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Foreword

The focus of IIASA's Population Program is population aging, particularly in the IIASA member nations. Changes in mortality, but to a much greater extent changes in fertility, account for the present aging of the IIASA countries. This paper discusses the anatomy of the most pronounced fertility change in recent times, the post-war baby boom. The presentation makes much use of newly-available graphical techniques, which allow the reader to visualize the demographic trends in great detail. The graphical tools also facilitate comparative analyses, such as that presented by the authors.

Douglas Wolf
Deputy Leader
Population Program

Comparative Anatomy of Fertility Trends: The Aging of the Baby Boom

Wolfgang Lutz and Anatoli Yashin

1. Introduction

Modern fertility trends in industrialized countries seem to follow strange and almost unpredictable patterns. Yet the comparative analysis of fertility trends in different countries shows a surprising similarity in the changing patterns of reproduction. Countries geographically as far apart as the United States of America and the Federal Republic of Germany show almost parallel fertility trends after 1950 (with the German rates consistently lower than the American).

We may assume that in countries where the decision to have children is deliberate and more or less conscious, fluctuations in fertility reflect fluctuations in the desires for children. On the aggregate level, such desires may be influenced by economic conditions and, probably more important, by socio-cultural developments and changes in attitudes. After World War II, such conditions changed almost simultaneously in North America and most European countries, first producing the baby boom and then the baby bust.

There are other examples where countries as closely related as the German Democratic Republic and the Federal Republic of Germany exhibit quite divergent trends. In this case we can assume that the diffusion of attitudinal and socio-economic changes relevant for childbearing was rather weak between the two German states. In addition to this, the GDR had an explicitly pronatalistic policy which seemed to have had some effect whereas the FRG abstained from population policy. With a total fertility rate of 1.26, the FRG today has the lowest fertility level in the world, whereas the GDR holds around 1.7.

In order to understand the baby boom and the baby bust and their consequences for the aging of the population, one must first take a closer look at fertility rates over time and age. What we need is a comparative analysis of many countries examining age-specific period fluctuations as compared to changes in cohort fertility. In the light of these empirical findings we can then consider the plausi-

bility of several models of explanation. In this paper we had to be selective in respect to the number of countries considered and especially in respect to explanatory models. This study is mainly an attempt to survey the extremely rich empirical material in a visual manner that makes you see the most important features at first sight. The graphs in this paper summarize more than 15,000 age- and period-specific fertility rates.

2. Looking at Demographic Surfaces

The traditional way of presenting data in demography is based on using tables and two-dimensional (x-y) graphs. Both approaches are appropriate for many problems in data analysis. However, they sometimes are not informative enough, especially when one needs to represent functional dependences among three or more variables. Rapid proliferation of computers and graphics software have made it possible to easily plot three-dimensional graphs. Such an opportunity seems especially useful for presenting many demographic characteristics which are the functions of age and time. Providing a nice image of demographic linkages and giving information on major trends in any direction on the surface of the three-dimensional plot alone is sometimes still not very convenient when we want to analyze the details and make a quantitative analysis of major dependences and tendencies. A supplementary approach is based on using the shaded contour maps of demographic surfaces. Shaded contour maps allow one to capture the most important qualitative changes of the surface. By using different shades, the methods provide the quantitative values of demographic characteristics for any point on the map.[1]

Unlike traditional methods of graphical analysis, interpreting contour maps requires some practice even for the most skilled scientists. After some training, however, reading the contour map should not be a problem. The method allows one to visualize the data and offers a panoramic view which is impossible to obtain from the usual graphs of levels or rates at selected ages over time or at selected times over age. It allows illustration of data in both age and time directions, simultaneously displaying the entire history of demographic characteristics (mortality, fertility, morbidity, etc.) in approximately one minute on an inexpensive personal computer.

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[1] The respective computer program for an IBM PC or compatible was developed at IIASA (see Gambill, Vaupel, and Yashin 1986).

The contour map provides a clear and rich representation of the entire demographic surface. While major peaks and valleys are readily apparent from viewing three-dimensional plots, trends are often obscured. Contour maps are particularly effective at highlighting patterns in the interaction of age, period, and cohort effects. They can be used as an initial step for data analysis by helping to select the frail cohorts, reveal the consequences of the most important social economic events, or the most sensitive age groups. After such a selection the traditional graphic analysis of demographic dependences might be relevant.

In our paper we present five fertility maps for each of the eight IIASA countries.[2] At the top right, a three-dimensional plot of age-specific fertility over time, to the left a contour map; beside it a two-dimensional plot of trends in the total fertility rates; and, finally at the bottom, age and time cuts for the highest rate observed since 1947 and other selected ages and years.[3]

3. Pre-World War II Fertility Trends

Fertility trends after World War II can only be understood if we see them within the fertility history of the last century. The findings from historical fertility studies in Europe (for surveys of the literature, see e.g. Knodel and van de Walle (1979) or Coale and Watkins (1986)) indicate that until the late nineteenth century, all European countries except France had a rather constant high level of fertility which was only distorted by strong short-term fluctuation due to wars, famines, or other exogenous events. For centuries most segments of the population exhibit what Henry (1961) called natural fertility, i.e. a fertility regime where, within marriage, the birth of an additional child did not depend on the number of children already born but only on the mother's age and physical capacity. A few decades before or after 1900 all European countries entered the secular fertility decline: a seemingly irreversible transition from high uncontrolled fertility to lower controlled fertility. This transition was accompanied by changes in socio-economic environments and mentality. At this point we do not intend a closer examination of the determinants of this secular change.

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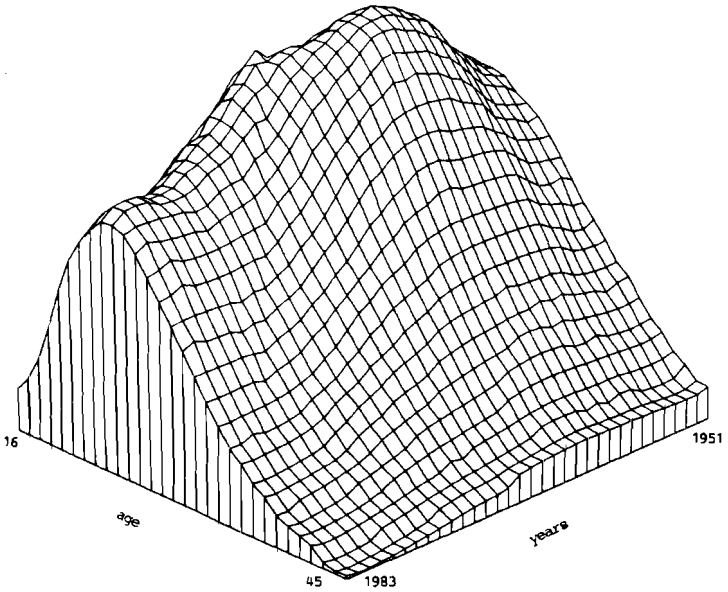
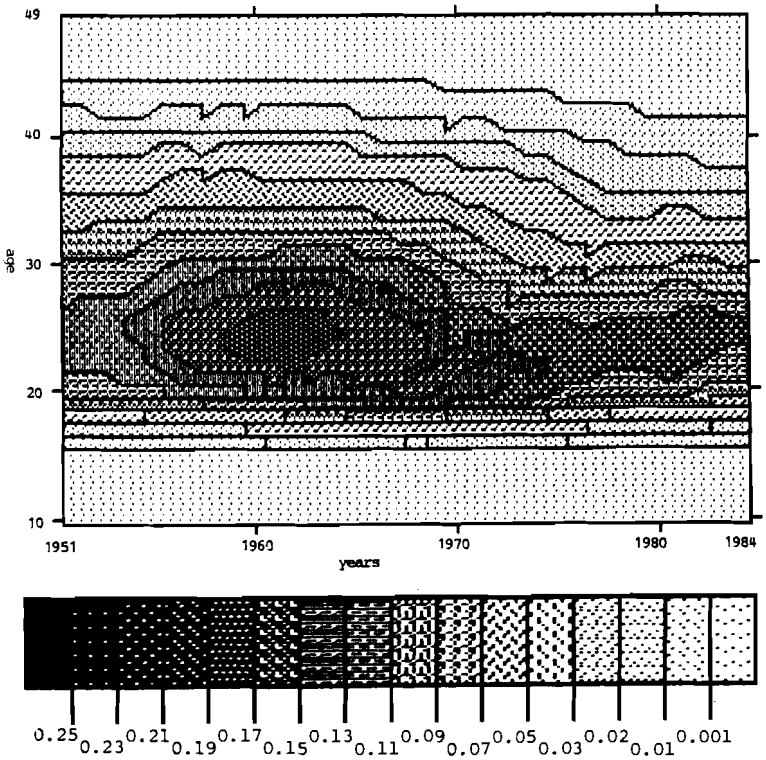
[2] IIASA member countries are: Austria, Bulgaria, Canada, Czechoslovakia, Finland, France, the German Democratic Republic, the Federal Republic of Germany, Hungary, Italy, Japan, the Netherlands, Poland, Sweden, the Union of Soviet Socialist Republics, and the United States of America.

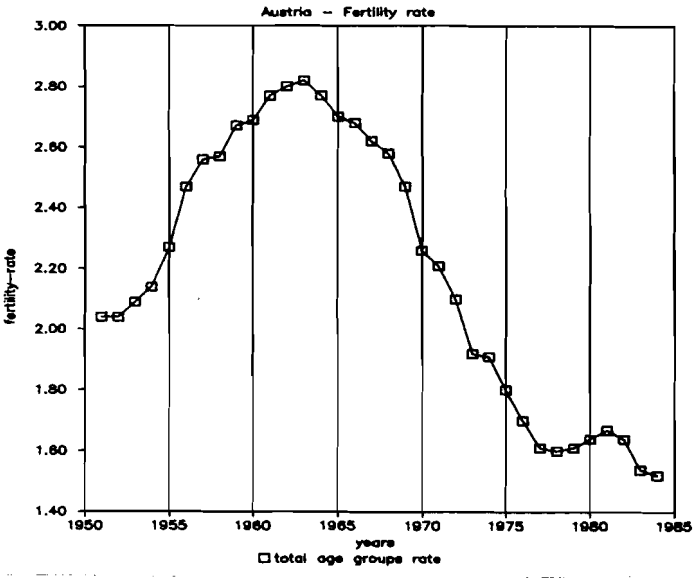
[3] Data on age-specific fertility rates originate from IIASA's demographic data bank.

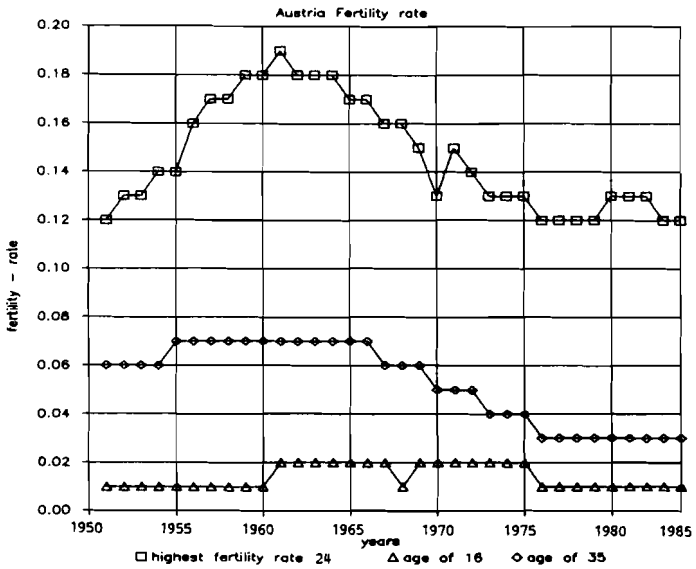
Graph 1. Fertility trends for Austria.



AUSTRIA – FERTILITY 1951–1983







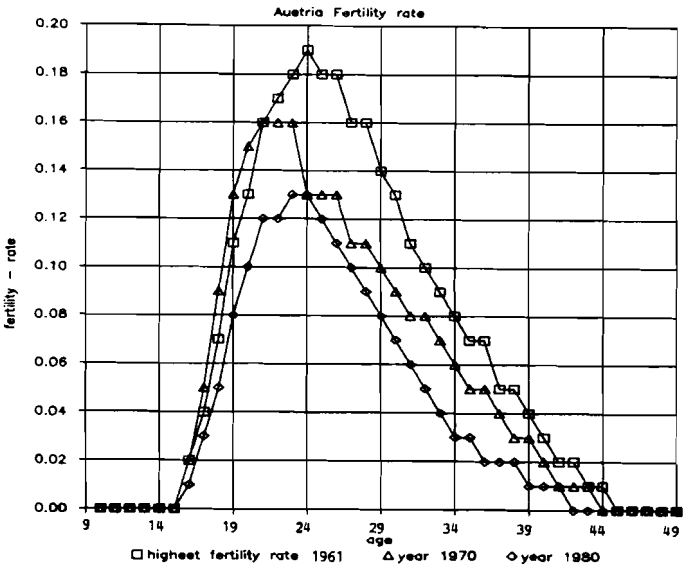


Table 1. Dates of a 10% decline in marital fertility from the pre-industrial level in selected IIASA countries (1900 boundaries).

France	1827	Hungary	1910
Germany	1888	Finland	1912
Netherlands	1897	Bulgaria	1912
Sweden	1902	Italy	1913
Austria	1908	European Russia	1922

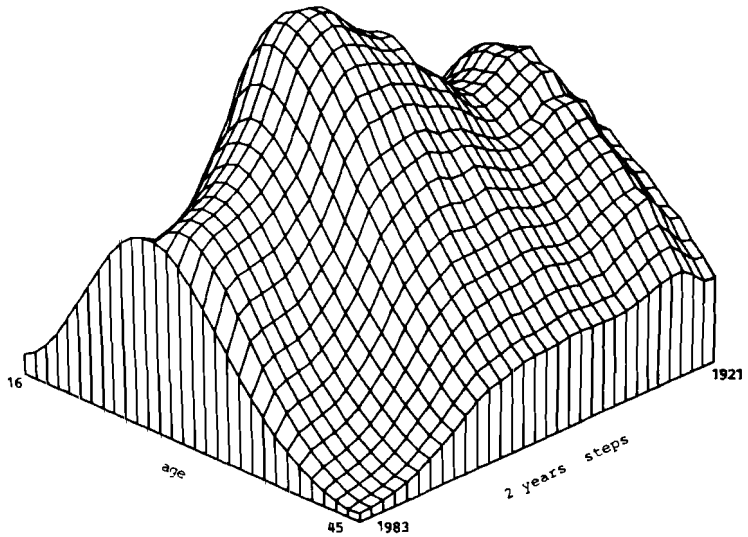
Source: Coale and Treadway (1986).

