

Working Paper

Demographic Trends and the Pension Problem in Finland

Jarl Lindgren

WP-92-30
March 1992



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INFORMATION ON THE PROJECT

The Finnish case study is part of the project "Social Security, Family and Household in Aging Societies," conducted at IASA in collaboration with the Netherlands Interdisciplinary Demographic Institute (NIDI).

Other papers related to the project are listed below:

- WP-92-24 Socio-Demographic Changes and the Pension Problem in France, by Jean-Louis Rallu
- WP-92-23 Demographic Trends and the Pension Problem in Poland, by E. Fratczak and J. Józwiak
- CP-91-15 The Effects of Changing Marital Status Patterns on Social Security Expenditures in the Netherlands, 1985-2050, by N. Keilman
- CP-91-02 Demographic Changes and their Implications on Some Aspects of Social Security in the Unified Germany, by N. Ott, T. Büttner, and H.P. Galler
- WP-90-22 Socio-Demographic Changes and the Pension Problem in Austria, by J.-P. Gonnot
- WP-90-15 Demographic, Social and Economic Aspects of the Pension Problem: Evidence from Twelve Countries, by J.-P. Gonnot
- WP-89-107 Pension Systems and Social Security Trends and National Characteristics, by J.-P. Gonnot and C. Prinz
- WP-89-34 Recent Trends in Living Arrangements in Fourteen Industrialized Countries, by J.-P. Gonnot and B. Vukovich

ABSTRACT

Projections of expenditures for old age pensions, survivor pensions, and disability pensions were made for the period 1985-2050 on the basis of future developments in the population structure by age, sex, and marital status. Four demographic scenarios were formulated: (i) a Benchmark scenario, with demographic rates kept constant at their 1980-84 level; (ii) a Fertility scenario, with a rise of the Total Fertility Rate (TFR) towards replacement level; (iii) a Mortality scenario, with reductions in mortality rates of 30 percent for females, and 45 percent for males; (iv) a Western scenario, which combines extreme demographic conditions of several West European countries: a TFR of 1.28, proportions never-marrying of one-third, one-third of marriages ending in divorce, and male and female life expectancies of 74 and 81 years, respectively.

The current pension system was combined with all four scenarios. Also, the impact of high female labor force participation, and a rise in the average age at retirement were investigated. The results indicate that changes in demographic conditions cannot prevent increases in and funding problems for pension expenditures in Finland. An increase in fertility has no effect on the pension system until 2030, when a larger generation will enter the labor force. Longer active periods for males and females will cause increases in pension expenditures in the future and are not long term solutions of the pension problem. Postponement of retirement age would help to balance the pension funds, but depends on the economic situation and on the labor market.

TABLE OF CONTENTS

1.	Population Trends in Modern Finland	1
2.	Population Size and Age Structure in IIASA Scenarios	6
3.	Marital Composition of the Elderly Population	10
4.	The Finnish Pension Systems	12
5.	Retirement and Work Pattern	13
6.	The Future of State Pensions	15
6.1.	Pension expenditures	15
6.2.	Number of retirees and the labor force	18
6.3.	Benefits and contributions	21
7.	Impact of Increasing Participation in the Labor Force and Raising the Age of Retirement	22
8.	Some Concluding Remarks	28
	References	29

DEMOGRAPHIC TRENDS AND THE PENSION PROBLEM IN FINLAND

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1. Population Trends in Modern Finland

In conformity with developments in Europe, the population of Finland increased rapidly after the end of the 18th century. In 1850 there were 1.6 million inhabitants in Finland. From 1850 to 1920 the population had almost doubled. Not until the end of the 1920s did growth weaken. The augmentation was mainly caused by a decrease in mortality.

World War II turned population developments in an entirely new direction. Immediately after the war fertility rose. In the mid-1950s it started to decline again and continued to decline during the following decades. Towards the end of the 1970s fertility stabilized and has remained more or less on the same level. Life expectancy has increased steadily. After the Second World War internal migration became intensive and reached its peak in the mid-1970s. Emigration has been a significant social phenomenon on two occasions during the last hundred years: before the First World War and after the Second World War. Net emigration after the Second World War has been about six percent of the population.

In the first decade of the 20th century fertility started to decline quite distinctly. Principally this declining tendency continued until the middle of the 1970s. In 1901-1910 total fertility was 4.7 children per woman. In the 1930s it went down to 2.4. During the time of the baby-boom (1946-1950) it increased to 3.4. When the bottom was reached in 1973, it was only 1.5. In the mid-1970s it was on a level of about 1.7, where it has remained. In Figure 1 the annual total fertility rate from 1950 to 1987 is displayed.

Even though the real fertility period has become shorter and shorter, over the last few years there has been a tendency to have children at a later age, as shown by the median age at first child. From 1970 to 1985 it rose from 23.2 to 25.7.

A characteristic feature of the fertility pattern during the last decades has been the growing proportion of children born out of wedlock. In 1970 only 5.8 percent of all live births occurred out of wedlock. Gradually, the proportion of extramarital births started to go up: in 1980 it was 13.1 percent and in 1986 as high as 18.0 percent (Figure 2).

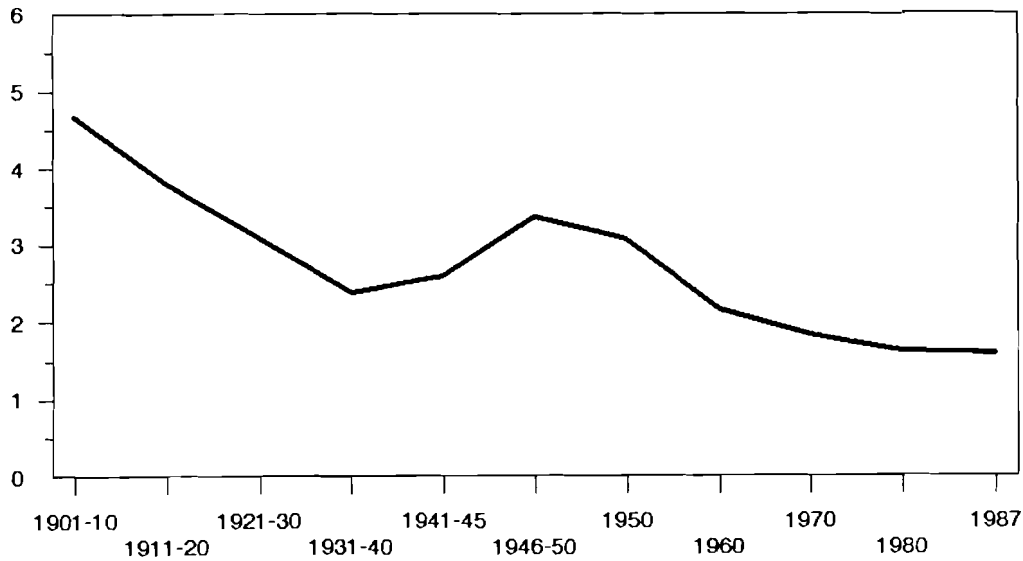


Figure 1. Total period fertility rate per woman, 1950-1987. Source: Yearbook 1982, 1986; OSF VI A:139, p. 40.

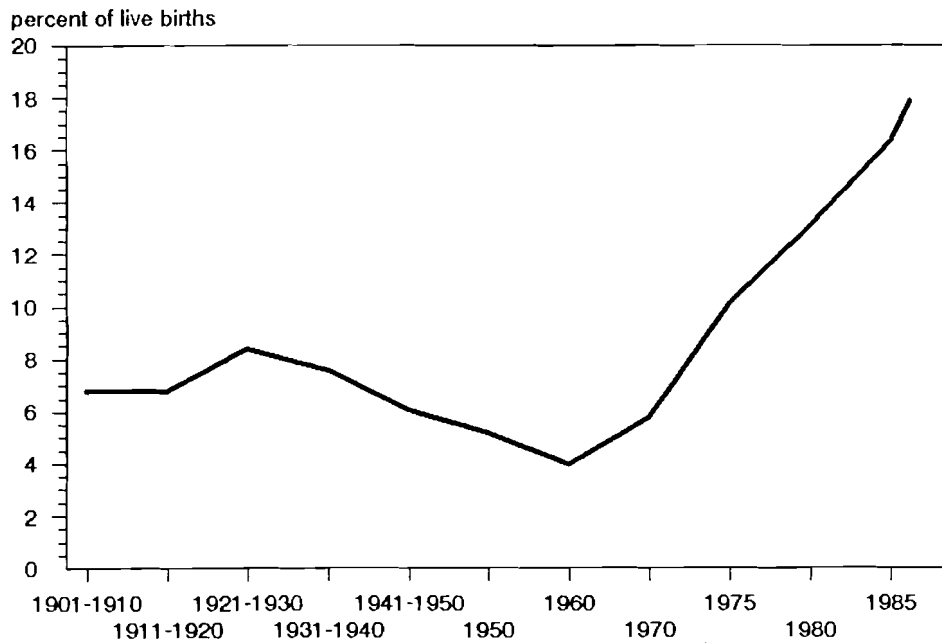


Figure 2. Children born out of wedlock in 1950-1986, percent of live births. Source: CSO Statistical Yearbook of Finland 1966, 1977 and 1990.

Even though premarital relationships have been relatively common in Finland, the reason for the increasing proportion of children born out of wedlock is increasing cohabitation without marriage. The number of childless families has increased somewhat since 1970.

