# БАЗЫ ДАННЫХ И ИНФОРМАЦИОННО-ПОИСКОВЫЕ СИСТЕМЫ

DATABASES AND INFORMATION RETRIEVAL SYSTEMS

# СОЗДАНИЕ БАНКА ДАННЫХ ПО ИСТОРИЧЕСКОЙ СОЦИАЛЬНОЙ МОБИЛЬНОСТИ В ВЕНГРИИ: ИСТОРИЧЕСКАЯ СОЦИАЛЬНАЯ СТРУКТУРА И МОБИЛЬНОСТЬ ЗА ЛЕЙТОЙ

# CREATING THE HUNGARIAN HISTORICAL SOCIAL MOBILITY FILE: HISTORICAL SOCIAL STRUCTURE AND MOBILITY BEYOND THE LEITHA

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Массив данных по исторической социальной мобильности в Венгрии является первым большим массивом репрезентативных данных по социальной мобильности и стратификации в центральной части Восточной Европы. Созданный для изучения долговременных изменений социальной мобильности и гомогамии на территории современной Венгрии, названный массив включает свыше 80000 записей о браке в период с 1850 по 1950 г. Мы знакомим с процессом формирования выборки и сбо-

The Hungarian Historical Social Mobility File is the first large-scale representative historical mobility and stratification dataset in Central-Eastern Europe. Designed to study long-time changes in social mobility and homogamy on the territory of present-day Hungary, the Hungarian Historical Social Mobility File includes more than 80,000 marriage records in the period between 1850 and 1950. We guide through the sampling and data collection process, and present solutions to common problems in historical mobility data, ра данных и даем решение типичных проблем, связанных с данными по исторической мобильности, таким как отсутствие данных о профессии отца, изменение возрастной структуры и качество информации о профессиях. Цель статьи — задать направление будущим проектам по историческим микроданным посредством высвечивания различных трудностей и решений по сбору и обработке исторических микроданных.

*Ключевые слова:* Венгрия, XIX век, мобильность, гомогамия, исторические микроданные, сбор данных, формирование выборки, профессии.

such as missing data on father's occupations, changing age structure, and the quality of information on occupations. The paper aims to provide guidance for future historical micro-data projects through presenting the various challenges and solutions to collecting and processing historical micro-data.

*Keywords:* Hungary; 19th century; mobility; homogamy; historical micro-data; data collection; sampling; occupations

## 1. INTRODUCTION

Social mobility researchers have growing interest in studying long-term, historical trends in stratification and mobility. Present-day computing possibilities enable the collection and organization of data from historical sources faster and more efficiently than in the past. This creates new opportunities to study mobility trends of historical populations. While there is an established literature on historical mobility research on Western Europe and the United States, countries in Eastern and Central Europe, and Asia has received considerably less attention. As a recent review of the historical mobility and stratification literature has noted, the main reason for lack of research in countries ´beyond the Leitha´, and for the strong focus on a handful of Western European countries and the US, is the availability of large-scale mobility micro-data (van Leeuwen and Maas 2010).

To fill part of this gap, we have built a social mobility database on Hungary from historical sources that go back to the 19th Century within the *Towards Open Societies* project1 of the Utrecht University. This short article gives a detailed description of the data collection and sampling process, and briefly addresses the quality of the collected data. Our purpose is to share our experience with mobility and stratification researchers on the challenges of collecting historical micro-data, which will hopefully be a useful guidance for those who are willing to endeavor data collection from historical sources to study mobility and stratification in the future. The outline of this article is as follows. We first present the goals of the data collection and we introduce marriage records as a source to study intergenerational mobility. We follow by describing the investigation period, after which the sampling and data collection method will be explained. We describe the main characteristics of the data. In the final section of the report we address potential pitfalls of using marriage records to study intergenerational mobility, and show how we addressed these problems. We conclude with some of the strengths and future prospects of the Hungarian Historical Mobility file.

## 2. GOALS OF DATA COLLECTION AND SOURCES

Gathering high-quality micro-data on past societies is challenging. To study the remote past, we cannot rely on social surveys; data have to be collected from historical sources that are sometimes accidental, often incomplete, and were almost never created minding 'future' sociological research. Despite the difficulties, careful collection, processing, and interpretation of historical data can assure reliable information about people in the past. Unfortunately, for the study of historical mobility patterns in Hungary, social mobility surveys are of little use. The first surveys in Hungary were carried out in the 1960s and 1970s (see a review in Kolosi 1988) and even by analyzing the oldest surviving cohorts, it is impossible to go further back than 1900. This created the need to gather new data to study social mobility during the 19th century in Hungary.

Our two main goals in designing the data collection were first, to find sources that included occupational information for father's and son's[2] for as long a period as possible for the time before such things as mobility surveys, and second, we wanted to represent as accurately as we could the various social contexts in which past populations lived in "our" period in Hungary. Various sources of historical data contain preserved information on the social position of individuals, such as birth and baptism registers, enumeration of tax-payers, or conscription listings of army-aged men, but marriage registers are particularly useful for studying intergenerational mobility. Marriage is a social arrangement that exists almost everywhere in the world, and in most cultures has some form of legal, sacred, and communal significance, which is why institutions, such as the church or state, tend to record the event. In Hungary, naturally enough churches and congregations maintained registers of marriages of their members in church books. The resulting documents are still available, usually well preserved in congregational archives in every municipality,, and they contain information about the occupations of both bride and groom, along with other basic facts like the date and place of birth, place of residence, existing marital status, — which information is often given for parents too, and in most cases, even for witnesses. This is where the main advantage of marriage registers lies: a single marriage record tells us the occupation of two generations, which sufficient to study intergenerational social mobility. This spares the researcher the time-consuming labor of collating records from different sources. For instance there is no need to match birth and death registers, nor census records taken at different times.

Compulsory civil registration of marriages was introduced in 1895 in Hungary. Civil marriage records, however, do not contain the occupation of parents after 1 January 1907[3], so they are thus not suitable for studying intergenerational mobility after this date. We therefore used only church marriage records. The registration of marriages, which the churches kept doing after the 1895 introduction of civil registration, was performed by the local official of the church in the presence of the bridegroom, bride, and the witnesses.

## 3. THE PERIOD OF INVESTIGATION

Occupational information is not available in marriage registers throughout all periods, and we had to take this into account when we selected the observation period. Preliminary investigation of Hungarian marriage registers indicated that two factors influenced the availability of information on occupations. One was the format of the actual book in the church where particular marriages were registered, the other was the language used for registration. 18th century marriage registers were not usually in a tabular form, and very often had no titles above columns of information, so that it was left to the church official who was performing the registration to decide what information were worth putting down in the book. That led to inevitably great variation in the accuracy of registration and the extent of information about key variables for intergenerational mobility research. Consequently, occupational information is particularly scarce before the 19th century, when church books were centrally printed and distributed to the churches and congregations of Hungary. These books adopted a uniform tabular form with pre-printed column headers which included as standard ‘occupation’ as required information. That naturally made it easier for whoever was filling in the register to record complete information with no omissions. Occupational information is much more often present in the uniform books of the 19th century than in the less-standardized church books of the 18th century.

The language of registration also affected the availability of information on occupations. In the case of the Catholic Church, the largest denomination in Hungary, we find alternating periods of registrations in Latin and Hungarian. Language of registration remained as Latin until the 1830s, when it switched to Hungarian, only to switch back to Latin again in 1849 after the defeat of the Revolution and War of Independence. All the same, by the 1860s Hungarian had been reintroduced again in most Catholic parishes. Meanwhile, the linguistic changes in the Lutheran Church’s record books mirrored those of the Catholics, although the records of the second-largest Hungarian Reformed church remained in Hungarian throughout the whole period. Jewish marriage registers were in Hungarian in most places and throughout most periods, although in a few cases they were in German. In the records in Latin, church officials rarely recorded occupations, usually noting only whether the groom, the bride and their parents were of noble birth or commoners[4]. The same is actually true for Hungarian-language records, where before 1848 registration of social status occurred more often than registration of occupations.

With an eye to the expected amount of occupational information in each historical period, we chose 1850 as the starting year for our data collection: the year of the end point was decided by Hungarian Law, for the Hungarian Archive Act forbids academic research of marriage records until 60 years have passed following a marriage, and as we filed for permission in 2010, the last year for which data collection was possible for us was therefore 1950.

