POST-TRANSITIONAL FERTILITY: CASE OF ESTONIA

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In the paper Estonian post-transitional fertility is discussed. The analysis is mainly based on results of the Estonian Family and Fertility Survey, combined with relevant census and vital statistics. Introductory section is giving a short outline of principal features and time frame for the period of fertility transition in Estonia. The comparison with other European, and particularly with neighbouring nations gives a ground to state that the fertility transition occurred rather early in Estonia, finalising with underreplacement level reached already in the second half of the 1920s. Concerning the post-transitional fertility in Estonia, three major features are outlined. First, the rather stable cohort fertility has maintained throughout six-seven decades when compared to other nations with advanced fertility development. Second, pregnancy outcomes other than live birth, and particularly induced abortion among them, should be taken into account when analysing the post-transitional fertility trends and levels. Also, the interaction of fertility and abortion trends has been rather unusual in Estonia. Third, juvenation of reproductive behaviour is studied upon the survivorship functions of first birth, first non-birth pregnancy and first sexual intercourse.

I. Background Notes on Fertility Transition

Despite the demographic transition is an universe process, its noticeably different timing has had a tremendous impact on population development, and correspondingly, on general social and human development of the European nations. The named influence has continuously been of great importance, particularly through the population age structure. It is a strong argument to consider methodologically as well as in practical terms the timing of the demographic transition as an important phenomenon in understanding the modern as well as the future population development. In this context the European marriage pattern has widely acknowledged as the first major differentiation factor in this timing [Hajnal 1965]. Estonia being situated to the West from the Hajnal line and leaving for example the immediate neighbour Russia to another side has proved to be a meaningful reality also in current world. Followed the new marriage pattern, the beginning of the fertility transition in Estonia is traced back to the middle of the 19th century being actually the earliest in the region.

The fertility transition and its timing in Europe is most comprehensibly studied by the Princeton Project. Measuring fertility with specially defined general indices (fertility rates, standardised to Hutterites fertility schedule), the province level analysis covers most of the European countries [Coale, Treadway 1986]. Using the methodology of the named Project the similar indices have been calculated for Estonia as well as for other Baltic countries [Katus 1991; 1994]. These indices have been proved extremely useful to present the fertility development during the transitional stage. Figure 1 presents the comparison of overall and marital fertility indices of different European countries with the corresponding levels of Estonia in 1881. The European figures have been taken from Princeton Project for the closest year available to the first Estonian (actually the Baltic regional) census datum referred. In case the indices are available only for the datum closer to the next, 1897 census, the comparison has been carried out with the corresponding Estonian level. The indices for Estonia are calculated on data of Estland and the Estonian part of Livland gubernia.

In the 1880s the overall fertility index was clearly lower only in France and Ireland compared to Estonia. The Estonian level was close to that of Sweden, Switzerland, Norway, Austria, Denmark. As Estonia had slightly higher proportion of married women in reproductive age compared to Northern and Western countries, except for France, England and Finland, the Estonian marital fertility index has been lower in relative terms than overall fertility index in this very comparison. The countries of the closest overall fertility like Sweden, Switzerland and Norway demonstrate up to 20 per cent (Norway) higher marital fertility compared to Estonia. France, as a leading nation in fertility transition, is the only European country having both overall and marital fertility lower compared to Estonia in the 1880s. Among other Baltic countries Latvia demonstrates rather close situation to Estonia having only slightly higher fertility levels at that time, most probably because of the higher fertility in catholic Latgale. Lithuania is clearly distinguished from the two northern neighbours with the 30-40 per cent higher fertility. According to these data Estonia stays without any doubt among countries experienced early fertility transition.

It is noteworthy that the Estonian index of marital fertility as well as index of overall fertility were already low not only in comparison of other countries but relative to uncontrolled fertility levels. It clearly reflects that the fertility transition has been in progress already in 1881. Only the remarkably low level of pre-transitional natural fertility could present an alternative possibility. However, no historical data on family reconstruction by some Estonian parishes support the latter hypothesis: total fertility rate has fluctuated around 4-5 in the XVIII century [Palli 1988; Palli 1996]. The case study of Viljandi county, the pioneering region of fertility transition in Estonia, proves that the continuously declining trend of overall fertility began in the 1840s [Nõges 1925]. Such a trend is typically caused by the parity-specific family limitation. Furthermore, the 1922 census data on cohort completed fertility rates support also the hypothesis that the parity-specific family limitation began already in the 1850-1860s in all Estonian regions.

The comparison of fertility indices of the same European countries are carried out for the 1930s when the fertility transition has been coming to an end and underreplacement fertility has already been reached by forerunners of the European demographic development. On Figure 2 the countries are ranked in the same order as in the previous figure. Estonia can continuously be found among the countries with the lowest fertility, demonstrating the closest levels to those in Sweden, Switzerland, Norway and Denmark. Also, fertility in Latvia and Estonia is very close to each other in opposite to Lithuania with ca 40 per cent higher fertility in the 1930s. However, a new feature worth to attention has been introduced. Namely, in Lithuania and Finland alongside with Ireland, the overall fertility index is higher than marital fertility index compared to Estonia. This refers to the intensive development of European type of marriage in these countries. It is particularly noticeable because that was not the case in the earlier period under examination. Lithuania and Finland seem to be two marginal countries, experiencing the late development of European type of marriage. They also form the eastern boundary of this phenomenon in Europe. It can be said that these two countries are somewhat catching up their neighbours in the Northern and Western Europe: in the 1930s Finland and Lithuania were belonging to the named region more obviously than half a century ago. As a result, the boundary between East and West has become actually more distinct.

