

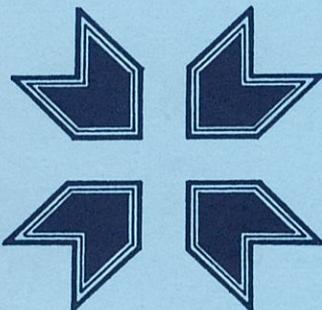
**RAHVASTIKU-UURINGUD
POPULATION STUDIES**

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**GENERAL TREND OF POPULATION
AGING IN ESTONIA**

Kalev Katus

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**EESTI KÕRGKOOIIDEVAHELINE
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The paper outlines general trends in population aging in Estonia. The process is analyzed in European context, determining the most specific trends and the major time frames of the population aging. The analysis is mainly based on general indicators of the population aging calculated on census data. There have been nine censuses at the territory of Estonia. The first Baltic census took place in 1881 followed by the Russian census in 1897. The Estonian Republic carried out three censuses: in 1922, 1934 and 1941. After the WW II there have been four Soviet censuses in 1959, 1970, 1979 and 1989. Using the same general indicators the population aging is followed up to the year of 2030 on the basis of population prognosis. The census data used for the analysis of population aging as well as data on population prognosis are derived from the Estonian Population Databank. The Databank has been developed in the Estonian Interuniversity Population Research Centre.

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Population aging as a specific process has been lasting more than a century in demographically developed countries and reached the stage where it is gaining increasing international attention. It is acknowledged that population aging is treated as one of the most important demographic processes in the developed countries, particularly because the aging is considered to be the cause for significant changes in social, economical and political organization of societies. The societal changes related to the population aging become also apparent upon the formation of a new direction of public policy, aging policy, and growing international co-operation in the given area. At the European Population Conference in Geneva, 1993, the population aging had been identified as one out of five major common population items characteristic to demographically developed societies and therefore as the field of joint-research as well as coordinated policies [European... 1994].

The preparatory work for the UN Population Conference in Cairo revealed clearly the fact that aside numerous different or even contradictory trends between demographically developed and developing societies, the population aging seems to be one of the major common processes for all the nations in current population development. Among many others this fact had been stressed also by Nafis Sadik [1992]. Although the population aging is characterized by varying intensity in different parts of the world it arises identical problems for all nations. From this international perspective the population aging provides one of the most significant linkages in the field of human development between the 20th and the 21st centuries: the urging need to change societal organization caused by population aging belongs to a range of tasks faced world-wide in the new century, though the cause itself originates from the present. In this quality the ability of policy-makers to manage the issues concerning population aging could be an effective indicator of their cognitive sense in enfolding the future developments.

What is the population aging? The process has been most frequently defined by the dynamics of specific quantitative indicator or group of indicators. Mainly the ratio of elderly, i.e. the percentage of population aged 60 years or 65 years old and over in the total population has been used (the age limit of 60 years is usually preferred in countries where the retirement age begins at 60). Correspondingly, the population aging is defined as the intensive growth of the percentage of elderly up to historically inexperienced high levels in human society as well as the rapid increase of absolute number of population aged 60 years old and over. The second basic indicator of population aging is the median age of total population as well as its certain age-groups: population aging is defined by the increase of the median age.

These two basic indicators as many others are based on the common understanding that old age begins after a certain number of years has passed after the moment of birth. There has been a lot of continuous debate round the beginning of old age. Most probably these debates never cease as the real beginning of the old age seems to be not a constant but changing limit in the course of human development. Alternatively to the chronological approach to the aging process there are suggestions to define elderly as persons above the age at which only a given proportion of a birth cohort survive. [Jackson 1980; Ryder 1975; Siegel 1980]. In such a case the beginning of the old age is determined by a certain fixed number of years left before the moment of death. Suggestions are made, for

example, to use the period of 10 or 15 years. This kind of approach allows to measure the population aging by the increase of average age limit of beginning of the old age.

There has been also more general discussion on limits of the usability of chronological age in the treatment of the aging process in scientific literature. Aside the important qualities such as simplicity and comparability the chronological age also identifies the cohort membership. The latter determines the social environment through which an individual proceeds during his life-cycle. Despite such powerful qualities of the chronological age, in reality the aging is a multidimensional process with different dimensions being far from as even as the proceeding of chronological time. For example, Maddox and Wiley identify aging as a triple process, involving the decline of biological capacity for survival, the decline of psychological capacity for adaptation and the reduction of sociological capacity for fulfillment of social roles [Maddox, Wiley 1976]. From the point of view of such a broad approach the arguments for single usage of chronological age in determining the population aging process tends to weaken, nevertheless, the construction of relevant indicators on basis of different dimensions of aging is considered more than complicated.

The demographic studies of population aging typically lay emphasis on the quantitative approach based on the concept of chronological age, analyzing the aging by a couple of general, and a number of special indicators [Fratczack 1993; Lindgren 1990; Rowland 1991; Stolnitz 1992, 1994; Vukovich 1991; Velkoff, Kinsella 1993; Warnes 1993 etc]. This kind of approach guarantees the international comparability which undoubtedly cannot be underestimated in the field of social sciences. At the same time the usage of methodologically simple and easily comprehensible system of indicators does not necessarily lead to any losses of understanding the complexity of the aging process.

In demographic context the aging is a multi-sided process of modification of the population age distribution in the way it corresponds to the new balance of demographic processes characterizing the modern type of population reproduction. It could be even stated that in some sense the demographic transition has caused a smaller direct effect on the changes in general scheme of society than the population aging corresponding to the transition. In the course of aging all the major proportions in society alters irreversibly. Consequently, there will be a clear need for the population policy which focuses on the adaptation of different aspects of social organization to the new population situation determined by the aging process. Mayers makes a distinction between such a population-responsive and a population influencing policies [Mayers 1994]. Compared to other social and even demographic processes the population aging is distinctively an inert process and in this quality makes the population-responsive aspect of the social policy particularly explicit.

It becomes obvious upon the scientific literature review that the adaptation of the society to the population age-structure characteristic of the modern demographic reproduction seems to be a rather laborious process. Though some of the spheres of societal life are not directly affected by the excessive pressure of the population aging, fairly often the situation is reverse. A wide range of literature on aging is devoted to various social problems accompanying the population aging [Binstock, George 1990; Matras 1990; Siegel 1993; Stolnitz 1994 etc].

Wide range of social problems which are emphasized within the context of population aging, either as aggregating or reappearing as new fractions, cannot be treated as a source for negative evaluation of the population aging. On the one hand, there is no sense in labelling the objective path of development. On the other hand, one could refer to Frank Notenstein's words: "views as a whole the *problem of ageing* is no problem at all. It is only the pessimistic way of looking at a great triumph of civilization" [Notenstein 1954]. In accordance with this statement, if the population aging is being determined as a problematic process, in reality it usually means the society's insufficient capability for adaptation to the new population situation, or even worse, the emerging of the old viewpoint on people as means, not the aim of development.

The evaluation of the aging process could be partially relevant in specific cases when the large differences in numbers of successive birth cohorts cause the population over-aging. The significant fertility decline below the replacement level or, on the contrary, a remarkable baby-boom are considered to be the classical causes for population over-aging at certain time periods. Additionally, at regional level the population over-aging could be caused by a continuous out-migration of younger age-groups of the regional population. While dealing with mentioned cases of population over-aging, the evaluative aspects may become relevant. They could be also consistent at the interpretation of the largely unbalanced sex-structure caused by the sex-specific aging as well as other similar kind of reflections that are not inevitable. The reflections deviating from the general path of population aging and corresponding negative effects could be mitigated to a certain extent by introducing a population-influencing policies. Though, in order to achieve such an aim, the demographic policy should be designed for the period encompassing three generations, i.e. for 75-80 years.

Upon rather capacious scientific literature concerning the process of population aging a noteworthy general approach was reported by Peter Laslett at the IUSSP Conference in Montreal [Laslett 1993]. Laslett points out the emergence of the Third Age as the most important characteristic of the population aging. The population in the Third Age, irreversibly reaching the distinct share in the total population, is going to play if not the decisive then at least an important role in the formation of the future perspectives of societal development. Laslett makes use of two general indicators for explicating the population aging and the formation of the Third Age: the proportion of elderly in the adult population (population aged 60 years old and over to persons over the age of 25) and the proportion of survivors at the age of 70 in the adult generation (170 to 125, according to the life table).

The emergence of the Third Age population relies upon the demographic transition after which the majority of members of every birth cohort exceeds the limit of old age, for the first time in history of mankind. This new situation principally contradicts with the pre-transitional experience when only a tiny share of people from every birth cohort, though, constituting sometimes of vital group of people exceeded the limit of old age. As a rule at that time, an individual's life-cycle ceased before reaching the old age, and the proportion of the Third Age population had been insignificant enough not to shape the specificity of that phase of cohort life-cycle. In other words, there had been no Third Age at the pre-transitional period, this is only being formed as a major effect of population aging. Demographers have also notified another process that had decisively changed the composition of elderly, namely the remarkable alteration of socio-biological selection

mechanism at the earlier years of life-cycle within the course of demographic transition [Olshansky, Carnes 1993].

According to Laslett the future development of the society depends to many respects on the successful integration of the Third Age population to the social activities. It must be taken into account that correspondingly to the traditional patterns acquired in previous experience the main emphasis could be laid on arrangement of *earned leisure years* rather than on creation of the developmental conditions for functions specific to the Third Age. Having been retired and left out of other social activities the Third Age population becomes a burden to themselves and to the society. Particularly economically in the latter case. In such a case the maintenance of the present standard of living can with a markable probability be doubted. In the worst situation the sustainable conflict between the Second and Third Age populations could emerge.

The research on aging deals with problems of individual aging as well as population aging. Though most of the authors usually emphasize the differences between individual and population aging the problem deserves repeated attention. Individual aging is an irreversible continuous process determined by steady and one-way movement of time. Every new-born moves along this path of time; if the life-cycle is not interrupted by early death every baby inevitably reaches the old age. The routines of aging process of individuals has been continuously repeated in human society since its foundation.

Through individual aging a human being passes the successive stages in life-cycle, each one of them having a unique meaning to a human being. The appearance of life-cycle stages by turns is determined by the irreversible moving of time and is therefore also one-directed process. At a certain stage the degradation of the vitality of an organism starts, which inevitably ends with a death of this organism. Hence by nature of things every individual is mortal. The successive alternation of stages of life makes a human being more versatile and consequently more perfect than any of the imaginable the immortals continuously experiencing one and the same stage of life.

Compared to individual aging the population aging is a totally different process. First, the population aging is a unique phenomenon accompanying the demographic transition which appears in modern era for the first time in human history, having been unknown to the population development in the earlier millenniums. Second, the population aging does not bring along the reduction of vitality of population in any respect as is typical to individual aging. The old population is not the stage of such a development characterized by diminishing strength for living or any other kind of degradation. This is actually a new age- structure corresponding to the modern reproduction type and offering new opportunities for the society. As population aging occurs in the result of a remarkable progress of the demographic development it can rather be treated as the process of strengthening of the societal vitality. Third, after the demographic transition and secular shift in the framework of a quantitative approach the population aging could not be defined as a restrictly irreversible process. Population aging may be followed by rejuvenation periods. Temporary time periods of quantitative aging and rejuvenation as two opposite processes of the age-structure modification have always alternated in the population reproduction.

The present paper deals with the population aging without any reference to the process of the individual aging. However, it has to be admitted that the Estonian-centered research in this field would be of use and contribution to better focusing of different aspects of population aging. Unfortunately, the representative gerontological research enlightening the individual aging characteristic of the Estonian population is not available. The following approach does not aim at enlightening the consequences of population aging. The adaptation of society to the new age distribution and numerous difficulties accompanying the process are not the objectives of this very paper. These important problems will be treated in the future respective research items focusing on various aspects of the elderly life opportunities in Estonia.

The general trends in population aging, significant features of the Estonian aging process in European context as well as the major time frames for the aging process of the Estonian population are of main purposes of the present paper.

1. DETERMINANTS OF POPULATION AGING

The population aging is determined by changes in population age structure. The latter is not an independent process as the age structure is shaped by the development of fertility and mortality; in case of open population also by external migration. Naturally, the impact of demographic processes on formation of the population age distribution over rather long time intervals is of importance. The slower the alternation of generations, the longer tends to be the time interval during which any given population age structure is shaped. Dealing with short time periods the population age structure can be noticeably inconsistent with the intensity and pattern of demographic processes in this period.

The population age distribution is under continuous change, as far as fertility, mortality and migration never remain completely stable within longer periods. This kind of changes in the population age distribution are of fluctuous character, and the level of changes is determined by the fluctuation amplitude of demographic processes. Consequently, throughout centuries the fluctuations in population reproduction and in population age distribution correspondingly have been concurrent with the interchange of small-scale population aging and rejuvenation periods.

At the same time, however, the demographic development is going through the specific period in the course of which the nature and intensity of all population processes are changing radically. Corresponding changes in the population age structure are also remarkably great compared with the interchange of small scale aging and rejuvenation periods of fluctuating type described above. At this period the principal changes in the population age structure are irreversible. Understandably, the period of demographic transition is concerned during which the type of population reproduction changes entirely. Caused by the same transition the population age pyramid specific to the traditional type of reproduction is reshaped into the population age rectangle typical of the modern type of reproduction. This unique and irreversible alteration process is known as population aging.

In the course of the demographic transition the population age distribution is shaped both by the decline in fertility and the decline in mortality. The mortality decline in older ages increases the number of persons in cohort who are likely to live over the old age limit, thus leading to the aging from the apex of the age pyramid. The fertility decline decreases the size of birth cohorts compared to previous ones, thus reducing the share of younger population age groups and leading to the aging from the bottom of the age pyramid. It is worth of consideration that mortality and fertility declines in the course of demographic transition could proceed with much less interdependence than usually common to these demographic processes. Therefore the nature and timing both of fertility and mortality decline are playing a substantial role in the flow of population aging in concrete cases. The decline in infant and child mortality as a part of mortality transition is an additional factor of making the population aging into a complex process: by increasing the proportion of younger age groups it leads to the population rejuvenation on otherwise equal conditions. In case of principal and irreversible development of demographic processes as is characteristic to the demographic transition, also the initial population age distribution acquires the status of separate factor of population aging. In this respect the concept of population momentum is concerned [Keyfitz 1971].

Fertility decline, mortality decline and the initial population have sometimes been treated as separate factors of the aging process. A couple of decades ago Roland Pressat associated unambiguously enough the population aging with the decline in fertility, more or less denying the effect of the mortality decrease on aging [Pressat 1961]. Pressat's statement has been cited somewhat out of context both by the supporters and opponents, in this way giving subject to debates resulting in voluminous literature on that matter. There have been competing attempts to prove that primary course of population aging being either the mortality decline or the decrease in fertility. One can say that sometimes this kind of discussions have proved to be rather worthless from a scientific point of view. The role of the three factors and their interdependence in forming the process of population aging has been comprehensively overviewed by Emil Valkovic [Valkovic 1989]. Particularly, his focused approach to the population momentum as a separate factor of aging is discussed in this paper.

Dealing with these three factors as separate determinants of the population aging will be reasonable only if shorter time periods are under observation. Over the periods sufficiently short each of these three aging factors can make and has historically made a different contribution to the concrete trend of the aging process. However, from aetiological viewpoint treating the three factors as separate ones is out of real meaning. Demographic transition is recognized to be the underlying process of the population aging, which through fundamental alteration of fertility, mortality and migration processes accordingly carries out the changes also in the population age distribution, though with a certain time shift. Regarding the population aging as a process resulting from the demographic transition could be considered to be a traditional approach in demography [Bourgeois-Pichat 1979; Wames 1989, 1993; Myers 1990; Horiuchi 1988; Lindgren 1990 etc].

Demographic transition is a common process characteristic to all the nations, yet regarding the timing, it is anything but synchronized in respect of different nations. To the same degree the population aging is unsynchronized when comparing the nations in the course of time. According to the aforesaid the main time frames and stages of the

demographic transition, as well as other major characteristics of the transition relevant to the given population should be of the first interest when dealing with the population aging and its determinants of the nation under interest. The following review on demographic transition of the Estonian population is aiming at the very target.

1.1. Time Frames of Demographic Transition in Estonia

Estonia belongs to the group of those West- and North-European countries which are characterized by early beginning of the demographic transition. Already from the 17-18 centuries the European marriage pattern started to gain ground among the nations living in the west from Peterbourg-Trieste line conditionally traced by John Hajnal [Hajnal 1965]. This phenomenon is considered to be causally related to the beginning of the demographic transition. The development of the European marriage pattern in Estonia can be retraced back to the repercussions after the Nordic War, to the first half of the 18th century [Palli 1988]. It is important to stress that the Estonian territory forms the eastern boundary of this historical phenomenon in Europe. The data available prove that the boundary line between Estonia and Russia denotes not only the extent of spreading of the European marriage pattern, but also marks the greatest time difference in the beginning of the demographic transition between neighboring nations in Europe. This time gap between Estonia and Russian adjacent regions (at kubermang/oblast level) is assumed to be approximately half a century [Katus 1994].

