TRAMES, 2000, **4(54/49)**, 3, 213–230

https://doi.org/10.3176/tr.2000.3.01

GENERAL PATTERNS OF POST-TRANSITIONAL FERTILITY IN ESTONIA

Kalev Katus

Estonian Interuniversity Population Research Centre

Abstract. The paper discusses post-transitional fertility in Estonia against the background of long-term population development. Estonian population is characterised by a remarkably stable cohort fertility throughout six-seven decades compared to other nations with advanced demographic development, and a very high intensity of non-birth pregnancy outcome, particularly of induced abortion. In that context the continuous juvenation of reproductive events is particularly emphasised in the article. Trends in (1) first birth, (2) first abortion, (3) beginning of sexual life, and (4) individual fertility interval are presented, using the survivorship approach. The analysis is mainly based on the Estonian FFS database which contains event-history data on female birth cohorts of 1924–1973.

The post-transitional fertility, despite its dominance for two, and partly already three, generations in Western and Northern Europe, is still a relatively new phenomenon in long-term perspective. Analysing the fertility process in its new quality, it is essential in that perspective to consider also the previous stages of population development. This is particularly important for analysing the timing patterns of reproductive events that were remarkably heterogeneous in European countries at the end of the fertility transition.

The importance of ascertaining the time frame of the demographic transition should also be stressed. Among other things, it provides the basis for determining the starting point of the post-transitional era in fertility development and helps to avoid inappropriate comparisons between countries at different demographic stages. As regards the timing patterns, the geographical extension of the European marriage pattern should be kept in mind as well, being closely related to the low versus high mean age of reproductive events at the beginning of the post-transitional fertility. There are grounds to assume that the interrelations between the general trend of post-transitional fertility and the timing patterns of reproductive events could be rather significant and certainly complex.

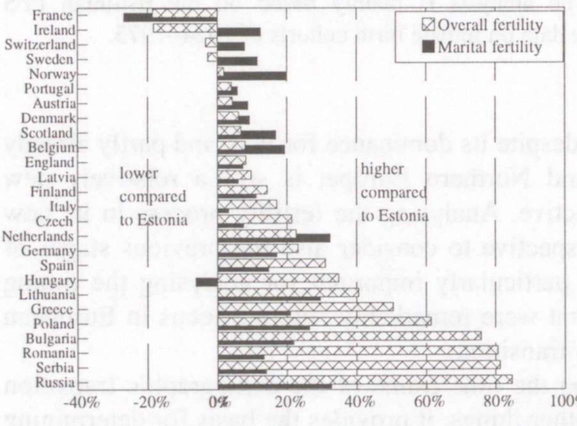
1. Context of transitional fertility

The fertility transition and its timing in Europe is most comprehensibly studied in the framework of the Princeton project. The province level analysis covers most of the European countries where the fertility development is measured by the unified general indices, specially elaborated for the purpose (fertility rates, standardised to the Hutterite's fertility schedule) (Coale, Treadway 1986). A set of those indices have also been calculated for the Estonian counties, as well as for other Baltic countries and presented in earlier papers (Katus 1991, 1994). These indices have proved very practical in analysing the fertility development during the transitional stage and in outlining the principal trend and time frame of the fertility transition.

Figure 1 presents the comparison of overall and marital fertility indices of various European countries against the corresponding Estonian level in 1881. The time point is determined by the first modern census in Estonia. Its data enable to calculate the fertility indices covering all the counties. Corresponding European figures are derived from the Princeton project, the closest year available to the datum referred.

Figure 1

Overall and marital fertility indices
Indices compared to level of Estonia 1881



Both the overall and marital fertility indices are compared, in order to consider the impact of the European marriage pattern. In this context it should be noted that Estonia is situated to the west of the Hajnal line (Hajnal 1965). The country formed an eastern border for the expansion of that pattern, i.e. the rough line of St.Petersburg-Triest could be fixed, in more detailed geographical level, alongside the Narva River and Lake Peipsi. Within the region, the Hajnal line runs from Narva to Petseri, strictly dividing the Russian and Estonian settlements. Moreover, the demarcation line of marriage pattern has become even more expressed in the northern part, simultaneously with the continuous repopulation of the Leningrad oblast / St.Petersburg *gubernia*, *resp* historical Ingeria (Katus, Puur, Sakkeus 2000a).

Turning back to the fertility indices, the Estonian level of the overall fertility index in the early 1880s was close to that of Sweden, Switzerland, Norway, Austria and Denmark. Lower levels of overall fertility were expressed only in France and Ireland. As Estonia had a slightly higher proportion of married women in reproductive age compared to Northern and Western European countries, except France, England and Finland in that comparison, the Estonian marital fertility stayed lower in relative terms than overall fertility. Correspondingly, the countries of the closest overall fertility like Sweden, Switzerland and Norway, demonstrated up to 20 per cent (Norway) higher marital fertility compared to Estonia.

France, as a leading nation in fertility transition, has been the only European country having both overall and marital fertility lower than Estonia in the 1880s. Among the other Baltic countries, Latvia demonstrated a rather similar situation to Estonia, having only slightly higher fertility levels at that time. Lithuania, on the other hand, was clearly distinguished from the two northern neighbours with the fertility levels about 30-40 per cent higher. According to these data, Estonia belongs among those European countries that had experienced an early fertility transition.