With industrialization and accompanying urbanization, great changes have occurred in the marriage and divorce patterns and an increasingly smaller proportion of the population has remained unmarried. Since the beginning of the 1970s new features have become clearly evident. The age at marriage has risen more for men than for women. Living in a consensual union has become more common among the young.

The crude marriage rate, which was rather high immediately after the Second World War, was still 8.5 per 1,000 inhabitants in 1950 (Table 1). During the 1950s it went down and was 7.2 at the end of the decade. When the large age groups born after the war reached marriageable age, it increased again. The peak was reached in 1967. Since then it has decreased continuously.

Table 1. Crude marriage rate, median age at first marriage and crude divorce rate, 1950-1988. Source: CSO Statistical Yearbook of Finland 1989; OSF VI A:106, pp. 112-153; Yearbook 1989.

	Marriage rate	Median age at first marriage		Divorce rate
		Males	Females	
1950	8.5	25.1	23.5	0.92
1960	7.4	24.4	22.7	0.83
1970	8.8	23.5	22.3	1.31
1980	6.1	25.6	24.1	1.98
1985	5.3	26.4	24.4	1.85
1988	5.0 ¹	27.0	25.2	2.93 ¹

¹ 1989

From the beginning of the century to the mid-1930s the median age at first marriage remained practically unchanged. The five-year average varied between 26.1 to 27.1 for men and between 23.5 to 24.4 for women. During and after the Second World War the median age showed a decreasing tendency. In 1950 it was 23.5 for women and 25.1 for men (Table 1). Early marriage became rather common after the war. Teenage marriages rose very distinctly. In 1955-1960 almost one-quarter of the brides in rural areas were under 20 years of age, while the proportion before the war was only about 12 percent. The rise was distinct also among urban females, although not as high as among rural brides.

The later age at marriage during the 1970s and the beginning of the 1980s obviously was to a large degree fictitious, even though continuously prolonged education and vocational training have contributed to the postponement of contracting marriage. Young people moved in together more or less at the same age as before, but now more and more often without marriage.

In 1987 about 15 percent of all conjugal unions--marriages and consensual unions--were consensual unions. Among 15-24 year-olds still more than 80 percent are neither married nor living in consensual unions, but in these age groups about two-thirds of all unions are

consensual (CSO 1989a). In the following age group, 25-29 years of age, 33 percent were consensual unions. The number of consensual unions decreases with age, e.g. among persons 45-64 years of age living with a partner only 10 percent were living in a consensual union. There is no information on the proportions among those over 65 years of age, but obviously it is still lower. Most of the consensual unions end in marriage. In 1987 20 percent of men and 14 percent of women living in consensual unions were divorced. This means that there are half as many divorced individuals living in consensual unions as those having remarried.

At the beginning of the 20th century about 40 percent of men and women were unmarried, women somewhat less than men. During the following decades the proportion of unmarried grew and reached its peak in the 1930s. The following decade, marked by the Second World War, was characterized by a marriage boom, and the proportion of unmarried went down and was smallest in the 1960s. After that there has again been a trend towards more unmarried persons, which reflects the increase of consensual unions.

The largest changes in the nuptiality pattern have occurred in the frequency of divorce. In Finland as in many other European countries the divorce rate started to increase in the mid-1960s. After a small peak at the end of the 1940s caused by marriages contracted during the war, the crude divorce rate remained more or less unchanged until the end of the 1950s. Growth was rather modest in the 1960s, but it rose rapidly in the beginning of the 1970s. For rather a long time the crude divorce rate remained stable at a good two divorces per year per 1,000 inhabitants and year (Table 1).

The highest proportion of divorced is to be found in age groups 30-49, where the proportion is somewhat higher among men than among women. In the age group 35-39 the proportion is highest; in 1985 it was 18.5 percent among men and 15.6 among women. Among women aged 65 the proportion of divorced is twice as high as among men, even if the proportion is low, about 2-6 percent.

Among those who married in 1950 in Finland, 18 percent were divorced 30 years later. The same level has been reached much earlier by later marriage cohorts. Those who married in 1970 show the same proportion 13 years later. There has been a strong increase in divorce especially during the first years of marriage. Many a marital lifestyle continues after a period of varying length after the divorce, but with another partner, either in the form of a new marriage or a consensual union. Nowadays a remarriage is almost always preceded by a divorce. One hundred years ago, at the end of the 1880s, remarriage in Finland composed about 20 percent of all marriages being contracted, but almost all remarriages were contracted by partners of which at least one was widowed (OSF 1909 VI:41). In the mid-1980s, the proportion of remarriages was 22 percent (OSF VI A:152), of which only two percentage units represented marriages where one partner had been widowed.

If one assumes that the remarriage pattern over the last few years was the same as in 1984, one reaches the conclusion that after ten years, among males 35 percent and among females 32 percent contract a new marriage. During the following ten years the proportion of remarriages increases but at a much slower rate. Twenty years after the divorce 47 percent of the men and 43 percent of the women will be remarried.

A significant share of the divorced live in consensual unions. According to the annual labor force survey (OSF 1985 XL:11, 1), 11 percent of all men and women living in a conjugal union lived together in a consensual union in 1984. Of these 17 percent were divorced men and 21 percent divorced women. A significantly larger proportion of divorced persons are living in a consensual union than of the entire population.

After the Second World War mortality declined rapidly. The crude death rate fell from about 12 per thousand in 1946 to roughly 9 in 1952 and approximately 10 in 1989. The mean expectation of life at birth went up from 58.6 in 1946-50 to 65.9 in 1956-60 among men and from 65.8 to 71.6 among women (Table 2). In the 1960s, male life expectancy rose only slightly but during the two following decades the development was again favorable. Among females the trend was the same but not so accentuated as among males.

Table 2. Life expectancy at birth and at age 60 and survivors at age 80 per 1000 newborn, 1950-1987. Source: CSO VÄ 1974:13; OSF VI A:147; CSO 1980.

	Life expectancy				Survivors	
	At birth		At age 60		Males	Females
	Males	Females	Males	Females		
1950	60.5	67.7	13.8	16.6 ¹	150	285
1960	65.1	72.1	14.4	17.5 ²	187	341
1970	65.9	74.2	14.3	16.5	189	395
1980	69.2	77.8	15.7	20.9	255	527
1985	70.1	78.5	16.1	21.3	274	546
1987	70.7	78.7	16.7	21.7	299	557

¹ The mean of the five-year periods 1946-1950 and 1951-1955.

² The mean of the five-year periods 1956-1960 and 1961-1965.

During the 1970s mortality declined among both men and women in all age groups. The decline was most rapid (about 50 percent) among children under 10 years of age. Among females the decline was, in general, greater than among males. The decline was very small among men aged 20-29, which was mainly due to an increase in mortality from suicide. The age-standardized mortality of men aged 35-64 rose eight percent from 1959 to 1969, but declined 25 percent from 1969 to 1980, which means that the decrease was faster than among women. The declining trend in female mortality has, on the other hand, been more stable.

The decline in mortality has been most significant in later age groups. During the last few decades the life expectancy of the elderly population, especially of women, has increased rapidly. In 1987 the expectation of life at age 60 was 21.7 for women and 16.7 for men. In the beginning of the 1960s the figures were 16.8 and 13.8, respectively (Table 2). Proportionally the increase of life expectancy has been greater among still older persons. At the age of 80 life expectancy has increased from the beginning of the 1950s to 1987 from 4.9 to 6.1 among men and from 5.4 to 7.6 among women. In 1950 there were 150

male survivors at age 80 of one thousand newborn boys. In 1987 the number was twice as high. As to females the figures were 285 and 557, respectively. The male survivors had grown somewhat more than female survivors.

Infant mortality, which was still considerably high in the beginning of the 1950s, higher e.g. than in Sweden and Norway, showed the same rapid decrease as mortality in general in the 1950s. In the 1960s it was already among the lowest in the world. The decreasing tendency continued, and in 1986 it was 6.4.

In contrast to very low infant mortality, excess male mortality has been notably high. At the beginning of this century the male-female mortality difference was almost zero, but it increased considerably up until the 1970s, when the difference in longevity was about nine years. After that a small decline could be observed, and in the most recent years (1987) the difference has shrunk by about one year. The reasons behind the high male death rates are still greatly a matter for conjecture. It seems likely, however, that smoking has been one of the causes of the early increase of male mortality. There is also clear excess mortality from violent causes of death. Further, mortality from cardiovascular diseases is among the highest in the world and the suicide rate unacceptably high.

2. Population Size and Age Structure in IIASA Scenarios

In order to trace the consequences for social security of future population trends in Finland, four demographic scenarios were set up for the period 1985-2050.

1. The *Benchmark scenario*, with age-specific rates for fertility, mortality, marriage and marriage dissolution constant at the levels observed during 1980-1984 in Finland.
2. The *Fertility scenario* in which it is assumed that fertility in Finland will gradually increase from its 1980-1984 level of 1.69 children per woman to replacement level (TFR = 2.1) in the period 2000-2004.
3. The *Mortality scenario*, with a gradual decrease by 30 percent of female mortality rates, and one by 45 percent of the rates for males. It is equivalent to an increase of 8.4 years in the life expectancy of males, and about 4.8 years for females. Thus the existing nine-year gap between male and female life expectancy would be reduced to approximately five years.
4. The *Western low scenario*, which combines the most extreme demographic conditions presently observed in Western Europe: a TFR of 1.28 (cf. the FRG), proportions never-marrying of one-third (cf. Sweden), one-third of all marriages ending in divorce (Sweden), and life expectancies of 74 and 81 years for men and women, respectively (Switzerland).