The demographic transition in Estonia began in the middle of the 19th century. Although the crude mortality and fertility rates had shown a falling trend for several decades already, a continuous and irreversible decline in mortality and fertility started in the 1850s-1860s. Since the first Estonian population census in 1881, the fertility development can be followed by the Pinceton indices [Coale, Treadway 1986]. One of the advantages of these indicators is the availability of comparable data for the most European countries. Provided, this opportunity is shortly exploited also in the current paper.

OVERALL AND MARITAL FERTILITY INDICES CENSUS YEARS, 1881-1959		
Census year	Overall fertility index	Marital fertility index
1881	0.3279	0.6278
1897	0.2924	0.5691
1922	0.1943	0.4079
1934	0.1642	0.3189
1959	0.1627	0.2392

Figure 1.1. presents the dynamics of the overall and marital fertility indices by census years of 1881-1959 [Katus 1991]. During this

period the fertility development is showing a persistent, almost linear trend down to the point where the fertility drops below the replacement level at the end of the 1920s. The Princeton Project has defined the beginning of the fertility transition by the 10 per cent fertility decline from the traditional level of uncontrolled marital fertility. Quite evidently, though without sufficient data and research it still remains a hypothesis to a certain extent, in Estonia the mentioned criterion has been crossed far before the 1880s. Most evidently,

the start of the parity-specific family limitation can be dated back to the period of the 1850-1860s.

The magnitude of fertility decline during the period under observation has been approximately twofold. In the 1930s the continuous declining trend was ceased and fertility stabilized at the level of 1.8 - 2.0 by the total fertility rate. Hence, Estonia belongs to the group of nations which are characterized by underreplacement fertility which has been reached already before the WW II. At the same time the dropping fertility below the replacement level could be conventionally regarded as the final phase of fertility transition.

It is somewhat more complicated to define the timing of the demographic transition by mortality development, as the essential changes characterizing the process commonly occur at the quantitative indicators with longer time shift. Therefore the beginning of a continuous decline in mortality occurs as if imperceptibly, particularly regarding the pioneer populations of the demographic transition. However, according to the existing data it can be stated that the steady decline in the intensity of Estonian mortality began more or less simultaneously with the fertility decline, i.e. in the middle of the 19th century. This development distinguishes Estonia from other countries with commonly earlier beginning of mortality decline relative to the beginning of fertility decrease.

Estonian mortality levels can be measured on the basis of life table indicators since the 1897 census [Katus, Puur 1991]. Figure 1.2. presents the relative dynamics of the life expectancy at birth and the life expectancy at the age of 5 years during the period of 1897-1959; corresponding absolute figures are given in the table. The data reveal the increasing male life expectancy at birth from 41.9 to 64.3 years and female life expectancy from 45.5 to 71.6 years up to the census year 1959. Eliminating the impact of different duration of intercensal periods enables to show that the growth rate of the life expectancy has maintained approximately at the same level during the whole period of 1897-1959. The

LIFE EXPECTANCY, CENSUS YEARS, 1897-1959				
Census year	Males		Females	
	e(0)	e(5)	e(0)	e(5)
1897	41.87	52.96	45.50	55.40
1922	48.65	53.91	54.92	60.09
1934	53.13	56.15	59.60	62.11
1959	64.31	62.35	71.62	69.41

mean annual growth rate of life expectancy at birth for males has been 0.27 years during 1897-1922, 0.44 years during 1922-1934 and also 0.44 years during 1934-1959.

The respective figures for females were 0.38, 0.39 and 0.48 years. Obviously, the life expectancy at birth fixed at the end of the last century is reflecting such a mortality level which presupposes a declining trend in mortality during several decades prior to the 1897 census year.

Although the mortality continued to decline and the life expectancy to grow after the WW II, primarily accounted for the decline in infant mortality, the endogenous causes of death have become uniformly predominant already during the pre-war period. Thus, the

demographic transition in Estonia can be conventionally framed according to the mortality development also by the interval of 1850-1940.

Aside from the time frames of the demographic transition period, fixing the size and the time of arising of the most numerous birth cohort can be useful for analysis of the population aging. In general, during the initial stages of the demographic transition, despite the declining fertility, the mean annual number of births is usually continuing to increase for a few more decades. This can be attributed to the decline in mortality among females in reproductive age, even more to the decline in infant and child mortality. Later, the spreading family limitation and persistent downward trend in fertility levels lead to the reduction of absolute size of birth cohorts. At the turn of the described two stages usually the most numerous birth cohort is emerging. From the viewpoint of the population aging the gradual movement in time of this largest cohort up to the old age usually indicates the most intensive phase of the population aging; later phases tend to be much more moderate in shaping the general aging indicators.

It is appropriate to recall that among the majority of the pioneer populations of the demographic transition the effect on population aging, caused by the largest birth cohort from the transition period, is somewhat overshadowed by the similar effect of the intensive and long-lasting baby-boom following the WW II. The baby-boom has resulted in a creation of a difference in successive birth cohort numbers as great or even greater in some cases than caused by the largest birth cohort from the transitional era. Estonia did not experience the post-war baby-boom, hence, the most numerous birth cohort from the transition period plays the more remarkable role in shaping the general aging trend than typical to many other countries.

AVERAGE ANNUAL NUMBER OF BIRTHS IN 9 ESTONIAN COUNTIES 5 YEARS INTERVALS PRIOR TO CENSUS YEAR, 1877-1933	
Interval	Average annual number of births
1877-1881	28,000
1892-1896	27,100
1918-1922	8,600
1929-1933	17,400

Multiple changes of administrative borders within the Estonian territory are making the comparison of size of successive birth cohorts in the course of the demographic transition rather complicated. However, with a certain degree of conventionality it is possible. The figures in the table reflect the data on 9 Estonian counties, which territory do not encompass the current, and is far from encompassing the whole pre-war Estonian territory, yet enable to compare the size of birth cohorts in time. Along with the increasing total number of population the average annual number of births has shown relatively rapid growth in Estonia during the 19th century until

the 1880s. The turn towards the decline took place during the last decade of the 19th century. The size of the largest Estonian birth cohorts could be estimated to be approximately 32-35 thousand children for the whole nation encompassing the territory of the Estonian Republic in pre-war boundaries. By the 1930s the average size of annual birth cohorts had reduced almost twofold.

The effect on population aging generated by the life-cycle movement of cohorts of different size can be described by applying the dynamics of population momentum. As the

decline in mortality and fertility have been remarkably simultaneous processes in Estonia, being comparable with the demographic transition of France by this feature, the transitional growth of population remained modest in Estonia. This quality of the transition pattern is not accompanied by the accumulation of population momentum of remarkable size, which in turn could have an essential and long-term effect on the aging development during the post-transition period. In other words, the role of the initial population age structure as a separate factor of aging process in Estonia has been to some extent smaller compared to those nations characterized by a considerable lag between the trends of mortality and fertility decrease and, respectively, by greater population momentum accumulated during the demographic transition.

Regardless of the above-mentioned smaller role, it is worth considering the formation of the population momentum and its later realization also in the study of population aging in Estonia. The data on gross demographic potential of female population, applying Burgeois-Pichat method for calculations, is presented in the table [Burgeois-Pichat 1971]. As discussed below, the population age structure has played the greatest impact on the Estonian aging process during ca 20 years after the end of the demographic transition, when the last portion of the population momentum had been realized.

GROSS DEMOGRAPHIC POTENTIAL	
Year	Potential
1881	1.570
1897	1.503
1922	1.320
1934	1.174
1941	1.109

The dynamics of the population momentum reveal that a greater strata of the initial potential had been exhausted already during the demographic transition. Because of the additional impact of the momentum the growth of total population during that period was greater than the difference between mortality and fertility levels might have generated. Since the end of the 1920s the population momentum compensated already the negative impact of the underreplacement fertility to population growth, resulting in the rapid reduction

of the momentum itself. Before the WW II the population age distribution contained only 11 per cent of growth capacity, probably, according to this indicator holding one of the lowest levels in the world after France.

Quite a different factor by virtue affecting the development of the Estonian population in general and not to a lesser extent the population aging in particular was the great difference in timing of demographic transition processes between Estonia and the neighbouring Russia. To express this difference would be appropriate to apply the Princeton fertility indices again. Figure 1.3. compares the overall fertility index of Russian population with the respective indicator for Estonia, demonstrating the fertility levels of adjacent Pihkva and Novgorod gubernias separately. The corresponding data for other neighbouring countries to Estonia have been added also.

In the 1880s the fertility level in Russia compared with Estonia has been explicitly high. The statement proves to be true as regards both Russia as a whole (precisely, the European part of Russia) as well as the Russian regions adjacent to Estonia. Among all the countries neighbouring Russia namely Estonia is exhibiting the most different fertility level. Smaller difference in fertility rates appear northwards, between Finland and Russia, as well as southwards, between Lithuania, Poland and Russia. In Latvia the situation proves

to be the closest compared to that in Estonia. It is quite remarkable that by the 1930s the differentials in fertility levels between Estonia and Russia noticed half a century earlier (as well as between other East-European states) have even increased. Compared with adjacent Russian territories, the fertility in Estonia was more than twice lower at that time. This gives a piece of evidence about an essential time difference in the demographic development between Estonia and Russia. With reference to earlier research this difference in time is estimated to be half a century long [Katus 1982; Vishnevski, Volkov 1983].

1.2. Postwar Migration Development and Growth of Foreign-born Population

The post-war immigration into Estonia has substantially influenced the population aging processes in Estonia. The immigration has originated more or less from the whole territory of the Soviet Union, though, mainly from the European part of Russia. Subsequently a brief overview is given on migration processes between the two neighboring countries, Estonia and Russia (Soviet Union) during the postwar period and the formation of the foreign-born sub-population as the major consequence to these migration flows. From the perspective of population aging this is considered to be one of the basic determinants having unusually significant impact on aging processes in Estonia, particularly compared to other European countries.

In view of long-term migration development, the migration flows between Russia and Estonia have occurred quite precisely in accordance with the classical theory introduced by Wilbur Zelinski in his concept of migration revolution [Zelinski 1971]. Continuous emigration of Estonian population out of its ethnical borders can be dated since the second half of the 19th century, approximately a couple of decades from the beginning of demographic transition. Attributed to several circumstances of simultaneous effect the emigration was mainly directed towards the East, i.e. into the various regions of the Russian Empire. Estonia has been rather outstanding for its relatively high intensity of emigration; approximately 15-20 per cent of the population settled outside its historical ethnic borders before the WW I. However, as the number of Estonian population is small, the absolute numbers of emigrants were not large in comparison with other nations.

Quite a different kind of demographic situation was in force after the WW II, and the migration flows obtained the opposite direction compared to the situation at the end of the 19th - at the beginning of the 20th century. The Estonian migration potential had been exhausted already by the 1920s, however, in Russia the same kind of potential reached the peak in the post-war decades. The new geo-political situation on the southern coast of the Baltic Sea, particularly the incorporation of Estonia into the Soviet Union created favorable circumstances for realizing the Russian emigration capacity in direction of the new colonies. In other words, the unsynchronized demographic development has created a fertile ground for the intensive immigration from Russia and other Soviet Union regions into Estonia. Noticeable reduction of Estonian population in the war and during the post-war social reorganizations as well as the official russification and sovietization policies carried out in Estonia strengthened these objective immigration flows, particularly up to the middle of the 1950s.

The immigration and emigration flows between Estonia and other regions of the Soviet Union, depicted in Figure 1.4., document the extensive migration turnover [Sakkeus 1991]. Upon this data approximately one out of seven immigrants has settled in Estonia, the other six have sooner or later left the country. For instance, during 1956-1991 (since 1956 the migration moves in rural areas were recorded similarly to moves in urban regions, for the previous decade the migration data concerning the rural population is based on estimates) the migration turnover between Estonia and other Soviet Union republics was 1.400 thousand persons, and the amount of net migrants of 200 thousand people. The migration turnover of that extent can be explained, on the one hand, by a significant military-related migration, on the other hand, by the negligible family migration against the dominating single young immigrants who are usually highly mobile for further moves as well.

Comparison of immigration and emigration flows and migration turnover with the number of deaths and births and with the so-called demographic turnover enables to disclose the general role of migration processes on the post-war population development in Estonia. From the data in the attached table it becomes evident that the number of migration moves has even exceeded the number of births and deaths in post-war Estonia. However, the interpretation of these figures requires observance. On the one hand, it is necessary to take into account the possibility of reflecting the same individuals in the migration flows as migration is a repeatable process, which possibility in case of nonrenewable demographic events, i.e. births and deaths, is excluded. Hence, the number of individuals taking part in migration processes is to some extent smaller than the number of migration events. On the other hand, the indirect influence of migration processes, i.e. the increase in number of demographic events contributed by the immigrants must be also taken into a consideration. The general conclusion may be drawn that the figures presented in the table are reflecting the minimum role of the migration processes in the formation of the post-war Estonian population. Thus, the migration events have had at least a twofold effect on the population replacement compared to the demographic events. However, the influence of migration processes on the population aging is less dominant as far as immigration and emigration age curves bear considerable resemblance.

ANNUAL NUMBERS OF DEMOGRAPHIC EVENTS, 1945-1989								
Time period	Deaths	Births	Dem. turnover	Share in total turnover	Immigration	Emigration	Migr. turnover	Share in total turnover
1945-1949	19290	20129	39419	34.7	47274	26814	74088	65.3
1950-1954	15078	20635	35713	30.6	45968	35202	81170	69.4
1955-1959	13110	19899	33009	30.3	39657	36278	75935	69.7
1960-1964	13054	19856	32910	38.8	28631	23333	51964	61.2
1965-1969	14079	19355	33434	35.5	33709	27122	60831	64.5
1945-1949	19290	20129	39419	34.7	47274	26814	74088	65.3
1970-1974	15342	21626	36968	35.5	37518	29770	67288	64.5
1975-1979	17378	21772	39150	39.1	33077	27788	60865	60.9
1980-1984	18343	23332	41675	42.8	30767	24968	55735	57.2
1985-1989	18503	24435	42938	45.4	28663	23049	51712	54.6

Although net migration has been relatively small compared to migration turnover, quite a numerous foreign-born population was formed in Estonia as a result of the post-war migration processes. According to the 1989 census data on place of birth of Estonian permanent residents the share of foreign-borns amounted to 26.3 per cent of the total population. Such a high proportion is considered to be a record figure in the European context being the highest among the previous Soviet Union republics [Katus, Sakkeus 1991].

By definition the foreign-born sub-population is formed by the first generation immigrants. Dealing with the population development, and the population aging, it is needed to consider also the effect of the second generation immigrants. Usually it is complicated to pinpoint the total population of foreign origin due to the insufficient direct data. In case of Estonia, the population of foreign origin, i.e. the foreign-borns, and their second generation can be quite precisely defined indirectly making use of ethnic origin of population.

On one hand, the immigrants were composed by non-Estonians, mainly Slavic nations, of which the majority belonged to Russian ethnicity. On the other hand, Estonia had come out of the WW II as almost an uniethnical country because of the new boundaries reduced in favour of the Russian Federation (see Table). In addition to the data presented in the table the figure depicts the distribution of the non-Estonians by foreign-borns and native-borns. In all generations born in 1945 and earlier the share of native-borns among non-Estonians is less than 10 per cent, even below 5 per cent in some cohorts. In younger age groups the proportion of native-borns increases from cohort to cohort, as far as the second generation of migrants is concerned. During the last population census the number of native non-Estonians living in Estonia amounted to 38.2 thousand (individuals, who have been living in Estonia already before 1945 and their offsprings), out of the total number of 602 thousand non-Estonians. This high correlation between non-Estonians and immigrants of the first and the second generation enable to apply ethnicity as an indicator in distinguishing the Estonian permanent population from the population of foreign origin, in cases when the direct indicators are absent. As appears later, the sub-population of foreign origin affects quite essentially the process of population aging in Estonia, favouring also the regional differentiation, particularly rural-urban differentiation.

ESTONIAN POPULATION BY ETHNICITY				
Census year	Total population	Estonians	Non-Estonians	Proportion of Estonians
*1945	854,000	831,000	23,000	97.3
1959	1,196,791	892,653	304,138	74.6
1970	1,356 079	925,157	430,922	68.2
1979	1,464 476	947,812	516,664	64.7
1989	1,565 662	963,281	602,381	61.5
* estimate				

The population of foreign origin, i.e. the foreign-borns together with their second generation, constitutes 36.0 per cent of total population (1989), thus closely approaching in figures (as well as in composition) the share of non-Estonians in the country (38.5 per cent). That great number of immigrants has had a considerable effect on the population age structure, because the age distribution of immigrants traditionally differs from that of the settled population. In case of Estonia the age curve of immigration has been extremely young, maintaining this shape even during the 1980s. Summing up, it would be more proper to treat the post-war population aging separately with regard to non-migrants and immigrants separately whenever such distinguishing is possible. It becomes evident further that the separate approach to both sub-populations could prove rather fruitful when interpreting of the perhaps odd looking general trends and regional differences of the population aging in Estonia.

