THE MARITAL FERTILITY OF MEN AND WOMEN IN CZECHIA BEFORE THE FIRST DEMOGRAPHIC TRANSITION AND IN THE CURRENT POPULATION

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Abstract

The aim of this study is to analyse the changes in the marital fertility of men and women in Czechia before the first demographic transition (data obtained by excerpting the parish registers of Škvorec manor in the years 1760–1839) and in the current population (data from the Czech GGS II based on interviews between 2020 and 2022) using a unified methodology. The results confirm previous findings on historical and modern marital fertility – determining the overall intensity of marital fertility by the duration of marriage in the historical population, the decrease in marital fertility by the decrease in the number of higher-order births in the modern population, etc. The results show that the timing of the first childbirth in marriage is similar in both (the historical and the modern) populations. Historical marriages with the same number of children have a much shorter reproductive window than modern marriages, with no differences at the beginning of the reproductive period, but with differences especially at the end. The timing of reproduction (median age at birth of the first child) does not differ for first marriage in modern and historical populations. In the historical population, women's fertility was limited at a lower age than men's fertility. In the modern population, the intensity of fertility by sex does not differ. In both populations the median duration of the reproductive window does not differ according to either sex or marriage order.

INTRODUCTION

To understand changes in population behaviour, it is necessary to quantify reproduction, not only in current and future populations but also in past ones. This study focuses on an analysis of fertility. The quantification of fertility is limited by the availability and quality of the input data. In historical populations, fertility is usually represented by the number of children born or by the crude birth rate since age-specific data on women of reproductive age are unknown. However, this indicator is affected by changes in the sex and age structure

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of the population. A more advanced indicator, the marital fertility rate, can be calculated for historical populations using the family reconstitution method (*Henry – Blum*, 1998). However, this method is demanding in terms of data collection and for this reason it is usually applied only to smaller geographical units. In modern populations, fertility is most often quantified using the total fertility rate (TFR), which is adjusted for the effect of the age structure.

Fertility analysis in modern populations has typically focused on women, but in recent years attention has also been paid to men (e.g. *Zhang*, 2011; *Schoumaker*, 2019; *Dudel – Klüsener*, 2016). In international comparisons, there is more variation in both the intensity and timing of fertility in men than is known for women (*Schoumaker*, 2019). The observed minimum of the TFR was around one child per woman/man in 2011, compared to a maximum TFR of nearly eight children for women and nearly fourteen children for men (*Schoumaker*, 2019). The differences in female and male fertility are due to the age difference of couples, the different lengths of fecundity, and, last but not least, the different size of the population at reproductive age (*Schoumaker*, 2019; *Dudel – Klüsener*, 2021). All of this is reflected in different age-specific fertility rates for men and women, with female fertility being higher at younger ages and male fertility exceeding it at older ages (*Schoumaker*, 2019; *Paget – Timæus*, 1994; *Dudel – Klüsener*, 2021).

The varying fertility in international comparisons is caused by the different stages of the reproductive regime. The highest fertility is found in sub-Saharan Africa, which, at the beginning of the 21st century, is in the second phase of its first demographic transition (*Bongaarts – Casterline*, 2013). In contrast, the lowest fertility can be observed in Europe and Southeast Asian countries, where the second demographic transition has been underway for a long time (*Lesthaeghe*, 2020), resulting in fertility levels that are persistently low and below replacement level.

Nowadays, it is no longer possible to find a country in which the first demographic transition has not yet begun. Thus, the reproductive behaviour of a population before the beginning of the demographic transition can only be analysed using

data on historical populations. The main aim of the present study is to analyse the changes in the marital fertility of men and women in Czechia before the first demographic transition and nowadays using a unified methodology.

In Czechia, the onset of the first demographic transition dates to the 1830s. Its second phase, the decline of fertility, occurred at the turn of the 19th and 20th centuries (*Pavlík et al.*, 1986: 569–572). The beginning of the second demographic transition in Czechia dates to the 1990s (*Rabušic*, 2001).

During the first transition, there was a decline in marital fertility as a result of families having a smaller number of children, and during the second transition the decline in overall fertility levels was intensified by the postponement of childbirth to later ages (*Lesthaeghe*, 2011). Therefore, it is possible to expect different fertility intensities when the current Czech population is compared to its historical counterpart. At the same time, however, some similarities between the populations can also be expected, as changes in reproductive behaviour during the first and second demographic transitions were often contradictory (for details see *Lesthaeghe*, 2011).

Although there are a significant number of children born out of wedlock in both historical and modern populations, this study focuses on an analysis of marital fertility, since the data for historical populations only allow for an analysis of marital fertility. Nevertheless, for historical populations in Czechia, marriage was the only socially accepted way to start a family. Thus, most children were born to married couples. Even in the current population, the main motivation for marriage is reproduction. For a significant part of society, marriage is still an important institution for the birth and upbringing of children (*Chaloupková – Šalamounová*, 2004; *Hašková*, 2004; *Hašková – Rabušic*, 2008; *Kyzlinková – Šťastná*, 2018).

In this analysis, the historical population is represented by the population of the Škvorec estate in the 18th and 19th centuries. For the current population, the analysis uses data from the second round of the Generation and Gender Survey (GGS), which reflects the reproductive behaviour of the Czech population from the 1970s to the 2020s.

TRENDS IN NUPTIALITY AND FERTILITY IN CZECHIA BEFORE THE FIRST DEMOGRAPHIC TRANSITION AND IN THE CURRENT POPULATION

Before the first demographic transition, marriage was usually motivated by reproductive intentions. Marital fertility was thus determined primarily by the timing of marriage. An example of this is a study from rural France at the turn of the 17th and 18th centuries, where later marriage led to a reduction in the fertile period by up to 10 years. Because of this, an estimated 35% fewer children were born than would have been if all women had married by age 20 (*Horská*, 1980: 343). Similarly, since the onset of the second demographic transition, marriages have been largely motivated by reproduction, and the decline in nuptiality has been explained by low reproductive intentions (*Hašková – Rabušic*, 2008). At the same time, marital status is a major predictor of fertility levels in the contemporary population (*Hašková*, 2004; *Kyzlinková – Šťastná*, 2018).

Marriage: the prevalence and timing

In the past, family formation in Czechia was classified as belonging to the so-called Western European model. In general, couples married only after they had sufficient material security (*Horský – Seligová*, 1996). This implies that marriage was not a universal phenomenon.[3] In the mid-18th century, the mean age at first marriage in the Czech lands was 20–25 years for women and 24–30 years for men, and by the first half of the 19th century the age had increased by another 2–3 years for both sexes, mainly as a result of economic and social factors (*Fialová et al.*, 1998: 158). Single women over the age of 50 only rarely entered marriage (*Maur*, 1983: 122).

Czechia ranked among Western European countries in terms of the intensity and timing of marriage until World War II (*Rabušic*, 2001).

At the beginning of the 20th century, according to the census, the mean age at first marriage was 28 years for men and 25 years for women[4] (*Fialová*, 2006). In Western European countries, starting in the mid-1960s there was a decline in intensity and an increase in the mean age at marriage. The countries of Central and Eastern Europe, including Czechia, then followed this trend from the 1990s onwards (*Sardon*, 1993). According to the 1970 census in Czechia, the mean age at first marriage was 24 years for men and 21 years for women and only 21% of men and 9% of women remained single at the age of 25–29, and only 6% of men and 5% of women at the age of 45–49 (*Fialová*, 2006). In 2021, first marriage occurred later (at 33 years for men and 30 years for women) and with a lower intensity (46% of men and 36% of women were never-married at the age of 50) (*Koukalová*, 2022).

The timing of marriage varies more in the contemporary population than in the historical population. On average, however, similar values for the timing of first-order marriage are expected in the studied populations, where the man will be older than the woman.

Fertility in the past and in the current population

Before the first demographic transition, a significant proportion of women entered marriage already pregnant. This was connected, among other things, to the rising age of marriage and at the start of reproduction. In the 18th century, the proportion of pre-marital conceptions in some localities in the Czech lands was as high as 20–25%. Therefore, first children were usually born soon after marriage. At the turn of the 18th and 19th centuries, the spacing of childbirth was regular, depending on the age of the women. Subsequent children were usually born at regular intervals of 2 to 2.5 years to women under 30 years of age. After the age of 30, the intervals lengthened, and the last child was born when a woman was

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3) It is estimated that in the second half of the 18th century approximately 5% of men and slightly more women in the Czech lands never married. A century later, the figures were probably 10% (and in some places significantly more) of women and approximately 8% of men (*Fialová et al.*, 1998: 158–165).

4) The proportion of singles at age 45–49 was 7% of men and 10% of women (*Fialová*, 2006).

on average around the age of 40–42 and sometimes even later. Fertility peaked between the ages of 20 and 29, when it reached approximately 0.5 live births per married woman. Studies carried out for localities in Czechia show that a woman who married before the age of 20 and lived to her 50th birthday gave birth to an average of 6–9 children. However, only less than one-fifth of these women had that many children. On average, families had 4–5 children (*Fialová et al.*, 1998: 167–168).

At the onset of the second demographic transition, in the early 1990s, the proportion of premarital conceptions in Czechia was as high as 55%. Changes in the reproductive behaviour of the Czech population resulted in the proportion of premarital conceptions falling to 26% by 2010[5] (*CZSO*, 2011). In 1989, women gave birth to their first child at a mean age of 22.5 years, and in 2021 at 28.8 years. The median interval between the birth of the first and second child in the current population is 3.5–4 years (*Šťastná et al.*, 2019), and due to the availability of modern contraceptives fertility is largely terminated after the birth of the second child, which fulfils the two-child family ideal (*Šťastná*, 2007; *Chromková Manea – Rabušic*, 2013; *Sobotka – Beaujouan*, 2014; *Kuchařová et al.*, 2019). It is also interesting to compare the age at the birth of fourth and higher-order children, which for women was 31.6 years in 1989 and 33.7 years in 2021. Given that the TFR is comparable in these years, this points to a shortening of the reproductive window during the second demographic transition. The maximum TFR after World War II in Czechia was recorded in 1974, when there were 2.43 births per woman. Even before the onset of the second demographic transition, the TFR had already fallen to 1.87 (1989). However, during the 1990s, fertility continued to fall and reached its minimum of 1.13 in 1999. This was caused by a decline in the fertility level itself and by fertility postponement. Since then, fertility has slightly increased again, reaching 1.83 children per woman in 2021 (*CZSO*, 2022b).