In all the scenarios made at IIASA the population size will be smaller in 2050 than in 1985. In the beginning of the period there is a population increase which varies in different scenarios. The decrease starts at different times, but in all scenarios the decrease is a fact in 2030. The highest population size will be reached if fertility is on the replacement level, and the lowest if fertility is as low as it was in the former FRG and the marriage and divorce rates as low as those in Sweden.

Several population projections and scenarios have been made in Finland during the last years. Every second year the Statistical Office produces a population projection which is based on population trends prevailing during the last years. It could be considered as the most realistic estimate of the demographic development in the near future. Unfortunately, it extends only to the beginning of the next century; the latest one goes to 2010. During the last years the Social Insurance Institution has published a projection as often as the Statistical Office. This covers a period much longer than that of the Statistical Office; the latest one goes to 2050. Principally, the two sets of projections are based on exactly the same assumptions.

Several scenarios have been made by authorities working with societal planning such as social policy, labor force, housing policy, etc. In the following, however, when discussing the consequences of population trends, comparisons will be made between IIASA and Finnish scenarios.

In the benchmark scenario in which the population development is a continuation of the situation at the beginning of the 1980s, there will be a small increase until the beginning of the 2000s (Table 3). After that a decrease will start and gradually accelerate. In 2050 the population size is about three-fourths of what it is in 2000, or 3.9 million. It is interesting to compare the benchmark scenario with the latest population projection made in Finland (The Social Insurance Institution 1990). In this projection it is assumed that age-specific fertility rates will be the same as in 1989 for the whole period or practically the same as in 1980-1985. Life expectancy will increase for males from 71.5 to 74 years and for females from 79.5 to 81 from 1990 to 2010. After that life expectancy will remain on the level achieved. No net in- or outmigration is assumed. The projection could be considered to give a fairly good estimation of the real population trend without migration, at least for the nearest decades. According to the projection the total population will be 4.98 million in 2015, 4.66 million in 2030 and 4.02 million in 2050. Hence, the figures estimated in the projection are higher than those in the benchmark scenario in almost all years shown.

If fertility returns to replacement level or the total fertility rate is 2.1 from the beginning of the scenario period, the increase is somewhat greater and will last longer than in the benchmark scenario. In the fertility scenario the population size is as high as 5.1 million in 2015 but diminishes to 4.8 million in 2050.

In the third scenario which assumes that mortality will decrease by 30 percent for women and 45 percent for men, i.e. an increase of life expectancy of 8-10 years for men and 4-5 years for women, the increase by 2015 is slightly higher than in the fertility scenario. The size of the population will, however, be much lower in 2050 or only 4.3 million.

The last scenario, the Western European scenario combines the most extreme demographic rates observed at present in Western Europe, i.e. (a) low fertility as in the former FRG, 1.28 children per woman, (b) the Swedish marriage and divorce rate, one-third never married, one-third of all marriages ending in divorce, mean age at first marriage for women 28 years and for men 30 years, (c) Swiss mortality, life expectation for men 74 years and for women 81 years. This scenario shows the most pronounced decrease. The population size in 2050 is only 3.3 million.

Table 3. Population by broad age groups, 1950-2050.

	Number (1000)				%			
	0-14	15-59	60+	Total	0-14	15-59	60+	Total
1950	1,209	2,414	407	4,030	30.0	59.9	10.1	100.0
1960	1,340	2,600	506	4,446	30.1	58.5	11.4	100.0
1970	1,119	2,819	661	4,599	24.3	61.3	14.4	100.0
1980	965	3,033	790	4,788	20.2	63.3	16.5	100.0
1985	952	3,098	861	4,911	19.4	63.1	17.5	100.0
Benchmark Scenario								
1985	951	3,096	856	4,903	19.4	63.1	17.5	100.0
2000	884	3,143	968	4,995	17.7	62.9	19.4	100.0
2015	782	2,838	1,228	4,848	16.1	58.5	25.3	99.9
2030	702	2,515	1,278	4,495	15.6	55.9	28.4	99.9
2050	605	2,179	1,102	3,886	15.6	56.1	28.3	100.0
High Fertility Scenario								
1985	951	3,096	856	4,903	19.4	63.1	17.5	100.0
2000	936	3,143	968	5,047	18.5	62.3	19.2	100.0
2015	959	2,889	1,228	5,076	18.9	56.9	24.2	100.0
2030	947	2,740	1,278	4,965	19.1	55.2	25.7	100.0
2050	958	2,741	1,102	4,801	20.0	57.1	23.0	100.1
Low Mortality Scenario								
1985	951	3,096	856	4,903	19.4	63.1	17.5	100.0
2000	885	3,154	1,017	5,056	17.5	62.4	20.1	100.0
2015	785	2,874	1,455	5,114	15.3	56.2	28.5	100.0
2030	707	2,557	1,635	4,899	14.4	52.2	33.4	100.0
2050	611	2,225	1,492	4,328	14.1	51.4	34.5	100.0
Western Scenario								
1985	951	3,096	856	4,903	19.4	63.1	17.5	100.0
2000	834	3,150	995	4,979	16.8	63.3	20.0	100.1
2015	609	2,807	1,339	4,755	12.8	59.0	28.2	100.0
2030	490	2,314	1,441	4,245	11.5	54.5	33.9	99.9
2050	343	1,691	1,269	3,303	10.4	51.2	38.4	100.0

Typical for all scenarios is that the number and proportion of the elderly population increases while the same figures for children, except in the high fertility scenario, decrease. The number of the elderly population grew less toward the end of the period in all scenarios, while their proportion increased during the whole period. The diminution of the child-age population is most marked in the Western European scenario, where the number of children is only one-third of what it was in the beginning of the period.

In the benchmark scenario the proportion of the elderly population reaches 28 percent in 2030, and in 2050 it is still on the same level. At the same time the proportion of the child-age population decreases to 16 percent. In the low mortality scenario the figures are much higher for the elderly population, or 34.5 percent, and only insignificantly lower for the child-age population, or 14 percent. The Western European scenario shows the most radical changes. Only 10 percent of the population are under 15 years of age and 38 percent are 65 years or older. The smallest changes are exhibited in the high fertility scenario with 20 percent children and 23 percent aged 65 or more.

Of great interest is the development of the working-age population. In all scenarios the decrease is rather remarkable. The change is less in the high fertility scenario and most notable in the Western European scenario. On the other hand, even if the number goes down the proportion will only show a rather modest decline.

Numerically the working-age population will decrease from 3.1 million in 1985 to 2.2 in the benchmark and the low mortality scenarios, and to 1.7 million in the Western European scenario. If fertility returns to reproduction level the decrease is rather low. In 2050 there will be 2.7 million persons of working age. The changes in the proportion are much smaller. In the benchmark and high fertility scenarios it lessens from 63 percent in 1985 to 56 and 57 percent, respectively. In the low mortality scenario the proportion decreases to 51 percent, and this is also the case in the Western European scenario.

The old-age dependency rate will increase noticeably during the period (Table 4). In 1985 there were only 18 persons aged 65 or over per 100 persons in working age. According to the benchmark scenario, it will rise to 35 in 2030 and remain, on the whole, at this level until the end of the period. In the high fertility scenario the growth is almost of the same rate at the beginning of the 2000s, but at the end of the period the effects of the higher fertility will be visible and in 2050 the ratio will be 28 per 100. In the low mortality and Western European scenario the old-age dependency rate increases to about 50 per 100. The total dependency rate (children and elderly compared with those in working age) grows from 47 to 60 per 100 in the benchmark and high fertility scenarios and to around 70 per 100 in the two other scenarios.

Table 4. Dependency ratios, 1985-2050.

	1985	2000	2015	2030	2050
			(0-14)/(15-64)		
Benchmark	28.5	26.1	24.6	25.0	24.8
High Fertility		27.6	29.6	31.2	31.9
Low Mortality		26.0	24.2	24.6	24.4
Western		24.5	19.3	18.7	17.5
			(65+)/(15-64)		
Benchmark	18.4	21.2	27.7	35.1	34.5
High Fertility		21.2	27.3	32.5	28.1
Low Mortality		22.5	33.6	46.0	48.4
Western		21.9	31.1	43.4	50.9
			(0-14)+(65+)/(15-64)		
Benchmark	46.9	47.3	52.3	60.1	59.3
High Fertility		48.8	56.9	63.7	60.0
Low Mortality		48.5	57.9	70.7	72.8
Western		46.4	50.3	62.1	68.4

3. Marital Composition of the Elderly Population

The scenarios show rather significant changes in marital status composition of those aged 60 or over during the following decades (Table 5). In all scenarios the proportion of the single and divorced will grow and the proportion of the married will decline. Even the widowed will be proportionally fewer in all scenarios. The change is, however, rather small. The trends in all scenarios are the same for men and women, except for the low mortality scenario, where the widowed men show an increasing tendency. As a consequence of the difference in life expectancy between men and women, but also partly as a result of war losses, the proportion of married men was almost twice as great as that of women in 1985. There is also a great difference between the proportion of widowed females and widowed males; while 44 percent of the females in 1985 were widowed, only 13 percent of males had the same marital status.