From the population aging perspectives Estonia finds itself, especially in this decade, in a rather complicated situation because of the particular kind of migration development. Namely, the Soviet-era union-wide migration flows have been significantly reduced after the collapse of the Soviet Union. The regained independence and withdrawal of Russian troops from Estonia can be considered as an additional factor contributing to the reduction of immigration into Estonia. Thus, the foreign-born sub-population is supported by the immigration processes in considerably less extent compared with the previous decades, and cannot maintain the young age composition any more. At the same time the most numerous generations of immigrants, which settled in Estonia in the 1940-1950s, are reaching the old age limit during this decade. Actually, due to the discontinuity of the immigrant sub-population, Estonia will experience a great, not to say an explosive aging of non-Estonians during couple of forthcoming years. This process will be strengthened by the sharp decrease in fertility. The described situation is an additional reason why the population aging should be carried out separately with respect to the Estonians and non-Estonians.

1.3. Post-war Baby-boom in Estonia

It is widely known that the post-war increase in fertility became characteristic of the majority of these pioneering populations of the demographic transition among which fertility had fallen below the replacement level already before the WW II. In the North- and West-European countries the increase in fertility compared with the pre-war period was remarkable, reaching the levels much higher than the replacement. The new trend in fertility was perceptible in the societal organization of life in general and draw wide public attention in addition to the professional. The new trend was called *baby-boom* which term is still widely used. In regard to the pre-war level the fertility remained high during almost two decades, until the second half of the 1960s. Hence, the baby-boom could not be viewed as a result of the realization of births post-poned at the war time but a real change in fertility behaviour for generations born between the two world wars. It is also a noticeable fact that the long-lasting baby-boom among populations featured by low pre-war fertility had much the same character [Calot, Blayo 1982; Festy 1984; Klinger 1988].

In view of population aging, the particular importance of the baby-boom regards the situation that large generations were born at that time comparable in size to the era of demographic transition. In some countries the baby-boom period appeared even as the constitution of the most numerous birth cohorts. By pointedly statement, pig in phyton, and its gradual movement towards the tail, is summing up the baby-boom effect on reshaping age structure in the countries involved into the process [Samms 1992].

The Estonian post-war fertility development deviated noticeably from what was inherent to North- and West- European countries. Though, certain possible errors have to be taken into account because the data deficit concerning the period preceding the 1959 census, it can fully consciously be confirmed that the phenomenon like baby-boom did not occur in Estonia [Katus 1992]. Presumably, the fertility slightly higher the replacement level at the beginning of the 1950s can be attributed to the immigrants characterized by a remarkably higher level of fertility than common to the non-migrants at that time (Figure 1.6.). No signs of the post-war increase in fertility can be noticed in the 1959 census age composition either. If, regardless of the aforesaid, the short-time and insignificant increase in fertility is contributed solely to the population of national origin, even then the fertility development cannot be compared to the baby-boom trends in other countries demographically comparable with Estonia. Actually, with the possible exception of a year or two the Estonian fertility remained constantly below the replacement level. Only at the beginning of the 1960s the fertility of the first European country, namely Hungary, fell below the Estonian level. Up to this time the Estonian population had experienced steadily low, slightly underreplacement fertility already for 30 years period. Quite evidently, Estonia had one of the lowest fertility levels, if not the lowest one in Europe and consequently in the world during the whole 1950s. Perhaps the situation in Latvia can be identified as more or less the same.

In view of population aging the intensity of fertility is not the most important factor. However, it is important that no more numerous generations were born during the 1950-1960s compared to the earlier as well as the later periods (1970 - 1980s). On the contrary, the birth cohorts of the Estonian population in the 1950s remained more or less on the pre-war level, as the human losses in war and repressions against the permanent population were quickly compensated by intensive immigration. Yet, the post-war birth cohorts were smaller compared to the later generations as the increase of the number of immigrants persistently contributed to the number of births. At the same time, the post-war birth cohorts appeared to be completely smaller compared to the respective size at the end of the 19th century. In this way the post-war rejuvenation of the population *from below* characteristic to the most of the North- and West-European countries at that time did not occur in Estonia. Vice versa, in Estonia the fertility factor had a stimulating effect on population aging.

1.4. Mortality Stagnation

One of the specific determinants of the population aging in Estonia, the influence of which has become apparent with growing evidence at present time and presumably continuing during the next decades, is the stabilization of mortality. In other words, it is the stagnation in mortality development which should be taken into a consideration when

dealing with the current aging processes. Namely, two stages in the trend of life expectancy are quite clearly distinguishable. As stated above, the life span for both males and females was lengthening persistently till the end of the 1950s. Until that time the mortality decrease in Estonia was comparable in every respect with the similar trend in North- and West- European countries. Estonia held the leadership compared to East- and South-European regions as well as to the republics of the Soviet Union regarding the level of life expectancy [Kruminsh 1990].

It is worth to draw attention to the fact, that although the 1940-1950s were the gloomiest in the destiny of the Estonian nation in this century, the life expectancy increased constantly even at that time, when excluding the direct human losses in war and during repressions. The seeming contradiction between the mortality development and prevailing social conditions can be explained by the inertia of population processes. The vitality of the generations does not break in a short time. Regardless of the repressions and poor living conditions the changes in the health of the Estonian population became apparent only a couple of decades later, when the hardest times actually had passed.

At the beginning of the 1960s the growth of life expectancy actually ceased, the following 30-35 years have not brought along extensive changes on the level of mortality (Figure 1.7.). Although the female life expectancy at birth increased in the 1960s and a certain increase in longevity for both sexes could be noticed during the second half of the 1980s, the whole period must be considered as a stagnation in mortality development. Not only the cease in the mortality

LIFE EXPECTANCY CENSUS YEARS, 1959-1989				
Census year	Males		Females	
	e(0)	e(5)	e(0)	e(5)
1959	64.31	62.35	71.62	69.41
1970	65.34	62.16	74.41	70.89
1979	64.21	60.92	74.35	70.69
1989	66.15	62.50	74.97	71.09

decrease, but also the stabilization of life expectancy at a very low level by contemporary standards draws attention. Admittedly, the aforestated little growth in life span, particularly during the 1960s, took place on the account of the decreasing infant mortality. By eliminating this effect the time margin becomes even more distinct separating the stages of the mortality decline and the stagnation of the process. In other words, the cease in the increase of life expectancy is caused, without exceptions, by mortality stagnation of the adult age groups.

Although belonging to the countries with early mortality transition the intensive decrease in mortality among the elderly population characteristic to the fourth stage of the epidemiologic transition [Olshanski, Ault 1986] still cannot be observed in Estonia. Referring to the Laslett's aging concept it denotes a weak and unstable formation of the Third Age population. Apparently, in this respect the Estonian aging pattern will bring along all new problems faced in the aging society, however, it will neither create appropriate conditions for the society to adoptate to the new population situation nor take potential advantage of the slow alteration of generations.

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Thus, the mortality maintaining almost at the same level for 35 years has not been the aging determinant of considerable importance in Estonia. This situation is rather characteristic to many other East-European countries, but due to the early demographic transition the mortality stagnation especially in Estonia has had a long-lasting effect. Because of the stable high mortality level since the 1960s, one must be cautious with the proportion of elderly in the total population as a general indicator measuring the process of aging. One should be particularly cautious at the spatial comparisons with the countries, where the life expectancy has had continuous increase also in the recent decades. In these countries the proportion of elderly has increased hand in hand with the decrease in mortality, in Estonia the impact of the given factor has been insignificant. All but little attention should be paid on the possible misinterpretation of the general process of population aging and the effect of one its concrete determinant (mortality development). Particularly, upon the short-term treatment of the aging process the regional comparisons may give a false picture about the general trend of the aging process. This is especially consistent with the stages of population aging in Estonia.

The widening gap between male and female life expectancies is another aspect of the mortality stagnation in the East-European countries. Estonia is rather a leading than an average country in Eastern Europe as it comes to sex differences in mortality. The gap between male and female life expectancies widened constantly until the end of the 1970s, exceeding the 10 year point in the 1979 life table. Yet, during the following decade the difference in male and female life expectancy has slightly decreased. The new rising trend is expected for the recent years (Figure 1.8.).

In respect of population aging, the sex differences in mortality are of considerable impact on the process. The almost 10 years gap in life expectancy causes the essential sex disproportions in an adult population already before the old age which are accelerating among the elderly. As the average male survival rate in old age is much shorter compared with females, the turnover of the male elderly population is much more rapid. In other words, the representation of birth cohorts among elderly is remarkably biased by sex which situation increases social heterogeneity. Primarily, the sex differences have an effect on the development of the oldest old, where the share of females overshadows males several times.

Besides the aging trend the sex-biased influence of mortality is of particular importance in the formation of family and household structures of the elderly population. The far earlier death of males alongside with the additional difference in male and female marriage age have caused a lasting female widowhood period in Estonia. It has to be taken into account, that the birth cohorts the 1910-1920s characterized by low fertility have already reached old age: approximately one out of four females in these cohorts remained childless due to the low fertility regime of the 1930s. Presently, the long female widowhood period coincides with the high share of childless old women in Estonia. The current family and household structures of elderly population have been additionally affected by war activities and repressions. In general, the Estonian family and household structures of elderly are deformed. For example, in the modern world Estonia is one of the countries with the highest number of old women without close relatives.

Figure 1.1. INDICES OF OVERALL AND MARITAL FERTILITY

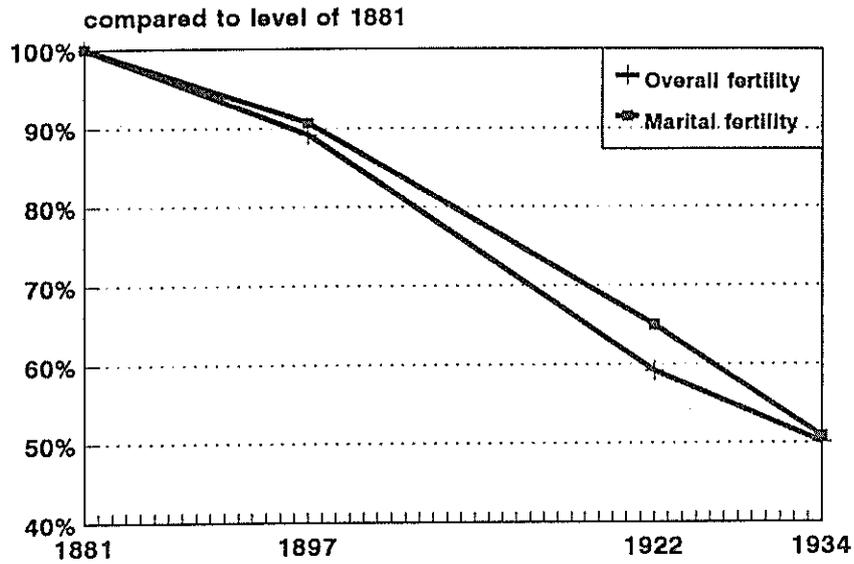


Figure 1.2. LIFE EXPECTANCY AT AGE 0 AND 5

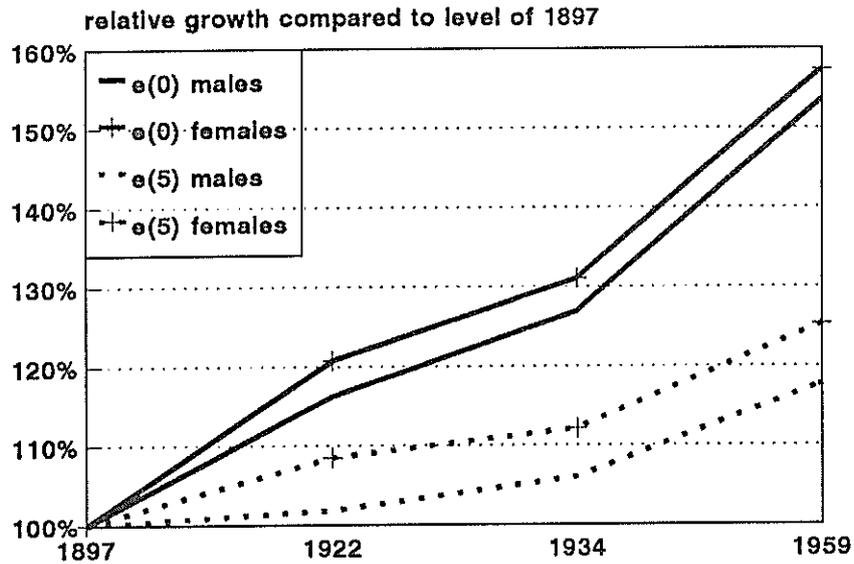


Figure 1.3. INDEX OF OVERALL FERTILITY
Compared to level of Estonia, 1881 and 1934

