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This essay grew out of a collaboration between the two authors, of which Kari Pitkänen carries the main responsibility for chapters 1 and 2, Wolfgang Lutz for chapters 3 and 4. The discussion section was written together.

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Abstract

Official Finnish population statistics starting in 1751 do not provide cross-classifications of age and marital status before 1880. However, declining overall proportions married and declining fertility rates suggest a major change in the marriage pattern during the second half of the eighteenth century. Five sources of information, namely overall proportions married, annual numbers of marriages, sizes of marriage cohorts relative to mortality-adjusted birth cohorts, information on the modal age at marriage from lagged correlation analysis between sizes of birth and marriage cohorts, and trends in age-specific fertility are analyzed to provide information on nuptiality trends. A simulation model based on the Coale-McNeill marriage model yields parameter estimates for the Finnish provinces in 1751-1772, which allow calculation of the "Princeton Index" I_m.

The results suggest a "nuptiality transition" from early and almost universal marriage to the so-called "European Marriage Pattern", which is characterized by late marriage and high proportions of unmarried. Provincial level analysis reveals significant east-west differentials with higher proportions marrying and lower mean ages at marriage in the eastern parts of Finland. Non-quantitative historical evidence in general also supports the assumption of a major change in the Finnish nuptiality pattern during the second half of the eighteenth century.

TRACING BACK THE EIGHTEENTH CENTURY "NUPTIALITY TRANSITION" IN FINLAND

Wolfgang Lutz, Kari Pitkänen***

1. INTRODUCTION

When Hajnal in 1965 presented statistical data on the marriage pattern of various countries at the turn of the twentieth century he showed that Finland shared at that date the typical characteristics common to all Western European countries, i.e. a high age at marriage and a high proportion of never-married population. These factors characterize a type of marriage pattern that Hajnal labeled as "European[1]".

Data presented in Table 1 clearly confirm Hajnal's findings as far as the late nineteenth century Finland is concerned. In 1880 the proportion of women married at age 45-49 was 0.853. This indicates that nearly 15 per cent of the women who reached an advanced age remained single for their whole life. The mean age at first marriage and the "Princeton Index"[2] of the proportion married (I_m) also show distinctive signs of the "European Pattern".

The regional differences between the administrative provinces are relatively small. The only exception seems to be the province of Viipuri, the most eastern province of Finland bordering northwestern Russia. There is reason to believe that the relatively low proportion of married women in the age group of 45-49 years in that province is due to certain features of the population registration system. In the province of Viipuri the local population registers record a considerable quantity of non-residents who had migrated several decades earlier in their

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[1]In this paper we shall consistently use the term "European marriage pattern", although prior to the late nineteenth century it might be more justified to talk about "Northwest European marriage pattern".

[2]The "Princeton Indices" I_f, I_g, and I_m are summary measures for overall fertility, marital fertility, and proportions married based on indirect standardization where the age-specific marital fertility rates of Hutterite women serve as weights.

Table 1. The proportion of ever-married at age 45-49 (PEM) and the index of proportion married (I_m) in 1880, and mean age at first marriage in 1880-81, female population, Finland.

	Province of								Whole country
	Uusimaa	Turku and Pori	Häme	Viipuri	Mikkeli	Kuopio	Vaasa	Oulu	
PEM	82.1	84.9	87.7	86.1	82.6	85.8	87.9	83.2	85.3
I_m	0.431	0.461	0.505	0.554	0.495	0.516	0.516	0.451	0.494
Mean age at first marriage	25.2	25.3	24.2	22.8	24.7	24.7	24.1	25.8	24.5

Sources: OSF, VI:9 (Population Census of 1880), and VI:10 (Vital Statistics in 1880-81).

youth to Russia (mainly to the nearby metropolis of St. Petersburg), resulting in an over-estimation of singles in the older age groups. The actual proportion ever-married for women aged 45-49 years should probably be closer to 0.900. Furthermore, a more plausible value for the index I_m would be nearly 0.6. Thus, the province of Viipuri, like several provinces of European Russia [cf. Coale et al. (1979, pp. 20-21)], appears in the later nineteenth century to be an intermediate region between the "European" and the "non-European" marriage pattern.

An important question asked in this essay is "How far back in time can the "European" marriage pattern be traced in Finland?" In a recent article Hajnal has suggested that there is evidence from eighteenth century Finland of "earlier marriage ... departing from the pre-industrial northwest European norms" [Hajnal (1983, p. 66)]. A Finnish ethnologist, J. Lukkarinen, had presented in a book published in 1933 a variety of folk traditions which (with a few exceptions) indicates that earlier in Finnish history marriage was more universal and that the age at marriage was lower than in the late nineteenth and early twentieth century.

This suggests the presumption that in Finland there has been a considerable change in the marriage pattern somewhere between the eighteenth century and the late nineteenth century.[3] Can we see here a nuptiality transition, or "the first

[3] In fact we know that both the proportion of never-married and the mean age at first marriage were rising from the early twentieth century up to the late 1930's (Pitkänen 1981; Strömmer 1969, p. 44). If a corresponding change had been taking place already earlier, the twentieth century development could be viewed as the last phase of a long-term nuptiality transition.

transition" as Coale (1973) expressed it, which has preceded the second, i.e., the fertility transition? Furthermore, we may ask how we can place Finland into the geographical pattern visible in the Russian Empire at the end of the nineteenth century? Coale (1973, p. 58) notes that this geographical pattern suggests that the "European" marriage pattern was still at that time spreading from the most Europeanized provinces in the western parts of the Empire--within which Finland then formed an autonomous state--to the eastern areas.

There exists, however, certain evidence that contradicts the hypotheses stated above. Finland formed the eastern provinces within the Kingdom of Sweden from the Middle Ages up to 1809, when these provinces were ceded to Russia. The late eighteenth century was characterized by a lively discussion concerning population and population growth in Sweden. [See, for example, Hutchinson (1959) and Utterström (1962).] A very common theme in this discussion is that Sweden was suffering from a shortage of people, and that one reason for this was late marriage and a high proportion of population remaining definitely celibate. One can see a concrete manifestation of this concern in the legislation during the period from 1747 to 1770 which aimed to remove factors that were seen as obstacles to more universal and earlier marriage among the peasant population (e.g., subdivision of farms was made easier). Contemporaries did not seem to think that the marriage pattern was greatly different in the Finnish provinces, although in the 1750s it was stated that women married somewhat earlier in the province of Ostrobothnia (northwestern Finland) compared with the national average. [See Hujmelt (1899, p. 89).]

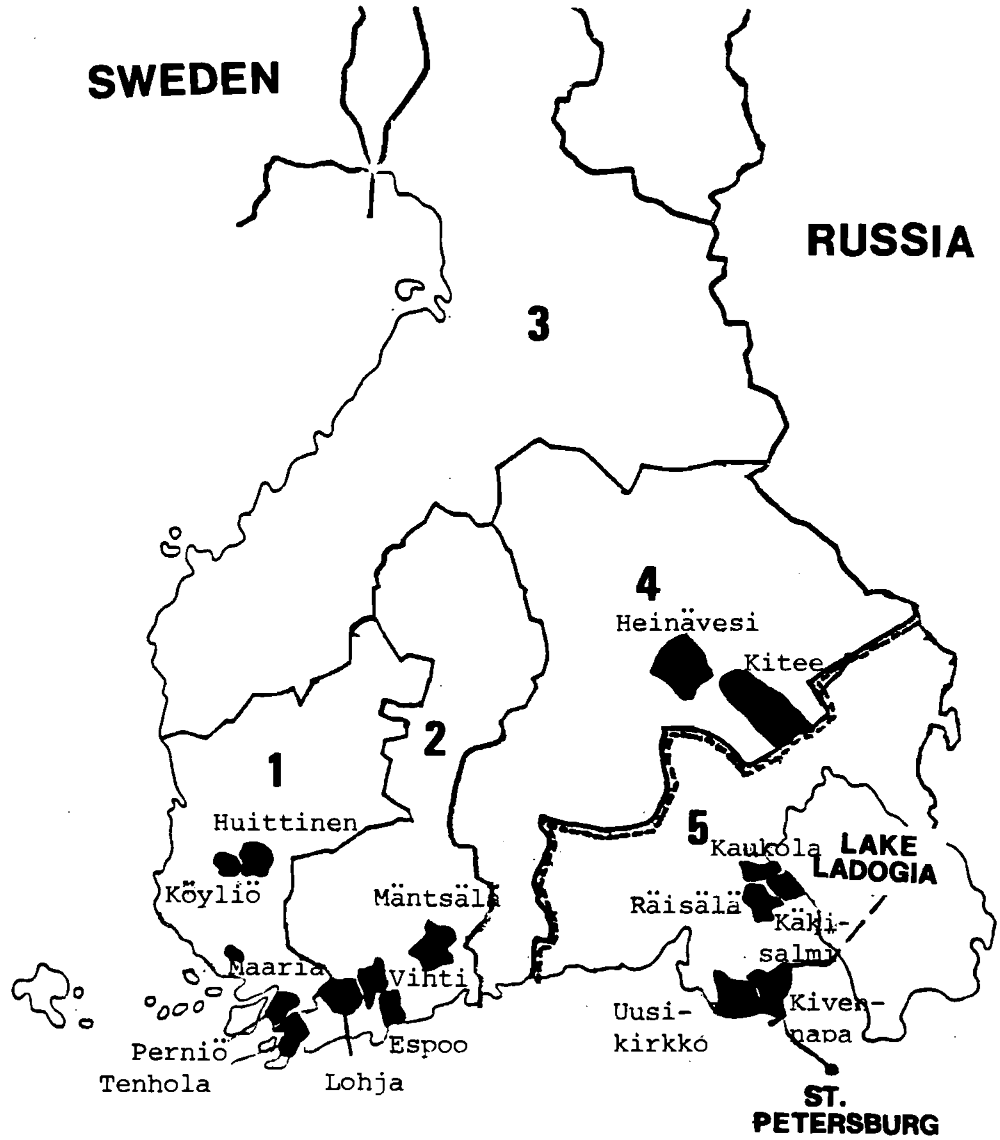
The problem of the contradictory statements cannot be solved directly on the basis of the earliest Finnish population statistics, since they do not give the age composition of the population by marital status or age at marriage until the late nineteenth century. Furthermore, micro-studies based on Finnish parish registers are currently too few in number to give a comprehensive picture of the marriage pattern in the eighteenth or early nineteenth century. The fact remains that the nuptiality pattern during the period with which we are concerned is poorly known for Finland. This is somewhat surprising, particularly as Finland has (together with her former mother country Sweden) the oldest nationwide population statistics in the world, dating from 1749. Estimates giving the marital status distribution by age starting from the mid-eighteenth century were published for Sweden as early as 1906 by a Swedish statistician, Gustav Sundärg.