Judging by fertility levels, the East- and South-European countries in general had become more different from Estonia compared to the corresponding differences half a century earlier. Despite fertility transition had begun already in most of these countries in the 1930s, the levels were still nearly twice as high as in Estonia and other forerunner countries of demographic development. Actually this has been the period of highest differences in European fertility, and probably, in European human development in general.

Figure 3 compares the Estonian fertility indices specifically with the closest neighbours. Three Russian boundary gubernias/oblasts, namely St.Petersburg, Pskoff and Novgorod, are included separately into the comparison. Only overall fertility indices are compared in two time points. Russian areas neighbouring to Baltic region, except St.Petersburg, are demonstrating very high fertility levels compared to Estonia, Latvia, Sweden and Finland. There is no principal difference between Pskoff and Novgorod regions compared to average Russia in this respect. Fertility transition in Poland has been somewhat earlier compared to these West-Russian regions, however, later in comparison with Lithuania. It is noticeable that the differences in fertility between Baltic countries and neighbouring Russian regions as well as between Poland had grown by the 1930s. This is the evidence of considerable time-lag in demographic development between the named regions. Referring to other evidence the time-lag between Estonia and Russia is estimated up to a half of century [Katus 1990; Vishnevski, Volkov 1983].

In this respect St.Petersburg gubernia seems to be an interesting region. In the region the fertility transition has begun rather early, and the levels of fertility indices have been comparable to Estonia (and Latvia) in the 1880s. Hajnal also noticed the same unitedness in marital patterns drawing his well-known line, namely from St.Petersburg to Trieste. By that interpretation, St.Petersburg became the only Russian gubernia separated from all other territories. One can easily conclude that low fertility in St.Petersburg region was formed under the impact of very high urbanisation in the area. The location of the capital city of Russian Empire as well as selectivity of population in the region could be a real explanation. However, the general fertility situation in St.Petersburg (Leningrad) oblast has been changed later on and the difference between the region and Baltic countries had sharply grown by the 1930s. One possible explanation of such a trend is a mass population displacement in the region during the last century. Historically Ingeria has been populated by Finnish-speaking nations (Votes, Ingerians, Finns and Estonians). Only after the conquest of Ingeria by Peter the Great, and the building of the new Russian capital in the region, the mass migration inflow of Russians was initiated. Nevertheless, the numerous Finnish-speaking population also remained in the region. The population displacement alongside with the assimilation of local orthodox Finnish-speaking population strengthened in the last decades of the 19th century [Engman 1993]. It culminated in the 1920-1940s when the mass deportation of non-Slavic ethnicities took place from the Leningrad oblast. Thus, the population discontinuity of St.Petersburg region could partially explain the sharp increase of fertility differences between Estonia and this straight neighbouring Russian region in the 1920-1930s.

Finland is another country to be paid attention to. It is evidential that the fertility transition has been later in Finland compared to Estonia. The case study on Vironlahti parish, one of the pioneering Finnish regions adapting the parity-specific fertility control, has given the ground to Irma-Leena Notkola for considering among the possible explanations of early development of fertility transition in this parish intensive contacts of local population with Estonians [Notkola 1989; 1990]. In general Finland seems to be somewhat intermediate country between the West and East inclining clearly towards the West in the XX century. More clear evidence of such an intermediate position is demonstrated by Lithuania, also inclining towards the Western demographic patterns.

Shortly discussed historical differences in timing of fertility transition are continuously of great importance for understanding the present fertility trends in Estonia. Particular significance of such history-rooted variation has been introduced by immigrants from the regions of previous Soviet Union to Estonia. Demographically speaking those immigrants of the Soviet period have brought along the demographic behaviour characteristic to their native regions, and the heterogeneity in demographic development, and also in fertility has sharply increased in Estonia. It should be noted that Estonia has received the greatest share of immigrants relative to other Baltic states. As a result Estonia has moved from the ethnically homogeneous country (in 1945 the Estonians comprise 97.3 per cent of total population in cut boundaries) into the multiethnic society with more than 120 different ethnicities. In the period of 1945-1989 the absolute number of the non-Estonians increased 26 times and their share in the total population rose from 2.3 per cent up to 38.5 per cent of the total population (census of 1989). Majority of them, 68.3 per cent of all non-Estonians are foreign-borns, and the rest of them are dominantly children, i.e. the second generation of post-war immigrants. In total population the foreign-borns comprise 26.3 per cent which is one of the highest levels in modern Europe [Sakkeus 1994; Council of Europe 1996].