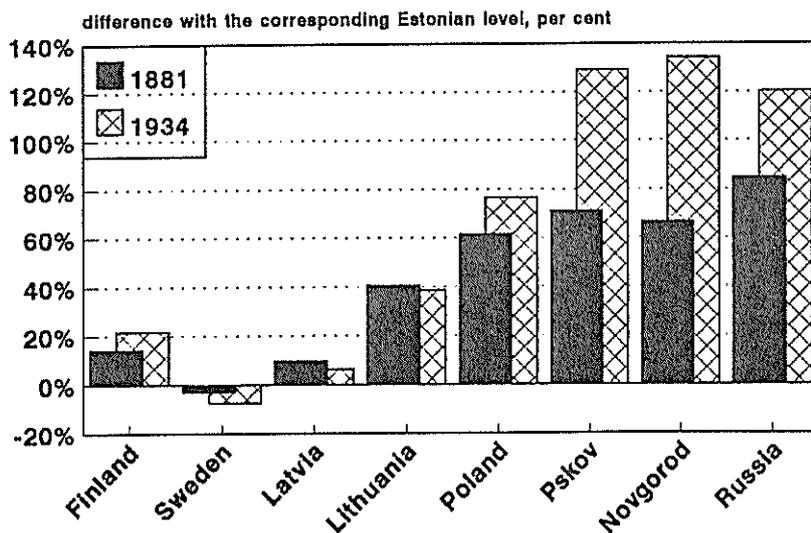


Figure 1.4. MIGRATION FLOWS

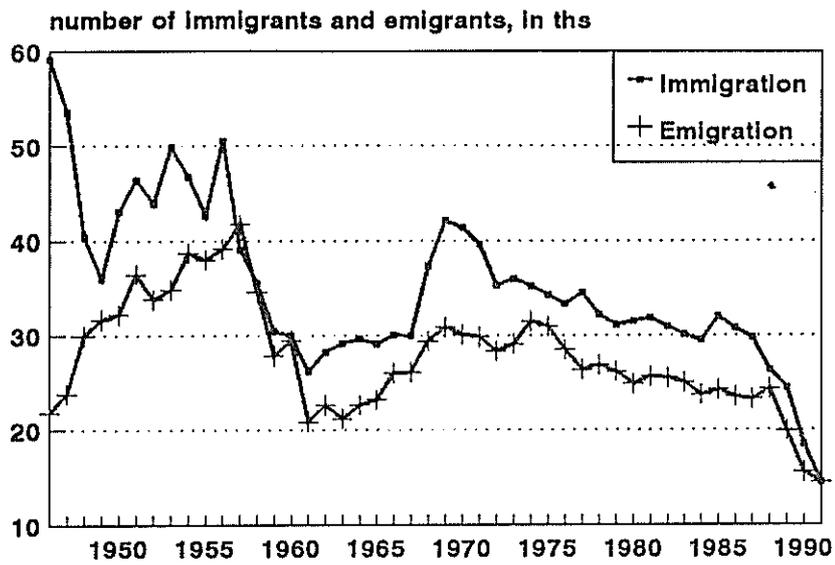


Figure 1.5. DISTRIBUTION OF NON-ESTONIANS BY PLACE OF BIRTH, Estonia, 1989

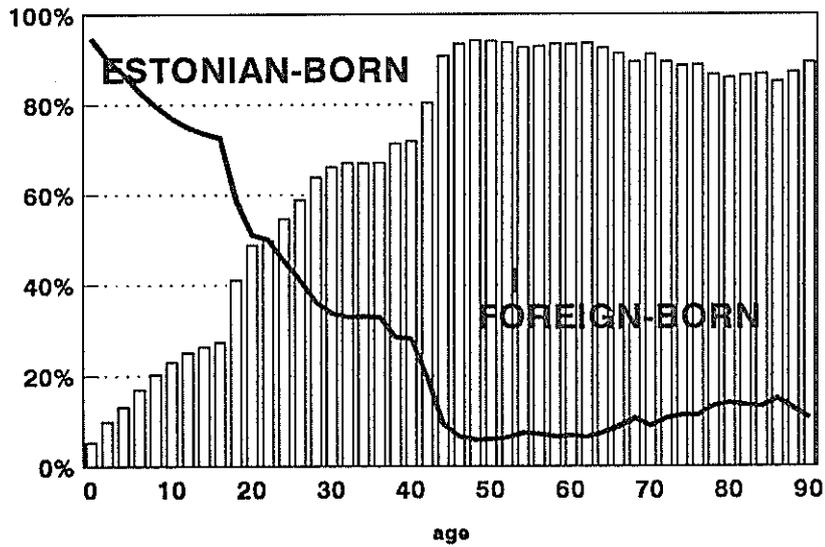


Figure 1.6. TOTAL FERTILITY RATE

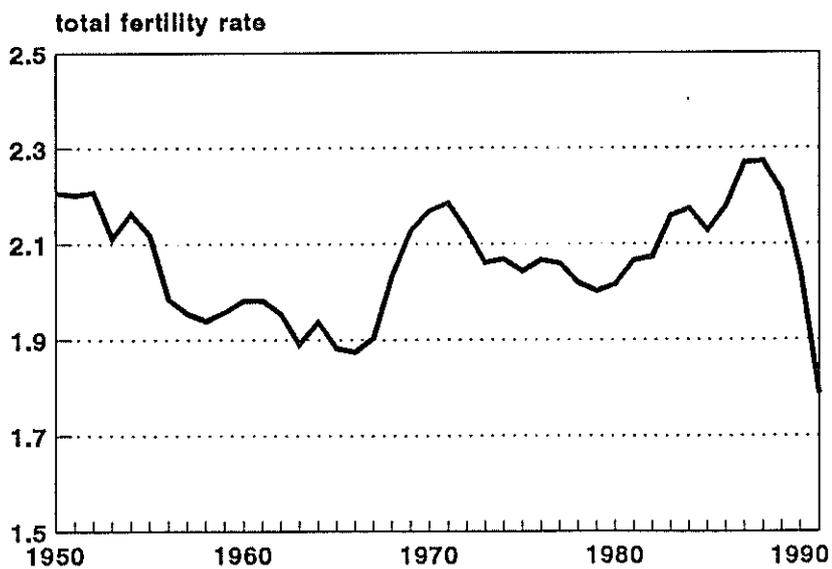


Figure 1.7. LIFE EXPECTANCY AT AGE 0 AND 5

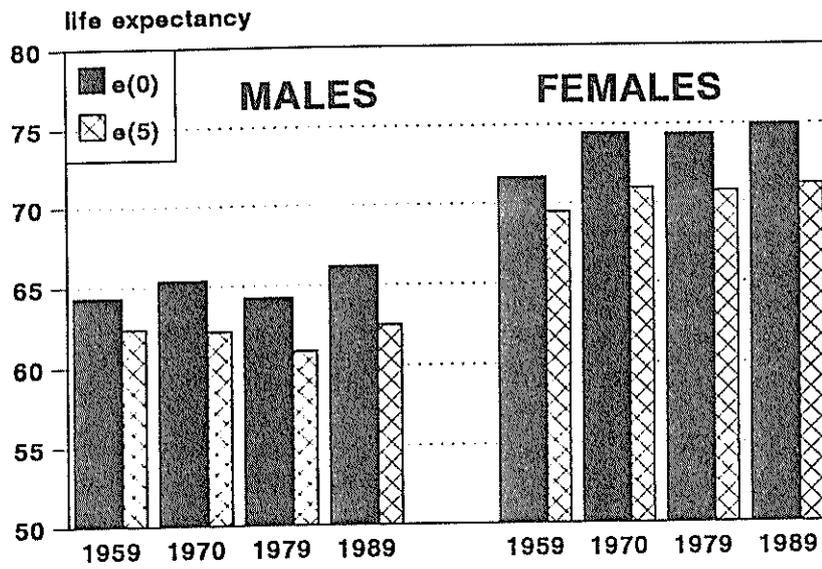
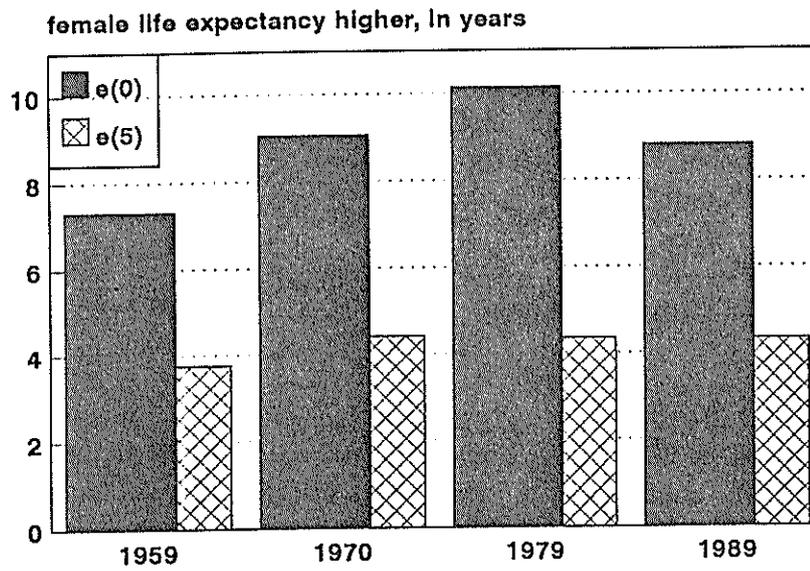


Figure 1.8. SEX DIFFERENCE IN LIFE EXPECTANCY



2. POPULATION AGING

The aim of the following analysis is to outline the main developments of the aging process in Estonia. Besides the major trends the paper attempts to show the heterogeneity of the aging process. The analysis is based on general indicators calculated on census data. The same indicators are used also for the analysis of the future perspectives in population aging until the year of 2030, relying on the respective data of population prognosis.

Upon the heterogeneity of the population aging the differences between immigrant and native born sub-populations as well as in urban and rural areas have been examined. The introductory treatment concerns the regional aspects of aging and the changes in the economic dependency accompanied by the aging.

The population aging is mainly discussed upon the data from nine Estonian censuses. The first census on the territory of Estonia took place in 1881, followed by one in 1897 and three between the two world wars (in 1922, 1934, and 1941). After the WW II there have been four Soviet censuses (in 1959, 1970, 1979, and 1989). The analysed census data, partially recalculated in comparability purposes are derived from the Databank of Estonian Population. This Databank is the central source of information for Estonian population development systematically developed by the Estonian Interuniversity Population Research Centre.

2.1. General Trend of Population Aging

To outline major trends of population aging, two easily calculable and comprehensible general indicators have been made use of: (1) the proportion of the elderly in total population, and (2) the median age of population. Besides those two, the Laslett indices of aging have been used as well.

2.1.1. Aggregated Population Age Groups

The determinants of population aging have quite frequently had compensatory effect on the Estonian population development, especially in the last half a century. Due to that the changes in population age distribution, and in proportion of elderly have been somewhat smaller than typical for the usual aging process characterizing the demographic transition and the following periods. Without these compensatory effects one could expect much larger changes in the population age structure alike experienced by many other nations. Figure 2.1. presents the relative dynamics of the three aggregated age groups for the last 150 years. The absolute figures by census years are presented in the table.

The major changes in population age distribution had been already developed during the second half of the 19th century, and the first half of the 20th century. The proportion of children (population aged 0-14 years old) in total population gradually declined up to the 1930s and stabilized afterwards for a half of a century more or less at the same level. Such a stability in share of younger age groups could be a surprise if not the specificity of the Estonian fertility trend, particularly the absence of post-war baby-boom. In general the fertility component affects the population aging in Estonia to a much lesser extent than usual in European countries.

POPULATION NUMBER AND MEDIAN AGE OF POPULATION CENSUS YEARS, 1881-1989					
Census year	Total population	Aggregated age groups			Median age
		0-14	15-59	60+	
1881	881,455	293,639	516,319	71,002	23.52
1897	958,351	306,173	558,295	93,443	24.99
1922	1,107,059	282,215	693,180	130,540	28.64
1934	1,126,413	261,929	710,718	152,458	31.29
1941	999,552	239,615	603,900	156,037	34.37
1959	1,196,065	271,527	744,273	179,996	31.83
1970	1,351,640	298,293	825,982	226,062	33.62
1979	1,464,476	315,725	910,012	238,405	33.89
1989	1,565,662	348,738	953,525	263,399	34.08

The proportion of elderly (population aged 60 years old and over) increased rapidly up to the 1940s. Later intensive immigration and mortality stagnation have kept the proportion of elderly nearly constant. This should be probably regarded as the major specificity of the aging process of the Estonian population in European context. However, the following analysis reveals the noticeable heterogeneity in this stable trend between the immigrant and the native sub-populations as well as between regions.

2.1.2. Proportion of Elderly and Median Age

Besides the proportion of the elderly in total population, the median age of population is another general indicator of the aging process. In Figure 2.2. both indicators are presented. Although the scales of the indices are rather different, they both describe the aging trend in Estonia rather likewise. This figure clearly demonstrates the quite sharp increase in the proportion of elderly until the census of 1941. The proportion rose from 8 per cent in 1881 to 16 per cent in 1941, i.e. doubled in sixty years. The next fifty years have added only one percentage point, while the sub-periods of 1941-1959 and 1970-1979 are characterized even by the decline in the proportion of elderly. However, such a stability is only apparent, the data presented below prove that the trend by the proportion of elderly is turning into a fast increase in the 1990s.

By making use of the median age quite the same picture of general trend of population aging could be received. After a rapid increase until the 1941 census, the median age of

the population has not risen any more in following fifty years. The short time fluctuations of the index are proved to be larger during that period compared to similar trend by the proportion of elderly. The most significant deviance can be followed in pattern of decline in 1941-1959: the median age of population decreased by almost two years in this period whereas the following three decades are characterized by slow increase.

Though the two main indices of population aging reveal coinciding trends the differences between the scales should not be misviewed. Comparison of the relative growth indices of the both indicators (Figure 2.3.) outlines a greater dynamicity of the proportion of elderly compared to the median age. During the period under observation the proportion of elderly had doubled, while the median age of population increased only by 1.5 times. In spite of differences in scope of growth the general pattern of the trend is still remarkably similar.

2.1.3. Laslett Indices of Aging

Peter Laslett has used in his hereby cited paper two other special indices of the population aging to outline the aging process as the principal change in population age distribution which corresponds to the demographical transition. These two indicators are the proportion of elderly in the adult population (population aged 60 years old and over to persons over the age of 25) and the proportion of survivors at the age of 70 in the adult generation. Both indicators are presented simultaneously on the same graph (Figure 2.4.) using different scales for each.

The rapid population aging in Estonia occurs more or less precisely at the treated time-period. The previous long-term period of relative stability of both indices characteristic for the traditional population reproduction had already been passed in Estonia by the 1880s and the aging processes of population had started. Laslett defines the numerical criteria of the emergence of the Third Age population as the level of 0.25 by the proportion of elderly, and as the level of 0.50 by the elderly survivors. The stable formation of the Third Age population could methodologically be regarded as the cessation of the aging process. The emergence of the Third Age population along with the principal changes in social role distribution between the major population groups shapes the most important distinction of the population aging process.

Both numerical criteria for the total population in Estonia were almost met in the pre-war period. However, it must be noted that the proportion of elderly had stabilized at very close to the qualification level until today. Further growth in the proportion of elderly as typical for the forth stage of epidemiological transition has not yet taken place in Estonian demographic development. Yet, it can be concluded that the main changes in the population age distribution had taken place already before the WW II. Though the importance of later trends in population aging is by no means undervalued, it has to be stressed that the irreversible trends of the aging process had come to the end by that time.

2.1.4. Average Annual Increase and Growth Rate of Elderly

Somewhat different picture on the aging process in Estonia could be demonstrated by comparing the average annual growth rate of the elderly population to the corresponding index of the total population (Figure 2.5.). Quite a few noteworthy deviations are being identified in the growth rates at the treated time-period. The annual elderly growth rate has dropped to its lowest level in the period of 1934-1941. In fact this fluctuation was caused by ca 10 per cent loss of population during the first Soviet occupation period (June 1940 - September 1941). Despite the decrease of that extent in total population, the growth of the elderly continued. The same intercensal period marked also the biggest difference in both growth rates during the whole century. Originating from extreme external factors, it does not have much importance from the viewpoint of internal aging developments.

The immigration to Estonia has been so intensive at the first post-war decade, that the growth rate of total population rose even to higher level than that of the elderly. It has happen despite the reversal of the previous declining trend of the elderly growth rate into a rise. In other words, the Estonian population rejuvenated at that period, and particularly migration development, not fertility factor should be regarded as aetiological. The figure brings out another, even more distinctive rejuvenation period of Estonian population, 1970-1979. That intercensal period in turn was preceded by the highest elderly growth rate during the 1959-1970. These fluctuations in aging process have occurred due to the movement of the largest Estonian birth cohorts from the 19th century.

The younger native-born generations after the largest were much less numerous due to rapid fertility decline, furthermore they were heavily influenced by the WW II activities. The relatively young immigrant sub-population, at first almost ineffective on numbers of the elderly, caused however, quite a significant increase of total population, and consequently contributed to the emergence of the 1970-1979 rejuvenation period a lot. In the 1980s the elderly growth rate once more surpassed the corresponding index of total population. At the present decade, the trends of the two indices have been proceeding noticeably apart. Upon quite intensive general depopulation the elderly growth rate has been increased considerably under the influence of the native-born as well as the immigrant sub-populations development. In regard to the population aging both sub-population groups demonstrate the development towards principally the same direction for the first time after the WW II.

That uneven dynamics of the elderly growth rate is being expressed also in considerable changes in corresponding absolute numbers. Figure 2.6. presents the average annual increase of the elderly population by the intercensal periods. Relying on previous information, the smallest increase in number of the elderly in the last pre-war period would be expected. At the same time the most intensive aging period of 1959-1970 is rather expressed. This decade becomes that outstanding owing partly to situation that the annual number of elderly increase has been almost three times lower in both preceding and succeeding decades. Furthermore, the annual growth rate of elderly in the 1950s and the 1970s has been even lower than that in the first decades of the present century. That quite a unique situation is reflective about cumulative effect of early fertility decline in Estonia, and significant loss of population in the war and post-war social rearrangements.

The 1980s were distinguished by intensified increase in the number of population reaching the old age, which, continuing in the present decade, is turning into one of the main trends of the Estonian population development at the end of the century. According to the prognosis a temporary over-aging period is expected to emerge when the largest immigrant cohorts reach the limit of old age. In case of Estonia the period of relatively high growth in numbers of the elderly population will coincide with the depopulation period. This could be considered as another feature specific for Estonia.

2.2. Aging of Elderly

The population aging process does not only affect the broad age proportions of total population but also creates the changes in the age distribution among the elderly population themselves. The elderly are also aging, namely the increase in proportion of the oldest olds among elderly, and the growth of mean age of the elderly are the trends to be mentioned in this connection. In the demographic literature the special concept for the very old population - oldest old - has been introduced. Usually the population at the age of 75 and over is considered to belong to that group but the higher age limits are also mentioned by different authors. Another most frequently used age limit is 85 [Serow et al 1987; 1990].

The concept of the oldest old signifies a population group which cannot cope entirely on its own with all necessary activities. This does not have to denote handicapness or sharp decrease of physical ability, but refers to the formation of some kind of dependency (including psychological dependency) of the oldest old on others. The oldest olds tend to need help with housework which used to be easily manageable alone before. They need support in carrying through some specific social transactions. The oldest olds are gradually retiring from active participation in social life. The principally similar dependency (although forms of dependency are different) on other people has been experienced by every individual in his childhood. It is remarkable that the definition of the oldest old and their age limit correspond to great extent with Peter Laslett's interpretation of the Third and Fourth Age populations. The transition from the Third Age to the Fourth Age bears resemblance to the features commonly assigned to the oldest old.

Generally the level of importance of social problems accompanying the population aging grows with the increase of the proportion of the oldest olds in elderly. The oldest olds are the agents intermediating several new social problems, which the society has not recognized earlier or which have been solved entirely within the households. As regards, the treatment of the oldest old does not reveal only the interest in one specific age group of elderly, it is actually the investigation of an important co-process of the population aging. That is why the oldest olds have been under profound analysis [Grigsby 1991; Rosenwaike, Dolinsky 1987; Serow et al 1990; Suzman et al 1987]. The development of the oldest old population does not necessarily proceed synchronously with the general population aging. In this quality the oldest olds gain even more importance as an independent focus of study [Myers, Boyle, Kinsella 1987].

The increase of the proportion of oldest olds in elderly population (population aged 75 years and over to persons over the age of 60) is presented in Figure 2.7. During the century the proportion of the oldest olds has constantly risen, increasing from 15 percent to 30 percent by today. In contrast to fluctuating trends in proportion of the elderly the increase of the proportion of oldest olds seems to be much more stable. We can still note the acceleration of the growth in last two decades. In that way the Estonian population development is confirming the general property of the aging process that the increase in proportion of oldest olds accelerates when the proportion of the elderly is starting to stabilize. That is quite an expected situation, as the intensive rise in proportion of the elderly, *ceteris paribus*, restrains the increase in proportion of the oldest old. It is remarkable that the increase in proportion of the oldest olds accelerates despite of the relatively long-lasting period of mortality stagnation.