In this article we intend to examine the eighteenth century nuptiality pattern in Finland utilising information obtainable from these population statistics. And since regional aspects seem to be crucial to this phenomenon we based our study on unpublished province level data. (For the administrative division of Finland, see Figure 1.) But only for the third quarter of the century the necessary information is available by province. Territorial changes present an additional problem. The province of Viipuri did not belong to Finland—or more specifically, Sweden—during the latter half of the eighteenth century. This region was ceded to Russia in two stages, in 1721 and 1743, and thus the Finnish population statistics do not, of course, cover this area until the early nineteenth century when it was once again incorporated into Finland. In order to obtain, at least, a general idea of the eighteenth century marriage pattern in this interesting eastern area we have used some supplementary data.

2. EIGHTEENTH CENTURY POPULATION REGISTRATION IN FINLAND

For this study our principal data source lies in the (Swedish-)Finnish population statistics, the collection of which was started in 1750 when the parish ministers had to complete in each parish two kinds of statistical forms for the year 1749, the so-called population ("census") and population change tables. The population tables contain the number of people by age, and by marital and occupational status. The population change tables list the number of births, deaths and marriages. Hence, all the information was numerical, and deanery, province or national level statistics were obtained by simply summing up the statistical tables from lower levels. Initially the ministers were required to complete both the population table and the population change table annually. In 1752 this practice was changed and at first the population tables were completed only every third year, then from 1775 to 1880 every fifth year, and finally from 1880-1940 only once every ten years. The information for the statistical tables was obtained from two sets of parish registers of the Lutheran church, the so-called communion books (registers of the parishioners) and the records of births (baptisms), marriages, and deaths (burials). The parish records formed an excellent basis for the statistics in the sense that only a very small minority of the population did not belong to the Lutheran state church.[4]

[4] For a more detailed description of the population statistics, see Pitkänen and Nieminen (1984).



Province of

1= Turku and Pori

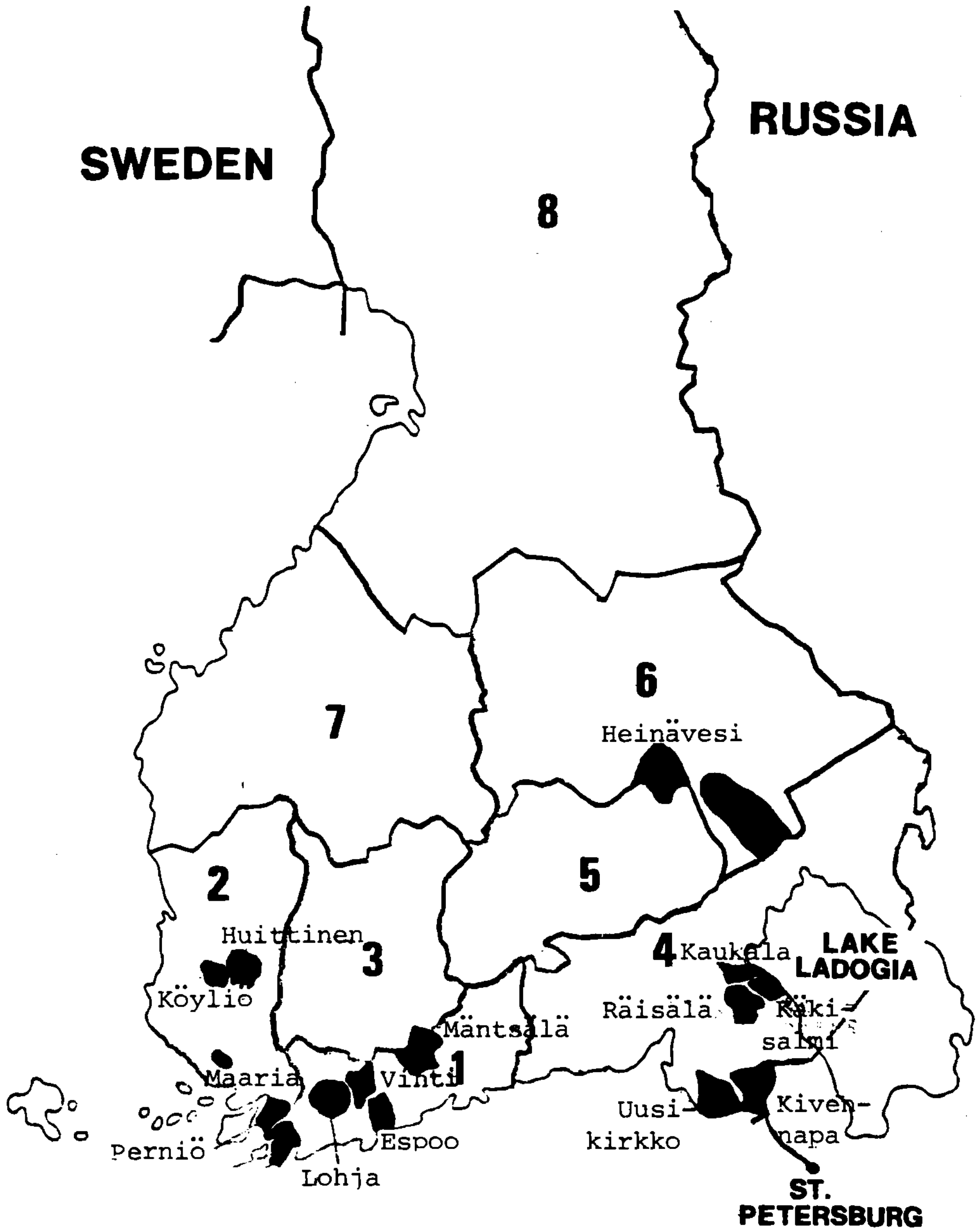
2 = Uusimaa and Häme

3 = Pohjanmaa (Ostrobothnia)

4 = Kymenkartano and Savo

5 = "Old Finland"
(province of Viipuri,
within the Russian Empire)

Figure 1a. Finnish provinces in the mid-eighteenth century.



Province of

1= Uusimaa

2= Turku and Pori

3 = Häme

4 = Viipuri

5 = Mikkeli

6 = Kuopio

7 = Vaasa

8 = Oulu

Figure 1b. Finnish provinces in the 1880's.

The uniqueness of the older Swedish-Finnish population statistics makes them very valuable, but the use of this material also presents the historical demographer with considerable problems. This is especially the case with the relatively meager information on nuptiality given in the early statistical tables. Gradually the contents of the tables became richer and for example, starting in 1774, the tables provide the age composition of women who gave birth. The order of marriage for the spouses was included in the tables in 1802, but, as mentioned earlier, age at marriage, and the cross-classification of age and marital status were not given prior to the late nineteenth century. Until then the marital composition was given only for the total population aged 15 and above while the age composition was given separately in five-year intervals in another section of the tables. The use of the primary materials, i.e., the parish records, would naturally offer an alternative way to study the nuptiality pattern. However, this would be an extremely laborious task, and any considerable use of these materials is currently beyond our capabilities.