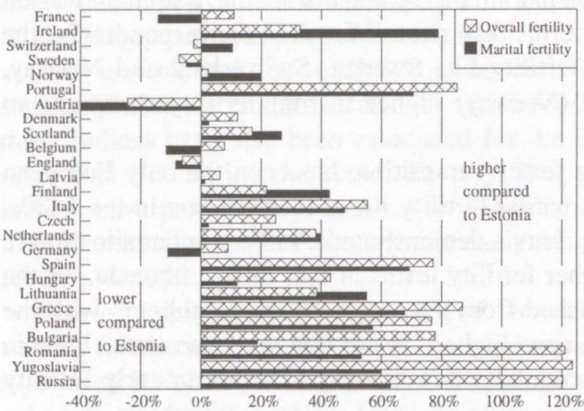
It is noteworthy that the marital fertility in Estonia was low not only in comparison with other European countries at the time, but also relative to the uncontrolled or natural fertility level. It reflects the ongoing progress of fertility transition which had supposedly started several decades ago. The remarkably low level of pre-transitional natural fertility in Estonia could present an alternative possibility. However, no historical data on family reconstruction by Estonian parishes support the latter hypothesis: total fertility rate has fluctuated around 4–5 in the 18th century like in other countries (Palli 1988, 1996). The case study of Viljandi county, the pioneering region of fertility transition in Estonia, proves that the continuously declining trend of overall fertility, typically caused by the parity-specific family limitation, began already in the 1840s (Nõges 1925). Also, the completed cohort fertility rates derived from the 1922 census data support the hypothesis that the parity-specific family limitation in Estonia began no later than in the 1850s –1860s.

Similar comparison of fertility indices is repeated for the 1930s. By that time the fertility transition had come to an end and the underreplacement fertility was already reached by the forerunners of demographic development in many Northern and Western European countries. In Figure 2, presenting the countries in the same order as in the previous one, Estonia can be again found among the countries with the lowest fertility. Close levels were observed in Sweden, Switzerland, Norway and Denmark. Also, fertility levels in Latvia and Estonia were rather close, in contrast to Lithuania with about 40 per cent higher fertility.

It should be pointed out that most East and South European countries, as well as those regions in total, have moved further from the Estonian situation compared to the corresponding difference half a century earlier. Although in most of these countries, fertility transition had also begun long before the 1930s, the

Figure 2

Overall and marital fertility indices
Indices compared to level of Estonia 1934



Countries are ranked by overall fertility level in the 1880s

levels still remained nearly twice as high as in Estonia. Likewise, Figure 2 confirms the considerable time-lag in fertility development between Estonia and the neighbouring Russia. Referring also to other relevant data, the time-lag in population development between Estonia and Russia is estimated up to half a century (Katus 1990, Vishnevski, Volkov 1983).

Long-term fertility development including the transitional period has been typically studied on the basis of relatively simple aggregated data. Given the magnitude of changes, this has proved quite an appropriate and sufficient approach. The analysis of post-transitional fertility, however, usually demands a closer insight, and correspondingly the application of various individual micro-level data. The following analysis of the fertility trend in Estonia is using the Estonian Family and Fertility Survey (FFS), 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 have been discussed in earlier publications (EKDK 1995a, 1995b, Katus, Puur, Sakkeus 1995). Overviews on other data sources on Estonian fertility covering the equivalent period could also be found elsewhere (Anderson, Katus, Silver 1994, EKDK 1999).

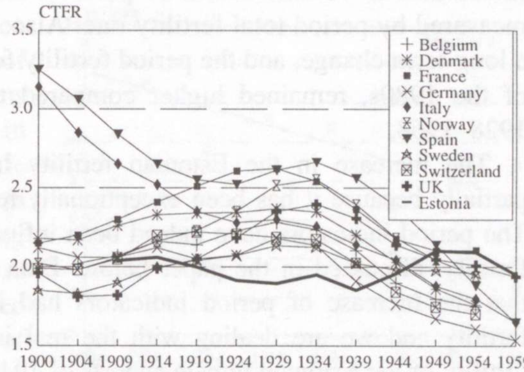
2. Patterns of post-transitional fertility

The most significant general feature of the Estonian post-transitional fertility is its long-term stability, from the 1920s up to the recent decade. This stability should be regarded in relative terms; in European experience, however, the Estonian fertility trend seems to be almost invariable indeed for more than half a century. This feature could be introduced by any general fertility indicator, among which cohort indices should be given preference for their more stable nature. In Figure 3, total cohort fertility rates and/or completed fertility rates for selected European countries are compared. The data are derived mainly from two sources, the publication by Sardon and the Council of Europe's population yearbook (CoE 1996–1999, Sardon

1990). The annual fertility rates are aggregated into five-year cohorts similar to the Estonian FFS results (EKDK 1995b).

Figure 3

Cohort total fertility rate
European countries, birth cohorts 1900-1963



Against the background of rather large-scale fluctuations in most European countries, the changes in the Estonian cohort fertility within the interval of 1.9–2.1, measured by the total rate, seem almost stable. Furthermore, the Estonian fertility has been the lowest for female birth cohorts 1924–1943, but among the highest for younger cohorts of 1949–1963, compared to the thirteen European nations.

It should be remembered that all the countries represented in the Figure, except Italy and Spain, have been the forerunners of fertility transition, and have experienced the underreplacement fertility for female birth cohorts of the beginning of the century. Correspondingly, those cohorts characterised with relatively high fertility in the 20th century were actually baby-boomers. In the context of the whole period, the stability of the Estonian fertility level is almost exceptional compared with the forerunning countries of demographic development.

Looking for an answer to this untypical stability of Estonian fertility, two important features should be stressed. Namely, there has been no baby-boom in Estonia after the Second World War (this divergent situation has been discussed in some early papers already cited). All the nations who experienced the underreplacement fertility in the 1920–1930s, also faced the post-war baby-boom, except Estonia.

