



Paths to Subreplacement Fertility: The Empirical Evidence

Tomas Frejka; John Ross

Population and Development Review, Vol. 27, Supplement: Global Fertility Transition (2001), 213-254.

Stable URL:

<http://links.jstor.org/sici?sici=0098-7921%282001%2927%3C213%3APTSFTE%3E2.0.CO%3B2-7>

Population and Development Review is currently published by Population Council.

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/popcouncil.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is an independent not-for-profit organization dedicated to creating and preserving a digital archive of scholarly journals. For more information regarding JSTOR, please contact support@jstor.org.

Paths to Subreplacement Fertility: The Empirical Evidence

TOMAS FREJKA

JOHN ROSS

IN THE MID-1990s 44 percent of the world's population lived in countries with fertility at or below the replacement level. This includes practically all of Europe, the overseas English-speaking countries, almost all countries of East Asia (including China and Japan), and Thailand and Cuba. An era of below-replacement fertility is taking hold. Evidence presented in this chapter suggests that in most of these countries fertility is likely to remain very low. A number of other countries are also heading in this direction. Such demographic developments will have profound economic, political, and social consequences.

This study examines the empirical record of the fertility transition in countries that as of the mid-1990s have had subreplacement fertility and investigates effects of three proximate determinants of fertility—marriage, contraception, and abortion—with limited attention to the social frameworks of change. This exploration may shed light on whether other societies are likely to follow similar paths and, if so, what the patterns and time frames of fertility change might be.

Our findings are for 54 countries: all European countries; the successor states of the Soviet Union except for those of central Asia; the United States, Canada, Australia, New Zealand; and Japan as well as other Asian countries that have recently reached subreplacement fertility, namely the People's Republic of China, the Republic of Korea (South Korea), the Republic of China (Taiwan), Hong Kong, Singapore, and Thailand.¹ We refer to these as the low-fertility countries.

We have relied on secondary data sets from both vital statistics and surveys to obtain long time series. The sources include United Nations publications, Council of Europe 1997, and many other publications listed in the References. Decisions on how far back in time to go were arbitrary; the interesting period for East Asia was clearly after World War II, but the other

regions experienced substantial fertility reductions, often to subreplacement, much earlier. We therefore chose to include the period before the war, using time series that for the most part started in the late nineteenth century, but with emphasis on the period after 1960.

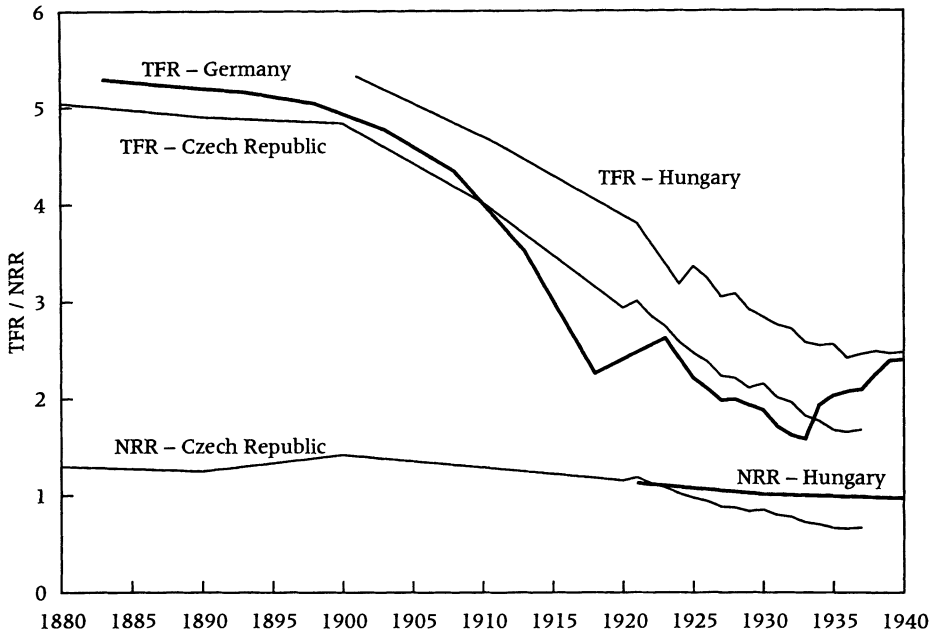
A specific methodological note is apropos. Three measures can be used to depict long-term fertility change: the period total fertility rate (PTFR), the completed cohort fertility rate (CCFR), and the net reproduction rate (NRR). Demographers are continually improving knowledge of the advantages and shortcomings of each of these. Most recently Bongaarts and Feeney (1998) and Lesthaeghe and Willems (1999) have refined our knowledge of how period total fertility rates can be affected by cohorts' postponing or advancing births. However, analysis of this relationship is possible only in countries that have detailed data sets of fertility by birth order and corresponding age at birth. For our analysis, which is focused on global long-term change, we rely primarily on the three aforementioned measures.

The era of subreplacement fertility

The global fertility transition has been underway for a little over a century. There were countries and regions where fertility was relatively low or had been declining for extended periods in the eighteenth and nineteenth centuries, as in France and the United States; however, only a very small proportion of the world population was involved, and the declines were gradual. Toward the end of the nineteenth century notable and rapid fertility declines started in a number of countries (Chesnais 1992). Although fundamental economic and social changes that tend to generate fertility declines had been in progress for several decades, the decisive changes in reproductive behavior did not commence on a widespread basis until the last quarter of the nineteenth century.

Not only did fertility decline rapidly in many Western and Central European countries during the first quarter of the twentieth century, but the descent was so steep that by the 1920s more than half of Europe's population was reproducing at below-replacement level. In the early 1930s, Austria, Germany, Estonia, and Sweden had net reproduction rates (NRRs) significantly below 0.8 (Kirk 1946). Almost all of the other Western and Central European countries had NRRs below unity: England and Wales (.81), Latvia (.82), Switzerland (.86), Norway (.89), Belgium (.91), France (.93), Czechoslovakia (.95), Denmark (.96), and Scotland (.98).² Figure 1 depicts trends in Germany, Hungary, and what is at present the Czech Republic. The NRR fell below replacement in the Czech Republic in 1925 and bottomed out at 0.66 in the mid-1930s. We do not have a time series of NRRs for Germany; however, during the 1920s and early 1930s its PTFR was consistently lower than that in the Czech Republic, implying that its

FIGURE 1 Total fertility rates and net reproduction rates, Czech Republic, Germany, and Hungary, 1880–1940



NRR was significantly below replacement. This was confirmed by Kirk (1946), who gave the NRR figure of .70 for Germany in 1933. Although Hungary was a “medium”-fertility country in the European context between the world wars, its reproduction rate was hovering around replacement.

Throughout Europe, as in the overseas English-speaking countries, a secular fertility decline was underway. By the late 1930s, fertility was around replacement in Canada, the United States, and Australia, where the average PTFRs in the period 1936–40 were 2.7, 2.2, and 2.2 children per woman (Chesnais 1992). The latter two were below the replacement level given mortality levels of that time.

Following World War II, the late 1940s and the 1950s were marked by increased fertility—the “baby boom”—in most Western and North European countries, and particularly in the overseas English-speaking countries. In the late 1950s the average PTFR for the latter countries was 3.7 children per woman; for the former it was 2.7. In the socialist countries of Eastern Europe and in the Soviet Union, fertility also increased after the war; however, the long-term decline resumed in the 1950s. In many other developed countries the secular decline reappeared in the 1960s. At about that time, the fertility transition started in many developing countries of Latin America and Asia, especially in East Asia, and it picked up speed in the 1970s and 1980s.

We now turn to a more detailed description of trends in the low-fertility countries. First we explore indicators that measure various aspects of fertility. Then we describe the principal trends in the main proximate determinants of fertility. Finally, we offer a rough assessment of the roles of population-related policies. In the tables and discussion, Eastern countries are all the formerly socialist countries of Central and Eastern Europe; Western countries are all the remaining developed countries; and the rapidly developing Asian countries are the People's Republic of China, Hong Kong, the Republic of Korea, Singapore, Taiwan, and Thailand.

Period total fertility rates

A major shift in fertility as reflected in PTFRs occurred between 1960 and the mid-1990s (see Table 1). In 1960, only four countries had a total fertility rate below 2.1: the Czech Republic, Hungary, Japan, and Latvia. In contrast, 53 countries in Table 1 had PTFRs below 2.1 in the mid-1990s. The one exception in Europe is Albania with a PTFR estimate of 2.70, a somewhat suspect estimate. Among the countries with the lowest PTFRs in the mid-1990s were the Czech Republic (1.17, 1997), Spain (1.15, 1997), Latvia (1.11, 1997), Bulgaria (1.09, 1997), and the former East Germany (0.95, 1996).

On average in 1960, fertility was higher in the Western compared to the Eastern countries; this persisted as of the mid-1990s. A few countries in the East had high fertility around 1960 (Albania, Armenia, and Azer-

TABLE 1 Distribution of low-fertility countries by total fertility rates, 1960-97

Total fertility rate	1960				1997 or latest available year			
	Total	West	East	Asia	Total	West	East	Asia
Below 1.20	—	—	—	—	5	1	4	—
1.20-1.49	—	—	—	—	18	7	10	1
1.50-1.79	1	—	1	—	18	10	5	3
1.80-2.09	3	1	2	—	12	7	3	2
2.10-2.39	12	5	7	—	—	—	—	—
2.40-2.69	9	5	4	—	—	—	—	—
2.70-2.99	7	5	2	—	1	—	1	—
3.00-4.99	15	9	5	1	—	—	—	—
5.00 +	7	—	2	5	—	—	—	—
Total	54	25	23	6	54	25	23	6
Median	2.75	2.72	2.49	5.50	1.57	1.71	1.40	1.77

NOTE: Eastern countries are all the formerly socialist countries of Central and Eastern Europe; Western countries are all the remaining developed countries; and the rapidly developing Asian countries are the People's Republic of China, Hong Kong, the Republic of Korea, Singapore, Taiwan, and Thailand.

baijan), but the majority of countries had already experienced a significant fertility decline in the 1950s. In contrast, many of the Western countries were still around the peak of their postwar fertility in 1960. At this time, the Asian developing countries were beginning their fertility transition from a median PTFR of 5.5.

By the mid-1990s practically all low-fertility countries were below the replacement level. The Asian developing countries had a median PTFR of 1.8. The median PTFR of the Western countries was 1.7; that of the Eastern countries was lower at 1.4 children per woman. As will be demonstrated below, the Eastern countries experienced a rapid fertility decline during the 1990s.

In the mid-1990s the range of the PTFR for all low-fertility countries was quite narrow; all had a value below replacement, with the possible exception of Albania for which reliable data are not available. This range was narrowing steadily from around 1960 when the developing countries of Asia had PTFRs around 5–6 and a number of other countries had high fertility: for instance, Albania 6.9, Iceland 4.2, Canada 3.9, New Zealand 3.9, the United States 3.5, Australia 3.3, Netherlands 3.1, and Slovakia 3.1.

Recent analyses by Bongaarts and Feeney (1998) and Lesthaeghe and Willems (1999) suggest that in a number of countries the period total fertility rates of the mid-1990s are distorted downward as a result of the postponement of births. However, in a number of countries below-replacement fertility has lasted for over two decades, which implies that in these countries the postponement effect has largely run its course. This is particularly so for the Western countries. In the mid-1990s over 80 percent of these countries had PTFRs below 1.8. Even if their PTFRs were adjusted, it is unlikely that they would be at or above replacement. As will be demonstrated below, this is confirmed by the trends in completed cohort fertility.

A clear regional pattern emerges for when countries reached subreplacement fertility. There are exceptions to the rule, but rather few.

During the 1950s and 1960s, the socialist countries of Central and Eastern Europe, as well as the countries of Northern Europe, experienced fertility declines leading to subreplacement (see Table 2). The countries of Western Europe entered the path of sharp fertility descent in the 1960s; however, they reached subreplacement fertility in the 1970s. The overseas English-speaking countries experienced even faster downward trends than did Western Europe, and they too reached subreplacement fertility in the 1970s. This decade was also notable because the first developing country/city-state, Singapore, reached such low fertility. The 1980s was the "South European decade," when Greece, Portugal, and Spain reached subreplacement fertility. It was also the decade when certain rapidly developing countries did so: Hong Kong, the Republic of Korea, and Taiwan. Finally, in the 1990s, the Transcaucasian countries reached replacement-level fertility, al-

TABLE 2 Period when low-fertility countries reached replacement-level fertility, 1960s–90s

Period	Country	Number of countries
Before 1960	Czech Republic, Hungary, Japan, Latvia	4
1960–69	Bulgaria, Croatia, Denmark, Finland, Romania, Russian Federation, Slovenia, Sweden, Ukraine	9
1970–79	Australia, Austria, Belarus, Belgium, Canada, Cyprus, Estonia, Federal Republic of Germany, France, German Democratic Republic, Italy, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Singapore, Switzerland, United Kingdom, United States	21
1980–89	Bosnia and Herzegovina, Greece, Hong Kong, Iceland, Ireland, Poland, Portugal, Republic of Korea, Slovakia, Spain, Taiwan, Yugoslav Federal Republic	12
1990–96	Albania, Armenia, Azerbaijan, Georgia, Moldova, People's Republic of China, Thailand, Former Yugoslav Republic of Macedonia	8

though Azerbaijan by some estimates might still have been above replacement in the mid-1990s.

We now analyze the regional patterns of fertility change in greater detail. First we will look at the Western, Eastern, and the Asian rapidly developing countries separately, and then analyze smaller groupings of countries.

The median fertility decline in all the low-fertility countries in the period 1960–97 was 47 percent (see Table 3). If one compares the period 1960–80 to 1980–97, the decline averaged 26 percent in both periods. This was, however, a consequence of differential decline in the East and in the West. In most of the Western countries the fertility decline was rapid during 1960–80, but relatively slow during 1980–97. In the Eastern countries most of the fertility decline was concentrated in the 1990s. In the Asian rapidly developing countries the average decline was rapid in both periods.

During 1960–97 distinct regional patterns of fertility change were evident in smaller country groupings. West European countries experienced a moderate fertility increase following World War II to a range around a PTFR of 2.5–3.0 that peaked in the mid-1960s (see Figure 2A).³ Then during the late 1960s and most of the 1970s these countries fell to below replacement, each country stabilizing within a relatively narrow range during the 1980s and 1990s.

Scandinavian countries experienced PTFR trends not very different from the West European countries, albeit with some fluctuations, particularly in Sweden before and after the decline of the late 1960s/early 1970s (Figure 2B).

