# Crossing the Hajnal line in Western Estonia: Understanding the Effect of Denomination on Demographic Behavior Through a Historical Natural Experiment

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## Abstract

Social institutions play an important role in demographic behavior. However, their effects in historical populations have not been well studied. This paper uses data on the population of the Estonian island of Muhu to see the effects of denomination on demographic outcomes. A policy change prompting the rapid and exogenous conversion of Muhu inhabitants into Orthodoxy provides a chance for a causal analysis of a natural experiment. The preliminary results show significant differences for types of behavior that are directly controlled by the church (e.g. fertility) and a much higher role of the family for other outcomes (e.g. mortality).

## Introduction

Historical research of the effects of social ties on demographic behavior has been relatively limited and mostly focused on immediate family. One of the pioneering projects that looked at community level effects on demographic processes is Eurasia project (Bengtsson et al. 2004, Tsuya et al. 2010, Lundh and Kurosu 2014) that analyzed social networks in a broader perspective by comparing Western and Eastern societies. The project revealed that the differences resulted from more than just the family size and the household composition. Different regions of the world had different community and state level policies to alleviate economic hardships people faced. However, the East and the West are too vague terms to be clearly defined. The border between the two was first drawn by Hajnal (1965) who showed differences in the marital behavior between the Western and Eastern Europe, but little is known about the factors that determined the location of this border. One hypothesis is that religion might play a certain role in the demographic attitudes and behaviors.

An island of Muhu (the third island in Estonia size wise), located right at the borderline of the Western European marriage pattern is an island where a natural experiment happened in the mid-19th century when the majority of the population converted from the Lutheran to the Orthodox Church after the promise of the Russian government to provide land to the converts after the abolishment of serfdom in 1819[1]. In addition, crop failures in 1838 – 1840s lead to an aggressive policy of the church to offer economic help in return for the conversion. In addition to a Lutheran parish, two Orthodox parishes were established by 1850, and most of the conversions happened shortly after.

The research hypotheses of the paper are the following:

1. Conversion to Orthodoxy lead to a short-term improvement in nutrition and consequently mortality.
2. The Church also had a longer lasting effect on the marriage and fertility patterns through direct interventions and control over nuptiality and reproductive behavior.

## Data and Methods

Data come from the digitalized images of archival documents stored in the Estonian Archive[2]. The choice of a particular island was made based on several considerations. The parish records are almost fully preserved. Migration had been negligible before the mid-19th century, when economic hardship resulted in a substantial out-migration to Latvia in search for a better job. While there definitely were selection mechanisms at play, married individuals rarely migrated from the island, and the majority of migrants were young unmarried men, so selection effects are less strong for the female population of the island.

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[1] http://www.koguva-home.ee/history-of-muhu-island/

[2] I would like to thank Ülo Rehepapp for providing digitalized data from the parish books.

In this paper, I focus on parish records from the three parishes that existed in Muhu, a Lutheran one with records dating back to 1762 and two orthodox ones established in 1850.

The resulting dataset includes the information for over 25000 individuals and over 5500 marriages. Sensitivity tests were performed to check the effects of the missing data on mortality and marriage patterns.

Belonging to a specific denomination is not the only social institution at place, family is no less important. It is necessary therefore to control for family characteristics in the analysis. At this stage of data preparation, precise identification of all the members of a given household has not been accomplished (although data do allow it). I therefore call "a family" spouses and their kids till their death, out-migration or the formation of a new family.

Several techniques of causal event history analysis will be implemented, which include differences-in-difference estimation, regression discontinuity and within-family fixed effect estimation of the role of denominations.

## Preliminary results

Table 1 summarizes the descriptive information about the sample. One of the tests of data quality is sex ratio at birth. In the sample, the population of Hellama demonstrates an "ideal" sex ratio, while the numbers for Rinsi and Muhu are slightly lower. This, however, might be due to small sample sizes and should not be treated as a direct evidence of the preference of girls over boys. A larger size of the Muhu parish is mainly due to a longer period of observation. Interestingly, the number of male deaths in orthodox parishes is 30% larger than the number of female deaths, while this phenomenon is not observed in the Lutheran parish. This might be a structural difference cased by differential age patterns of mortality across genders and the fact that Lutherans were generally born Lutherans, while members of the Orthodox church were mainly converts.