The differences in marital and non-marital fertility before and during the significant changes that occurred in reproduction during the second demographic transition were examined by *Rychtaříková* (2013), who described the different patterns of fertility rates of the first kind[6] by age, which is mainly a result of the different age structure of women in these populations. Non-marital fertility has a typical 'bell-shaped' pattern with a peak between 25 and 34 years. In contrast, marital fertility peaks at the beginning of the age interval (15–19 years) and declines with increasing age. It is affected by the high proportion of premarital conceptions and the relatively small number of married women in the lowest ages.

Fertility studies of men

It is clear from the above that the study of fertility in historical and modern populations has focused primarily on women, while men are rarely considered in specific studies (e.g. *Janáková Kuprová*, 2020; *Chromková Manea – Rabušic*, 2013; *Kyzlinková – Šťastná*, 2018). At the turn of the 18th and 19th centuries, on the Škvorec estate, both women and men saw the birth of their first child just after marriage. The end of the male reproductive window (the birth of the last child) was on average at 37.3 years. Male marital fertility rates, like those of women, peaked between the ages of 20 and 29 and reached similar values. However, men's marital fertility declined more slowly with increasing age than women's and was still more than 0.2 live births per man after the age of 45 (*Janáková Kuprová*, 2020: 120, 128–130).

According to the 2008 GGS survey, half of the men in the 1945–1949 generation had had their first child by age 26, while in the 1972–1976 generation the median had shifted to 31.6 years (*Kyzlinková – Šťastná*, 2018). Based on data from the 2010 survey, the fertility of men aged 48–55 was 1.85 children per man, which was slightly lower than the same indicator for women, whose fertility was 1.94 children

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5) The proportion of non-marital fertility has played a significant role in the decline in the proportion of premarital conceptions. Just before or at the beginning of the first demographic transition, approximately 15% of children in Czechia were born out of wedlock (*Fialová et al.*, 1998: 167). A similar proportion was recorded in Czechia in the 1990s. However, during the second demographic transition the share of non-marital fertility increased significantly, reaching 49% in 2020 (*CZSO*, 2022a).

6) The number of children born to married/unmarried women is related to the mean number of married/unmarried women.

per woman (*Chromkova Manea – Rabušic*, 2013). In the case of the fertility of married men and married women the values were higher – 1.98 for men and 2.01 for women (*Chromkova Manea – Rabušic*, 2013).

It is therefore possible to expect that while in the historical population the timing of marriage and the length of marriage will significantly determine the overall fertility of marriage, in modern society the timing and length of marriage will not play as significant a role (given that marriage is not closely related to conception and the ideal of the two-child family). However, given the same number of children born to one woman in both populations, the reproductive window (the time between the birth of the first and the last child) will be shorter on average in the historical population. While in the historical population the peak should be between 20 and 30 years, in the modern population it should decline with increasing age. An important contribution should then be to compare fertility not in terms of age but in terms of time elapsed since marriage, where the highest intensity for both sexes can be expected at the beginning of marriage.

DATA

The dataset for the Škvorec estate in the years 1760–1839 ('historical data') is the basis for the analysis of fertility before the first demographic transition. The Škvorec estate was located to the east of Prague in central Bohemia in a rural, agricultural area. The data were obtained using full name excerption from parish registers (information on births, marriages, and deaths), which were initially used for standard historical-demographic analysis (see *Janáková Kuprová*, 2020: 41–45 for details). The data are thus representative of the fertility of the entire population of one territory in the 1730–1889 period. Previous studies conducted on this population have not revealed any significant difference between the population of Škvorec and other Czech localities or for the overall Czech lands (*Janáková Kuprová*, 2020). The data can therefore in a simplified way be considered to be representative for the population of the Czech lands at the turn of the 18th and 19th centuries. This representativeness is also supported by the fact that in the studied period, most of the population lived in rural areas. In the middle of the 18th century only one-tenth of the population lived in towns and in the middle of the 19th century it was only about one-fifth of the population, and it was only at the end of the 19th century that the share of the urban population increased to one half (*Fialová et al.*, 1998: 148).

Contemporary reproductive behaviour is analysed using the Czech GGS II data – both data from the first wave of the survey (*Kreidl et al.*, 2023a) and from the pilot sample (i.e. the 'modern data') (*Kreidl et al.*, 2021). The GGS data are drawn from interviews with the population aged 18–69 between 2020 and 2022. The pilot sample is a quota sample, and the main sample is a random sample (*Kreidl et al.*, 2023b).

The input datasets were organised in a uniform form with identical variables (Table 1) and marriages were the observations. Four input datasets were created with respect to the source data (GGS, Škvorec estate) and sex (male, female) and were independently analysed.

Table 1 Unified entry variables for an analysis of marital fertility

Variable	Detail	Note
ID	Unique number for each individual	The same ID may appear more than once in the input file if the person has had multiple marriages.
Date of birth Date of marriage Date of birth of spouse Date of end of marriage Date of birth of children	Year and Month	If the month was not specified, 'June' was inserted.

To begin the analysis, the children were ordered by date of birth within the marriage. Then the ages/durations at the time of the event were calculated: age of the individual at marriage (difference between the marriage date and the date of birth), duration of the marriage (difference between the marriage end date and the marriage date), age difference of spouses (difference between the spouses' birth dates), age of the individual at the birth of the first/last child in the marriage (difference between the child's birth date and the studied individual's birth date). Subsequently, the number of children born in the marriage, the number of marriages, and the order of the marriage from the perspective of the studied individual were computed.

There was also a problem with missing values (Table 2). In the case of the historical dataset, there are missing values because the data were only excerpted from the parish registers belonging to the Škvorec estate. If the event of interest (birth or death) occurred in another parish, the records were

consequently not traced. The date of the marriage is always known, as this date was set as the basis for family reconstitution.[7] Limiting the analysis to specific parishes resulted in two types of missing data. First, there are the couples who, although they married on the estate, likely moved away from the estate after marrying. There is no or only incomplete information about their fertility. For this reason, only those marriages in which at least one of the subsequent events (childbirth or death of spouse) after the marriage was known were included in the analysis. The same condition was also applied to the modern population. However, it should be noted that this assumption may result in an underestimation of childless marriages. Second, the month of the event is often missing in the data. In this case, the unknown month was replaced by June, the value that provides the smallest possible deviation from the actual month of the event. The variable that was most often adjusted was the date of birth of a spouse in the historical population

Table 2 Number of observations and proportion of missing data in the historical (Škvorec) and modern (GGS) populations

| Variables | Contracted marriages | | | |
| | Škvorec | | GGS | |
	Men	Women	Men	Women
Total number of observations	2,644	2,644	2,116	3,262
Number of observations entering analyses	1,565	1,565	2,059	3,182
Date of birth – missing (%)	9.78%	9.58%	0.00%	0.00%
Date of marriage – missing (%)	0.00%	0.00%	3.35%	2.61%
Date of birth of spouse – missing (%)	9.58%	9.78%	3.74%	3.05%
End of marriage – missing (%)	1.85%	1.85%	1.65%	2.07%
Childless marriages (%)	3.51%	3.51%	18.79%	18.70%
Marriage – 1st order (N)	764	749	1,840	2,805
Date of marriage – missing (%)	0.00%	0.00%	2.45%	2.07%
End of marriage – missing (%)	2.36%	2.67%	1.47%	1.89%
Marriage – 2nd order (N)	721	763	200	344
Date of marriage – missing (%)	0.00%	0.00%	10.00%	5.81%
End of marriage – missing (%)	1.53%	1.18%	3.00%	3.49%
Marriage – 3rd order (N)	70	47	19	31
Date of marriage – missing (%)	0.00%	0.00%	21.05%	12.90%
End of marriage – missing (%)	0.00%	0.00%	5.26%	0.00%

Source: Parish registers of Škvorec estate; Czech GGS II data.

7) Family reconstitution starts with the date of marriage, from which the birth and death dates of the couple and the birth and death dates of all their children are then determined (more detailed in *Henry – Blum*, 1998).

(almost 50%[8]). In the case of the modern population, the reason for the missing data is the respondent's unwillingness to answer the question or invalid values. For the modern population, the information on the date of birth is complete. The above limitations are considered in the interpretation of the results.

Finally, it should be mentioned that the data for the Škvorec estate represent couples. That is, the number of marriages contracted by a man corresponds to the number of marriages contracted by a woman, and the only way in which the sets may differ by sex is in the order of marriage. In the GGS, the datasets for men and women are independent.

In the historical population, there are 1,565 marriages involving 1,453 men born between 1710 and 1821 and 1,544 women born between 1712 and 1822. In the modern population, there are 2,059 marriages of men involving 1,844 men born between 1951 and 1999 and 3,182 marriages of women involving 2,820 women born between 1951 and 2003.

METHODS

Measures of position (median, quartiles, deciles) were calculated for the variables of interest (the timing of marriages and childbirths) to assess differences in the historical and modern populations. Marital fertility rates were then calculated by the duration of marriage and by age.

Fertility rates of the first kind by age (Equation 1) were calculated as the proportion of children born into the marriage of a man (women) at age x ($B_x^{married\ couple}$) and the number of men (women) who were married at age x ($P_x^{married}$). When calculating age-specific fertility rates, children born before the marriage were included in the analysis.