The demographic behaviour of the Estonian foreign-born population (as well as their second generation) has proved in general to be much closer to their home regions compared to the local native-born population. In demographic behaviour it is making noticeable dissonance, including the opposite trends during the specific periods. Both population groups are comparable in absolute numbers, therefore they should be dealt separately when studying any of modern demographic pattern. When data allows to make conclusions, it seems that this is also true for many other social developments, including the process of building the democratic structures of society and developing the market economy [Mihhailov 1990; Paadam 1990; Puur 1997; Sakkeus 1991].

II. Data Sources on Fertility

The demographic literature for the last couple of decades underlines, willingly or unwillingly, that aggregated census and vital statistics are not sufficient to carry out in-depth studies on population fertility in modern era. To apply new research techniques the classical data should be complemented in two directions. Firstly, individual versus aggregated data are going to be increasingly preferred. This process is particularly supported by technical progress: personal computers and relevant software have been made even huge databases manageable as easy as aggregated tabulations. Secondly, large number and specification of personal, family and kinship characteristics have proved their usefulness in fertility research. Typically surveys are the most adequate way to collect such an information which has made the survey statistics of growing importance compared with census and vital statistics.

The following analysis of the general post-WW II fertility trend in Estonia is based on the Estonian Family and Fertility Survey. This is the first national dataset containing individual level, event-history data on fertility careers of female cohorts 1924-1973. The data as well as survey methodology is discussed in earlier publications [EKDK

1995a; EKDK 1995b; Katus, Puur, Sakkeus 1995]. Overview on classical data sources on Estonian fertility covering the equivalent period could also be found elsewhere [Anderson, Katus, Silver 1994; Katus 1991b], and the corresponding data in relevant publications containing population vital and census statistics [ESA 1996]. Concerning further in-depth studies, it should be noted that the individual FFS fertility careers are linked to the last census database (1989) and also to birth records of vital registration from 1994.

III. Stability of Post-Transitional Fertility

Supposedly the most outstanding feature of the Estonian after-transition fertility trend up to the recent period is the stability. Naturally this stability should be regarded in relative terms, and some aspects of existing heterogeneity will be also discussed later in the report, nevertheless, in European experience the Estonian fertility trend could be really claimed as invariable. Figure 4 compares cohort total fertility rates for some European countries. Data for the purpose is derived from Sardon's article and Council of Europe demographic yearbook as the relevant information of the European FFS project is not yet widely available for most of the participating countries [Council of Europe 1996; Sardon 1990]. For presentation annual cohort fertility rates are aggregated into five-years cohorts comparable with the Estonian FFS results [EKDK 1995b]. All the countries with available extended cohort fertility data are included into the figure.

On the background of rather large-scale changes in most of the European countries, the fluctuation of the Estonian cohort fertility within the interval of 1.9 - 2.1, measured by total rate, seems also visually really stable. Furthermore, the Estonian fertility has been the lowest for older female birth cohorts under observation (cohorts of 1924-1943) but already the highest for younger cohorts of 1949-1963 compared to the same thirteen European nations. It is noteworthy to remember that all the countries represented in the figure, except Portugal and Spain, have been forerunners of fertility transition, and have experienced the underreplacement fertility for female cohorts prior to the time demonstrated in figure. In other words, those cohorts with relatively high fertility are actually from baby-boom era characterised by sharp fertility increase at that time. Consequently, if taking a longer period backward, an additional fertility wave could be found for the demographically forerunning nations. In context of development of this longer period the stability of the Estonian fertility level will be even more outranking, and exceptional for the discussed group of countries.

Looking one step further for the answer of this untypical stability of the Estonian cohort fertility, it is obvious to stress two specific features. Firstly, there has been no baby-boom in Estonia after the WW II. This phenomenon has been discussed in earlier papers already indicated, and referring to conclusions, the exceptional character of such a trend concerning forerunners of fertility transition has been outlined. All such countries having experienced the underreplacement fertility in the 1920-1930s, except Estonia, have also faced the post-war baby-boom. That fertility increase has not been a short-term phenomenon but has lasted up to the middle of the 1960s [Festy 1984]. Neither it has been the minor increasing trend: all the low-fertility countries reached the replacement fertility during the baby-boom period. In contrary, the Estonian fertility remained continuously below the named level, and the stability in fertility levels concerning the older cohorts of the current study is maintained because of systematic underreplacement fertility in Estonia. Actually for the Estonian native-born cohorts at least of ten years birth interval, 1924-1933, the completed fertility has proved to be the lowest in the World.

Second reason behind the relatively stable level of the Estonian cohort fertility is not less exciting. Already discussed in some previous papers, the end of the 1960s marks the introduction of a new trend in the Estonian period fertility [Katus 1991]. This period has been the era of rather important demographic changes everywhere in Europe, particularly for the baby-boom countries where the fertility demonstrated the beginning of sharp decrease at that time. In contrary to this general European trend, the Estonian period fertility surprisingly began to rise. The increase was rather substantial: more than 17 per cent by total period fertility rate in four years (1971 compared to 1967). The increase also proved to be a long-term change, and the period fertility remained higher compared to previous forty-years interval of 1928-1968 up to the end of the 1980s.