## 4. SAMPLING AND DATA COLLECTION

*Coverage and sampling*

A further goal of our data collection was to represent accurately the various social contexts in which past populations in Hungary lived in that period. We therefore aimed for a stratified representative sample of the married Hungarian population between 1850 and 1950, in the period of investigation. It is however unfortunate that we were unable to collect data for the entire territory of historical Hungary. Representing the whole historical territory of Hungary would have required data collection in modern-day Austria, Slovakia, Ukraine, Romania, and countries of the former Yugoslav Republic, which clearly would have exceeded the possibilities of this project. The dataset therefore contains information about marriages solemnized within the borders of present-day Hungary which was established in 1920.

The list of names of municipalities in the 1930 Hungarian Census (Census 19301935) was used as a sampling frame. That census was taken within the borders of the Hungarian Kingdom and includes all municipalities that existed in the year 1930 and the published tables from the 1930 census are the most reliable among pre-WWII census publications with respect to municipal names and statistical accuracy[5].

A simple random sample of marriages would have led to little variation in occupations. The great majority of Hungarians then worked in agriculture (Andorka 1982; Kövér and Gyáni 1998) and there were major differences between municipalities in labor structure and modernization (Beluszky and Győri 2005; Beluszky 2001). So to ensure variation in social-economic contexts and occupation, we stratified Hungarian municipalities according to economic and social development. The strata represent the diversity of occupational class structures in Hungary, and hence we expect them to reflect possible differences in occupational class mobility as well. We distinguished seven municipal strata: rural villages, developing rural villages, urban-type villages, agrarian towns, industrializing towns, developed urban towns, and regional centers with municipal rights. Appendix A gives a description of our method of stratifying municipalities and describes the municipal strata in detail.

Present-day territory of Hungary is divided into seven large regions: Western Transdanubia, Southern Transdanubia, Central Transdanubia, Central Hungary, Northern Great Plain, Southern Great Plain, and Northern Hungary. We used a two-stage, stratified cluster sampling design to sample municipalities from those regions[6]. In each of the seven regions we first randomly selected a maximum of two towns from each of the seven municipal strata[7]. For three of the the larger regions, also randomly selected, we sampled one regional center with municipal rights, and included two districts from the capital city of Budapest. Budapest had a highly populous metropolitan agglomeration, and representing the different parts of Budapest and that of the agglomeration separately was not feasible given the resources available for the data collection. We chose to represent Budapest together with its agglomeration by sampling from those parts which were merged with the city in 1950. These districts were close to the inner city but also of large area and with a heterogeneous labor population, so they represent the population of Budapest and its agglomeration very well. In the original sampling plan we included Újpest, from 1950 a district of Budapest, as digitized marriage records were already available from parishes there. However, for a long period Roman Catholic marriage registers in Újpest neglected to include occupational information, so we randomly selected another town, Rákospalota, which likewise became a district of Budapest in 1950.

After taking samples from towns and cities we proceeded to take them from villages too. Hungary's territory is divided into 174 statistical micro-regions, each micro-region having a larger town or city as its centrum (HCSO 2007). The micro-regions were used during sampling, and for each town, we selected one or two villages from the same micro-region of that town. We used the same procedure as we had used for selecting cities: per micro-region choosing one to three villages from each municipal stratum. The selection of the number of villages per stratum was based on the distribution of populations in different municipal types. In order to represent villages that are not in the vicinity of a larger town we selected three additional villages[8] from micro-regions that had a smaller town as regional center.

Low-populated villages had very small number of marriages. To optimize data collection, we excluded municipalities with less than 1000 inhabitants from the sampling frame (altogether approximately 11 percent of the population in 1930). Inspection of municipal indicators (see Appendix A) indicated only minor differences in modernization and labor structure between such villages and those that had a slightly larger population (between 1000 and 3000), so we reasoned that their exclusion would not bias the sample.

We also wanted to ensure that the amount of digitized marriages did not differ greatly between sampled municipalities and was evenly distributed across time. Per village we targeted a sample size between 400 to 1000 marriages, and this was 800 to 3000 marriages in case of towns. As in some larger towns and periods there were too many marriages, further random sampling of marriages was necessary, so to do that, we calculated a sampling interval beforehand for each year, each denomination, and each municipality, taking into account the distribution of marriages across parishes if there were multiple parishes of the same denomination. The persons performing the digitalization was subsequently instructed to use those sampling intervals and digitize every second, third, etc. marriage record in the marriage register. Although the sample must be weighted to represent the country, our method allowed us to balance the number of observations in the sample across municipalities and periods.

*Pre-selection of sampled municipalities*

The recording of occupations was very common across Hungary, even if the frequency and quality of registration shows some variation, and the Roman Catholic Archdiocese of Eger in Northern Hungary was the only Catholic Archdiocese where it was not the custom to register occupations at all. The territory of the Archdiocese of Eger does not quite cover the mostly Catholic region of Northern Hungary, so we were still able to sample municipalities from the region, although there is no information for marriages from the North-Eastern part.

If it happened that church officials in other regions too did not document occupations, we had to pre-select towns to make sure that we did not end up trying to analyze towns with hardly any occupational information in their marriage registers. We did that by first counting the number of marriage records for every five years and then looked at the number of marriages with no information on the occupation of the father's or bridegroom's occupation. Based on those counts, we decided to either proceed with data collection for the town or select another town. The decision rule was this: if valid observations, i.e. observations including both father´s and bridegroom´s occupation, for the most popular denomination were absent over a period of 30 years or the number of valid observations made up less than 30 percent of all marriages within that denomination, we dropped the town from the sample and sampled another town from the same region and municipal stratum. If we sampled a town, we repeated the same procedure for each of the sampled villages in the micro-region, dropping those whose where marriage records had sparse information on occupations, and randomly selecting a replacement village from the same micro-region and municipal stratum. We did not see any systematic regional or municipal stratum-specific pattern in the availability of information on occupation, so recording occupation must have been a matter of local customs, and as such, it is unlikely to be related to the social structure or to mobility at the municipality.

*Data collection*

For each municipality selected, we proceeded by digitizing the marriage acts in the marriage registers. The four largest religious denominations of Hungary, the Roman Catholic Church (64–65 percent of the population[9]), the Hungarian Reformed Church (21 percent), the Lutheran Church (6 percent), and the Hungarian Israelite Church (5–6 percent) all kindly provided access to their marriage registers. The registers of two smaller denominations, the Greek Catholic (2 percent) and Greek Orthodox (0.5 percent), were available also, but those churches did not collect information about occupations. Marriages of the population living on the periphery of municipalities (puszta, határ, or szél in Hungarian) were registered in the church book of one of the municipal parishes and we digitized also these ones. Where two or more larger municipalities merged or separated during the investigation period (most important mergers are listed in Appendix B), we digitized the parish records, and we included marriages in municipal parishes that were actually founded within the sampled municipalities during the period under investigation. Only those marriages were digitized which told us both bridegroom´s and father´s occupation, although the number of marriages with missing occupations as well as which occupation was missing (father´s occupation, bridegroom´s occupation, or both) was registered during coding and that data can be obtained from the principal investigator on request. The pattern of missing information showed no systematic variation across municipal strata.

For digitizing marriage records up to 1895, we used the microfilm collection of parish registers of the Hungarian National Archives, while for later periods, records were obtained from copies of parish registers held in large congregational archives or we looked in original parish books in individual parishes. The data collection took place, after we had obtaining permission from the religious authorities, between December 2010 and November 2011, and a full list of collaborating archives, parishes, names of research assistants, and experts we consulted about designing the data collection can be found on the webpage of the Hungarian Historical Mobility File (Lippényi et al. 2011).

## 5. SHORT DESCRIPTION OF THE DATASET: VARIABLES, NUMBER OF CASES, WEIGHTING

The dataset includes the following variables: date of marriage, municipality of marriage, denomination of parish, name of parish, age of the bridegroom and the bride, marital status of the bridegroom and the bride, birthplace and municipal residence of bridegroom and bride, occupation of the bridegroom, bride, father and mother of the bridegroom, father and mother of the bride, and the occupation of the witnesses. Residence of parents and witnesses was also digitized, although was not often recorded. The names of the people involved in the marriage were not digitized, but a unique identifier is was created for each marriage record (using the registered number of the marriage record on its page in the marriage register page, the date of the marriage, and the name of the parish name. It is therefore entirely) which makes possible to complement these data with names.

During digitizing, research assistants were provided with an extensive list of occupational titles in Latin and their translation to Hungarian. Based on this they could identify those marriage records that had occupational information for digitizing. The amount of German-language Jewish marriages was small; these marriages were also digitized and translated to Hungarian.