Table 1 shows the years in which European IIASA countries first experienced a 10% decline in marital fertility. As previously mentioned, France was the first country to reduce marital fertility, followed about 60 years later by Germany in 1888. Over the next 30 years most European countries followed those outriders. In 1922 European Russia also experienced a 10% decline. Finland had seen a decline in total fertility already at the end of the eighteenth century but Lutz and Pitkänen (1986) shows that this was not due to marital fertility but to changes in the marriage pattern. More will be said on the decomposition into nuptiality and marital fertility trends later on.

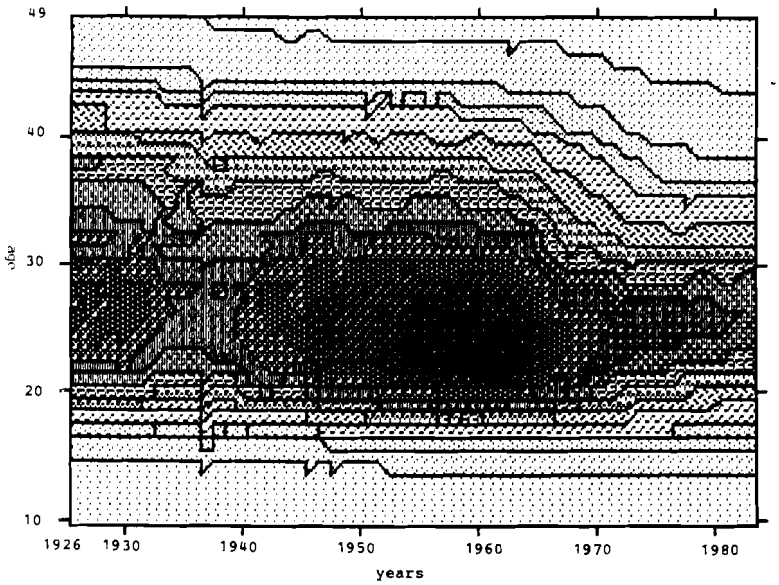
For Finland, Canada, the US, and Italy we have time series of age-specific fertility rates that start before World War II. All four countries exhibit declining fertility until the 1930s. The total fertility rate declined from 3.35 in 1915 in the US to less than 2.20 in 1936; in Finland it even declined from more than 4.50 in 1910 to less than 2.30 in 1933. Canadian fertility also displays a minimum in 1937. For Italy the pattern is somewhat different with a local minimum of 2.95 in 1936 but a much lower level of 2.45 in 1944-45. In all cases this decline is clearly part of the great secular fertility transition.

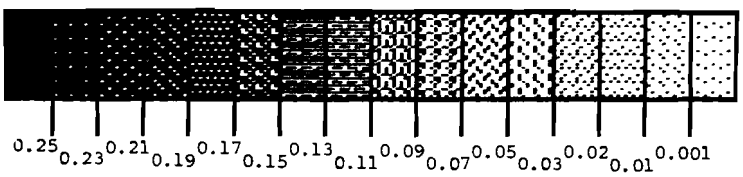
In many countries, the late 1930s and early 1940s saw a recovery of fertility rates but the last years of the war in 1944-45 again caused a depression of fertility in all countries participating in the war. Finland was exceptional in the way that the post-war baby boom started already in 1945 and peaked in 1947. After that fertility entered a new decline. A similar phenomenon of an early boom is visible in Canada and the US where total fertility also reached a local maximum in 1947 but peaked again, together with most other western countries, in the late 1950s and early 1960s. In North America this real baby boom with total fertility rates above

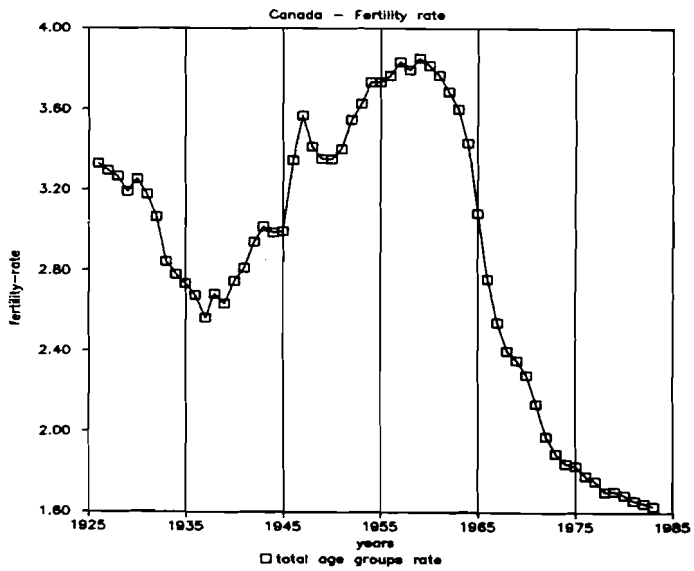
Graph 2. Fertility trends for Canada.

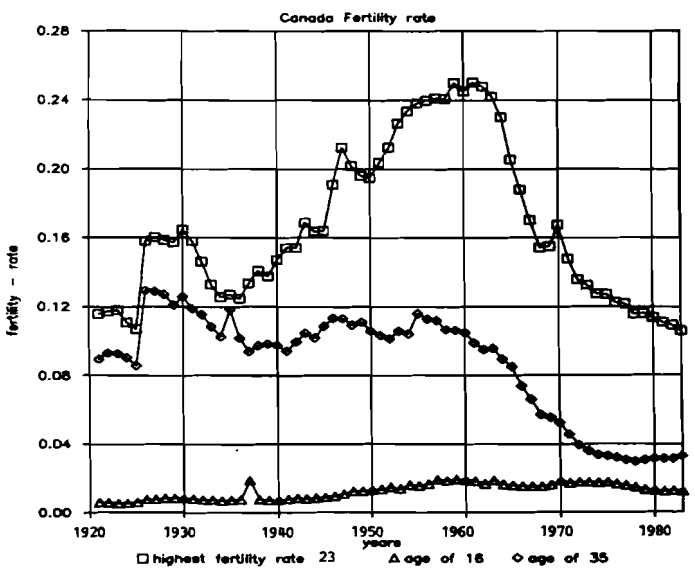


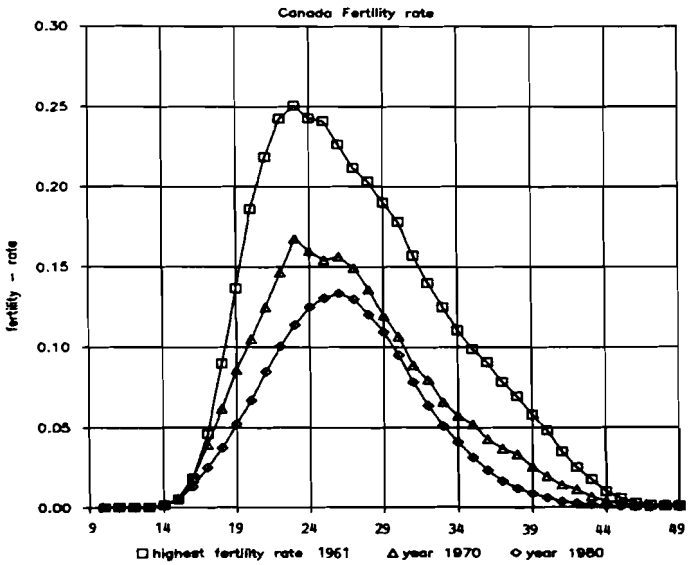
Canada – Fertility 1921–1983











3.7 was much higher and more pronounced than in any European country.

In the following section we will have a closer look at this unique phenomenon of the post-World War II baby boom.

4. Comparative Anatomy of the Baby Boom

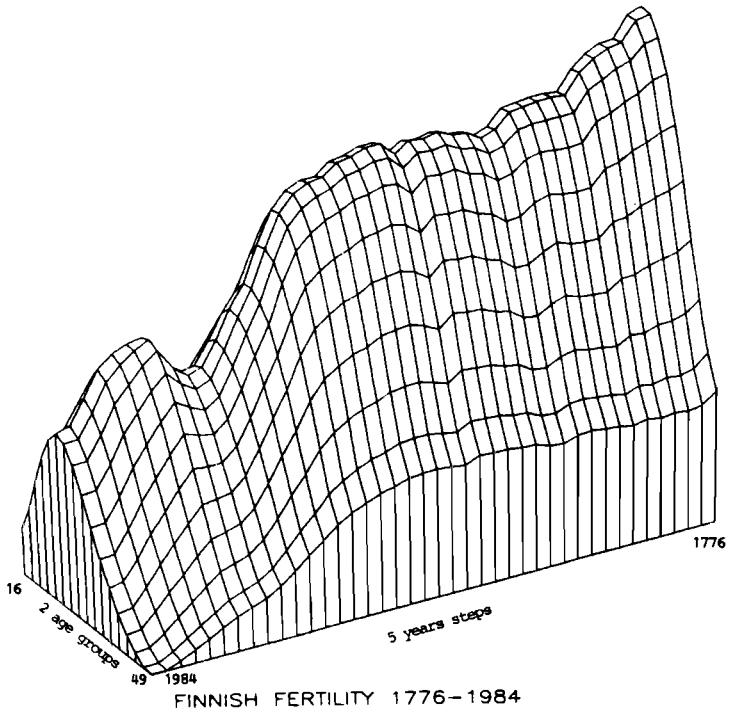
What is usually called the post-war baby boom is a phenomenon that appeared in quite different forms in various countries. What makes the baby boom a distinct phenomenon is that it was an unexpected significant increase in fertility that, irrespective of different cultures, religions, and socio-economic standing, took place in most industrialized countries at about the same time.

This increase was completely unexpected even to the scholars of demography who expected continuation of pre-World War II fertility levels or even a further decline. It was significant in a way that it brought the total fertility rate up to an almost pre-modern level. In the US, for example, the total fertility rate increased by more than 70% from 1935 to 1957; the fertility rate of women in their early twenties even more than doubled over that period. This unexpected increase of fertility did not seem to be specific for any culture or economic system. It could be observed in Protestant Scandinavia as well as in Catholic Italy, in eastern Europe as well as in the United States and Canada. And in all countries the increase occurred within the 25 years following World War II, even in countries that did not participate in the war such as Sweden and Switzerland.

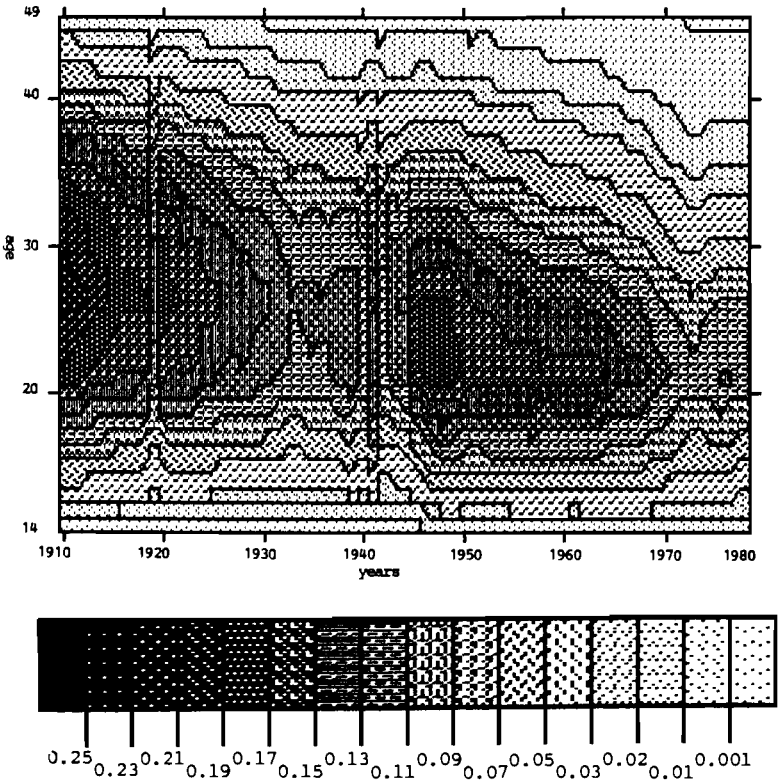
Table 2. Highest age-specific fertility rates observed after 1947.