(1) age-specific fertility rates of the first kind by age:

$$f_x = B_x^{married\ couple} / P_x^{married}$$

The exposures involve men (women) in a marriage at a given age. For example, married men at age x ($P_x^{married}$) equals the number of married men in the previous age interval ($P_{x-1}^{married}$) and the number of men who enter into marriage at age x ($P_x^{wedding}$) minus the number of men who are no longer married ($P_x^{terminated\ marriage}$), whether due to divorce or the death of a spouse (Equation 2).

(2) exposure (married individuals):

$$P_x^{married} = P_{x-1}^{married} + P_x^{wedding} - P_x^{terminated\ marriage}$$

Thus, in the case of a higher-order marriage, a man (or woman) can re-enter the exposures. To calculate fertility by the duration of marriage, age (x) is replaced by the duration of marriage (t). The calculation is done independently for men and women. An illustrative example of how time and the exposed population are considered is described in Appendix B.

RESULTS

The timing and duration of marriages in the historical (Škvorec) and modern (GGS) populations

In both the historical and modern populations, women enter their first marriage earlier than men (Figure 1). While for women the median age at first marriage does not vary over time (24 years), it does for men. Historical men enter their first marriage earlier than modern men (26 years versus 27 years). However, for second marriages, spouses in the historical population are significantly younger than those in the modern population (median ages: women – 23 vs 34 years; men – 26 vs 39 years). The age at third marriage increases significantly for the historical men (median age 41 years) and only slightly for the modern men (43 years). Historical women, however, were still very young at the time of their third marriage compared to modern women (25 versus 41 years).

The duration of marriage by order is similar for both populations, with only first marriages being statistically significantly different between the historical and modern populations, both for men (13 vs 15 years) and women (12 vs 14 years).

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8) The reason for this high proportion of missing values is that family reconstitution was based on the date of marriage, and the date of birth for those who could not be linked to the birth register was derived from the age at marriage (the age given in the marriage record was subtracted from the year of marriage).

Figure 1 **The age at marriage and the length of marriage by the order of marriage in the historical (Škvorec) and modern (GGS) populations**
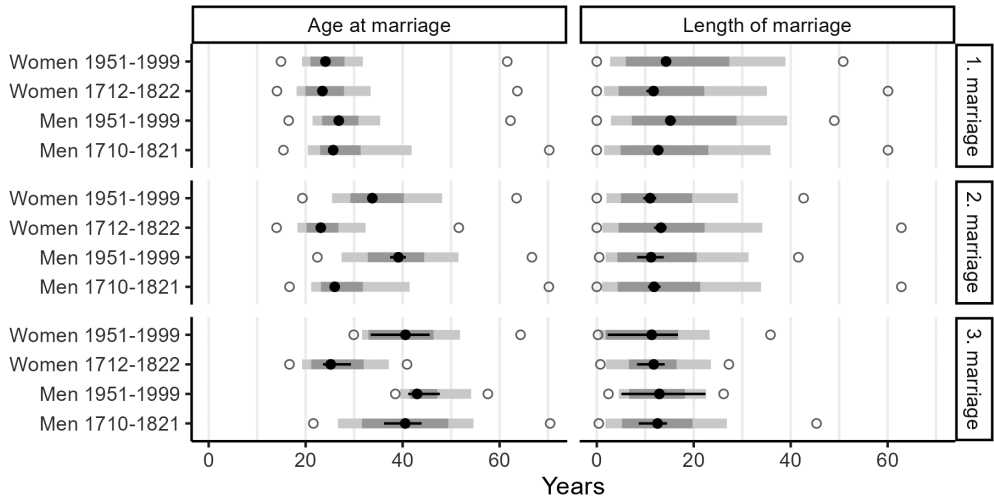
Note: The figure shows the minimum and maximum observed values (empty circles), the range between the first and ninth deciles (light grey), the interquartile range (dark grey), and the median values (black circle) with 95% confidence interval (black lines). The exact values are in Tables A1 and A2.
Source: Parish registers of Škvorec estate; Czech GGS II data.

Figure 2 **The age difference between spouses by marriage order in the historical (Škvorec) and modern (GGS) populations**
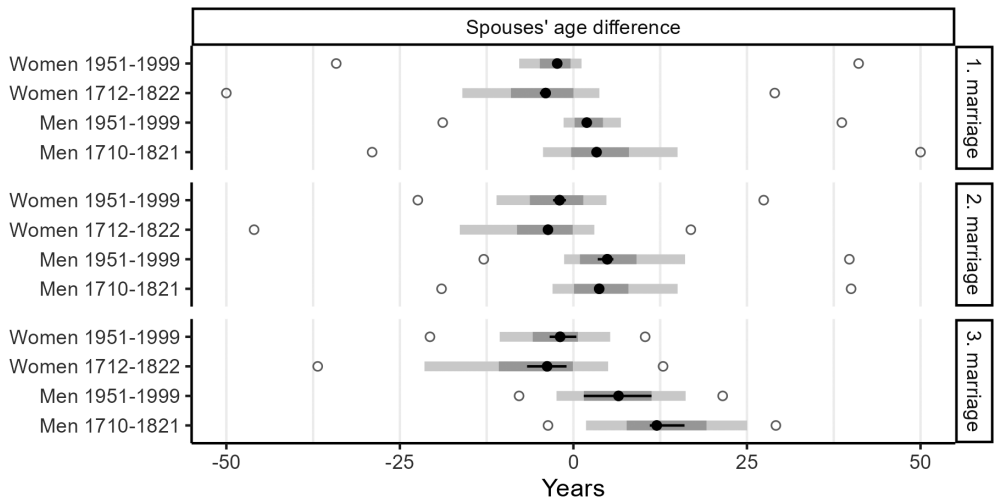
Note: The figure shows the minimum and maximum observed values (empty circles), the range between the first and ninth deciles (light grey), the interquartile range (dark grey), and the median values (black circle) with a 95% confidence interval (black lines). The exact values are in Table A3. It was measured as the age of the observed person minus the age of the spouse.
Source: Parish registers of Škvorec estate; Czech GGS II data.

Figure 2 shows the age differences between spouses (for women, negative values indicate that the husband is older and positive values that the wife is older; the opposite is true for men). In the historical population,

the age gap at first marriage was larger than in the modern population. In both populations it is the men who are older. Historical men were 3 years older and women were 4 years younger at first marriage, while in the modern population the age difference is 2 years. The age gap at second marriage does not differ significantly from first marriages, except in the case of modern men, who in second marriages are significantly older than their spouses (median age 5). The increase in the age gap between men and women is magnified for the third marriages of men, with a median gap of 12 years in the historical population and 7 years in the modern population. In the case of women, the age gap remains similar to that of lower-order marriages (4 years in the historical population and 2 years in the modern population). The change in age differences is thus consistent with the differences observed for age at marriage entry (Figure 1), with historical men entering third marriages even at a relatively old age, but with a much younger partner. Whereas women entered a third marriage at an age when they still had a substantial part of their reproductive period to live.

The timing and duration of the reproductive window in the historical (Škvorec) and modern (GGS) populations

The length of the marital fertility window in the historical population is significantly influenced by the age at marriage and the duration of marriage. In the modern population, it is possible and quite common that the onset of reproduction is timed before marriage. However, the median ages at marriage are usually lower than the ages at the birth of the first child by order of marriage, or at least their confidence intervals overlap (see A1 and A5 in the Annex). The only exception is for modern women at the second marriage, where the median age at the birth of the first child (31 years) is lower than the age at the second marriage (34 years).

The reproductive window is bounded by the birth of the first and the last child in the marriage under study. Its median length (Figure 3) does not statistically significantly differ by marital order or by sex. The median length of the reproductive window in the historical population ranges between 11 and 12 years. In the modern population, the reproductive window

Figure 3 The reproductive window by marriage order in the historical (Škvorec) and modern (GGS) populations

Note: The figure shows the minimum and maximum observed values (empty circles), the range between the first and ninth deciles (light grey), the interquartile range (dark grey), and the median values (black circle) with a 95% confidence interval (black lines). The exact values are in Table A4. Only the population with more than 10 observations are shown.
Source: Parish registers of Škvorec estate; Czech GGS II data.