This increase in period fertility has not received the appropriate attention, partially because it was regarded exceptionally as a result of timing effect. In reality the period indicators have been influenced by the accelerated juvenation of fertility indeed, followingly discussed also in the current paper, nevertheless, the data on cohort fertility confirm that the increase of period indicators has its definite impact to the completed fertility as well. Consequently, fertility level of the female cohorts 1949-1958 exceeds the level of previous older cohorts by 8-13 per cent. This increase seems to be of particularly importance because of two features. Firstly, the completed fertility of those cohorts raised close to replacement, after 40-45 years period of lower fertility. Secondly, during the same period the Estonian foreign-born population has demonstrated continuous decreasing fertility, i.e. the opposite trend to native-born population. In Figure 5 both population groups are compared, and the diversing trend demonstrated by cohorts 1949-1958 are easily observed. Actually, the country of origin has become the most dominant factor for the heterogeneity of the Estonian fertility level in those cohorts compared to much more usual characteristics of that type like urban/rural residence, economical status, education etc. The fertility increase, particularly for the Estonian birth cohorts of 1949-1958, experienced in calendar period of 1970-1980 certainly remains an interesting research topic.

Summarising three principal explanatory feature of relative stability of the Estonian cohort fertility trend during the XX century - pioneering fertility transition, absence of post WW II baby-boom and fertility increase at the end of the 1960s - two last-mentioned characteristics should be regarded as untypical in the European context, particularly in combination with advanced fertility transition.

The discussed long-term Estonian cohort fertility trend of relative stability has been accompanied by the internal homogenisation of reproductive behaviour, when concerning the native-born population. The process could be clearly outlined, however, the distinction of the changes has been not very dominant neither continuously one-directed. Figure 6 is presenting the difference in cohort fertility levels by general social characteristics. Data on figure demonstrate that the difference by urban/rural residence has continuously decreased, and among the youngest cohort is approximately only half of the level observed for the oldest cohort. From another hand, the county differences have enlarged during a long period, and only for two youngest cohorts they have slowed down. Fertility differences by population education and economic status have generally been lower alongside the cohorts, and also having somewhat decreasing trend. When calculating simple trend-functions, all the discussed differences are indicating the decrease during the observed time brackets. The social differences in fertility are naturally a special topic for in-depth study, however, the dominating homogenisation trend could be derived even from this simple presentation.

The homogenisation trend of the same nature could be also followed by population demographic characteristics. The parity distribution of female cohorts, one of the most important characteristics of reproductive behaviour, could serve as an useful example. Figure 7 is comparing the outermost ends of the named distribution, proportions of zero and five+ parity women. Usually it is expected to discover the decrease of higher parity orders. In case of Estonia with its early fertility transition the proportion of higher parity women is found already very low, and therefore rather stable for cohorts starting already from 1924. This proportion is fluctuating around 4 per cent in every cohort. Those numbers also give a suggestion that the parity-specific fertility limitation characteristic to the transitional period is not resulting in total disappearance of births of higher orders but preserving higher parity women as a small minority group. Another end of the parity distribution of female cohorts, zero parity women, are found rather numerous in older cohorts of the current study. Naturally this is also the intermediate result of the fertility transition when decreasing trend is accompanied with the increasing differentiation by population groups. In earlier papers it has been stated that the highest fertility differentiation in Estonia were found in 1920-1930s, thus, carried out by the female cohorts born at turn of the century when the zero parity women comprise a quarter in a cohort [Katus 1991]. The proportion is already lower for the older cohorts covered by FFS, however, still high, and continuously decreasing in younger cohorts. The concentration of female fertility careers, particularly to parity two, could be easily demonstrated by other data in FFS standard tabulations [EKDK 1995b].

In general it seems that the increase of heterogeneity in population reproduction behaviour for the cohorts covered by the Estonian FFS is somewhat larger by taking account the demographic rather than social characteristics. Analysis of the fertility homogenisation process seems to prove rather stimulating and capable to draw interesting results but this will be the matter of a separate topic. Hereby it could be roughly concluded that the relative stability of the Estonian cohort fertility has been accompanied by growing heterogeneity of reproduction behaviour, particularly of demographic origin. This conclusion is extremely important when looking for hypotheses for possible reasons of the current sharp fertility decline in Estonia as well as in many other East-European countries.

IV. Fertility in Context of Pregnancy Development

Broader concept on population fertility considers beside a birth of a child also other possible pregnancy outcomes. Such an approach could be regarded more general because a birth of a child is not possible without pregnancy while a child delivery is only one possible result of the pregnancy. Naturally, this approach to fertility development is particularly important when other pregnancy outcomes compared to births are relatively frequent. Spontaneous abortion and stillbirth are two pregnancy outcomes with less dependence on personal behavioral patterns, however in contrary, induced abortion certainly involves a special individual and/or family decision-making procedure. Therefore, the magnitude of induced abortion intensity is expected to have a greater variation compared to stillbirth and spontaneous abortion among societies of similar population health conditions. Despite the absence of detailed data it has been well known that USSR, as well as Estonia being part of the Soviet Union for a half of century, is characterised by one of the highest abortion prevalence in the World [Avdeev 1994; Avdeev, Blum, Troitskaya 1995; Popov 1991]. Besides the considerable contribution to pregnancy level, and therefore separating fertility and pregnancy processes, high induced abortion is also expected to introduce specific differentiation in population. All those arguments emphasise the analysis of fertility in broader pregnancy context.