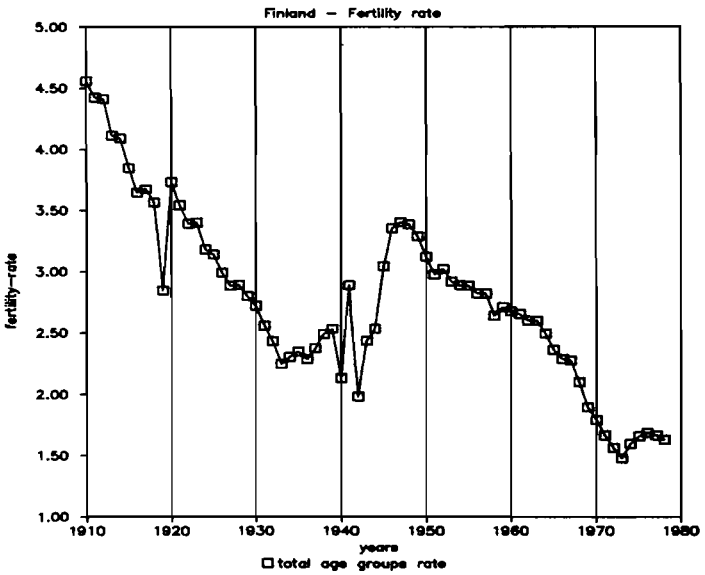
Peak of post-war fertility	Age	Year	Level
Finland	25	1948	0.18
US	22	1957	0.26
Austria	24	1961	0.19
Canada	23	1961	0.25
France	24	1963	0.22
FRG	25	1963	0.18
Italy	26	1964	0.19
GDR	20	1967	0.20

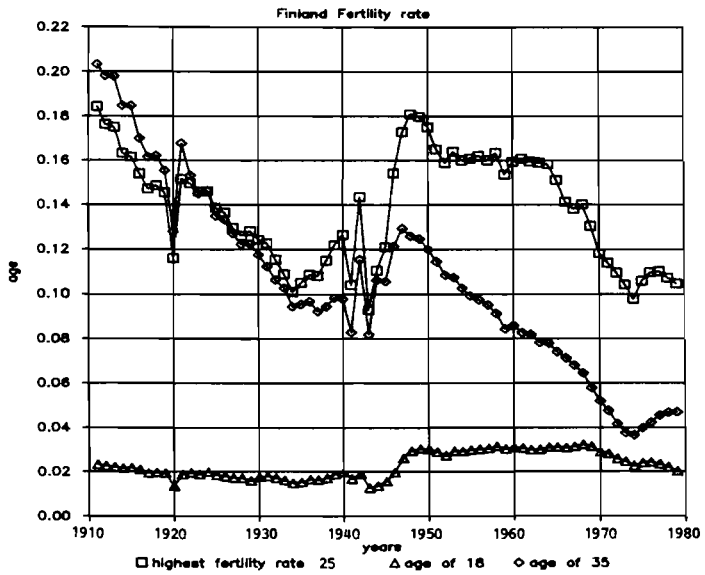
Graph 3. Fertility trends for Finland.

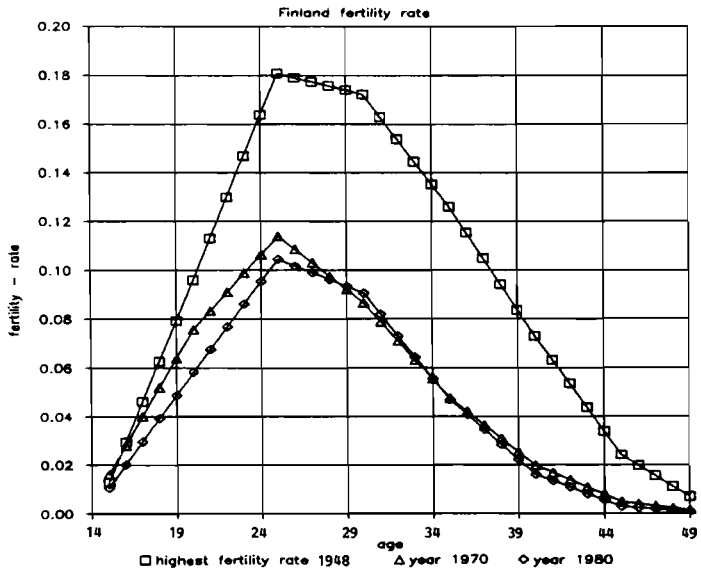


FINNISH FERTILITY 1776-1984

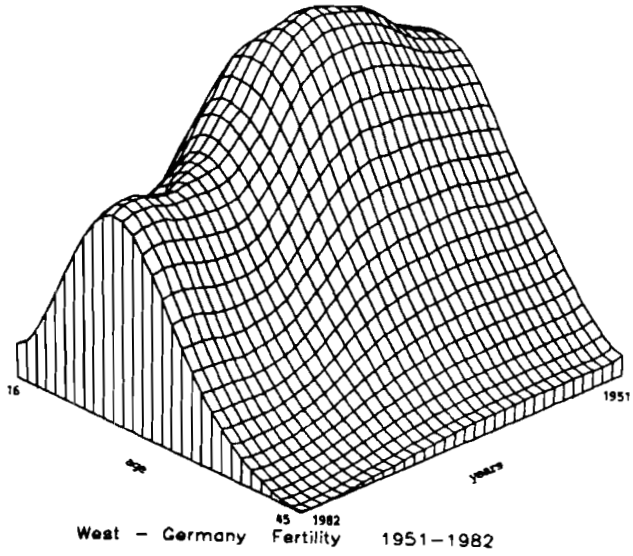




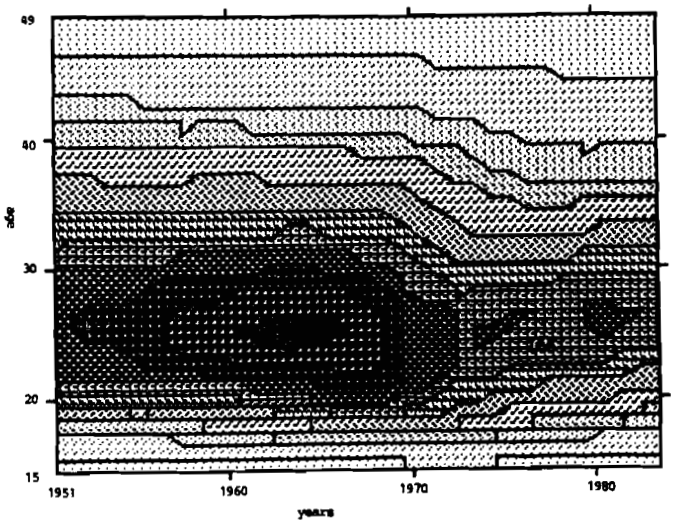


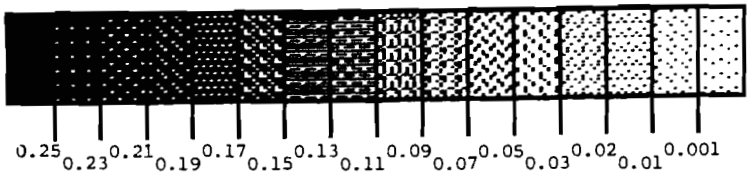


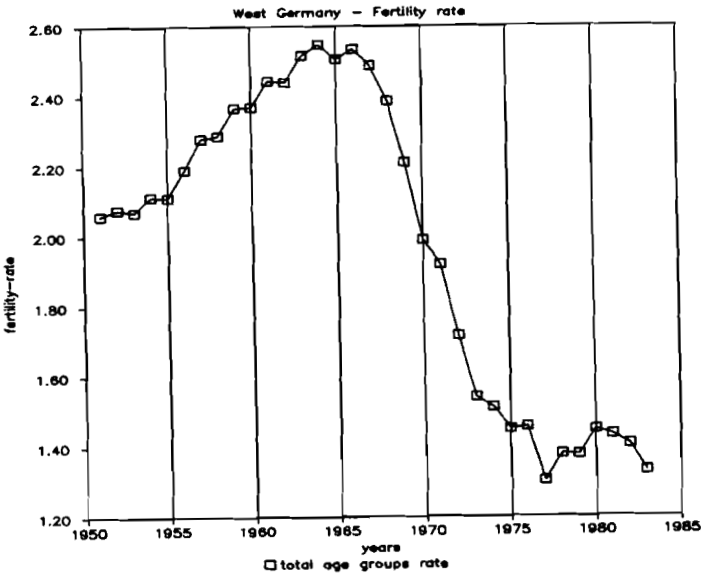
Graph 4. Fertility trends for the Federal Republic of Germany.

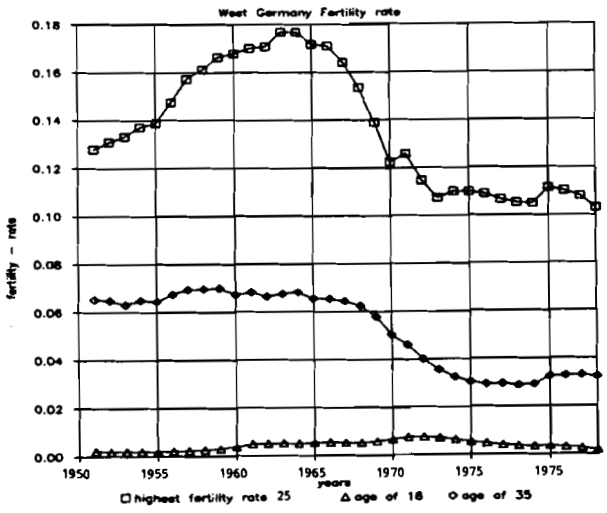


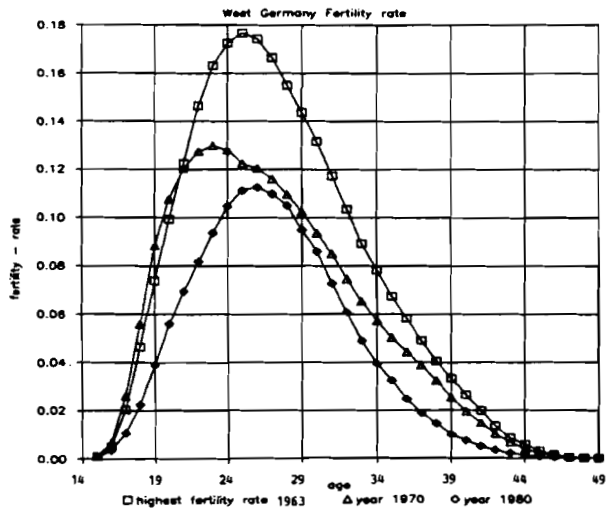
West - Germany Fertility 1951-1982







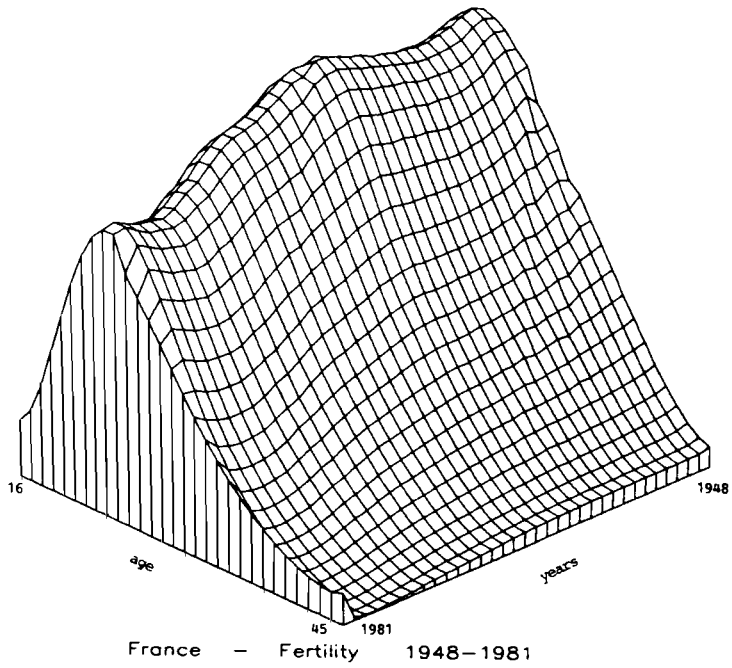




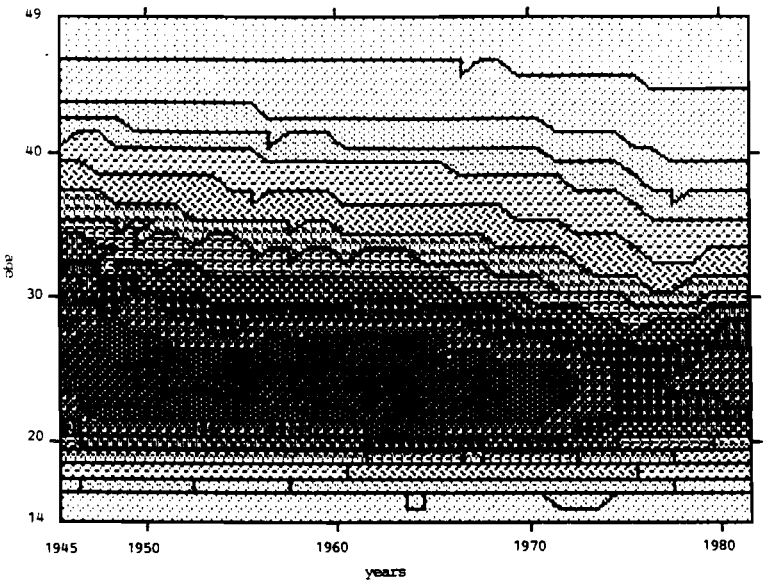
Graph 5. Fertility trends for France.