Although the eighteenth and nineteenth century Finnish population statistics have generally been evaluated as reliable, there are, nonetheless, certain problems which should be kept in mind when using them. So far a thorough examination of the reliability of the statistical tables does not exist. However, a few local studies have shown that there are sometimes considerable omissions in the primary records causing under-registration in the number of births and deaths, which also leads to omissions from the population change tables (Pitkänen 1977). The extent of these omissions varies in time and place, but they can sometimes reach considerable proportions (even up to 25 per cent). Most omitted cases seem to be children who had died at a very young age, often unbaptised. In individual parishes the proportion of omitted births and deaths can fluctuate depending on the minister who kept the registers. This makes it difficult to see any consistent trend in the proportion of omitted cases. At the provincial level, however, it is plausible that the omissions are largest (and most significant) during the "pre-statistical" period, i.e., prior to 1749, and that they had already become much smaller during the latter half of the eighteenth century. By the late nineteenth century the proportion omitted has become relatively insignificant. Furthermore, the omissions are probably much larger in eastern and northern Finland than in the other parts of the country. The marriage records, on the other hand, seem to be reasonably complete already in the eighteenth century.

Thus, the problems of reliability of the population change tables are mainly due to the weaknesses in the primary materials, i.e., the parish records. This is probably not the case with the population ("census") tables. It is plausible that the eighteenth century communion books that were compiled separately provide fairly accurate information on the actual population living in the parishes.[5] Thus, in principle, the ministers had good opportunities to report the actual number of parishioners in the population tables. However, it was a very laborious task to complete the tables in parishes with a large population. Especially the parishes of eastern Finland often had several thousands of inhabitants and these circumstances have, indeed, resulted in obvious mistakes both in the number and composition of the population recorded in such parishes. Sometimes the ministers did not even attempt to use the communion books, but estimated the population size on the basis of a previous population table (Pitkänen 1979).

The inconsistencies in the parish level population tables are hardly systematic from one parish (or table) to another. Hence, at the province level these variations to some extent cancel out. We have, in fact, studied the population tables in each province carefully and compared the consecutive tables with each other. We have come to the presumption that these tables in most cases reflect the actual size and composition of the population fairly accurate. If some information in a table differed drastically both from the preceding and the following table(s), we concluded that the data were incorrect and excluded them from our analysis. We did so for the province of Turku and Pori and the province of Ostrobothnia in 1766 and 1763 (when data were missing). Finally, we were able to conclude that prior to 1766 the population tables for the province of Kymenkartano and Savo slightly under-estimate the number (and proportion) of the young single population. [See also Pitkänen (1979, pp. 22-23, 38).]

Despite these weaknesses and discrepancies in the older Finnish population registers which have to be taken into account the data seem to be fairly reliable and good enough for the purpose of reconstructing the age patterns of marriage in a simulation model.

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[5]Prior to 1749, however, children who had not yet taken their first communion (i.e., children below approximately 15-16 years of age) were not always included in the communion books (or in separate children's books). This fact seems to have caused problems in some parishes at the time when the first population tables were completed (see Pitkänen 1979).

3. FIVE SOURCES OF INFORMATION

Given the difficulties presented by the data which we discussed above, there is no direct way of obtaining the age schedule of marriage and the proportion of women ever marrying. Eighteenth century vital statistics and "censuses", however, provide abundant material to derive both a reconstruction of the age schedule and the intensity of marriage. Altogether there appear to be five sources of information, some of which are less conventional than others: the proportion of women ever-married in "census years" is a measure directly derived from the registration system. Similarly, the total number of marriages per year is given by vital registration, but it is not differentiated by order of marriage. The other pieces of information all derive from vital statistics and are somewhat more sophisticated. By tracing surviving birth cohorts to a point close to the mean age at marriage of that cohort and comparing the number of surviving women to the number of first marriages around that time, one yields an estimate of the proportion ever-marrying. Another method relies on lagged correlation analysis between the sizes of birth and marriage cohorts to receive an estimate of the modal age at marriage. Finally, changes in the ratios between different age-specific fertility rates can reveal a great deal about the trends in the marriage pattern.

To combine some of these independent sources of information in a simulation model, we will use the Coale-McNeill model that describes a standard schedule of first marriages. Ansley Coale (1971, p. 209) first presented the model in a three-parameter form:

$$G(a) = C\, G_s\left(\frac{a - a_0}{k}\right) \quad , \qquad (1)$$

where $G(a)$ is the proportion ever-married at age a, $G_s(x_s)$ is the standard schedule of proportions ever-married, a_0 the origin, and k the "speed" of the observed schedule of first marriage frequencies. Subsequently a_0 was defined as the age at which one percent of the first marriages of a cohort have already occurred. The factor C can be interpreted as the proportion of women of a specific cohort that will ultimately marry; this factor can be approximated by the proportion ever-married at age 50. The "standard" was based on first marriage frequencies recorded in Sweden in 1865-69 [see Coale (1971), p. 199].

Trussell (1981, p. 499) rewrote the model which described the first marriage frequencies in term of a proper location (mean), scale (standard deviation), and area (proportion ever-marrying). Although this equation seems more elegant from a statistical point of view, in our case where assumptions on the parameters must be made, equation (1) makes it easier to check the plausibility of these assumptions.

In the following section the first three pieces of information will be written in the parameters of Coale's model to make them compatible when introducing the equations into the simulation model. The latter two sources of information on the marriage pattern will mainly serve as plausibility checks.

3.1. Information from the Overall Proportions Married

The proportion of women ever married above age 15 shows an almost monotonic decline from 1751 to 1865. The pace of decline in the proportions ever married was fastest between 1751 and 1775, followed by a period of slower decline between 1775 and 1825. After 1825 the ratio, again, decreases at a somewhat faster rate, and then shows an increase in the proportions ever married after 1865. Provincial level data for 1751-1772 show considerable regional diversity with the highest proportions ever-married encountered in the eastern parts of the country. Even during the short observation period of 20 years significant declines seem to occur in all regions, especially dramatic in the eastern province of Kymenkartano and Savo (more than 7%).

To express the proportions ever-married above age 15 in terms of the three parameter marriage model, the following equation can be written:

$$PEM_{15+} = \int_{a=15}^{\infty} G(a)c(a)da \quad , \tag{2}$$

where $c(a) = \frac{W(a)}{W_{15+}}$ is the proportion of women aged a, out of all women aged 15 or more, and PEM_{15+} is the proportion of women ever-married above age 15. And by applying equation (1) it can be rewritten as

$$PEM_{15+} = C \int_{a=15}^{\infty} c(a)G_s(\frac{a-a_0}{k})da \quad . \tag{3}$$

If the assumption is made that this model pertains not only for a cohort but also for a cross-section at one point in time, PEM_{15+} and $c(a)$ would be given empirically from the official census data. But C, a_0, and k still remain to be estimated, and because many different combinations of those three parameters yield the

Table 2a. Proportions married, ummarried, widowed and divorced above age 15 for different years.

Year	Proportion never-married (1)	Proportion married (2)	Proportion widowed and divorced (3)	Proportion ever-married (2)+(3)
1751	30.71	55.60	13.69	69.29
1775	34.85	54.18	10.97	65.15
1800	35.57	53.15	11.28	64.43
1825	35.49	51.92	12.59	64.51
1850	37.27	50.24	12.49	62.73
1865	38.37	49.42	12.21	61.63
1880	36.97	50.34	12.69	63.03
1890	36.59	51.15	12.26	63.41

Table 2b. Proportion ever-married above age 15 in Finnish provinces, 1751-1772.

Age	Turku and Pori	Uusimaa and Häme	Pohjanmaa	Kymenkartano and Savo
1751	66.78	68.99	69.87	75.49
1754	66.35	68.62	64.78	74.95
1757	66.48	67.59	69.83	74.84
1760	66.16	67.01	70.61	75.16
1769	64.22	67.28	66.47	70.03
1772	63.92	63.61	64.83	68.11

same proportion ever-married, there is no unique solution, and additional constraints have to be sought.

3.2. Information from the Annual Number of Marriages

Let $g(a)$ be the frequency of first marriages as defined by Coale (1971, p. 209) then the number of first marriages (written as FM) in a cohort of women can be expressed in the following way:

$$FM = \int_{a=0}^{\infty} W(a) g(a) da \quad . \qquad (4)$$

Under the assumption that this model is valid not only for a cohort but also for a period t—a problematic assumption when there are changes in nuptiality—it can be rewritten as

$$FM^{(t)} = C^{(t)} \int_{a=15}^{50} W(a)^{(t)} g_s\left(\frac{a - a_0^{(t)}}{k^{(t)}}\right) da \quad , \tag{5}$$

according to which, by definition, nobody can marry (for the first time) before age 15 and after age 50. This final assumption is not particularly unrealistic and corresponds, as far as the lower limit of 15 is concerned, to the empirical data and to the legal situation that made it impossible for a woman to marry before age 15 (see Law of the Swedish Kingdom of 1734).

But still equation (5) cannot be used because only the total number of marriages is given for the period under consideration. Hence, another unknown parameter $PFM^{(t)}$ representing the proportion of first marriages among all marriages $M^{(t)}$ of a certain year t must be introduced, where

$$FM^{(t)} = M^{(t)} PFM^{(t)} \quad . \tag{6}$$

The equation to be used in our estimation model, thus, has to contain four unknown parameters:

$$M^{(t)} = \frac{C^{(t)} \int_{a=15}^{50} W(a)^{(t)} g_s\left(\frac{a - a_0^{(t)}}{k^{(t)}}\right) da}{PFM^{(t)}} \quad . \tag{7}$$

Although equation (7) together with a period-specific formulation of equation (2) will be the basis for the simulation model, more independent information is needed to achieve unique solutions.