One can be surprised how rare are combined pregnancy-fertility studies in demography. Certainly there is a huge amount of medically-related scientific literature on pregnancy including pregnancy and contraception versus abortion. In many of those research items the quantitative aspects are also followed but usually the female group studied has happened to be too small to derive the national level information and/or represent long-term pregnancy trend in combination of fertility. Evidently it is not the misunderstanding or methodological underestimation of the role of other pregnancy outcomes and their impact on fertility, but primarily the unavailability of relevant data. In most European countries there is no vital registration system for abortion and other pregnancy outcomes, such registers could not be expected before the legalisation of abortions in the 1960-1970s. General data problems are discussed in many papers which have also made useful attempts to present the comparative abortion trend in European region [Blayo 1991; David 1992; Henshaw, Morrow 1990; Frejka 1985]. Even in European FFS, a major in-depth study on family and fertility career, many participating countries have been rather conservative to include comparable blocks of questions on different pregnancy outcomes [Klijzing 1996].

General proportions of different pregnancy outcomes for native-born Estonian population are presented in Figure 8. Stillbirths are combined with spontaneous abortions, and cover together 7-9 per cent of pregnancy outcomes. This proportion has been rather stable alongside all the cohorts which, inter alia, is an indicator of relatively good validity of the data. From medical point of view it is impossible to record all spontaneous abortions. Many, if not most of those taking place in very early stages of pregnancy, are remaining unnoticed by women, and naturally unrecorded. However, from demographic and social point of view such spontaneous abortions are also of much less importance compared to those pregnancies which take place at later stages of gestation. Particularly stillbirths and repeated spontaneous abortions could be a definite shock to a young woman. In this perspective the level of nearly one tenth of the kind of pregnancy outcomes is not a small figure at all.

Induced abortion has been an important pregnancy outcome exclusively to all female cohorts, particularly of 1934-1958. Additionally, the abortion behaviour is noticeably contrasting between native-born and foreign-born population in Estonia. On the background of this general importance, the next figure is presenting the total abortion rate separately for both groups. The data emphasise two major items at least. First, the difference between the older cohorts of native-born and foreign-born populations is really astonishing: for first two older cohorts under study the difference is nearly three-fold. It is not mainly because of extremely low abortion level of native-born population. Referring to above-described overall fertility trend those FFS cohorts have already experienced underreplacement fertility, and total abortion rate of 0.75 - 1.0 should be considered rather substantial. Supposingly this level is higher compared to the European average for comparable female birth cohorts [Frejka 1985]. Consequently, the reason for discussed large difference between native-born and foreign-born populations is caused by extremely high abortion level of immigrant population. Comparing with fertility (Figure 5) the total abortion rate of the Estonian foreign-born population has been continuously higher, making abortion the most frequent pregnancy outcome. Sometimes it has been stated that the Soviet rule has imported abortion behaviour to the Baltic states. Data on Figure 9 is making adjustment, particularly concerning the 1940-1950s: the Soviet rule has really imported the high intensity of abortion but together with numerous immigrants themselves. Local population has been characterised by much lower levels during the two first Soviet decades, and remaining somewhat lower later as well. Unpublished data on current abortion trend is speaking about the widening gap in abortion beahviour between native-born and foreign-born population groups once more, which has been predicted elsewhere [Anderson, Katus, Puur, Silver 1992].

Another major feature stressed by dynamics of induced abortion is probably even more exiting. The total abortion rate of native-born population has been increased from older cohorts towards younger from 0.75 up to 1.5, i.e. twice. However, not the increase itself is impressive, vice versa, this kind of trend is more or less usual for many European nations in their specific cohorts carrying out sexual revolution. What is exceptional is the interrelation between abortion and corresponding fertility trend. Figure 10 is comparing fertility and induced abortion trend relative to the maximum level estimated for the cohort 1949-1958 (native-borns). It is remarkable that both the highest levels of fertility and abortion are characterised by the same female cohort. Moreover, the sharply increasing abortion rate among cohorts of 1924-1933 seems to have no impact to corresponding fertility levels. Followingly, for younger female cohorts of 1939-1953 both fertility and abortion rates are demonstrating relatively slow but nearly identical increase, followed by decrease in succeeding cohorts, also significantly parallel. This seems to be a crucial evidence of doubtful inverse proportionality of fertility/abortion, so widely pre-assumed in numerous behavioral studies.