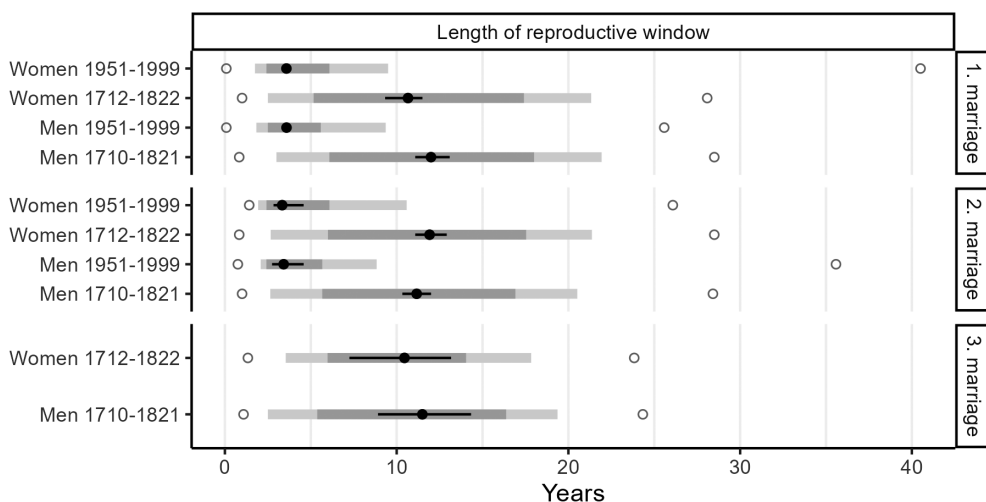**Figure 4 The age at first childbirth and last childbirth in a marriage by the order of the marriage in the historical (Škvorec) and modern (GGS) populations**
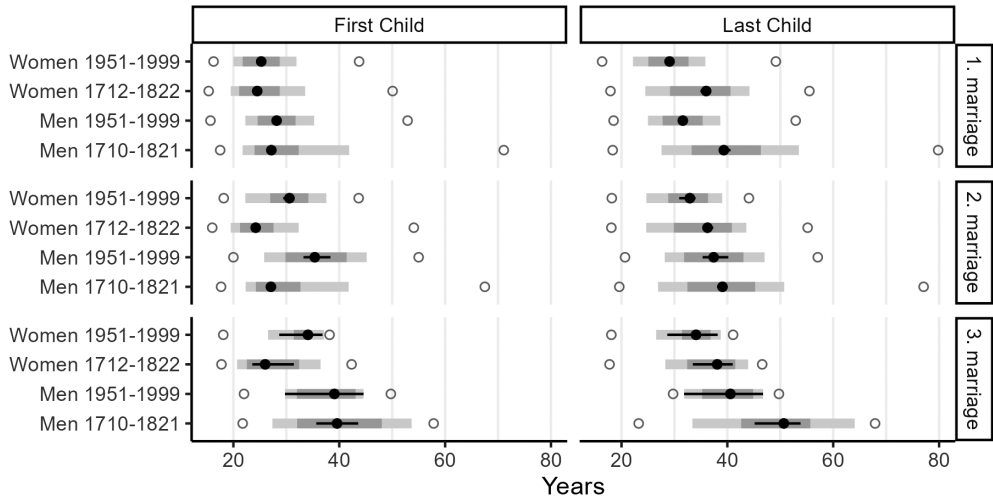
Note: The figure shows the minimum and maximum observed values (empty circles), the range between the first and ninth deciles (light grey), the interquartile range (dark grey), and the median values (black circle) with a 95% confidence interval (black lines). The exact values are in Tables A5 and A6.
Source: Parish registers of Škvorec estate; Czech GGS II data.

is considerably shorter. It is 3 to 4 years long for first and second order marriages.

The beginning of the reproductive window varies between sexes and by marriage order (Figure 4). Interestingly, in the case of first marriages, the median ages of men and women do not differ over time. The median age at first childbirth is 27 years for historical men and 28 years for modern men; for females, the median ages are 25 years. However, substantial changes over time occur at the end of the reproductive window. The last child in the first marriage is born on median by age 39 for historical men and by age 32 for modern men. For women, the median age is 36 years for the historical population and 29 years for the modern population. In the case of higher order marriages, the lowest median birth of the last child is observed for modern women and the highest for historical men.

Interestingly, the length of childless marriages does not differ between the populations and ranges from 6 to 8 years. The median length of modern marriages in which one child is born is 8 years for women and 10 years for men. If 2 to 4 children are born in modern marriages, the median length

of marriage is 18 to 21 years. The length of marriage in the historical population was much more determined by the number of children born and up to ten births clearly continued to increase (Figure 5). Marriages in which one child was born lasted on average 1.2 years, marriages with two to four children lasted 4–10 years, and marriages with ten or more children lasted 25–30 years. Overall, historical marriages were shorter than modern marriages with the same number of children.

The length of the reproductive window is a valid variable only for marriages with at least two children. The number of children born significantly determines the length of the reproductive window in both populations (Figure 6). For the historical population, the median length of the reproductive window for two-child marriages was 2 years and for modern marriages 3 years. For more children, the differences increase over time. For three-child families, the median reproductive window was 5 years in the historical population and about 7 years in the modern. For four-child marriages, the median then shifts to around 8 years for the historical population and between

Figure 5 **The length of marriage by the number of children in a marriage in the historical (Škvorec) and modern (GGS) populations**
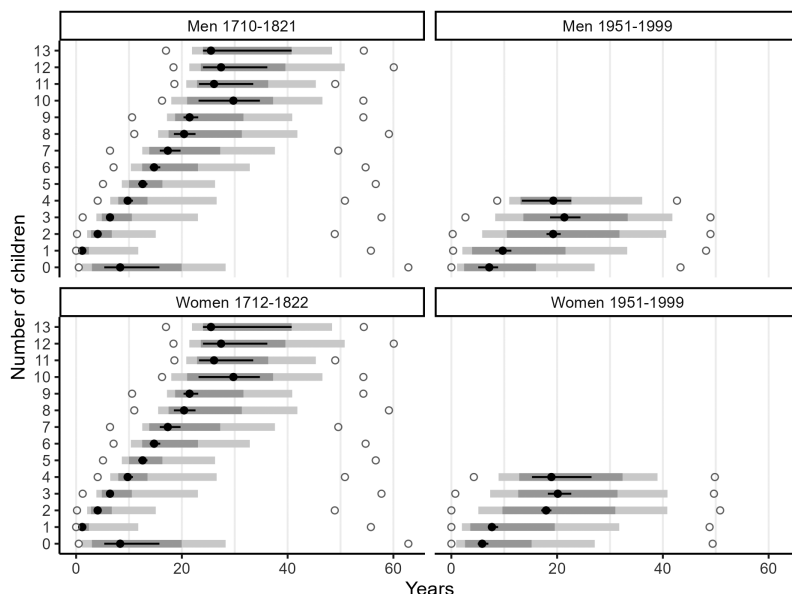
Note: The figure shows the minimum and maximum observed values (empty circles), the range between the first and ninth deciles (light grey), the interquartile range (dark grey), and the median values (black circle) with a 95% confidence interval (black lines). The exact values are in Table A7.
Source: Parish registers of Škvorec estate; Czech GGS II data.

9 and 11 years for the modern population. While in the modern population, marriages with valid information on the date of birth of the first and last child born are known for a maximum of seven children (for women, and five for men), for the historical population the maximum moves to 15 births and the length of the reproductive window is more than 20 years.

Fertility rates in the historical (Škvorec) and modern (GGS) populations

Figures 7 and 8 present the age- and length-specific marital fertility rates of the first kind. The length-specific rates follow a similar pattern in both populations. Fertility is realised with the greatest intensity at the beginning of a marriage and declines exponentially with the duration of a marriage. However, there is a significant difference in fertility intensity over time, with the fertility of the historical

population being higher than that of the modern population throughout the duration of a marriage (Figure 7).

In the case of age-specific rates, the differences between populations are larger. While in the modern population, the pattern of fertility is similar to the pattern of marriage duration and thus fertility is most likely to be realised at the lowest age, in the historical population fertility peaked around age 25 for women and between 25 and 30 for men. Interestingly, in the modern population, fertility intensity does not differ significantly by sex, whereas in the historical population there is a clear biological limit to female fertility. The fertility of historical men reaches higher values than women even. Based on the Figure 8, the marital fertility of the historical population is more than double that of the modern population.

Figure 6 **The reproductive window by the number of children in the historical (Škvorec) and modern (GGS) populations**
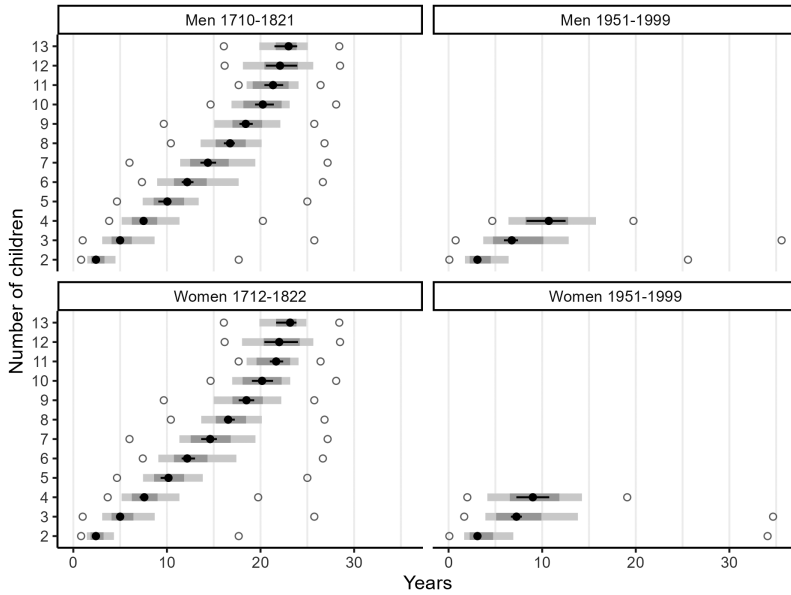
Note: The figure shows the minimum and maximum observed values (empty circles), the range between the first and ninth deciles (light grey), the interquartile range (dark grey), and the median values (black circle) with 95% confidence interval (black lines). The exact values are in Table A8. Only the population with more than ten observations are shown.
Source: Parish registers of Škvorec estate; Czech GGS II data.

Figure 7 **Fertility rates by the length of a marriage in the historical (Škvorec) and modern (GGS) population**
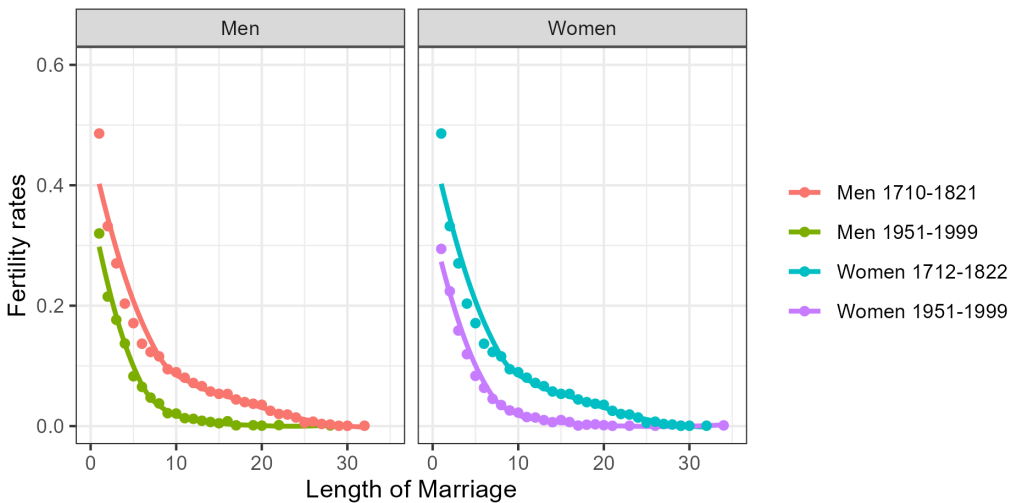
Note: The figure shows the measured age-specific fertility rates (coloured points) and the loess smoothing of these points (coloured lines).
Source: Parish registers of Škvorec estate; Czech GGS II data.