In the benchmark scenario the proportion single increases more among men than among women. In 2050 there will be 20 percent single females but 27 percent single males. The changes among the married exhibit the same rate. In 2050 the proportion of the married men will still be almost twice as great as that of women. The proportion divorced rate will increase rapidly in the beginning of the following century, but will show a decreasing tendency during the last decades of the period studied.

The other scenarios present more or less similar changes. The highest proportion of the single of both sexes is exhibited in the Western European scenario. The lowest proportion of females divorced and widowed could also be noted in the Western European scenario. The highest proportion of married women and divorced men in 2050 are exhibited in the low mortality scenario.

The increasing life expectancy for men has a great impact on the future marital composition among old-age people. In the benchmark scenario--and in the high fertility scenario--the sex ratio grows from 60 to 67 during the period studied (Table 6). Both scenarios show the trends under present mortality conditions. Evidently, the period studied has been too short to allow the higher fertility to affect the sex ratio among the old-age population.

The effect of the increasing male life expectancy in relation to that of female is most accentuated in the low mortality scenario, where the sex ratio grows very rapidly at the beginning of the 2000s. From 2015 to 2050 the increase is rather small or from 81.8 to 85.2. It is significant also in the Western European scenario, even if not so rapid.

It is to be remembered that the scenarios show the marital status composition. There are couples living in consensual unions also among the elderly, which in practice means that they live under similar conditions as married couples. There is at present no information on the proportions among those over 65 years of age; it is obviously rather low--only a few percent of all unions. In the future, assumably the proportion will be higher if the increase of consensual unions continues at the same rate as at present. The consequence is that in reality the number and the proportion of persons living alone might be progressively lower than the number and proportion of non-married persons according to the scenarios.

Table 5. Marital composition of population aged 60 or over, 1985-2050.

<u>Females</u>	Single	Married	Divorced	Widowed	Total
1985	13.4	36.1	6.2	44.2	100.0
Benchmark Scenario					
2000	10.8	33.9	10.1	45.2	100.0
2015	11.0	34.1	14.6	40.4	100.0
2030	16.5	28.6	14.6	40.3	100.0
2050	20.2	26.7	13.8	39.2	100.0
Low Mortality Scenario					
2000	10.9	35.8	10.1	43.3	100.0
2015	11.0	40.4	14.4	34.3	100.0
2030	15.8	36.4	14.8	33.0	100.0
2050	19.5	33.0	14.3	33.2	100.0
Western Scenario					
2000	10.9	35.0	10.1	44.1	100.0
2015	10.8	37.0	15.3	36.9	100.0
2030	16.1	30.8	17.5	35.5	100.0
2050	25.3	25.0	17.2	32.5	100.0
<u>Males</u>					
1985	8.5	73.6	4.8	13.2	100.0
Benchmark Scenario					
2000	11.7	64.5	9.5	14.3	100.0
2015	16.0	59.2	12.5	12.3	100.0
2030	24.0	51.7	11.6	12.7	100.0
2050	26.9	49.8	11.2	12.1	100.0
Low Mortality Scenario					
2000	11.6	64.9	9.4	14.1	100.0
2015	15.5	59.6	12.3	12.7	100.0
2030	22.4	51.4	11.8	14.3	100.0
2050	26.2	46.9	11.4	15.5	100.0
Western Scenario					
2000	11.6	64.6	9.4	14.4	100.0
2015	15.6	58.1	13.3	13.0	100.0
2030	23.5	48.7	14.7	13.8	100.0
2050	34.4	40.1	12.9	12.7	100.0

Table 6. Sex ratios (men/100 women) for the population aged 60 and over, 1985-2050.

	Benchmark	High Fertility	Low Mortality	Western
1985	59.5	59.5	59.5	59.5
2000	65.5	65.5	67.9	67.0
2015	72.0	72.0	81.8	77.5
2030	69.0	69.0	84.4	77.1
2050	67.4	67.4	85.2	76.2

4. The Finnish Pension Systems

The Finnish pension system is composed of an employment pension scheme and a national pension scheme. The private and public sectors have their own employment pensions.

The national pension's task is to guarantee a certain minimum income for all pensioners. It comprises a small basic amount and an additional amount, which is reduced by the employment pension. All pensioners receive the basic amount, which is the same for everybody. The additional amount includes various supplements depending on marital status, family circumstances, etc. The national pension contribution is taken from the income tax of employees.

Before the enactment of the Employment Pensions Act in 1962, the national pension provided a minimum income for the majority of pensioners. Later, as the employment pension gradually increased, the national pension lost some of its significance and the trend is toward still less significance. For instance, when a male industrial worker receiving an average income retires, he will only receive the basic amount in addition to his employment pension.

The employment pensions are determined by earnings during a period of employment and the length of the insurance period. A full pension in the private sector is 60 percent of the wage after a 40-year period of employment. The amount of the pension is 1.5 percent of the pensionable earnings for every year of employment. In the public sector the full pension is 66 percent of the wage and it accrues after 30 years of service, or 2.2 percent for every year of employment. As the pension scheme in the private sector is implemented in stages, the full amount of 60 percent will be attainable at the turn of the century. At present the minimum level for old-age pension is 39 percent for employees and 38 percent for self-employed persons.

The private-sector employment pensions are implemented by several acts such as the Employees' Pensions Act, the Self-Employed Persons' Pensions Act, the Farmers' Pensions Act, etc. On the whole, the various pension acts are similar.

Private employment pension insurance is financed by two alternative systems, a pay-as-you-go system and a funding system. Farmers' and self-employed persons' pensions are based on a pay-as-you-go system, while for instance the most important pension system, the employees' pension system, is partly financed by funding, partly by a pay-as-you-go system. Employers are entirely responsible for financing the employees'

pensions. State pensions are financed out of the state budget and local government pensions out of local government budgets. Hence, state and local government pensions are based entirely on the pay-as-you-go system. From 1990 on, however, the local government pension system will be partly based on funding. Totally, about 40 percent of the pension costs in 1985 were paid purely from pay-as-you-go pension systems.

In 1985 the contribution paid by the employers was on average 11-12 percent of the employees' wages. The pension costs in 1985 were 11 percent of the GDP and 43 percent of the total social expenditure (Economic Planning Center 1986, p. 47).

Pension benefit levels are adjusted every year by an index which is calculated from the average changes in the price index and the general wage index.

5. Retirement and Work Pattern

The general pensionable age is 65. In the public sector the pensionable age is 63 or lower. In 1986 a flexible retirement age was introduced in the private sector and some years later also in the public sector; an early old-age pension could be granted starting from the age of 60. The pension can also be postponed beyond 65. Early retirement reduces the amount of the pension. An employee or a self-employed person, who has reached 55 years of age, can receive an early disability pension, which is a moderate version of the disability pension. A person whose work capacity has been so reduced that he or she cannot be expected to continue his or her work, is entitled to this kind of pension. Factors affecting the granting of an early disability pension are illness, disability, work-related stress and fatigue and working conditions. Persons aged 60-64 who have received an unemployment benefit for 220 days are entitled to an unemployment pension. Both pensions, which could be considered forms of early retirement, are equal to the full pension to which a person is entitled.

Before July 1990 all widows were entitled to a survivor's pension. The rules were somewhat different for survivors with or without children. The size of the survivor's pension varied depending on the number of beneficiaries, with one-half pension for one beneficiary. After July 1990 a new survivor's pension act changed the rules for receiving survivor's pensions. For example, the survivor's pension depends on the income of the survivor.

In reality, the retirement age is much lower than the official one. Already in 1985 about 56 percent of the population aged 60-64 years and 34 percent of those aged 55-59 had a disability, unemployment or old-age pension. Since then more and more people have made use of their right to early retirement. In 1988 about 55 percent of the population aged 55-64 received some kind of pension, under disability, unemployment, old age, front-veterans' or farmers'¹ pension schemes. Of those aged 55, 24 percent had retired. The proportion increases with age, and 84 percent of those aged 64 were retirees (Hytti

¹That is, pension paid to farmers aged 55-64 on a transfer of the farm to a descendant or to farmers aged 55-64 who voluntarily give up unprofitable farms.

et al. 1990). The proportion was somewhat smaller among women than among men. For instance, while 88 percent of the men aged 64 were retired, the corresponding figure for women was only 81 percent. Hence, the mean age at retirement of both sexes together was 60 years.

A cross section of the current old-age retirement pattern is given in the statistics on new retirees in 1989, when early retirement became possible also in the public sector. Figure 3 shows the new retirees under old-age retirement and early disability pension schemes, which in many regards could be juxtaposed with the early retirement pension. Both schemes are in force from 55 years of age. Hence, the figures give a picture of the real old-age retirement pattern. It can be seen that the greatest part of retirements still occur at the age of 65. Only about one-third of all retirees have used the possibility to retire earlier than 65. The mean age at old-age retirement is 60.7 for men and 63.0 for women.