Very high level of induced abortion and its specific trend, particularly for the Estonian native-born population has also contributed substantially to population pregnancy level. Like CTFR and CTAR the cohort total pregnancy rate could be easily calculated on FFS data. It is remarkable that the lowest pregnancy levels, ca 2.75 by total rate, are demonstrated by the oldest cohorts of native-born population. Moving towards younger cohorts the pregnancy intensity has been gradually increased and reached the maximum of 4.0 for the cohort of 1949-1953. In younger cohorts the total pregnancy is decreasing, however, the level has remained higher compared to the oldest cohorts despite the uncompleted reproductive life-span. Foreign-born population has been characterised by extremely high pregnancy with the total rate fluctuating around 4.5. Starting from the cohort of 1949-1953 the pregnancy intensity has turned to decrease, nevertheless continuously remaining higher compared to native-borns.

V. Juvenation of Reproductive Behaviour and Fertility Concentration in Life-Course

The third general pattern of the Estonian post-transitional fertility is its juvenation and concentration of births (as well as other pregnancy outcomes) in a shorter range of an individual life-span. Like above-discussed two other principal features - remarkable stability of the overall trend and extremely high level of induced abortion, and consequently pregnancy - this pattern has also been of the long-term character. The fertility juvenation has had an essential impact on different directions, including specific modifications between period and cohort fertility measures. However, unlike the two other major patterns the fertility juvenation is more or less a common feature for the second half of the XX century in most if not all nations characterised by the European marriage pattern and early fertility transition [Festy 1984]. In this respect the Estonian population can contribute just one additional case which could be added into the European experience.

Fertility juvenation could be followed by different indicators. In current paper survivorship functions are calculated on the FFS individual-level data, separately for all ten 5-years female cohorts, and compared to each other. Survivorship function is the usual life-table function l_x with its well-known capacity to estimate the speed as well as curve (trajectory) of the process under the interest. The calculations presented are made on monthly-based time intervals except the survivorship function on first intercourse which is the yearly-based estimate. The calculations are made using the TDA package and the underlining methodology [Blossfeld, Hamerle, Mayer 1989; Blossfeld, Rohwer 1995]. The primary reason to prefer TDA lies on the programme capacity to carry out the event-history analysis. In a way the calculation of the survivorship functions could be taken as the first step to apply the programme in a wider range of event-history analysis.

Technically the survivorship function could be calculated in two different ways. In first approach all the individuals under risk are included regardless the interested event is recorded or not during the time-interval observed in the survey. In second approach only those individuals under risk are considered who have actually experienced the event during the observation period. Combining both approaches one could usually obtain the more detailed information on speed and trajectory on the interested process. Nevertheless, in the current paper the first approach for survivorship calculations is applied. Therefore the results emphasise the comparability between female cohorts in connection to one specific event/process, when the comparability between different events/processes within the cohort is dependent on degree of similarity of completeness of the process. It should be also noted that the life-table function is regarded preferable compared to cumulative percentages, nevertheless, in some cases the results could be rather close to each other.

Figure 11 is presenting the survivorship function for the first birth, or in other words, transition rate from childlessness to motherhood status. The graph actually is providing the reversal figures to original survivorship rates which is more common in demographic presentations. The rates are calculated for all ten 5-years female cohorts of 1924-1973 to follow the continuous changes over time controlling the individual time/age. Data are demonstrating a small decrease of women remaining childless up to the end of reproductive age, which is already discussed earlier, and the noticeable shift of the first birth towards the younger age of mother. There seems to be minor changes in timing for first four cohorts except somewhat smaller proportion of completed childlessness. The fifth cohort of 1944-1948 introduces the largest shift in timing of the first birth towards younger age. This shift is proved to be common for all age groups within the cohort. The successive female cohorts are continuing the movement towards the younger age of motherhood, particularly during their 20s. The eighth cohort, also specifically indicated in the figure, is the last one covering more or less full interval of first birth probabilities. The last female cohort of 1968-1973 is demonstrating further juvenation of the first birth but the process is still ongoing. The outlined cohorts are notified also in succeeding survivorship graphs making the comparison easier.

In order to summarise the juvenation of timing of first birth between cohorts the following figure is outlining difference in months of average individual age at three process-specific points: when (1) one quarter, (2) one half, and (3) three quarters of the female cohort has already experienced the first delivery. Three above-reviewed cohorts, namely the first, fifth and the eighth are compared, two last cohorts relative to the first one. It is usually expected that the difference in average age of mother between cohorts is lower in earlier stages of the process when the relative speed of changes is quicker, i.e. the age difference is expected to grow gradually towards the point when the third quarter of the cohort has been completed the first delivery. The juvenation at this point of the process is estimated 46 months between the cohorts of 1924-1928 and 1944-1948, and already 67 months when the first and eighth (1959-1963) cohorts are compared to each other.