In total, 88,970 marriage records were collected from 62 present-day municipalities and 207 parish books. Figure 1 shows the number of marriages per year in the sample. The number increases, reflect-

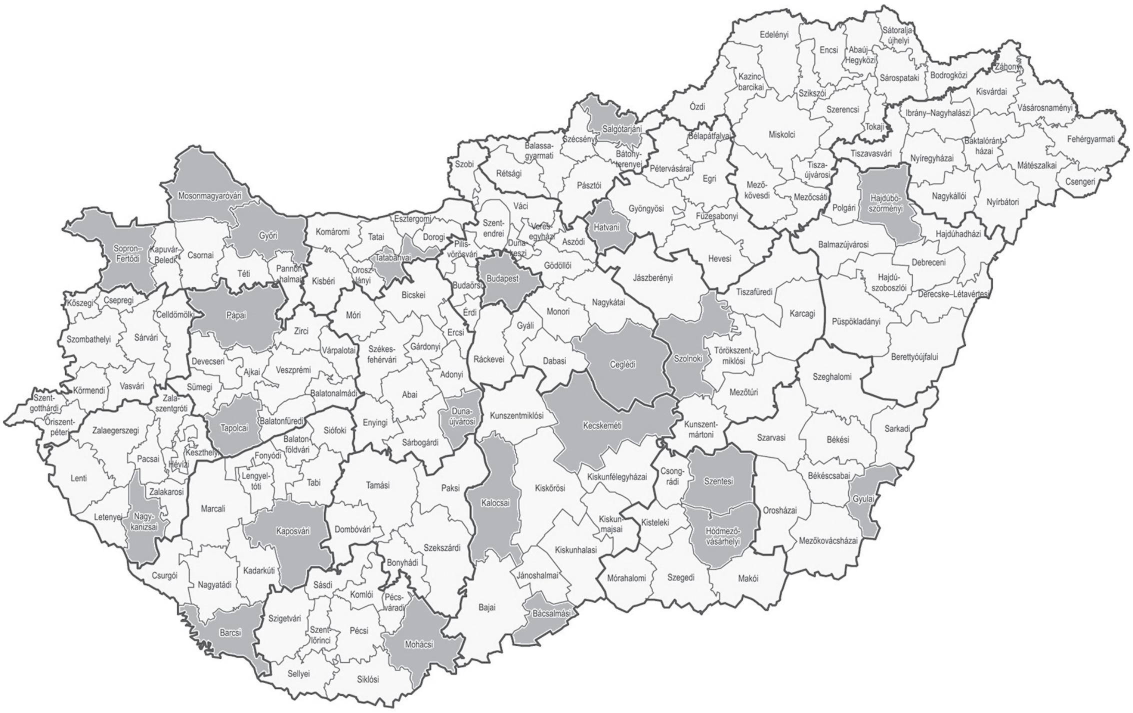

Figure 1. The HHSMF on the micro-region map of Hungary

ing the growth of the Hungarian population. The rapid falls in the number of marriages in 1915–1918 and 1943–1945, and peaks immediately afterwards are due to delaying marriages during wartime. Figure 2 shows the geographic distribution of the sample on the map of micro-regions of Hungary. Finally, appendix B lists the municipalities, their macro- regions, the municipal center of their micro-region, the number of marriages digitized per religious denomination, and the population sizes as taken from the Hungarian contemporary censuses. A detailed description of changes in the Hungarian occupational structure, upward and downward mobility rates, and relative social mobility in these data is given by Lippényi et al (2013).

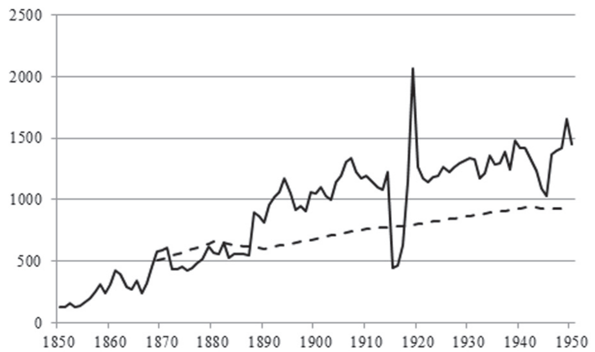


Figure 2. Population size and the number of marriages in the HHSMF

**Note:** dashed line — population size (10000) of present-day territory of Hungary, estimated from Hungarian censuses, continuous line — number of marriages in the Hungarian Historical Social Mobility File.

Due our balanced sample sizes, weighting was needed to match the sample distributions to the overall distribution of the population in different regions and in types of municipalities. We computed weights that fit the data to the population sizes of the 7 macro-regions and 7 municipal strata for every ten year period, using iterative proportional weighting for the purpose. The algorithm we used computes weights for each case by first weighting the sample against the population proportion in each macro-region, then to the proportion of population in each of the municipal strata, then again to macro-regions, iterating the process until a stationary weight is obtained that satisfies both population proportional distributions. The population sizes per macro-region and municipal-strata were obtained using municipal-level aggregate data on population size from the Hungarian Census, held once every ten years between 1869 and 1949 (Dallos and Klinger 1990)[10].

## 6. DATA QUALITY

As with every historical data source, marriage records have their potential pitfalls. Delger and Kok (1998) list three main problems in marriage records data that might bias results in mobility studies: unobserved cases because of non-marriage, missing data about fathers' occupations, and measurement of occupations at different points in the careers of fathers and sons.

We shall address those biases in the concluding section, and in addition we assessed whether the quality of occupational measurement is consistent across periods.

*Unobserved groups in the population*

A potential source of bias is that certain social groups might not be observed in mobility data taken from marriage registers. Most importantly, permanently single males are of course omitted altogether from the data, and they were likely to differ from married individuals in their chances for occupational mobility. According to John Hajnal's estimates, in Northern- and Western-European societies individuals who remained single made up a significant part of the population, but in Eastern Europe the proportion who never married was significantly lower and indeed Hungary's marriage pattern more closely resembled the Eastern pattern (Hajnal 1953, 1965) John Hajnal's estimates are shown in Table 1: the number of males who were single at the ages of 45–49 were approximately 5–6 percent in Hungary whereas the percentage was from 10–17 in Western European countries. The marriage records dataset in Hungary therefore covers around 94–95 percent of the total male population. Even though we cannot assess to what extent those who never married differed from their married counterparts, because the overwhelming majority of the population did marry at some point the missing information on the never-married is very unlikely to lead to distortions.

*Table 1*

**Proportion single males at specified ages in the 1900s and in the 1930–1940s**

| | Year | 20-24 | 25-29 | 45-49 |
|---|---|---|---|---|
| Hungary | 1941 | 0.88 | 0.46 | 0.06 |
| Hungary | 1900 | 0.81 | 0.31 | 0.05 |
| Austria | 1939 | 0.85 | 0.60 | 0.10 |
| Austria | 1900 | 0.03 | 0.51 | 0.11 |
| France | 1949 | 0.81 | 0.39 | 0.12a |
| France | 1900 | 0.90 | 0.48 | 0.11 |
| Germany | 1939 | 0.91 | 0.51 | 0.07 |
| Germany | 1900 | 0.91 | 0.48 | 0.09 |
| Great Britain | 1931 | 0.86 | 0.48 | 0.12 |
| Great Britain | 1900 | 0.83 | 0.47 | 0.12 |
| Holland | 1930 | 0.90 | 0.49 | 0.11 |
| Holland | 1900 | 0.89 | 0.53 | 0.13 |
| Sweden | 1945 | 0.87 | 0.52 | 0.17 |
| Sweden | 1900 | 0.92 | 0.61 | 0.13 |
| United States | 1940 | 0.72 | 0.36 | 0.11b |

**Notes:** a Age group 40–49 b Age group 45–54
**Source:** (Hajnal 1953:81–83, 1965:102–103)

*Missing father's occupation*

A second potential pitfall of marriage registers is that they usually provide occupational information only about fathers who were still living when their sons married. A father's early death might have been more likely among the lower social classes, potentially leading to the underrepresentation in the dataset of men of lower-class origin. In addition, a father's early death might have reduced the occupational possibilities available to some, while to others, it might have offered greater opportunity, for instance by the inheritance of a farm, a workshop, or simply of money. The fact and timing of the death of a man's father might well therefore be related to occupational mobility, in spite of the fact that previous research have shown that the occupational status of fathers who died relatively young tended to be no lower than that of fathers who did older (Van Poppel and Van Gaalen 2008) and that the occupational status of the sons of fathers who had died before their sons' marriage was no different from that of those whose fathers were living when their sons married (Maas et al. 2011). We could assess whether those findings hold true for the Hungarian case too. For the town of Kalocsa from 1930–1950 occupational information and father's death were registered regardless of whether the father was alive at the time of his son's marriage. We can then assess if a father's death affected this son's social mobility. Table 2A-B shows intergenerational occupational mobility, split according to whether the father of a bridegroom was alive at the time of the bridegroom's marriage. The incidence of a father's early death, similarly to what was found in other studies based on marriage records (Maas et al. 2011), was quite high a quarter of recorded marriages. However, again as found in earlier studied, there is no indication that a father who had died before the marriage of any of his sons was from a lower class background than a father who was still alive at his son's marriage. The distributions of class origins (final columns to the right in Table 2A and 2B) are identical in the two tables ($\chi^2$ independence test, p=0.477). Furthermore, the fact of a father's death was unrelated to the status of his son, whether higher or lower, since the distributions of class destinations (final rows in Table 2A and 2B) are also identical ($\chi^2$ independence test, p=0.157). Finally, additional analyses indicated neither more of less social fluidity in reference to a father's death[11]. Based on those results which pertain to a smaller subset of the Hungarian data, unobserved cases by father's death are unlikely to cause bias in our derived rates of total and relative mobility.