3.3. Information on the Proportion Remaining Unmarried from Comparing the Sizes of Marriage Cohorts and Mortality-Adjusted Birth Cohorts

The basic idea underlying this approach is as follows.[6] Let us first assume, for the reason of simplicity, that all women of a certain birth cohort that eventually

[6] A similar approach was also suggested by Livi-Bacci (1977). Since the structure of the data used there is quite different, and no attention is paid to the problem of remarriages, his method will not be discussed here.

marry, do so only at age N. Then the following equation holds:

$$FM_t = B^f_{t-N} P(N)^f_t C_t \quad , \tag{8}$$

where the number of first marriages at time t (FM_t) equals the number of female births at time $t-N$, times the probability prevalent at time t that a baby girl survives up to age N ($P(N)^f_t$) times the factor C from the Coale-Trussell model which gives the proportion of all women that will eventually marry. Equation (8) can be rewritten as:

$$M_t \, PFM_t = C_t \, B_{t-N} \, SEXR \, P(N)^f_t \quad , \tag{9}$$

where M_t is the total number of marriages at time t, PFM_t the proportion of first marriages among all marriages of a year t, B_{t-N} the total of births at year $t-N$, $SEXR$ the proportion of female births over all births, and $P(N)^f_t$ as above. It can be transformed to:

$$\frac{M_t}{B_{t-N}} \times \frac{1}{SEXR \, P(N)^f_t} = \frac{C_t}{PFM_t} = R_t \tag{10}$$

where the value of this ratio shall be called R.

In reality women do not all marry at one age; first marriages are, however, concentrated heavily within an age span of 8-10 years (for instance, in the Coale-Trussell standard schedule of first marriages, 88% of all first marriages occur within the 10 years centered around the median age of marriage if k = 0.5, and 77% if k = 0.8). For this reason more years have to be summed up, and assumptions on the stability of the prevailing marriage pattern have to be made.

For the empirical analysis $P(N)^f_t$ can be best obtained from comparing census data to the number of births N years before. With this definition $P(N)^f_t$ would also include net-migration, which is of great importance especially for the second half of the nineteenth century. Since census data give only 5-year age groups, the survival ratio up to the age group 20-25 will be calculated. The results are given in Table 3. In all cases the value of $SEXR$ is assumed to be constant at 0.495.

For calculating the ratios R it seems desirable to aggregate a large number of years in order to eliminate the effect of short-term changes in the "timing" of marriages within a period. For both ends of the period of aggregation, however, it has to be assumed that the number of women born as members of the birth cohorts under consideration, but marrying outside that period, equals the number of women

Table 3. *R*-ratios.

Census years	Women aged 20-25	Corresponding sum of births over 5 years	Survival ratio	Ratio of surviving women	*R*-ratio
Province of Turku and Pori					
1751	6986	18785	.7513	.3726	.90159
1754	7107	20459	.7018	.3481	.89061
1757	6922	21391	.6537	.3242	.91938
1760	6952	22265	.6308	.3129	.96577
1769	7373	22831	.6524	.3236	.86284
1772	7675	24168	.6416	.3182	.82618
Province of Uusimaa and Häme					
1751	5272	14501	.7345	.3643	.9913
1754	5470	14885	.7424	.3682	.9146
1757	5413	16344	.6691	.3319	.9546
1760	5267	17549	.6063	.3007	1.0592
1769	5608	17381	.6518	.3233	.9848
1772	6219	19313	.6505	.3227	.9436
Province of Pohjanmaa					
1751	4435	14229	.6297	.3123	.9548
1754	4558	15356	.6995	.2974	.9411
1757	4654	17334	.5424	.2690	.9940
1760	4514	17334	.5261	.2609	1.0675
1769	5169	17749	.5883	.2918	.9140
1772	5786	20426	.5723	.2838	.8897
Province of Kymenkartano and Savo					
1751	4802	14439	.6719	.3332	1.1840
1754	5003	13652	.7403	.3672	1.0172
1757	4921	15674	.6343	.3146	1.0735
1760	4766	17772	.5418	.2687	1.1735
1769	5857	20745	.5704	.2829	1.0493
1772	6309	23778	.5360	.2659	1.0389

who marry within the period of summation but are not members of the birth cohorts considered. Sensitivity analysis with 20-year averages, however, showed that these assumptions are especially problematic in periods of rapid population growth or when the survival ratios tend to change rapidly.

To adjust for some of these problems, Table 3 gives ratios resulting from a method that averages twice. First, the period of summation for births and marriages is shortened to 9 years to make the assumption of compensating errors more likely. Secondly, the 9-year periods are shifted up the time scale year by year (like a 9-year moving average) and the average of the ratios for 5 periods around the census year is taken. This procedure also makes the assumption of constant survival ratios more likely.

The R ratios (Table 3) are quotients of two unknowns: the proportions ever-marrying (C) and the proportions of first marriages among all marriages (PFM). For this reason it is possible to obtain ratios above 1.0 since a high incidence of remarriage might lead to a higher number of marriages in a cohort than survivors in that cohort. The R ratios are very high around 1751-53 but decline very fast thereafter. It seems unlikely, however, that the proportion of first marriages in a year (PFM_t) was increasing strongly over these 9 years, especially since the death rates show an increasing trend during that period. Hence, it can be concluded, that the fast decline in R's over this short period must have been mainly due to a decrease in C (or possibly an improvement in birth registration).[7] Numerical values for this will be estimated in the simulation later on.

3.4. Information on the Modal Age at Marriage from Lagged Correlation Analysis between Sizes of Birth and Marriage Cohorts

Another piece of information drawn from the annual series of births and marriages does not focus on the "intensity" but rather on the "timing" of marriages. In contrast to the previous approach annual fluctuations are not regarded as a disturbance, but they are the major source of information. This approach is based on the assumption that a shortage in one or more birth cohorts will cause a shortage in the number of marriages N years later, and conversely that an unusually large birth cohort will generate a peak in marriages N years later. N is the length of the lag between cause and consequence, which should be close to the modal age at marriage.

[7]Equation (8) shows that an improvement in birth registration would not affect the estimated value of C. It would increase the B's but also result in a decrease of the survival ratio P.

Based on this assumption, Livi-Bacci (1977) developed a model to estimate the modal year at marriage through analysis of correlations. His idea was to calculate hypothetical marriage cohorts by the following formula:

$$M_t = \sum_{x=a}^{b} B_{t-x} P_x^t N_x^t \quad , \tag{11}$$

where the number of marriages in the year t (M_t) equals the sum of the products of each birth cohort (B_{t-x}) times its probability of surviving to the year t (P_x^t), combined with the probability of getting married in the year t (N_x^t). The birth cohorts under consideration are from $t-a$ to $t-b$, a being the minimum age at marriage and b the number of years corresponding to the maximum age at which there is still a significant number of marriages. Holding P_x^t and N_x^t constant, the hypothetical numbers of marriages fluctuate only because of changes in the size of birth cohorts.

In practice Livi-Bacci calculated annual percentage changes in smoothed series of actual marriages (using a 5-year moving average) and a series of weighted moving averages of births, the weights being proportional to $P_x N_x$. The P_x had been derived from model life tables and the N_x from Coale's marriage model, making quite arbitrary assumptions on all three parameters. Then, he calculated the correlation coefficients between those two series of annual percentage changes for different lengths of lag, and concluded that the length of the lag showing the highest correlation coefficient corresponded to the real modal age at marriage. He showed that for nineteenth century Tuscany and Sweden this method yielded reasonable estimates of the modal age at marriage using only the annual series of births and marriages as empirical input.

There are, however, two serious drawbacks to Livi-Bacci's method of operationalizing the concept described in equation (11) which made us decide against its application to the Finnish data. First of all, it is not clear whether this procedure gives the female modal year at marriage or the male one, or some kind of average of both. Secondly, Livi-Bacci already made relevant assumptions on the speed (k) and on the starting point (a_0) of the first marriage schedule, when he selected the N_x's to calculate the weights; the assumption he made on C is not relevant since C is a constant factor. Thus he made prior assumptions about most of the information he wanted to derive. Finally, from a statistical point of view it is not clear why the correlations between hypothetical distributions (here the distribution according to the N_x-schedule) would give more information than just the correlations between the peaks of these one-peaked distributions. [For a more detailed critique of this method, see Lutz (1983).]

A much easier and more straightforward approach of comparing the series of annual percentage changes in births to the series of annual percentage changes in marriages at different lags, seems also to be the better one. It is less problematic since it is purely descriptive and no assumptions have to be made, and it is more informative since it allows for more than one peak in the correlogram (possibly male and female modal ages at marriage). The only thing that is neglected in such a model is differential mortality up to those ages which are candidates for modal ages at marriage. As we will see, however, the results of this method turn out to be quite unstable, especially if only small numbers of cases are taken into consideration.