Figure 8 **Fertility rates by age in the historical (Škvorec) and modern (GGS) populations**
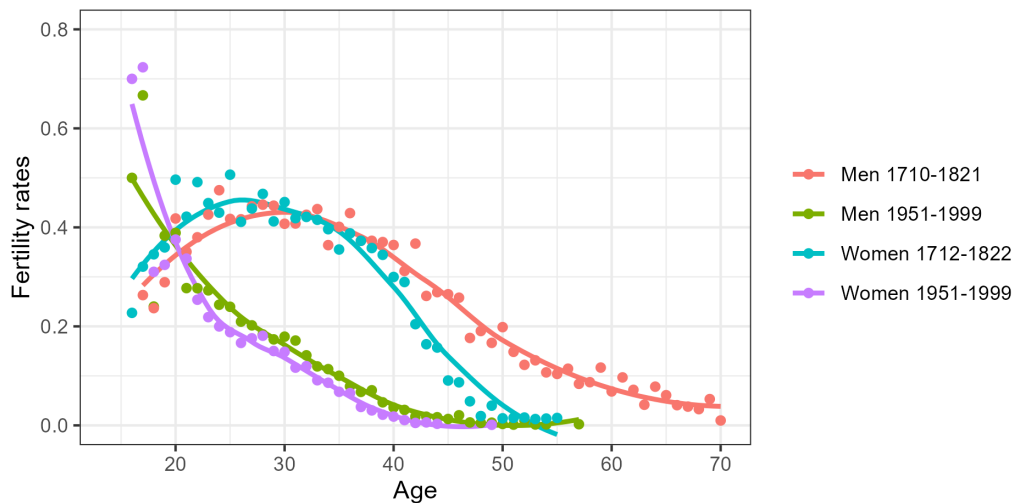
Note: The figure shows the measured age-specific fertility rates (coloured points) and the loess smoothing of these points (coloured lines).
Source: Parish registers of Škvorec estate; Czech GGS II data.

CONCLUDING DISCUSSION

The study compares the marital fertility of men and women before the first demographic transition and in the present day in Czechia. In both populations, the historical (Škvorec) and the modern (GGS), marriage is predominantly (although in modern society not exclusively) motivated by reproduction (*Klabouch*, 1962; *Hašková*, 2004; *Kyzlinková – Šťastná*, 2018). Our results confirm the assumption, based on the known data for the Czech historical and contemporary populations described in the introduction, that the timing of first marriage does not differ for historical and modern women. Although there is a significant difference for men. In the case of second marriages, however, the spouses in the modern population are considerably older than those in the historical population. This may be related to the higher mortality rate at a younger age in the historical population (the life expectancy at age of 15 at the turn of the 18th and 19th centuries was around 53 years for both sexes (*Janáková Kuprová*, 2020: 167)). In the case of third marriages, historical women were very young compared to modern women (25 versus 41 years). This finding confirms the hypothesis that in the past the main criterion widowed men applied to choosing a new partner was youth, which was associated, among other things, with a higher ability to bear more children and, conversely,

a lower likelihood of having to provide for children born from a previous marriage. At the same time, widowed older women who had already fulfilled their reproductive 'duty' might not have been interested in remarriage, as without a spouse they became independent of male authority for the first time in their lives (*Janáková Kuprová*, 2020: 91; *Bůžek – Král*, 2007: 26; *Lenderová – Kopičková – Burešová – Maur*, 2008: 151).

The length of marriage by the order of marriage is similar for both populations, with only first marriages being significantly different between the historical and modern populations for both sexes (shorter in the historical population). Again, this may be associated with the higher mortality rate at younger ages in the historical population.

The timing of reproduction (median age at birth of the first child) does not differ for first marriage in the modern and historical populations. The gender difference is unaffected due to the age gap between spouses. Thus, in the case of first marriages, there is no evidence of a restriction on the length of the reproductive window at its beginning in either the historical or the modern population.

In summary, this confirms the initial hypothesis that in the historical population the duration of marriage is important for the overall level of fertility,

as the median length of marriage increases up to a total of ten children, with long marriages being easier to achieve in the case of early marriage. In the modern population, the duration of marriage determines childlessness, one-child marriages, and multiple marriages. Thus, the effect of marriage length on fertility level is much lower than in the historical population. This is reflected in the duration of one-child marriages, for which the median duration is 1 year for the historical population and 8–10 years for the modern population. The short duration of historical marriages is most likely largely due to maternal mortality (i.e. deaths associated with childbirth and sextuplets (*Janáková Kuprová*, 2020)) and mortality in general, whereas in the case of modern marriages it is the choice of couples themselves to have one child (*Hašková – Pospíšilová*, 2020). In the modern population, the number of children in a marriage is generally influenced by the individual choice of the couple; reproductive intentions are not very high and there is a preference for two children (*Šťastná*, 2007; *Chromková Manea – Rabušic*, 2013; *Sobotka – Beaujouan*, 2014; *Kuchařová et al.*, 2019). In contrast, in pre-transition societies, there is no conscious limitation of fertility (*Fialová et al.*, 1998: 167). Two-child marriages lasted 4 years in the historical population but 18–19 years in the modern population. Smaller differences can be observed in the median length of the reproductive window of two-child marriages, which was 2 years in the historical and 3 years in the modern population. As expected, historical marriages with the same number of children have a much shorter reproductive period than modern marriages, with no differences at the beginning of the reproductive period, but with differences especially at the end.

In the case of marital fertility by age, the assumption was confirmed that in the modern population, fertility is most likely to be realised at the youngest age, and in the case of the historical population, fertility intensity peaks around the age of 25 for women and between 25 and 30 for men. This is due to societal attitudes towards marriage and the total number of children born in marriage. Whereas in the historical population marriage was the dominant fertility predictor, in the modern population marriage at a young age is usually entered due to pregnancy, so the denominator is relatively low and the number of children born relative to it is high. This is related to the fertility pattern by the duration of marriage, which is similar for both populations, with fertility declining over the course of the marriage, but with higher fertility in the historical population.

The results of the present study are generally consistent with previous findings on marital fertility in the historical population (*Fialová et al.*, 1998: 167). Simultaneously, the results are consistent with the findings of a recent global comparison on the age difference between spouses, which is a significant differentiating factor in fertility intensity, with higher fertility in the studied population when the age difference between spouses is and the men tend to be much older than their spouse (*Schoumaker*, 2019). Similarly, the results confirm that the decrease in marital fertility that accompanies the second demographic transition occurs through a reduction in the fertility of higher-order children, but they do not provide direct support for the decline in overall fertility levels being amplified by fertility postponement (*Lesthaeghe*, 2011), as there are minimal differences in the timing of first childbirth in marriage between the historical and modern populations. It is true, however, that not all children in the studied population were born during the second demographic transition, so further fertility postponement may yet occur. Nevertheless, there is still room for the ideal of the two-child family to be fulfilled, given the length of the reproductive window in the historical population.

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Appendix A

Table A1 Age at marriage by the marriage order in historical (Škvorec) and modern (GGS) population

Population	Marriage order	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	1st	1,795	16.5	21.4	23.4	**26.8**	**26.5**	**27.2**	30.9	35.4	62.3
Men 1710–1821	1st	633	15.4	20.4	23.0	**25.7**	**25.3**	**26.3**	31.3	41.9	70.3
Women 1951–1999	1st	2,744	14.9	19.3	21.0	**24.1**	**23.8**	**24.4**	28.0	31.8	61.6
Women 1712–1822	1st	634	14.1	18.1	19.9	**23.5**	**22.9**	**23.9**	27.9	33.4	63.7
Men 1951–1999	2nd	180	22.4	27.4	32.8	**39.1**	**37.4**	**40.7**	44.5	51.5	66.7
Men 1710–1821	2nd	699	16.7	21.1	23.2	**26.0**	**25.5**	**26.6**	31.8	41.4	70.2
Women 1951–1999	2nd	324	19.3	25.4	29.2	**33.8**	**32.8**	**34.7**	40.3	48.1	63.5
Women 1712–1822	2nd	726	14.0	18.3	20.2	**23.1**	**22.5**	**23.7**	26.8	32.4	51.6
Men 1951–1999	3rd	15	38.5	39.5	41.5	**43.0**	**41.2**	**47.7**	47.2	54.1	57.6
Men 1710–1821	3rd	70	21.6	26.7	31.6	**40.5**	**36.2**	**43.9**	49.4	54.6	70.4
Women 1951–1999	3rd	27	29.9	31.6	33.0	**40.6**	**33.4**	**45.6**	46.4	51.8	64.3
Women 1712–1822	3rd	47	16.7	19.3	21.2	**25.2**	**23.6**	**29.3**	32.0	37.1	40.9

Source: Parish registers of Škvorec estate; Czech GGS II data.