In Europe, the baby-boom was not a short-term fertility increase of compensatory nature, but lasted up to the middle of the 1960s. Nor has it been a minor increase in volume: all the low-fertility countries reached the replacement fertility during the baby-boom period, and some of them have reached the level of period total fertility rate as high as three children (Festy 1984, Gillis et al 1992, Westoff 1983). Estonian fertility, however, remained continuously below the replacement level, and the fertility levels, characteristic of the older birth cohorts, were maintained throughout the baby-boom era. The ten-year birth cohort of 1924–1933 of the Estonian native-born population actually demonstrated the lowest completed fertility worldwide.

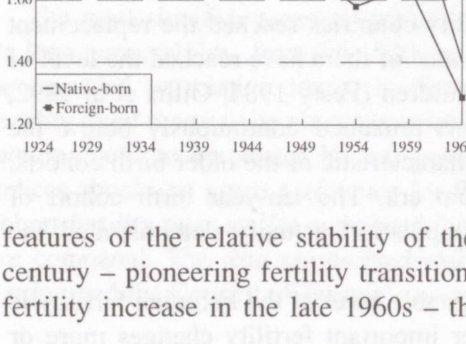
The second reason behind the relatively stable level of the Estonian fertility is no less fascinating. There have been rather important fertility changes more or less everywhere in Europe in the 1960s–1970s. In contrast to that general European trend of fertility decrease, particularly for the baby-boom countries, the period fertility in Estonia began to rise (Katus 1991). The increase was quite remarkable in volume: about 17 per cent in four years (1971 compared to 1967) measured by period total fertility rate. Also, that increase in Estonia proved to be a long-term change, and the period fertility for the two decades, *resp* up to the end of the 1980s, remained higher compared to the previous forty-year period of 1928–1968.

The increase in the Estonian fertility has not received sufficient attention, partially because it has been exceptionally regarded as a result of a timing effect. The period indicators have indeed been influenced by an accelerated juvenation of fertility, discussed in the paper below. Data on cohort fertility, however, confirm that the increase of period indicators had its definite impact on the completed fertility and we are dealing with the real increase. For example, the completed fertility of the Estonian female cohorts of 1949–1958 exceeds the comparative level of the preceding older cohorts by 8–13 per cent.

From the viewpoint of population development, the fertility increase in Estonia in the late 1960s should be particularly emphasised because of two features. First, the completed fertility of those female cohorts mostly affected by the increase, rose close to replacement after a 40–45 year period of underreplacement fertility. Second, the Estonian foreign-born population has demonstrated a continuously decreasing fertility, i.e. the opposite trend to the native-born population. In Figure 4 two population groups are compared, and the diverting trend of the birth cohorts 1949–1958 could be easily observed. Moreover, the country of origin has become the dominant factor of difference in fertility levels in those cohorts, replacing the usual social characteristics such as urban/rural residence, economical status, education, etc. The fertility increase, particularly for the birth cohorts of 1949–1958, experienced in the calendar period of 1970–1980, certainly demands a detailed analysis in future.

Figure 4

Cohort total fertility rate
Estonia, native and foreign-born birth cohorts 1924-1968



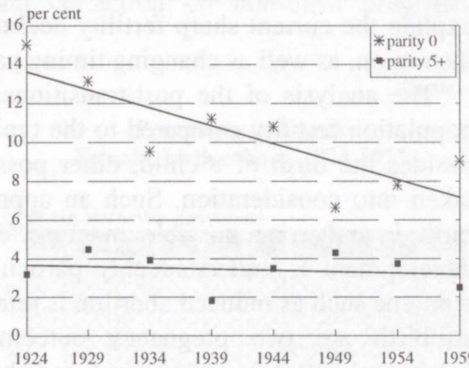
Considering the three principal features of the relative stability of the Estonian fertility trend during the 20th century – pioneering fertility transition, absence of post-WW II baby-boom, and fertility increase in the late 1960s – the last two present untypical trends in the

European context, particularly when combined with advanced demographic development.

The discussed stability of the Estonian fertility trend has been accompanied by a homogenisation of reproductive behaviour. The process could be observed by the changes in the parity distribution of female cohorts which is also important in understanding the shifts in timing pattern of reproductive events. Figure 5 compares the extremes of the named distribution, i.e. the proportion of women at parity zero and the proportion of women at parity five-plus.

Figure 5

Proportion of 0 and 5+ parity women Estonia, birth cohorts 1924-1963



It is usually likely to find a decrease in the proportion of higher parities. In the case of Estonia with its early fertility transition, the proportion of high-parity women is already very low for the oldest cohort and therefore rather stable for all the successive cohorts starting from 1924. This proportion has fluctuated around 4 per cent in every 5-year cohort without any inclination for change. Stability in the proportion of high-parity women in birth cohorts for more than half a century supports the hypothesis that the parity-specific fertility limitation during the fertility transition does not result in the disappearance of births of higher orders in the modern regime of population development. Higher parity women have become a small minority in the female birth cohort, but still managed to survive.

Another end of the parity distribution, the proportion of women at parity zero in the birth cohort, has shown no stability over time. That proportion has been rather high among older cohorts, reflecting the intermedium of the fertility transition when the continuous fertility decrease was accompanied with the increasing fertility differentiation. In earlier analyses it has been determined that the highest fertility differentiation in Estonia was found in the 1920s and 1930s correspondingly, expressed by the female cohorts born at the turn of the century (Katus 1991). At that time the zero-parity women comprised a quarter of the female birth cohort. That proportion was already lower for the cohorts covered by FFS, but still high, and steadily decreasing toward the younger cohorts. The process corresponded to the concentration of female fertility careers, particularly at parity two (Katus, Puur, Sakkeus 2000b).