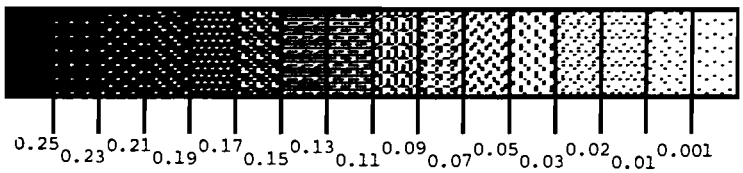
FRANCE

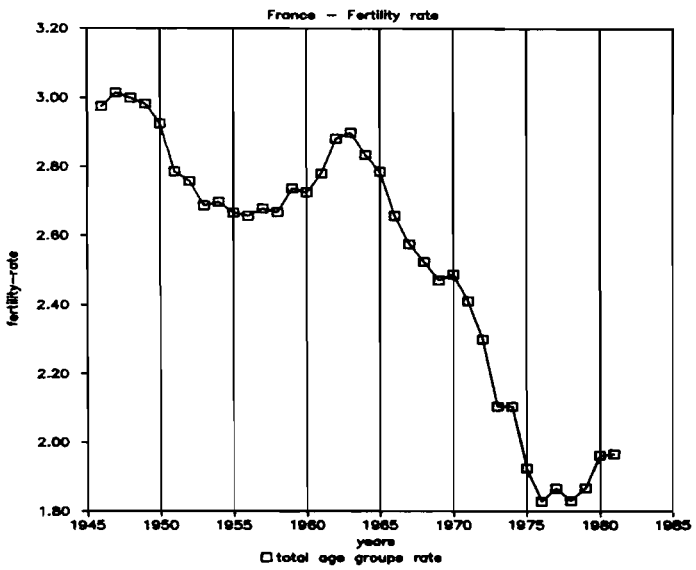
Fertility - Trend

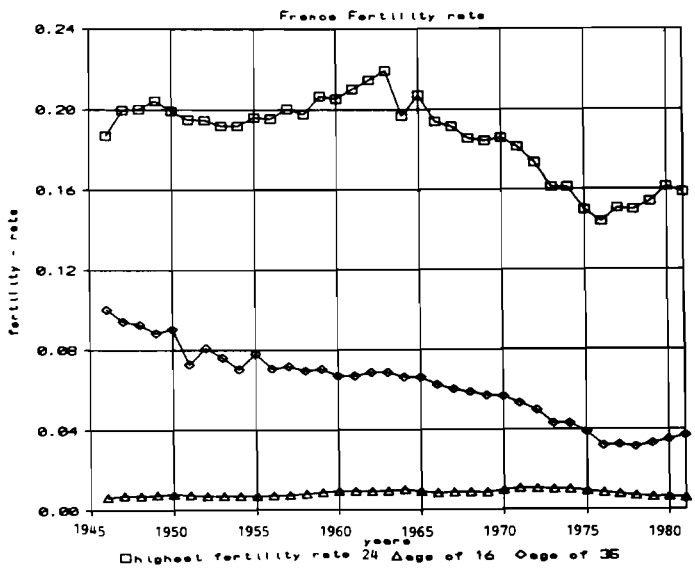


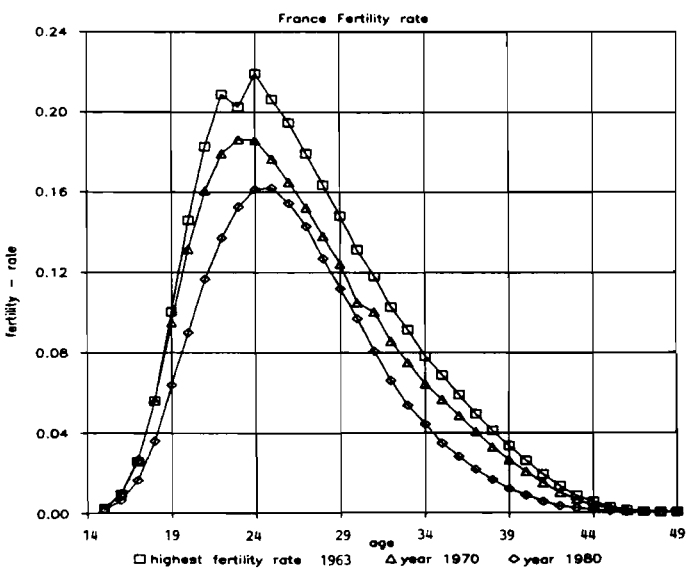
France – Fertility 1948–1981









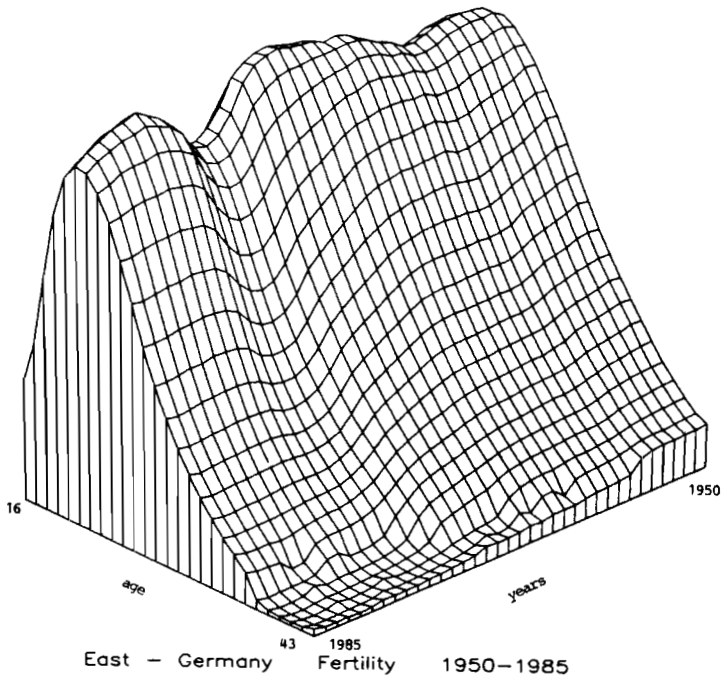


In all countries fertility trends show a local maximum right after the end of the war in the late 1940s. For some countries this was already the highest level of fertility experienced after World War II, for other countries this was only a short recovery followed by the real baby boom in the early 1960s. Among the eight IIASA countries studied in this paper, only Finland belongs to the first group with the peak of the baby boom in 1948. From the plots of age distributions (see Appendix), we can see that in Hungary, Poland, Czechoslovakia, the GDR, Japan, and Sweden, similar peaks in the number of births appear around 1948-53. In all IIASA countries except Finland this was followed by another local maximum in the early 1960s. In Finland fertility declined almost monotonically between 1948 and 1974. After 1975 a slight recovery is visible, especially for women above age 25.

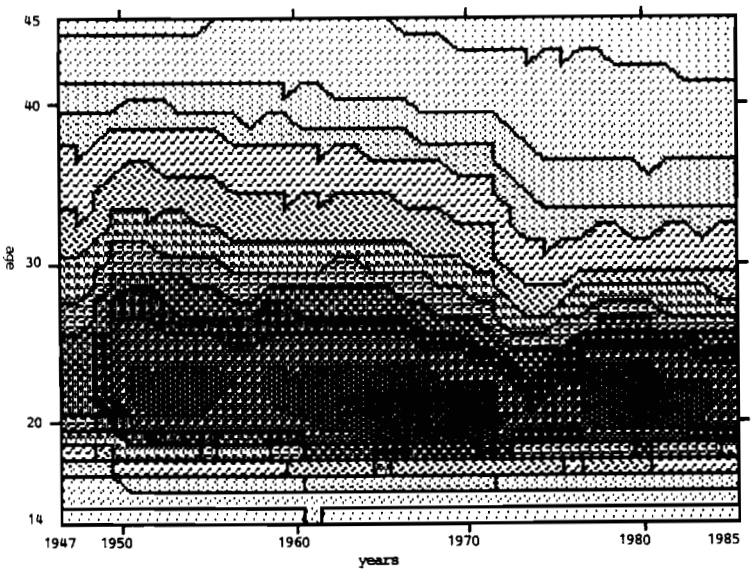
Among the countries studied, France and Italy do not show a distinct peak of the baby boom. In France total fertility was above the level of 2.6 from 1945 until 1966. Nevertheless, two peaks can be identified: one in 1947 and another in 1963. An analysis of the age patterns of fertility reveals that the 1947 peak included a higher percentage of births by women above age 30, whereas in the peak of 1963 women in their early twenties played a major role. Hence, the age pattern of this second baby boom is similar to that of the US and other western European countries. In Italy the pattern is somewhat similar to France. Only the level of fertility between the peaks of 1946 and 1964 was significantly lower than in France. Again, women in their twenties played a more significant role in the second peak. Since 1965 both countries have experienced steep fertility declines, especially for women above age 30.

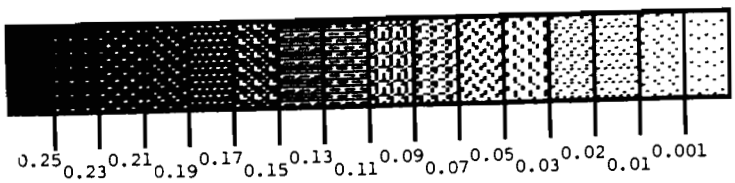
Fertility trends in the German Democratic Republic have a unique feature. Total fertility shows one peak in 1951, another peak in 1967, and a local maximum in 1980. Between the two first peaks that reached a level of about 2.5 children per woman, fertility had declined to a total fertility rate of less than 2.2. As in most other countries the peak in 1965 was mainly due to younger women, and hence can be called the "real" baby boom. Between 1970 and 1974 fertility declined dramatically at all ages. In 1974 the total fertility rate was about 30% lower than just four years earlier. This precipitous decline can be seen in connection with the introduction of new legislation in social politics that, among others, abolished restrictions on abortion. In the following years new social legislation was introduced to make childbearing more attractive and the total fertility rate increased again to over 1.8 in 1980. Since then, a slow decline can be observed.

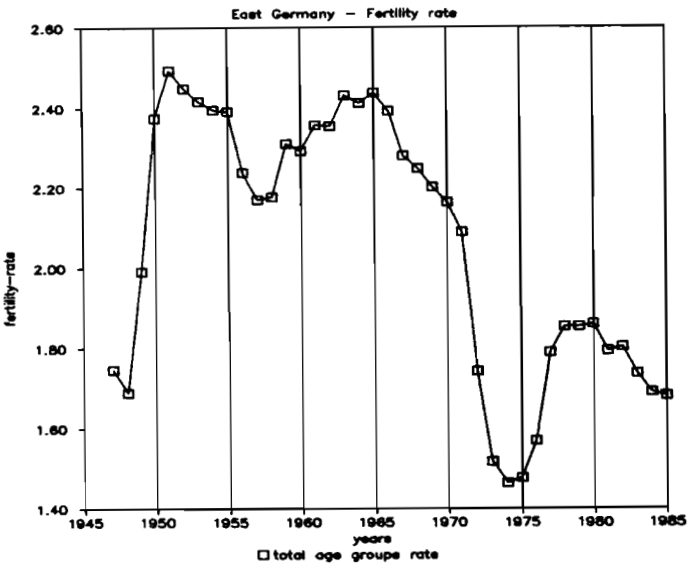
Graph 6. Fertility trends for the German Democratic Republic.