Table A2 Length of marriage by the marriage order in historical (Škvorec) and modern (GGS) population

Population	Marriage order	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	1st	1,767	0.0	2.9	7.3	**15.2**	**14.3**	**16.3**	28.8	39.3	49.0
Men 1710–1821	1st	742	0.0	1.5	4.9	**12.7**	**11.7**	**13.7**	23.0	35.8	60.1
Women 1951–1999	1st	2,698	0.0	2.7	6.0	**14.3**	**13.6**	**14.9**	27.3	38.9	50.8
Women 1712–1822	1st	724	0.0	1.5	4.5	**11.7**	**10.2**	**12.6**	22.2	35.1	60.1
Men 1951–1999	2nd	176	0.5	1.8	4.3	**11.2**	**8.3**	**13.8**	20.6	31.3	41.6
Men 1710–1821	2nd	708	0.0	1.1	4.3	**11.8**	**10.6**	**13.2**	21.3	33.9	62.8
Women 1951–1999	2nd	316	0.0	2.0	5.0	**11.0**	**9.6**	**12.3**	19.7	29.1	42.7
Women 1712–1822	2nd	753	0.0	1.2	4.5	**13.2**	**11.8**	**14.4**	22.3	34.1	62.8
Men 1951–1999	3rd	13	2.4	4.5	6.7	**12.9**	**5.1**	**22.4**	18.2	22.6	26.2
Men 1710–1821	3rd	70	0.4	1.8	5.2	**12.5**	**8.7**	**14.5**	19.7	26.8	45.3
Women 1951–1999	3rd	27	0.2	0.6	1.8	**11.3**	**2.3**	**16.7**	16.8	23.3	35.8
Women 1712–1822	3rd	47	0.8	1.9	6.6	**11.7**	**8.3**	**14.0**	16.5	23.5	27.2

Source: Parish registers of Škvorec estate; Czech GGS II data.

Table A3 The age difference between spouses by marriage order in historical (Škvorec) and modern (GGS) population

Population	Marriage order	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	1st	1,775	−18.8	−1.4	0.2	**1.9**	**1.8**	**2.2**	4.2	6.8	38.7
Men 1710–1821	1st	585	−29.0	−4.4	−0.3	**3.3**	**2.8**	**4.0**	8.0	15.0	50.0
Women 1951–1999	1st	2,724	−34.2	−7.8	−4.8	**−2.3**	**−2.5**	**−2.2**	−0.4	1.2	41.1
Women 1712–1822	1st	582	−50.0	−16.0	−9.0	**−4.0**	**−4.8**	**−3.5**	0.0	3.7	29.0
Men 1951–1999	2nd	190	−12.9	−1.3	0.9	**4.9**	**3.5**	**5.7**	9.1	16.1	39.7
Men 1710–1821	2nd	680	−19.0	−3.0	0.1	**3.7**	**3.0**	**4.1**	7.9	15.0	40.0
Women 1951–1999	2nd	328	−22.4	−11.1	−6.3	**−2.0**	**−2.9**	**−1.1**	1.4	4.8	27.4
Women 1712–1822	2nd	710	−46.0	−16.4	−8.1	**−3.7**	**−4.1**	**−3.0**	−0.1	3.0	16.9
Men 1951–1999	3rd	17	−7.8	−2.4	1.5	**6.5**	**1.5**	**11.3**	11.3	16.2	21.5
Men 1710–1821	3rd	69	−3.7	1.8	7.7	**12.0**	**11.0**	**16.0**	19.2	25.0	29.2
Women 1951–1999	3rd	30	−20.7	−10.6	−5.9	**−1.9**	**−3.4**	**0.4**	0.6	5.3	10.3
Women 1712–1822	3rd	46	−36.8	−21.5	−10.7	**−3.8**	**−6.7**	**−1.0**	−0.1	5.0	12.9

Source: Parish registers of Škvorec estate; Czech GGS II data.

Table A4 Reproductive window by marriage order in historical (Škvorec) and modern (GGS) population

Population	Marriage order	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	1st	1,094	0.1	1.8	2.5	**3.6**	**3.4**	**3.8**	5.6	9.4	25.6
Men 1710–1821	1st	519	0.8	3.0	6.1	**12.0**	**11.1**	**13.1**	18.0	21.9	28.5
Women 1951–1999	1st	1,715	0.1	1.7	2.4	**3.6**	**3.4**	**3.8**	6.1	9.5	40.5
Women 1712–1822	1st	501	1.0	2.5	5.2	**10.7**	**9.3**	**11.5**	17.4	21.3	28.1
Men 1951–1999	2nd	51	0.8	2.1	2.4	**3.4**	**2.7**	**4.6**	5.7	8.8	35.6
Men 1710–1821	2nd	558	1.0	2.6	5.7	**11.2**	**10.3**	**12.0**	16.9	20.5	28.4
Women 1951–1999	2nd	73	1.4	1.9	2.4	**3.3**	**2.8**	**4.6**	6.1	10.6	26.1
Women 1712–1822	2nd	587	0.8	2.7	6.0	**11.9**	**11.1**	**12.9**	17.5	21.4	28.5
Men 1951–1999	3rd	4	1.5	1.7	2.0	**2.5**	**-Inf**	**Inf**	7.9	17.0	23.2
Men 1710–1821	3rd	47	1.1	2.5	5.4	**11.5**	**8.9**	**14.3**	16.4	19.4	24.3
Women 1951–1999	3rd	1	6.8	6.8	6.8	**6.8**	**-Inf**	**Inf**	6.8	6.8	6.8
Women 1712–1822	3rd	36	1.3	3.5	6.0	**10.5**	**7.3**	**13.2**	14.0	17.8	23.8

Source: Parish registers of Škvorec estate; Czech GGS II data.

Table A5 The age at the first childbirth in the marriage by the marriage order in historical (Škvorec) and modern (GGS) population

Population	Marriage order	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	1st	1,536	15.7	22.3	24.6	**28.2**	**27.7**	**28.5**	31.7	35.3	52.9
Men 1710–1821	1st	609	17.5	21.7	24.0	**27.2**	**26.6**	**27.8**	32.3	41.9	71.1
Women 1951–1999	1st	2,359	16.3	20.0	21.8	**25.3**	**24.9**	**25.6**	28.7	31.9	43.8
Women 1712–1822	1st	604	15.3	19.5	21.1	**24.5**	**24.0**	**25.2**	28.8	33.6	50.1
Men 1951–1999	2nd	118	20.0	25.8	29.8	**35.4**	**33.3**	**38.3**	41.4	45.2	55.0
Men 1710–1821	2nd	679	17.7	22.3	24.2	**27.1**	**26.5**	**27.7**	32.7	41.8	67.5
Women 1951–1999	2nd	199	18.2	22.2	27.0	**30.6**	**29.4**	**31.3**	34.2	37.6	43.7
Women 1712–1822	2nd	706	16.0	19.5	21.3	**24.2**	**23.7**	**24.7**	27.6	32.3	54.1
Men 1951–1999	3rd	11	22.0	29.7	32.0	**39.1**	**29.7**	**44.6**	43.1	44.6	49.7
Men 1710–1821	3rd	59	21.7	27.4	32.0	**39.6**	**35.7**	**43.6**	48.0	53.7	57.8
Women 1951–1999	3rd	9	18.1	26.5	31.4	**34.1**	**28.7**	**36.8**	34.7	37.1	38.2
Women 1712–1822	3rd	43	17.7	20.7	22.5	**26.0**	**23.6**	**31.4**	32.4	36.5	42.3

Source: Parish registers of Škvorec estate; Czech GGS II data.

Table A6 The age at the last childbirth in the marriage by the marriage order in historical (Škvorec) and modern (GGS) population

Population	Marriage order	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	1st	1,538	18.5	25.0	27.8	**31.6**	**31.3**	**31.9**	35.3	38.7	52.9
Men 1710–1821	1st	609	18.3	27.6	33.3	**39.3**	**38.7**	**40.6**	46.3	53.5	79.8
Women 1951–1999	1st	2,365	16.3	22.2	25.1	**29.1**	**28.7**	**29.3**	32.7	35.8	49.2
Women 1712–1822	1st	605	17.9	24.5	29.2	**36.0**	**34.9**	**36.7**	40.6	44.2	55.5
Men 1951–1999	2nd	119	20.7	28.2	31.8	**37.4**	**35.3**	**40.2**	43.0	47.0	57.1
Men 1710–1821	2nd	679	19.6	26.9	32.5	**39.1**	**38.1**	**40.0**	45.2	50.7	77.1
Women 1951–1999	2nd	200	18.2	24.7	28.8	**32.9**	**30.9**	**34.0**	36.4	39.0	44.1
Women 1712–1822	2nd	708	18.1	24.7	29.9	**36.3**	**35.6**	**37.3**	40.9	43.6	55.2
Men 1951–1999	3rd	11	29.7	31.8	35.3	**40.6**	**31.8**	**46.8**	44.9	46.8	49.7
Men 1710–1821	3rd	59	23.2	33.4	42.6	**50.7**	**45.2**	**53.8**	55.7	64.1	67.9
Women 1951–1999	3rd	9	18.1	26.5	31.4	**34.1**	**28.7**	**38.2**	36.8	38.8	41.1
Women 1712–1822	3rd	43	17.7	28.3	32.4	**38.1**	**33.5**	**41.0**	41.5	43.9	46.6

Source: Parish registers of Škvorec estate; Czech GGS II data.