In general, it seems that the increase in heterogeneity in the population reproduction behaviour for the cohorts covered by the Estonian FFS is somewhat more definite according to the demographic characteristics compared with social indicators (EKDK 1995b, Katus 1997). The analysis of the process of fertility homogenisation seems to demonstrate a rather stimulating item, providing an approach to outline interesting results. It could be thus roughly concluded that the relative stability of the Estonian cohort fertility has been accompanied by decreasing heterogeneity of reproduction behaviour, particularly of demographic origin. This conclusion is also rather important when looking for hypotheses to explain the current sharp fertility decline in Estonia and many other countries of the region, as well as changing timing patterns of reproductive events.

The analysis of the post-transitional fertility calls for a broader concept on population fertility compared to the typical approach for earlier periods. Namely, besides the birth of a child, other possible pregnancy outcomes should also be taken into consideration. Such an approach could be regarded more general as birth is only one possible outcome of pregnancy. This approach to fertility development is understandably particularly important when another pregnancy outcome such as induced abortion is relatively frequent. Spontaneous abortion and stillbirth are two pregnancy outcomes with less dependence on personal behavioral patterns, whereas induced abortion involves a special individual and/or family decision-making. The magnitude of induced abortion intensity is therefore expected to have a greater variation compared to stillbirth and spontaneous abortion in societies of similar population health conditions.

Despite the absence of necessary data, it has been recognised that the Soviet Union, as well as Estonia as part of it for half a century, was characterised by one of the highest abortion prevalence in the world (Avdeev 1994, Avdeev, Blum, Troitskaya 1995, Popov 1991). Besides a considerable addition to pregnancy level, and therefore clearly differentiating between population fertility and pregnancy processes, high induced abortion is also expected to introduce specific differentiation in female population and influence parity distribution patterns. The timing patterns of fertility could also be largely affected. Those arguments emphasise the need to consider a broader pregnancy context when analysing the post-transitional fertility, particularly in the countries of high levels of non-birth pregnancy outcome.

Considering this background, it is surprising how rare the combined pregnancy-fertility studies in demography actually are. There is certainly an extensive amount of medical studies on human pregnancy, including contraception versus abortion behaviour. In that type of studies the quantitative aspects are usually not of primary concern, but are still quite often treated. On the other hand, the national-level data on abortion prevalence and/or long-term pregnancy trend in combination with fertility cannot be derived from these kind of sources.

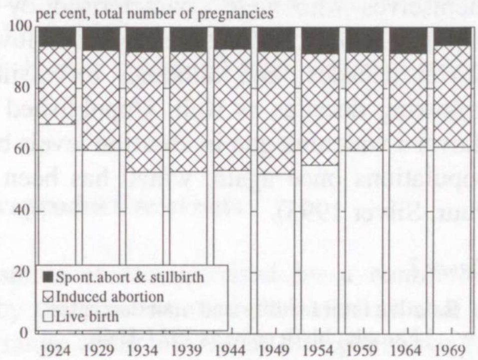
As for demographic studies, it is obviously not a methodological under-estimation of the role of other pregnancy outcomes and their impact on fertility, but primarily the unavailability of relevant data. In most European countries there is no vital registration of abortion and other pregnancy outcomes; such registers could naturally not be founded before the legalisation of abortions in the 1960s–1970s. The data issues have been discussed in many papers together with useful attempts to present the comparative abortion trend in the European region (Blayo

1991, David 1992, Henshaw, Morrow 1990, Frejka 1985). It is noteworthy that even in the European FFS, a major in-depth study on the population family and fertility careers, many participating countries have been rather conservative in including a comparable module of data collection on non-birth pregnancy outcomes (Klijzing 1996).

The general distribution of pregnancy outcomes in Estonia confirms the importance of non-birth events in women's reproductive career. In Figure 6, the FFS data is presented for the native-born population. Stillbirths are combined with spontaneous abortions, and cover 7–9 per cent of pregnancy outcomes. It should be stressed that from the medical point of view, it is impossible to record all spontaneous abortions. Many, if not most of them, take place in very early stages of pregnancy, and remain unnoticed even by the women themselves, and will thus be unrecorded. From the demographic and social point of view, however, such spontaneous abortions are also of much less importance compared to those pregnancy terminations which take place at later stages of gestation. Stillbirths in particular, as well as repeated spontaneous abortions, for example, certainly mean a painful experience to a childless woman and her family. In this perspective, the level of nearly one tenth of this kind of pregnancy outcome is not a small figure at all. On the other hand, this proportion has been rather stable throughout the cohorts which, *inter alia*, is an indicator of a relatively good validity of the data on a female pregnancy career.

Figure 6

Pregnancy outcomes
Estonia, birth cohorts 1924-1973



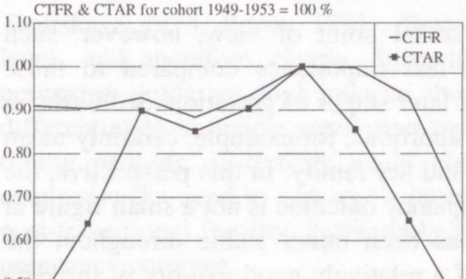
An induced abortion has been an important pregnancy outcome to all female FFS cohorts, particularly of 1934–1958. Additionally, the abortion behaviour is strikingly different between the native-born and foreign-born population in Estonia (EKDK 1995b). The latter population group has experienced higher levels of abortion for all female cohorts. Comparing the total abortion rates for both population groups, at least two general features should be emphasised.