The annual series of births and marriages will not be smoothed here by any method so that we can take maximum advantage of the information given through annual changes in cohort sizes. The series of annual changes in death rates is used as a control for marriages delayed or anticipated because of exogenous events like wars and epidemics, effects that are not consequences of different sizes in birth cohorts.

The following model was used to calculate the partial correlation coefficients that relate to the annual series of birth, death, and marriage rates. Since the rates already represent a relative measure, the annual differences in those ratios were taken instead of the annual percentage changes in the series of absolute numbers.

Let

$$\Delta B_t = BR_{t-1} - BR_t \quad ,$$

$$\Delta M_t = MR_{t-1} - MR_t \quad ,$$

$$\Delta D_t = DR_{t-1} - DR_t \quad ,$$

where BR_t, MR_t, and DR_t are the birth rates, marriage rates, and death rates, respectively, which are prevalent in the year t. Then a stepwise regression procedure is applied to the model:

$$\Delta M_t = b_0 + a\,\Delta D_t + b_1 \Delta B_{t-17} + b_2 \Delta B_{t-18} + b_3 \Delta B_{t-19} + \cdots \qquad (12)$$

$$\cdots + b_{12} \Delta B_{t-28} + b_{13} \Delta B_{t-29} + b_{14} \Delta B_{t-30} \quad .$$

where ΔD_t is entered at the first step and all other variables representing changes in birth rates with different time lags are entered at the second step. The patterns of partial correlation coefficients appearing for different time periods are plotted in Figure 2. The pattern of zero-order correlations at different lags is very similar to that presented in Figure 2, but the peaks and troughs are generally less pronounced.

The selection of the periods for which the coefficients are calculated is quite arbitrary. Trial and error methods showed that for periods shorter than 20 years the partial correlation coefficient pattern was quite unstable. The theoretical expectation is that for phases of relative stability in the marriage pattern the coefficients should not be very sensitive to slight changes in the period under consideration. For the periods of transitions in the age patterns of marriage no stable coefficients can be expected.

Another theoretical expectation is that this method should result in two peaks in the correlogram, one for females and one for males. Figures 2.1 and 2.2 show that for both periods a bimodal distribution appears. The first peak can be regarded as an estimation of the female modal age at marriage, and the second peak as an estimation of the male modal age. In some cases, however, as e.g. for 1751-75 the correlogram can be seen in a way that shows a third peak above age 27. This might lead to an interpretation of 24 as a female peak and 28 as a male peak. But as the most likely result the appearing pattern suggests that for 1751-75 the female modal age at marriage was at 19 and the male one at 24. For 1776-1800 the coefficients show a dramatic increase in modes, raising the estimation of the female modal age at marriage to 23 and the male one up to 27. During the course of the nineteenth century the female modal age seems to go slowly down to 21, the male one to 25, but the picture is rather unstable.

Because this empirical evidence is still not very convincing, the technique of inferring modal ages at marriage from correlation analysis of aggregate time-series data needs testing on data from many other countries and periods, especially in contexts where both the mean and modal ages at marriage are well known. However, this would be a research project in its own right, and for the present study we have to be content with the information at our disposal.

Finally, another problem of this method must be highlighted: this technique disregards the complex mechanisms of the marriage market as we had to assume that the supply of male partners is abundant at every point in time. In the real world, however, cohort sizes of men and women and mean ages at marriage as well

Figure 2.1

1751 - 1775

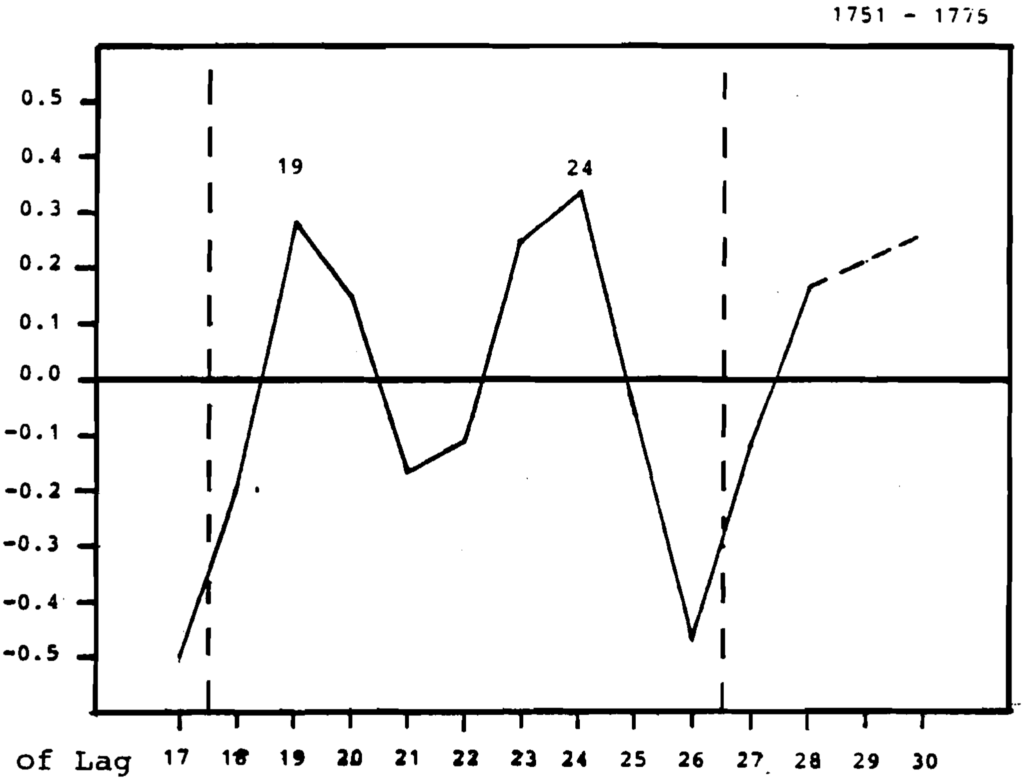

Figure 2.2

1776 - 1800

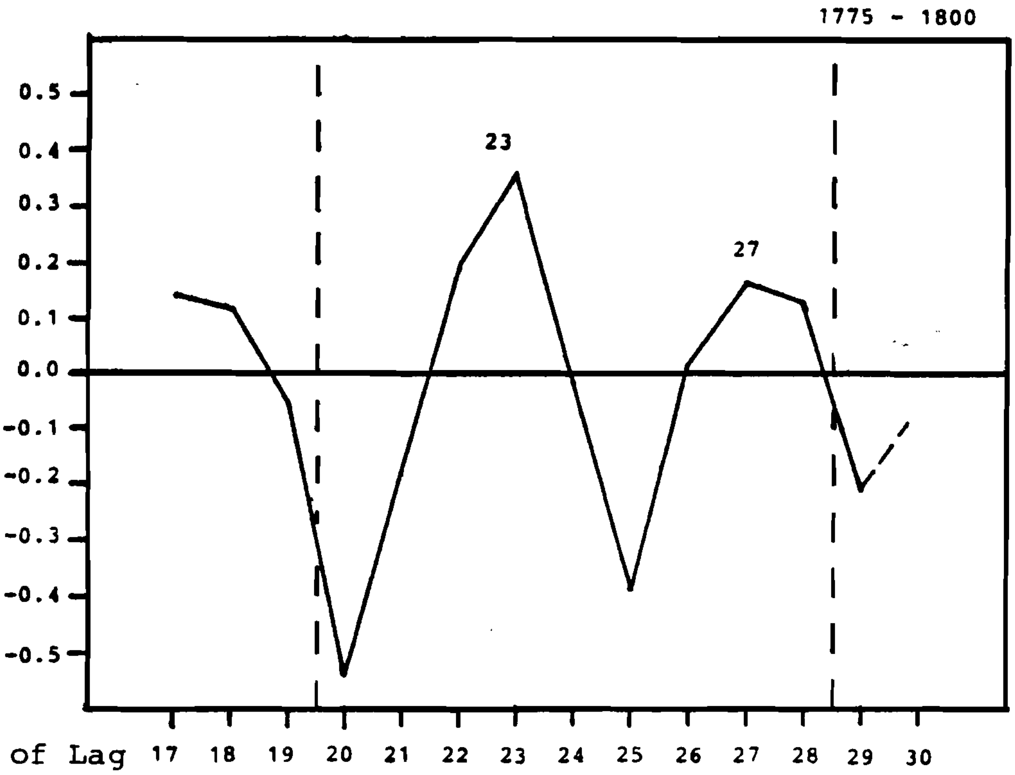

Figure 2. Partial correlation coefficients for equation (12) (after controlling for ΔD_t).

as proportions ever marrying are interrelated in a very complex way, since it always takes two to get married. The analysis of marriage market mechanisms constitutes a field of its own in formal demography which is far from being exhausted.

Because of these problems and because of the relative instability of the estimates suggested by the correlogram, the resulting values of male and female modal ages at marriage cannot be taken as granted. Therefore they will not be treated as a constituting part of the reconstruction model. But they still represent an important source of external information that allows consistency checking.

3.5. Clues from the Development of Age-Specific Fertility Rates

Changes in the levels of fertility rates in the younger age groups seen as a fraction of the fertility in the prime childbearing ages can give indications on the development of proportions married at those ages, if fertility outside wedlock is negligible as it was in eighteenth century Finland. We do not even have to assume completely natural fertility since a certain degree of family limitation might be expected to occur first within higher age groups.

