The main features and possible underlying causes of the fertility declines in Japan, Taiwan, South Korea, and China during this century are discussed. Fertility decline in East Asia is interesting both in its own right, as a chapter in the history of human reproduction, and for the light it may shed on fertility decline in the rest of the world.

In the not too distant past, most children reaching adulthood in the world would have seen roughly half of their brothers and sisters die. With declining mortality in the 1900's, the childbearing habits of earlier times would lead to historically unprecedented numbers of surviving children. Declining fertility has tended to correct the balance, reducing family size to more or (usually) less than past levels, with associated improvements in quality of life.

The most profound consequences initially have been in the lives of women, for whom the bearing and rearing of children may now occupy a smaller fraction of adult life and energies. In the long run, however, so great a change in the lives of women must induce comparable alterations in society at large. The fertility decreases have been too recent for us to know their eventual effects, even in the developed countries in which these changes first occurred.

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Demographic Transition

The defining features of demographic transition are the levels of fertility, mortality, and family limitation before and after the transition occurs (*1*). Before transition, less than half of all children in East Asia survived to adulthood. For families (*2*) to reproduce themselves, the mother had to bear a large number of children to compensate for mortality loss. After the transition, nearly all children survived to adulthood. If couples did not act to limit their fertility, they might have twice or three times as many surviving children as they would have had in the past. Nearly all couples adopt some form of family limitation, however, limiting fertility to an average of about two children per woman (*3*).

Pretransition levels of mortality vary widely, but risks of death are generally an order of magnitude or more higher than modern levels. Fertility levels vary widely (*4*), but the average level of fertility is always much lower after the transition (*5*).

Family limitation is necessarily widespread after the transition, but the pretransition situation is variable. Primitive methods of family limitation can be very effective, and were systematically practiced in some pretransition populations. There is evidence of family limitation in premodern China (*6*, *7*) and in Tokugawa, Japan (*8*, *9*).

Fertility, Mortality, and Surviving Children

A woman's fertility may be described numerically by plotting the number of children she has borne at any given time and age. Surviving children are likewise described by a graph of number of children versus time and age. Averages for groups of women may be computed by averaging numbers of children born and surviving for each age of woman.

When mortality risks are low, as in the currently developed countries, the average curve describing surviving children does not differ appreciably from the corresponding curve of children ever born until well after most children have left home. For most of human history, however, mortality

risks have been high. Many children died before their younger siblings were born, so that the average curve for surviving children remained far below that for children ever born. Chinese women aged 40 to 44 surveyed circa 1930 had borne an average of 5.0 children but had only 3.0 surviving children per woman.

The distinction between fertility and numbers of surviving children is important because the number of children actually present in a family at any given time is a far more pertinent statistic for most purposes than total number of children born. In particular, virtually all explanations of fertility decline, such as the importance of children as sources of household labor and of security in their parent's old age, apply to living children rather than to children ever born.

Fertility Decline in East Asia

Figure 1 shows fertility decline in Japan, Taiwan, the Republic of Korea, and China (*10*) in the form of an annual series of total fertility values (*11*). Some accounts of fertility decline in Japan suggest that it was primarily a post–World War II phenomenon (*12–14*), others that it began as far back as the 1920s (*15*, *16*). Figure 1A indicates the source of the confusion. The postwar time series shows total fertility of 4.5 children per woman in 1947 dropping extremely sharply to about 2 children per woman by the late 1950s. The available figures on total fertility before World War II suggest an earlier decline, but are too sparse to allow us to draw confident conclusions (*17*). Filling in the missing years by interpolation from census age distributions (*18*) yields a complete annual series and shows that the high values circa 1950 were a postwar aberration following extremely low values toward the end of the war. This is confirmed by lifetime fertility data from the postwar censuses, which suppress short-term fluctuations and reveal the long-term trend (*19*) and by estimated numbers of surviving children (*20*). It is apparent that the Japanese fertility decline began during the 1930s and was about two-thirds complete by 1950. Fitting a straight line to the cohort total fertilities gives a maximum rate of decline of nearly 1.2 children per woman per decade.

Taiwan's fertility decline presents a relatively simple picture. There was no long term decline in fertility during 1906 to 1943 (*21*). Accurate census and registration statistics available for the postwar period (*22*) show that total fertility declined from about 6.5 children per woman during the mid-1950s to 2 children per woman during the mid-1980s. The rate of decline is about 1.6 children per woman per decade.

Fertility decline in South Korea (*23*) was similar. Estimates going back to 1920 show negligible long-term decline before 1960 (*24*). Birth registration statistics in South Korea were seriously incomplete until recently, and estimates (*25*) disagree in detail, but the main features of decline are not in doubt. Total fertility declined from six to two children per woman between the late 1950s and the early 1980s, a decline of about 1.9 children per woman per decade.