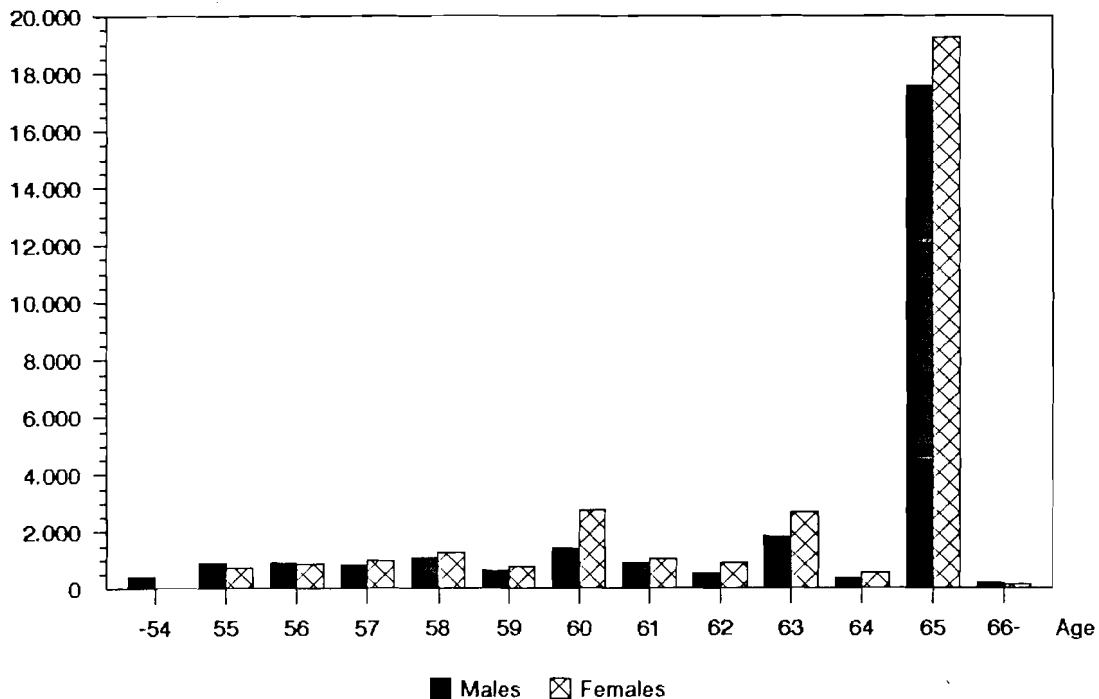


Figure 3. New old-age retirees by age and sex in 1989. Source: The Central Pension Security Institute 1989; Unpublished data on new retirees in the public sector from the Pension Institute of the Municipalities and State 1989.

There is a rather significant difference between the average number of years worked at mean age at retirement. In 1985 it was 42.1 years for males and only 29.1 for females (Table 7). As a consequence of the changes in the sex and age pattern in economic activity during the last decades, the average number of years worked will be reduced to 37.5 for males in 2050 and increased for females to 35.6 when the age-specific labor force participation rates of 1985 are kept constant.

Table 7. Average number of years worked at mean age at retirement, 1985-2050.

	1985	2000	2015	2030	2050
Males	42.1	40.5	38.5	37.8	37.5
Females	29.1	32.4	35.4	35.5	35.6

6. The Future of State Pensions

6.1. Pension expenditures

All scenarios mainly follow the same pattern; the pension expenditures will increase rather little in the beginning of the period studied. In the first decade of the next century growth will continue at a higher rate. During the last decades of the period studied, the expenditure curve will change direction and even become negative, so that the total amount will be lower in 2050 than in 2030.

The pension expenditures under prevailing circumstances show only a small increase during the last decade of this century (Table 8). The growth will cumulate in the beginning of the next century. During the period 2000-2015 the annual increase will be 1.4 percent. After that the growth rate will become negative during the next 15-year period. If the index of the total expenditures is 100 in 1985, it will rise to 153 in 2030 but will be only 132 in 2050.

It should be mentioned that according to the calculations made by the Ministry of Social Affairs and Health (1987b, p. 25) the total cost of pensions, including old-age, disability and survivor's pensions, will grow in the basic alternative from 39 billion in 1987 to 58 billion Finnish marks in 2000 and 134 billion in 2030. The annual growth of real income is assumed to be 1.5 percent and benefits are assumed to grow at the same rate as real income. The number of beneficiaries of employment pension will be 76 percent more in 2030 than in 1987; 58 percent of the growth of pension cost are caused by an increasing number of pensions and 42 percent of the income growth.

Further, it is assumed that fertility will be the same as in 1985 and life expectancy will increase to 73.4 for men and 80 for women in 2000 and remain on this level to 2030. No immigration or emigration is included in the calculation.

It has not been possible to explain satisfactorily the great difference between the Finnish calculation and the benchmark scenario. The income growth included in the Finnish calculation but not in the ILASA scenarios partly explains it. However, if the economic growth is eliminated the Finnish estimate is still about hundred percent greater. Another reason for the difference is the number of beneficiaries--old-age and disability pension receivers as well as survivors--which is estimated to be in 2030 about 24 percent greater than in the benchmark scenario. The beneficiaries of the national pension system which does not depend on employment and which is paid to those without or with a reduced employment pension are estimated at 1,137,000 and those receiving employment pensions at 1,168,000 (old-age and disability pension).

Table 8. Pension expenditures, 1985-2050

Scenario		1985	2000	2015	2030	2050			1985	2000	2015	2030	2050
		Absolute (millions of Finnish marks)							Index (1985=100)				
Benchmark	old age	20550	23999	29972	32256	27667	Benchmark	old age	100	117	146	157	135
	survivors	2916	3278	3578	3701	3165		survivors	100	112	123	127	109
	total	23466	27276	33550	35957	30832		total	100	116	143	153	131
Low Mortality	old age		25483	36871	43440	39886	Low Mortality	old age		124	179	211	194
	survivors		3233	3332	3484	3202		survivors		111	114	119	110
	total		28715	40203	46924	43088		total		122	171	200	184
High Fertility	old age		23999	29972	32257	27725	High Fertility	old age		117	146	157	135
	survivors		3278	3578	3701	3176		survivors		112	123	127	109
	total		27276	33550	35958	30902		total		116	143	153	132
Western	old age		24822	33326	37342	32815	Western	old age		121	162	182	160
	survivors		3246	3412	3465	2809		survivors		111	117	119	96
	total		28068	36737	40807	35624		total		120	157	174	152

		1985	2000	2015	2030	2050			1985/00	2000/15	2015/30	2030/50
		Percentage							Average Annual Growth Rate (%)			
Benchmark	old age	87.6	88.0	89.3	89.7	89.7	Benchmark	old age	1.0	1.5	0.5	-0.8
	survivors	12.4	12.0	10.7	10.3	10.3		survivors	0.8	0.6	0.2	-0.8
	total	100.0	100.0	100.0	100.0	100.0		total	1.0	1.4	0.5	-0.8
Low Mortality	old age		88.7	91.7	92.6	92.6	Low Mortality	old age	1.4	2.5	1.1	-0.4
	survivors		11.3	8.3	7.4	7.4		survivors	0.7	0.2	0.3	-0.4
	total		100.0	100.0	100.0	100.0		total	1.3	2.2	1.0	-0.4
High Fertility	old age		88.0	89.3	89.7	89.7	High Fertility	old age	1.0	1.5	0.5	-0.8
	survivors		12.0	10.7	10.3	10.3		survivors	0.8	0.6	0.2	-0.8
	total		100.0	100.0	100.0	100.0		total	1.0	1.4	0.5	-0.8
Western	old age		88.4	90.7	91.5	92.1	Western	old age	1.3	2.0	0.8	-0.6
	survivors		11.6	9.3	8.5	7.9		survivors	0.7	0.3	0.1	-1.0
	total		100.0	100.0	100.0	100.0		total	1.2	1.8	0.7	-0.7

Survivor's pension based on the employment pension system will be paid to 311,000 survivors and 36,000 will get survivor's pension from the national pension system (Ministry of Social Affairs and Health 1987b, p. 88). The costs are calculated separately for both pension systems. Because both pension systems are overlapping a comparison with the number of beneficiaries in the scenario is difficult. However, the national pension costs are in 2030 only about one-tenth of all pension costs.