Figure 3 gives the ratios of the fertility of the youngest age group (15-20) over the age group with the highest fertility level (30-35). The plot shows a straight decline of the ratio from 1776 to about 1870, with greater variance in the first 50 years of that development. After 1870 the ratio increases and remains at a low level. Translated into the development of the marriage pattern this would mean, that around 1776 a significant number of women below the age of 20 must have been married. This number must have decreased rapidly until around 1830, and then at a slower rate until about 1870.

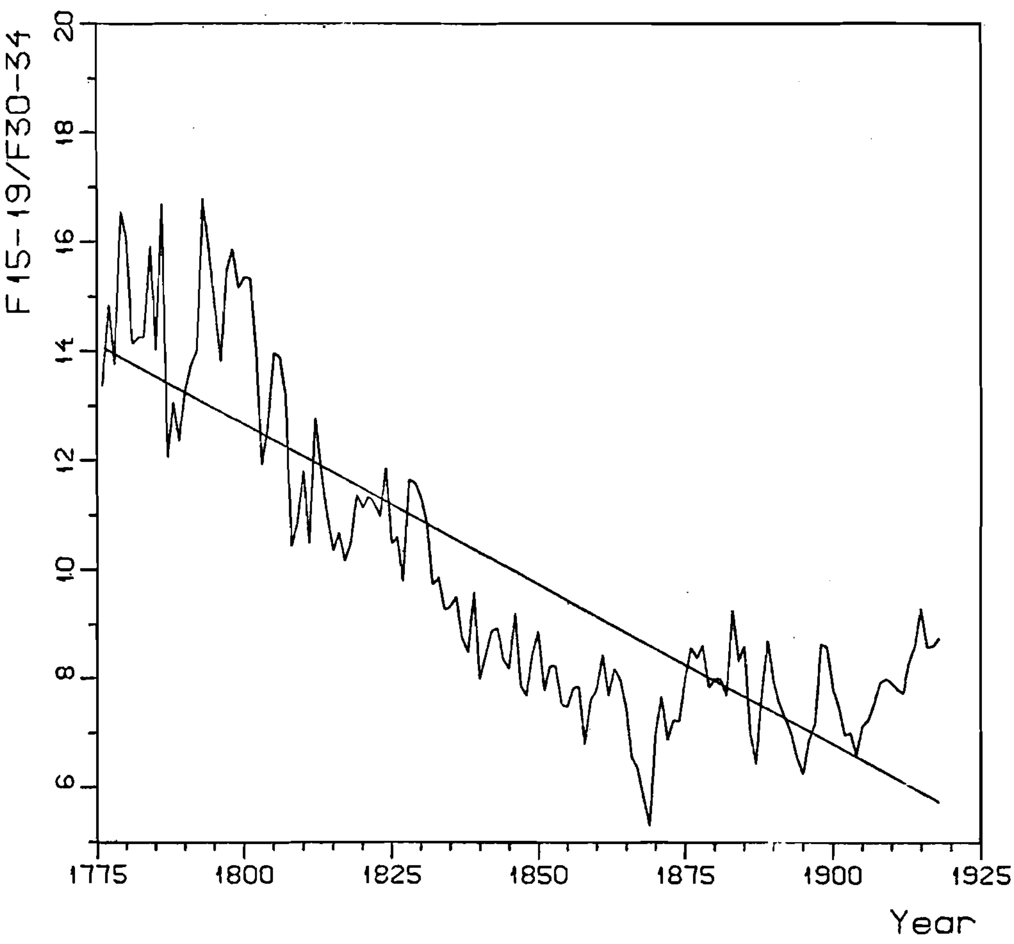

Figure 3. Plot of the ratios of age-specific fertility rates 15-20 over 30-35 against time (1776-1918).

Unfortunately, age-specific fertility rates are not available before 1776. Hence, we cannot draw any inference from this for the period during which the bulk of the "nuptiality transition" possibly occurred. This source of information only caught the tail of this dramatic development but it still gives clear indications of declining proportions married at younger ages.

4. RECONSTRUCTING AGE PATTERNS OF MARRIAGE FOR 1751-72

The sources of information described above indicate dramatic changes in the age pattern of marriage during the second half of the eighteenth century: the proportion ever-married declined sharply from 69.29% in 1751 to 65.51% in 1775 and 64.43% in 1800; the R-ratio described in the previous section also declines in all provinces between 1751 and 1772 thus indicating diminishing proportions marrying; the information on the modal age at marriage inferred from correlation analysis between sizes of birth and marriage cohorts finally suggests an upward shift in the modal age at marriage for both males and females between 1751 and 1800. However, none of these pieces of information is sufficient to provide a detailed description of the timing and intensity of marriage that would for instance allow the construction of the marriage index I_m. Only a combination of the different sources of information makes this possible. Since this combination cannot be done analytically it must be done by the means of simulation.

Four parameters, namely a_0, k, and C, and the proportion of first marriages PFM, have to be estimated to describe the age schedule of first marriages prevalent at each census year completely. Since two of the parameters, a_0 and k, are closely related to each other, the omission of a_0 as an unknown is the least distorting simplification that can be made in our case. More precisely, with k being equal to unity (= Swedish standard) the distance from the beginning of marriages to the modal age at marriage is 8.0 years; if a false assumption on a_0 were made, then the estimated value of k could compensate for this.

After this assumption on a_0, three parameters remain to be estimated. Further assumptions on the stability of the first marriage schedules allow us to build a system of three equations with three comparable parameters $k^{(t)}$, $C^{(t)}$, and $PFM^{(t)}$. [For an explanation of the notation see the previous section.]

Equation (2) containing information from the overall proportions married can be rewritten with a time index (t) and in discrete form as:

MODEL EQUATION 1

$$PFM_{15+}^{(t)} = C^{(t)} \sum_{a=15}^{\infty} c(a)^{(t)} G_s\left(\frac{a-16}{k^{(t)}}\right) .$$

Equation (5) giving the information from the annual numbers of marriages can be expressed in discrete form as:

MODEL EQUATION 2

$$M^{(t)} = \frac{C^{(t)} \sum_{a=15}^{50} W(a)^{(t)} g_s\left(\frac{a-16}{k^{(t)}}\right)}{PFM^{(t)}} .$$

Finally, equation (10) can be generalized for averages over 9-year periods (see Table 3) and rewritten as:

MODEL EQUATION 3

$$R^{(t)} = \frac{\sum_{t=t-4}^{t+4} M_t^{(t)}}{\sum_{t=t-4-N}^{t+4-N} B_t^{(t)}} \cdot \frac{1}{SEXR\ P(20-25)_f^{(t)}} = \frac{C^{(t)}}{PFM^{(t)}} \quad ,$$

where N is the length of the lag between the relevant birth and marriage cohorts. The only way to find parameter values that meet the conditions given through the model equations, is to write a simulation program which varies the values of each parameter step by step and selects "best" solutions according to specified criteria. But before we enter the computational part, it seems important to summarize the major assumptions made.

Besides the assumption that the various averages taken closely represent the real levels of fertility, nuptiality, and mortality at the periods under investigation, the following assumptions must be made to allow a solution to the problem of reconstructing the age pattern of marriage by using all three model equations:

1. Age-specific first marriage frequencies at a given point in time are approximated sufficiently well by the Coale-Trussell model of first marriages if appropriate values for the model parameters are chosen.
2. The parameter a_0 in the Coale-Trussell model is constant at the value 16.0. As discussed earlier, this is not a very serious assumption since errors are partly compensated by the estimation of k.
3. The first marriage schedule prevalent at time t is equal to that of the period $t-x$ to t. Concerning the parameter $k^{(t)}$ x has to be "only" 20-25 years, since the plausible span of k, ranging from 0.4 to 1.0 in our case, affects almost exclusively the age-specific proportions married between age 15 and age 35-40. The estimate of parameter $C^{(t)}$, however, is influenced by the proportions ever-married of women aged 70 or more, although that proportion carries very little weight.

Assumption 3 is certainly the most problematic one. But it must be made to make the $C^{(t)}$ and the $k^{(t)}$ which result from the marriage behavior of the period preceding the census year (model equation 1) comparable to the parameters representing the marriage behavior at a given point in time (model equations 2 and

3). For the given analysis of provincial level data this assumption became even more problematic than on the national level (Lutz 1983) because of smaller numbers and stronger fluctuations. For this reason the present analysis prefers to make assumptions on a plausible value of the proportion of first marriages among all marriages (PFM) thus reducing the number of model equations (by leaving out model equation 1) and making assumption 3 unnecessary. Hence, in the present application of the model assumption 3 will be replaced by an assumption on PFM. The values on PFM were chosen in accordance with the survival ratios of the provinces (to account for differential probabilities of widowhood) and particularly based upon scattered information from village reconstruction studies (see last section).