China does not yet have an effective system of birth registration, but retrospective estimates are available from two censuses and four large population surveys. China's decline began circa 1970 and brought total fertility from six children per woman to under three children per woman in just over 7 years (*26–29*). The rate of decline is an extraordinary 4.1 children per woman per decade. The 1980s saw fluctuations superimposed on slight overall decline that was nonetheless sufficient to bring total fertility to 2.1 children per woman in 1989.

The very low fertility levels indicated for 1991 to 1992 by the 1992 survey have caused observers in and out of China to question whether new birth planning policies have impaired the ability of the government to collect accurate data. A recent analysis comparing 1990 census (*30*) and 1992 survey results concludes, however, that the indicated decline during 1987 to 1990 is probably correct (*28*). A study of recent policy and program developments (*31*) makes the recent low levels more plausible than they would otherwise be.

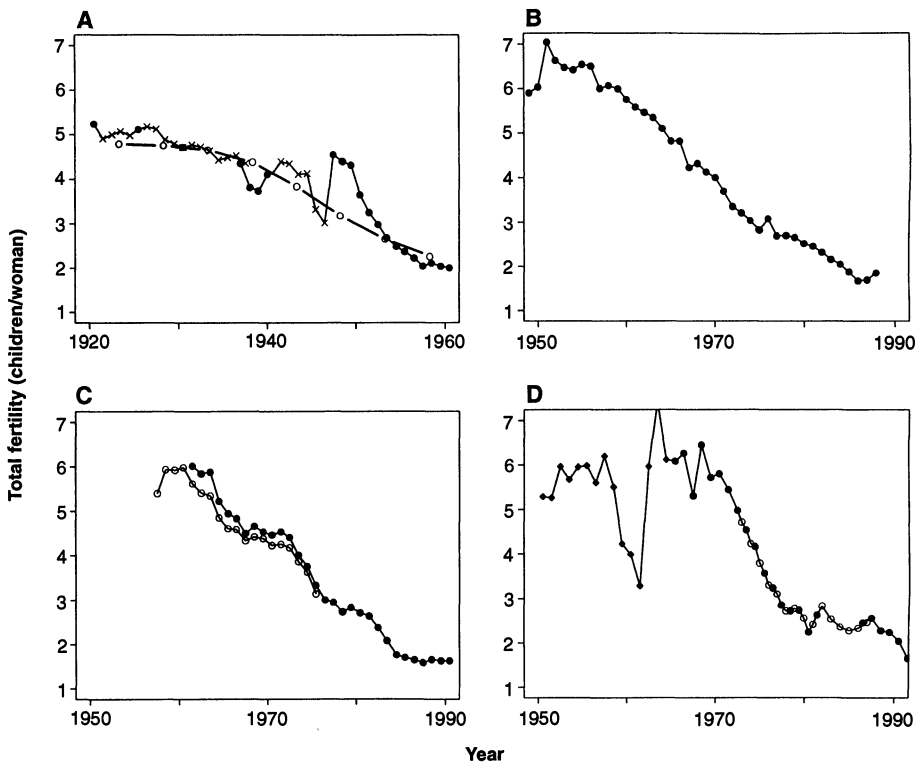

Fig. 1. Fertility decline in Japan (**A**), Taiwan (**B**), the Republic of Korea (**C**), and China (**D**).

Explaining the Declines

We may start with the simple proposition that fertility declined in Japan, South Korea, and Taiwan because (i) families wanted fewer children than they would have had if they had not acted to limit family size, and (ii) they were able to and did act accordingly. This formulation focuses attention on numbers of surviving children and on decision-making within families, and the assumptions are made that the "rational choice" model (*32*) is appropriate and that families were acting voluntarily.

The excess of surviving children reflected two quite different influences (*33*). Declining mortality substantially increased numbers of surviving children before fertility began to decline (*34*). Japanese women reaching prime childbearing ages during the early 1930s averaged about 4.6 surviving children per woman on reaching age 50 (*20*). Women in Taiwan reaching prime childbearing ages during 1930 to 1955 averaged about 4.7 surviving children per woman on reaching age 50 (*35*, *36*). Although we do not have comparable figures for earlier periods, these values almost certainly represent a significant increase over earlier levels. Data from recent South Korean censuses suggest that average numbers of surviving children at age 50 rose from about 3.0 per woman for women reaching prime childbearing ages circa 1920 to about

4.6 children per woman in prime childbearing ages circa 1950 (*37*).