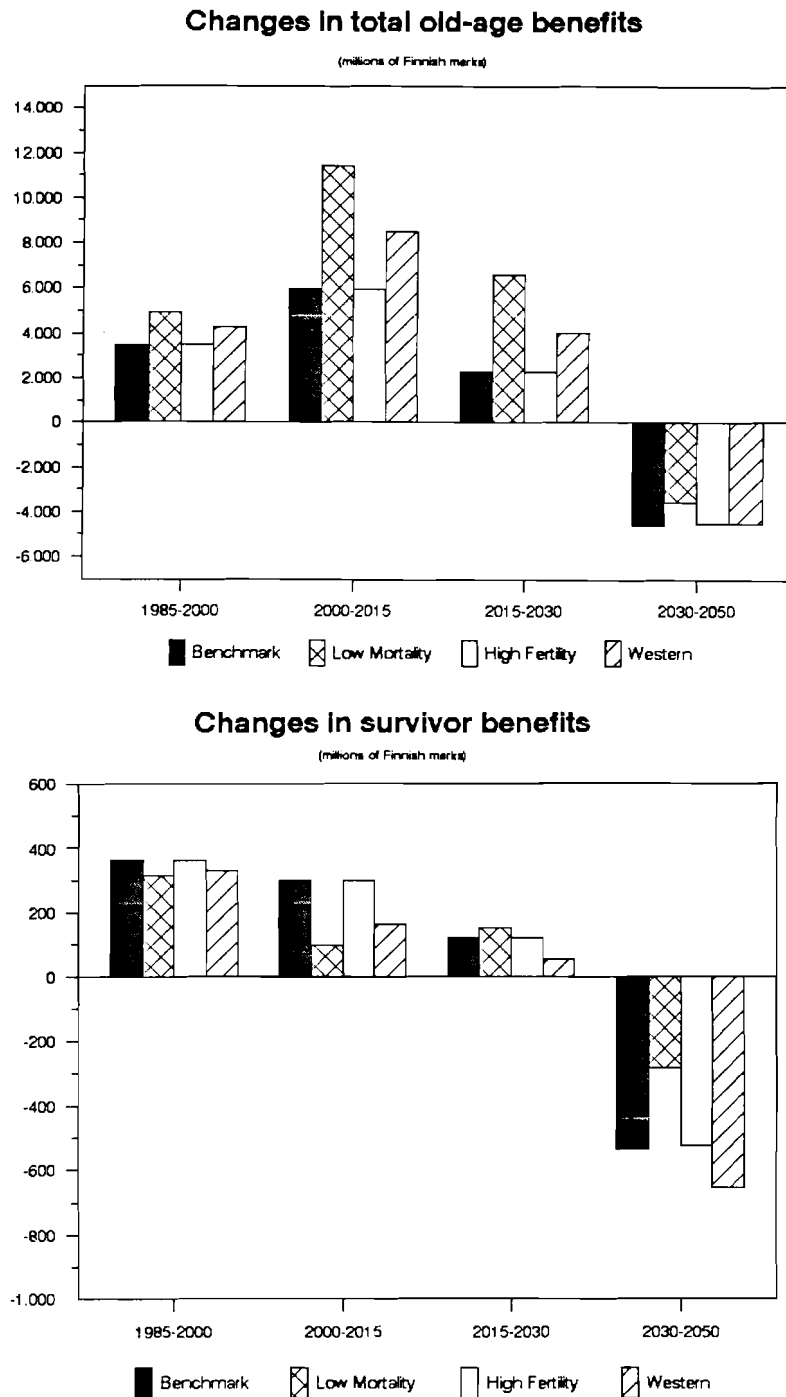


Figure 4. Changes in total old-age and survivor benefits, 1985-2050.

The fertility scenario follows the same pattern as the benchmark scenario. In the Western Europe scenario the increase will be somewhat more rapid and reach an even higher amount. The index for 2030 is 174 and that for 2050 as high as 152. If mortality goes down the pension costs will increase still more. As in the other scenarios, the increase is most accentuated in the period 2000-2015, with an annual growth of 2.5 percent. It will still be high during the following 15 years or 1.0 percent but will be negative after that. However, the indices for 2030 and 2050 are 200 and 184, respectively.

The large age classes born after the Second World War, in 1947-1951, will reach pension age sometime in the 2010s. As the fertility curve in Finland declined continuously until the mid-1970s, after the baby boom in the late 1940s and early 1950s, the pension expenditures will decline rapidly after the large age classes begin to leave the population pyramid in the 2030s-2040s.

The survivor's pensions form a rather small proportion of the total pension costs, in the benchmark and fertility scenarios only around one-tenth, and they will remain on this level during the whole period. In the two other scenarios they are even smaller (Figure 4). Obviously, they will be smaller than calculated in the scenarios, as a new law enacted in 1990 curtails the possibilities of receiving a survivor's pension in the future.

Figure 4 shows that, in all scenarios, the old-age benefits will grow most in the beginning of the 2000s. The period from 2030 to 2050 is a period of decrease. The changes are most notable for the low mortality scenario. As to the changes in survivor benefits, the pattern seems to be that of a continuous decrease, which is again most accentuated in the last part of the period studied.

6.2. Number of retirees and the labor force

The large age classes born after the Second World War will reach the old-age pension age mainly during the second decade of the next century. However, the calculated growth of the retirees, if the present demographic conditions prevail, is rather small during the first two 15-year periods (Table 9). During the third period, from 2015 to 2030, the growth rate will already decrease significantly and in 2050 the number of retirees will be less than in 2030. Proportionally the growth is greater among men than among women.

It should be mentioned that the Ministry of Social Affairs and Health (1987b, p. 19) has calculated that in 2030 the number of beneficiaries receiving employment pension will be 1,168,000 assuming that fertility is the same as in 1985 and that life expectancy will increase to 74.3 for men and 80 for women, and remain on this level until 2030. All retirees receiving employment pension also receive at least the basic amount included in the national pension system. To these must be added those who for various reasons, e.g. congenital disability, do not get employment pension. Obviously, those who had an early old-age pension were so few in 1987 that they did not affect the number of beneficiaries, at least not to a notable extent.

Table 9. Proportional change of retirees, 1985-2050.

		1985	2000	2015	2030	2050
Old-Age Retirees						
Benchmark	males	100	119	156	165	139
	females	100	136	173	190	166
	total	100	129	166	179	154
Low Mortality	males		129	205	246	227
	females		142	198	228	209
	total		136	201	237	217
High Fertility	males		119	156	165	140
	females		136	173	190	166
	total		129	166	179	154
Western	males		125	180	202	177
	females		139	184	207	184
	total		133	183	205	181
Survivors						
Benchmark	males	0	0	0	0	0
	females	100	110	119	124	106
	total	100	110	119	124	106
Low Mortality	males		0	0	0	0
	females		108	112	117	107
	total		108	112	117	107
High Fertility	males		0	0	0	0
	females		110	119	124	106
	total		110	119	124	106
Western	males		0	0	0	0
	females		108	114	116	94
	total		108	114	116	94

The number of those receiving national old-age pension in 2030, according to the calculations made by the Ministry, is 17 percent greater than the number of retirees in the benchmark scenario, where it was 1,003,000. However, to some extent the national old-age pension is paid to persons younger than 65 years of age. While the high fertility scenario shows almost the same development as the benchmark scenario, both the others, low mortality and Western European, exhibit a somewhat more intensive growth of retirees.

As to the survivors, a small increase is expected during the first decades of the 2000s. At the end of the period studied, the number of survivors will decrease. The increase is most extensive, and of the same size, in the benchmark and in the high fertility scenarios.

Labor force shows a small growth until the beginning of the next century. Under present conditions the decrease will be rather rapid and the rate about the same during the whole period. In 2050 the labor force will have shrunk to 72 percent of what it was in the beginning of the period (Table 10). There is no difference between sexes. In the high

fertility scenario the change is much less. On the whole, the diminution is only about 10 percent from 1985 to 2050. If the Western European demographic trends prevail, the labor force will be reduced still more, or to somewhat less than 60 percent, while the low mortality scenario will settle on the same level as the benchmark scenario at the end of the period.

Table 10. Change of the labor force, 1985-2050 (constant activity rates).

		1985	2000	2015	2030	2050
Benchmark	males	100	102	94	83	72
	females	100	103	94	84	72
	total	100	102	94	84	72
High Fertility	males		102	94	90	89
	females		103	95	90	89
	total		102	95	90	89
Low Mortality	males		103	96	87	76
	females		103	95	85	74
	total		103	96	86	75
Western	males		103	94	79	59
	females		103	94	78	58
	total		103	94	79	58

The overall activity rate gives an idea of the aging of the labor force. In 1985 the overall activity rate for males was 70.9 and for females 59.7 (Table 11). There is only a very small decrease until the beginning of the new century. After that it will become more rapid and slow down already around 2020. The decreasing trend will continue to the end of the period studied. There are only very small differences between the scenarios. Again the Western European scenario exhibits the most pronounced diminution and the high fertility one the smallest changes. If fertility goes up, the overall activity rates in 2050 will be 65.2 for men and 54.6 for women.

Table 11. Overall activity rates, 1985-2050 (labor force as a ratio to total population aged 15 and over).

	1985	2000	2015	2030	2050
Males					
Benchmark	70.9	69.3	64.4	62.4	62.7
High Fertility		69.3	64.2	62.9	65.2
Low Mortality		68.5	61.0	56.8	55.9
Western Europe		68.9	62.8	58.9	55.7
Females					
Benchmark	59.7	59.1	54.7	51.6	51.4
High Fertility		59.1	54.7	52.5	54.6
Low Mortality		58.6	52.9	48.8	47.9
Western Europe		58.8	53.9	49.4	45.7

6.3. Benefits and contributions

The ratio contribution/benefits reflects the impact of the variations in labor force on the pension system, primarily in a pension system based on the pay-as-you-go system. The ratio shows that the contributions will cover the benefits in the main, at least during this century, but will change significantly during the following decades. If the ratio is 100 in 1985, it will decrease to 58 in 2030 in the benchmark scenario and remain on this level until the end of the period (Table 12). In the low mortality and Western European scenarios the decrease will be still greater, so that in 2050 the ratio will be 44 and 41, respectively. Again the fertility scenario is the most favorable with a diminution only to 72.

Table 12. Ratio contribution/benefits, 1985-2050.

	1985	2000	2015	2030	2050
Benchmark	1.06	0.94	0.70	0.58	0.59
High Fertility		0.94	0.71	0.62	0.72
Low Mortality		0.89	0.60	0.46	0.44
Western Europe		0.91	0.64	0.48	0.41

Financial equilibrium between benefits paid in the form of pensions and contributions can be reached in a pay-as-you-go system either by cutting benefits or raising contributions.

In the benchmark but also in the high fertility scenario a cut of 11 percent in average benefits would be enough to keep the benefits and contributions in balance (Table 13). In the other two scenarios, low mortality and western, the corresponding percentage would be somewhat larger. Typical for all scenarios is a rapid increase from 2000 to 2015, which continues somewhat more slowly during the following decades. In the high fertility scenario a decrease is also visible towards the end of the period. In 2050 a cut in benefits of about 60 percent will be necessary in the low mortality and western scenarios, in order to keep the financial balance between benefits and contributions.