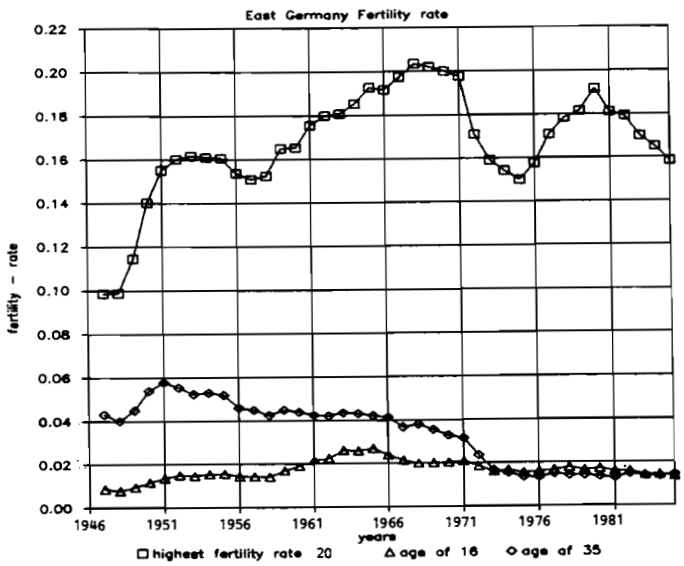


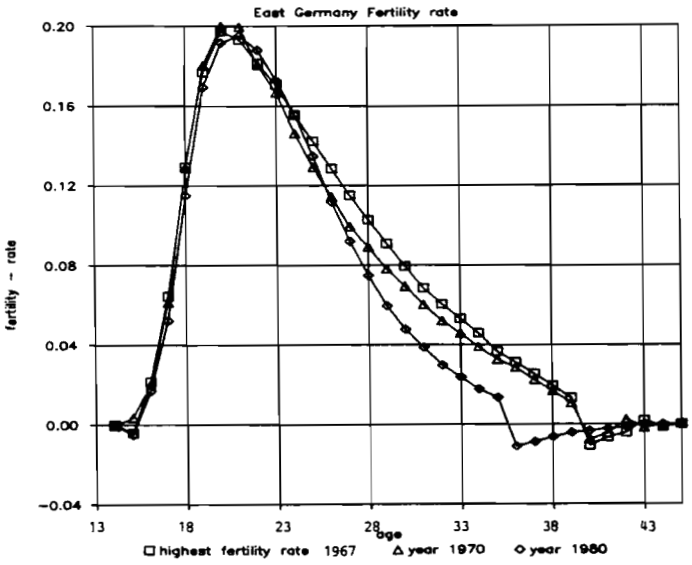
East – Germany Fertility 1950–1985



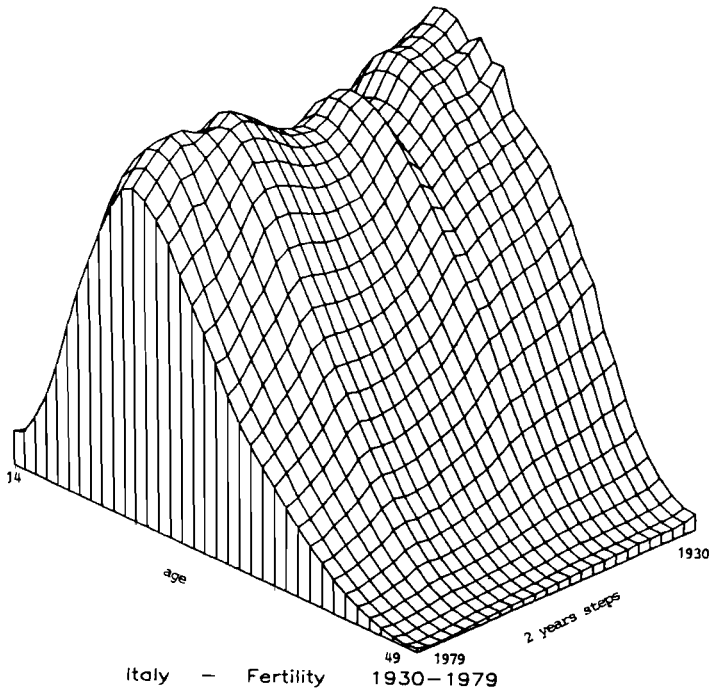




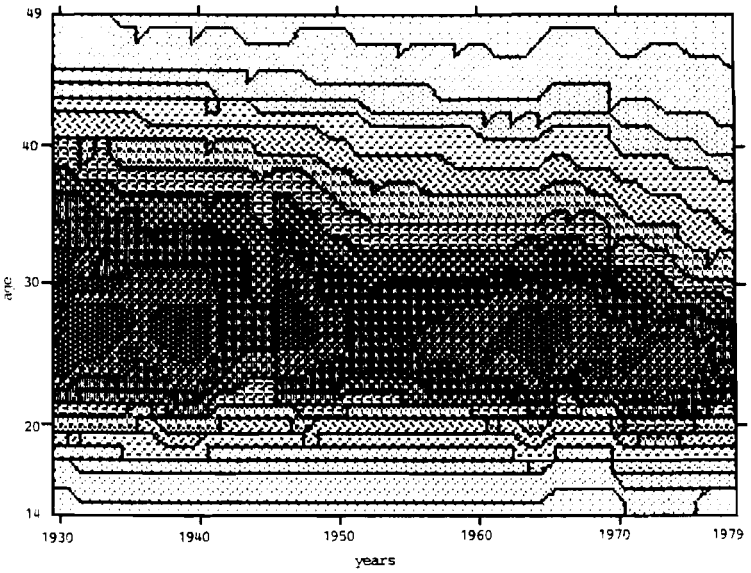


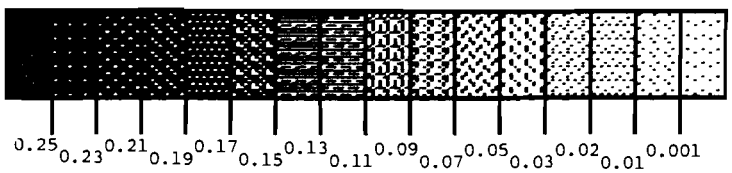


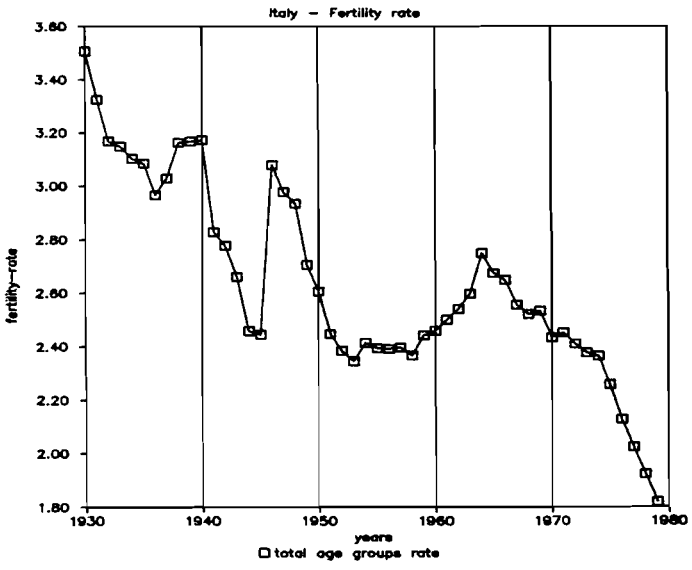
Graph 7. Fertility trends for Italy.

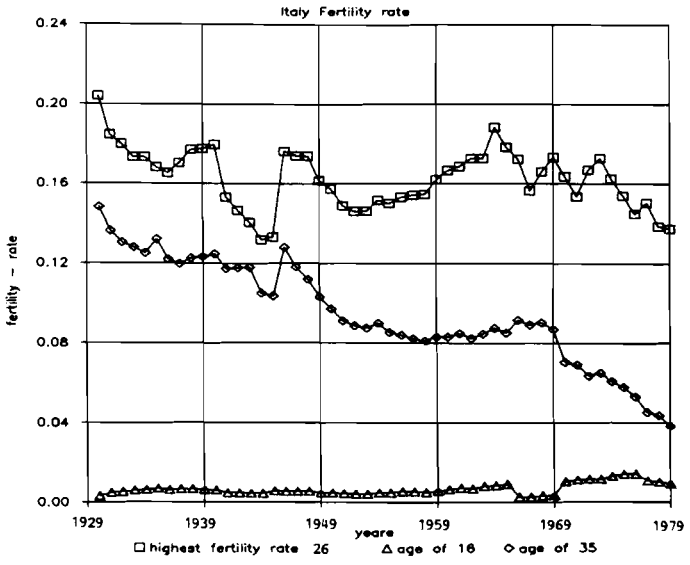


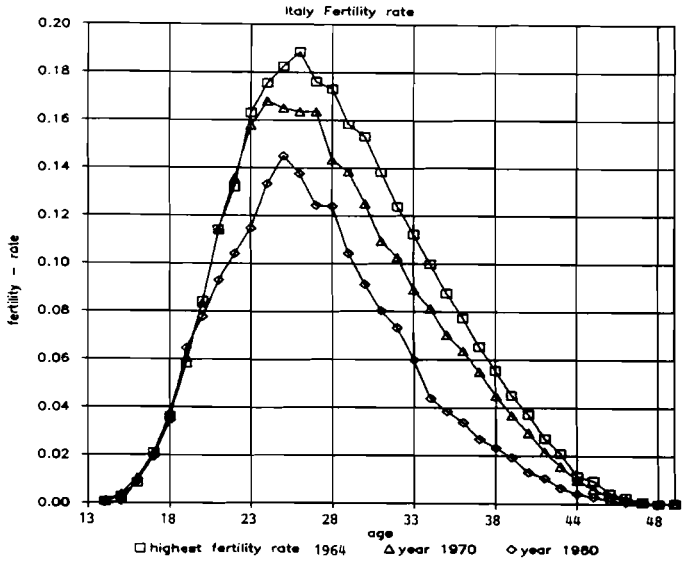
Italy – Fertility 1930–1979



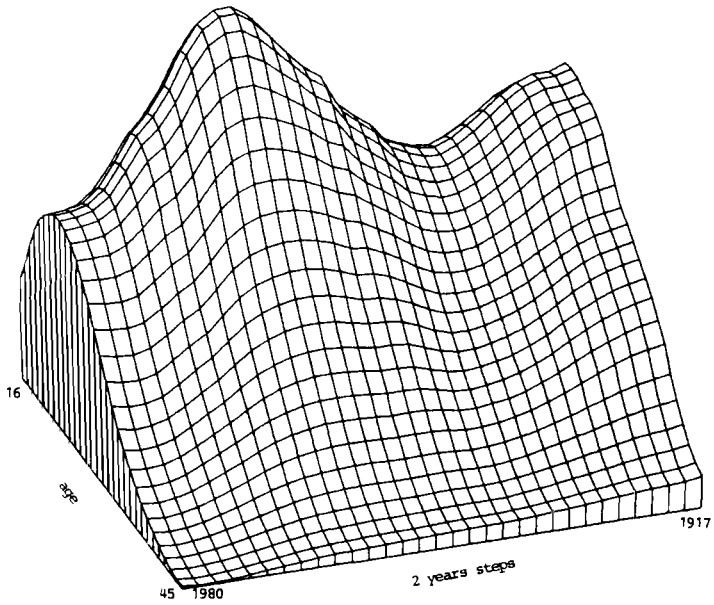




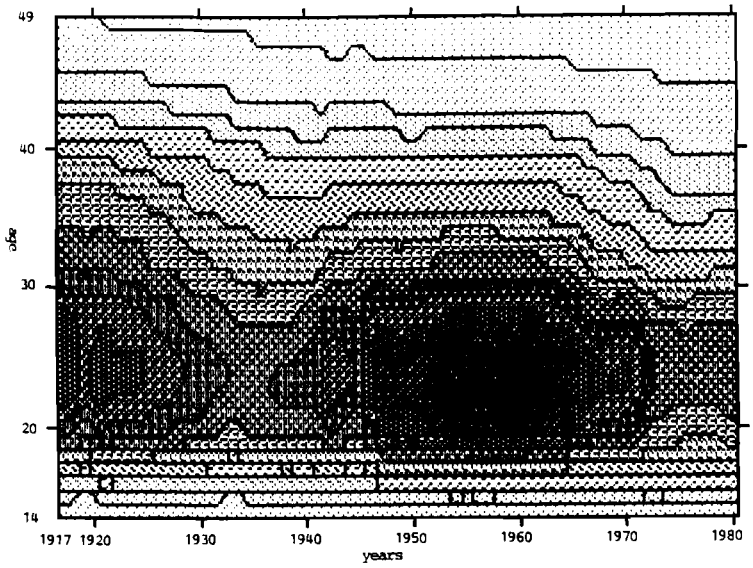


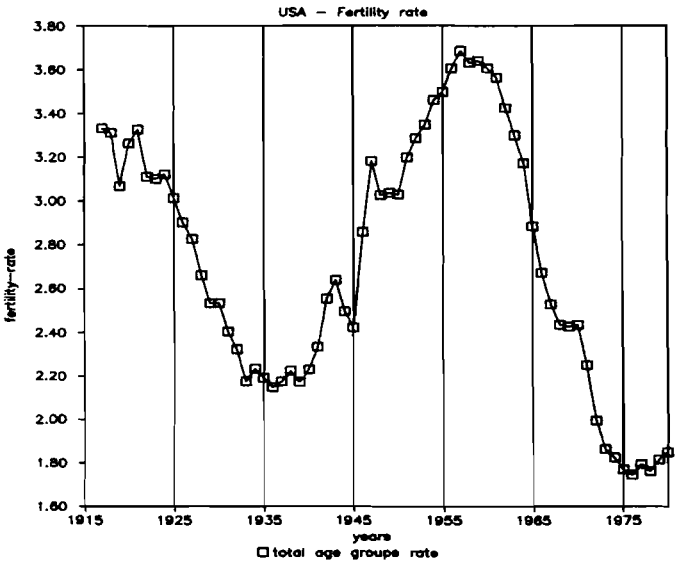


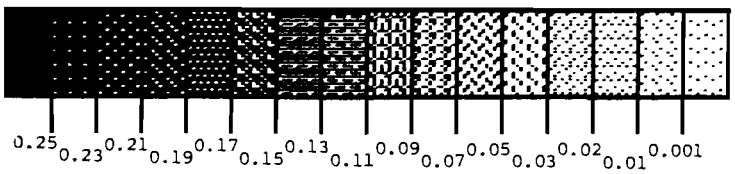
Graph 8. Fertility trends for the United States of America.

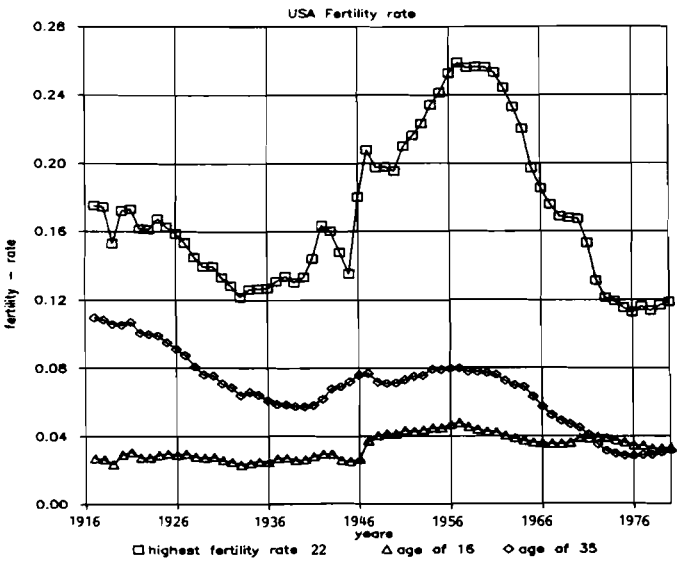


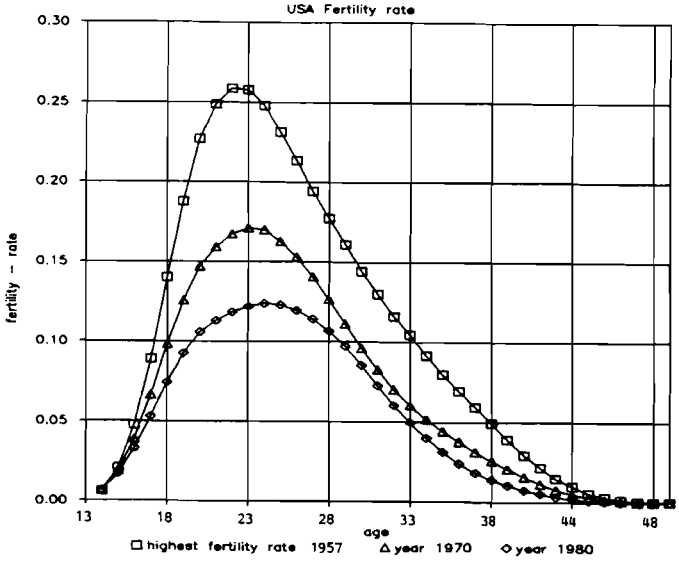
US – Fertility 1917–1980











Fertility trends in the Federal Republic of Germany were quite different. First, there was no peak in the early 1950s as compared to the GDR. Instead, there was a steady increase of fertility rates, especially of women in their twenties. A peak was reached in 1963 with a total fertility rate of more than 2.5 children per woman. In the eleven years between 1966 and 1977, fertility fell extremely rapidly at all ages; the total fertility rate was almost cut in half. This was simultaneous to the steep decline in the GDR, but it was not followed by a recovery. By now fertility in the FRG is the lowest in the world at a level of less than 1.3 children per woman.

Fertility trends in Austria were very similar to those in the FRG, only the level of fertility has always been slightly higher and the mean age of childbearing slightly lower. As in the FRG, the baby boom in Austria was clearly concentrated within a few calendar years and a few years of age. Since 1970 the modal age of childbearing has been shifting upwards.