*Table 2*

**Mobility tables of bridegrooms by father deceased or alive, Kalocsa, 1930–1950**

| | *A* *father deceased* | son | | | | | |
|---|---|---|---|---|---|---|---|
| father | | *Higher managers* | *Lower managers* | *Industrial workers* | *Farmers* | *T* | *T %* |
| | Higher managers and professionals | 20 | 9 | 0 | 0 | 29 | 18% |
| | Lower managers, professionals, clerical, sales | 10 | 24 | 1 | 3 | 38 | 23% |
| | Industrial workers | 6 | 16 | 21 | 10 | 53 | 32% |
| | Farmers and farm workers | 1 | 14 | 2 | 28 | 45 | 27% |
| | Total | 37 | 63 | 24 | 41 | 165 | |
| | Total percentage | 22% | 38% | 15% | 25% | | |
| | | | | | | | |
| | *B* *father alive* | son | | | | | |
| father | | *Higher managers* | *Lower managers* | *Industrial workers* | *Farmers* | *T* | *T %* |
| | Higher managers and professionals | 40 | 21 | 3 | 0 | 64 | 13% |
| | Lower managers, professionals, clerical, sales | 25 | 83 | 3 | 3 | 114 | 24% |
| | Industrial workers | 26 | 45 | 74 | 19 | 164 | 34% |
| | Farmers and farm workers | 4 | 53 | 8 | 70 | 135 | 28% |
| | Total | 95 | 202 | 88 | 92 | 477 | |
| | Total percentage | 20% | 42% | 18% | 19% | | |

**Source:** HHSMF. Note: Occupations are classified into 4-category HISCLASS to avoid empty cells

*Timing of measurement in the life course*

Marriage certificates give father's details at a moment when the first part of his son's career was already finished and his own career was likely approaching its end. Preferably however, one would like to look at a father's occupation and his son's occupation at similar points in their respective careers; indeed to not do so might bias the influence of the father's class on his son's class destination. Measuring occupation of fathers and their sons at different points in their careers would not necessary lead to bias in changes in mobility over time. However, if bridegrooms observed in later periods are older (or younger), career mobility patterns confound the estimates of temporal change in social mobility. For similar reasons, if temporal trends in marital age existed only for specific class origins that might cause bias in period comparisons of social mobility. If the timing of marriage does not change over time (and over time within class origins), any bias originating from measuring fathers and sons at different periods of their lives is constant and so cannot confound estimates of temporal change in social fluidity. We assessed whether that is true for our Hungarian data. Figure 3 shows that average age at marriage and the variation in age (measured by standard deviation) did not change across periods. Furthermore, the average age at marriage of different classes of origin was largely similar, and apart from small fluctuations — especially in the first few periods when observations in some classes were few in number — the average age at marriage does not vary across time (Figure 4A-F). If age at marriage is stable across periods, it is not likely to influence temporal comparisons.

The pattern of occupational careers may change in historical perspective (Mitch, Brown, and van Leeuwen 2004; Schulz 2013). If men's occupational career development changes over time, for instance if occupational careers go up more steeply as the relevant period becomes more modern, it could show up in social fluidity as a temporal increase, even if processes driving intergenerational reproduction and mobility did not change. As we do not have repeated measures of individuals' occupations in the HHSMF, we could not directly assess whether career patterns in Hungary changed over time. However, by using age at marriage as a proxy for certain stages the occupational careers, we were able to compare the association between origin and destination class at different ages to see if it remained constant over time. If intergenerational association at different age levels is shown not to have changed over time, then we have evidence that what changes in fluidity do take place over time are driven primarily by intergenerational processes not by changing career patterns. Table 3 shows the occupational class-career patterns for Hungary, approximated by using age groups, and the table shows a familiar inverted U-shaped pattern. Middle-aged bridegrooms (between 30 and 45) are more often found in high-status class destinations than the younger or older age groups, and they are the most mobile from their class origins also. Figure 5 indicates that laying outside some fluctuation, total mobility increased in a similar fashion over time in all age groups. To assess whether the pattern of change in social fluidity also was similar across age groups, we estimated log-linear models. We specified mobility tables based on the cross-classification of occupational origin, destination, 5-year time periods and 5 age groups. Five models were estimated: (1) no change, (2) temporal variation in relative mobility and no age group differences, (3) age group differences in relative mobility and no temporal variation, (4) both temporal variation and age group differences in relative mobility but no interaction between them, (5) and age-group specific temporal variation. Table 4 shows the results. The interactive change model (5) fits the data the least among the estimated models[12], indicating that differences between age groups in social fluidity, which reflect possible changes in intra-generational career patterns, are unlikely to influence temporal variation in social fluidity in Hungary. As the best fitting model (4) shows, age groups might differ in their relative mobility, but those differences neither grow nor shrink over time.


Figure 3. Bridegrooms' average age at marriage across time

**Note:** HHSMF, complete observations on origin-destination occupation, 1865–1950, (n=76049). Dashed line shows ±1 standard deviation of age at marrying at each 5-year period. Data weighted by size of region and municipal strata.

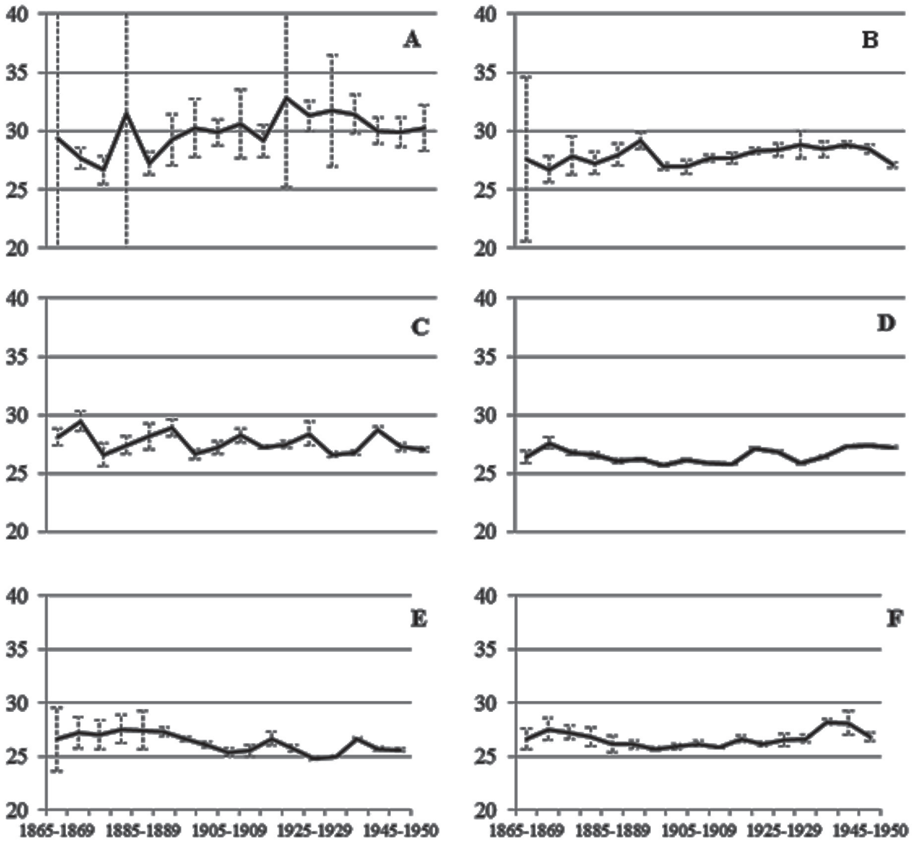


Figure 4. Bridegrooms' average age at marriage across time and class origins

**Note:** HHSMF complete observations on age, origin, and destination class, 1865–1950 (n=76049). Data weighted by size of region and municipal strata. Dashed line shows ± 2 weighted confidence intervals. HIS-

CLASS classes: A — higher managers and professionals, B — lower managers, professionals, clerical, sales, C — skilled workers, D — farmers, E– unskilled workers, F– farm workers.