At this point the technical part of the simulation model shall not be described [for details, see Lutz (1983)]. It may only be said that first marriage frequencies are calculated according to the double exponential function given by Trussell (1981); the five-year age groups of the input data are transformed to single-year age groups for the application of the standard first marriage frequencies; and the "best" set of parameters is chosen by trying to minimize the differences between the $C^{(t)}$'s from model equations 2 and 3. The parameter estimates for the four provinces are given in Table 1 of the Appendix.

The period covered by this analysis is only 21 years. The trend of the estimated parameters between 1751 and 1772 is not linear, but in every province there is a clear trend of increasing k's—indicating higher ages at marriage—and decreasing C's—indicating lower proportions ever-marrying. As Appendix table 1 indicates, already in 1751 there were clear differentials between the provinces. The proportion ever-marrying was by far the highest in the eastern province of Kymenkartano and Savo and the lowest in the southwestern province of Turku and Pori with Uusimaa and Pohjanmaa in between. In 1771 we find the same ranking but a significantly lower level in all provinces. The proportion ever-marrying seems to have fallen by as much as 8-10% in only two decades.

The given parameter estimates allow to calculate age-specific proportions married by single-year age groups which subsequently can be reaggregated into five-year groups. Together with the age structure of the female population provided by the official statistics these figures may be used as input data for the calculation of the Princeton Indices. Without the reconstruction model only I_f, the index of total fertility, could be calculated. Now, the marriage index I_m and consequently the index of marital fertility I_g may be derived. These indices give more weight to the prime childbearing ages than to very young and older women. As a consequence these indices are less sensitive to violations of the assumptions specified than would be the case with age-specific marital fertility rates. They seem to be an appropriate result of the effort expended to reconstruct the age patterns of marriage because they do not yield particularly detailed information by the standards of still quite unstable parameter estimates. They do, however, provide very relevant information on the marriage pattern and also on marital fertility which had not been derived before.

Table 4. Calculation of "Princeton Indices" for provinces based on reconstruction model.

	Turku and Pori	Uusimaa and Häme	Pohjanmaa	Kymenkartano and Savo
for 1751-54				
I_f	.410	.424	.565	.548
I_m	.651	.708	.708	.762
I_g	.631	.599	.798	.719
for 1769-72				
I_f	.362	.377	.510	.470
I_m	.487	.579	.520	.589
I_g	.743	.651	.979	.798

Table 4 provides the figures of the Princeton Indices for the four Finnish provinces for 1751-54 and 1769-72 based on the simulation model. Total fertility as measured by I_f declined steeply in all provinces. This shows that even before the start of the time series of age-specific fertility rates in 1776 with a declining trend until 1800, there was a significant reduction in fertility. Marital fertility, on the other hand, did not seem to decline at all suggesting that the reason of this fertility decline most probably lies in diminishing proportions married at all ages. Whether we call this a "nuptiality transition" or not, it was doubtlessly a dramatic shift from high proportions marrying and low ages at marriage to higher ages at marriage and an increasing number of women remaining single that took place over a very restricted period of time during the second half of the eighteenth century.

5. DISCUSSION

The series of the index I_m estimated by the simulation model indicates that the proportion of married women was relatively high in all parts of Finland around the middle of the eighteenth century. The values of the index range from 0.651 in the southwestern province of Turku and Pori to 0.762 in the eastern province of Kymenkartano and Savo. As compared to the other regions of Europe showing the typical "European" pattern this implies that in all parts of Finland marriage was definitely earlier and more universal at that time. During the second half of the eighteenth century, however, the estimated indices show a drastic change towards a more "European" pattern. This decline continued over the nineteenth century at a much slower pace until the proportions married became comparable to most Western European countries by 1880 at the latest.

Are these results plausible? Do they fit into the social history of Finland or is there any contradictory evidence from other sources of information? In the following we want to discuss arguments of both quantitative and qualitative nature that support or weaken the validity of our results. There are two arguments from the social history of seventeenth and eighteenth century Finland that cast doubts on the notion of a major nuptiality transition during the late eighteenth century:

1. Although the downward trend in the intensity of marriage seems to be consistent after the 1750's we cannot deny the possibility that this is only part of some considerable long-term fluctuation in the intensity of marriage. There are some reasons to believe that the possibilities for (young) people to marry may have been exceptionally good around the middle of the eighteenth century. During the preceding 50 years Finland had suffered from dramatic population losses. In the years of the great famine in the 1690's about 30 percent of the population succumbed. The years of the Great Northern War (1700-1721) hindered any continuous population growth and finally, mortality reached considerable proportions during the War of the Hats in the early 1740's. Altogether this development probably led to a decrease in the number of the landless population, a shortage of rural labour force (in some regions at least), and to an increased possibility for the young generation to take over their parents' farms at a younger age. This may have led temporarily to younger mean ages at marriage and the higher proportions of ever-married. Besides, the new legislation aiming at easier subdivision of farms and promoting the creation of new crofts may have had some influence in the same direction.

2. At least in western Finland, the seventeenth century marriage patterns may well have been of the "European" type, similar to what we found in the early 1770's. We have no actual data which would directly prove that this was the case, but we are able to present some indirect evidence (although obviously insufficient for any firm conclusions). As Hajnal (1983) has pointed out it is reasonable to assume that late marriage is often related to certain household formation characteristics. First, before marriage young people often circulate between households as servants. Secondly, households are mainly simple, i.e., include only one married couple. Oja (1945) and Saarenheimo (1984) have analysed listings from the seventeenth century which give the composition of the adult population by occupational status in two regions in southwestern Finland. These listings show a large number of servant population indicating frequent and relatively long-lasting circulation of young adults as servants before marriage, thus implying relatively late marriage. In addition we can point out that the marriage market was undoubtedly disturbed during several decades in the seventeenth century and still during the very first decades of the eighteenth century. Due to the continuous wars considerable proportions of the young male population were drafted and the war losses being substantial the adult female population clearly outnumbered the corresponding male population.

Despite the possibility of fluctuations in the pre-statistical period the sustained decline in proportions married seems to be a unique phenomenon in Finnish history. The following arguments support the notion of a real "nuptiality transition":

1. Although the high intensity of marriage in the mid-eighteenth century may be partly due to exceptionally favourable conditions, this does not explain the persistent decline in the intensity towards the late nineteenth century. The population of Finland grew at a very high rate during the second half of the eighteenth century and by the end of the century the population size was considerably higher than ever before in history. Population growth continued over a century, although at a somewhat lower rate. During this period the number of farms grew at a much slower pace and thus the bulk of the population growth occurred in other groups of the agricultural population. In the eighteenth century the number of crofters increased substantially, but after the early decades of the next century new crofts were not founded to a similar extent and the population growth was concentrated even more dominantly on

the landless rural proletariat. As Soininen (1974) has pointed out the increased pressure on land did not cause only quantitative changes in the population composition, but had also unfavourable effects on the economic position of the different groups of the peasant population. This development as a whole may well have led to postponement of marriage and even to less universal marriage.

2. The correlation analysis between sizes of marriage cohorts and lagged birth cohorts which was described in section 3.4 indicated that the modal ages at marriage for men and women increased substantially during the second half of the eighteenth century. Although the results are not stable enough to yield robust estimates it is clear from the data that drastic changes towards later marriage occurred during that period.

3. Changes in the magnitude of age-specific fertility rates relative to fertility at the prime childbearing ages provide hints on changes in the marriage patterns, especially if continued natural fertility is assumed. The analysis in section 3.5 showed that the fertility pattern implies decreasing nuptiality during the second half of the eighteenth century.

4. A modification of the "Index of Family Limitation" which can be used for overall age-specific fertility rates [see Lutz (1984)] shows that between 1776 and 1800 no deviation from a natural fertility pattern occurred. The total fertility rate, on the other hand, decreased by more than 1 child per woman over that period. (Graphs showing the time series of total fertility and the "Modified Index of Family Limitation" are given in the Appendix.) Hence, we may conclude that a change in nuptiality rather than a decrease in marital fertility is the reason for this early fertility decline in Finland.

5. Finally, information from the few micro-studies conducted so far can provide valuable insights into eighteenth century nuptiality changes. Generally, this information is consistent with our findings. The mean age at first marriage is relatively low in the mid-eighteenth century but by the end of the century the first marriage of women occurred in most communities clearly at an older age. The eastern Finnish parish of Kitee is the only area for which the cross-classification of age and marital status is available at several points in time starting already from the middle of the eighteenth century.[8] At that time mar-

[8] In 1751 Kitee's population size was about 5,000 individuals. By 1840 the population had increased to about 12,400.

riage is early and universal, but by the turn of the next century marriage of women clearly takes place later in life and during the nineteenth century even the proportion of never-married is increasing to a considerable extent.

Tables 5 and 6 present the evidence obtained from the small-community case studies available for Finland (the locations of these communities are shown in Figure 1 above). In Table 5.2 we also present some data for Southern Karelia based on a listing of the population from the early 1750's. In the nineteenth century this region belonged to the most eastern part of Finland, but during the preceding century it was part of Russia and was thus not included in the foregoing analysis.[9] Reporting of ages is not very accurate and the widows cannot always be distinguished from the single population in the listing, but still the results indicate very early and universal marriage, quite comparable to the Northern Karelian parish of Kitee. However, according to Kaukiainen (1982, pp. 24-25) even in Southern Karelia marriage did become less universal by the early nineteenth century.