First, the difference between the two older FFS cohorts of native-born and foreign-born populations is remarkable, being nearly threefold. The difference is not caused by the extremely low abortion level of native-born population. Those FFS cohorts, as already discussed, were characterised by an underreplacement fertility. Against this background the total abortion rate of about 0.7–1.0 should be considered rather substantial. This level is higher compared to the European average for the same female birth cohorts (Frejka 1985). Consequently, the reason for the large difference between the native-born and foreign-born populations is caused by an extremely high abortion level of the foreign-born population. Compared with fertility levels, the total abortion rate of the Estonian foreign-born population has been continuously higher, making abortion the most frequent pregnancy outcome for all cohorts 1924–1973.

It has been stated sometimes that the Soviet rule imported abortion behaviour to the Baltic countries. On the basis of the Estonian FFS data, the statement can be altered, particularly concerning the 1940–1950s: the Soviet rule did introduce a high intensity of abortion into Estonia, but together with numerous immigrants themselves who were characterised by that behaviour. The local native-born population was characterised by much lower levels of abortion during the first two Soviet decades, and although increasing, remained somewhat lower for the following decades as well. Unpublished data on the current abortion behaviour shows a widening gap in abortion levels between the native-born and foreign-born populations once again, which has been predicted elsewhere (Anderson, Katus, Puur, Silver 1993).

Figure 7

Relative total fertility and abortion rates Estonia, birth cohorts 1924-1968



Another feature emphasised by the comparable dynamics of fertility and induced abortion is no less exciting. The total abortion rate of native-born population has increased from older FFS cohorts towards younger, from 0.75 up to 1.50, i.e. twice. The increase itself is not particularly impressive, quite the opposite – this kind of trend is more or less typical of many European nations in their population cohorts who carry out sexual revolution. What is exceptional, is the interrelation between abortion and fertility, compared in Figure 7. The dynamics of both processes are presented relative to the maximum level estimated for the female birth cohort of 1949–1958.

The fact that the highest level of fertility as well as abortion are characteristic of the same female birth cohort, is itself remarkable. Moreover, the sharp increase in abortion intensity when compared with the cohorts of 1924–1933 seems to have no impact on the corresponding fertility levels. Additionally, for female cohorts of 1939–1953 both fertility and abortion rates are demonstrating relatively slow, but nearly identical increase, followed by a decrease in succeeding cohorts, also suprisingly similar. The Estonian fertility and abortion trends for the last half century thus seem to provide considerable evidence against the hypothesis of inverse proportionality of fertility and abortion which has been rather widely assumed in numerous behavioural studies.

The high induced abortion intensity has contributed substantially to the population pregnancy levels. Like CTFR and CTAR, the total cohort pregnancy rate could be calculated on the basis of the Estonian FFS data. The lowest pregnancy levels, about 2.75 by total rate, are demonstrated by the oldest cohorts of the native-born population. Moving towards younger cohorts, the pregnancy intensity is gradually increasing and reaching the maximum of 4.0 for the cohort of 1949–1953. In younger cohorts, the total number of pregnancies is decreasing, but the level is still higher compared to the oldest FFS cohorts, despite the uncompleted reproductive life-span. Foreign-born population has been characterised by continuous high pregnancy levels with the total rate fluctuating around 4.5. Starting from the cohort of 1949–1953, the pregnancy rate has shown some decrease, remaining nevertheless higher compared with the native-born population.

3. The timing of reproductive events

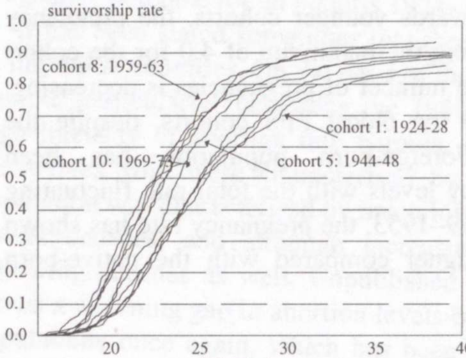
The post-transitional fertility in Estonia is characterised by a continuous juvenation up to the last decade, and by the concentration of births, as well as other pregnancy outcomes in a shorter range of an individual life-span. Like the above-discussed two principal features – remarkable stability of the overall fertility for a long period and very high intensity of induced abortion, and consequently pregnancy – the change in the timing patterns of reproductive events has also been of long-term nature. The juvenation of post-transitional fertility is a common feature for most, if not all the nations historically characterised by the European marriage pattern and early fertility transition. In this respect the Estonian population is just another similar case.

Fertility juvenation could be followed by several indicators. In this paper the survivorship functions are calculated on the basis of the FFS individual-level data, separately for all ten 5-year female cohorts, and compared to each other. A survivorship function is the usual life-table function l_x with the capacity to estimate the speed as well as curve (trajectory) of the process. The presented data are calculated on monthly-based time intervals except the first intercourse which survivorships are yearly-based estimates. The calculations were prepared using the TDA package and the underlining methodology (Blossfeld, Hamerle, Mayer 1989, Blossfeld, Rohwer 1995). In a way survivorship functions could be regarded as the first step to apply the wider range of event-history tools.