Figure 5. Percentage mobility from class origin across age groups and over time

**Note:** HHSMF complete observations on age, origin, and destination class, 1865–1950 (n=76049). Data weighted by size of region and municipal strata

*Table 3*

**Age, occupational class destinations and intergenerational mobility**

| | 16-25 | 26-30 | 31-35 | 36-45 | 46-80 |
|---|---|---|---|---|---|
| Higher managers and professionals | 0.6% | 2.5% | 5.3% | 4.7% | 3.2% |
| Lower managers, professionals, clerical, sales | 5.9% | 11.2% | 16.2% | 14.7% | 11.7% |
| Skilled workers | 11.1% | 15.5% | 15.2% | 14.9% | 13.3% |
| Farmers | 46.2% | 38.8% | 31.7% | 36.3% | 41.6% |
| Unskilled workers | 21.5% | 20.3% | 18.8% | 15.6% | 13.4% |
| Unskilled farm workers | 14.6% | 11.6% | 12.8% | 13.8% | 16.9% |
| % mobility from class origin | 30.8% | 39.5% | 44.3% | 42.1% | 36.7% |

**Note:** HHSMF complete observations on age, origin, and destination class, 1865–1950 (n=76049). Data weighted by size of region and municipal strata.

*Table 4*

**Models of Temporal change and age effects in social fluidity**

| | L2 | DR | BIC | p | D |
|---|---|---|---|---|---|
| no change, no age effects | 5299 | 2100 | -18304 | 0 | 13.9 |
| only temporal change | 4715 | 2084 | -18708 | 0 | 11.9 |
| only age effects | 5207 | 2096 | -18351 | 0 | 13.7 |
| temporal change + age effects | 4654 | 2080 | -18725 | 0 | 11.9 |
| age specific temporal changes | 4438 | 2016 | -18221 | 0 | 11.3 |

**Note:** HHSMF complete observations on age, origin, and destination class, 1865–1950 (n=76049). Data weighted by size of region and municipal strata. Models include age group x 5-year period x origin x destination main effects. Temporal and age differences in origin-destination association are log-multiplicative uniform difference parameters (Xie 1992).

*Measurement quality of occupational titles*

Finally, we assess the quality of occupational measurement. In historical mobility data, occupational information can be rather unspecific sometimes. For instance, someone who was registered to be a 'worker' could in realty have been a laborer in a factory or a farm worker. When we code occupations to standard occupational coding schemes, these 'vague' occupations are troublesome because they might fit in more than one occupational category. The standard practice to address occupations with les detail is to code them with fewer digits. To code occupations in the HHSMF we used the HISCO scheme (van Leeuwen, Maas, and Miles 2002) and we assigned 2-or 3-digit HISCO codes to occupations that were not specific enough to pair with one of the detailed 5-digit HISCO codes.

Less specific occupation codes may cause a problem in mobility analyses if it is ambiguous to which occupational class they belong. As our example illustrates, someone with the occupation 'worker' could be classified either as skilled, or unskilled worker, or as farm laborer even. In those cases one could choose the class which was more populous in the period and place of investigation (van Leeuwen and Maas 2011). Even though this procedure somewhat reduces measurement error, the trends of mobility could still be biased if measurement quality changes over time. To assess how severe the problem is in our Hungarian data, we plotted the over-time change of the percentage of 2-digit HISCO-codes. Figure 6 shows that the percentage was very low for the whole period and increased only slightly — likely as a result of the growing number of non-specific industrial occupations. However, the decreasing trend of class immobility — which we estimated based on assigning HISCO codes to HISCLASS classes (see van Leeuwen and Maas 2011) — is unlikely to be driven by changing precision of occupational measurement.

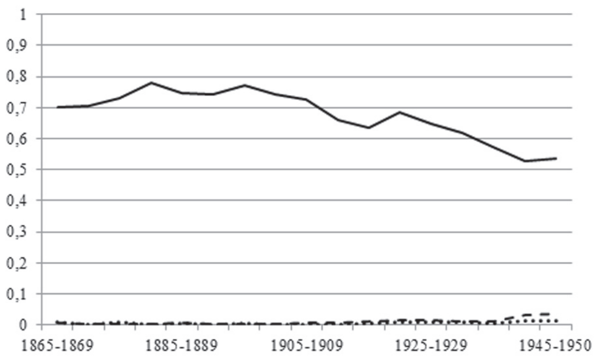


Figure 6. Percentage immobility and 2-digits HISCO codes

**Note:** HHSMF complete observations on age, origin, and destination class (n=76049). Short-dashed line: percentage 2-digit HISCO codes among fathers' occupations, long-dashed line: percentage 2-digit HISCO codes among sons' occupations, continuous line: percentage immobile. Data weighted by size of region and municipal strata.

## 7. CONCLUDING REMARKS: MAJOR STRENGTHS AND FUTURE PROSPECTS

The Hungarian Historical Social Mobility File is the largest micro-level dataset describing historical stratification and mobility ´beyond the Leitha´, in Central and Eastern Europe. Its main strength is that the dataset represents a great variety of social contexts for approximately hundred years in present-day Hungary. Although the main aim of collecting the HHSMF was to study intergenerational occupational mobility, the dataset can be used to investigate various other stratification processes in Hungary during the 19th and 20th century. Occupational information about fathers-in-law can be used to study homogamy, and information about the occupation of witnesses is useful for addressing homophily. For broader use in social science history, the dataset facilitates the study of long-term temporal developments in age at marriage, migration from birthplace, and their inter-relations with occupational status positions and class. The Hungarian Historical Mobility File is not suitable for studying intra-generational processes, such as social mobility or migration during the life course of individuals. We hope that these research questions will be addressed in historical perspective in Hungary, although that requires future data collection of birth and death registers, and linking with marriage records. Until then, we are confident that the social mobility research community can make good use of the Hungarian Historical Mobility File and it will provide empirical material for many research projects in the years to come.

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## APPENDIX A

### Creating municipal strata for sampling by using latent profile analysis

To sample marriage records for the Hungarian Historical Social Mobility File, we stratified Hungarian municipalities. Conforming to the sampling plan, we stratified towns and villages separately. Municipalities in Hungary in 1930 were officially assigned to statuses: 3 percent of all municipalities (105 settlement) were officially towns, approximately 97 percent had no status, while fewer than 0,5 percent (12 settlements) were regional centers with municipal rights. Even though town or regional center status conferred certain institutional rights on settlements, there was still a good deal of heterogeneity within official settlement types in economic development, industrialization, and their urban character. In their study of Hungarian settlement structure as it was in 1910, Beluszky and Győri (2005) showed that around 300 settlements had some urban function, almost three times as the number of the official towns, and a number of the official towns lacked any urban character. This appendix describes the methods how we explored developmental variation within official settlement types and created an optimal categorization to be used for stratification of municipalities.

We based the stratification of developmental differences between municipalities on various dimensions of economic development and urbanization. To find the categorization that best fits the structure of municipal differences in Hungary, we used Latent Profile Analysis (LPA). The goal of LPA is to find a latent categorical pattern behind an observed set of indicators (McCutcheon 1987). The method estimates the probability of strata membership of a given case to each of the strata, and based on that probability we assigned cases to the stratum to which they were most likely to belong. The method has the advantage over cluster analytical methods that it is based upon a probabilistic model and on maximum likelihood estimation procedures (Vermunt and Magidson 2002) which makes it possible to evaluate and compare the fit of different stratification solutions to the data.

In choosing the number of strata, we used the Bayesian Information Criterion (BIC) and the Entropy measure, with lower BIC values indicating better model fit. The Entropy measure reflects the quality of classification by showing whether the strata are sufficiently distinct from each other. The Entropy index runs from 0 to 1, larger values indicating better separation in the estimated stratum-membership probabilities.

Models were run using Mplus 5.0, separately for villages and towns, with a maximum number of four strata and allowing items to covary within classes*. More strata were not allowed for reasons of parsimony and to keep sufficient numbers of observations per stratum.