TABLE 3 Distribution of low-fertility countries by percent change in total fertility rate, 1960–97 (or latest available year)

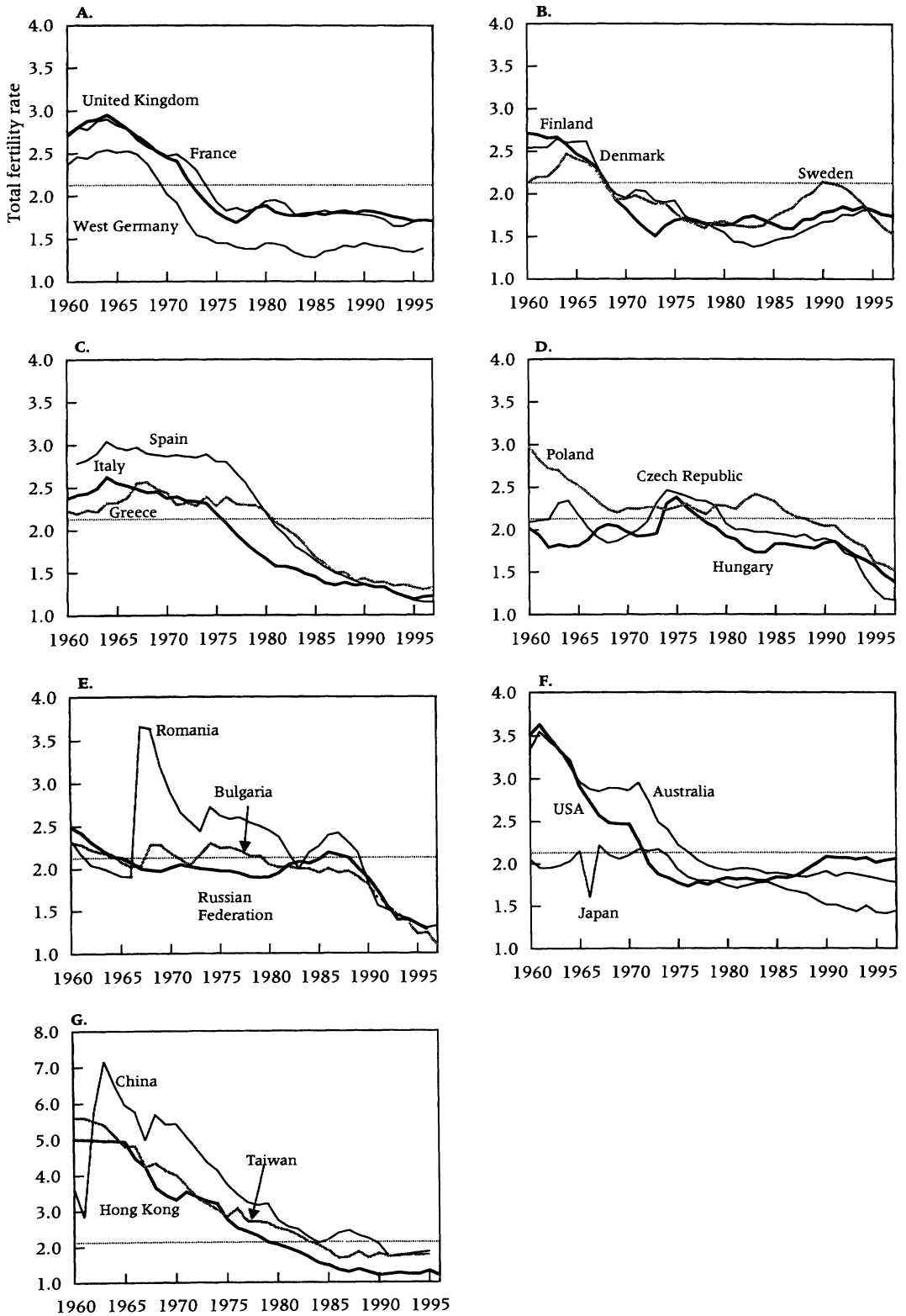
Fertility change (percent)	1960–80				1980–97 (or latest available year)				1960–97 (or latest available year)			
	Total	West	East	Asia	Total	West	East	Asia	Total	West	East	Asia
Increase	2	—	2	—	6	5	—	1	—	—	—	—
Decline												
0.0–9.9	6	2	4	—	10	10	—	—	—	—	—	—
10.0–19.9	8	2	6	—	7	5	2	—	1	1	—	—
20.0–29.9	11	4	6	1	8	1	6	1	4	3	1	—
30.0–39.9	11	10	1	—	13	1	9	3	12	7	5	—
40.0–49.9	10	6	3	1	8	3	5	—	18	9	8	1
50.0–59.9	5	1	1	3	2	—	1	1	10	5	5	—
60.0–69.9	1	—	—	1	—	—	—	—	6	—	4	2
70.0 +	—	—	—	—	—	—	—	—	3	—	—	3
Total number of countries	54	25	23	6	54	25	23	6	54	25	23	6
Median decline in percent ^a	26	29	14	47	26	8	33	34	47	41	49	70

^aThe median rate of decline is calculated from individual country data. The rate for the 20-year period 1960–80 is controlled for period length, i.e., the data are prorated to be comparable to the 17-year period 1980–97.

Total fertility rates around 2.5–3.0 lasted into the mid- to late-1970s in South European countries (Figure 2C). The notable fertility decline in these countries occurred about ten years later than in the West European countries. By the mid-1990s the PTFRs in South European countries were lower than in the West European and Scandinavian countries. This was apparently due to a considerable tempo effect as shown by the comparison of calculations for Italy and Belgium in Lesthaeghe and Willems (1999). PTFRs in Southern Europe may increase once the postponement of births runs its course; however, since the PTFRs in this region are between 1.2 and 1.5 the elimination of the tempo effect would not raise them to replacement level.

Many of the formerly socialist countries of Central and Eastern Europe experienced a fertility decline during the 1950s, and by 1960 their PTFRs were close to replacement (Figures 2D and 2E). Throughout the 1960s, 1970s, and 1980s their PTFRs fluctuated around the replacement level. To a significant extent these swings were influenced by various pronatalist measures or by policies modifying abortion legislation and the availability of modern contraceptives (David 1970, 1999; Frejka 1980, 1983, 1993; Stloukal 1995). Most prominent among these measures was the total ban on induced abortions in Romania in 1965, where the population relied heavily on abortion for fertility regulation; the PTFR increased from under 2 to above 3.5 from one year to the next. A slow fertility decline in

FIGURE 2 Period total fertility rates, selected low-fertility countries, 1960–97



most of these countries started in the late 1980s and accelerated following the disintegration of the socialist regimes throughout Central and Eastern Europe around 1990. In the Czech Republic the PTFR declined from 1.89 in 1990 to 1.17 in 1997; in Romania from 2.42 in 1987 to 1.83 in 1990 and to 1.32 in 1997. In practically all these countries the fertility decline was still in progress in the mid-1990s.

The postwar fertility increase was more pronounced in the non-European developed countries, rising to a PTFR as of 1960 around 3.5 (Figure 2F). The fertility decline in these countries started in the early 1960s and lasted longer than in Europe, through the late 1970s. Period fertility then stabilized slightly below replacement in a quite narrow range. Bongaarts and Feeney (1998) argue that the postponement of childbearing has caused a distortion of the period TFR. The PTFR adjusted for the tempo effect was still only around 2 children per woman throughout the period from the early 1970s through the mid-1990s.

Japan experienced its rapid fertility decline in the late 1940s and the 1950s (Frejka 1960). The total fertility rate declined from its postwar high of 4.5 births per woman in 1947 to 2.0 in 1957, a decline of 56 percent in ten years. During the 1960s its PTFR hovered around the replacement level (Figure 2F) and has since been slowly declining, to a level of around 1.5 or less during the 1990s.

In the rapidly developing Asian countries the PTFR was 5–7 prior to sustained fertility decline in the 1960s to 1980s (Figure 2G). In the mid-1990s these countries were within a PTFR range of 1.3 in Hong Kong to 1.9 in China. Bongaarts and Feeney (1998) demonstrated that in the case of Taiwan the tempo effect in the late 1980s and early 1990s was considerable and the adjusted PTFR would have been around the replacement level.

Net reproduction rates

In 1970, the majority of low-fertility countries still had net reproduction rates above 1.0 (see Table 4). Only ten countries had a net reproduction rate below unity, and only two of those (Croatia and Finland) had a NRR below 0.9.

In the mid-1990s all but four of the low-fertility countries had NRRs clearly below unity. The data for three out of the four countries listed with a NRR of 1.0 or above in the mid-1990s were outdated; they refer to 1990 (Albania, Azerbaijan, and Georgia). Their NRRs have probably declined since then. The one remaining country, Cyprus, had a NRR of 1.00 in 1996.

At least seven countries had NRRs below 0.6 in the mid-1990s: Belarus 0.59, Estonia 0.59, the Czech Republic 0.57, Spain 0.56, Bulgaria 0.52, Latvia 0.52, and the former German Democratic Republic 0.45. But it is possible that as many as ten countries had such low fertility, because the latest fig-

TABLE 4 Distribution of low-fertility countries by net reproduction rates, 1970 and 1997 (or latest available year)

Net reproduction rate	1970				1997 or latest available			
	Total	West	East	Asia	Total	West	East	Asia
Below 0.60	—	—	—	—	7	1	6	—
0.60–0.79	—	—	—	—	23	11	11	1
0.80–0.99	10	4	6	—	20	12	3	5
1.00–1.19	24	14	10	—	2	1	1	—
1.20–1.39	10	6	4	—	2	—	2	—
1.40–1.99	7	1	2	4	—	—	—	—
2.00 +	3	—	1	2	—	—	—	—
Total	54	25	23	6	54	25	23	6

ures for Georgia (1.04) and Bosnia and Herzegovina (0.81) were for 1990; for Italy (0.64) for 1993; and for Russia (0.60) for 1996.

Fertility by age of women

In gross terms, fertility has become more concentrated in the middle of the reproductive period. Large reductions have certainly occurred at the older ages. It is difficult to generalize about the younger ages because of variance by region and country; nevertheless, the considerable concentration of fertility into a span of 15 years has occurred in almost all countries.

Fertility of women above age 40 declined faster than the PTFR in all countries studied (see Table 5).⁴ The same was true at ages 35–39 in the majority of countries in the East and in Asia; however in the West there were about as many countries where fertility declined more slowly than the PTFR in this age group as there were with equal or faster declines.

For the other age groups, clear patterns emerge in the smaller regional groupings of countries.

—In the West and North European countries fertility declined considerably faster than the PTFR not only in the ages above 40, but also under 25. The one exception was Great Britain where the fertility decline of the 15–19 age group was relatively slow. In the middle of the reproductive ages (25–39), and particularly at ages 30–34, fertility in these countries declined considerably more slowly than the PTFR.

—In the South European countries the age-specific decline was more evenly distributed. For ages 20–39 the fertility trend was not very different from the PTFR decline. In Greece and Spain fertility declined very slowly among women under age 20.

—In the formerly socialist countries of Central Europe fertility declined rapidly in the age groups above 34 and below 25. These trends were most

TABLE 5 Distribution of low-fertility countries by changes in age-specific fertility rates, 1960–96 (or latest available year)

Change in relation to total fertility rate	15–19	20–24	25–29	30–34	35–39	40–44	45–49
West: 25 countries							
Decline larger than TFR decline	16	19	1	—	8	25	25
Decline equal to TFR decline (within 10 percent)	—	6	10	2	7	—	—
Decline smaller than TFR decline or increase	9	—	14	23	10	—	—
East: 23 countries							
Decline larger than TFR decline	8	3	6	15	22	23	23
Decline equal to TFR decline (within 10 percent)	—	6	7	4	1	—	—
Decline smaller than TFR decline or increase	15	14	10	4	—	—	—
Asia: 5 countries							
Decline larger than TFR decline	2	1	—	1	3	5	5
Decline equal to TFR decline (within 10 percent)	2	3	2	1	2	—	—
Decline smaller than TFR decline or increase	1	1	3	3	—	—	—

pronounced in Hungary. In Poland on the other hand, especially up to age 34, age-specific fertility declined quite closely in line with the overall decline.

—In the formerly socialist countries of Eastern Europe there was a rapid fertility decline at all ages above 30, whereas fertility declined slowly among young women, especially in the Russian Federation.

—In the overseas developed countries, as in other Western countries, a rapid fertility decline occurred among women in their early 20s, but not in the 15–19 age group. As elsewhere, a rapid fertility decline emerged among women over age 40.

—In the Asian developing countries age-specific fertility rates fell quite evenly. The declines were large but fairly uniform across all age groups, although they were slightly faster in the age groups over 40. There was one outstanding exception, in Thailand, where fertility at the young ages declined very slowly.

Shifts in the age concentration of fertility appear also in the peak age-specific fertility rate. In almost all countries in Northern Europe and half of those in Central Europe, the peak shifted from ages 20–24 to ages 25–29. This was also the case in all the overseas English-speaking countries. In the Asian countries, the peak age-specific fertility rate was in the 25–29 age group for the entire period, except in Thailand, where there was a move

to the younger ages. In the former Soviet Union and former Yugoslavia, about half of the countries had their peak fertility in the 20–24 age group around 1960, whereas by the mid-1990s almost all had shifted their peak up to ages 25–29.

Live births by order

The change to smaller families is essentially universal. Between the early 1960s and the mid-1990s, in almost all countries the proportion of births that were first- and second-order increased.⁵ Around 1960, the median proportion of first- plus second-order births was 64 percent. By the mid-1990s, the median had risen to over 84 percent.

At the other extreme, the proportion of fourth- and higher-order births declined almost everywhere. Around 1960, there were only six countries in which fourth- and higher-order births made up less than 10 percent of the total. By the mid-1990s, 42 countries were below that mark. Those countries above 10 percent were so by only a few points; the highest proportion, 14 percent, was in Ireland.

The proportions of third-order births also declined in most countries. Only 11 of 51 countries had increases (by 1–3 percentage points) in third-order births.

Mean age of women giving birth

On balance, the mean age at childbearing in the mid-1990s was considerably higher than it was 25 years earlier. In over half (24) of the countries with available data, the mean age was above 28 years compared to only nine countries at that level around 1970.

In Western countries there was a tendency toward a declining age at childbearing in the 1960s and early 1970s (see Figure 3A); however, to a significant extent this was the result of the changing weights in birth orders, that is, the proportion of first- and second-order births was increasing at the expense of higher-order births. This lowered the mean age at childbearing even though the age at each order may not have changed much. (The United States case is illustrated in Bongaarts and Feeney 1998.) Subsequently, despite the continuous shift to higher proportions of lower-order births, the mean age at childbearing increased considerably, implying a strong shift toward a pattern of later childbearing. By the mid-1990s most Western countries had a mean age at childbearing around 29 years.