The second reason for the excess of surviving children was changing circumstances within and beyond the family that shifted costs and benefits of different numbers of surviving children in favor of smaller numbers (*38–40*). The shift reflects a complex of interrelated influences, changes in family structure, the spread of education, rise of nonfarm employment, the development of labor and capital markets, and monetization of the economy (*41*, *42*). Before fertility decline, each of the three countries was a peasant agrarian society, characterized by low output, periodic subsistence crises, low nonfarm employment, and relatively undeveloped labor and capital markets. The family system (*43–45*) gave the older generation control over household resources and the marriage of children and therefore the power to demand labor services from children. These features led to a reliance on family labor and so created a demand for larger rather than smaller numbers of surviving children.

The beginnings of economic development increased demand for nonagricultural labor and stimulated the development of labor markets. Given that numbers of surviving children had been increasing and were more than sufficient to continue the family, the older generation was inclined to welcome the employment of some children in the emerging nonfarm sector, for this was likely to increase family income through remittances and provide a hedge against rural subsistence crises. As educated children stood better chances for such employment, and as the early years of primary school (at least) occurred before children had substantial labor value, the older generation was also inclined to have their children take advantage of emerging educational opportunities.

In time these developments changed both the nature of relations within the family and the social and economic environment in which it functioned. Education of children and the possibility of their departing for nonfarm jobs weakened the authority of the older generation (*41*, *43–45*). Education reduced the labor value of children in various ways. Economic development increased agricultural productivity and diminished the need for labor, whereas emerging labor markets and monetization of the economy made it easier and less risky to engage nonfamily labor. When these developments had run their course, farm employment had shrunk to a small fraction of total employment. The labor value of children, low in the emerging nonfarm sector to begin with, declined in the farm sector as well.

The huge gap between the numbers of surviving children families wanted and the numbers they would have had in the absence of family limitation left no serious doubt that family limitation would be adopted. It does not, however, explain why the fertility declines began when they did. The changes that explain the declines developed over many decades and would not at first have been perceived. Once perceived, they would have to have been sustained for a period of time to be confirmed as more than erratic fluctuation, and when confirmed would be acted on only if judged sufficiently drastic.

There is considerable uncertainty regarding the magnitude, time span, level, and duration of increase that would be necessary to provoke a family limitation response. Thus, even the most satisfactory explanation of fertility declines will not necessarily explain why declines began when they did. By analogy, knowing that earthquakes are caused by the shifting of tectonic plates does not give an investigator the ability to predict when an earthquake will occur (*46*).

We have no very satisfactory explanations for the time of onset of the declines in Japan, South Korea, and Taiwan beyond that they began when the pressures favoring them became sufficiently strong to provoke behavioral response. The instigating conditions may be entirely different from the prevailing condition of excess numbers of surviving children (*47*) and are more likely to be identified from historiographic or ethnographic than from statistical evidence. The economic dislocations of the great depression are obvious candidates for Japan, whose decline began during this period. The governments of South Korea and Taiwan both developed active family planning programs to promote the idea of family planning and the use of contraception. The activities of these programs are natural candidates for instigating fertility decline. Taiwan's fertility decline began during the mid-1950s, however, and it is generally agreed that the family planning program could have had a significant effect only after its expansion in 1963 (*48*). South Korea's decline began in the early 1960s, and although the South Korean government initiated the national family planning program in 1962, a recent study concluded that the role of the program in the onset of fertility decline "was probably negligible" (*23*).

Once initiated, the rate of fertility decline reflects the rate at which the relevant influences change and the time required for families to identify and adopt acceptable means of family limitation. Although it is plausible that the relatively rapid fertility declines in Taiwan and South Korea were due, in part, to their national family planning programs, evidence of this is more limited than one would like. The essential difficulty is insufficient understanding of how fertility levels respond to influences unrelated to the family planning program.

An authoritative study of Taiwan concludes that fertility decline "was to a large degree a result of the reduced fertility of (i) couples practicing program methods and (ii) couples who began in the program and then shifted to nonprogram methods or some combination of the two over time," but goes on to say that "It is *possible* that in the absence of the program other means would have been used by this large number of couples to reduce their fertility; there is no way of definitely proving or disproving this point" (*49*).

The situation in China was similar in some respects, but different enough to require separate discussion (*50*). Numbers of surviving children increased rapidly and to much the same levels as in Japan, South Korea, and Taiwan (*51–54*). China before fertility decline was a peasant agrarian society, with a family structure (*7*) that gave the older generation the power to secure the labor services of their children, making at least modestly large numbers of children desirable. In the two decades after the 1949 revolution there were extremely rapid improvements in educational attainment (*55*).

The power of the older generation was weakened, but was supplanted to a considerable extent by that of the party and administrative organs, rather than devolving to the younger generation. The prohibition of migration to urban areas (*56*) and stagnation in rural areas (*57*) prior to the rural economic reforms in 1979 (*58*) severely curtailed opportunities for nonfarm employment. The collectivization of agriculture (*59*) created incentives for larger numbers of surviving children (*56*).