Population	Children in one marriage	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	0	341	0.0	1.1	2.4	**7.2**	**5.1**	**8.8**	16.0	27.1	43.3
Men 1951–1999	1	466	0.3	2.1	3.9	**9.7**	**8.3**	**11.3**	21.6	33.3	48.2
Men 1951–1999	2	927	0.3	5.8	10.5	**19.2**	**18.0**	**20.7**	31.8	40.6	49.0
Men 1951–1999	3	196	2.7	8.3	13.6	**21.4**	**18.7**	**24.4**	33.4	41.8	49.0
Men 1951–1999	4	20	8.7	10.9	13.1	**19.3**	**13.3**	**22.7**	22.7	36.1	42.7
Men 1951–1999	5	6	10.3	12.2	14.7	**17.1**	**10.3**	**42.7**	21.7	32.9	42.7
Men 1710–1821	0	55	0.5	1.1	3.0	**8.3**	**5.3**	**15.8**	20.0	28.3	62.8
Men 1710–1821	1	252	0.0	0.3	0.7	**1.2**	**1.0**	**1.4**	2.4	11.7	55.7
Men 1710–1821	2	197	0.2	2.1	2.8	**4.1**	**3.8**	**4.5**	6.7	15.1	48.9
Men 1710–1821	3	155	1.2	3.8	4.9	**6.4**	**5.9**	**7.1**	10.5	23.0	57.7
Men 1710–1821	4	156	4.1	6.5	8.0	**9.7**	**9.2**	**10.7**	13.5	26.6	50.8
Men 1710–1821	5	120	5.1	8.6	10.0	**12.6**	**11.7**	**13.5**	16.3	26.3	56.7
Men 1710–1821	6	123	7.1	10.4	12.5	**14.7**	**13.9**	**15.9**	23.0	32.9	54.7
Men 1710–1821	7	113	6.4	12.5	13.8	**17.3**	**15.8**	**19.7**	27.2	37.6	49.6
Men 1710–1821	8	109	11.0	15.5	17.5	**20.4**	**18.5**	**22.6**	31.3	41.8	59.2
Men 1710–1821	9	92	10.6	17.2	18.7	**21.5**	**20.3**	**23.1**	31.6	40.9	54.3
Men 1710–1821	10	61	16.3	18.0	21.0	**29.7**	**23.2**	**34.7**	37.2	46.6	54.3
Men 1710–1821	11	46	18.6	20.8	22.9	**26.1**	**23.2**	**33.5**	36.3	45.3	49.0
Men 1710–1821	12	25	18.4	21.4	23.6	**27.4**	**24.0**	**36.2**	39.6	50.8	60.1
Men 1710–1821	13	17	17.0	21.9	24.0	**25.5**	**24.0**	**40.8**	40.8	48.4	54.4
Men 1710–1821	14	4	20.5	22.2	24.8	**41.0**	**-Inf**	**Inf**	56.3	57.5	58.3
Men 1710–1821	15	5	28.0	29.2	31.1	**38.0**	**-Inf**	**Inf**	39.1	41.1	42.5
Women 1951–1999	0	549	0.0	0.9	2.6	**5.8**	**5.0**	**7.0**	15.2	27.1	49.4
Women 1951–1999	1	723	0.0	2.0	3.6	**7.7**	**7.0**	**8.8**	19.5	31.7	48.8
Women 1951–1999	2	1,413	0.0	5.1	9.7	**17.9**	**17.0**	**18.9**	31.0	40.8	50.8
Women 1951–1999	3	288	0.7	7.3	12.6	**20.1**	**18.3**	**22.7**	31.4	40.9	49.7
Women 1951–1999	4	55	4.3	8.9	12.8	**18.9**	**15.2**	**26.5**	32.4	39.0	49.8
Women 1951–1999	5	4	7.4	9.5	12.7	**15.6**	**-Inf**	**Inf**	17.4	18.4	19.2
Women 1951–1999	6	9	14.0	19.0	20.4	**25.7**	**20.3**	**31.1**	30.3	32.0	35.5
Women 1951–1999	7	1	17.3	17.3	17.3	**17.3**	**-Inf**	**Inf**	17.3	17.3	17.3
Women 1712–1822	0	55	0.5	1.1	3.0	**8.3**	**5.3**	**15.8**	20.0	28.3	62.8
Women 1712–1822	1	252	0.0	0.3	0.7	**1.2**	**1.0**	**1.4**	2.4	11.7	55.7
Women 1712–1822	2	197	0.2	2.1	2.8	**4.1**	**3.8**	**4.5**	6.7	15.1	48.9
Women 1712–1822	3	155	1.2	3.8	4.9	**6.4**	**5.9**	**7.1**	10.5	23.0	57.7
Women 1712–1822	4	156	4.1	6.5	8.0	**9.7**	**9.2**	**10.7**	13.5	26.6	50.8
Women 1712–1822	5	120	5.1	8.6	10.0	**12.6**	**11.7**	**13.5**	16.3	26.3	56.7
Women 1712–1822	6	123	7.1	10.4	12.5	**14.7**	**13.9**	**15.9**	23.0	32.9	54.7

Table A7 **The length of marriage by number of children in marriage in historical (Škvorec) and modern (GGS) population**

Table A7											cont.
Population	Children in one marriage	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Women 1712–1822	7	113	6.4	12.5	13.8	**17.3**	**15.8**	**19.7**	27.2	37.6	49.6
Women 1712–1822	8	109	11.0	15.5	17.5	**20.4**	**18.5**	**22.6**	31.3	41.8	59.2
Women 1712–1822	9	92	10.6	17.2	18.7	**21.5**	**20.3**	**23.1**	31.6	40.9	54.3
Women 1712–1822	10	61	16.3	18.0	21.0	**29.7**	**23.2**	**34.7**	37.2	46.6	54.3
Women 1712–1822	11	46	18.6	20.8	22.9	**26.1**	**23.2**	**33.5**	36.3	45.3	49.0
Women 1712–1822	12	25	18.4	21.4	23.6	**27.4**	**24.0**	**36.2**	39.6	50.8	60.1
Women 1712–1822	13	17	17.0	21.9	24.0	**25.5**	**24.0**	**40.8**	40.8	48.4	54.4
Women 1712–1822	14	4	20.5	22.2	24.8	**41.0**	**-Inf**	**Inf**	56.3	57.5	58.3
Women 1712–1822	15	5	28.0	29.2	31.1	**38.0**	**-Inf**	**Inf**	39.1	41.1	42.5

Source: Parish registers of Škvorec estate; Czech GGS II data.

Table A8 Reproductive window by number of children in historical (Škvorec) and modern (GGS) population											
Population	Children in one marriage	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Men 1951–1999	2	928	0.1	1.8	2.3	**3.1**	**3.0**	**3.2**	4.5	6.4	25.6
Men 1951–1999	3	195	0.8	3.7	4.7	**6.8**	**5.9**	**7.4**	10.1	12.8	35.6
Men 1951–1999	4	20	4.7	6.4	8.2	**10.7**	**8.3**	**12.5**	12.8	15.7	19.8
Men 1951–1999	5	6	11.8	11.9	12.3	**13.5**	**11.8**	**15.8**	13.6	14.8	15.8
Men 1710–1821	2	165	0.8	1.5	1.9	**2.4**	**2.3**	**2.6**	3.3	4.5	17.7
Men 1710–1821	3	139	1.0	3.1	4.1	**5.0**	**4.6**	**5.3**	6.2	8.7	25.7
Men 1710–1821	4	139	3.8	5.2	6.3	**7.5**	**7.1**	**7.9**	9.0	11.3	20.3
Men 1710–1821	5	112	4.7	7.4	8.6	**10.0**	**9.1**	**10.5**	11.8	13.4	25.0
Men 1710–1821	6	115	7.3	9.0	10.8	**12.2**	**11.6**	**12.8**	14.2	17.7	26.7
Men 1710–1821	7	108	6.0	11.4	12.5	**14.4**	**13.6**	**15.3**	16.6	19.4	27.2
Men 1710–1821	8	107	10.4	13.6	15.2	**16.7**	**16.1**	**17.3**	18.4	20.1	26.8
Men 1710–1821	9	93	9.7	15.0	17.0	**18.4**	**17.8**	**19.2**	20.2	22.1	25.7
Men 1710–1821	10	59	14.7	16.9	18.2	**20.2**	**19.4**	**21.4**	22.3	23.1	28.1
Men 1710–1821	11	45	17.7	18.5	19.2	**21.3**	**20.4**	**22.4**	23.0	24.1	26.4
Men 1710–1821	12	25	16.2	18.1	20.4	**22.1**	**20.6**	**23.9**	24.0	25.6	28.5
Men 1710–1821	13	16	16.1	19.9	21.6	**23.0**	**21.5**	**23.9**	23.9	25.0	28.4
Men 1710–1821	14	3	19.6	20.7	22.4	**25.2**	**-Inf**	**Inf**	25.3	25.4	25.4
Men 1710–1821	15	5	23.3	23.6	24.1	**24.7**	**-Inf**	**Inf**	24.8	26.3	27.3
Women 1951–1999	2	1,430	0.1	1.7	2.2	**3.1**	**3.0**	**3.2**	4.8	6.9	34.1
Women 1951–1999	3	293	1.7	3.9	5.1	**7.2**	**6.7**	**7.8**	9.9	13.8	34.7
Women 1951–1999	4	54	2.0	4.1	6.5	**9.0**	**7.2**	**10.8**	11.8	14.2	19.1

Table A8											cont.
Population	Children in one marriage	Number of observations	Minimum	1st decile	1st quartile	Median	Median (lower confidence interval)	Median (upper confidence interval)	3rd quartile	9th decile	Maximum
Women 1951–1999	5	4	7.7	8.4	9.3	**18.0**	**-Inf**	**Inf**	28.6	33.1	36.1
Women 1951–1999	6	8	2.2	10.4	14.4	**15.5**	**2.2**	**40.5**	18.7	27.5	40.5
Women 1951–1999	7	1	15.7	15.7	15.7	**15.7**	**-Inf**	**Inf**	15.7	15.7	15.7
Women 1712–1822	2	174	0.8	1.4	1.8	**2.4**	**2.3**	**2.5**	3.2	4.3	17.7
Women 1712–1822	3	137	1.0	3.1	4.1	**5.0**	**4.6**	**5.3**	6.4	8.7	25.7
Women 1712–1822	4	140	3.7	5.2	6.3	**7.6**	**7.1**	**8.0**	9.0	11.3	19.7
Women 1712–1822	5	115	4.7	7.4	8.6	**10.2**	**9.3**	**10.5**	11.8	13.8	25.0
Women 1712–1822	6	111	7.4	9.1	10.8	**12.2**	**11.6**	**13.0**	14.3	17.4	26.7
Women 1712–1822	7	106	6.0	11.3	12.5	**14.6**	**13.7**	**15.3**	16.8	19.5	27.2
Women 1712–1822	8	104	10.4	13.7	15.2	**16.5**	**16.1**	**17.2**	18.5	20.1	26.8
Women 1712–1822	9	89	9.7	15.0	17.0	**18.5**	**17.7**	**19.3**	20.2	22.2	25.7
Women 1712–1822	10	58	14.7	17.0	18.1	**20.2**	**19.1**	**21.3**	22.3	23.2	28.1
Women 1712–1822	11	45	17.7	18.5	19.6	**21.7**	**21.0**	**22.4**	23.2	24.1	26.4
Women 1712–1822	12	24	16.2	18.0	20.3	**22.0**	**20.4**	**24.0**	24.2	25.6	28.5
Women 1712–1822	13	17	16.1	19.9	21.7	**23.2**	**21.7**	**23.8**	23.8	24.9	28.4
Women 1712–1822	14	3	19.6	20.7	22.4	**25.2**	**-Inf**	**Inf**	25.3	25.4	25.4
Women 1712–1822	15	5	23.3	23.6	24.1	**24.7**	**-Inf**	**Inf**	24.8	26.3	27.3

Source: Parish registers of Škvorec estate; Czech GGS II data.