## Data and measures

The 1930 Hungarian census contains information on demographics, labor, and the housing situation of the Hungarian population. The figures were aggregated on the municipal level, and complemented with information on economic establishments form the Hungarian Central Statistical Office. Full information on all statistics was available for all 3417 municipalities. The following dimensions of municipal modernization were distinguished.

*Industrialization and economic development*

Settlements differ with respect to the agrarian or industrial character of the working population. Municipal industrial development was measured by the *percentage of active population in agriculture*, and the *number of industrial establishments* per 1000 inhabitants. The latter indicator excludes establishments with no employees. Economic development creates a higher demand for workforce, and developing areas attract workers from less developed areas, resulting in a migration surplus. *Net migration* between 1920 and 1930 was used as an indicator of economic development. Net migration (migration arrivals minus migration departures) was measured as a percentage of the population in 1930.

* Classic Latent Profile Analyses assumes that the relationship between observed continuous indicators can be fully explained by the latent categorical variable, meaning that the items are locally independent, i.e. uncorrelated within each latent class (Marsh et al. 2009). As these models do not fit the data when a parsimonious number of strata was specified, we allowed covariances between the indicators. These models provided a better fit. Additional models (not presented) have shown that the covariance structure is similar across strata, and covariances between indicators are therefore constrained to be equal in each stratum.

*Urban functions*

Urban functions of a municipality are defined as the services it provides to its inhabitants, and to its surroundings (Beluszky and Győri 2005) and included are service institutions such as banks, courts, tax offices, governmental directorates, and centers of trade. Naturally, urban settlements employ a large number of professionals to work in such institutions. Urban functions were measured with the *percentage of active population working in public sector, banking, and trade*.

Urban settlements also have the function of providing their surroundings with opportunities for employment. An important urban employment opportunity for village-born people was domestic service (Gyáni 1981) and at the turn of the 20th century, as the Hungarian bourgeoisie and the middle class of the cities become wealthier, the demand for household services rose sharply, resulting in significant temporal migration of young village-born women to larger cities. The *percentage of domestic servants* in the working population is used as measure of urban function.

*Cultural functions*

Urban settlements are also centers for cultural and educational institutions and organizations, and associated professional occupations usually cluster in urban locations. We assumed that higher cultural activity within a municipality would correlate with better general level of education among the population and accordingly measured the cultural function with the *percentage of the population older than 6 who can read and write*.

*Urban character*

We included population density per km2 to measure the urban character of the settlement.

We then standardized the variables in order to facilitate estimation. Table A1 shows the descriptive statistics of the indicators.

*Table A1*

**Descriptive statistics of Municipal characteristics in 1930**

| villages, n=3000 | | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| % active population in agriculture | AGR | 78.31 | 16.02 | 0.47 | 100 |
| Number of industrial establishments per 1000 inhabitants | IND | 6.01 | 4.68 | 0.00 | 68.85 |
| Net migration 1920–1930 (% of population 1930) | MIG | –6.36 | 10.05 | –47.84 | 60.82 |
| % active population working in public sector, banking, and trade | URB | 1.52 | 1.08 | 0.00 | 16.80 |
| % domestic servants in the working population | DOM | 0.86 | 0.75 | 0.00 | 10.25 |
| % population older than 6 who cannot read and write | ILLIT | 10.66 | 5.91 | 0.00 | 53.99 |
| Population density (km2) | DENS | 81.42 | 144.23 | 7.27 | 6072.76 |

| | | | | | |
|---|---|---|---|---|---|
| towns, n=105 | | | | | |
| % active population in agriculture | AGR | 45.52 | 27.10 | 0.50 | 83.77 |
| Number of industrial establishments per 1000 inhabitants | IND | 11.12 | 4.04 | 4.62 | 22.36 |
| Net migration 1920–1930 (% of population 1930) | MIG | 0.61 | 12.97 | –17.29 | 58.49 |
| % active population working in public sector, banking, and trade | URB | 5.01 | 2.59 | 1.49 | 10.84 |
| % domestic servants in the working population | DOM | 1.99 | 0.87 | 0.72 | 4.67 |
| % population older than 6 who cannot read and write | ILLIT | 10.46 | 4.82 | 2.96 | 24.10 |
| Population density (km2) | DENS | 523.88 | 1346.57 | 37.24 | 8637.01 |
| | | | | | |
| Regional centers with municipal rights, n=12 | | | | | |
| % active population in agriculture | AGR | 21.40 | 19.66 | 0.93 | 59.02 |
| Number of industrial establishments per 1000 inhabitants | IND | 15.95 | 3.53 | 9.21 | 20.01 |
| Net migration 1920–1930 (% of population 1930) | MIG | 3.89 | 9.03 | –5.19 | 23.34 |
| % active population working in public sector, banking, and trade | URB | 8.77 | 2.89 | 4.40 | 15.58 |
| % domestic servants in the working population | DOM | 3.29 | 1.24 | 2.07 | 6.29 |
| % population older than 6 who cannot read and write | ILLIT | 7.08 | 3.64 | 2.45 | 14.67 |
| Population density (km2) | DENS | 769.30 | 1344.74 | 79.35 | 4870.53 |

**Source:** 1930 Hungarian population census

## RESULTS

For villages the 3-strata solution is optimal (Table A2). Although the BIC values are lower for the 4-strata solution, the higher entropy value of the 3-strata version indicates better separation. Table A3 contains the sample means and standard errors for each stratum. Stratum 1 (4%) is titled *urban-type villages*. Those settlements had a dominantly urban-industrial character with the average number of industrial establishments per 1000 inhabitants almost twice the average for all villages and the average proportion of urban-type workers three times than average (cf. Table A1). Urban-type villages had a high mobility surplus, low illiteracy rates, and high density compared to the other strata. Stratum 2 (23.6%) is titled *developing rural villages*. The settlements in this stratum still had a rural character, but industrial-urban development was present as they had a slightly higher average number of industrial establishments than the average of all villages. They still show negative net migration, although to a lesser extent than the average net migration of all villages. Developing rural villages were relatively sparsely populated, which points again to their more rural character. Stratum 3 (72.4%) includes *rural villages* and the settlements it were agrarian. More than 80 percent of the population worked in agriculture, and only a small fraction (less than 2 percent) had an urban-type occupation. High migration loss (7 percent in terms of the 1930 population migrated away between 1920 and 1930) points to the lack of economic development in those settlements.

*Table A2*

**Results Latent Profile Analysis**

| | | *BIC* | *Entropy* | *LL* | *MLR scaling factor* | *df* |
|---|---|---|---|---|---|---|
| VILLAGES | 1 cluster | 59847 | | –29781.8 | 19.96 | 35 |
| | 2 cluster | 47224 | 0.946 | –23409.5 | 3.20 | 50 |
| | 3 cluster | 45367 | 0.855 | –22420.0 | 1.89 | 65 |
| | 4 cluster | 44387 | 0.774 | –21869.4 | 2.01 | 80 |
| | | | | | | |
| TOWNS[b] | 1 cluster | 2144 | | –1039.4 | 1.86 | 14 |
| | 2 cluster | 1194 | 0.994 | –480.5 | 1.19 | 50 |
| | 3 cluster[a] | 1104 | 0.988 | –403.1 | 1.08 | 64 |

**Note:** Robust Maximum Likelihood estimates (MLR), N village=3300, N town=105.

a The variance of population density is constrained to be equal across two groups for model identification

b Models with 4 latent classes did not provide admissible results due to the relatively low number of observations