These considerations suggest no strong impetus for fertility decline, yet fertility in China declined far more rapidly than fertility has ever declined anywhere in the world (*60*). There is little doubt that the instigating condition for the decline was the "later-longer-fewer" policy for restricting family size introduced in the early 1970s. This policy advocated later marriage, longer intervals between births, and fewer children altogether (*61*). Although there was little lengthening of birth intervals, age at marriage increased and total fertility decreased very substantially during the years the policy was in effect (*62*).

The extraordinary rapidity of the decline suggests that the later-longer-fewer policy encountered little resistance in most of the country, and this suggests a widespread judgement by rural families either that numbers of surviving children were too high or that the marginal value of family sizes over two or three children was low. We do not understand satisfactorily why this

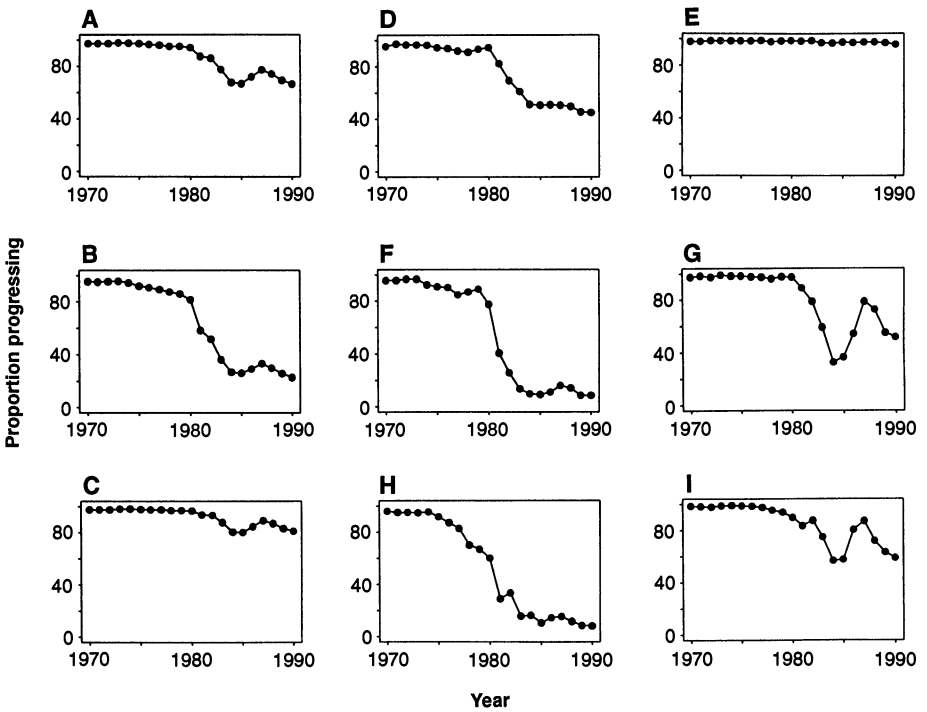

Fig. 2. Proportions of women progressing from first to second birth (period parity progression ratios) in China (**A**), urban and rural areas of China (**B** and **C**), and urban and rural areas of Guangdong (**D** and **E**), Liaoning (**F** and **G**), and Sichuan (**H** and **I**) provinces, respectively.

should have been the case. The pressure of rapidly growing population on limited agricultural land was probably a factor. With nearly five surviving children per woman, the prohibition of migration to urban areas, the self-consciousness of community conditions promoted by cadres, and severely limited agricultural land, few peasant families could have been unaware of population pressure. The stagnation of agricultural output from the late 1960s through the 1970s after rapid increases in the early postrevolutionary years may have been perceived (correctly or not) as a consequence of this rapid population growth. The prestige of the revolutionary government, although tarnished by the disaster of the Great Leap Forward, was still high (*63*).

It must not be forgotten, finally, that the large average numbers of surviving children in families circa 1970 were an historical anomaly. It may be more than coincidence that the 1970s fertility decline came to an end when total fertility fell slightly below three children per woman which, in combination with the low mortality that had been achieved (*64*), meant an average of perhaps 2.5 surviving children per woman. This was only slightly less than the 3.0 surviving children per woman of prerevolutionary times.

In 1979, the later-longer-fewer policy was supplanted by the one child per family policy (*61*, *65*). The apparent lack of impact suggested by Fig. 1 is misleading and illustrates the necessity of more focused fertility measures (*27*, *60*, *62*). Figure 2 shows period parity progression ratios for progression from first to second birth for China as a whole and for eight subpopulations (*66*). Investigators use this statistic to determine the proportion of women who, having had a first birth, go on to have a second, on the basis of rates at which women with one child at the beginning of any given year have second births during that year (*30*, *60*, *62*, *67*).