Appendix B

To illustrate the calculation of age-specific marital fertility, a Lexis diagram (Scheme 1) is provided, in which 14 marriages of twelve randomly selected respondents are shown. On the diagram, it can be observed that women whose time spent in marriage graphically begins before the date of marriage (S) or ends before the date of marriage termination (X). The reason for this seeming ambiguity is the rounding of a woman's exact age to the completed age (i.e., downward, e.g., from 26.67 to 26 years). The number of children born at a given age (B_x) and the number of married at that age ($P_x^{married}$) are essential for calculating the marital fertility rate at a selected age (f_x). For example, at the completed age of 29, we can observe 4 children born and 8 married women, so the fertility rate would be 0.5 children per married woman.

In contrast, at the completed age of 35, the rate would be only 0.2 children (1 child to 5 women).
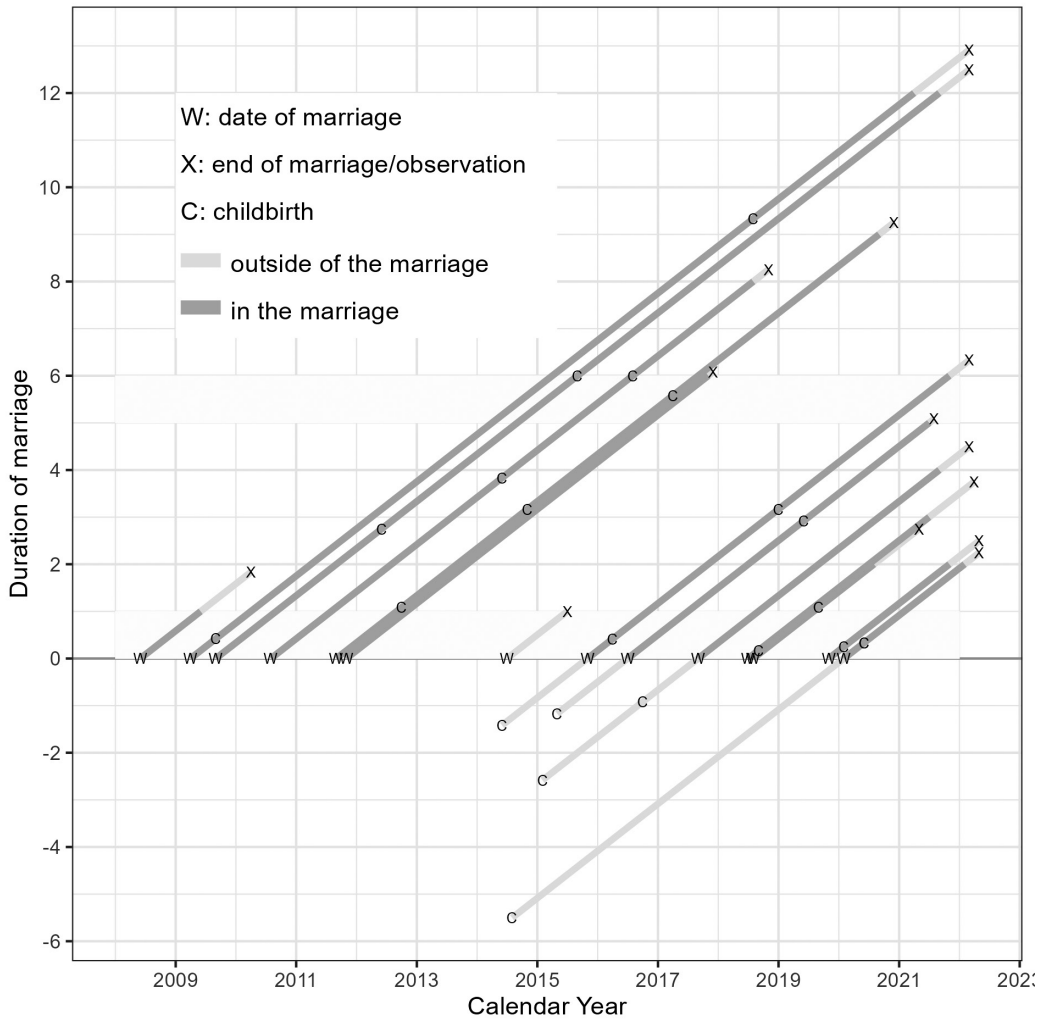
$$f_x = B_x / P_x^{married}$$

The Lexis diagram below (Scheme 2) represents the same observations shown in Scheme 1 related to the length of the marriage. It is already apparent from the diagram itself that children born before marriage are not included in the calculation. The method of calculation is the same as for the calculation of the age-specific rate ($f_t = B_t / P_t^{married}$). In the first year of marriage (completed duration zero), the marital fertility rate is 0.38 (5 children for 13 marriages). In the five completed years of marriage, the marital fertility rate is 0.5 (3/6).

Scheme 1 **An analysis of marital fertility by age**

W: date of marriage

X: end of marriage/observation

C: childbirth

outside of the marriage

in the marriage
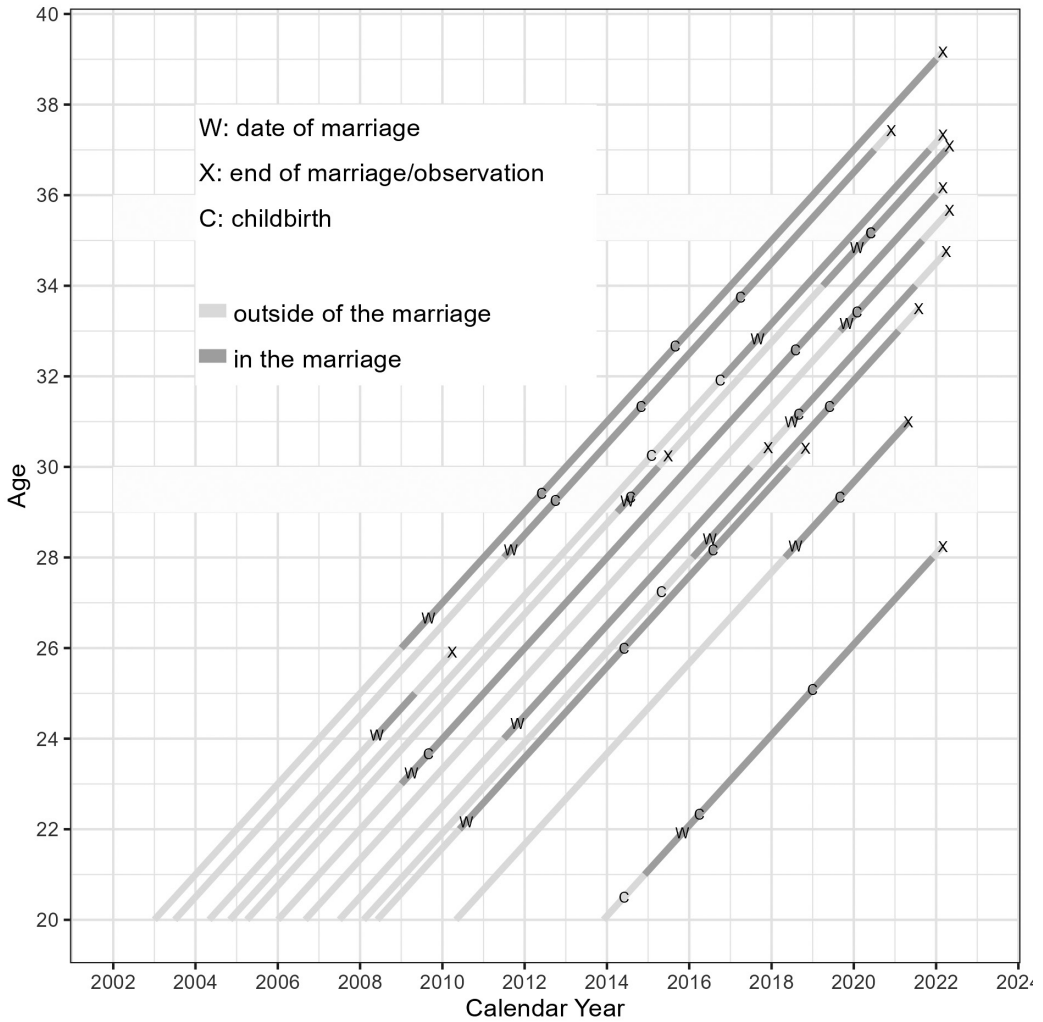
Source: Parish registers of Škvorec estate; Czech GGS II data.

Scheme 2 **Analysis of marital fertility by duration of marriage**