It seems a reasonable hypothesis to assume that the substantial juvenation of the first delivery is accompanied by the similar trend in the beginning of sexual life. The shifts in sexual behaviour could not give the full explanation to the fertility juvenation, nevertheless, it would be very useful information for understanding this process. Technically speaking it could support some intermediate variables for analysing the cohort fertility juvenation. Data on beginning of sexual life is not very frequent in different databases, particularly combined with the fertility information, this gives an extra reason to present the survivorship rates by first sexual experience on the Estonian FFS data. Calculation and presentation of rates is similar to the procedure discussed above, except the survivorship function for the first sexual intercourse is calculated on a year-interval, not a month-interval basis. Results demonstrated in Figure 13 are expressing the juvenation process of already familiar type. The differences in transition rates seem to be slightly larger between the first four cohorts compared to the same differences in fertility function, nevertheless, the fifth cohort of 1944-1948 is the first to show the clear turn of beginning of sexual life towards younger age. Later the process is continued in all succeeding cohorts. The youngest cohort of 1969-1973 is introducing a sharp shift to younger age. There has been no such a shift measured in the fertility function, i.e. the difference between first sexual experience and first delivery seems to be widened recently. It is a respectable ground to expect the accompanying differences in other demographic processes to be followed in their later life-course.

Similar to presentation of the fertility function, also the accompanying second graph on difference in months of individual age at first sexual intercourse is plotted. Age difference is compared at three process-specific points: when cumulative rate reaching levels of 0.25, 0.50 and 0.75, correspondingly. Already reviewed cohorts, the first, fifth and the eighth are compared. According to the data the age difference between cohorts is smaller in earlier stages of the process, and growing alongside with progress of the process. Slightly more than a half of the total estimated juvenation between the first and eighth cohorts has been taken place from cohort 1 to cohort 5, later on the speed of juvenation has been somewhat accelerating. The estimated age difference at cumulative rate of 0.75 between the cohorts of 1924-1928 and 1944-1948 is 29 months and between cohorts of 1924-1928 and 1959-1963 already 45 months. In general the difference in age at first sexual intercourse is lesser compared with the fertility function, however, bringing also the last cohort into the comparison seems to wave off those small differences between two events/processes.

Referring to above-discussed high proportion of non-birth pregnancy outcomes and the specific trend of abortions in Estonia, the survivorship function by this event is not less important than the first birth when analysing population fertility in wider pregnancy context. Next figure is presenting the survivorship rates for the first non-birth pregnancy, in customary expression. When analysing the calculated cohort survivorship functions it should be taken into account that for one part of women in every cohort the first pregnancy is resulting in non-birth outcome and for another part in birth of child. The named proportions are naturally not fixed and are subjected to change from cohort to cohort. We already know that this shift has been substantial, particularly moving from the two oldest cohorts towards younger ones. The largest difference in non-birth pregnancy function compared to the fertility function is much lower completion plateau, i.e. relatively numerous group of women in each cohort has never experienced non-birth pregnancy outcome. In the oldest cohorts the plateau is lower than 0.5, however, rising sharply up to 0.8 in younger cohorts. It is also the main reason of considerable difference between the trajectory of first birth and first non-birth survivorship rates.

The same reason is partly explaining much larger-scale juvenation of non-birth pregnancy compared to first birth. (Figure 12). The age difference in first non-birth pregnancy between the cohorts of 1924-1928 and 1944-1948 are estimated 144 months, already at the point of cumulative rate 0.4. The difference between the first and eighth cohorts have been risen even up to 166 months or nearly up to 14 years. In other words, the non-birth first pregnancy survivorship function has shifted in considerable speed towards the shape common to the first birth function. If the nature of the pregnancy outcome was rather important for the oldest cohorts differentiating the corresponding process, it has became less and less important for the younger cohorts. For latter the pregnancy function is more uniformal and not depending any more on the type of pregnancy outcome in large extent.

At the background of such a considerable juvenation of all three processes analysed it could be a surprise for the first view that the real individual fertility interval has changed at much lesser scale. Hereby the real individual fertility interval is defined as the period between the first and the last delivery. The two already routine figures on survivorship rates and age differences are prepared (Figures 14 and 15). Relatively small differences are documented for the first five-six cohorts. The eighth cohort really outstands from the general picture and shows the biggest difference: it is estimated in 53 months compared to the first cohort at the cumulative rate of 0.7. Successor cohorts compared to eighth have moved backward, closer to the older cohorts, however, it is mainly because of uncompleted fertility career.

References

Anderson, Barbara, Kalev Katus, and Brian Silver (1994). Developments and Prospects for Population Statistics in Countries of the Former Soviet Union. *Population Index*, Vol. 60, No.1, pp. 4-20.

Anderson, Barbara, Kalev Katus, Allan Puur and Brian Silver (1993). Characteristics of women having abortions in Estonia. *International Population Conference*, vol.1. Montreal, IUSSP, pp.215-234.

Avdeev, Alexandr (1994). Contraception and Abortions: Trends in the USSR and Prospects for the 1990s. *W.Lutz, S.Scherbov, A.Volkov (Eds). Demographic Trends and Patterns in the Soviet Union Before 1991*. London-New York, Routledge, pp.131-146.

Avdeev, Alexandr, Alan Blum, Irina Troitskaya (1995). The History of Abortion Statistics in Russia and the USSR from 1900 to 1991. *Population An English Selection*, vol.7, pp.39-66

Blayo, Chantal (1991). Les modes de prevention des naissances en Europe de l'Est. Population, vol.46, No.3, pp.527-546.