The magnitude and timing of the 1979 to 1984 declines show beyond reasonable doubt that they were instigated by the one-child policy. The cessation of the declines corresponds to the "open a small hole" modification of the one-child policy, which in effect allowed rural families with a single female child to have another, and which was caused by peasant resistance to the one-child policy (*68*). The low level reached in 1984 was maintained in some areas, but there was a fairly rapid increase in other areas during 1984 to 1987. The reversal in 1987 was almost certainly a response to some change in national policy, but we know little of the change.

The pattern of fertility levels in the 1980s suggests substantial resistance to further decline, a marked contrast to the 1970s, with a balance finally being struck between peasants and the state. The rapid economic development engendered by the 1979 economic reforms radically changed the situation in much of the countryside, bringing into play some of the antinatalist influences that operated in Japan, South Korea, and Taiwan.

We have no very satisfactory answer to the question of why the fertility declines ceased at the levels they did in Japan, South Korea, and Taiwan; the question for China is premature. Pretransition fertility levels represented a balance between economic benefits and costs of different numbers of surviving children. Economic costs remain and increase after the transition, but economic benefits largely disappear, and there is no obvious way of balancing the non-economic benefits against the economic costs.

The recent experience in Japan (*69*) suggests that, in East Asia as in the West, substantial proportions of women are willing to forgo childbearing altogether. It is possible that the desire for children may be largely satisfied by a single child, and there is no obvious reason why families should adjust their behavior to achieve long-term population replacement. It might be considered remarkable that total fertility in developed countries has remained as close to replacement level as it has.

It has not been possible to consider developments at other than the national level here, but families are specifically located in space as well as time, and spatial patterns are arguably as important as changes over time (*70*). The problems of explaining a unique historical event may be considerably ameliorated merely by spatial disaggregation, effectively multiplying the number of cases by several orders of magnitude. The gains of disaggregation in space go far beyond this multiplication, however, because human behavior is spatially patterned (*71*).

Conclusion

We can describe fertility decline in East Asia with considerable detail and precision, and we understand in general terms why these declines occurred. Although this is a significant accomplishment, our understanding of demographic change remains insufficiently rooted in an understanding of social change generally. Even for Japan, for which two wide-ranging monographic studies (*13*, *15*) are available, there is clearly much to be learned. Demographic research has leaned heavily, probably too heavily, on sample surveys. Understanding the broad sweep of historical change, of which fertility decline is one element, requires investigators to examine demographic trends in historical depth and in changing historical social context (*42*).

It would be misleading to conclude without mention of the important differences between East Asia and the rest of Asia, differences both in demographic experience and in the availability and quality of data.

An attempt to replicate for South Asia the picture of fertility decline in East Asia shown here would, for example, quickly founder on data problems. We know that fertility levels in South Asia, although declining, remain high, but precise levels and detailed changes over time are difficult to obtain.

The emphasis on numbers of surviving children in relation to fertility is important for understanding the demographic situation in those countries in which fertility remains high. Mortality in these countries, although usually high by comparison with currently developed countries, is far lower than it was in the past. These large declines in mortality mean that family size has increased substantially. The pertinent question is why these societies have accommodated to a large increase in family size rather than acting to limit it. We know less than we might of the answer, in part because an overemphasis on fertility levels has obscured the question.

Most studies of fertility decline have relied on elementary measures of fertility level, often because the data required for more sophisticated measures is unavailable, either at all, or in sufficient historical depth. Early discussion of the demographic transition, for example, was based on little more than time series of crude birth and death rates. The case of China after the introduction of the one child per family program shows the importance of sophisticated measurements. Standard fertility measures show almost no impact of the one child per family policy, suggesting that it was a failure. When we look at statistics showing how many women with one child go on to have another, however, we see the very sharp impact (Fig. 2).

Demographers have tended to view demographic transitions throughout the world from the perspective of Western (usually European) experience. Although natural and appropriate to a point, this perspective has been overemphasized. We have learned more about fertility decline in East Asia by detailed studies of what happened there, and particularly by studies that place the demographic trends in broad social context, than by attempts to draw lessons from Western experience.