*Table A3*

**Estimated means and variances of developmental indicators in municipal strata**

| | *urban-type villages* | | *developing rural villages* | | *rural villages* | | *urban centers* | | *industrial centers* | | *agrarian centers* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Variance | Mean | Variance | Mean | Variance | Mean | Variance | Mean | Variance | Mean | Variance |
| AGR | –2.65 | 2.50 | –0.76 | 1.07 | 0.40 | 0.15 | –1.506 | 0.093 | –0.712 | 0.172 | 0.813 | 0.087 |
| | (0.22) | (0.36) | (0.08) | (0.12) | (0.02) | (0.01) | (0.05) | (0.04) | (0.09) | (0.03) | (0.04) | (0.01) |
| IND | 1.60 | 5.07 | 0.34 | 1.16 | –0.20 | 0.49 | 0.018 | 0.991 | 1.122 | 0.545 | –0.585 | 0.264 |
| | (0.25) | (1.24) | (0.06) | (0.10) | (0.02) | (0.03) | (0.24) | (0.32) | (0.14) | (0.11) | (0.07) | (0.05) |
| MIG | 1.24 | 3.61 | 0.09 | 1.26 | –0.10 | 0.69 | 1.476 | 2.007 | 0.148 | 0.242 | –0.512 | 0.141 |
| | (0.20) | (0.55) | (0.05) | (0.15) | (0.02) | (0.03) | (0.35) | (0.54) | (0.09) | (0.08) | (0.05) | (0.02) |
| URB | 2.67 | 6.12 | 0.27 | 0.83 | –0.24 | 0.25 | 0.808 | 0.811 | 0.964 | 0.283 | –0.737 | 0.147 |
| | (0.34) | (1.20) | (0.06) | (0.10) | (0.01) | (0.01) | (0.24) | (0.25) | (0.11) | (0.06) | (0.05) | (0.04) |
| DOM | 1.40 | 3.55 | 0.38 | 1.48 | –0.20 | 0.48 | –0.246 | 1.07 | 1.00 | 0.63 | –0.444 | 0.33 |
| | (0.23) | (1.09) | (0.07) | (0.15) | (0.02) | (0.03) | (0.26) | (0.54) | (0.18) | (0.21) | (0.08) | (0.06) |
| ILLIT | –0.48 | 0.49 | –0.16 | 0.67 | 0.08 | 1.10 | –1.09 | 0.155 | –0.399 | 0.495 | 0.528 | 0.779 |
| | (0.07) | (0.07) | (0.04) | (0.07) | (0.02) | (0.05) | (0.01) | (0.05) | (0.13) | (0.16) | (0.12) | (0.14) |
| DENS | 2.08 | 19.19 | 0.04 | 0.10 | –0.13 | 0.03 | 1.439 | 3.539 | –0.198 | 0.003 | –0.323 | 0.003 |
| | (0.53) | (13.67) | (0.03) | (0.02) | (0.00) | (0.00) | (0.47) | (1.40) | (0.02) | (0.00) | (0.00) | (0.00) |
| | n=127 | | n=719 | | n=2454 | | n=17 | | n=30 | | n=58 | |

**Note:** AGR % active population in agriculture, IND Number of industrial establishments per 1000 inhabitants, MIG Net migration 1920–1930 (% of population 1930), MIG % active population working in public sector, banking, and trade, DOM % domestic servants in the working population, ILLIT % population older than 6 who cannot read and write, DENS population density ($km^2$). Standard errors are in parentheses.

Evaluating the latent structure of town types, the 3-strata version proved to be the best solution. That model had the lowest BIC and its Entropy index was satisfactory (Table A2). Table A3 shows the characteristics of the strata. Stratum 1 (28.5%) can be called *industrial centers*. Those settlements had more industrial activity — in terms of the number of industrial establishments — than the average in all of the towns (cf. Table A1). Industrial centers had relatively high presence of urban functions, and attracted the highest number of domestic servants of all town strata (2.9 percent of the working population). Those towns, however, still show some similarities with the countryside: they were less densely populated than the town-subsample average and a quarter of their active population still worked in agriculture. Stratum 2 (16.3%) contains *urban centers*. Those settlements were the most developed among Hungarian municipalities: the proportion of agrarian population was negligible, and the settlements had high concentration of urban functions (7.5 percent of the population held a 'typically urban' occupation). The low illiteracy rate compared to other towns shows they offered greater cultural and educational opportunities than did other towns. Urban centers were densely populated and had an exceptionally high mobility surplus (20 percent in terms of the 1930 population migrated into those settlements between 1920 and 1930). Stratum 3 (55.2%) were *agrarian centers* where more than two-thirds of the population worked in agriculture. Those towns show some urban functions (3.1 percent of the population worked in urban-type jobs), but their negative net migration, low population density, and high illiteracy rate all point to a lack of industrial and urban development.

## CONCLUSIONS

The distribution of municipalities across these strata shows that the settlement population of Hungary in 1930 was overwhelmingly agrarian. 71 percent of all municipalities were rural villages and the three municipal strata in which fewer than 50 percent of the population worked in agriculture (urban-type villages, industrial centers, and urban centers), and regional centers together made up only 5.4 percent of all settlements. The distribution of population among the strata was more even however: 37 percent of the Hungarian population lived in urban-type settlements (urban-type villages, industrial centers, urban centers, and municipal towns), while 38 percent lived in villages. The small proportion, but relatively large population size of urban-type settlements supports a sampling procedure which oversamples urban-type settlements. In that way, and by using the municipal strata we had constructed, we were able to obtain information about a large enough sample of marriages from modernized and modernizing municipalities.

## APPENDIX B

**B1 Municipalities in the HHSMF: region, micro-region, and stratum**

| *Name* | *Micro-region* | *Region* | *Stratum* |
|---|---|---|---|
| Alsógalla | Tatabánya | Central Transdanubia | developing rural villages |
| Bánhida | Tatabánya | Central Transdanubia | urban-type villages |
| Boldog | Hatvan | Northern Hungary | rural villages |
| Bóly | Mohács | Southern Transdanubia | urban-type villages |
| Cegléd | Cegléd | Central Hungary | agrarian centers |
| Ceglédbercel | Cegléd | Central Hungary | developing rural villages |
| Cered | Salgótarján | Northern Hungary | rural villages |
| Csót | Pápa | Central Transdanubia | developing rural villages |
| Dunaföldvár | Dunaföldvár | Southern Transdanubia | agrarian centers |
| Elek | Gyula | Southern Great Plain | developing rural villages |
| Felsőgalla | Tatabánya | Central Transdanubia | urban centers |
| Fertőrákos | Sopron | Western Transdanubia | rural villages |
| Foktő | Kalocsa | Southern Great Plain | rural villages |
| Gönyű | Győr | Western Transdanubia | developing rural villages |
| Győr | Győr | Western Transdanubia | municipal centers |
| Gyula | Gyula | Southern Great Plain | industrial centers |
| Hajdúnánás | Hajdúböszörmény | Northern Great Plain | agrarian centers |
| Halászi | Mosonmagyaróvár | Western Transdanubia | rural villages |
| Hatvan | Hatvan | Northern Hungary | industrial centers |
| Heréd | Hatvan | Northern Hungary | rural villages |
| Hódmezővásárhely | Hódmezővásárhely | Southern Great Plain | municipal centers |
| Homokmégy | Kalocsa | Southern Great Plain | rural villages |
| Igal | Kaposvár | Southern Transdanubia | developing rural villages |
| Kalocsa | Kalocsa | Southern Great Plain | industrial centers |
| Kaposvár | Kaposvár | Southern Transdanubia | urban centers |
| Kazár | Salgótarján | Northern Hungary | developing rural villages |
| Kecskemét | Kecskemét | Southern Great Plain | municipal centers |
| Kópháza | Sopron | Western Transdanubia | developing rural villages |
| Köveskál-Szentbékkálla | Tapolca | Southern Transdanubia | rural villages |

| *Name* | *Micro-region* | *Region* | *Stratum* |
|---|---|---|---|
| Lánycsók | Mohács | Western Transdanubia | developing rural villages |
| Mindszent | Hódmezővásárhely | Southern Great Plain | developing rural villages |
| Mohács | Mohács | Southern Transdanubia | industrial centers |
| Mosonmagyaróvár | Mosonmagyaróvár | Western Transdanubia | industrial centers |
| Mosonszentmiklós | Mosonmagyaróvár | Western Transdanubia | developing rural villages |
| Murakeresztúr | Nagykanizsa | Western Transdanubia | developing rural villages |
| Nagycenk | Sopron | Western Transdanubia | developing rural villages |
| Nagykanizsa | Nagykanizsa | Western Transdanubia | industrial centers |
| Nagykőrös | Cegléd | Central Hungary | agrarian centers |
| Németkér | Dunaföldvár | Southern Transdanubia | rural villages |
| Nyúl | Győr | Western Transdanubia | rural villages |
| Öttevény | Győr | Western Transdanubia | developing rural villages |
| Pápa | Pápa | Central Transdanubia | industrial centers |
| Rákóczifalva | Szolnok | Northern Great Plain | rural villages |
| Rákospalota-Budapest | Budapest | Central Hungary | urban centers |
| Salgótarján | Salgótarján | Northern Hungary | urban centers |
| Somoskőújfalu | Salgótarján | Northern Hungary | urban-type villages |
| Sopron | Sopron | Western Transdanubia | municipal centers |
| Szakmár | Kalocsa | Southern Great Plain | rural villages |
| Szegvár | Szentes | Southern Great Plain | rural villages |
| Szentes | Szentes | Southern Great Plain | agrarian centers |
| Szolnok | Szolnok | Northern Great Plain | industrial centers |
| Szulok | Barcs | Southern Transdanubia | rural villages |
| Tarján | Tatabánya | Central Transdanubia | rural villages |
| Taszár | Kaposvár | Southern Transdanubia | rural villages |
| Tatabánya | Tatabánya | Central Transdanubia | urban-type villages |
| Tataháza | Bácsalmás | Southern Great Plain | rural villages |
| Tiszakécske | Kecskemét | Northern Great Plain | rural villages |
| Törtel | Cegléd | Central Hungary | rural villages |
| Újszász | Szolnok | Northern Great Plain | developing rural villages |
| Újpest-Budapest | Budapest | Central Hungary | urban centers |
| Vaszar | Pápa | Central Transdanubia | rural villages |
| Vémend | Mohács | Southern Transdanubia | rural villages |
| Vértesszőlős | Tatabánya | Central Transdanubia | developing rural villages |
| Zalaszentbalázs | Nagykanizsa | Southern Transdanubia | rural villages |
| Budapest | Budapest | Central Hungary | capital |