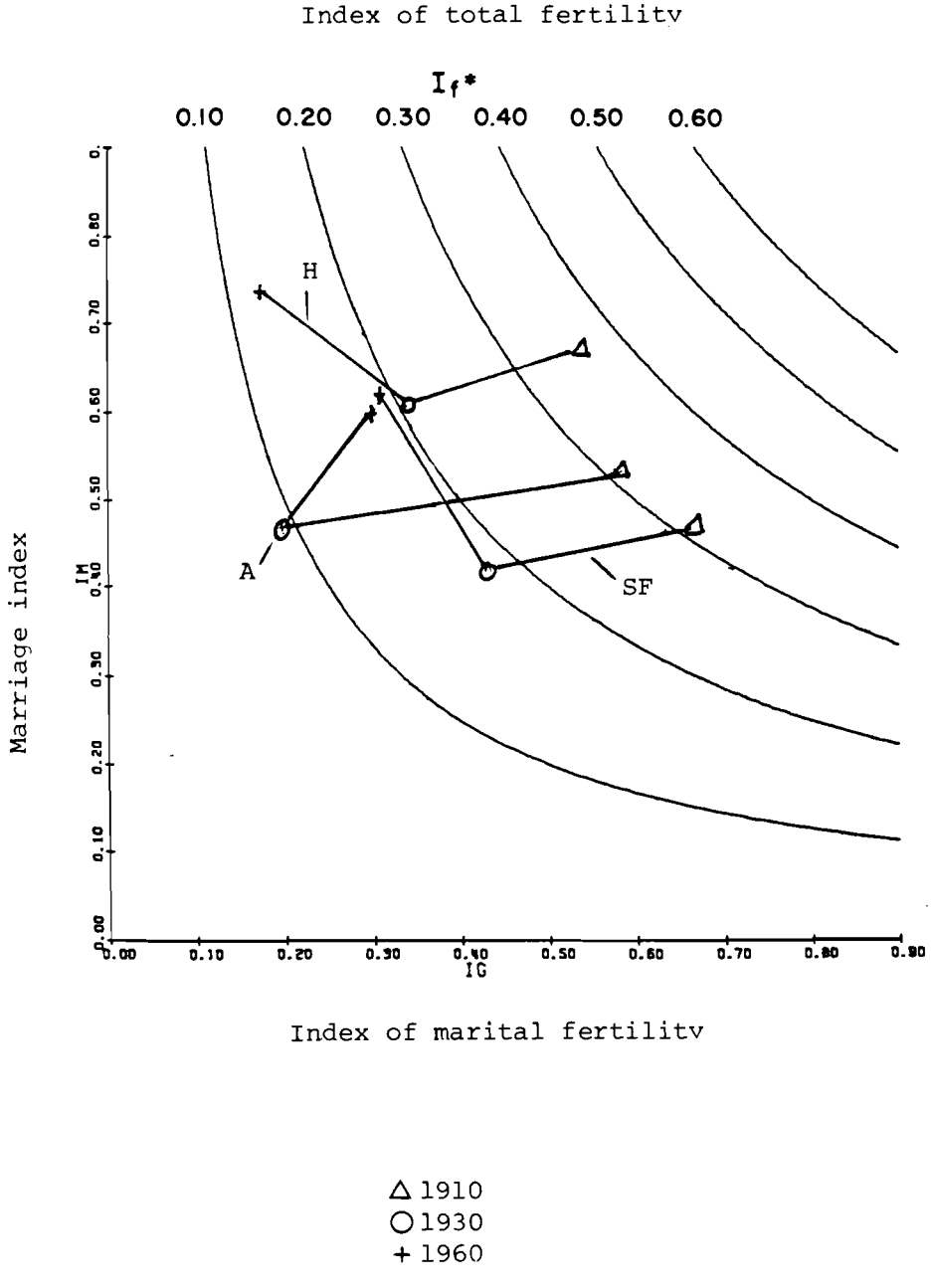
By far, the highest concentration of the baby boom could be observed in the US and Canada. In the US between 1956 and 1961, on the average, every fourth woman aged 20 to 24 had one child in a year. In Canada fertility levels were slightly lower but still higher than in the baby boom of any other industrialized country. At its peak the total fertility rate was above 3.7 children per women in those countries, which was clearly higher than the fertility levels shortly before World War I.

The contour maps also indicate that the high fertility levels of the baby boom years were to a large extent due to period fluctuations. No cohort of women born in this century in the US had actually 3.7 children on the average. On the contour map we can follow the diagonals to analyze the reproductive experience of cohorts of women. By looking at the maps in this respect, we can find that for every country considered the cohort of women that participated in the baby boom in their early twenties exhibit lower fertility in their thirties than earlier cohorts. From this we can visually understand the fact stressed by numerous authors (see e.g. Ryder 1955) that with respect to cohort fertility, the baby boom was much less pronounced than with respect to period fertility.

5. The Role of Marriage in the Baby Boom

So far the fertility rates given referred to all women, regardless if they were married or not. But it is a universally observed phenomenon that fertility within marriage is higher than outside marriage. For this reason trends in marriage strongly influence trends in overall fertility. In the following we try to decompose

Graph 9. Changes in the relationship between I_g, I_m, and I_f in Hungary (H), Austria (A), and Finland (SF), 1910-1960.



overall fertility into the marital fertility and nuptiality components. We do this by using the indices developed by Ansley Coale in the course of the Princeton European Fertility Project.

Coale (1969) developed a set of interrelated demographic indices to describe trends in overall fertility and its nuptiality and marital fertility components. The indices relate the actual population considered to the population with the highest schedule of age-specific fertility on a reliable record: the fertility of married Hutterite women in 1921-1930. Hence, the index of overall fertility (I_f) is defined by

$$I_f = \frac{B}{\sum w_i F_i} \quad ,$$

where B is the annual number of births to all women in a given period, w_i is the number of women in each 5-year age interval from 15-49, and F_i is the fertility of married Hutterite women in each age interval (see Knodel 1974). The index of marital fertility (I_g) is defined by

$$I_g = \frac{B_L}{\Sigma m_i F_i} \quad ,$$

where m_i is the number of married women in each age group and B_L is the annual number of legitimate births. Finally, the marriage index (I_m) summarizes the proportion married among women which is weighted at each age by the Hutterite fertility schedule.

In the absence of illegitimacy, the following equation holds:

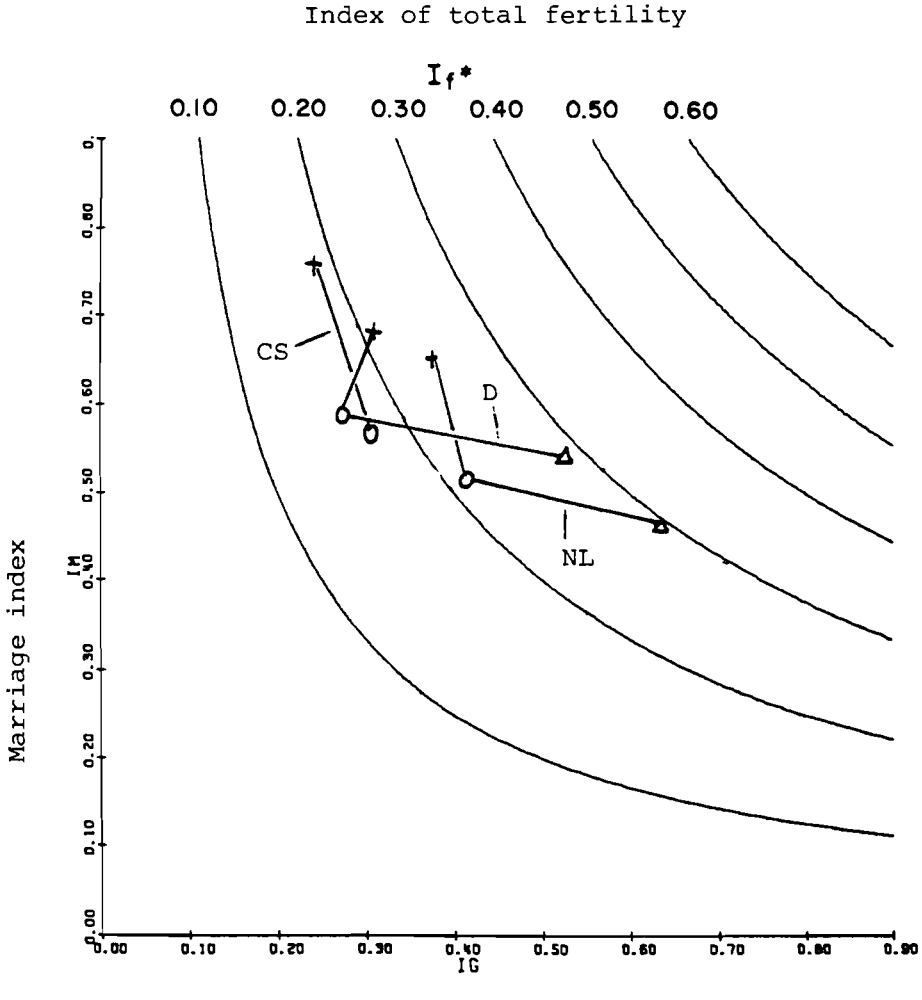
$$I_f = I_m \cdot I_g \quad .$$

And even in real populations with certain proportions of children born out of wedlock, the product of I_m and I_g gives a rather good approximation of I_f (Coale and Treadway 1986).

In the context of the European Fertility Project these indices (plus an additional index I_h for illegitimate fertility) were calculated for the period 1870-1960 for all provinces of Europe. The following two graphs show how, over the period 1910 to 1960, changes in overall fertility I_f were induced by changes in marital fertility and nuptiality.[4] The horizontal axis gives the value of the marital fertility

[4]Data for all IIASA countries are given in Appendix 1. Data and the setup of the graphs were extracted from Coale and Treadway (1986).

Graph 10. Changes in the relationship between I_g, I_m, and I_f in Czechoslovakia (CS), the Netherlands (NL), and the Federal Republic of Germany (D), 1910-1960.



Index of marital fertility

△ 1910
○ 1930
\+ 1960

index I_g and the vertical axis that of proportions married I_m. Together, both produce a level of overall fertility I_f.

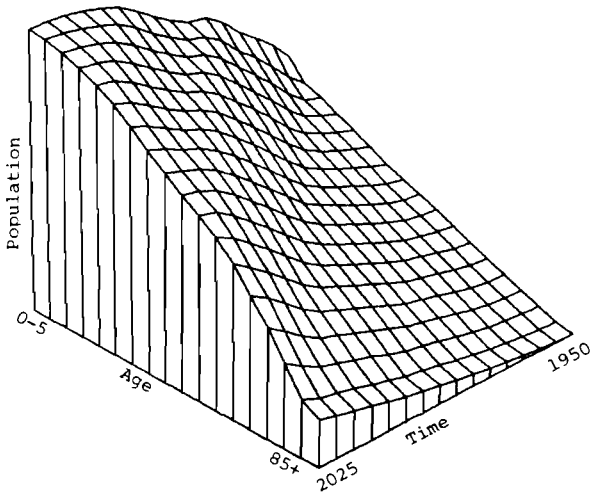
In all three countries in Graph 9, namely Hungary, Finland, and Austria, the steep decline in overall fertility between 1910 and 1930 was mainly due to declining marital fertility; proportions married declined only slightly. In Germany (GDR and FRG combined) and the Netherlands (Graph y), the proportions married even increased over that period, though not strongly enough to offset the steep decline in marital fertility.

Between 1930 and 1960 the situation was almost reversed. In Austria and Germany both I_m and I_g increased, producing a sharp increase in overall fertility, i.e. the peak of the baby boom around 1960. In Germany proportions married increased significantly more than marital fertility, indicating that changing marriage patterns played a more important role in the peak of the baby boom than changes in the number of children per family. In Finland, the Netherlands, and Czechoslovakia, overall fertility increased between 1930 and 1960, despite the fact that marital fertility declined. Hence, the observed increase in overall fertility was exclusively due to increasing proportions of marrying women. In Hungary, Poland, and Italy, the observed fertility decline would have been much stronger if the proportions married had not increased over the same period.

From the eleven IIASA countries considered in the European Fertility Project, only Austria and France clearly showed increasing levels of marital fertility between 1930 and 1960. In Germany a marginal increase could be observed. Over the same period the proportions married increased in all countries except European Russia.

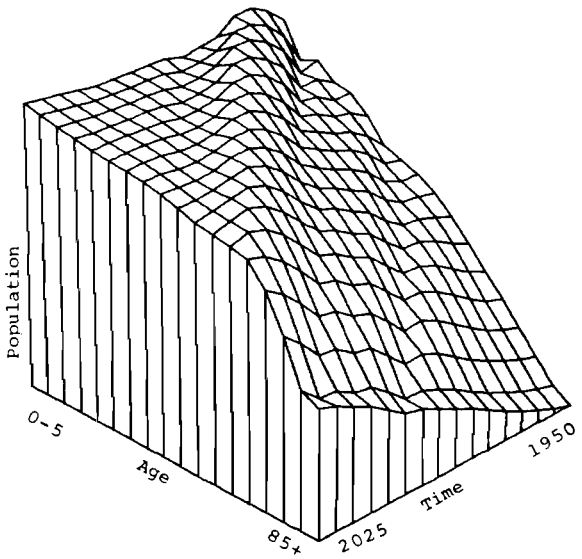
Marriage had been legally or socially and economically restricted in many European countries. It was not until the end of World War II that these restrictions were completely abolished. During the economic boom of the 1950s, almost everyone who wanted to marry could afford to. And contrary to today's situation, the wish to marry seems to have been universal at that time. Hence, we can conclude that the baby boom was, to a large extent, induced by a marriage boom.

Graph 11. Projected age structural changes, 1950-2025.



World Total, 1950–2025

Graph 12. Projected age structural changes, 1950-2025.