REFERENCES AND NOTES

1. Mortality refers to the survivorship curve, which shows proportions of persons who survive to each age. Fertility refers to the number of children a woman has borne at the end of her childbearing. Family limitation refers to a pattern of behavior in which reproducing couples, having reached a certain number of surviving children, act to avoid additional births.
2. Family here will mean "conjugal unit" (husband/father, wife/mother, dependent children, or any two of these three) when referring to numbers of children born and surviving and as the socially understood family unit when discussing childbearing decisions.
3. Ideas about how and why demographic transition occurs must be distinguished from the transitions themselves, unambiguous evidence of which comes from the historical record of the changes in mortality and fertility levels. For a recent discussion of ideas surrounding the demographic transition see S. Szreter, *Popul. Dev. Rev.* **19**, 659 (1993).
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10. Hong Kong and North Korea are not considered here, the former because its experience is similar to that of China, South Korea, and Taiwan, the latter because statistical sources are too limited to allow comparable presentation.
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17. *Historical Statistics of Japan* (Japan Statistical Association, Tokyo, Japan, 1987), vol. 1, p. 272, shows prewar total fertility for only six years—1925, 1930, and 1937 to 1940.
18. Births during 1940 to 1947 correspond closely to persons aged 8 to 15 at the 1955 census, taken as of October 1. Fluctuations in the numbers of persons in this age range provide a close analogy to fluctuations of numbers of births during these years. Let $TF(y)$ denote total fertility for year y, $N(y)$ the number of persons enumerated in a subsequent census that would have been born (but for the difference between the census date of 1 October and the end of the calendar year) in year y, and put $r(y) = N(y)/TF(y)$. Interpolating between computed values of $r(1940)$ and $r(1947)$ gives interpolated values of $r(y)$ and thus values of $TF(y) = N(y)/r(y)$ for intervening years, and similarly for earlier periods. Values for 1941 to 1946, 1931 to 1936, 1926 to 1929, and 1921 to 1924 are based on the censuses of 1955, 1947, 1935, and 1930, respectively.
19. Following N. B. Ryder [in R. W. Hiorns, Ed., *Demographic Patterns in Developed Societies* (Taylor & Francis, London, 1980), p. 25], mean numbers of children ever born for women aged 40 to 44 through 75 to 79 at the 1970 census are plotted at the time the cohort reached its mean age of childbearing, taken as 30 years on the basis of mean ages computed as described (*17*, p. 217). The mean number of children born for women aged 40 to 44 at the 1970 census, for example, is plotted at the time of the census less 42.5 to 30 years; in other words, 12.5 years prior to the time of the census. Comparing mean numbers of children ever born to the same cohort as recorded in the 1960 and 1970 censuses indicates a slight downward bias as women age. This might be due either to an association between number of children ever born and probability of survival or to deterioration in the completeness of reporting as women get older. The comparison leads easily to the following set of adjustment factors for mean numbers of children ever born to women aged 50 to 54 through 80 to 84, respectively, at the 1970 census: 1.002 (ages 50–54), 1.012 (ages 55–59), 1.031 (ages 60–64), 1.036 (ages 65–69), 1.054 (ages 70–74), 1.049 (ages 75–79), and 1.067 (ages 80–84). Until recently it was considered that information on children ever born to women of postreproductive age was unreliable [A. J. Coale and T. J. Trussell, *Popul. Index* **40**, 2 (1974), p. 195]. Recent work has shown that this is not true in general [G. Feeney, *NUPRI Research Paper No. 55* (Nihon University Population Research Institute, Tokyo, Japan, 1990), and *Asian and Pacific Popul. Forum* **5**, 80 (1991)].
20. A. Mason, "HOMES: A household model for economic and social studies", *Papers of the East-West Population Institute, No. 106* (East-West Center, Honolulu, HI, 1987), describes a method for estimating average numbers of surviving children in the absence of a census question. Unpublished estimates received from Mason show average numbers of surviving children borne to Japanese women are declining approximately linearly from 4.6 for women aged 70–74 to 2.0 for women aged 40–44. The older women were in prime childbearing ages during the early 1930s (relative to younger women, whose prime childbearing years were in the 1960s), and since infant mortality was declining sharply throughout this period (*17*), fertility must have declined even more rapidly.
21. G. W. Barclay, *Colonial Development and Population in Taiwan* (Princeton Univ. Press, Princeton, NJ, 1954).
22. *1992 Taiwan-Fukien Demographic Fact Book Republic of China* (Ministry of the Interior, Taipei, Republic of China, 1993) and preceding annual volumes.
23. T. H. Kwon, in *The Revolution in Asian Fertility*, R. Leete and I. Alam, Eds. (Clarendon Press, Oxford, UK, 1993).
24. T. H. Kwon, *Demography of Korea: Population Change and Its Components 1925–66* (Seoul National Univ. Press, Seoul, Korea, 1977).
25. A. J. Coale, L. J. Cho, and N. Goldman [*Committee on Population and Demography Report No. 1* (National Academy of Sciences, Washington, DC, 1980), p. 2] give total fertility for the years 1955 to 1975. N. O. Tsuya and M. K. Choe [*NUPRI Research Paper Series No. 58* (Nihon University Population Research Institute, Tokyo, Japan, 1991), p. 17], continue the series through 1988.
26. A. J. Coale and S. L. Chen, *Basic Data on Fertility in the Provinces of China, 1940–82* (East-West Center, Honolulu, HI, 1987), for years prior to 1973.
27. N. Y. Luther, G. Feeney, W. M. Zhang, *Popul. Stud.* **44**, 341 (1990), for 1973 to 1987.
28. G. Feeney and J. H. Yuan, *Popul. Stud.*, in press.
29. The sharp drop circa 1960 reflects the disastrous famine of the late 1950s.
30. G. Feeney, N. Y. Luther, Meng Qingpu, Sun Ying, "Recent fertility trends in China: Results from the 1990 census," International Seminar on China's 1990 Population Census, 19 to 23 October 1992, Beijing (State Statistical Bureau).
31. S. Greenhalgh, C. Z. Zhu, N. Li, *Popul. Dev. Rev.* **20**, 365 (1994).
32. D. Little, *Understanding Peasant China* (Yale Univ. Press, New Haven, CT, 1989).
33. R. A. Buletao and R. D. Lee, *Determinants of Fertility*