By defining the age limit to 85 years instead of 75 years, an even faster increase in numbers of the oldest olds becomes apparent on the next figure. Up to the 1959 census the proportion of oldest olds, defined by two different age criteria, has not increased exactly synchronously, however, the cumulative increase has been identical for the 80 year period: 50 per cent by both indicators. During the last three decades the increase by both indicators has accelerated but trends of the indicators have considerably diverged. Cumulatively, the proportion of the 75+ year olds in elderly population has doubled during the century, the analogous proportion of the 85+ year olds has almost tripled.

Another way of measuring the aging of the elderly is to compare the age curves at different points in time. Figure 2.9. displays the age curves of the three last census points compared to the corresponding level in 1959. The graph demonstrates clearly a general tendency: the older the age group under concern, the larger is its relative increase. Certain fluctuations are also observable among which the most important is created by a relatively small birth cohort from the WW I era.

2.3. Gender Differences in Population Aging

The lengthening of life-span during the demographic transition is being accompanied by changes in gender distribution of population. The mortality development affects the gender structure at most among the elderly, as the female survivorship increases much faster than that of males at older ages enlarging the proportion of women and consequently causing continuous change in the gender structure of the elderly. Besides the mortality development, the gender distribution of the Estonian generations has been seriously affected by population crises of the century: two world wars and the Soviet occupation. It could be stated that the changing proportion between males and females among elderly splits the population aging process into two different trends specified by gender. The second important factor influencing the gender differentiation of population aging is enfolded in migration processes noticeably uneven by gender. Besides the external migration frequently the internal migration has also a significant effect on the formation of gender differences of aging, being especially explicit on the regional level. Both mentioned factors causing gender differences have affected the population aging in Estonia stronger compared to many other European nations.

NUMBER OF ELDERLY POPULATION CENSUS YEARS, 1881-1989							
Year	Total number 60+	Age groups					
		60-64	65-69	70-74	75-79	80-84	85+
1881	71,002	30,072	18,362	11,830	6,103	3,226	1,409
1897	93,443	34,868	24,904	17,865	10,064	4,100	1,642
1922	130,540	47,557	34,780	24,341	13,251	7,333	3,278
1934	152,458	49,554	40,082	32,317	18,267	8,786	3,452
1941	156,037	48,084	42,402	*65,551			
1959	179,996	55,357	46,714	36,290	23,652	12,653	5,330
1970	226,062	68,222	59,471	43,440	29,110	16,939	8,880
1979	238,405	55,235	63,752	51,549	36,968	19,457	11,444
1989	263,399	84,504	58,355	41,155	40,627	24,449	14,309

* Age group of 70+

Figures 2.10. and 2.11. present the gender differences of the population aging by two general indices: proportion of elderly and median age of population. In case of the first indicator the difference in gender is stated in percentage points, and in case of the median age in years. The dynamics of gender differences outlines the two notable trends. First, the general trends of gender differences by both indicators are similar to the trend of population aging measured by the same indices (Figure 2.2.). In other words, the formation of gender differences has been almost parallel to the development of the aging process. That emphasizes the inevitability of increase in differences between male and female sub-population in the course of aging. In this quality it is a distinctive source for social problems.

PROPORTION OF ELDERLY AND MEDIAN AGE OF POPULATION BY GENDER CENSUS YEARS, 1881-1989				
Census year	Males		Females	
	Prop. of elderly	Median age	Prop. of elderly	Median age
1881	7.41	22.78	8.66	24.22
1897	8.96	24.08	10.49	25.79
1922	10.44	27.04	12.99	30.02
1934	11.50	29.29	15.34	33.24
1941	13.62	32.57	17.14	35.61
1959	11.05	28.21	18.18	35.10
1970	12.00	30.30	20.71	37.28
1979	11.49	30.29	20.40	37.76
1989	11.96	31.33	21.09	36.85

The other noteworthy trend is the sharp growth in gender differences occurring in two decades after the war. That intensive growth period is accentuated by the decrease of gender differences in the last pre-war decade and by the stabilization of these differences during the last decades. Expectedly the gender differences have increased particularly fast among the oldest olds. The changes in the

proportion of female oldest olds compared to similar index for males are presented on Figure 2.12. The oldest olds have been defined within the age limits of both 75 and 85 years. Based on these data it could be stated that at the beginning of the population aging process the male and female proportions of the oldest olds (according to the age limit of 75 years) have been almost equivalent to each other. Concurrent to the population aging the female proportion of the oldest olds has increased more rapidly compared to the trend of the male index, and stabilized then at the level of ca 40 per cent difference. When using the age limit of 85 years to define the oldest olds, the predominance of females in numbers has been much bigger, the increase in gender differences more intensive, and the stabilization of the growth of these differences not yet achieved.

To complement the trend examination of gender differences in population aging, the proportions of males and females by age groups is being studied. The latter can conventionally be defined as a curve for gender differences. Based on data of the last census, the comparison is presented on Figure 2.13. The predominance of women grows with every age group: their relative proportion increases from ca 60 per cent in the age group of 60-64 year up to ca 80 per cent in the age group of 85 year old and over.

The gender differences in population aging in Estonia are larger than usual accelerating various social problems. One of the major problems caused by too large gender disproportions is the relatively early breakdown of marriages due to death of one spouse, particularly due to death of a husband. The shortening of average duration of marriage, and the minimized opportunity to remarry at the elderly age, have brought about an enormous number of single elderly women in the society. This indicator regrettably makes Estonia a leading country in the world. Under the circumstances, *ceteris paribus*, the average ability of the elderly to cope with themselves decreases. In other words, the Third Age population is transforming to the Fourth Age unnecessarily early in the life-cycle.

2.4. Future Developments of Population Aging

Inertness of population aging allows to follow its future development on the basis of population prognosis without major difficulties. The general future trends of population aging in Estonia until the year 2030 are presented further below. The analysis makes use of two population prognosis. The first concerns the medium variant of the UN population prognosis of the 1994 revision [United Nations 1994]. The second has been produced at the Estonian Interuniversity Population Research Centre from which two versions, the so called optimistic and basic, are introduced. The basic variant presumes the stability of age intensities of the current demographic processes (demographic situation in 1993-1994), while the optimistic version presumes the substitution of decrease in fertility by a moderate increase, and the gradual decline in mortality.

In the first Figures 2.14. and 2.15. the dynamics of the two main indicators of population aging are presented. As the three variants of prognosis do not differ from each other notably, the general trend is clearly identified: the proportion of elderly will rise from the present level of 18 per cent up to 25-27 per cent in 2030, and the median age of population will be around 43-44 years at the end of the observed period. As is shown in next paragraph, the main part of these changes is caused by the sub-population of

immigrant origin. Until recently the latter has been characterized by an artificially young age structure, and in this quality has hindered the normal course of the aging process. However, the renewed wave of more intensive aging processes of the native-born sub-population, having started in the 1990s, should also not be underestimated. According to the prognosis the general aging trend by these two indices seems to be quite a linear, not considering the internal heterogeneity of the population aging process.

The analysis of the annual growth rates of elderly population brings out one of the mentioned waves in recent future (Figure 2.16.). In the coming decade, particularly in the second half of the 1990s, the most intensive period of population aging will be expected. The average annual growth rate of elderly population will reach the level of the 1960s. It is noticeable that one of the three variants of the prognosis, namely the UN one, does not forecast this high a growth, however, that is probably caused by the deviation of the actual patterns of the Estonian life-tables compared to the corresponding survival patterns of the standard life-tables used for this variant of prognosis.

PROPORTION OF ELDERLY AND MEDIAN POPULATION AGE POPULATION PROGNOSIS, 1989-2030						
Year	Optimistic variant		Basic variant		UN medium variant	
	Prop. of elderly	Median age	Prop. of elderly	Median age	Prop. of elderly	Median-age
1989	16.82	34.08	16.82	34.08	16.82	34.08
1995	18.34	35.43	18.34	35.43	18.17	35.68
2000	20.16	37.01	20.15	37.14	19.26	37.07
2005	21.49	38.18	21.35	38.53	19.46	37.98
2010	22.24	39.05	21.90	39.51	20.05	38.58
2015	23.61	40.01	23.18	40.68	21.36	39.16
2020	25.05	40.86	24.70	41.85	22.96	40.07
2025	26.28	41.80	26.17	43.16	24.12	41.28
2030	26.76	42.82	27.01	44.60	24.72	42.34

When the largest immigrant cohorts from the first post-war decade reaches the limit of old age at the beginning of the next century, the average annual growth rate of elderly population starts to decrease. Although in the second decade of the 21st century the trend of growth rate turns to rise again, it will not reach the level depicting our present decade. The gradual deceleration of the growth rates will start from around the year 2020, and at the end of the treated period the number of elderly will stabilize. It must be noted that the future aging process, particularly intensive during the next decade is occurring in the context of remarkable depopulation for the whole upcoming period.

Figure 2.17 presents the development of the aging process by the absolute annual increase of the elderly population. During the most intensive sub-period of aging ca 6000 elderly persons will annually be added. That average annual increase will surpass the hitherto existing maximum from the 1960s with 1500 persons. The absolute figures help to understand that the prognosticated increase of the elderly population will be actually the largest than experienced in Estonia up to now.

Some specific developments on the background of more or less uniform general trend, such as the wave of fluctuate character connected with the dynamics of the oldest olds (Figure 2.18.) also deserve attention. At first sight the presumed decrease in the proportion of oldest olds in the 1990s may seem surprising. By recalling the emergence of a large generation into the elderly population at that decade, which inevitably brings about temporary changes in the age distribution of the elderly in favour of the younger sub-groups among them, the decreasing proportion of the oldest olds is certainly understood as logical. When the aforementioned numerous generation reaches the age limit of the oldest olds, the expected accelerating growth in proportion of the oldest olds is also of customary nature .

The high level of gender differences in population aging had been already accentuated. The Figure 2.19. promises some diminution of these differences at the time of the prognosis period. The position of females in the elderly population will naturally remain predominant but instead of further increase in difference, the decrease from 9.5 percentage points to 8.5-9.0 points is expectable. In contrast the gap between median ages of male and female populations show a different trend by widening up to the year 2005 and turning to a downwards trend later on. At the end of the prognosis period the gender difference in mean ages will be less than 5 years.

2.5. Ethnic Differences in Population Aging

The Estonian population of migrant origin forms a considerable proportion, almost two fifths of the total population. Due to its size this sub-population group affects all the demographic processes in Estonia, particularly those characterizing at least similar behaviour between the native-born and immigrant sub-populations. Unfortunately, the direct information on place of origin/birth of the Estonian population is available only for the last census of 1989. Neither the earlier Soviet censuses nor the post-war vital statistics have registered the origin of people. Nevertheless, in case of the absence of direct indicators, it is possible to distinguish both sub-population groups by applying a characteristic of ethnicity, as described in the previous chapter. The following analysis of aging differences between the native-born and immigrant sub-populations relies namely on this kind of approach.

Although the total population is divided into the Estonians and non-Estonians by making direct use of the ethnic characteristic, and consequently drawing out the general ethnic differences of the population aging in Estonia, the results for the non-Estonians should not be interpreted as their ethnic peculiarities. Paradoxically it can be stated that by applying ethnic indicators the detected heterogeneity in population aging is not that reflective of ethnic differences than of stressing two other circumstances of utmost importance in the entire population development of Estonia. Considerable differences between the native-born sub-population and that of the foreign origin evolve the scope and nature of particularly the two factors.

First, the very unstable age structure of the non-Estonians, which has influenced and will in the future the course of aging of this sub-population, is not an ethnic feature, but common to any migrant population. The present age distribution of the non-Estonians is

determined by variation in numbers of immigrants during the post-war period, by the migration age curve, by higher or lower levels of settled down immigrants during the time, and by other similar factors concerning the migration processes. Namely the effect of the mentioned factors is apparent on the non-synchronous aging processes of the non-Estonians compared to the Estonians. At the same time the aging process of native-born Russians does not significantly differ from that of the Estonians. Due to its small number the native-born non-Estonian community does not have an explicit effect on the general aging process.

Second, in the aging process of the Estonian and non-Estonian sub-populations a half a century long non-synchronous demographic development has been consequential. The relatively numerous Russian (Slavic) migrant groups are also represented in many other regions of former Soviet Union, and like in Estonia their age distribution is more or less unstable, however, the level of differences in aging process between native-borns and immigrants is not anywhere in the area comparable with the one in Estonia. In most other regions a demographic similarity or even concurrence between the native-borns and immigrants is typical. As is known, the Estonians differ significantly from its eastern neighbour by timing of demographic development. Certain similarity in the aging process with Latvia could be observed where the largest native-born birth cohorts also reached the old age in the 1960s-1970s; that has not happened yet in other regions of the former Soviet Union. Consequently, Estonia is being distinguished even among the Baltic countries by remarkable aging differences between the native-born and migrant sub-populations, particularly clearly when compared to Lithuania.

As the intensive immigration to Estonia and the formation of the migrant sub-population as a numerous stratum of society took place at the post-war period, the comparative analysis between the native-born and migrant sub-populations is relevant for the last half of century period. Accordingly, the following study is limited to the intercensal periods of 1959-1989.

Figure 2.20. demonstrates the dynamics for two main indicators of population aging differentiated by origin (see also table). Both the level and trend of population aging, measured by proportion of the elderly and median age of population, are extremely different at both sub-population groups. Above all the large gap between the levels of indicators at the beginning of the observed period, 1959, demands attention. The proportion of the Estonian elderly (18 per cent) surpasses the level of the non-Estonians (8.5 per cent) more than twice. The difference in median age between the sub-populations is almost eight years. The proportion of non-Estonian elderly is more or less comparable with that level of the Estonians 80 years earlier, in the 1880s (see Figure 2.2.).

The differences noted at the beginning of the period have remarkably been reduced during the observed period. At 1989 census the proportion of the Estonian elderly distinguishes from that of the non-Estonians "only" by 5-6 percentage points, and the difference in median age had levelled even more. These differences had been decreasing mainly due to rapid aging of the non-Estonian sub-population. In fact, this had been a step-by-step normalization of their distorted age distribution when viewed from the point of population reproduction. Even 10 years after the beginning of explosive immigration (in 1959) the non-Estonian age structure has been extremely young, but subjected to unavoidable and rapid transition. The differences between the trends characteristic of the two sub-

populations are accentuated by the fact, that the main indicators of population aging for the Estonians were already declining after being at top level. The proportion of the Estonian elderly has been decreasing already during two decades, and the median age during the last decade. These trends of decrease by both indicators were not significantly large but the lack of growth in main indicators of population aging during the last 20 years is in itself an important phenomenon, not mentioning a completely opposite trend of the non-Estonians.

Relying on the reported data it would not be an exaggeration to refer on actual splitting of Estonian population in the aging process. The native-born (Estonian) sub-population has rejuvenated after the largest birth cohorts had reached the old age in the 1960s, which was supported independently by the stagnation of mortality and a noticeable fertility rise at the end of the 1960s. Accordingly, the Estonians have been rejuvenated from the apex of the age pyramid as well as from the bottom of it. The migrant population, including their second generation, has been aging fast during the observed period. In shaping the general population trend, due to described great differences between the two sub-populations, the continuously changing balance of the Estonians and the non-Estonians in total population at every certain period is undoubtedly important.

PROPORTION OF ELDERLY AND MEDIAN AGE BY ETHNICITY CENSUS YEARS, 1959-1989				
Census year	Estonians		Non-Estonians	
	Prop. of elderly	Median age	Prop. of elderly	Median age
1959	17.98	34.78	6.72	27.08
1970	20.80	36.09	8.11	30.36
1979	20.05	36.30	9.36	30.38
1979	19.12	35.12	13.15	32.95

The large differences in main indicators of aging between two sub-populations stress the need to apply other respective indicators for displaying the ethnic differences as well. In this context it is reasonable to use Laslett indicators of aging which were already applied to total population of Estonia (see Figure 2.4.).

The Laslett indices are presented on Figure 2.21. The proportion of the elderly in adult population points out the range of ethnic differences in aging process quite similarly to formerly described main indicators. Additionally, it is notable that the level of the index for the non-Estonians has not reached the 25 per cent limit yet, which was defined by Laslett as the criterion for an advanced stage of aging process. The given index for the Estonians has during the whole period constantly been above the level of that criterion. Therefore the differences between the Estonians and the non-Estonians do not illustrate only the quantitative side of the aging process, but also as to the essence, namely in view of the formation of the Third Age population, these groups are principally different.