Technically, the survivorship function could be calculated in two different ways. In the first approach, all individuals under risk are included regardless of whether the event is recorded or not during the observed time-interval. In the second approach, only those individuals under risk are considered who have actually experienced the event at some point during the observation period. By combining both approaches, it is usually possible to obtain more detailed

Figure 8

First birth: survivorship function
Estonia, birth cohorts 1924-1973



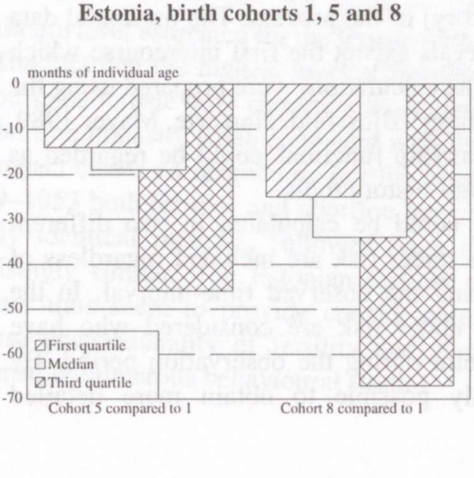
information on the speed and trajectory of the process. In the current paper, the first approach is applied for survivorship calculations. Correspondingly, the results emphasise the comparability between female birth cohorts of 1924–1973 regarding one specific event/process, when the comparability between different events/processes of the same cohort is dependent on the degree of similarity between the completeness pattern of the processes.

Figure 8 presents the survivorship functions for the first birth, or in other words, the transition rate from childlessness to motherhood. The graph is actually providing the reversal picture of the original survivorship rates, more common in demographic presentation. In general, the data show a small decrease of women remaining childless up to the end of reproductive age, already discussed earlier, and the noticeable shift of the first birth towards a younger age in the individual life course.

Concerning the juvenation of the first birth, there seem to have been only minor changes in timing for the first four FFS 5-year cohorts, except a somewhat smaller proportion of completed childlessness. The fifth birth cohort (1944–1948) introduced the largest shift in timing towards a younger age, and this shift appears common for all age groups within the cohort. The successive female cohorts keep moving towards younger age of motherhood, particularly in their twenties. The eighth birth cohort (1959–1963) is the last that covers the more or less full interval of the first birth probabilities. The youngest FFS female cohort of 1968–1973, however, seems to continue the juvenation trend of the first birth. The same female cohorts specified in Figure 8 are also outlined in the succeeding survivorship graphs for comparative purposes.

Figure 9

Timing of first birth
Estonia, birth cohorts 1, 5 and 8



To summarise the shift in timing of the first birth within the FFS cohorts, the average individual age in months is calculated 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 birth. The three above-reviewed birth cohorts, namely the first, fifth and the eighth are compared, the two last cohorts relative to the first one. The differences in average individual age of first motherhood are presented in Figure 9.

It is only to be expected that the difference in the average age of mother between cohorts is lower in earlier stages of the process when the relative speed of change is more rapid, i.e. the age difference is expected to gradually grow towards the point when the third quarter of the cohort has completed the first birth. The shift towards the younger age at this point of the process-specific cohort life-cycle is estimated at 46 months between the cohorts of 1924–1928 and 1944–1948, and as many as 67 months between the first and eighth (1959–1963) cohorts.

It is reasonable to assume that the substantial shift in the average age of mother at first birth towards younger age is accompanied by a similar trend in the beginning of sexual life. The changes in the pattern of the latter could not fully explain the fertility juvenation, although, it would be useful background information. Technically speaking, it could support some intermediate variables for analysing the cohort fertility juvenation. The data about the beginning of sexual life by female cohorts, however, is not easily available, particularly when combined with fertility information. The Estonian FFS supports that data, and it is possible to calculate the survivorship rates by the first sexual experience similarly to the first birth.

Results in Figure 10 express the already familiar juvenation process. On the one hand, the differences in transition rates between female cohorts are slightly larger, particularly between the first four cohorts, compared to the same differences in fertility function. On the other hand, the fifth cohort of 1944–1948, similarly to the first birth, shows a clear turn of the beginning of sexual

Figure 10

First sexual intercourse: survivorship function
Estonia, birth cohorts 1924-1973

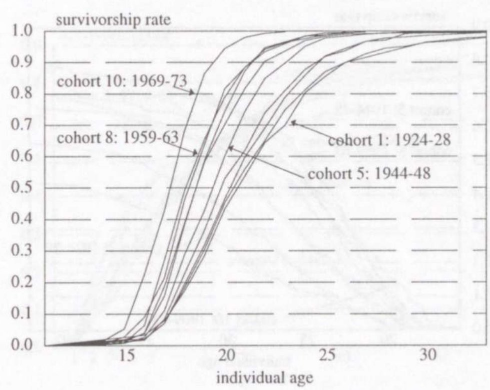
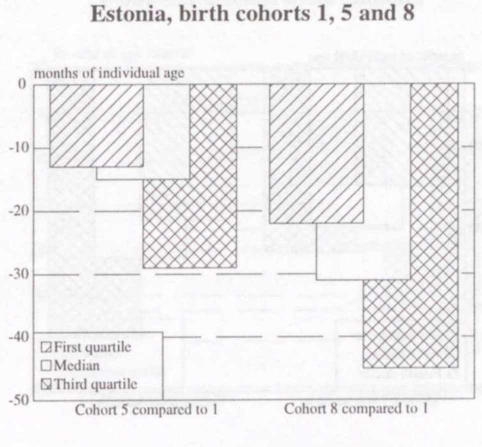


Figure 11

Timing of first sexual intercourse
Estonia, birth cohorts 1, 5 and 8



relations towards younger age. The process is later continued in all succeeding cohorts, again similarly to the first birth.

It is noticeable that the youngest cohort of 1969–1973 already introduces a sharp shift in the start of sexual relations towards younger age. There has been no such shift measured in the first birth function, i.e. the difference between the first sexual experience and first birth is widening. This process has sharply accelerated in the 1990s in Estonia, particularly because of the fertility ageing. That is, *inter alia*, a reliable ground to expect an increase of differences in other demographic events in later life.