in Developing Countries (Academic Press, New York, 1983) emphasizes the "supply" and "demand" for children. The validity of this emphasis has been challenged over the past decade, though not specifically in connection with East Asia, by asserting the importance of culture and cultural change as influences on fertility behavior. See, for example, J. Cleland, in *Reproductive Change in Developing Countries*, J. Cleland and J. Hobcraft, Eds. (Oxford Univ. Press, Oxford, UK, 1985), chap. 10, and, for a recent review, C. Hirschman, *Annu. Rev. Sociol.* **20**, 203 (1994). My own view is that the arguments made on both sides of what is sometimes regarded as a heated debate are broadly complementary and that the perceived conflict reflects inadequate empirical evidence.

34. Davis (*12*) seems to have been the first to emphasize the importance of rising numbers of surviving children as a factor in fertility decline. [Increases due to declining mortality may have been augmented by the increases in fertility that may occur during the early years of the demographic transition. T. Dyson and M. Murphy, *Popul. Dev. Rev.* **11**, 399 (1985).]
35. *An Extract Report on The 1980 Census of Population and Housing, Taiwan-Fukien Area, Republic of China* (Census Office of Executive Yuan, Taipei, China, 1982).
36. Unpublished estimates received from A. Mason show an average of 4.7 surviving children per woman for women aged 45 to 69 in 1970 (*20*).
37. The censuses, conducted at five year intervals from 1970 through 1990, provide average numbers of surviving children for women in five-year age groups in Table 2 of the "Fertility" volume for each census. Average numbers of surviving children decline as women age because children die, but comparison between censuses indicates the magnitude of this decline and permits adjustment for it.
38. R. A. Easterlin, in *Historical Studies of Changing Fertility*, C. Tilly, Ed. (Princeton Univ. Press, Princeton, NJ, 1978).
39. J. C. Caldwell, *Theory of Fertility Decline* (Academic Press, New York, 1982).
40. It is the costs and benefits of given numbers (and sex composition) of surviving children, rather than the costs and benefits "of children" considered individually, that matter. Costs and benefits are to be understood broadly, as possible answers to such questions as "What are the advantages and disadvantages of large families? Of small families?"
41. C. Mosk [*Patriarchy and Fertility in Japan and Sweden, 1880–1960* (Academic Press, New York, 1983)] provides the basis for much of the following discussion.
42. J. C. Caldwell, P. H. Reddy, P. Caldwell [*The Causes of Demographic Change* (Univ. of Wisconsin Press, Madison, 1988)] provides an invaluable counterpoint.
43. N. O. Tsuya and M. K. Choe, *NUPRI Research Paper Series No. 58* (Nihon University Population Research Institute, Tokyo, Japan, 1991).
44. A. P. Wolf and C. S. Huang, *Marriage and Adoption in China, 1845–1945* (Stanford Univ. Press, Stanford, CA, 1980).
45. A. Thornton and H. S. Lin, *Social Change and the Family in Taiwan* (Univ. of Chicago Press, Chicago, 1994).
46. This uncertainty over timing suggests that even the closest analysis of relevant time series data is unlikely to yield satisfactory explanations either of why fertility declined or why the declines began when they did. The statistical evidence is necessary both to define the problem and to test alternative explanations, but assessments of causality must also consider evidence on the perceptions and dispositions of family members who did, in fact, adopt family limitation at particular times and for particular reasons.
47. Prevailing and instigating conditions in causal analysis have been discussed (*32*).
48. T. H. Sun, in *Measuring the Effect of Family Planning Programs on Fertility*, C. Chandrasekaran and A. I. Hermalin, Eds. (Ordina Editions, Dolhain, Belgium, 1975).
49. The role of family planning programs in fertility decline has been the subject of robust debate for several decades, going back at least to K. Davis, *Science* **158**, 730 (1967) and P. M. Hauser, *Demography* **4**, 1 (1967). See L. H. Pritchett, *Popul. Dev. Rev.* **20**, 1 (1994), and commentary and response in the same journal, p. 3.