In Central and Eastern European countries childbearing has historically occurred on average at younger ages than in Western Europe. In addition, the social policies of the formerly socialist countries were conducive to early childbearing (David 1970, 1999; Frejka 1980; Stloukal 1995)

FIGURE 3A Mean age at childbearing, selected Western countries, 1960-96

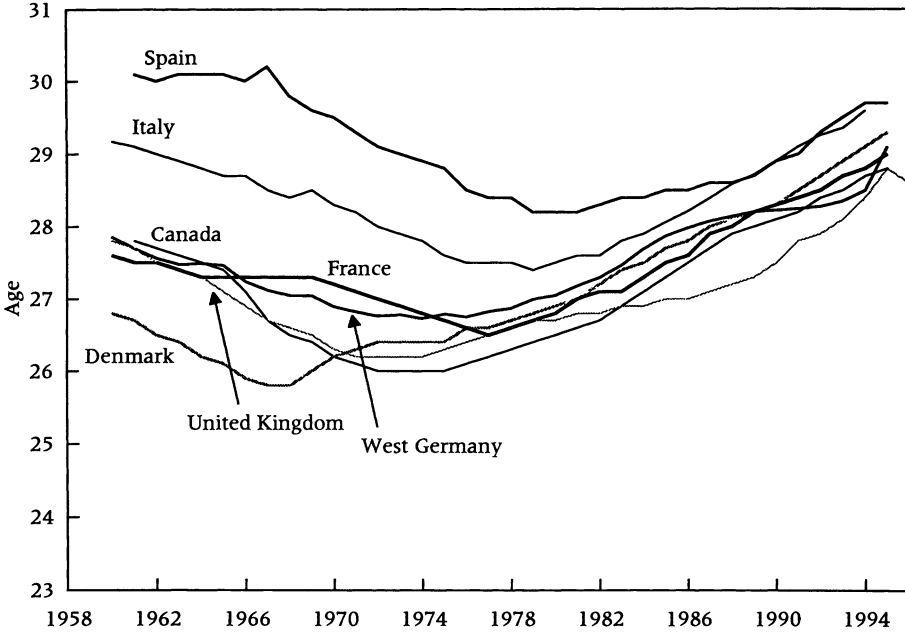
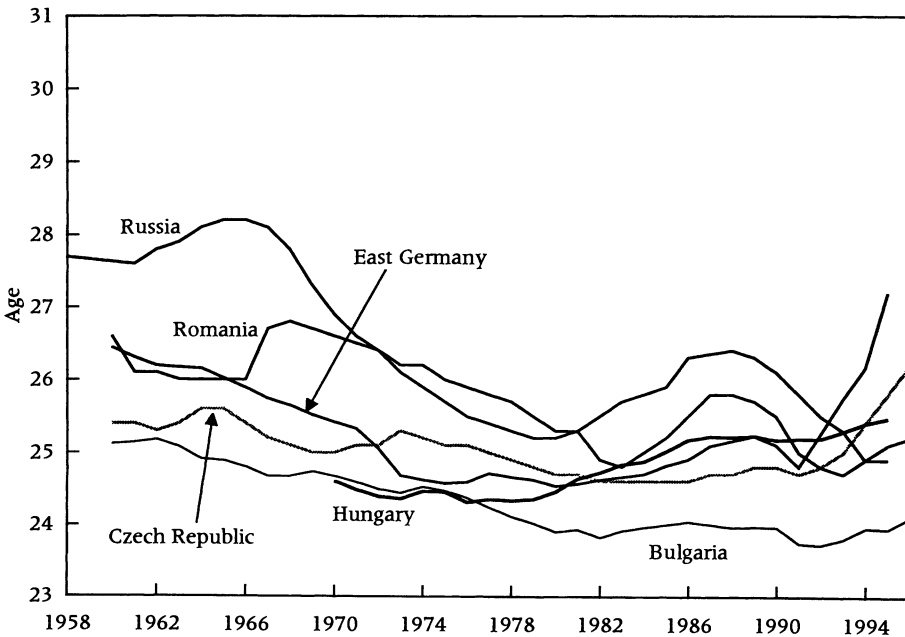


FIGURE 3B Mean age at childbearing, selected Central and Eastern European countries, 1958-96



so that between 1960 and 1990 the mean age at childbearing was around 24 to 26 (see Figure 3B). In the 1990s the age at childbearing has increased. In former East Germany and in the Czech Republic the increase was very steep, reflecting the precipitous decline of fertility at young ages. In spite of this, the mean age was still in the range of 25–27 years in most Eastern countries, much lower than in the Western countries. In an interesting contrast to the Central European formerly socialist countries, the mean age at childbearing has been declining in nearly all the successor states of the Soviet Union, reflecting relatively high fertility at young ages (as well as a rise in the proportions of lower-order births). The trend in the Russian Federation is a case in point.

The other outstanding exceptions are China and South Korea. There the dynamics are very different owing to the sharp decline of childbearing among older women, whereas the decline among younger women has been more modest. Furthermore, the increase in the relative weight of lower-order births has been rapid.

Completed cohort fertility rates

“Real” fertility levels and trends are probably best reflected in completed cohort fertility rates (CCFRs). By definition, these are available only after women have reached the end of their childbearing years, that is, with a considerable time delay. To partially mitigate this shortcoming, one can quite reliably estimate CCFRs for cohorts that have nearly completed their fertility, when only trivial additions remain. In the majority of developed low-fertility countries this certainly includes women in their 40s, and often even those who are in their late 30s. Such data are available for over 30 countries.⁶

Data in Table 6 show declines in completed cohort fertility rates. In all countries for which data for the 1930 birth cohort were available, the CCFR was above 2.1 children per woman. Among the birth cohorts of 1950—those that had reached age 45 by the mid-1990s—over two-thirds had CCFRs below 2.1. With the exception of Yugoslavia and Ireland, all birth cohorts of the 1960s in Europe and North America will apparently have CCFRs below 2.1. In two-thirds of these countries cohort fertility will likely be below 1.9 children per woman.

The lowest estimated CCFRs among the birth cohorts of the 1960s (below 1.7) are in the German-speaking countries, in Italy and Spain, and in Russia. Already about 20 birth cohorts have experienced CCFRs below 1.9 in former East and West Germany and in Switzerland; in Austria the first birth cohort with such low fertility was that of 1949 (see Figure 4A). The estimated CCFR is 1.47 for the 1965 cohort in the former East Germany and in the former West Germany it is 1.55 for the 1961 cohort.

TABLE 6 Distribution of low-fertility countries by completed cohort fertility rate, birth cohorts 1930–65

Completed cohort fertility rate	Birth cohort		
	1930	1950	1965 or latest cohort (at least 1960) ^a
Below 1.70	—	1	7
1.70–1.89	—	12	15
1.90–2.09	—	10	9
2.10–2.29	10	6	1
2.30 +	13	4	1
Total	23	33	33

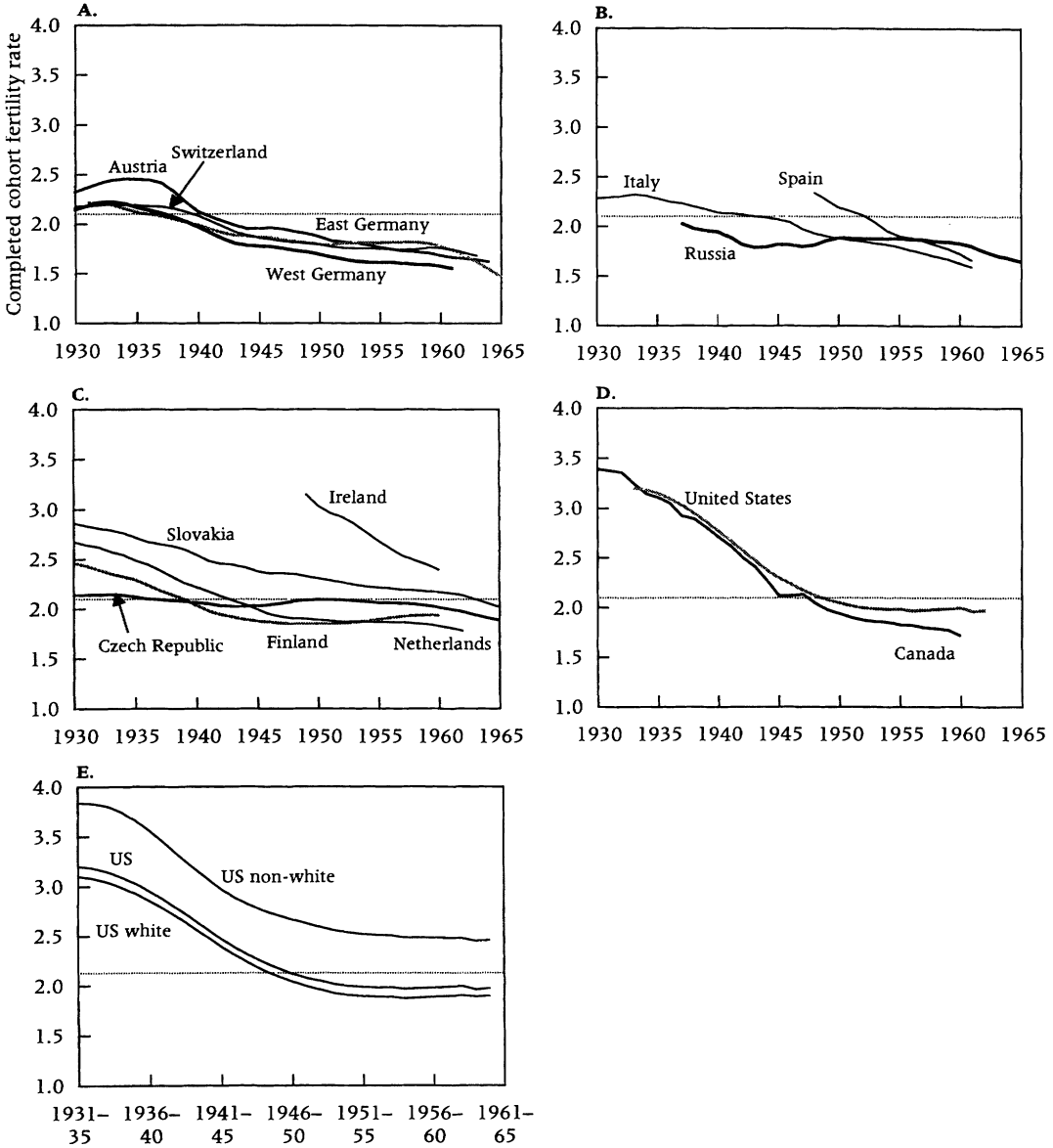
^aEstimate for cohorts younger than 50 years at the time of observation equals actual observed fertility plus estimated fertility for remaining years.

In Italy and Spain the first birth cohorts to experience CCFRs below 1.9 were those of 1950 and 1956, respectively (see Figure 4B). In both countries there appears to be a distinct decline in the CCFR from one birth cohort to the next. This is more pronounced in Spain than in Italy; their respective estimated CCFRs are 1.66 and 1.59 for the birth cohorts of 1961. In Russia, all birth cohorts starting with that of 1941 have had CCFRs below 1.9. The estimate for the 1965 birth cohort is 1.65.

A general decline in CCFRs is present in almost all other countries (see Figure 4C). The estimated CCFR of the 1960 cohort is the highest in Ireland at 2.40; however, the decline from cohort to cohort was steep. In contrast, the CCFR in the Czech Republic fluctuated within a narrow band of 2.15 to 2.02 from the 1930 to the 1960 birth cohort, but then the estimate for the 1965 cohort falls to a value of 1.89. A very different pattern is observed in Slovakia, with a relatively steady decline from 2.86 for the 1930 cohort to 2.02 for the 1965 cohort. The Netherlands experienced a smooth decline from the 1930 cohort to the cohorts of the late 1940s, a leveling off for about ten years, and then a slow decline for the cohorts born in the late 1950s and early 1960s. Finland exemplifies a steady decline among the cohorts of the 1930s followed by stabilization and even a modest increase among the cohorts of the 1950s. Similar trends occurred (not shown) in Denmark and Norway.

In the United States and Canada CCFRs declined rapidly from the birth cohorts of the early 1930s through the cohorts of the late 1940s (see Figure 4D). In Canada the declining trend continued among the cohorts of the 1950s, and the 1960 birth cohort will probably have a CCFR of about 1.72. In the United States it appears that the completed fertility of the cohorts of the 1950s and 1960s will be around 2.0. US data permit decomposition by race (see Figure 4E). Data for whites and non-whites are pub-

FIGURE 4 Completed cohort fertility rate, selected countries, birth cohorts 1930-65



lished separately. These two groups followed similar trends during the period under consideration, with a steady differential of about 0.5-0.6 children. The white birth cohorts of the mid-1940s reached replacement and the cohorts of the 1950s appear to be stabilizing with CCFRs of about 1.9. CCFRs for the 1950s cohorts for non-whites, which undoubtedly conceal other differentials by race, have stabilized at close to 2.5 children per woman.

The main conclusion from these data is that significant shifts are taking place in completed cohort fertility, not just in period fluctuations. Completed cohort fertility is below the replacement level for the birth cohorts of the 1950s and the early 1960s in almost all European and North American countries, and with very few exceptions the trend among the most recent cohorts is one of decline.

Parity

Data on completed fertility by parity of birth cohorts of women are analytically valuable but rarely available. Table 7 presents such data for Germany, Hungary, and Russia.

A drop in family size is clear: the proportions of higher-order parities in the more recent birth cohorts are significantly smaller than in earlier cohorts. In the three countries the proportions at 3+ parity in the 1955, 1960, and 1950–54 birth cohorts were 18–20 percent compared to higher percentages in earlier cohorts.

More tellingly, from the perspective of replacement fertility, in all three countries the combined proportion of parities zero and one is larger than the proportions of 3+ parities. With a generous allowance for the fraction at 4+, the overall result is clear; it confirms that completed cohort fertility is below replacement. In Russia the combined proportion of parity 0 and 1 in the 1955 birth cohort was 34 percent and for parity 3+ only 18 percent; the respective proportion for the 1960 German cohort was 45 percent compared to 18 percent; in Hungary these proportions were 28 percent compared to 20 percent in the 1950–54 birth cohort. These data are in logical consonance with the estimated completed cohort fertility rates for the respective birth cohorts. These are 1.88 births per woman for the 1955 Russian birth cohort, 1.56 for the 1960 German cohort, and 1.94 for the 1950–54 Hungarian birth cohort.

TABLE 7 Distributions of completed fertility by parity, Federal Republic of Germany, Hungary, and Russian Federation, selected birth cohorts 1905–60 (in percent)

Parity	Federal Republic of Germany		Hungary		Russian Federation	
	1940	1960	1926–30	1950–54	1905	1955
0	10	23	12	8	11	7
1	24	22	25	20	14	27
2	39	37	36	52	16	48
3	27	18	15	15	15	13
4+			12	5	44	5
Total	100	100	100	100	100	100

Proximate determinants of fertility

Among the proximate determinants of fertility, we concentrate on cohabitation, contraceptive use, and induced abortion. Ideally one would want to measure the relative effect of each determinant through decomposition. Because data permit such an exercise only on a country level, we identify the basic direction of impact of the respective determinants in various country groupings.

Cohabitation

Major changes in cohabitation patterns occurred in all countries we have studied. Until the 1960s, it was common to get married during the child-bearing years in all low-fertility countries. Few men and women did not enter into marriage. Total first marriage rates⁷ (TFMRs) for women were close to unity in the early 1960s in all countries with available data. Thirteen of these are illustrated in Figures 5A and 5B.