Like in the first birth function, the differences in individual age at the first sexual intercourse by three female cohorts (first, fifth and eighth) are plotted (Figure 11). These differences are compared at three process-specific points: cumulative rate reaching levels of 0.25, 0.50 and 0.75, correspondingly. The differences between cohorts are smaller in earlier stages of the individual life-cycle, but growing together with the progress of individual age. The difference at cumulative rate of 0.75 between the cohorts of 1924–1928 and 1944–1948 is estimated at 29 months, and reaching 45 months between cohorts of 1924–1928 and 1959–1963. In general, the difference in age at first sexual intercourse is somewhat smaller compared with the first birth function. Including also the last cohort in the comparison, seems to erase even these small differences in the juvenation pattern of the two processes.

Referring to the high prevalence of non-birth outcome of pregnancy and its specific trend in Estonia, the survivorship function of this process is considered rather interesting. Figure 12 presents the corresponding survivorship rates. It should be noted that for one part of women in every cohort, the first pregnancy results in non-birth outcome and for another part in the birth of a child. These proportions are not fixed and change

Figure 12

First non-birth pregnancy: survivorship function Estonia, birth cohorts 1924-1973

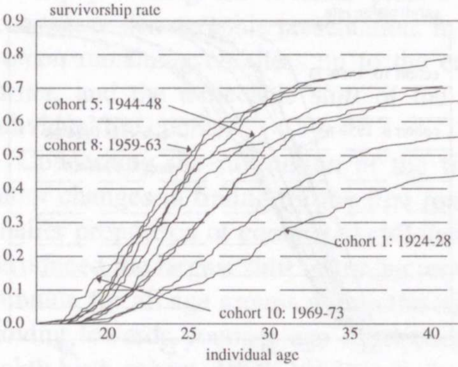
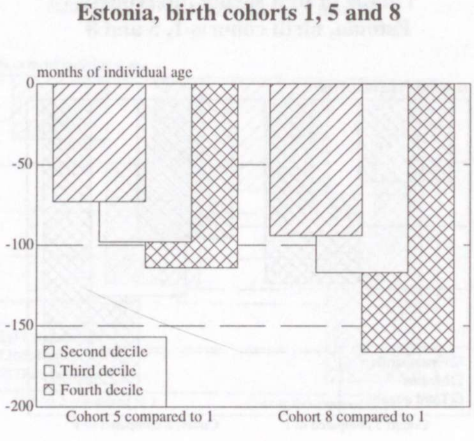


Figure 13

Timing of first non-birth pregnancy Estonia, birth cohorts 1, 5 and 8



from cohort to cohort. We already know that this shift has been substantial, particularly when moving from the oldest towards the youngest cohort. In general, the principal difference between non-birth pregnancy and fertility functions is a much lower completion plateau of the non-birth pregnancy, i.e. a relatively numerous group of women in each cohort has never experienced a non-birth pregnancy outcome. In the oldest cohorts this plateau is below 0.5, but rising sharply up to 0.8 in younger cohorts. This change is what mainly explains the different trajectories of the first birth and first non-birth survivorship rates.

The same reason also partly explains the much larger-scale juvenation of non-birth pregnancy compared with the first birth. The difference in average ages at the first non-birth pregnancy between the cohorts of 1924–1928 and 1944–1948 is estimated at 144 months, already at level 0.4 of cumulative rate (Figure 13). The difference between the first and eighth cohorts has risen even up to 166 months or nearly up to 14 years. In other words, the non-birth first pregnancy survivorship function has shifted considerably quickly towards the shape common to the first birth. If the pregnancy outcome, whether birth or non-birth, has been relatively important for the older cohorts differentiating the corresponding processes, it has become less and less important for younger cohorts. The pregnancy function of the younger cohorts is more uniform and no longer largely depends on the type of pregnancy outcome.

Against the background of such considerable juvenation of all three analysed processes, it might at first glance be surprising that the real individual fertility interval has actually not changed very much at all. In the paper this interval is defined as the period between the first and last birth, independent of the final parity reached by a woman. The two already routine presentations on survivorship rates and age differences are presented (Figures 14 and 15). Relatively small differences are documented for the

Figure 14

First and final birth: survivorship function Estonia, birth cohorts 1924-1973

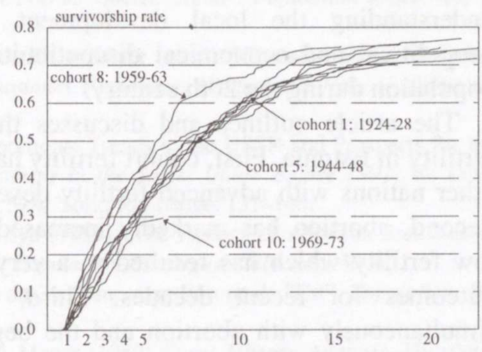
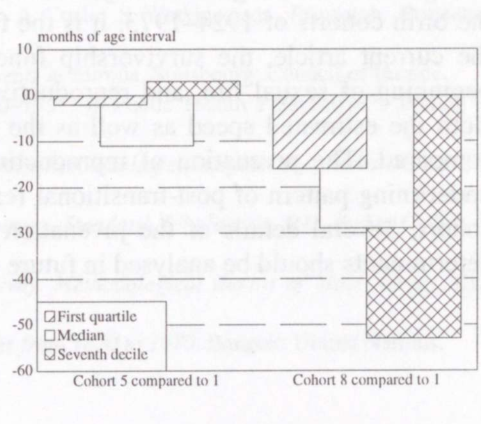


Figure 15

Timing of first and last birth Estonia, birth cohorts 1, 5 and 8



first five-six cohorts. The eighth cohort somewhat stands out from the general picture and shows the biggest difference: it is estimated at 53 months compared to the first cohort at the cumulative rate of 0.7. The succeeding cohorts after the eighth have moved backwards once again, closer to the older cohorts, but mainly because of uncompleted fertility career.