50. W. Lavely and R. Freedman, *Demography* **27**, 3 (1990), provide persuasive evidence that fertility decline in China began in the early 1950s; that it began among the educated and urban elites, as in Europe and other developing societies; but that subsequent rapid declines in both urban and rural areas were probably due to government policies. Only the latter declines are perceptible at the national level.
51. G. W. Barclay, A. J. Coale, M. A. Stoto, T. J. Trussell, *Popul. Index* **72**, 42 (1976), give data from which it may be calculated that women aged 40 to 44 in 1930 had an average of 3.0 surviving children per woman.
52. *1982 Population Census of China (Results of Computer Tabulation)* (State Statistical Bureau, Beijing, China, 1985), Table 76, shows 4.1 surviving children for women in the same age group at the 1982 census.
53. J. L. Buck [*Land Utilization in China* (Univ. of Nanking, Nanking, China, 1937), pp. 367–370] gives data on family composition indicating 2.2 surviving children per wife, including recently married wives. The average of 5.3 persons per household would imply 3.3 surviving children per woman if households included husband, wife, and children only; but persons classified as head of household, wife, and son or daughter constitute only 69% of household members.
54. J. Bongaarts [in J. Bongaarts, T. K. Burch, and K. W. Wachter, *Family Demography* (Clarendon Press, Oxford, UK, 1987)] gives macrosimulation results for changing levels of surviving children during the demographic transition remarkably similar to those described for the four countries considered here.
55. W. Lavely, Z. Y. Xiao, B. H. Li, R. Freedman, *The China Quarterly* **121**, 61 (1990).
56. S. H. Potter and J. M. Potter, *China's Peasants* (Cambridge Univ. Press, New York, 1990).
57. V. Smil, *Popul. Dev. Rev.* **12**, 25 (1986); H. Harding, *China's Second Revolution* (The Brookings Institution, Washington, DC, 1987).
58. D. Kelliher, *Peasant Power in China* (Yale Univ. Press, New Haven, CT, 1992).
59. V. Shue, *Peasant China in Transition* (Univ. of California Press, Berkeley, 1980).
60. G. Feeney, in *The Future Population of the World: What Can We Assume Today?*, W. Lutz, Ed. (Earthscan, London, 1994). Even after adjustment for the effect of rising age at marriage, fertility declined at a rate of about 2.3 children per woman per decade between 1970 and 1984.
61. Peng Xizhi, *Demographic Transition in China* (Clarendon Press, Oxford, UK, 1991); H. Yuan Tien, *China's Strategic Demographic Initiative* (Praeger, New York, 1991); J. Banister, *China's Changing Population* (Stanford Univ. Press, Stanford, CA, 1987); P. C. Chen and A. Kols, *Population Reports, Series J., No. 25* (Population Information Program, Johns Hopkins Univ., Baltimore, MD, 1982).
62. G. Feeney and F. Wang, *Popul. Dev. Rev.* **19**, 61 (1993).
63. A. P. Wolf, *ibid.* **12**, 1 (1986). Wolf notes also the penetration of village society by the national bureaucracy, on which see A. Chan, R. Madsen, J. Unger, *Chen Village* (Univ. of California Press, Berkeley, ed. 2, 1984).
64. J. Banister and S. H. Preston, *Popul. Dev. Rev.* **7**, 1 (1981).
65. S. Greenhalgh, *The China Quarterly* **122**, 191 (1990); *American Ethnologist* **21**, 1 (1994).
66. G. Feeney, X. R. Li, H. W. Yu, J. H. Yuan, L. J. Chen, *Period Parity Progression Measures of Fertility for China and its Provinces: Estimates from the 1990 Census* (East-West Center, Honolulu, HI, 1994).
67. G. Feeney and W. Lutz, in *Future Demographic Trends in Europe and North America: What Can We Assume Today?*, W. Lutz, Ed. (Academic Press, New York, 1991); G. Feeney, F. Wang, M. K. Zhou, B. Y. Xiao, *Popul. Dev. Rev.* **15**, 2 (1989); G. Feeney and J. Y. Yu, *Popul. Stud.* **41**, 1 (1987).
68. S. Greenhalgh, in *Chinese Families in the Post-Mao Era*, D. Davis and S. Harrell, Eds. (Univ. of California Press, Berkeley, 1993).
69. N. Ogawa and R. D. Retherford, *Popul. Dev. Rev.* **19**, 4 (1993).
70. G. W. Skinner, *Journal of Asian Studies* **44** (1985).
71. ———, in *The City in Late Imperial China*, G. W. Skinner, Ed. (Stanford Univ. Press, Stanford, CA, 1977); and in T. P. Lyons and V. Nee, *Transformation in South China: Reform and Development in the Post-Mao Era* (Cornell East Asian Program, Ithaca, NY, 1994).

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