The Laslett second index of population aging, the proportion of survivors in adult population, shows greater closeness between the two sub-populations. Also the time trend of that indicator is nearly similar for both groups. The migrant sub-population has similarly to Estonians passed the demographic transition, furthermore, the stagnation of mortality is characteristic for both groups. Most remarkable is the similar decreasing trend in proportion of survivors during the 1970s. The somewhat increasing trend during the last decade is also quite similar. Most certainly, the same indicator brings out also some

differences between the Estonians and the non-Estonians. The current gap of 3 percentage points was formed in the 1960s-1970s and has not yet shown any tendency of decrease.

Figure 2.22. depicts the aging process in the post-war period making use of the number of average annual increase of elderly population. On that graph the splitting, even opposite development of the Estonians and the non-Estonians is well described providing almost a mirror image: the 1960s were characterized by an annual increase of 3000 elderly Estonians, the 1980s by the same average annual increase concerning the elderly non-Estonians. When the increase in one group was in its maximum, the increase in the other group was in its minimum. This figure also helps to understand the influence in scope of the migrant population on demographic development in Estonia: the graph displays absolute numbers which make the two sub-populations well comparable.

The described development of the two sub-populations of a compensatory nature has been a significant factor for the relative stability of the aging process in Estonia during the whole post-war period which in most other countries has been much more dynamic. That figure also helps to understand the expected situation when these development waves no longer compensate each other but exaggerate the development of population aging in near future.

Referring to the large gender differences in population aging in Estonia it is reasonable to elucidate the possible influence of the migrant sub-population on formation of that difference. On Figure 2.23. the average annual growth rate of the elderly is presented by gender. The Estonians are characterized by a decrease in growth rate of the elderly until the end of the 1970s and by the following stability period. At that the male and female annual growth rates have been surprisingly similar. This situation is worth emphasizing as the gender differences in mortality have been quite significant. The average annual growth rate for the non-Estonian elderly has been naturally very high during the observed period, as the initial number of the elderly in that sub-population was exceptionally small. While the annual male growth rate has been more or less steadily high, the dynamics for the same indicator for females has been different. The decrease in annual growth rate of the female non-Estonian elderly during the 1960s has resulted in the 1.5 percentage point difference compared to level of similar male index; this noticeable difference has prevailed until recently. That specific development of the non-Estonians has decreased the gender differences in population aging in Estonia. One should not forget, however, that the initial increase in gender differences was namely caused by the gender disproportion of the migrant sub-population.

The gender differences in aging process between the Estonians and the non-Estonians are being complemented with the comparison of main indicators of aging, the proportion of the elderly and the median age of population, separately for males and females (Figure 2.24.). The general difference in proportion of the elderly between two sub-populations has diminished during the observed period, while the gender differences have remained more or less stable. The same could be stated about the median age of population. Upon the latter index the difference between the male Estonians and non-Estonians has diminished to a rather low level, while difference among females remains still much larger. Faster levelling of male differences between two sub-populations is partly a result of much lower male life expectancy, and consequently the faster rotation of generations among elderly.

The dynamics of ethnic differences in the population aging takes completely another pattern when the development of the oldest old is considered (Figure 2.25.). Compared to the census year 1959 the proportion of the Estonian oldest olds has increased to much higher level than that of the non-Estonians. This outcome is principally the similar regardless of the indicator concerned (the age limit of 75 or 85 years old for defining the oldest old population). Compared to initial levels the increase of both indicators has been respectively 20 and 40 percentage points higher for the Estonians. However, the difference in the proportion of oldest old between two sub-populations has been formed only during the last decade; in previous two decades the growth rate of the proportion of the oldest old among non-Estonians has been even higher compared to that of the Estonians.

This figure proves a simple fact that the increase in proportion of the oldest old is the next step in aging process, following the rapid increase in the whole group of elderly population. The increase in proportion of the oldest old in elderly population speeds up when the proportion of the elderly in the total population is going to stabilize. The opposite relationship of these two indices is also true: when the most numerous generations reach the old age the proportion of the oldest old may even decrease for a while. That is what happened in the development of non-Estonians in the 1980s. Also Estonians have experienced this development taking place already in the 1950s.

Figure 2.26. presents the comparison of the proportion of the oldest old among the Estonians and non-Estonians separately for each census year. The increase in differences by the present time becomes even more apparent, particularly at proportion of population at the age of 85 and over. Concludingly, it has to be admitted that the trends of general aging as well as of oldest olds among the Estonian and the non-Estonian sub-populations are splitting. In view of population aging the Estonians have even rejuvenated during two last decades, remaining behind in growth trends characteristic of the non-Estonians by all indicators. In development of the oldest old, on the contrary, the Estonians have advanced more than the non-Estonians, and the relative gap in the proportion of the oldest old has widened.

The great differences in population aging process between the native-born and the migrant sub-populations are, besides differences in demographic behaviour, mostly caused by non-correspondence of age-structures of those two groups. One could easily get convinced in this by comparing the age distribution of the Estonians to that of the non-Estonians. The following comparison encompasses age pyramids for all four census years. Due to early demographic transition and the stability of post-war fertility and mortality, noticeable in the European context, the age-rectangle of the Estonians shows unexpectedly little change over the entire post-war period. Even the implications of war and repressions are not significantly expressed in age structure, as the human losses occurred in all age groups. There were more male victims in war activities, but in the course of repressions women, children and the elderly may have suffered even more severely.

At the same time the age pyramid of the non-Estonians has been significantly different, though in itself it is quite natural as it corresponds to the migrant population. At the first post-war census the age structure of the non-Estonians was extremely young. The younger adult age groups had surpassed their Estonian counterparts by almost two times in relative

numbers. In the course of time the age structure of the non-Estonians has developed remarkably, acquiring a more normal shape at every following census. By the year 1989 only the over-representation of the age group of 20-39 years olds has partly persisted.

The differences between the native-born and migrant sub-populations in population aging process have been significant, even opposite in many cases. As to demographic development and age distribution, these two groups are more or less totally different, and the joint analysis both of them together may dim the understanding of the population aging trends in Estonia. At the same time learning the differences between the two demographic groups serves as a key to explaining the peculiarities of Estonian population aging process. The Estonian aging process, influenced by co-development of these two completely different population groups, is obviously quite outstanding in the European context.