4. Conclusion

The post-transitional fertility in the advanced countries of the population development has predominated for about two-three generations, and is *per se* quite a new phenomenon in the long-term perspective. There is therefore insufficient data available to make the solid conclusions of the principal patterns of the post-transitional fertility, one of the most acute of which, for example, are very low fertility levels in contemporary Europe (UN 1999). This makes every new piece of information extremely important. Against that background, the fertility development in Estonia with it particular patterns could be an interesting case for understanding the local development, particularly in the context of the geopolitical and economical discontinuities experienced twice by the Estonian population during the 20th century.

The article outlines and discusses the general patterns of post-transitional fertility in Estonia. First, cohort fertility had stayed remarkably stable compared to other nations with advanced fertility development throughout six-seven decades. Second, abortion has markedly increased after two-three decades of prevailing low fertility which has resulted in a very high intensity of non-birth pregnancy outcomes for recent decades. Third, fertility has continuously juvenated, simultaneously with abortion and the beginning of sexual life for the post-war period. This development, however, ended in the late 1980s. The mentioned patterns of the post-transitional fertility in Estonia are discussed in a wider context of demographic development, including the previous transitional period.

It is remarkable that the Estonian FFS database enables to follow the cohort changes in the timing of fertility, abortion and sexuality for the period covering the birth cohorts of 1924–1973. It is the first dataset of its kind in the country. In the current article, the survivorship functions for the first birth, first abortion, beginning of sexual life, and reproductive interval are presented and discussed. Both the estimated speed as well as the curve (trajectory) for the processes are compared. The juvenation of reproductive events has proved to be the general underlining pattern of post-transitional fertility, having progressed from cohort to cohort. Several details of the juvenation process, as well as the possible social determinants should be analysed in future studies.

Acknowledgments

The study has been carried out in the framework of the research project 0501463s00 and supported by the ETF grant No. 3801.

Address:

Kalev Katus
Estonian Interuniversity Population Research Centre
P.O.Box 3012, Tallinn 10504, Estonia
Ph: +372 6409451
Fax: +372 6409453
E-mail: kalev@ekdk.estnet.ee

References

Anderson, Barbara, Kalev Katus, and Brian Silver (1994) "Developments and Prospects for Population Statistics in Countries of the Former Soviet Union". *Population Index*, 60, 1, 4–20.

Anderson, Barbara, Kalev Katus, Allan Puur and Brian Silver (1993) "Characteristics of Women Having Abortions in Estonia". In *International Population Conference*. Vol. 1. Montreal: IUSSP, 215–234.

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

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

Blayo, Chantal (1991) "Les modes de prévention des naissances en Europe de l'Est". *Population*, 46, 3, 527–546.

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

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

Coale, Ansley and Robert Treadway (1986) "Summary of the Changing Distribution of Overall Fertility, Marital Fertility and the Proportion Married in the Provinces of Europe". In *The Decline of Fertility in Western Europe*. A. Coale, S. Watkins, eds. Princeton: Princeton University Press, 31–181.

CoE (1996–1999) *Recent Demographic Developments in Europe*. Strasbourg: Council of Europe.

David, Henry (1992) "Abortion in Europe, 1920–1991: A Public Health Perspective". *Studies in Family Planning*, 23, 1, 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.

EKDK (1999) *Estonian Family and Fertility Survey. Methodological Report of Male Survey*. RU, Series A, No. 40. Tallinn: EKDK.

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

Frejka, Tomas (1985) "Induced Abortion and Fertility". *Family Planning Perspectives*, 17, 5, 230–234.

Hajnal, John (1965) "European Marriage Patterns in Perspective". In *Population in History*. D. Glass and D. Eversley, eds. 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". In *Yearbook of Population Research in Finland*, 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". In *Demographic Trends and Patterns in the Soviet Union Before 1991.* W. Lutz, S. Scherbov, A. Volkov, eds. London and New York: Routledge, 89–113.

Katus, Kalev (1997) "Post-Transitional Fertility: Case of Estonia". In *Demographic Development in Baltic Countries.* K. Katus, V. Stankuniene, A. Vikat, eds. Special issue of Revue Baltique, 49–64.

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

Katus, Kalev, Allan Puur and Luule Sakkeus (2000a) "The Demographic Characteristics of National Minorities in Estonia". In *The Demographic Characteristics of National Minorities in Certain European States*. W. Haug, P. Compton, Y. Courbage, eds. Strasbourg: Council of Europe, 29–93.

Katus, Kalev, Allan Puur and Luule Sakkeus (2000b) *Family and Fertility in Estonia*. New York and Geneva: United Nations. Forthcoming.

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

Nõges, Mats (1925) *Rahvamuutused Viljandi maakonnas 1801–1923.* Tartu.

Palli, Heldur (1988) *Otepää rahvastik aastail 1716–1799.* Tallinn: Eesti Raamat.

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*, 22, 6, 368–377.

Puur, Allan (1997) *Change in Economic Activity of Population: Case of Estonia.* Paper presented to 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". In *The Politics of East-West Migration.* Solon Ardittis, ed. London: MacMillan Press.

Sardon, Jean-Paul (1990) "Le remplacement des générations en Europe depuis le début du siècle". *Population*, 45, 6, 947–969.

Vishnevski, Anatoli and Andrei Volkov, eds. (1983) *Vosproizvodstvo naselenia SSSR.* Moskva.

UN (1999) *Population in Europe and North America on the Eve of the Millenium: Dynamics and Policy Responses*. Ney York and Geneva: United Nations.