IIASA Countries, 1950–2025

6. The Aging of the Baby Boom

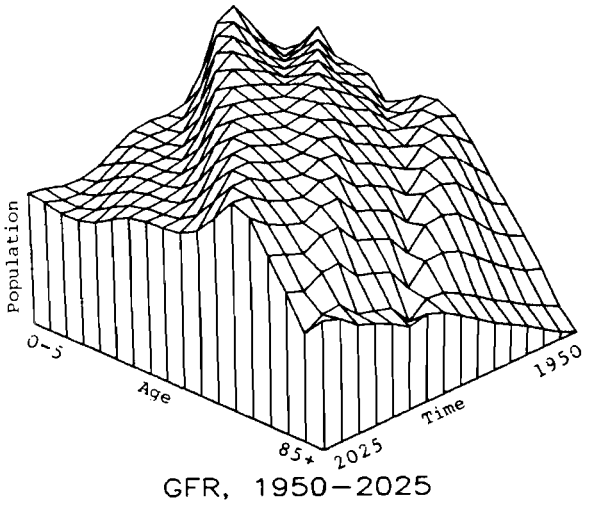
Men and women born at the peak of the post-war baby boom will soon find themselves in the situation that not only at the time of their birth did they belong to the largest age group of the population, but that at the age of retirement no other age group will be more extensive than their own. This has far-reaching consequences for their individual opportunities, where they face higher competition from day care centers to the labor market up to old-age homes, but it also has dramatic consequences for the society as a whole.

Population aging is the most important demographic problem for industrialized countries. Aging may be defined as an increase in the proportion of older people in the total population which is accompanied by an increase in the mean age of the population. In terms of the age structure of the population, it characterizes the shift from a population pyramid where the age groups decline with age to a rectangle where the age groups are of comparable size until a certain age (60 or so) or, in some cases, even to a situation where older age groups are larger than younger age groups.

The process of aging is already at an advanced stage in a number of European countries but everything points toward much higher proportions of the aged in the future. The major reason for this is the continued very low level of fertility in most industrialized countries. Furthermore, fertility, mortality, and migration determine the structure and the size of the population. Inmigration of guest workers in recent decades tended to dampen the process of aging in several industrialized countries because migrants were usually below the mean age of the population and their fertility is usually much higher than that of the citizens of their host country. But in most European countries the effect of inmigration was not strong enough to stop or even reverse the process of aging.

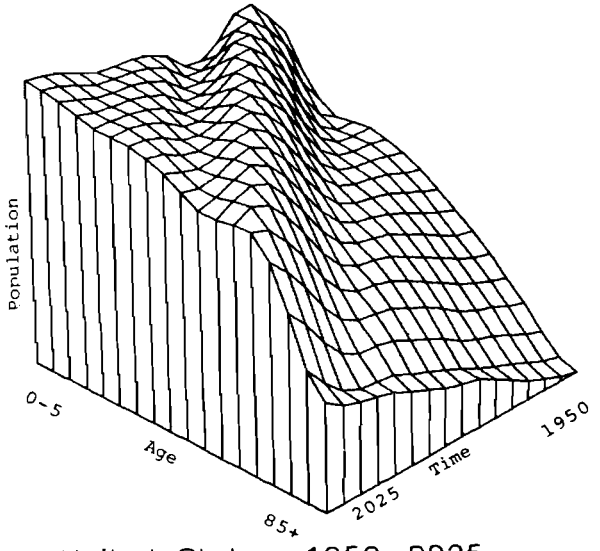
Improvements in mortality, on the other hand, played a significant role in making the age distribution rectangular by allowing higher and higher proportions of a birth cohort to survive to old age. Recent improvements in old-age mortality also led to a significant increase in the proportion of the population above age 70. Since very old people have a much higher risk of being subject to chronic diseases, aging is not only a problem of the proportion of the population engaged in economic activity but it also carries dramatic implications for the health care system. The care for chronically ill persons above age 70 will soon become a major problem for aging societies.

Graph 13. Projected age structural changes, 1950-2025.



GFR, 1950–2025

Graph 14. Projected age structural changes, 1950-2025.



United States, 1950–2025

By comparing the effect of mortality and fertility on the process of aging over the last decades and in the near future, it becomes clear that fertility changes played the major role in bringing about today's distorted age distributions. When looking at the population distributions of the United States (Graph 13) and the Federal Republic of Germany (Graph 4), we can see the strong impact of changing fertility. The baby boom generation of around 1960 will retire in 2025 (under an assumed retirement age of 65). In most IIASA countries, their age group will not be smaller than that of children born at the beginning of the next century because of the low fertility levels that can be expected to continue. At least there is no evident reason why fertility should increase again—most information available points towards further decreases in fertility.[5] Hence the projections shown, which are based on UN estimations with relatively high fertility assumptions, are still very conservative.

In the graphs it is only the remarkable increases of people aged over 85 is partly the result of improving mortality conditions, but also in part caused by greater birth cohorts entering those ages. It is also in part improved survivorship that makes the ridge of the baby boom still so strong at higher ages. When trying to assess the relative effects of fertility and mortality on the process of aging, we find that for the changes up to the late 20th century it is predominantly improving mortality and later on primarily fertility (Lutz 1987). The quantitative figure, however, depends greatly on the aging indicator selected.

For the FRG, the picture is much more pronounced than for the US. Most unevenness in the pattern can be traced back to ups and downs in the number of births. On top of this the wars selectively reduced some cohorts of men. This results in very distorted sex ratios at certain ages. Because of an extended period of subreplacement fertility after the end of the baby boom, younger cohorts are much smaller than older ones.

There is no doubt that fertility is the most important determinant of differentials in the age structure and the process of aging. Mortality trends and levels in the US and the FRG were, except for the two world wars, rather similar and can be expected to be even more similar in the future, but as Graphs 13 and 14 reveal the age structures are very different. As we showed earlier, the reason for this lies in different fertility histories.

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[5]Nevertheless the possibility of unexpected trends always remains. We mentioned before that the baby boom came completely unexpected. We now understand to a great extent why it came. But still some unexpected changes in mentalities might occur.

7. Discussion

The baby boom and the subsequent decline in fertility were the main factors that produced the distorted age patterns of today's population under age 30 and that will lead to very dramatic developments in the proportion of retired to active people in the next 30-40 years. But even before that the decreasing proportion of young people together with a higher proportion of very old persons, due to mortality reductions at old ages, will bring drastic changes for society.

What are the factors behind these fertility trends that first produced exceedingly large cohorts and then extraordinarily small ones? At this point we will not review the very extensive literature on fertility determinants. We will only selectively mention some of the most common patterns of interpretation.

The previous section demonstrated that changes in the marriage pattern played an important role in the post-war fertility increase. The decreasing inclination to marry and an extraordinary fast rise in divorce rates have also attributed to the downward trend in fertility rates since the 1960s. Hence, nuptiality did not only contribute to the baby boom, it also plays its role in the current bust. But by no means is marriage behavior the only factor explaining fertility fluctuations, especially in a situation where the percentage of children born out of wedlock is becoming more and more significant.

Richard Easterlin (1980) stressed what is usually referred to as the relative income hypothesis (or simply Easterlin-Hypothesis). Referring to the empirical evidence for the United States, he argued that a young family's expected income, relative to the aspirations the spouses bring from their parents' families, plays a crucial role in the couple's decision on family size. The small cohorts born during the depression of the 1930s had rather low material aspirations due to the difficult living circumstances of their time, but because there was less competition for jobs and the economy was booming during the late 1950s and early 1960s, the available income by far exceeded the aspirations for those young families and they decided to have many children. For those children born as part of the baby boom, the situation is reversed and they will have only a few children. The purely demographic side of this arguments says that small cohorts tend to have high fertility and large cohorts low fertility holding economic conditions constant. Our empirical analysis can contribute to the evaluation of this argument in different countries.

The demographic side of the Easterlin argument can be evaluated in respect to two aspects: does the period between low and high fertility really correspond to the mean length of a generation, and is the fluctuation really a cohort

phenomenon? The second aspect was already discussed earlier and we came to the conclusion that in all countries young families that had many children at the time of the baby boom did not continue childbearing in the late 1960s when they became 30. Hence, the main argument should not be that members of small birth cohorts have higher completed fertility but that they start out faster and have their children at younger ages. The remaining cyclical fluctuation of cohort fertility is much less impressive than the period perspective.

But was there really any cyclical pattern? In the US the period between the lowest fertility in 1933 and the highest fertility in 1957 is indeed about the mean length of a generation. But this relationship no longer holds when we move up and down the time scale: the large cohorts born around 1920-25 should have their lower number of children around 1945-50 which was in fact a period of fast fertility increase. Similarly, the still very small cohorts born around 1940 had much lower fertility than the cohorts born in the early 1930s. For other countries with time series on age-specific fertility starting earlier in this century, the argument is even much weaker than in the U.S. In Finland, for instance, the time between the low fertility of the 1930s and the peak of the baby boom was only about 12 years. Between 1955 and 1965 when the small cohorts were in their prime childbearing ages, fertility was declining steeply. In Italy even the unusually large cohorts born in 1938-40 produced the peak of the baby boom in 1964. For many other countries the time series are too short to say much about cyclical patterns. We can only see that the extremely low level of period fertility observed in most countries around 1978 was at a time when the women in the prime childbearing ages came from rather small pre-baby boom cohorts. Much more could be said about cyclical patterns and more sophisticated methods could be applied, but the *prima facie* impression is that the demographic evidence for Easterlin cycles is extremely weak in most of the countries we considered.

The steep decline of fertility after the peak of the baby boom has often been associated with the introduction of new effective contraceptive methods, especially the pill which appeared in the 1960s and quickly became very popular. The pill has facilitated a liberalization of sexual attitudes by greatly diminishing the risk of conception and it also contributed to the postponement of marriage. Despite the medical concerns over the years, the pill continues to be the most commonly used effective method of contraception for women, especially those under age 30. Surgical sterilization for contraceptive purposes is also widely used in the US at older ages. Induced abortions were legalized in the US in 1973 and in many other industrialized countries around that time. In most countries the number of

abortions steadily increased until it seemed to level off in the 1980s. For the US it is estimated that in 1984, 25% of all pregnancies were terminated by induced abortions (Westoff 1986).

However, these proximate determinants of fertility only explain the how but not the why of fertility trends. In modern societies the number of children born is mainly determined by the couple's attitudes and intentions. Of course a certain percentage of couples ends up with more or less children than they originally intended (e.g. Gisser et al. 1985). Despite this inconsistency between desires and reality, fertility intentions and their changes over the life cycle remain the crucial factor in explaining fertility patterns. These intentions or desires are the result of a very complex process that has its roots in childhood experiences and the normative system of the parents, own inclinations, education, job opportunities, the economic situation, and the relationship to one's partner. For the link between desires and reality, not only contraception but also physical aspects of fecundability play a certain role. Summarizing the findings from a number of recent fertility studies (Lutz 1985), it can be said that there are currently no indications of dramatic changes in the determinants of desired family size in the near future that would bring about significantly higher fertility levels. On the contrary, many factors point towards still lower fertility.

The understanding of fertility intentions on an individual level is extremely complex, but their consequences are very relevant on an aggregate level. The future process of population aging will, to a large extent, depend on the family size desires of young couples. The population projections presented in this paper are based on very optimistic fertility assumptions of the UN, that assume increasing levels for some countries in the near future. Scenarios of further decreasing fertility result in an even faster and more pronounced process of aging than shown in the graphs.

Even though fertility rates cannot be projected, we already know the number of women that will be in their prime childbearing ages in the next 25 years. Large cohorts of women such as those born during the baby boom will produce a larger number of children even if average fertility remained constant simply because potential mothers are larger in numbers. This phenomenon can be clearly seen in most graphs giving the projected population to the year 2025 (see Graphs 11 to 14). It is called the echo of the baby boom. Especially in countries with a very pronounced and concentrated baby boom, this echo is visible as a second wave of births following the baby boom by about 25 years (see, for instance, the graphs for

Poland, Czechoslovakia, FRG, and others). These echos have led to an increase in the absolute number of births in several countries at present. Journalists and politicians have to be cautious so as not to interpret this as an increase in fertility but as the age structural effect it really is.

The baby boom generation in most countries is currently in their mid-twenties. Their members faced more difficult conditions when trying to enter the labor market than many generations before them. This is part of the reason for the high youth unemployment we currently observe and of crowded universities and other phenomena related to cohort size. This harder competition will go on over their whole life and even after retirement, since in many countries the cohort born at the peak of the baby boom will be the largest age group in the population until age 70 or even beyond. For the cohorts following them it will be easier again but still they may suffer from the fact that many positions will be filled with relatively young people and, in positions where the exact age is not so important, they will have to compete with the baby boomers.