Figure 2.1. AGREGATED POPULATION AGE GROUPS
0-14, 15-59 JA 60+

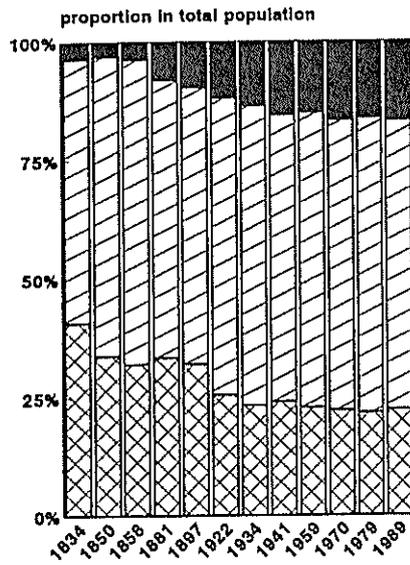


Figure 2.2. PROPORTION OF ELDERLY
AND MEDIAN AGE

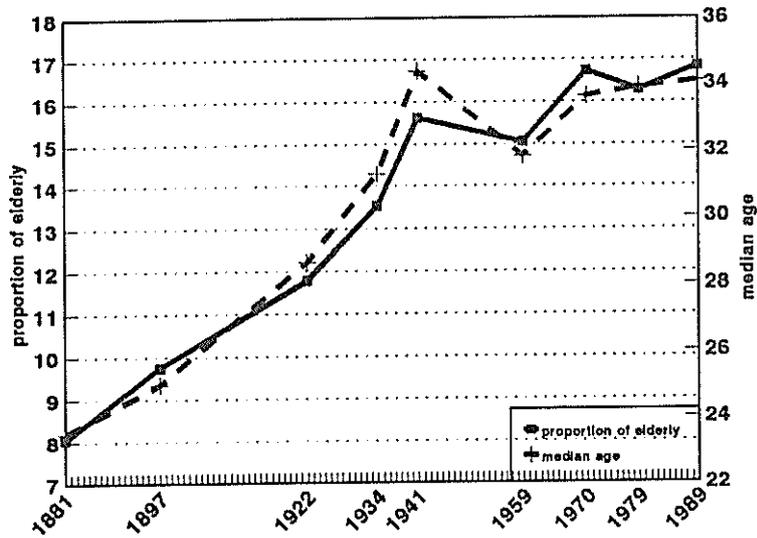


Figure 2.3. PROPORTION OF ELDERLY
AND MEDIAN AGE

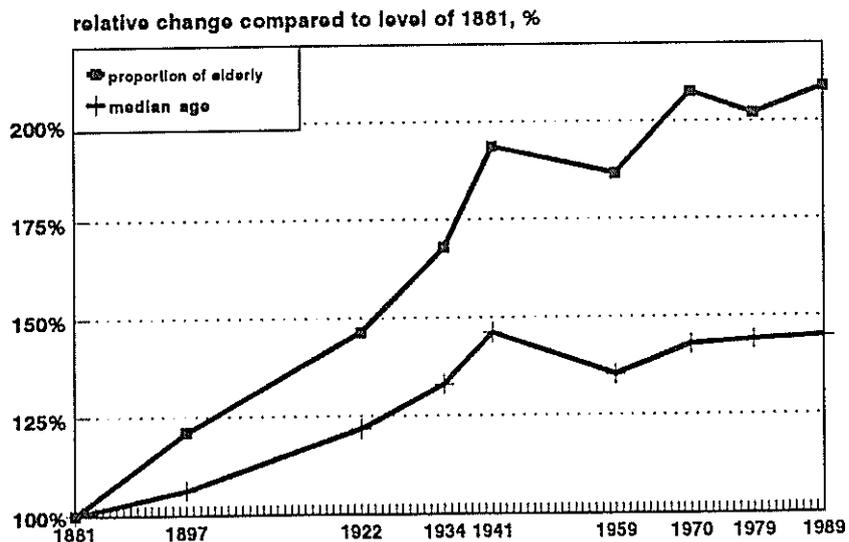


Figure 2.4. LASLETT INDICES OF AGING

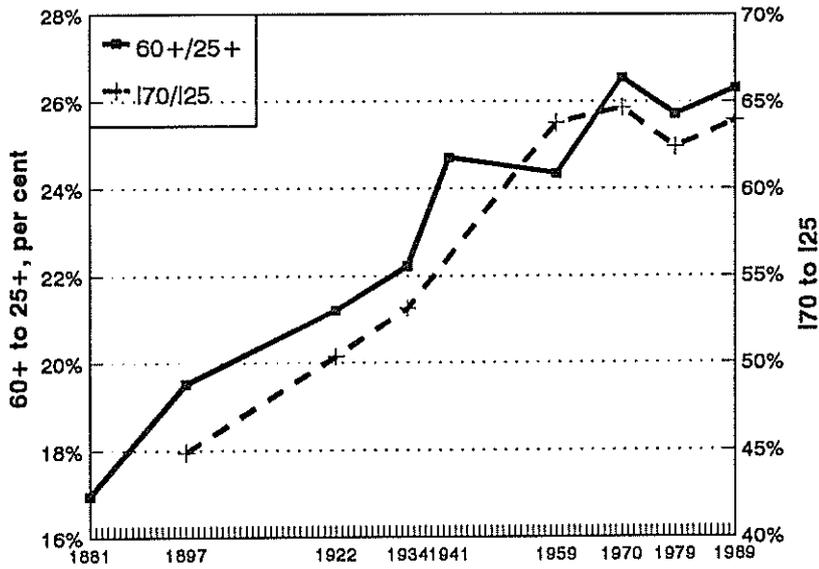


Figure 2.5. AVERAGE ANNUAL GROWTH RATE OF TOTAL POPULATION AND ELDERLY

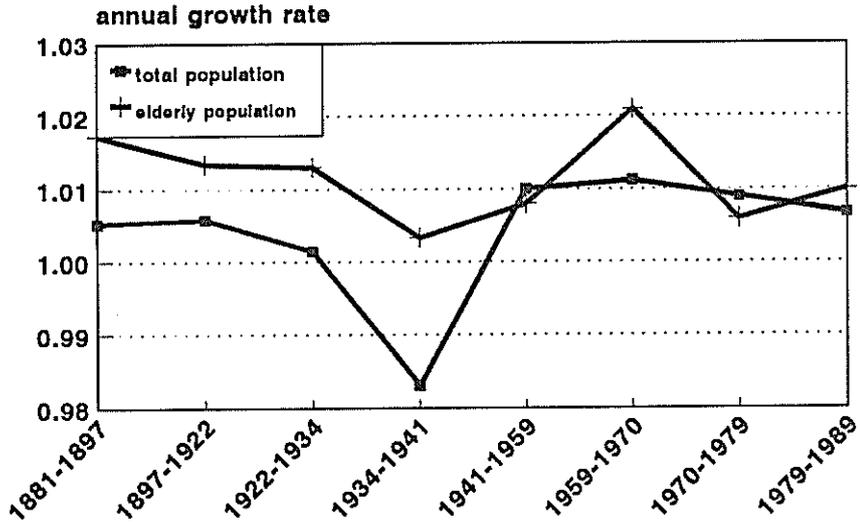


Figure 2.6. AVERAGE ANNUAL INCREASE OF ELDERLY

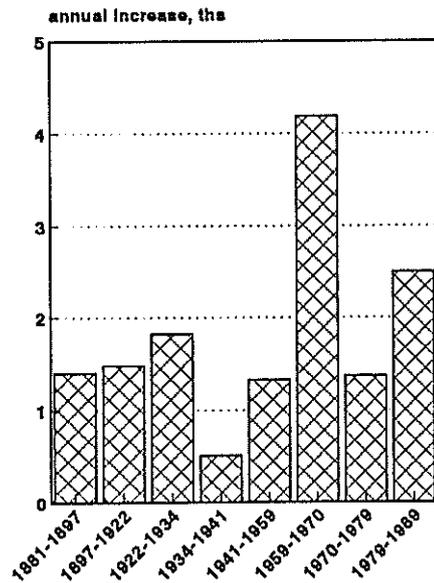


Figure 2.7. PROPORTION OF OLDEST OLDS IN ELDERLY POPULATION

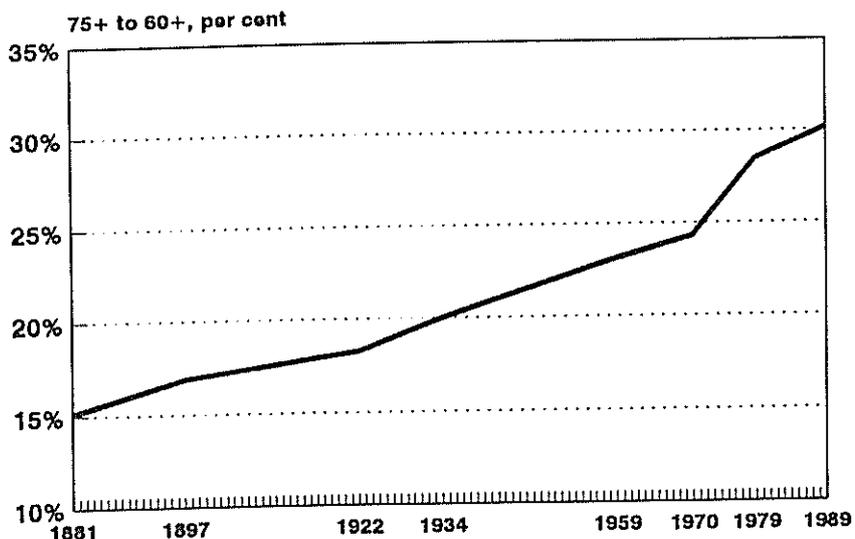


Figure 2.8. RELATIVE PROPORTION OF OLDEST OLDS IN ELDERLY POPULATION

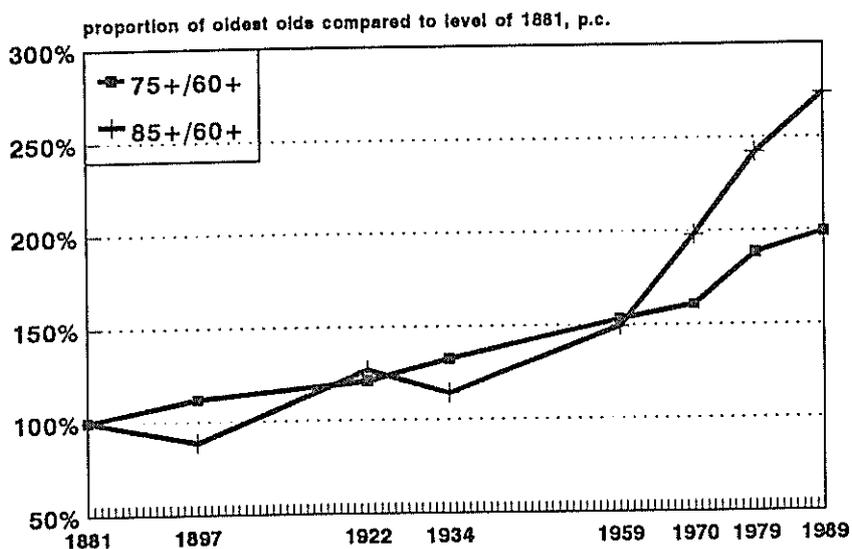


Figure 2.9. NUMBER OF ELDERLY

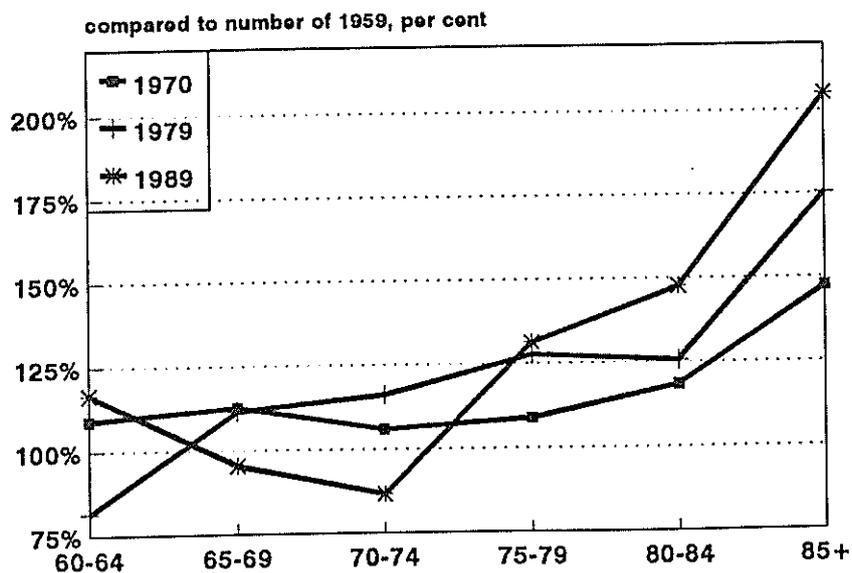


Figure 2.10. GENDER DIFFERENCE IN PROPORTION OF ELDERLY

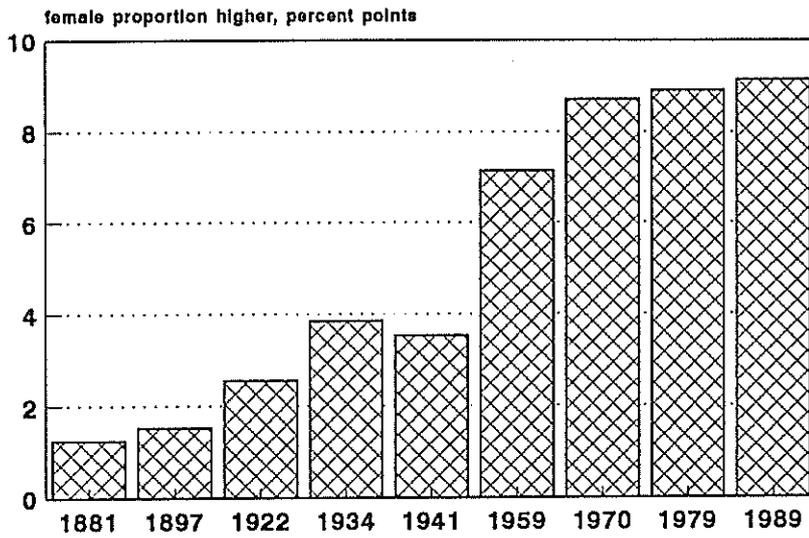


Figure 2.11. GENDER DIFFERENCE IN MEDIAN AGE

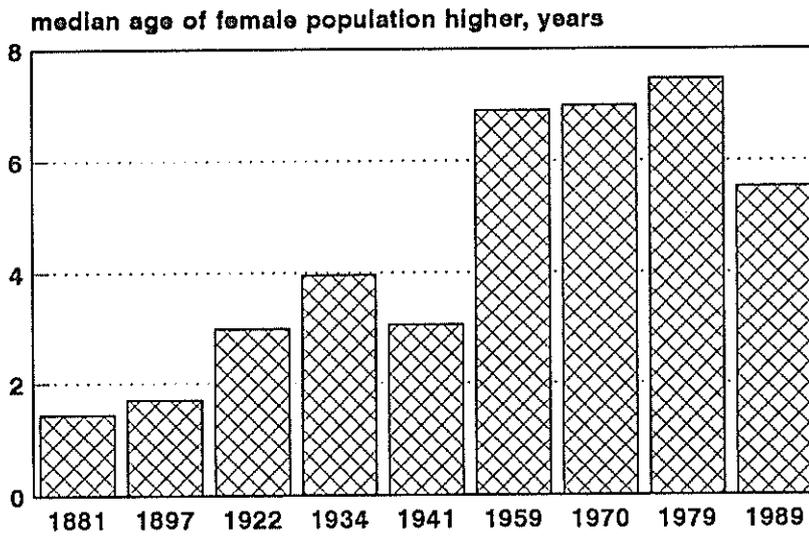


Figure 2.12. GENDER DIFFERENCE IN PROPORTION OF OLDEST OLDS

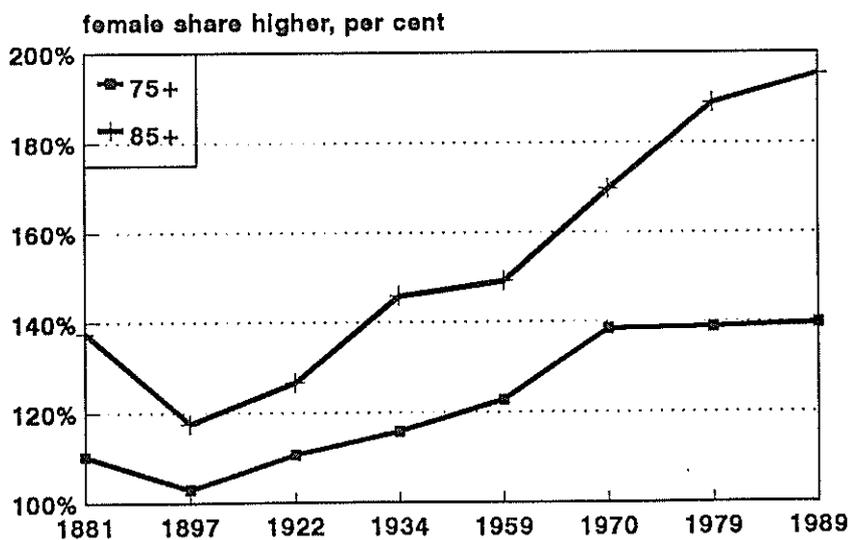


Figure 2.13. PROPORTIONS OF MALE AND FEMALE ELDERLY POPULATION, Estonia 1989

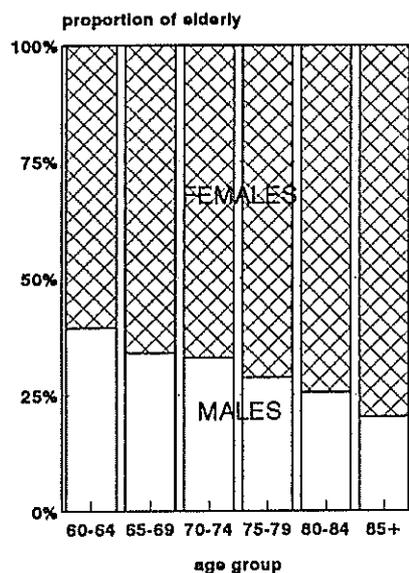


Figure 2.14. PROPORTION OF ELDERLY PROGNOSIS

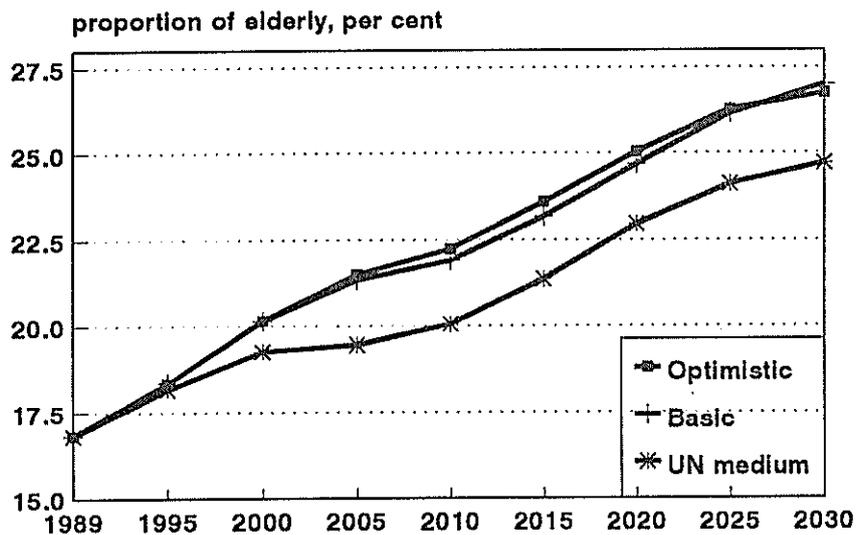


Figure 2.15. MEDIAN AGE OF POPULATION PROGNOSIS

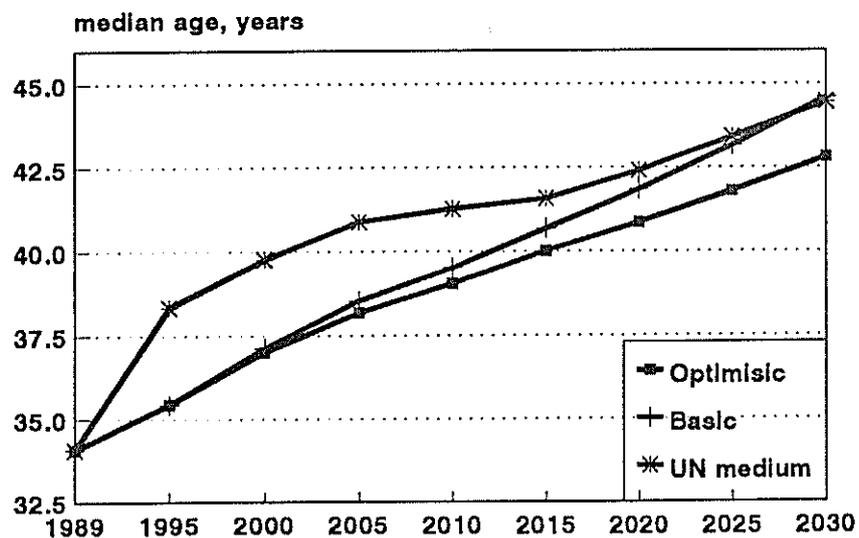


Figure 2.16. AVERAGE ANNUAL GROWTH RATE OF ELDERLY, PROGNOSIS

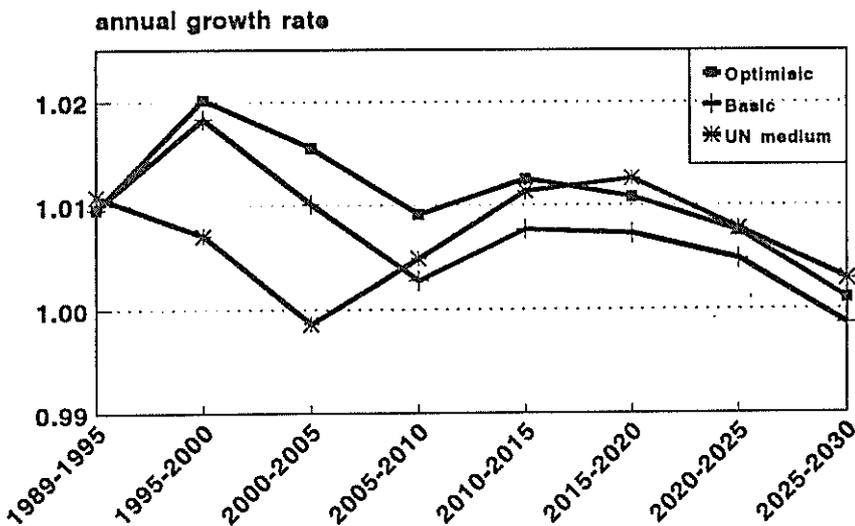


Figure 2.17. AVERAGE ANNUAL GROWTH OF ELDERLY PROGNOSIS