In several Western countries the female TFMRs started to decline in the mid-1960s and reached a value of near 0.6 in all of them by the mid-1980s (Figure 5A), implying that only 60 percent would ever marry. But the data presented in this section are period rates, subject to timing effects. The long-term cohort marriage behavior may differ.

In the Scandinavian countries this process occurred earlier than elsewhere, as illustrated by the data for Denmark. In Southern Europe this trend did not start until the mid-1970s, but the decline was faster and steeper than elsewhere, as depicted by the trend in Spain. A significant proportion of the decline in formal marriage in the Western countries is offset by increases in consensual unions; however, this compensation is only partial.

As with all general indicators, TFMRs are indicative only of main trends and can conceal structural changes. For example, although age-specific first marriage rates have been declining among women in their teens and early 20s, in more recent years among women in their late 20s and early 30s they have either been relatively stable or have even increased in many Western countries.

In the Central and Eastern European countries the female TFMRs were near unity until around 1980 (Figure 5B). A moderate decline is discernible during the 1980s followed by a universally steep decline in the 1990s. Age-specific marriage rates (not shown) followed similar paths. In the Czech Republic, for instance, the declines in the young age groups were so abrupt that between 1960 and 1996 the proportions currently married plummeted to historic lows, from 8 percent to 2 percent at ages 15–19 and from 62 percent to 38 percent at ages 20–24.

TFMRs were not available for the Asian countries; however, age-specific proportions married provide evidence of distinct changes in family for-

FIGURE 5A Total first marriage rates for women, selected Western countries, 1960-96

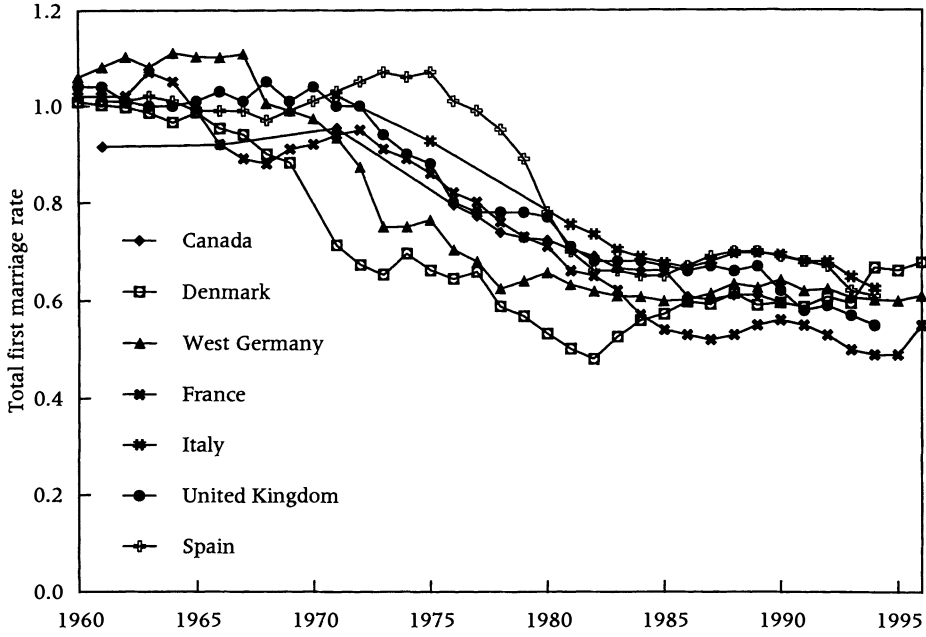
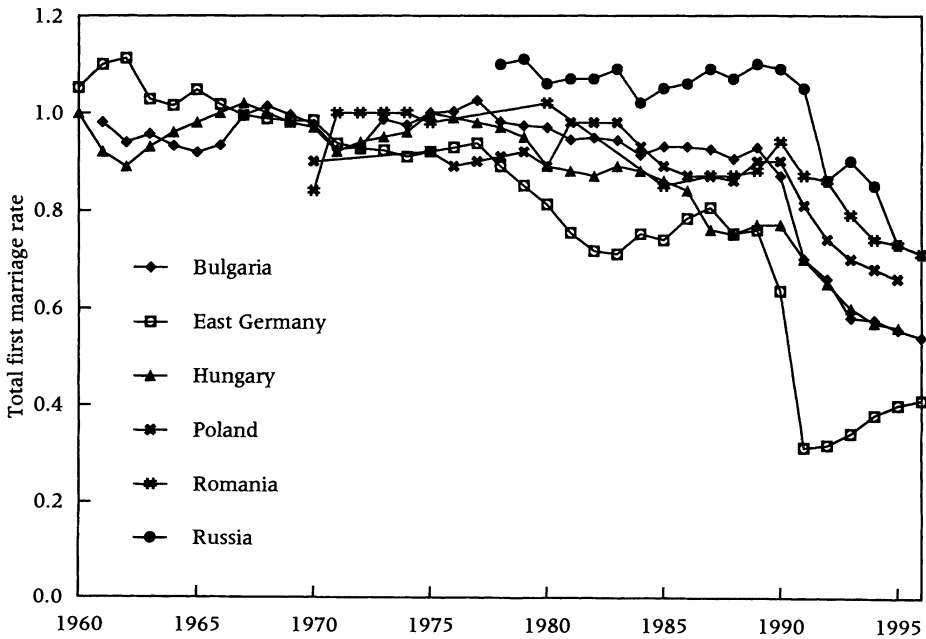


FIGURE 5B Total first marriage rates for women, selected Central and Eastern European countries, 1960-96



NOTE: See endnote 7 for definition of total first marriage rates.

mation (see Figure 6A). Among women aged 20–24 in Taiwan, 70 percent were married in the mid-1950s but only 20 percent by the mid-1990s. Japan and Korea experienced similar declines at ages 20–24 and also at higher ages; the proportions married in the late 20s and early 30s also fell in Japan, Korea, and Taiwan, but commencing after a delay of several years. The proportions of women married in their 40s have not changed.

In some countries patterns of family formation were modified by exceptional demographic structures created by manmade cataclysms. The low proportion of women married in Russia in the late 1950s was in part the consequence of unbalanced sex ratios arising from extremely high male mortality during World War II and possibly also from the incarceration of millions of men in the Gulag. As sex ratios became more balanced, the proportions of women married at ages 20–24 increased after 1950 but fell off again around 1990 (see Figure 6B). In China, marriage patterns were modified by demographic imbalances emerging from high famine-induced mortality and a temporary collapse of fertility around 1960, as well as by comparatively strict policy measures that in some periods restricted entry into marriage to relatively high ages.

The proportions of women cohabiting, either in formal marriages or in informal unions, are considerably smaller in the mid-1990s in the low-fertility countries than ever before. The 1901 to 1961 female birth cohorts

FIGURE 6A Proportions of women married at ages 20–24, Japan, Republic of Korea, and Taiwan, 1950–96

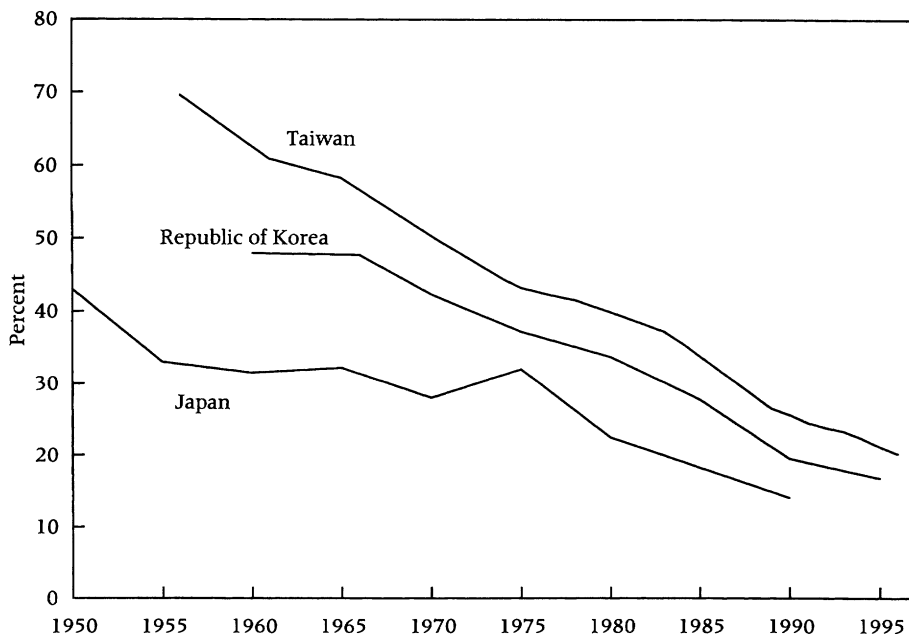
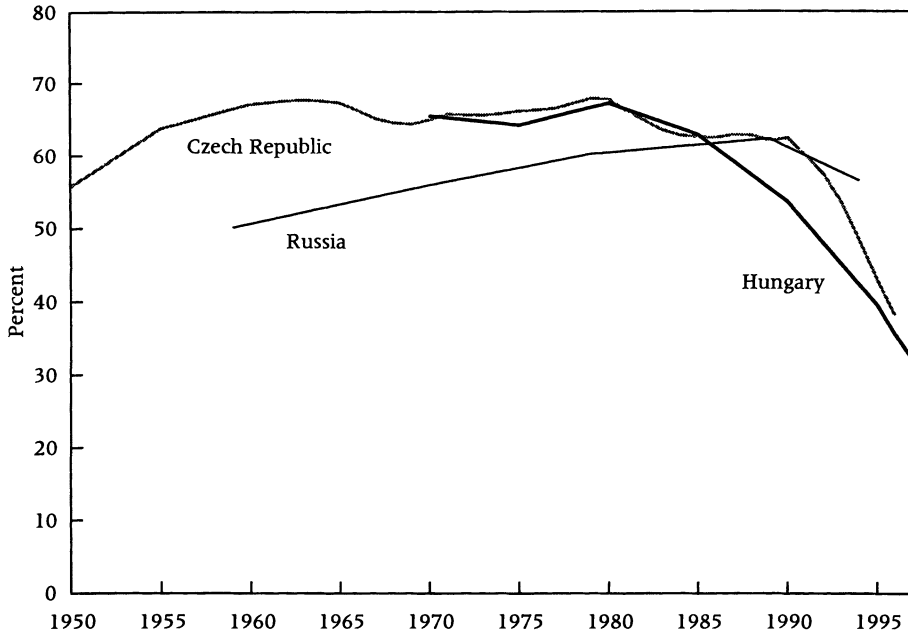


FIGURE 6B Proportions of women married at ages 20–24, Czech Republic, Hungary, and Russia, 1950–96



in Spain are illustrative (see Figure 7). For the cohorts born in the 1940s and earlier, at least 80 percent of women were ever married. Since then these proportions have been declining rapidly with only 68 percent of the 1961 birth cohort ever married. With some variation in timing, similar trends have probably been taking place in all low-fertility countries. This is a significant factor in lowering the probabilities of conceiving, even though sexual activity also occurs outside the bounds of cohabitation.

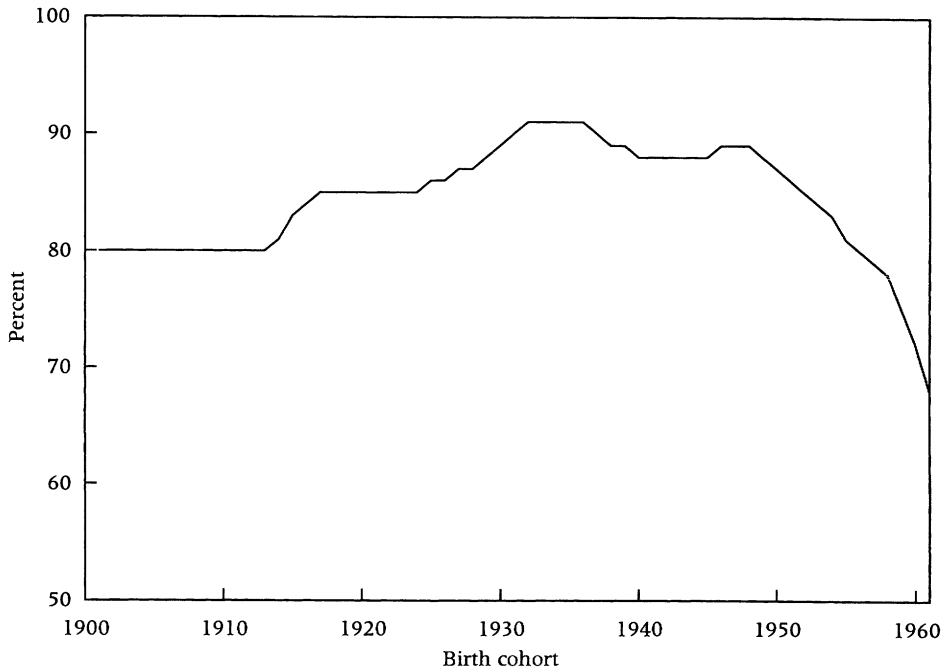
Contraceptive use

Profound changes have taken place in the use of contraception during the last four decades of the twentieth century, both in total use and in reliance on modern methods.

The increase in use was remarkably fast in the rapidly developing Asian countries (see Figure 8). Between the mid-1960s and the mid-1980s the proportions of women in union using contraception rose from 20 percent to 80 percent in Taiwan and in the Republic of Korea. Without doubt a similar process transpired in China, but the early years were not documented.

In the developed countries contraceptive use was commonplace earlier, yet even there some growth took place in the latter part of the century (Figure 8). Data for Hungary, the Netherlands, and the United States

FIGURE 7 Proportions ever married, Spain, female birth cohorts 1901-61

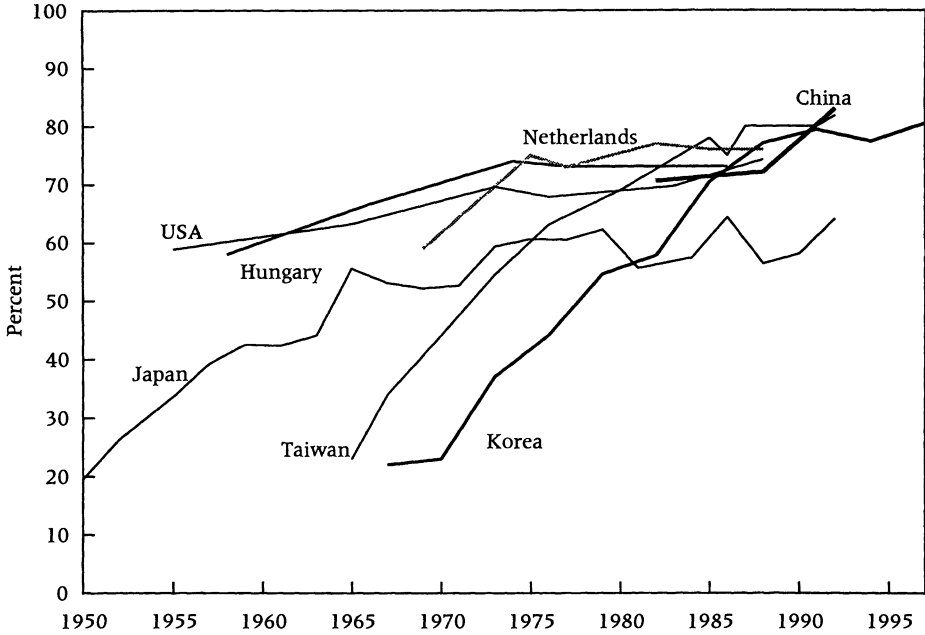


indicate that from the 1950s to the mid-1990s contraceptive use increased from around 60 percent to roughly 75 percent.