Blossfeld, Hans-Peter, Alfred Hamerle, Karl Mayer (1989). *Event History Analysis*. Hillsdale, Lawrence Erlbaum Associates.

Blossfeld, Hans-Peter, Götz Rohwer (1995). *Techniques of Event History Modeling*. Mahwah, Lawrence Erlbaum Associates.

Coale, Ansley, Robert Treadway (1986). Summary of the changing distribution of overall fertility, marital fertility and the proportion married in the provinces of Europe. *A.J.Coale and S.C.Watkins (Eds)*. *The decline of fertility in Western Europe.* Princeton, pp.31-181.

Council of Europe (1996). *Recent Demographic Developments in Europe*. Strasbourg, Council of Europe Press.

David, Henry. (1992). Abortion in Europe, 1920-1991: A Public Health Perspective. *Studies in Family Planning*, vol.23, No.1, pp.1-22.

EKDK (1995a). *Estonian Family and Fertility Survey. Methodological Report*. RU, Series A, No.39. Tallinn, EKDK.

EKDK (1995b). *Estonian Family and Fertility Survey. Standard Tabulations*. RU, Series C, No.6. Tallinn, EKDK.

Engman, Max (1993). *St. Petersburg as a melting pot.* Paper presented to the IX Visby Symposium for Historical Sciences. Visby.

ESA (1996). *Statistical Yearbook of Estonia 1996*. Tallinn, Eesti Statistikaamet.

Festy, (1984). Fertility in Western Countries from 1870 to 1970. Bangok, United Nations.

Frejka, Tomas (1985). Induced Abortion and Fertility. *Family Planning Perspectives*, vol.17, No.5, pp.230-234.

Hajnal, John (1965). European marriage patterns in perspective. *D.Glass and D.Eversley (Eds.) Population in History.* Chicago.

Henshaw, Stanley, E. Morrow (1990). *Induced Abortion: A Worldwide Review. 1990 Supplement*. New York, Allan Guttmacher Institute.

Katus, Kalev (1990). Demographic Trends in Estonia Troughout the Centuries. *Yearbook of Population Research in Finland*, XXVIII, pp.50-67.

Katus, Kalev (1991). *Fertility Trend and Regional Differences in Estonia*. RU, Series B, No.12. Tallinn, EKDK.

Katus, Kalev (1994). Fertility Transition in Estonia, Latvia and Lithuania. *W.Lutz, S.Scherbov, A.Volkov (Eds). Demographic Trends and Patterns in the Soviet Union Before 1991*. London-New York, Routledge, pp.89-113.

Katus, Kalev, Allan Puur and Luule Sakkeus (1995). *Estonian Family and Fertility Survey: Experience from Post-Soviet Environment*. Paper presented at the European Population Conference. Milano.

Klijzing, Erik (1996). *FFS Countries Module Selection Implemented. Working paper 12.* Presented at the Fifth Informal Working Group meeting on the Promotion of FFS in the ECE Region. Geneva, United Nations.

Mihhailov, Dmitri (1990). Mitteeestlastest, ennekõike venelastest, Eestis. *Aja Kiri*, No.58. Stockholm.

Notkola, Irma-Leena (1989). *Luonnollisesta hedelmällisyydestä lapsirajoitukseen.* Kuopio.

Notkola, Irma-Leena (1990). *Transformations of reproductive behaviour during fertility transition: a study of a Finnish parish.* Paper presented to the I Estonian-Finnish Demographic Symposium. Tallinn.

Nõges, Mats (1925). *Rahvamuutused Viljandi maakonnas 1801-1923. Demograafiline töö*. Viljandi.

Paadam, Katrin (1990). Naiste sotsiaalse käitumise erisused Tallinnas. *Linna sisestruktuurid*, vol.3. Tallinn.

Palli, Heldur (1988). *Otepää rahvastik aastail 1716-1799*. Tallinn.

Palli, Heldur (1996). *Eesti rahvastiku ajalugu aastani 1712*. Tallinn, Teaduste Akadeemia Kirjastus.

Popov, Andrei (1991). Family Planning and Induced Abortion in the USSR: Basic health and Demographic Characteristics. *Studies in Family Planning*, vol.22, No.6, pp.368-377.

Puur, Allan (1997). *Change in Economic Activity of Population: Case of Estonia*. Paper presented at the International Symposium Demographic Development in Baltic Countries. Tallinn.

Sakkeus, Luule (1991). *Post-war migration trends in Estonia*. RU, Series B, No.15. Tallinn, EKDK.

Sakkeus, Luule (1994). The Baltic States. *Solon Ardittis (Ed). The Politics of East-West Migration.* London, MacMillan Press.

Sardon, Jean-Paul (1990). Le remplacement des generations en Europe depuis le debut du siecle. Population, vol.45, No.6, pp.947-969.

Vishnevski, Anatoli and Andrei Volkov (1983). (Eds). *Vosproizvodstvo naselenia SSSR.* Moscow.