The balanced contribution rate in 1985 is estimated in the model to be 17.6 percent. The actual rate is somewhat greater, or 18.7 percent. The model shows that in order to have the pension fund balanced the contributions have to be increased in the benchmark scenario until 2030, when they are 32 percent of the gross salary. In the low mortality and western scenarios the contributions will have to be raised even after 2030 and will be 42 and 46 percent, respectively, of the salaries in 2050. The lowest increase of the contribution rate is exhibited in the high fertility scenario, but the difference between this and the benchmark scenario is not noteworthy.

Table 13. Cuts in benefits and contribution rate corresponding to a balanced pension fund, 1985-2050.

	1985	2000	2015	2030	2050
		Cuts in benefits (%) ¹			
Benchmark		-11	-34	-45	-44
High fertility		-11	-33	-41	-32
Low mortality		-16	-43	-57	-59
Western		-16	-43	-55	-61
		Balanced contribution rate ²			
Benchmark	17.6	20.5	26.7	32.2	31.7
High fertility		19.9	26.3	30.2	26.0
Low mortality		21.6	31.2	40.6	42.5
Western		20.5	29.2	39.0	45.6

¹ $100 \cdot (\text{RBC}(t)/\text{RBC}(1985)-1)$ RBC = ratio benefits/contributions

² Actual rate(=18.7)*RBC

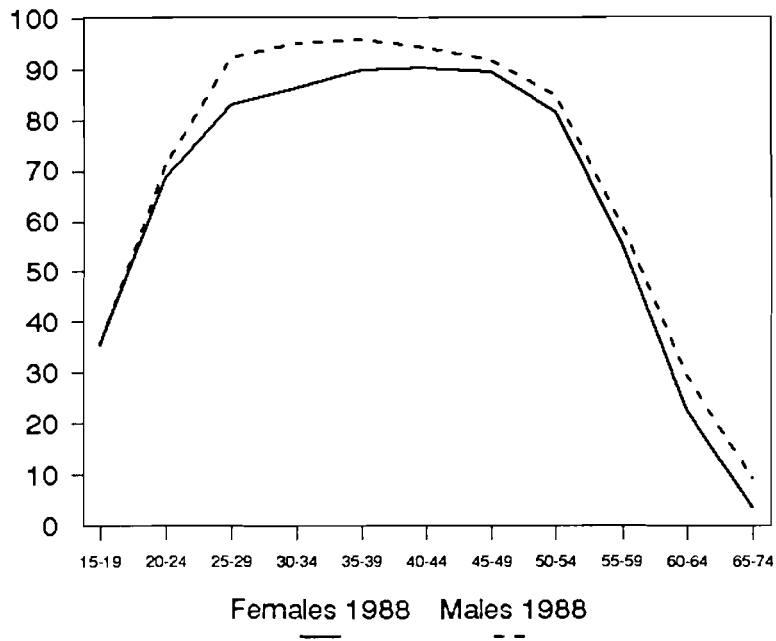
Conforming with the conclusions drawn from Table 12, the Central Pension Security Institute has estimated that the insurance contributions paid by the employers to the largest employment pension insurance (employees of private employers) has to be increased from 13 percent of wages to 20 percent in 2000 and to 34 percent in 2030 in order to cover the benefits. In 2010 the benefits will exceed the yield of insurance contributions. After that the funding degree will be decreased in order to balance the growing pension expenditures (Ministry of Social Affairs and Health 1987b, p. 28). The assumptions concerning population and economic development are those used in the basic scenario in the study made by the Ministry of Social Affairs and Health (see pp. 31-32).

7. Impact of Increasing Participation in the Labor Force and Raising the Age of Retirement

An increase in the labor force participation rate will increase the financial contribution for pensions. The IIASA scenarios include the high activity scenario (also called "GDR" scenario), which presumes that labor force participation by the year 2005 will be the same as in the former German Democratic Republic in 1985.

Compared with the benchmark scenario, the high activity scenario shows a growth of the total labor force already in 2000 (see Table 14). The increase from 1985 to 2000 is about 9 percent. During the following decades, the difference remains approximately on the same level. The difference is much higher in the male labor force (around 16 percent) than in the female labor force (less than 2 percent). This smaller increase in the female labor force is a consequence of the fact that the labor force participation rate of women is already very high in Finland (see Figure 5).

Males and Females



Females, married and unmarried

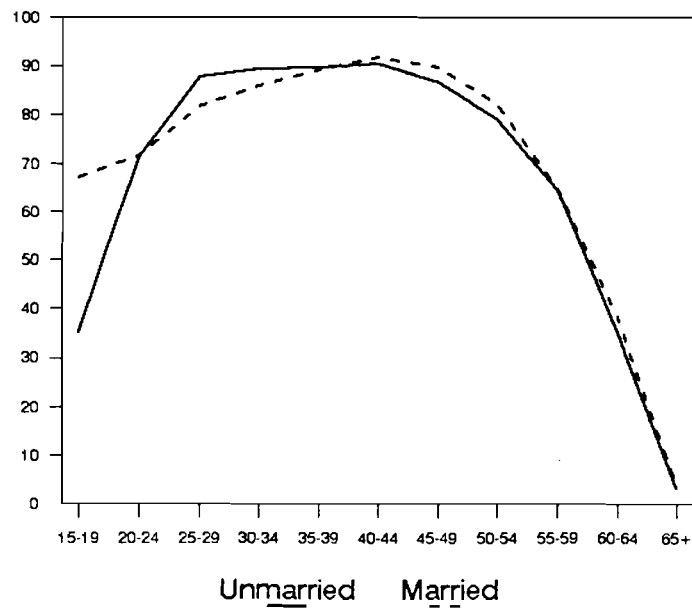


Figure 5. Labor force participation rates in 1988. Source: Ministry of Labor 1989; CSO 1988.

Table 14. The impact of increasing labor force participation and raising age at retirement on the size of the labor force, 1985-2050.

		1985	2000	2015	2030	2050
		Size of the labor force (1,000)				
Benchmark	males	1338	1366	1251	1117	969
	females	1233	1265	1162	1034	892
	total	2571	2631	2413	2151	1861
		Difference with Benchmark (in %)				
"GDR"	males		15.0	17.4	16.7	17.0
	females		1.7	1.9	1.7	1.9
	total		8.6	9.9	9.4	9.7
"65"	males		5.5	7.4	8.0	7.9
	females		3.1	4.2	4.3	4.5
	total		4.4	5.9	6.2	6.3

In practice, the labor force participation could be increased rather conveniently by raising the age at retirement. The late retirement "65" scenario assumes that the age at retirement will be progressively raised to 65 years by the year 2005 for both males and females and that no survivors' pension will be paid under the age of 60. If the age at retirement is raised to 65 for both sexes, it is self-evident that the labor force participation of women will increase more than in the "GDR" scenario. However, the augmentation is not very important: in 2015 it will be about 4 percent (see Table 14). Again, the difference in the male labor force participation is more significant, but still less than in the "GDR" scenario (roughly 7 percent). The greater significance of changes caused by the "65" scenario for the male population is a consequence of their lower age at retirement in 1985 when compared to the female population.

The increasing labor force participation in both scenarios also affects the average number of years worked. The rise in the "GDR" scenario in years worked at the mean age at retirement is again important among males. It increases from 42.1 to 44.4 years until 2000 (see Table 15). In 2015 and later it decreases somewhat, but the difference with the benchmark scenario remains about 15 percent. Women's average number of years worked is generally significantly lower and the increase caused by the "GDR" scenario is not very significant. In the "65" scenario, the increase is less distinct for both sexes.

If the labor force participation increases as in the "GDR" scenario, the number of retirees will also increase somewhat in the beginning of the 2000s, about three percent (Table 16). After that it will decline. During the rest of the period studied it will be practically at the same level as in the benchmark scenario. The "GDR" scenario shows a growing number of male retirees. In 2000 there would be three percent more and in 2050 almost five. Female retirees will increase in the beginning of the period but already from 2015 a small decrease compared with the benchmark scenario will be visible.

Table 15. The impact of increasing labor force participation and raising age at retirement on the average number of years worked, 1985-2050.

		1985	2000	2015	2030	2050
Benchmark	males	42.1	44.4	43.9	43.3	43.2
	females	29.1	32.4	35.4	35.5	35.6
"GDR"	males		44.4	43.9	43.3	43.2
	females		35.2	36.3	36.4	36.4
"65"	males		42.0	40.9	40.2	39.8
	females		33.4	36.9	37.0	37.1

In the "65" scenario, where the age at retirement is increased to 65 in 2005, there will be a rather significant decrease in the number of retirees in the beginning of the period, a 13 percent decrease in 2000. During the following decades, the difference between the "65" scenario and the benchmark scenario will diminish, so that it is six percent smaller in 2050. Again the decrease is more accentuated among men than among women. However, in 2050 the number of male retirees is only five percent smaller than in the benchmark scenario, while that of females is about nine percent less.

Table 16. The impact of increasing labor force participation and age at retirement on the number of retirees compared with the benchmark scenario, 1985-2050.