The other major development in contraceptive use was the rapid and widespread proliferation of modern methods. Early forms of the intrauterine device had been known (and sparsely used) since the 1920s, but a number of new versions were developed. Hormonal methods were invented and gradually refined, in particular oral contraceptives. Methods of surgical contraception were substantially improved. The quality of condoms was also improved. All of these contraceptives became accessible to, and were progressively used by, large segments of populations in developed and developing countries, essentially because of their effectiveness and convenience of use. Also, their prices were reasonable in comparison to other needs, or prices were subsidized for those who would otherwise not have had the means to purchase them.

In the West the contraceptive revolution got underway in the late 1950s and early 1960s. In 1955, for instance, in the United States 84 percent of users were relying on traditional contraceptives, including condoms (see Figure 9A). In less than two decades this number declined to 31 percent and it remained at that level through the 1980s. While 70 percent of users have been relying on modern contraceptives since the early 1970s, structural changes have occurred. The oral contraceptive was preferred by

FIGURE 8 Proportions of women in union (or couples) of reproductive age practicing contraception, selected countries, 1950-97



over one-third of users in the 1970s; this declined to one-fifth by the late 1980s. Use of the IUD increased to almost 10 percent by 1973, but fell to only 2 percent by the late 1980s. There has been a steady increase in the adoption of male and female sterilization; in 1988 one-half of all birth control users living in unions were sterilized. In sum, among the majority of users modern methods have replaced traditional ones. With many variations in composition and timing this has occurred in most Western countries.

In the formerly socialist countries of Central and Eastern Europe, the transformation from traditional to modern contraception has been much slower than in the West and has taken a different path. Most governments blocked the use of oral and surgical contraception. Hungary was an exception. Its relatively permissive government, which came into power in the late 1960s and gradually introduced social and economic reforms, supported the use of oral contraception and the IUD. As a result, modern contraceptive use rose from zero in 1966 to 62 percent in 1977 (see Figure 9B).

The spread in the use of the IUD (mostly the older versions) and especially of oral contraception was slow, with large differences between countries. In the Czech Republic in 1991, for instance, 22 percent of users were employing IUDs and less than 10 percent oral contraceptives; 70 percent of users were still relying on traditional methods.

FIGURE 9A Contraceptive use by method, United States, 1955-88

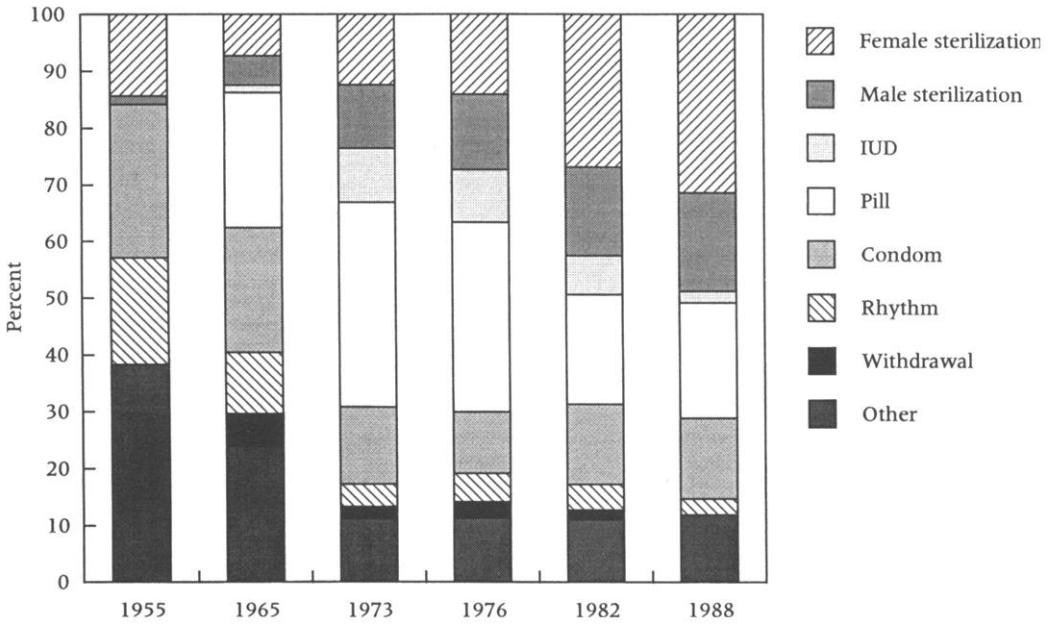
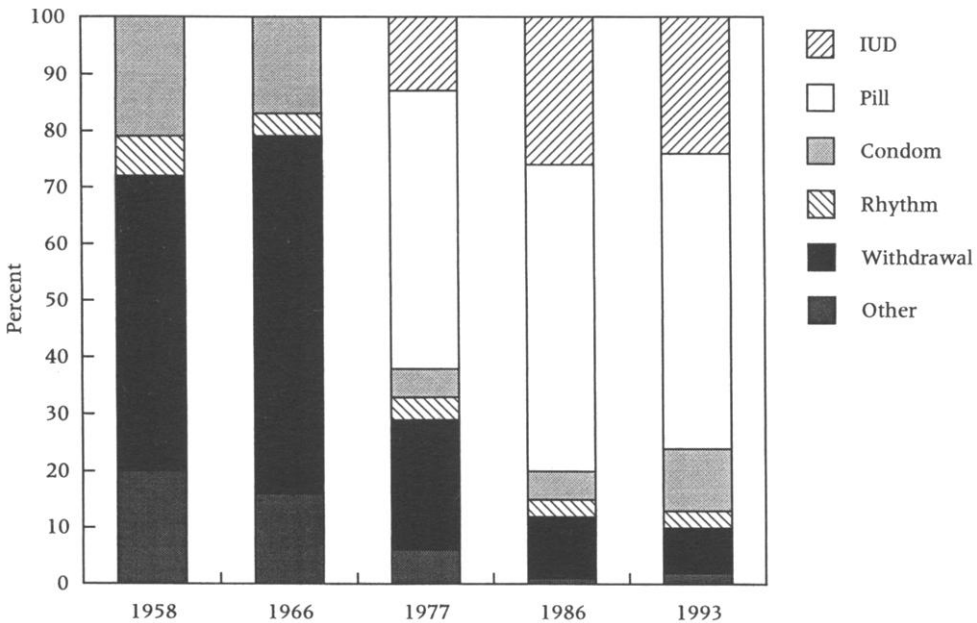


FIGURE 9B Contraceptive use by method, Hungary, 1958-93



Changes in the use of contraception were very different in the developing countries. Traditional method use had always been trivial, so the spread of contraception was directly tied to modern contraceptives. Moreover, modern contraceptives were at first supplied and promoted mostly by public family planning programs with the assistance of international organizations. Even in the mid-1960s when only about 20 percent of women living in union were using contraception in Taiwan and Korea, 83 and 77 percent of these women, respectively, relied on modern contraception (see Figures 9C and 9D).⁸ These proportions remained quite stable over the next several decades, and as the numbers of users increased rapidly so did the numbers relying on modern contraception.

At the same time, there were significant changes in method mix. In the 1960s, IUDs were in the forefront. Their use later diminished, more so in South Korea than in Taiwan where an earlier version of the IUD, the Ota ring, had been in use. The proportion using oral contraceptives was around 20 percent in South Korea in the early 1970s; that has decreased steadily to almost zero in 1997. In Taiwan pill use rose into the mid-1970s; thereafter a slow decline set in. The use of the condom has been increasing since the early 1980s with around 20 percent of users relying on it in both countries in the 1990s. Resort to sterilization has been quite important in Taiwan; since the mid-1980s one-third of users rely on it. In the Republic of Korea by 1979 almost 40 percent and by 1988 62 percent of users were sterilized. Although this proportion has since been declining it was still at 46 percent in 1997.

Even though modern contraceptives now dominate, the method mix differs from one country to another (see Figure 10). In China, South Korea, Canada, and the United States around 50 percent or more of users are sterilized. But in Hungary over 50 percent rely on oral contraceptives and an additional 24 percent on IUDs. In Japan 65 percent of couples using a method employ the condom. In Taiwan 33 percent of users are sterilized and almost 30 percent use IUDs. In the Czech Republic in the early 1990s over 30 percent of users were relying on withdrawal, and almost 30 percent the condom; less than 40 percent employed modern contraceptives. There, as in practically all other Central and Eastern European countries, induced abortion is an important means of fertility regulation.

Induced abortion

Induced abortion has played a significant role in the fertility transition of all low-fertility countries. During the first half of the twentieth century when numerous European countries were approaching replacement-level fertility, induced abortions were legally restricted everywhere (except for the Soviet Union⁹). Understandably, there is no official information on the

FIGURE 9C Contraceptive use by method, Taiwan, 1965-92

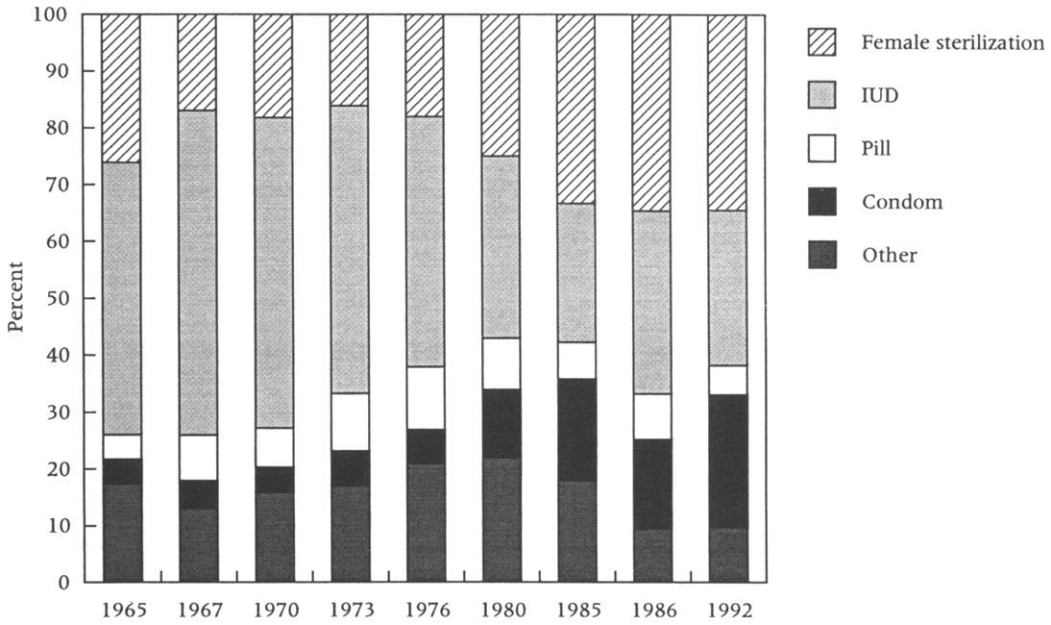


FIGURE 9D Contraceptive use by method, Republic of Korea, 1967-97

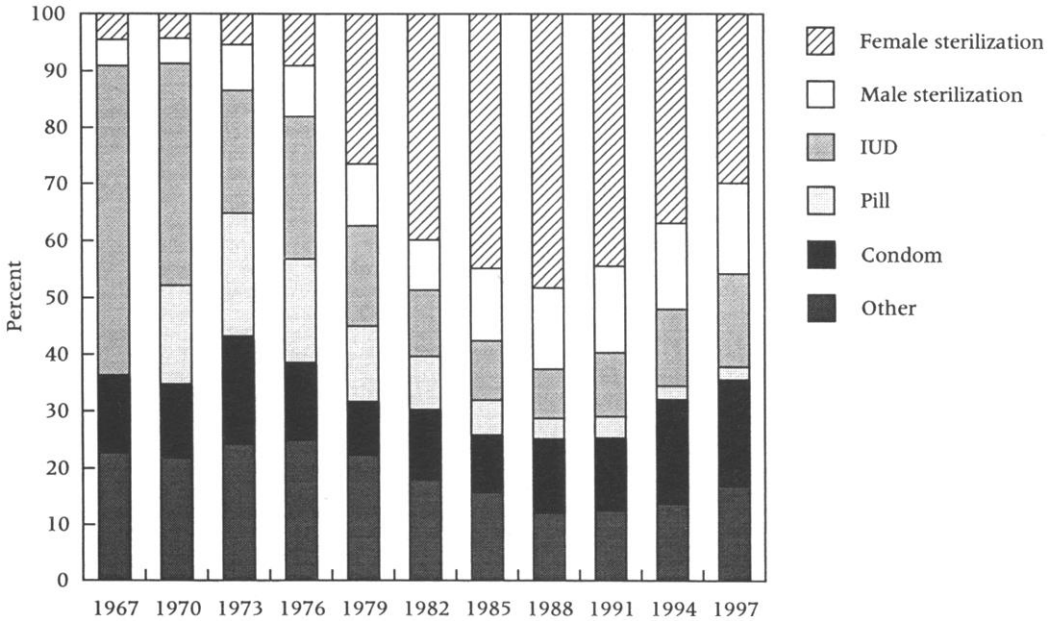
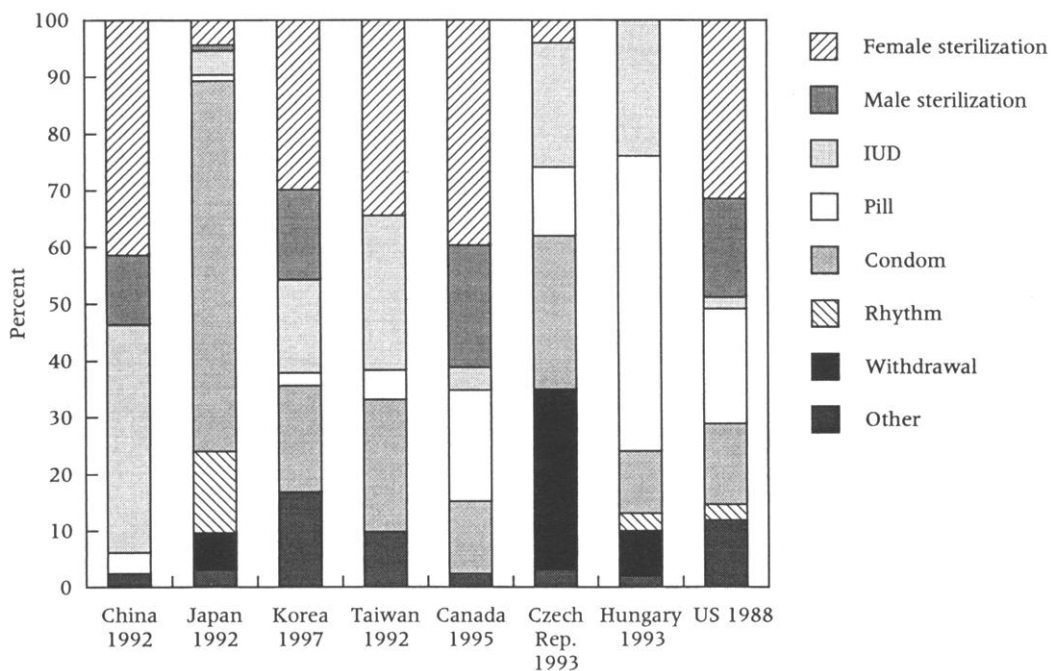


FIGURE 10 Contraceptive use by method, selected countries, 1988–97

incidence of abortion for those years;¹⁰ however contemporary observers believed the incidence to be high, especially in the worst years of the Depression in the 1930s (Carr-Saunders 1936; UN 1954; Glass 1940, reprinted in 1967; McLaren 1990).