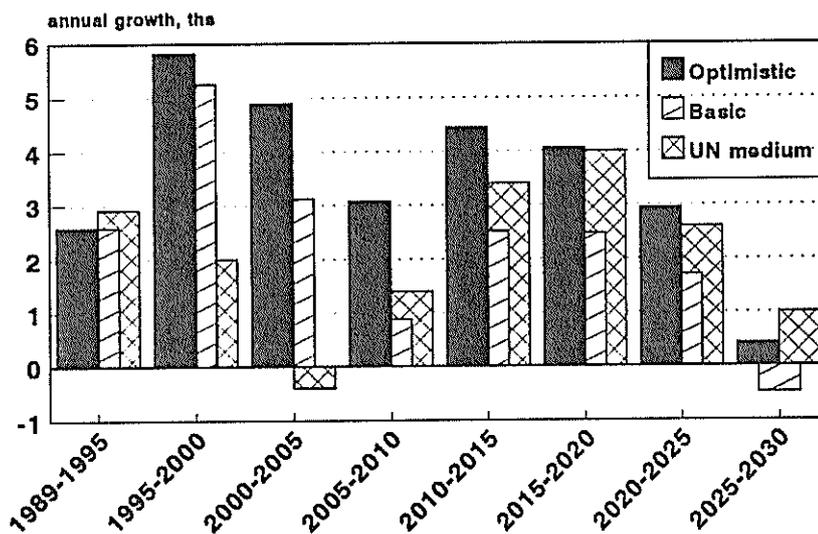


Figure 2.18. PROPORTION OF OLDEST OLDS PROGNOSIS

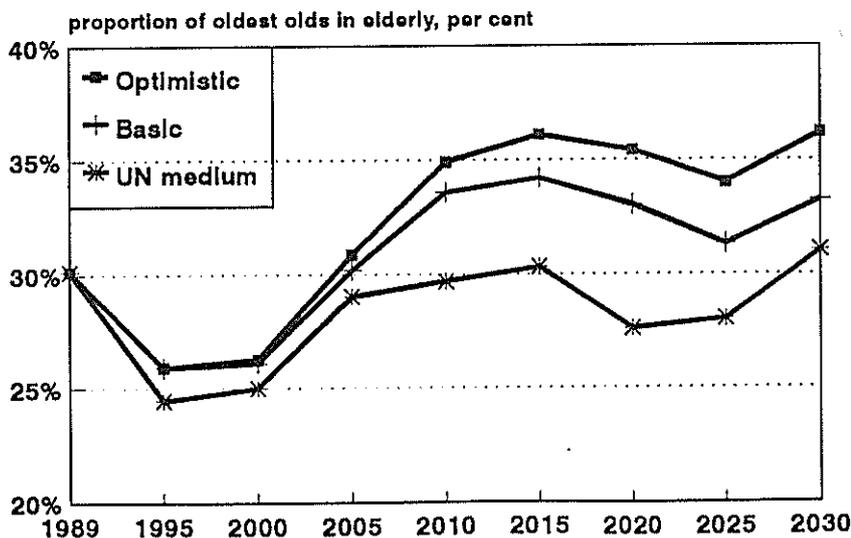


Figure 2.19. GENDER DIFFERENCE IN PROPORTION OF ELDERLY AND IN MEDIAN AGE, PROGNOSIS

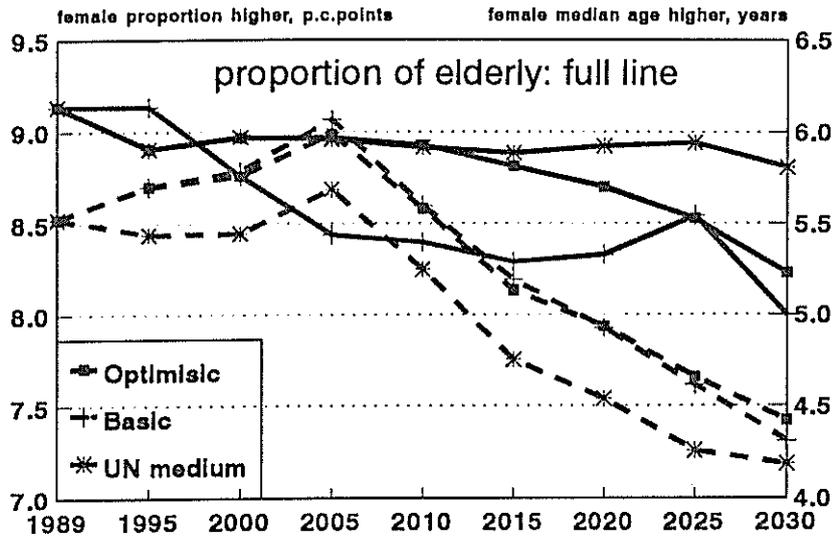


Figure 2.20. PROPORTION OF ELDERLY AND MEDIAN AGE, Estonians and non-Estonians

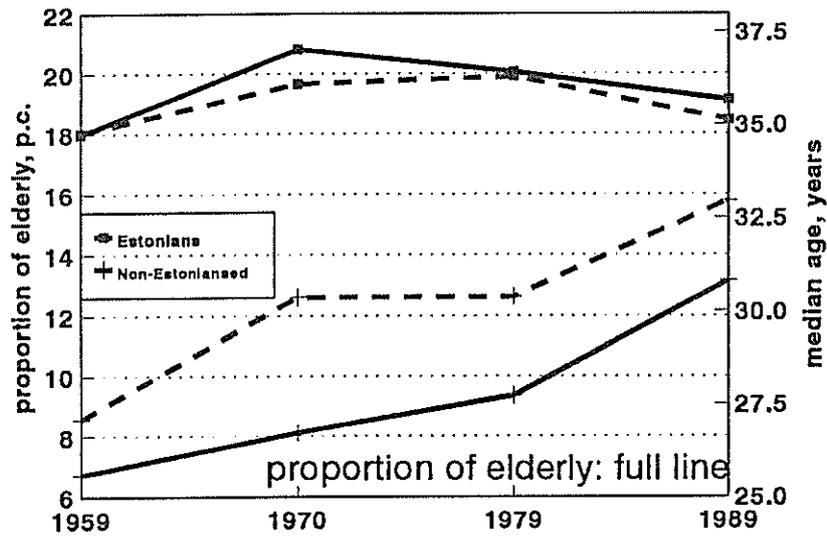


Figure 2.21. LASLETT INDICES Estonians and non-Estonians

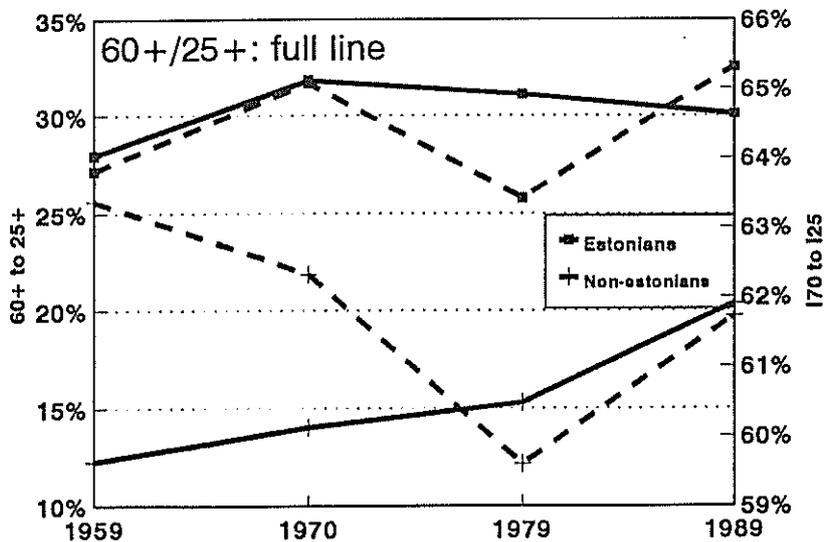


Figure 2.22. AVERAGE ANNUAL GROWTH OF ELDERLY Estonians and non-Estonians

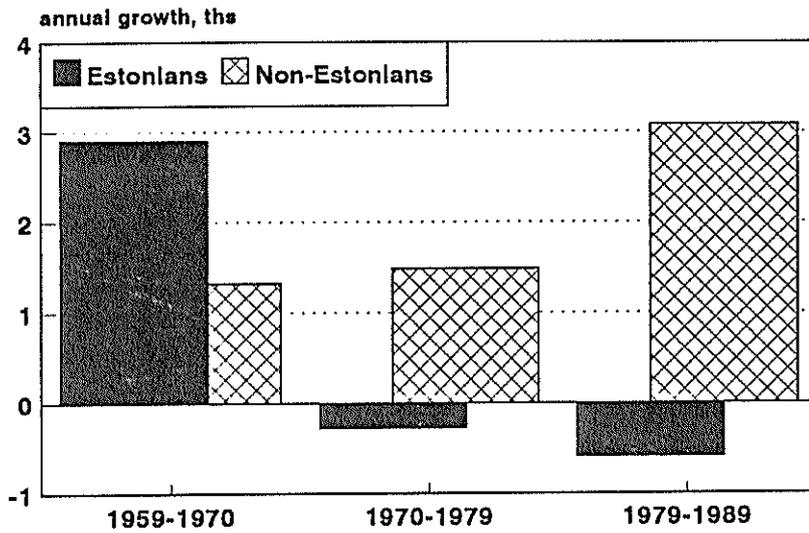


Figure 2.23. AVERAGE ANNUALE GROWTH RATE OF ELDERLY BY GENDER, Estonians and non-Estonians

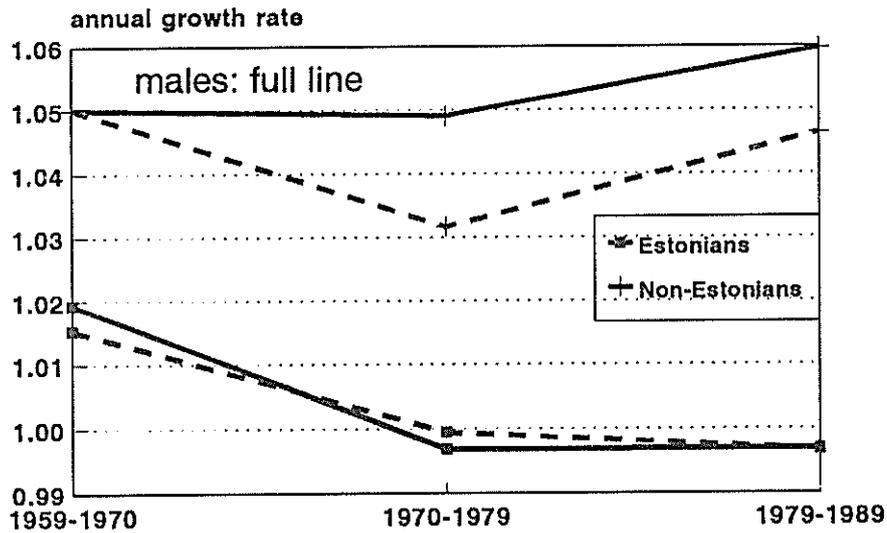
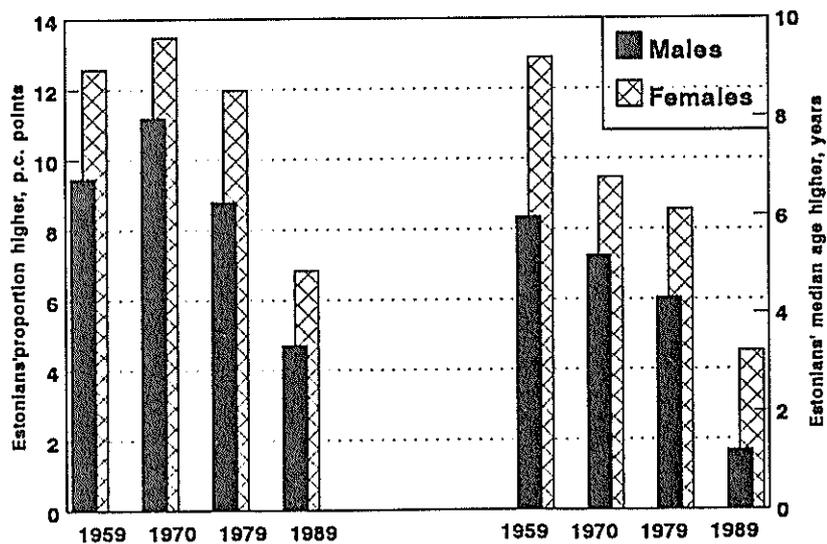
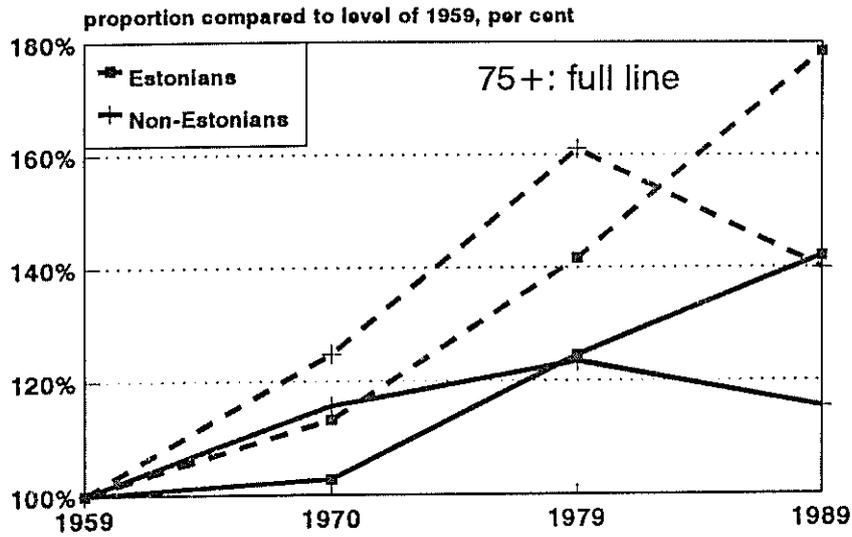


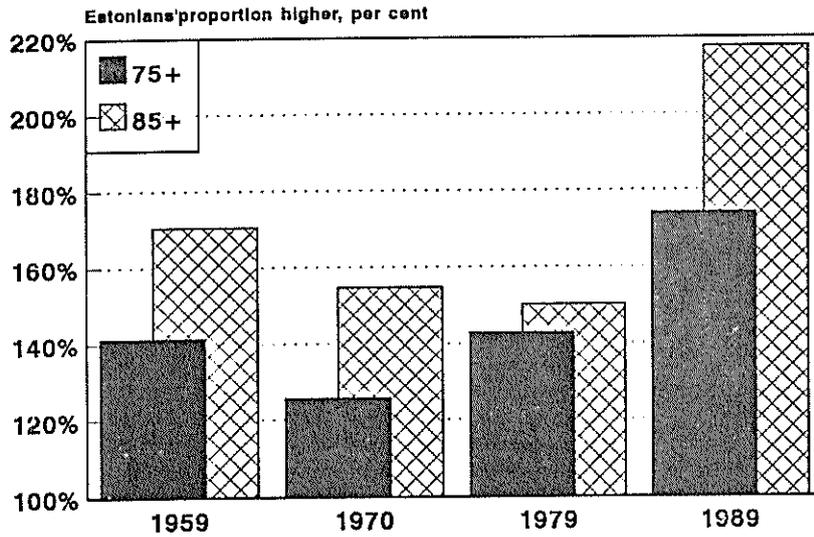
Figure 2.24. ETHNIC DIFFERENCE IN PROPORTION OF ELDERLY AND MEDIAN AGE



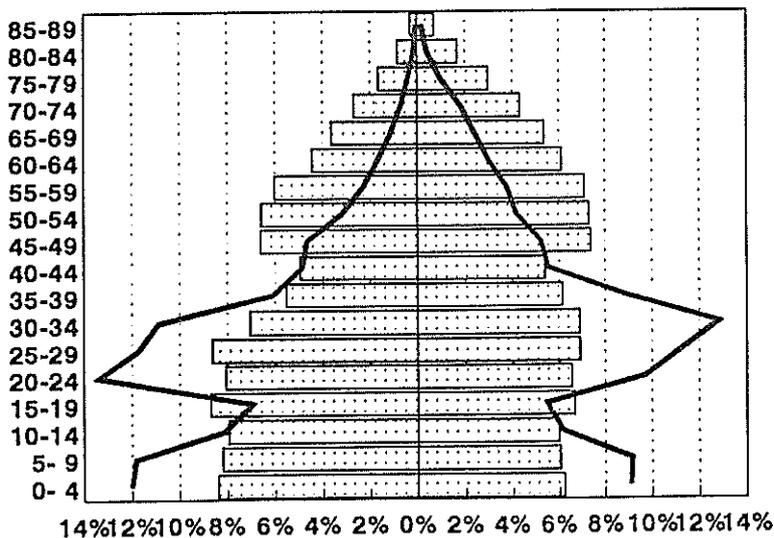
**Figure 2.25. PROPORTION OF OLDEST OLDS
Estonians and non-Estonians**



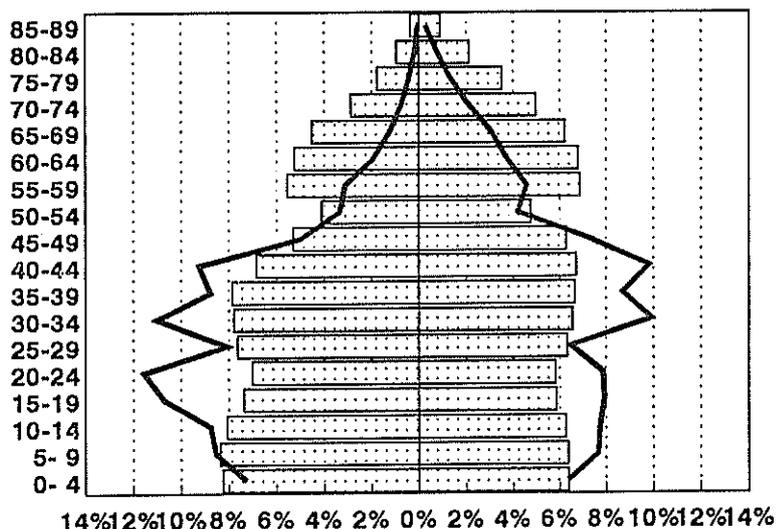
**Figure 2.26. ETHNIC DIFFERENCE IN PROPORTION
OF OLDEST OLDS**



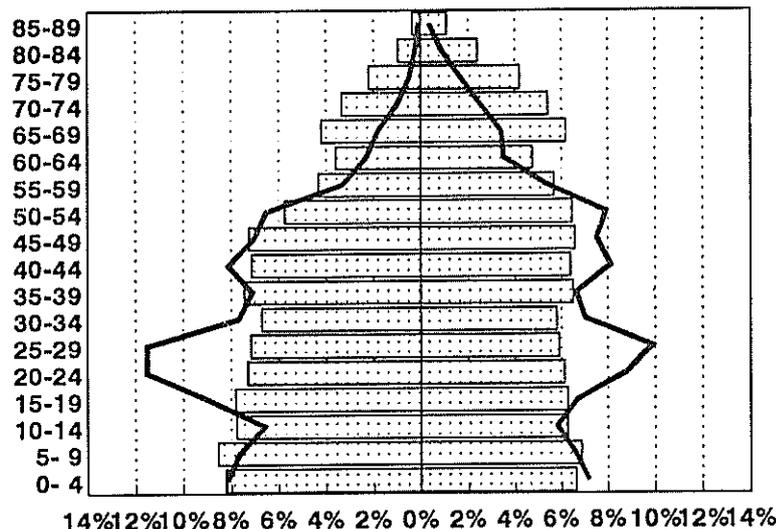
**Figure 2.27. POPULATION AGE STRUCTURE
Estonians and non-Estonians, 1959**



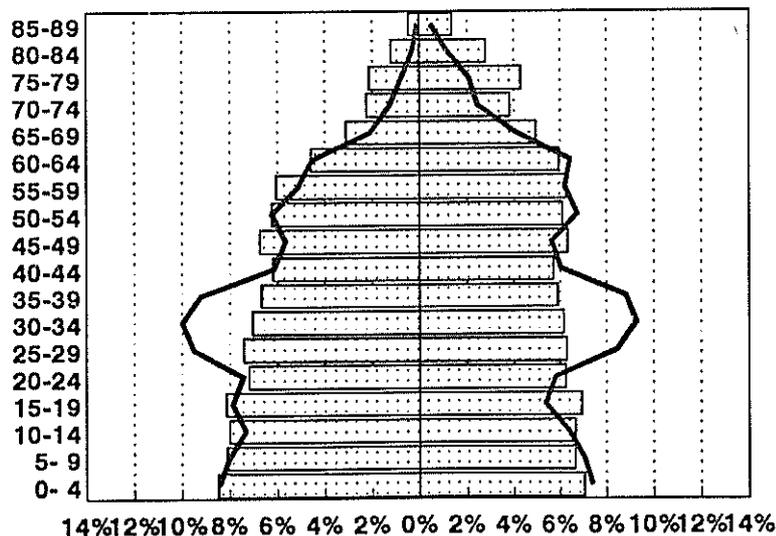
**Figure 2.28. POPULATION AGE STRUCTURE
Estonians and non-Estonians, 1970**



**Figure 2.29. POPULATION AGE STRUCTURE
Estonians and non-Estonians, 1979**



**Figure 2.30. POPULATION AGE STRUCTURE
Estonians and non-Estonians, 1989**



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