**Table 1. Numbers of events in the database**

| | Orthodox | | Lutheran |
|---|---|---|---|
| | Hellama | Rinsi | Muhu |
| Births: | | | |
| *Boys* | 1636 | 1581 | 6418 |
| *Girls* | 1527 | 1537 | 6181 |
| *Total* | 3163 | 3118 | 12599 |
| Sex Ratio | 1,071 | 1,029 | 1,038 |
| Marriages | 1658 | 1580 | 5294 |
| Deaths | | | |
| *Men* | 754 | 656 | 4357 |
| *Women* | 575 | 551 | 4307 |

Figure 1 contains the information on the number of kids born within a marriage by the year of marriage.

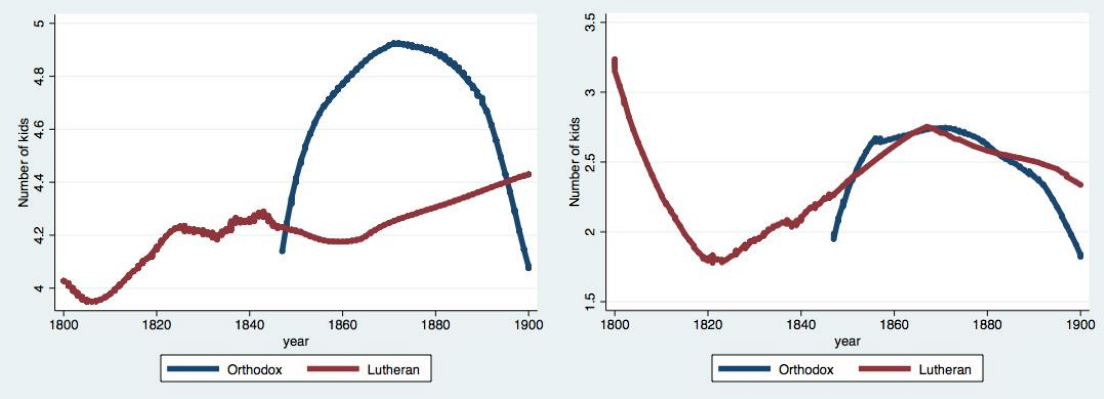


**Figure 1. Average number of children by year of marriage for Orthodox and Lutheran population**

Note: First marriages (left panel), Subsequent marriages (right panel).

Orthodox population demonstrates a significantly higher number of children per marriage for the first marriages, but not for remarriages. This might represent a difference in the fertility attitudes of members of different denominations based on the order of their marriage, but might also be due to selection into second marriage and age differences of the people who marry for the first time and all the subsequent times.

Interestingly, the number of children among members of the Orthodox church increased in the 1850s and 1860s, but started to decrease afterwards. This might be an evidence of the economic hardships people suffered that also lead them to convert, as well as the church policy to provide support for the needy and the decline in the amount of this support in the 1870s. Right censoring is also at play as data quality drops in the 20th century. The question is, however, whether any of these differences represented any actual religious attitudes of the people.

Table 2 contains the results of the Cox proportional hazard model of fertility by selected characteristics. The Lutheran parish demonstrates a significantly lower fertility (7 – 17% lower than Hellama depending on the specification), which confirms the initial hypothesis of differential reproductive behavior by denomination. However, the number of children alive also affects fertility in a non-trivial way. This should not be treated as the presence of deliberate fertility control (Henry 1965). Rather, it might be indicative of differential time spent breastfeeding by infant mortality, which is directly related to fecundability, as well as selection mechanisms that pushed people to covert.

**Table 2. Odds ratios of giving one more birth by parish and number of alive children (1800 – 1900).**

| | | | |
|---|---|---|---|
| Parish (ref. - Hellama Orthodox): | | | |
| *Rinsi Orthodox* | 1.007 | 1.008 | 0.944 |
| | (0.28) | (0.30) | (-1.48) |
| *Muhu Lutheran* | 0.932** | 0.929*** | 0.832*** |
| | (-3.26) | (-3.40) | (-5.51) |
| Children alive | | 0.987* | 0.951*** |
| | | (-2.15) | (-4.44) |
| Parish x children alive (ref. = Hellama Orthodox): | | | |
| *Rinsi Orthodox* | | | 1.033* |
| | | | (2.21) |
| *Muhu Lutheran* | | | 1.057*** |
| | | | (4.29) |

Note: * p<0.05, ** p<0.01, *** p<0.001 Exponentiated coefficients; t statistics in parentheses.

## Discussion and conclusion

The results indicate that being a member of a certain denomination clearly mattered not only in the religious, but also in the social and economic sense. Being a member of the Orthodox Church lead to higher fertility and arguably imposed more limitations on the marriage itself. However, the denominational differences in the demographic behavior and outcomes were only observed when the church imposed direct limitations on the allowed types of behavior through regulating minimal age at marriage, rules concerning remarriage and the difficulty of entering the marriage itself.

## References


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