During the second half of the century, legalization of induced abortion occurred in many countries (Tietze 1983; Rahman, Katzive, and Henshaw 1998). The effects tend to be multiple. The absolute number of abortions may or may not increase much; many legal abortions simply replace illegal ones. The liberalization of abortion laws lowers the health and mortality risks associated with induced abortion, because most of the abortions that would have been performed by unqualified personnel under unsanitary conditions can be and usually are performed by physicians in appropriate facilities. Liberal legislation has also enabled more or less complete registration of abortions, thus providing reasonable information on actual incidence and, frequently, on certain personal characteristics.

The fertility effect of liberalized legislation depends very much on the extent to which contraception is practiced. Wherever a large proportion of the population is already practicing contraception, the fertility effect tends to be small, since relatively few unwanted pregnancies occur, and birth

intervals are in any case long on average. On the other hand, if contraception is not widely practiced, the fertility effect can be large (Tietze and Bongaarts 1976). During the modernization process, when desired family size is falling, legalization can reinforce the growing use of abortion, which can even serve as a primary method of birth limitation. Moreover, some contraception may be replaced by induced abortion. Overall abortion incidence in such cases tends to increase considerably, reaching and remaining at high levels (Frejka 1983). In the Asian rapidly developing countries similar processes took place; however, the prevalence of contraception, mostly modern, was increasing alongside the rise in abortion and has gradually replaced it, leading to declines in abortion incidence.

Around 1950 only a few countries had legislation that gave women easy access to induced abortion. In the mid-1930s three Nordic countries—Iceland (1935), Sweden (1937), and Denmark (1938)—liberalized their abortion laws. In 1948 the Eugenic Protection Law was promulgated in Japan; it permitted the termination of pregnancy for a woman “whose health may be affected seriously by continuation of pregnancy or by delivery from the physical or economic viewpoint.” During the 1950s abortion laws were liberalized in the Soviet Union, in most countries of Central and Eastern Europe, and in China. Some Western countries followed during the 1960s as did Singapore, but the main wave of liberalization of abortion laws in the West did not take place until the late 1970s (Tietze 1983). In Korea practice has generally been more liberal than legislation. It was so before some liberalization occurred in 1973 and continued to be more liberal even afterward. In Hong Kong liberalization occurred a year earlier, in 1972.

The development and widespread use of new procedures for performing induced abortions is another characteristic of recent decades. This certainly contributed to lowered morbidity and mortality and may well have influenced incidence. The main improvements consisted in substituting dilation and curettage with suction (machine and manual), and the development of nonsurgical medical abortion. Moreover, on average abortions are performed earlier in pregnancy than before. The concepts of “menstrual regulation” in many developing countries, and “mini-abortions,” as in the former Soviet Union, have become commonplace.

Although some mode of registration is in place in practically all low-fertility countries, there is a great difference in its completeness from one country to another. Caution in interpreting available abortion data is called for; however, crude comparisons in space and time make sense, especially if the relative reliability of the respective data is known (Henshaw, Singh, and Haas 1999).

In the second half of the twentieth century induced abortions were employed as a means of fertility regulation especially in countries of Central and Eastern Europe and in the former Soviet Union. Experts differ on

estimates of the incidence of induced abortion in the former Soviet Union. Some estimate that in addition to registered abortions,¹¹ which for decades indicated a total abortion rate (TAR) on the order of 2.5 to 3.0 abortions per woman (see Table 8 and Figure 11), there were at least as many un-

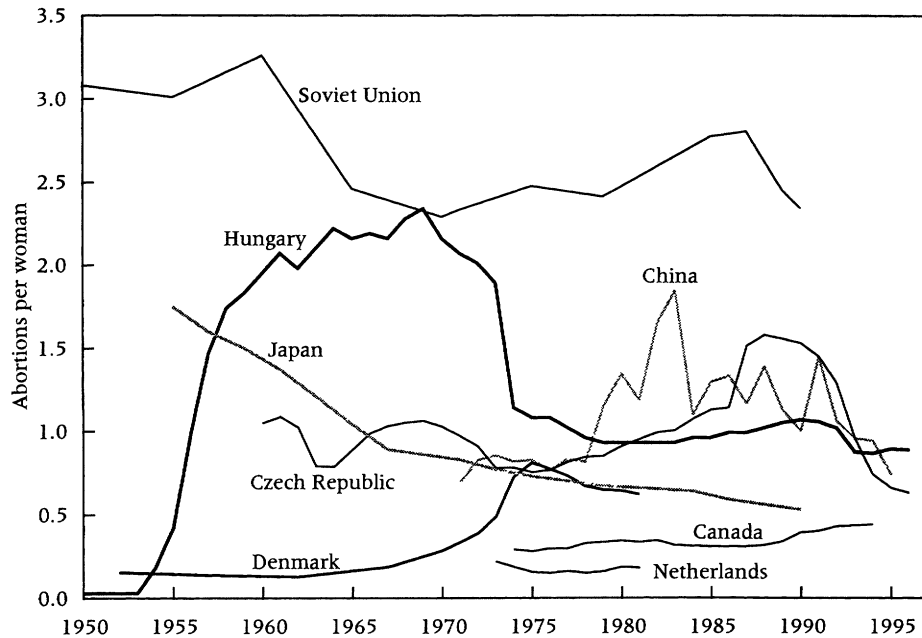
TABLE 8 Estimated legal total abortion rates (TAR), selected countries, 1950–96

Region and country	1950 or year as shown	1960 or year as shown	1970 or year as shown	1980 or year as shown	1990 or year as shown	1996 or year as shown
Central and Eastern European countries						
Albania ^a	—	—	—	0.1	0.2	0.8
Bulgaria	0.02(1953)	0.9	1.9	2.3	2.2	1.6
Czechoslovakia	0.03(1954)	1.0	1.0	0.9	1.4	—
Czech Republic	—	—	0.8(1975)	1.0	1.5	0.6
Slovakia	—	—	0.7(1975)	0.9	1.2	0.6
East Germany	0.2	0.01	0.2	0.7	0.6(1989)	0.3
Hungary	0.02	2.3	2.5	1.1	1.2	1.1
Poland ^a	0.01	0.7	0.6	0.5	0.2	0.0
Romania ^a	—	5.6	1.9	2.7	5.5	2.3
Soviet Union ^a	0.4(1955)	3.4	3.3(1971)	3.1	2.6	—
Russian Federation ^a	—	—	—	—	4.1(1989)	2.9(1995)
Yugoslavia ^a	—	0.5	1.3	1.8	2.7	1.6(1993)
Other European countries						
Denmark	0.2(1954)	0.1	0.3	0.6	0.5	0.5(1995)
England and Wales	—	0.1(1968)	0.2	0.4	0.5	0.5
Finland	0.1(1951)	0.2(1961)	0.4	0.4	0.3	0.3
France ^a	—	—	0.4(1976)	0.5	0.4	0.4
Italy ^a	—	—	—	0.6	0.4	0.3
Netherlands	—	—	0.2(1973)	0.2	0.2	0.2
Norway	—	0.1(1964)	0.3	0.5	0.5	0.5
Sweden	0.1(1954)	0.1	0.3	0.6	0.6	0.6
West Germany ^a	0.0	0.01(1968)	0.0	0.3	0.2	0.2
Selected countries outside Europe						
Canada	—	—	0.1	0.3	0.4	—
China	—	—	0.7(1971)	1.3	1.2(1991)	0.8(1995)
Cuba	—	—	1.2	1.4	2.6	2.3
Israel ^a	—	—	—	0.5	0.5	0.4(1995)
Japan ^a	1.2(1952)	1.3(1962)	0.8	0.7	0.5	0.4
Korea (South) ^a	—	—	1.9(1975)	1.9	1.1	0.6
New Zealand	—	—	0.2(1976)	0.3	0.4	0.5(1995)
Singapore	—	—	0.7(1975)	0.9	0.7	0.5
United States	—	0.003(1963)	0.5(1973)	0.9	0.8	0.7

^aReporting incomplete or completeness unknown.

SOURCES: Frejka 1983; Henshaw, Singh, and Haas 1999; Barkalov and Ivanov 1997 (for Russian Federation).

FIGURE 11 Total abortion rates, selected countries, 1950–96



registered ones, which would imply annual TARs above 5.0, and two to three times more abortions than births (Popov et al. 1993). In Romania, which had a reliable registration system, the TAR was between 6.0 and 7.5 in the period 1961 to 1966 (Tietze 1983) and subsequently, in 1990, it again increased to 5.5 (Henshaw, Singh, and Haas 1999)—these are to our knowledge the highest rates ever reasonably reliably recorded. Throughout the 1960s the TAR in Hungary was above 2.0. Bulgaria and Yugoslavia also experienced years when the TAR was above 2.0. In Czechoslovakia the TAR fluctuated around 1.0; in East Germany and Poland it was even lower, but Poland's data were never complete.

In East Asia induced abortions were also an important factor in the fertility transition. Frejka (1993) estimated that in the late 1980s induced abortions compared to contraception accounted for about one-quarter of the fertility decline in East Asia. It was in Japan that induced abortions were first widely employed as a method of birth control in the late 1940s. Official statistics are grossly incomplete but experts estimate total abortion rates for the 1950s and 1960s between 3 and 4 abortions per woman (Muramatsu 1973). In the other countries of East Asia the incidence of induced abortion was lower, as it accompanied the intensive introduction of modern contraception. Nevertheless, in China, for instance, throughout the 1980s the TAR was between 1.0 and 1.9. In Korea TARs for married

women, as distinct from all women in Table 8, fluctuated from 2.1 to 2.9 between 1973 and 1985, declining thereafter, though still at 1.4 in 1994 (Cho 1997). In Taiwan, from 1985 through 1991, a third of married women reported ever having had an abortion.¹²

In the West the incidence of induced abortion tends to be relatively low, with TARs of around 0.5 or less, because of the widespread use of modern contraception.

In the remainder of the low-fertility countries in Asia, in the countries of the former Soviet Union, and in Central and Eastern Europe the resort to induced abortion has declined in recent years. In the countries of East Asia this trend has been in progress for possibly two decades, as documented in Korea and Japan. In the states of the former Soviet Union and in Central and Eastern Europe the decline is mainly a feature of the 1990s. According to one estimate the TAR in Russia declined from 4.1 to 2.9 between 1989 and 1995 (Barkalov and Ivanov 1997). Access to modern contraception has become easier than under the previous socialist regimes; however, it will likely be some time before induced abortion is employed primarily as a backup to contraception.

Policy measures

Policy measures can have direct and immediate effects on reproductive behavior. Indeed, they have had an important impact in the Asian low-fertility countries and at times in the formerly socialist countries.

The fertility transition in the Asian low-fertility countries has occurred at a much faster pace than that in the industrialized countries. Within two to three decades fertility declined from TFRs of about 6 to replacement. Without national family programs, the principal policy measure in the developing countries, this decline might have taken significantly longer. In Taiwan, for example, "the family planning services provided by the program were the immediate proximate cause of the fertility decline" (Freedman, Chang, and Sun 1994: 327). The authors continue by noting that "as late as 1985, just after reaching replacement-level fertility, 73 percent of all current users had obtained their contraceptive services from the family planning program" (*ibid.*). Also, organized efforts to provide access to family planning services to many population strata commenced in some countries even before any significant or widespread economic development took place. In China this was as early as the mid-1950s and in Korea in the early to mid-1960s. Still, early fertility declines assisted by family planning programs materialized because of existing latent demand for family limitation. In 1964, on the basis of the experience of designing and implementing one of the first large-scale family planning programs, Berelson and Freedman (1964: 29) concluded that "people do not need to be motivated. They

want to plan their families, but they need to know how. Teaching them how—implementing a family planning program—has proved to be feasible.”

In almost all low-fertility countries in Asia—in Hong Kong, the Republic of Korea, Singapore, Taiwan, and Thailand—family planning programs while vigorous were essentially noncoercive. They employed large staffs, operated with adequate material resources provided by local funds and international aid, and carried out effective information, education, and communication projects. In general they relied heavily upon a substantial existing interest in contraceptive use in the population.

In China the approach was different. The government provided similar services, but specific policies were authoritarian, backed by strong and strict enforcement. Initially, the national program was based on the *wan xi shao* approach—later (marriage), longer (birth intervals), fewer (births)—promulgated in 1971. As this policy was perceived not to be sufficiently effective, in 1979 the one-child principle was adopted. That policy, with certain modifications, including a partial relaxation in 1984 regarding minorities and rural couples whose first child was a daughter, has since formed the national approach. Fertility decline in China has possibly been faster than in any of the other countries. Feeney and Wang (1993: 95), who conducted a detailed analysis of China's fertility decline, concluded: “It is likely that over half of this decline may be attributed to government intervention specifically aimed at reducing fertility.”

In Korea, Taiwan, Singapore, and Hong Kong, by the late 1980s or early 1990s, fertility declines had made family planning programs largely superfluous and they have been largely dismantled. Individuals themselves decide and finance their means of fertility control. The programs have turned their attention to special issues; in Korea for instance the focus is on adolescents and single persons, with more attention to reproductive health and such issues as home health care and private medical insurance (Cho, Seo, and Tan 1990). Furthermore, some governments, for instance in Singapore and Taiwan, have become concerned with low fertility and have initiated efforts to raise fertility and stabilize it around replacement level.

A unique “population policy” decision in 1948 turned out to have a major effect in Japan during the 1950s and later. The government in an atmosphere of postwar rapid population growth—a baby boom, a sharp mortality decline, and the repatriation of more than 5 million persons from various Asian countries—together with major economic and political problems, adopted the Eugenic Protection Law. The interpretation of this law by the medical profession and by government authorities made abortion available on request (Tietze 1983). By 1955 the annual number of recorded induced abortions was 1.2 million compared to 1.7 million births, and the annual number of sterilizations (also permitted by the Eugenic Protection Law) had increased to 44,000 (Terao 1959). It can be argued whether the Eugenic Protection Law concerned population policy, but there is no ques-

tion that it provided Japanese couples with an effective means of fertility control, and it hastened the secular fertility decline to below replacement. As discussed above, the total fertility rate declined from its postwar high of 4.5 births per woman in 1947 to 2.0 in 1957.