		Number of retirees (1,000)				
		1985	2000	2015	2030	2050
Benchmark	Males	256	304	400	422	357
	Females	305	416	528	581	506
	Total	560	720	927	1,003	862
"GDR"	Males		314	411	443	374
	Females		424	520	568	491
	Total		738	931	1,011	865
"65"	Males		259	336	374	374
	Females		378	484	539	466
	Total		637	820	913	813
		Relative change (%)				
"GDR"	Males		3.3	2.7	5.0	4.8
	Females		1.9	-1.5	-2.3	-3.0
	Total		2.5	0.4	0.7	0.3
"65"	Males		-14.8	-16.0	-11.4	4.8
	Females		-9.1	-8.3	-7.2	-7.9
	Total		-11.5	-11.5	-9.0	-5.7

The effects of increasing labor participation and raising the age at retirement on total benefits are shown in Table 17. The benefits will increase until 2030. After that a decreasing tendency will be visible in all scenarios. The "GDR" and benchmark scenarios are almost of the same size for males and females. The "65" scenario shows in the beginning of the 2000s an 11-12 percent smaller benefit than the benchmark scenario. In 2015, benefits are 15.5 percent smaller among males and 9.5 percent smaller among females. The difference decreases slightly afterwards.

Table 17. The impact of increasing labor participation and raising the age at retirement on total benefits, 1985-2050.

		Total benefits (million FIM)				
		1985	2000	2015	2030	2050
Benchmark	Males	9,626	11,730	15,424	16,239	13,724
	Females	13,840	15,546	18,126	19,718	17,108
	Total	23,466	27,276	33,550	35,957	30,832
		Difference with benchmark (in %)				
"GDR"	Males		-0.2	-0.1	-0.4	0.4
	Females		-0.1	-1.1	0.5	0.0
	Total		-0.2	-0.6	0.0	0.2
"65"	Males		-15.5	-15.5	-11.7	-12.9
	Females		-7.4	-9.5	-6.2	-6.5
	Total		-10.9	-12.2	-8.6	-9.4

The overall impact of the "GDR" and "65" scenarios could be measured by comparing the ratio contribution/benefits with that in the benchmark scenario. The effect of the higher labor participation rate and raising the age at retirement on this ratio is rather small. In 2000, contributions still exceed benefits but the ratio becomes smaller and smaller. It is, however, still higher than in the benchmark scenario. In 2030 it is about 17 percent larger in the "65" scenario as compared to the benchmark scenario (see Table 18). In the "GDR" scenario the ratio is somewhat lower than in the "65" scenario during the whole period.

Table 18. The impact of increasing labor force participation and raising the age at retirement on the contribution/benefits ratio, 1985-2050.

	1985	2000	2015	2030	2050
Benchmark	1.06	0.94	0.70	0.58	0.59
"GDR"		1.03	0.78	0.65	0.65
"65"		1.10	0.84	0.68	0.69

In Finland some studies have dealt with the financing of the future pension costs. The study made by the Economic Planning Center (1986) states that the growth of pension costs will depend on economic growth. Three scenarios are used with different levels of growth in real income, 0.5, 1.5 and 2.5 percent growth (Figure 6). In all scenarios the increase of pension costs is greater than the growth of GDP up to 2015. After that it will be on about the same level as the growth of the GDP. In the lowest alternative, however, there will be greater difficulties to afford the costs as the flexibility of the economy gets smaller.

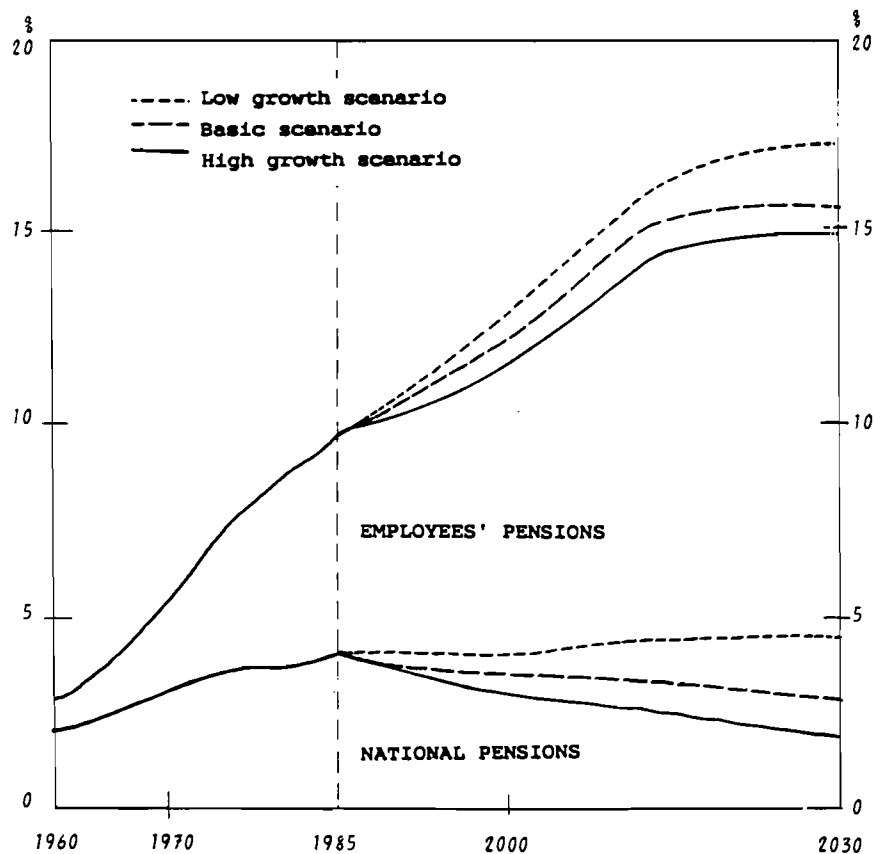


Figure 6. The proportion of pensions of the GDP, 1960-2030. Source: Economic Planning Center 1986.

It is said in the study that the problems caused by the growing pension costs are not insurmountable, if the growth of pension costs are taken into consideration in wage negotiations. Further, it will be necessary to raise taxes and insurance premiums to keep social security on the same level as the existing legislation presumes. The share paid by private employers to the pension system will increase from 10.1 percent of GDP in 1987 to 16.3 in 2030. The report also examines the effects of alternative assumptions in population trends. It states that an increase of total fertility per woman to 2.1 in 2010 will not have any positive effect on the social expenditure share of GDP, at least not during

the period studied. Neither will a decrease of fertility to 1.4 in 2000 have any notable effect on the share of GDP.

The old age pension costs are calculated to grow from 6.3 percent of the GDP per year in 1985 to 12.5 percent in 2030. Even if the growth of the population aged 65 and over will be less in the 1990s than in the beginning of the 1980s, the contribution of employers to pension insurance will increase more than pension costs because of the funding used in the pension system. As a consequence of this but also of the growing employment rate, the GDP ought to grow 2.4 percent annually in the 1990s, in order to keep the yearly growth of income of the working population at the 1.5 percent level. During the whole period up to 2030 the GDP ought to grow at least an average of 1.7 percent per year (Palm 1988, p. 58). The pension costs will grow as a consequence of an increasing number of beneficiaries and growing pensions, when more and more pensioners receive a full pension.

8. Some Concluding Remarks

The trend towards an aging population seems to be unavoidable and irrevocable. The survival curve will be "rectangularized" with more and more people living to a high age. At the same time fertility has decreased and seems to be close to the lowest level possible. To retain a young population structure seems to imply continuously growing fertility and also a growing population which generally is considered a goal to be avoided. The aging of the population faces society with questions and problems it evidently has never experienced earlier in history. It has been more and more necessary to plan for the future, to prepare demographic projections and seriously examine the trends and analyze the effects on all sectors of society.

As to population development, the scenarios used in the IIASA project show that if life expectancy becomes longer--reaching the life expectancy observed in Switzerland--which might be one of the most probable features in the population development, the proportion of the elderly will grow rather rapidly or at least more rapidly than in the projection based on prevailing demographic conditions, which is also used in the official Finnish population projections. One of the impacts of this is not only more elderly, but also proportionally more men, and consequently a growing proportion of widowed men. With regard to the labor force, the fertility scenario shows, on the long run, that it is the best alternative; the labor force is much greater than in the other scenarios. Clearly, the low mortality scenario also shows the most rapid growth of retirees and pension expenditures.

Increasing participation in the labor force by raising the labor participation rate will slow down the rate of decrease somewhat. If the level of labor force participation prevailing in the former GDR is reached in 2000, the labor force will decrease more slowly not among females but among males. The same will occur if the age at retirement is raised.

The scenarios also make it clear that the pension costs will increase significantly in the future and, as a consequence, also the contributions. The contributions have to be

increased tremendously in a pay-as-you-go system as the IIASA-scenarios show, but also in a funding system, as the Finnish studies have proved.

The scenarios can tell us the direction and consequences of the trend but not the probability with which it will occur. Hence, if the results of the scenarios are to be used, an estimate of the probability of the trends must be made. The measures taken in order to avoid unwanted population development ought to be based on the most probable trends. However, population development is not only affected by the current population situation but also by economic and social development, which at the moment is rather rapid and includes many unknown factors, such as the integration of Europe, the political and economic development in Eastern Europe, growing environmental problems with global effects, etc. The scenarios give valuable information on the effects of population trends which--in order to give a comprehensive picture of the effects on the pension costs--should be completed with other things affecting these costs, such as economic development, funding, contribution alternatives, etc.

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