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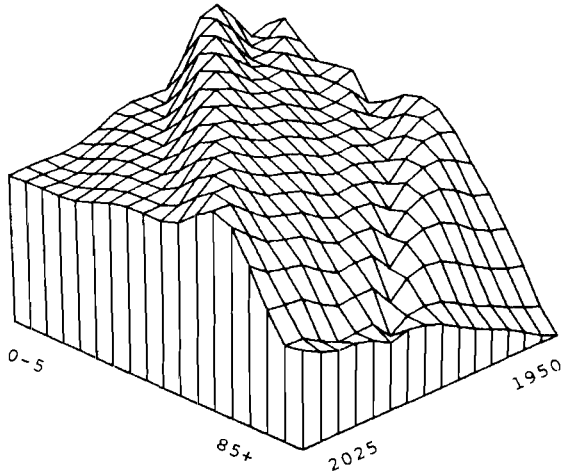
Appendix Table 1

	1910			1930			1960		
	I_f	I_g	I_m	I_f	I_g	I_m	I_f	I_g	I_m
Austria	.345	.588	.517	.124	.186	.452	.219	.330	.588
Bulgaria	.514	.694	.737	.292	.379	.750	.196	.236	.776
Czechoslovakia	—	—	—	.205	.327	..558	.192	.254	.722
Finland	.320	.647	.459	.200	.455	.404	.215	.343	.602
France	.204	.315	.591	.182	.273	.613	.222	.323	.646
Germany	.312	.542	.524	.179	.284	.583	.202	.293	.644
Hungary	.388	.529	.665	.235	.357	.598	.158	.207	.725
Italy	.346	.616	.534	.255	.471	.513	.200	.338	.578
Netherlands	.312	.652	.469	.227	.446	.499	.252	.394	.630
Poland	—	—	—	.290	.501	.544	.244	.335	.696
European Russia	—	—	—	.428	.665	.628	.207	.356	.581

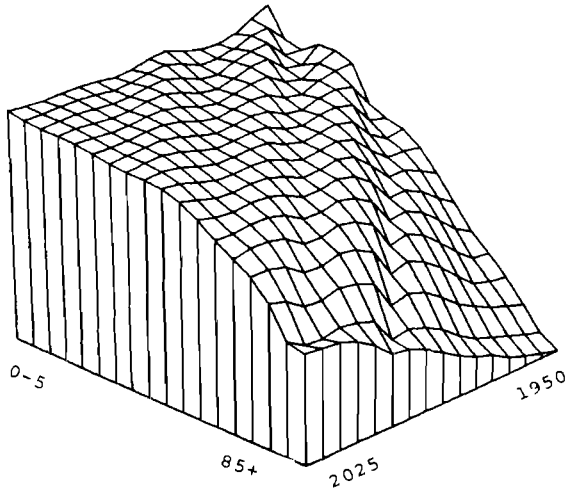
Appendix Graphs

Age distributions 1950-2025 for
all IIASA countries if graph
is not given in the text

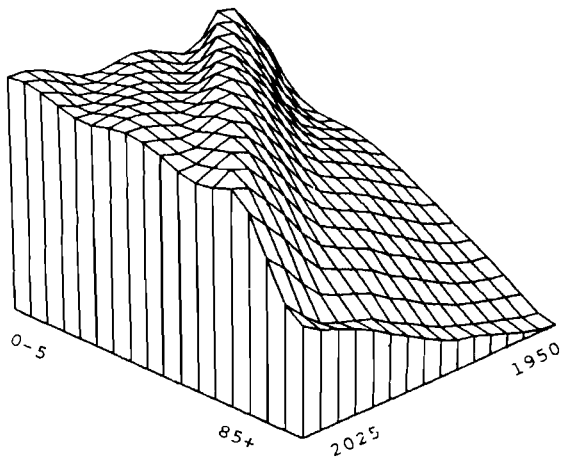
Source: Population Program's data bank



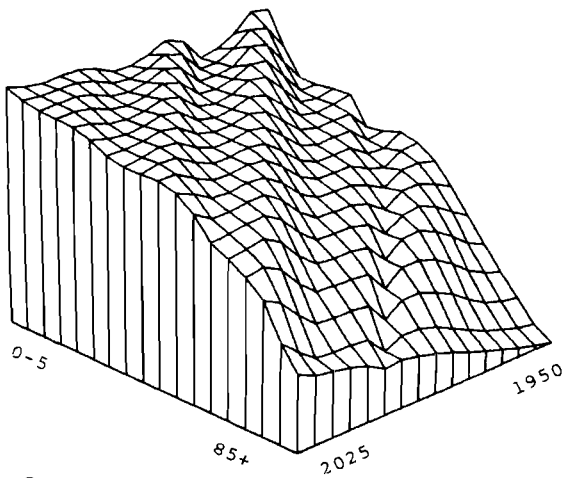
Austria, 1950–2025



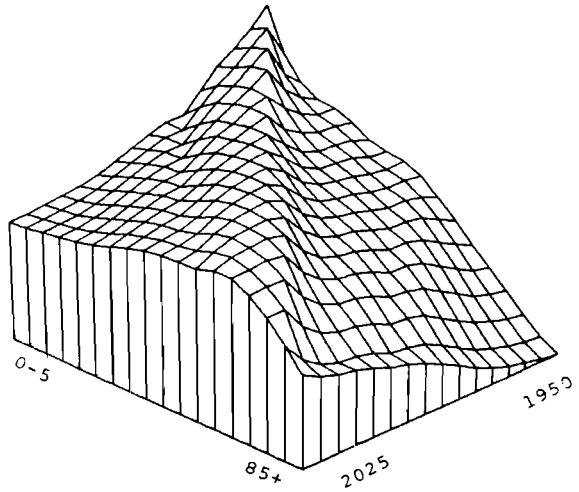
Bulgaria, 1950–2025



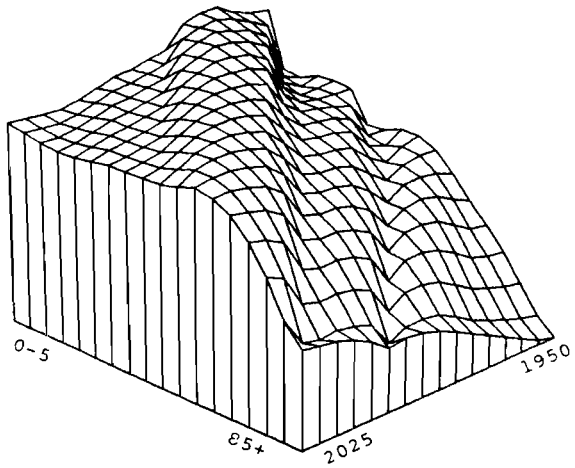
Canada, 1950–2025



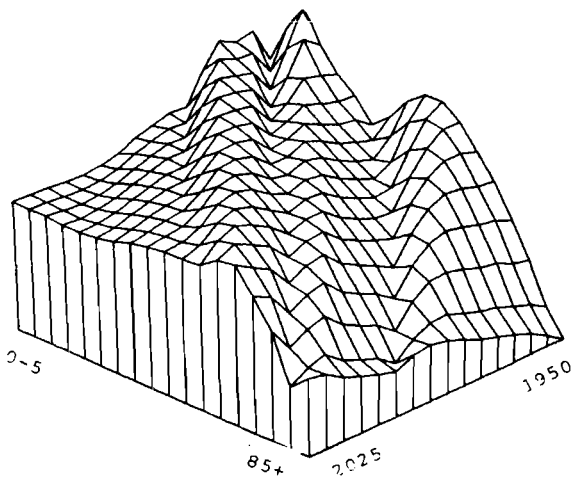
Czechoslovakia, 1950–2025



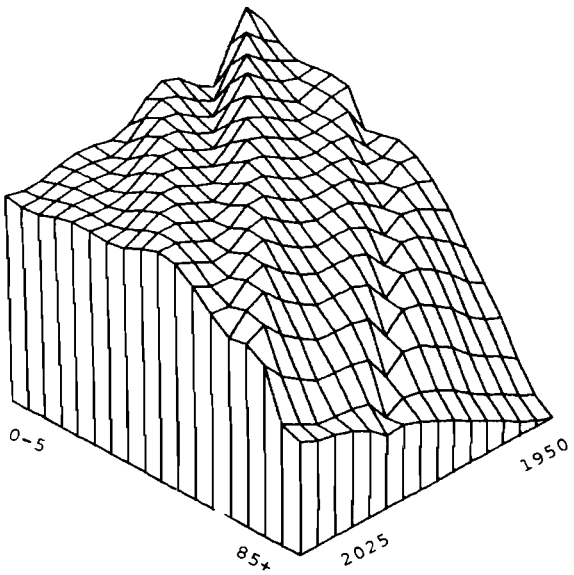
Finland, 1950–2025



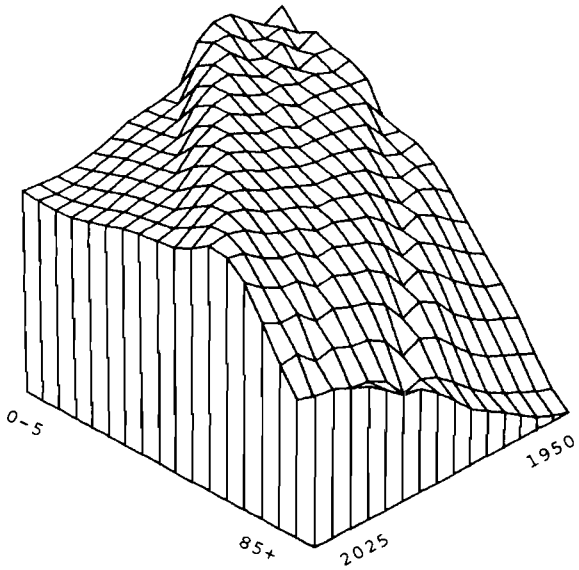
France, 1950–2025



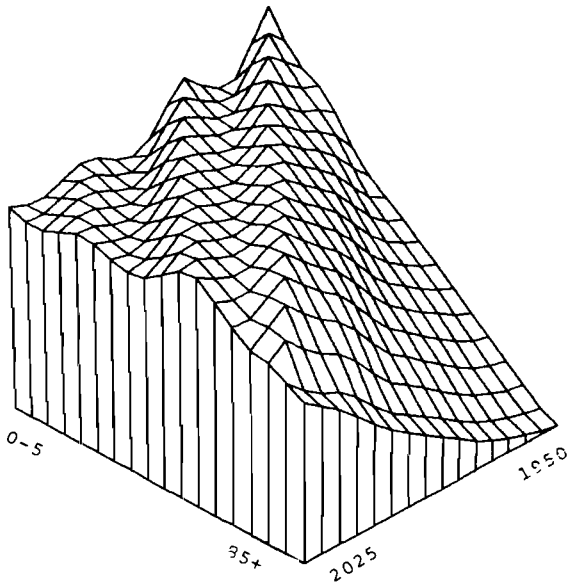
GDR, 1950–2025



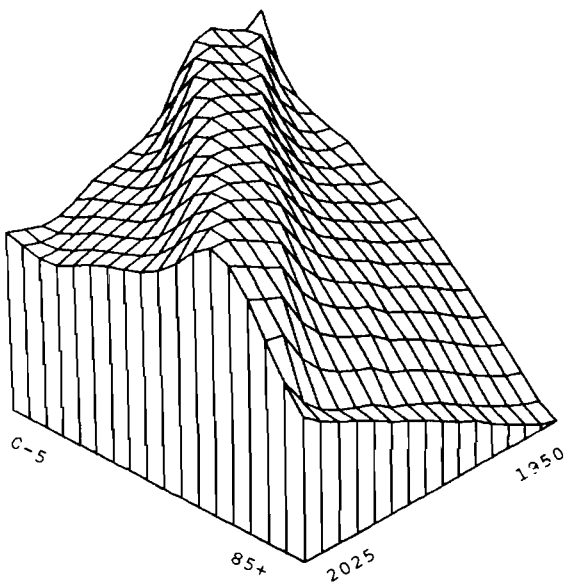
Hungary, 1950–2025



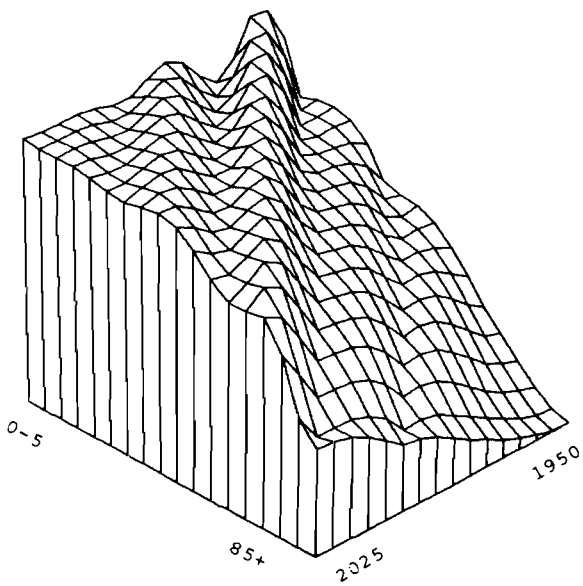
Italy, 1950–2025



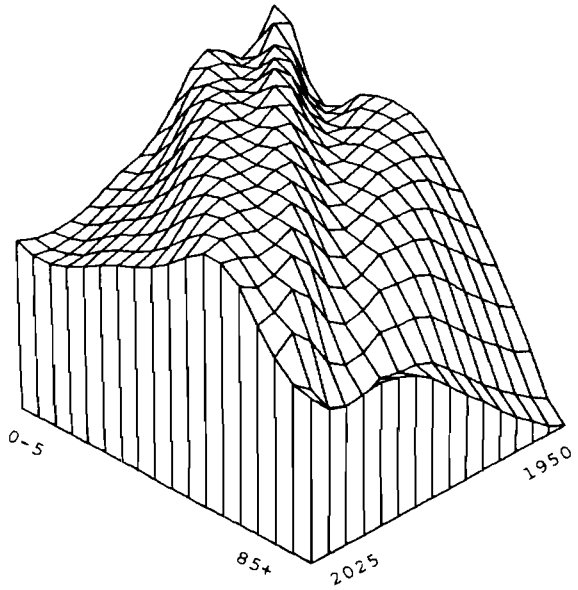
Japan, 1950–2025



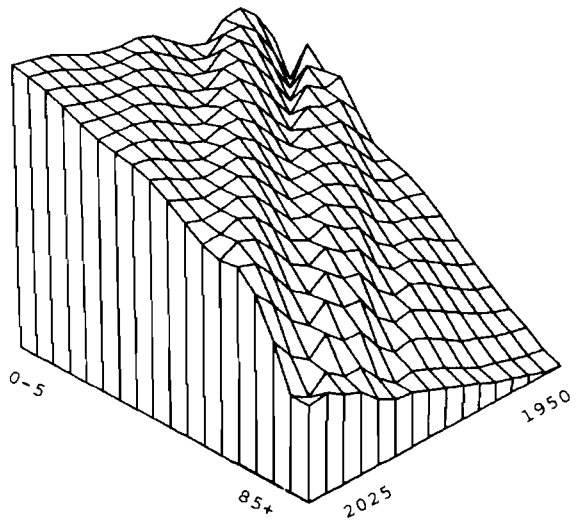
Netherlands, 1950–2025



Poland, 1950–2025



Sweden, 1950–2025



USSR, 1950–2025