In the formerly socialist countries of Central and Eastern Europe and in the former Soviet Union a wide variety of population-related policy measures were taken in the four decades following World War II. The pronatalist orientation of these policies was rooted in Marxist ideology, reinforced by the simplistic notion that since fertility is declining in capitalist societies it must increase, or at least remain "high," in socialist ones. Thus, many of the adopted policies, including a range of social welfare measures, were intended to stimulate fertility. Other policies of a broader economic nature (such as giving priority to large-scale labor-intensive investments) were implemented for different reasons but had fertility consequences, usually quickening the declines. Measures to legalize induced abortion were adopted to prevent the deleterious consequences of poorly performed illegal abortions; in the process women's rights were enhanced although this was rarely a primary consideration. Occasional decisions to restrict the use of abortion were made to lessen its perceived excessive use by certain strata of the population and to reduce its impact on fertility decline. Other measures were taken to bar or limit the introduction of modern contraceptives. These were justified on ideological grounds (modern contraceptives were developed in the capitalist West, especially in the imperialist United States), or by concerns about health side effects, or by the state's need to raise fertility.

The deliberate measures to raise fertility included liberal maternity leave, financial support for mothers staying at home with young children, family and child care allowances, birth grants, subsidized prices for child clothing and free textbooks, subsidized public child care, loans to newlyweds, and rents and pensions tied partially to family size (Frejka 1980; Klinger 1984; Centre for Demography and Human Ecology 1997). At times their effect was ambiguous, but, particularly when several measures were introduced simultaneously and when they were materially attractive, the fertility effects were discernible. This happened in Czechoslovakia in the period 1968–73, in Hungary in 1973, in East Germany in 1976, and to some extent in the former Soviet Union in the early 1980s. Czechoslovakia, for instance, experienced an increase in age-specific fertility rates and the total fertility rate, an increase in first marriage rates, an increase in second and third births, and increases in parity progression ratios for cohorts that were entering their prime childbearing years in the early 1970s. Thus the completed fertility of these cohorts was also affected. Invariably the fertility effect was limited to the cohorts in their prime childbearing years at the time the measures were adopted. After a few years they were taken for granted and had little or no effect on subsequent cohorts.

In addition to the social policy measures directly aimed at increasing fertility, many features of the social infrastructure motivated young people to have children and to have them earlier rather than later. This included preferential allocation of housing, which was in short supply in the tightly regulated state-controlled systems (Frejka 1980; Klinger 1984; Centre for Demography and Human Ecology 1997; David 1999). Also, there was a lack of sex education, lack of knowledge about contraception, and a general preference for getting married to accommodate a first, early and unintended pregnancy rather than to interrupt it (David 1999). There was also a wide belief that first pregnancies of young women should not be terminated because this might impede later childbearing. Large and increasing proportions of first births occurred less than eight months after weddings (Centre for Demography and Human Ecology 1997). Induced abortions were practiced mainly by married women, usually in their late 20s or older, who had already achieved their desired family size (Tietze 1983).

While numerous countervailing forces were present, some depressing rather than stimulating the desire for children, in the 1970s and 1980s fertility was higher than it would have been without the socialist system of centralized economic management and social welfare policies.¹³ This conclusion appears to be supported by period TFRs in the formerly socialist countries that were on average higher by about 20 percent compared to Western European ones.¹⁴ Subsequently, by the mid-1990s—after the dissolution of the authoritarian governments in Central and Eastern Europe and in the former Soviet Union, and after the value of the social welfare measures had eroded (Rychtaříková 1996)—period rates declined rapidly to values on average lower than in the West. In the Czech Republic, for instance, fertility declined especially among women under 25 years of age; age-specific first marriage rates for women under 25 declined by more than 50 percent within six years; the mean age at childbirth increased from 24.7 in 1991 to 26.2 in 1996. Obviously it is too early to assess longer-term effects, but there are indications, including evidence provided above, that cohort fertility is also generally on the decline.

Our arguments appear to contradict what others in the profession have concluded, namely that “the effects [of pronatalist policies] are nil or negligible” (Demeny 1986: 350). However, the policy relevance now seems limited, since the fertility-enhancing effect of such policies in the formerly socialist countries was achieved under circumstances that are not likely to be replicated in any country in the foreseeable future.

Conversely, the experience with the implementation and functioning of family planning programs in the East Asian countries has had and continues to have a great deal of policy relevance. For instance, Freedman (1998), in an article evaluating social science and operations research, writes: “Taiwan’s program, because it was an early success, was visited by thousands of people concerned with programs in developing countries” (p. 39).

And further: "In retrospect, Taiwan's family planning history has significant value...for other countries in the early stages of their demographic transitions" (p. 43).

Conclusions

Never before in history have there been such enormous changes in fertility behavior in so many societies as took place in the twentieth century. This phenomenon clearly reflects the profound changes in technology, labor productivity, urban occupations and living arrangements, and social infrastructure and lifestyles—in short a consequence of major changes in social and economic frameworks. The fertility responses have not mirrored these changes mechanically and uniformly, but have frequently been modified also by political structures and by national cultures. At the beginning of the century total fertility rates around the world were on the order of 5 to 7 children per woman. In contrast, in the mid-1990s 44 percent of the world's population lived in countries where total fertility rates were at or below 2.1, the replacement level for low-mortality populations.

Is subreplacement fertility likely to prevail in these countries for at least two to three decades or is it a temporary phenomenon? The evidence presented here points to the former scenario.

Completed cohort fertility for the majority of these countries is and apparently will remain below replacement. Large proportions of women remain childless or have only one child. Only small proportions of women have more than three children. The proportions of women married and cohabiting are at historically low levels and declining further. People have access to and are using effective means of fertility regulation—pills, IUDs, condoms, sterilization, and induced abortion. Key social changes in the status of women, in the place of the family, and in Western cultures unite to undermine childbearing. In the developing countries population policies have been effective in assisting people to limit their family size, whereas population policies inducing people to raise their fertility, which showed some results in the formerly socialist countries, usually have only temporary effects. All things considered, it appears that an era of subreplacement fertility has taken hold and will endure.

Notes

We owe substantial debts to numerous individuals who helped to advance this study. Erik Klijzing of the UN Economic Commission for Europe greatly expedited our access to much European information, and Gérard Calot and Alain Confesson of the Observatoire Démogra-

phique Européen provided numerous data sets in electronic form. Additional data were provided by Aminur R. Khan, Bhakta Gubhaju, Sergei Ivanov, and Mary Beth Weinberger of the United Nations Population Division. Griffith Feeney was constantly helpful with

counsel on parity progression rates and available data sets. We also thank the Advisory Group of the Fertility and Family Surveys (FFS) program of comparative research for its permission, granted under identification number 24, to use FFS data. We owe special debts to other individuals who provided documents or data. Alphabetically by country they are Douglas Norris for Canada, Jitka Rychtaříková for the Czech Republic, Charlotte Höhn and Jürgen Dorbritz for Germany, Peter Józán for Hungary, Chai Bin Park and Nam Hoon Cho for Korea, Sergei Zakharov, Elena Ivanova, Ward Kingkade, and Ludmila Pashina for Russia, Joaquin Arango for Spain, and T. H. Sun and M. C. Chang for Taiwan. We especially thank Laura Heaton and Robert McKinnon for assistance with data processing, and Cathy Johnson, chief of the production unit of the Futures Group International.

1 For the purpose of this analysis:

a. As a rule, countries are considered legal entities as they existed on 1 January 1998. Each of the successor states of the former Soviet Union, Yugoslavia, and Czechoslovakia are units of analysis. The one exception is Germany. The reunification Federal Republic of Germany and the former German Democratic Republic are each treated as a unit.

b. Only low-fertility countries with more than 250,000 inhabitants on 1 January 1998 were included. The full list of the 54 countries appears in Table 2.

2 In a detailed analysis of the demography of Europe in which some 600 small political divisions were surveyed, even lower net reproduction rates were observed. In numerous cities across the continent, fertility was extremely low. In the early 1930s, the NRR stood as low as 0.25 in Vienna, 0.36 in Oslo, 0.37 in Berlin, 0.40 in Stockholm, 0.47 in Riga, 0.48 in Hamburg, and 0.61 in Copenhagen (Kirk 1946). The NRR was well below replacement in London, Paris, Prague, Budapest, Belgrade, and Warsaw.

3 In Figures 2A through 2F a "replacement fertility" straight line is drawn with the value of 2.1. This is strictly for illustrative purposes. In the 1990s replacement-level fertility is close to 2.1 in almost all countries shown; however, in earlier decades in a number of countries, particularly in the Asian developing countries,

replacement fertility was much higher owing to higher mortality.

4 Only 53 countries are included in this analysis, because no data on age-specific fertility rates are available for the People's Republic of China.

5 Data for Malta, the Republic of Korea, and Thailand were not available.

6 Estimates for cohorts younger than age 50 years at the time of observation equal actual observed fertility plus estimated fertility for remaining years. For each year of age above the observed age, the respective age-specific fertility rate of the most recent cohort for which an observation was possible is applied. For instance, if fertility for the 1960 birth cohort was observed through 1995, when it completed age 35, the observed age-specific fertility rate at age 36 for the 1959 birth cohort plus the observed age-specific fertility rate at age 37 for the 1958 birth cohort were added. The methodology applied was developed by Gérard Calot of the Observatoire Démographique Européen. The data for the European countries were provided by this institution. Canadian data were provided by François Nault. Detailed tables of US cohort fertility were provided by Stephanie Ventura of the National Center for Health Statistics, Centers for Disease Control and Prevention and the estimates were completed by the authors (calculations of the US completed cohort fertility rates are based on 5-year moving averages; in the table and figures these are centered on the respective year as indicated).

The proportions of the completed cohort fertility rates that are estimated provide evidence of the degree of accuracy. In the CCFRs for the US cohorts of the early 1950s, about 0.7 percent of the total was estimated; for those of the late 1950s about 5.5 percent was estimated; and for the cohorts of 1961 and 1962 about 15 percent of the CCFR was estimated. Thus the estimates of the 1950s cohorts were clearly close to what they will actually turn out to be, and there is some room for error in the birth cohorts of 1961 and 1962, although even here the margin of error is not likely to be large. The proportions of the CCFRs that are estimated are similar in the other countries.

Countries included in this analysis for which at least short time series of completed

cohort fertility rates were available are the following: Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Federal Republic of Germany (former), Finland, Former Yugoslav Republic of Macedonia, France, Georgia, German Democratic Republic (former), Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States, and Yugoslavia.

7 The total first marriage rate is calculated as the probability of first marriage for a person if she or he were to pass through her/his lifetime conforming to age-specific first marriage rates of a given year. Although one person cannot have more than one first marriage, the value of the measure can exceed unity, if there is a burst of first marriages in several age cohorts in the single reference year.

8 In the developing countries condoms are included in the category of modern contraception, because they were part of national and international introduction efforts.

9 Legislation pertaining to abortion was liberalized in the Soviet Union in 1920, but in 1935 and 1936 severe limitations were reinstated (David 1970).

10 Data are available for some parts of the Soviet Union. Reasonably reliable data from

Moscow, for instance, document a rise in the use of abortion during the 1920s: from about 20 per 100 births in 1921–24, rising to 56 per 100 in 1926 and to 75 in 1927 (Stloukal 1995). This rate continued to increase thereafter and, according to Soviet medical statistics, in Moscow there were 271 and 221 abortions per 100 births in 1934 and 1935, respectively.

11 The records were confidential and were not open to the public until the 1990s.

12 Sex-selective abortions are employed throughout East Asia to ensure a male birth at parity two and above. In Korea in 1988, for example, there were almost 200 male births per 100 female births at parity four (Cho, Seo, and Tan 1990).

13 Some demographers have voiced similar conclusions, albeit less forcefully. For instance, Andorka (1996: 28), in a chapter summarizing population developments in Hungary since 1960, concluded that “in the absence of family benefits, the level of fertility would be much lower than it is now.”

14 The average (unweighted) TFR during 1971–90 for the Czech Republic, German Democratic Republic, Hungary, and Russia was 1.95; for Denmark, the Federal Republic of Germany, and Italy it was 1.62. The TFR was 21 percent higher in the former group compared to the latter.

References

- Andorka, R. 1996. “Demographic changes and their main characteristics from 1960 to our days,” in P. P. Tóth and E. Valkovics (eds.), *Demography of Contemporary Hungarian Society*. Highland Lakes, NJ: Atlantic Research and Publications.
- Arango, J. 1998. Unpublished data, personal communication, Instituto Universitario Ortega y Gasset, Madrid.
- Avdeev, A. 1994. “Contraception and abortion: Trends and prospects for the 1990s,” in W. Lutz et al. (eds.), *Demographic Trends and Patterns in the Soviet Union Before 1991*. London, New York, and Laxenburg: Routledge and IIASA.
- Barclay, G. 1954. *Colonial Development and Population in Taiwan*. Princeton, NJ: Princeton University Press.
- Barkalov, N. and S. Ivanov, 1997. “Contraception and induced abortion in Russia: A review,” unpublished manuscript.
- Berelson, B. and R. Freedman. 1964. “A study in fertility control,” *Scientific American* 21(5): 29–37.
- Blum, A. and S. Zakharov. 1997. “The demographic history of the USSR and Russia in the mirror of cohorts,” *Population and Society*, No. 17, Centre for Demography and Human Ecology, Moscow.