In spite of the drastic changes in the intensity of marriage in Finland it appears that the main characteristics of the regional differences remain throughout the period dealt with. Both in the mid-eighteenth century and in the late nineteenth century southwestern Finland shows the lowest and eastern Finland the highest intensity of marriage.

There might be economic and cultural explanations to the persisting regional differentials. We can argue that earlier and more universal marriage is found in those regions where the possibilities for clearing new land were better and subsidiary economic activities for field cultivation prevailed (e.g., burn-beating, freighting). On the other hand, it seems indicative that the provinces which by 1750 already had the lowest proportions married and subsequently moved fastest and closest towards the "European Marriage Pattern" already prevailing in Sweden lie in the southwest of the country. The province of Turku and Pori has culturally and economically been Finland's gate to Western Europe. The province of Kymenkartano and Savo, on the other hand, borders Russia and had been more exposed to influences from the East.

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[9]For further details see chapter 1 above. For the sake of clarity it should be emphasized that although Southern Karelia was unified in the eighteenth century with Russia, one should not draw a parallel between its population and the Russian peasants submitted to serfdom. The total population of the five parishes included in Table 5.2 numbered nearly 10,000 in the 1750's.

Table 5. Mean age at first marriage for women in various Finnish parishes in the eighteenth and nineteenth centuries.

Period	Huittinen (Province of Turku and Pori)	Period	Köyliö (Province of Turku and Pori)	Period	Maaria (Province of Turku and Pori)
1751-65	22.5	1733-49	23.2	1753-57	24.2
1770-85	24.8	1750-60	23.2	1796-00	27.3
1790-05	23.7	1761-70	22.1	1832-36	26.1
1810-25	25.2	1871-80	23.7		
1830-50	24.8				

Period	Perniö (Province of Turku and Pori)	Period	Five parishes in Uusimaa	Heinävesi in Savo	Period	Kitee in Northern Karelia
1756-60	24.7	1751-55	23.5	22	1750-52	20.7
1796-00	26.8	1796-00	25.4	25	1800-01	23.7
1841-45	27.1	1846-49	25.4	25	1840-41	24.5
					1881-83	26.0

Sources: Huittinen, Martoma (1942); Köyliö, Tegengren (1916); Maaria and Perniö, Airola (1971); parishes in Uusimaa (i.e., Espoo, Lohja, Mäntsälä, Tenhola, and Vihti), Varis (1971), Heinävsi, Hämynen (1984); Kitee, Marriage records and Communion books and Population change tables of 1881-83.

We can conclude that without doubt in Finland there was a dramatic decrease in proportions married at all ages during the second half of the eighteenth century. Is it justified to call this a transition? In this context we may define a transition as a change in the pattern that is quantitatively significant and induced by structural changes that are irreversible (at least in the short run). The decline in nuptiality we observed in Finland between 1751 and 1800 was indeed significant and it led to a new nuptiality regime (the "European Marriage Pattern") that persisted until the middle of the twentieth century when this pattern disappeared in most Western European countries.

Table 6. Proportions single, married and widowed for women in various age groups in some Eastern Finnish parishes.

	Kitee (Northern Karelia)				Five parishes in Southern Karelia*		
Age	Single	Married	Widows	Total	Single or widows	Married	Total
15-24							
1751	46.9	52.2	0.8	100	53.4	46.0	100
1800	70.8	29.2	0.0	100			
1840	84.6	15.4	0.0	100			
1880	86.1	13.9	0.0	100			
25-34							
1751	11.4	85.0	3.5	100	7.6	92.4	100
1800	19.7	77.3	3.0	100			
1840	31.2	67.9	0.9	100			
1880	32.1	64.9	3.0	100			
45-54							
1751	4.1	69.9	26.0	100	21.4	78.6	100
1800	1.5	67.2	31.3	100			
1840	7.7	72.0	20.3	100			
1880	13.6	66.5	19.9	100			

*The parishes of Kaukola, Kivennapa, Käkisalmi, Räisälä, and Uusikirkko. The data are from the year 1754.

Sources: The parish records and the poll tax records for Kitee. The proportions for Southern Karelia are based on material collected by Yrjö Kaukianinen.

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Appendix

Table 1. Parameter estimates from the simulation model.

PFM is fixed in advance because of instability of the estimates probably due to strong fluctuations in the period measure. PFM is set to .90 in all provinces except that of Kymenkartano and Savo where it is set to .85.

		Year					
Province	Parameter	1751	1754	1757	1760	1769	1772
Turku and Pori	PFM	.90	.90	.90	.90	.90	.90
	k	.40	.40	.41	.55	.72	.52
	C	.83	.83	.84	.92	.77	.74
Uusimaa	PFM	.90	.90	.90	.90	.90	.90
	k	.40	.40	.64	.72	.70	.62
	C	.91	.88	.86	.95	.89	.85
Pojanmaa	PFM	.90	.90	.90	.90	.90	.90
	k	.40	.40	.60	.59	.63	.62
	C	.90	.88	.91	.97	.82	.80
Kymenkartano and Savo	PFM	.85	.85	.85	.85	.85	.85
	k	.51	.40	.46	1.06	.56	.72
	C	1.00	.97	.95	.99	.88	.88

Table 2. Number of women ever-married by the age groups 1751-72 resulting from the reconstruction model.

Age group	Year 1751	1754	1769	1772
Province of Turku and Pori				
15-19	1133	1085	346	317
20-24	4676	4784	2631	2476
25-29	3878	4457	3991	3766
30-34	2928	3651	4203	4048
35-39	2834	2537	4129	3954
40-44	2919	3072	3580	3571
45-49	2619	2482	2956	2743
Province of Uusimaa and Häme				
15-19	948	868	327	524
20-24	3891	3905	2362	2908
25-29	3339	3699	3585	3815
30-34	2663	2846	3625	3695
35-39	2536	2326	3625	3623
40-44	2621	2464	3105	3446
45-49	2107	2102	2395	2586
Province of Pohjanmaa				
15-19	749	763	341	370
20-24	3259	3290	2171	2434
25-29	3010	3618	2633	2939
30-34	1912	2629	3041	2717
35-39	1576	1566	2849	2791
40-44	1725	1633	2551	2593
45-49	1545	1583	1969	2090
Province of Kymenkartano				
15-19	563	868	561	356
20-24	3319	3950	3199	2524
25-29	3659	4010	3903	3602
30-34	3056	3314	3621	3593
35-39	2593	2430	3516	3431
40-44	2317	2556	3975	3282
45-49	1760	1852	2414	2653

Figure 1a. Plot of the total fertility rate against time for Finland 1776-1978.

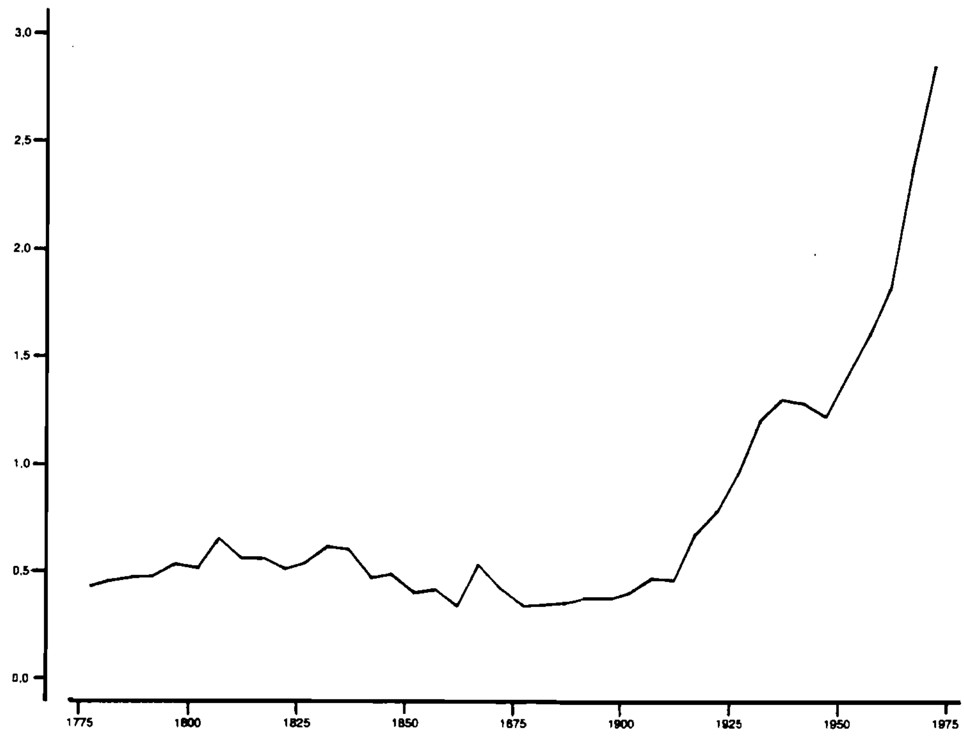

Figure 1b. Plot of the modified Index of Family Limitation (m^*) against time for Finland 1776-1978.