- Bongaarts, J. and G. Feeney. 1998. "On the quantum and tempo of fertility," *Population and Development Review* 24(2): 271-291.
- Breslin, M. 1997. "Japanese women want more children than their total fertility rate suggests," *Family Planning Perspectives* 29(6): 291-292.
- Calot, G. 1998. Unpublished data, personal communication, Observatoire Démographique Européen, Paris.
- Carr-Saunders, A. N. 1936. *World Population: Past Growth and Present Trends*. Oxford: Clarendon Press.
- Centre for Demography and Human Ecology. 1996. *The Population of Russia 1995*. Moscow. ———. 1997. *The Population of Russia 1996*. Moscow.
- Chang, M. C. 1993. "Sex preference and sex ratio at birth: The case of Taiwan," presented at the Annual Meeting of the Population Association of China, Taipei, 5-6 February.
- Chang, M. C., R. Freedman, and T. H. Sun. 1981. "Trends in fertility, family size preferences, and family planning practice: Taiwan, 1961-80," *Studies in Family Planning* 12(5): 211-228.
- . 1987. "Trends in fertility, family size preferences, and family planning practice: Taiwan, 1961-85," *Studies in Family Planning* 18(6): 320-337.
- Chen, C. H. C. et al. 1997. "Contraceptive prevalence in China: Findings from the 1992 National Family Planning Survey," in *1992 National Fertility and Family Planning Survey, China*. Beijing: State Family Planning Commission.
- Chen, S. 1997. "Demographic change from 1982 to 1992," in *1992 National Fertility and Family Planning Survey, China*. Beijing: State Family Planning Commission.
- Chesnais, J-C. 1990. "Demographic transition patterns and their impact on the age structure," *Population and Development Review* 16(2): 327-336.
- . 1992. *The Demographic Transition*. Oxford: Clarendon Press.
- Cho, N. H. 1996. *Achievements and Challenges of the Population Policy Development in Korea*. Seoul: Korea Institute for Health and Social Affairs.
- . 1997. Unpublished data, personal communication.
- Cho, N. H., M. H. Seo, and B. A. Tan. 1990. "Recent changes in the population control policy and its future direction in Korea," *Journal of Population, Health and Social Welfare* 10(2): 152-173.
- Coale, A. J. 1981. "A further note on Chinese population statistics," *Population and Development Review* 7(3): 512-518.
- Council of Europe. 1997. *Recent Demographic Developments in Europe 1997*. Strasbourg: Council of Europe Publishing.
- Czech Statistical Office; Factum non Fabula; WHO Collaborating Center for Perinatal Medicine/Institute for the Care of Mother and Child, Prague; and Centers for Disease Control and Prevention, USA. 1995. *1993 Czech Republic Reproductive Health Survey: Final Report*. Prague.
- Darsky, L. E. 1994. "Quantum and timing of births in the USSR," in W. Lutz et al. (eds.), *Demographic Trends and Patterns in the Soviet Union Before 1991*. London, New York, and Laxenburg: Routledge and IIASA.
- David, H. P. (ed.). 1970. *Family Planning and Abortion in the Socialist Countries of Central and Eastern Europe*. New York: Population Council.
- (ed.). 1999. *From Abortion to Contraception: A Resource to Public Policies and Reproductive Behavior in Central and Eastern Europe from 1917 to Present*. Westport, CT: Greenwood Press.
- Davis, K., M. S. Bernstam, and R. Ricardo-Campbell (eds.). 1986. *Below-Replacement Fertility in Industrial Societies: Causes, Consequences, Policies*, Supplement to *Population and Development Review* (12).
- Delgado, M. 1992. "Spain," in H-P. Blossfeld (ed.), *The New Role of Women*. Boulder: Westview Press.
- Delgado, M. and M. Livi-Bacci. 1992. "Fertility in Italy and Spain: The lowest in the world," *Family Planning Perspectives* 24(4): 162-171.
- Demeny, Paul. 1986. "Pronatalist policies in low-fertility countries: Patterns, performance, and prospects," *Population and Development Review* 12 (Supp): 335-358.

- Dorbritz, J. and C. Höhn. 1998. "The future of the family and future fertility trends in Germany," manuscript, provided as a personal communication to authors.
- Feeney, G. 1991. "Fertility decline in Taiwan: A study using parity progression ratios," *Demography* 28(3): 467-479.
- . 1994. "Fertility decline in East Asia," *Science* 266(5190): 1518-1523.
- . 1996. "Fertility in China: Past, present, prospects," in W. Lutz (ed.), *The Future Population of the World: What Can We Assume Today?* London: Earthscan Publications.
- Feeney, G. and F. Wang. 1993. "Parity progression and birth intervals in China: The influence of policy in hastening fertility decline," *Population and Development Review* 19(1): 61-101.
- Feeney, G. and J. Yu. 1987. "Period parity progression measures of fertility in China," *Population Studies* 41: 77-102.
- Fernandez, C. J. A. 1986. "Análisis longitudinal de la fecundidad en España," in Ministerio de Economía y Hacienda, *Tendencias demográficas y planificación económica*, Madrid.
- Freedman, R. 1986. "Policy options after the demographic transition: The case of Taiwan," *Population and Development Review* 12(1): 77-100.
- . 1998. "Operations and other types of research in Taiwan's family planning history," in J. R. Foreit and T. Frejka (eds.), *Family Planning Operations Research: A Book of Readings*. New York: Population Council.
- Freedman, R., M. C. Chang, and T. H. Sun. 1994. "Taiwan's transition from high fertility to below-replacement levels," *Studies in Family Planning* 25(6): 317-331.
- Frejka, T. 1960. "The development and present state of the population in Japan" (in Czech), *Demografie* 2(2): 250-256.
- . 1980. "Fertility trends and policies: Czechoslovakia in the 1970s," *Population and Development Review* 6(1): 65-93.
- . 1983. "Induced abortion and fertility: A quarter century of experience in Eastern Europe," *Population and Development Review* 9(3): 494-520.
- . 1993. "The role of induced abortion in contemporary fertility regulation," in IUSSP, *International Population Conference*, vol. 1: 209-213, Montreal.
- Frejka, T. and E. Frejka. 1965. "Women in the labor force" (in Czech), *Planovane Hospodarstvi* 18(7-8): 169-176.
- Glass, D. V. 1940, reprinted 1967. *Population Policies and Movements in Europe*. London: Cass.
- Henshaw, S. K., S. Singh, and T. Haas. 1999. "The incidence of abortion worldwide," *International Family Planning Perspectives* 25 (Supp): S30-S38.
- Höhn, C. 1991. "From one to two to one Germany," in J. L. Rallu and A. Blum, *European Population, I. Country analyses*, Paris: EAPS, IUSSP, INED, pp. 83-112.
- . 1996. "Fertility and family policy in Germany: Experiences from one to two to one Germany," manuscript, provided as a personal communication to authors.
- Hongsheng, H. and G. Ling. 1997. "Sex preference and its effects on fertility in China," in *1992 National Fertility and Family Planning Survey, China*. Beijing: State Family Planning Commission.
- Ilyina, I. 1994. "Marital status composition of the Soviet population," in W. Lutz et al. (eds.), *Demographic Trends and Patterns in the Soviet Union Before 1991*. London, New York, and Laxenburg: Routledge and IASA.
- Instituto Nacional de Estadística. 1997. Unpublished data, personal communication, Madrid.
- Ivanova, E. 1996. "Female nuptiality in Russia," *Population and Society*, No. 12, Centre for Demography and Human Ecology, Moscow.
- Józán, P. 1997. Unpublished data, personal communication, Hungarian Central Statistical Office, Budapest.
- Kamarás, F. 1994. *Reproductive Behavior in Hungary*. Hungarian Central Statistical Office.
- . 1995. "The impacts of the population-related policies on fertility in Hungary," *European Population Conference*, Milan, 4-8 September.
- . 1996. "Birth rates and fertility in Hungary," in P. P. Tóth, and E. Valkovics (eds.), *Demography of Contemporary Hungarian Society*. Highland Lakes, NJ: Atlantic Research and Publications.

- . 1997. "Birth control practice in Hungary," Hungarian Central Statistical Office.
- Kerr, G. H. 1945. "Formosa: Island frontier," *Far Eastern Survey* 14(7): 80–85.
- Kim, T. I., J. A. Ross, and G. C. Worth. 1972. *The Korean National Family Planning Program: Population Control and Fertility Decline*. New York: Population Council.
- Kirk, D. 1946. *Europe's Population in the Interwar Years*. League of Nations, Princeton University Press.
- Klinger, A. 1984. *The Impact of Policy Measures, Other Than Family Planning Programmes, on Fertility*. Budapest: Demographic Research Institute.
- Lee, H. T. and N. H. Cho. 1992. "Consequences of fertility decline: Social, economic and cultural implications in Korea," in *Impact of Fertility Decline on Population Policies and Programme Strategies*. Seoul: Korea Institute for Health and Social Affairs.
- Lesthaeghe, R. and P. Willems. 1999. "Is low fertility a temporary phenomenon in the European Union?" *Population and Development Review* 25(2): 211–218.
- Lyle, K. C. and J. S. Aird. 1982. "China," in *International Encyclopedia of Population*. New York: Free Press.
- Mauldin, W. P. and J. A. Ross. 1989. "Historical perspectives on the introduction of contraceptive technology," in S. J. Segal, A. O. Tsui, and S. M. Rogers (eds.), *Demographic and Programmatic Consequences of Contraceptive Innovations*. New York: Plenum Press.
- McLaren, A. 1990. *A History of Contraception: From Antiquity to the Present Day*. Oxford: Basil Blackwell.
- Monnier, A. 1998. "The demographic situation of Europe and the developed countries overseas: An annual report," *Population: An English Selection* 10(2): 447–473.
- Mundigo, A. I. 1992. "The determinants of impact and utilization of fertility research on public policy: China and Mexico," in J. F. Phillips and J. A. Ross (eds.), *Family Planning Programmes and Fertility*. Oxford: Clarendon Press.
- Muramatsu, M. 1973. "An analysis of factors in fertility control in Japan—An updated and revised version," *Bulletin of the Institute of Public Health* 22(4): 228–236.
- Norris, D. 1998. Unpublished data, personal communication, Statistics Canada, Ottawa.
- Ogawa, N. and R. D. Retherford. 1993. "The resumption of fertility decline in Japan: 1973–92," *Population and Development Review* 19(4): 703–741.
- Park, C. B. 1992. "Family building in the Republic of Korea: Recent trends," in *Impact of Fertility Decline on Population Policies and Programme Strategies*. Seoul: Korea Institute for Health and Social Affairs.
- . 1995. "Transition of family formation in South Korea: Cohort perspectives," unpublished manuscript.
- Pavlik, Z. 1964. *An Outline of the World Population Development* (in Czech). Prague: Czechoslovak Academy of Sciences.
- Peterson, P. G. 1999. *Gray Dawn: How the Coming Age Wave Will Transform America—and the World*. New York: Times Books.
- Popov, A. 1994. "Family planning and induced abortion in the post Soviet Russia of the early 1990s: The unmet needs in information supply," Centre for Demography and Human Ecology, Moscow, Working Papers, Vol. 16, August.
- Popov, A. et al. 1993. "Contraceptive knowledge, attitudes, and practice in Russia during the 1980s," *Studies in Family Planning* 24(4): 227–235.
- Quo, S. K. 1950. "The population growth of Formosa," *Human Biology* 22(4): 293–301.
- Rahman, A., L. Katzive, and S. K. Henshaw. 1998. "A global review of laws on induced abortion, 1985–1997," *International Family Planning Perspectives* 24(2): 56–64.
- Romaniuc, A. 1984. *Fertility in Canada: From Baby-Boom to Baby-Bust*. Ottawa: Statistics Canada.
- Ross, J. A. and K. S. Koh. 1975. "Transition to the small family: A comparison of 1964–1973 time trends in Korea and Taiwan," in Y. Chang and P. J. Donaldson (eds.), *Population Change in the Pacific Region*. Vancouver: The Thirteenth Pacific Science Congress.
- Russian Centre for Public Opinion Research (VCIOM), Centers for Disease Control and Prevention (CDC), and United States Agency for International Development (USAID).

1997. *1996 Russia Women's Reproductive Health Survey: A Study of Three Cities. Preliminary Report*, January.
- Rychtaříková, J. 1996. "Current changes of the reproduction character in the Czech Republic and the international situation," *Demografie (Czech)* 38(2): 72-89.
- . 1998. Unpublished data, personal communication, Charles University, Prague.
- Song, K. Y and S. H. Han. 1974. *1973 National Family Planning and Fertility Survey: A Comprehensive Report*. Seoul: Korean Institute for Family Planning.
- Srb, V. 1967. *Demographic Handbook*. Svoboda, Prague.
- State Committee of the Russian Federation on Statistics (Goskomstat). 1996. *The Demographic Yearbook of Russia*. Moscow.
- Statistics Canada, Canadian Centre for Health Information:
Selected Birth and Fertility Statistics, Canada. 1993. 1921-1990. Pub. March.
Selected Marriage Statistics. 1992. 1921-1990. Pub. Sept.
- Statistics Canada, General Social Survey, 10th round, 1995, special tabulations for contraception data.
- Statistics Canada, Health Statistics Division:
Therapeutic Abortions, 1994. 1996. Pub. Sept.
Selected Therapeutic Abortion Statistics, 1970-1991. 1994. Pub. Nov.
Births and Deaths, 1995. 1997. Pub. May.
Marriages, 1995. 1996. Pub. Dec.
- Stloukal, L. 1995. "Demographic aspects of abortion in Eastern Europe: A study with special reference to the Czech Republic and Slovakia," Ph.D. thesis, Australian National University, Canberra.
- . 1997. "Abortion," in Z. Pavlík and M. Kucera (eds.), *Population Development in the Czech Republic 1996*, Department of Demography and Geodemography, Charles University, Prague, pp. 35-41.
- Taeuber, I. 1944. "Colonial demography: Formosa," *Population Index* 10(3): 147-157.
- . 1946. "The population potential of postwar Korea," *The Far Eastern Quarterly*. New York: Columbia University, May.
- . 1958. *The Population of Japan*. Princeton, NJ: Princeton University Press.
- Taeuber, I. B. and G. W. Barclay. 1950. "Korea and the Koreans in the northeast Asia region," *Population Index* 16(4): 278-297.
- Terao, Takuma. 1959. *Outline of Birth Control Movement*. Tokyo.
- Thornton, A. and H. S. Lin (eds.). 1994. *Social Change and the Family in Taiwan*. Chicago, IL: University of Chicago Press.
- Tietze, Christopher. 1983. *Induced Abortion: A World Review, 1983*. New York: Population Council.
- Tietze, Christopher and John Bongaarts. 1976. "The demographic effect of induced abortion," *Obstetrical and Gynecological Survey* 31(10): 699-709.
- United Nations. 1954. *Foetal, Infant and Early Childhood Mortality: The Statistics*. ST/SOA/SER.A/13, New York.
- . 1996. *Levels and Trends in Contraceptive Use As Assessed in 1994*. New York.
- . 1999. "Fertility trends among low-fertility countries," *Population Bulletin of the United Nations* Nos. 40/41: 35-125.
- United Nations Development Programme. 1996. *Human Development Report 1995: Russian Federation*. New York.
- United Nations Population Division. 1992. *Patterns of Fertility in Low-Fertility Settings*. New York.
- United Nations Population Fund. 1998. *Population and Reproductive Health in the Russian Federation: Needs Assessment Mission, 12-30 May 1997*. New York.
- Van de Kaa, D. 1987. "Europe's second demographic transition," *Population Bulletin* 42(1). Washington, DC: Population Reference Bureau.
- Weinstein, M. et al. 1990. "Household composition, extended kinship, and reproduction in Taiwan: 1965-1985," *Population Studies* 44(2): 217-239.

- Westoff, C. F. and N. B. Ryder. 1977. *The Contraceptive Revolution*. Princeton, NJ: Princeton University Press.
- Zakharov, S. V. 1994. "Changes in spatial variation of demographic indicators in Russia," in W. Lutz et al. (eds.), *Demographic Trends and Patterns in the Soviet Union Before 1991*. London, New York, and Laxenburg: Routledge and IIASA.
- . 1999. "Fertility trends in Russia and the European newly independent states: Crisis or turning point?" in *Population Bulletin of the United Nations* Nos. 40/41: 292–317.