### B2 Number of digitized marriages in HHSMF per municipality

| *Name* | *Israelite* | *Lutheran* | *Reformed* | *Catholic* |
|---|---|---|---|---|
| Alsógalla | | | | 273 |
| Bánhida | | | | 627 |
| Boldog | | | | 1067 |
| Bóly | | | 93 | 1148 |
| Cegléd | 105 | | 1706 | 1113 |
| Ceglédbercel | | | | 1603 |
| Cered | | | | 449 |
| Csót | | | | 800 |
| Dunaföldvár | 22 | 18 | 120 | 1961 |
| Elek | | | 31 | 1812 |
| Felsőgalla | | | | 873 |
| Fertőrákos | | | | 826 |
| Foktő | 13 | | | 768 |
| Gönyű | | | | 800 |
| Győr | 48 | 416 | 314 | 3454 |
| Gyula | 32 | | 211 | 3959 |
| Hajdúnánás | | | 2501 | |
| Halászi | | | | 808 |
| Hatvan | 47 | | 120 | 1522 |
| Heréd | | | | 613 |
| Hódmező-vásárhely | | | 1971 | 877 |
| Homokmégy | 2 | | | 824 |
| Igal | | | | 918 |
| Kalocsa | 134 | | | 2422 |
| Kaposvár | 1001 | 178 | 154 | 1685 |
| Kazár | | | | 1113 |
| Kecskemét | | | 1757 | 1421 |
| Kópháza | | | | 829 |
| Köveskál-Szentbékkálla | | | 104 | 518 |
| Lánycsók | | | | 1059 |
| Mindszent | | | | 619 |
| Mohács | | | 4 | 1795 |
| Mosonmag-yaróvár | 41 | | | 2200 |
| Mosonszent-miklós | | | | 645 |
| Murakeresz-túr | | | | 732 |
| Nagycenk | | | | 605 |
| Nagykanizsa | 164 | 64 | 185 | 1509 |
| Nagykőrös | 185 | | | 839 |
| Németkér | | | | 394 |
| Nyúl | | | | 431 |
| Öttevény | | | | 456 |
| Pápa | 140 | 46 | 269 | 1592 |
| Rákóczifalva | | | 37 | 612 |
| Rákospalota-Budapest | | | 13 | 2567 |
| Salgótarján | 106 | 293 | 121 | 2346 |
| Somoskő-újfalu | | | | 661 |
| Sopron | 170 | 1179 | 109 | 2045 |
| Szakmár | | | | 610 |
| Szegvár | | | | 1084 |
| Szentes | 121 | | | 2261 |
| Szolnok | 235 | 16 | 14 | 1414 |
| Szulok | | | | 1493 |
| Tarján | | | 80 | 373 |
| Taszár | | | | 1002 |
| Tatabánya | | 91 | 25 | 1727 |
| Tataháza | | | | 835 |
| Tiszakécske | | | | 947 |
| Törtel | | | | 915 |
| Újszász | | | 28 | 934 |
| Újpest-Buda-pest | 84 | | | 52 |
| Vaszar | | | | 887 |
| Véménd | | | | 1272 |
| Vértesszőlős | | | | 253 |
| Zalaszentba-lázs | | | | 1803 |
| Total | 2650 | 2301 | 9967 | 74052 |
| Grand total | | | | 88970 |

### B3 Population sizes of municipalities in the HHSMF from Hungarian national censuses, 1000 inhabitants

| *Name* | *1869* | *1880* | *1890* | *1900* | *1910* | *1920* | *1930* | *1941* | *1949* |
|---|---|---|---|---|---|---|---|---|---|
| Alsógalla | 0.585 | 0.562 | 0.614 | 0.935 | 1.622 | 1.336 | 1.308 | 37.955 | 40.221 |
| Bánhida | 1.55 | 1.617 | 1.872 | 2.22 | 3.638 | 5.005 | 9.424 | 37.955 | 40.221 |
| Boldog | 1.505 | 1.604 | 1.995 | 1.994 | 2.485 | 2.57 | 2.861 | 2.909 | 3.185 |

| Name | 1869 | 1880 | 1890 | 1900 | 1910 | 1920 | 1930 | 1941 | 1949 |
|---|---|---|---|---|---|---|---|---|---|
| Bóly | 2.596 | 2.589 | 3.032 | 2.946 | 3.298 | 3.022 | 3.095 | 3.085 | 3.104 |
| Cegléd | 22.216 | 24.872 | 27.549 | 30.106 | 33.942 | 36.929 | 37.413 | 38.87 | 37.965 |
| Ceglédbercel | 2.048 | 2.367 | 2.68 | 2.925 | 3.396 | 3.66 | 3.963 | 3.916 | 4.007 |
| Cered | 0.711 | 0.726 | 0.767 | 1.147 | 1.239 | 1.435 | 1.63 | 1.479 | 1.808 |
| Csót | 1.084 | 1.136 | 1.241 | 1.392 | 1.349 | 3.82 | 1.336 | 1.473 | 1.485 |
| Dunaföldvár | 12.382 | 12.72 | 12.364 | 12.117 | 12.087 | 11.733 | 11.34 | 11.48 | 11.216 |
| Elek | 4.583 | 5.607 | 6.629 | 7.591 | 7.268 | 7.64 | 8.446 | 6.757 | 6.67 |
| Felsőgalla | 1.079 | 1.218 | 1.299 | 1.621 | 9.563 | 13.378 | 15.57 | 37.955 | 40.221 |
| Fertőrákos | 1.864 | 1.98 | 2.491 | 2.799 | 2.98 | 3.025 | 3.371 | 3.745 | 2.053 |
| Foktő | 3.618 | 3.54 | 3.535 | 3.517 | 3.353 | 3.133 | 2.899 | 2.85 | 2.847 |
| Gönyű | 1.206 | 1.361 | 1.508 | 1.625 | 1.767 | 2.085 | 2.33 | 2.713 | 2.873 |
| Győr | 26.235 | 27.571 | 30.021 | 37.543 | 44.3 | 50.036 | 50.881 | 57.19 | 55.143 |
| Gyula | 18.495 | 18.046 | 19.991 | 22.446 | 24.284 | 24.908 | 25.241 | 24.901 | 23.567 |
| Hajdúnánás | 13.198 | 13.957 | 14.457 | 15.884 | 16.781 | 17.085 | 17.99 | 18.77 | 18.222 |
| Halászi | 1.539 | 1.724 | 1.779 | 1.674 | 1.943 | 1.881 | 2.03 | 2.456 | 2.423 |
| Hatvan | 4.018 | 4.877 | 6.979 | 9.838 | 12.387 | 14.359 | 15.38 | 16.02 | 16.458 |
| Heréd | 1.37 | 1.253 | 1.577 | 1.879 | 1.955 | 2.055 | 2.264 | 2.179 | 2.706 |
| Hódmezővásárhely | 49.153 | 52.424 | 55.475 | 60.883 | 62.445 | 60.922 | 60.342 | 58.977 | 56.769 |
| Homokmégy | 2.189 | 2.246 | 2.736 | 2.656 | 2.879 | 2.858 | 3.062 | 3.043 | 3.172 |
| Igal | 1.931 | 2.19 | 2.076 | 2.152 | 2.089 | 2.169 | 2.214 | 2.375 | 2.467 |
| Kalocsa | 9.504 | 9.116 | 10.77 | 11.38 | 11.738 | 12.332 | 11.88 | 12.341 | 11.546 |
| Kaposvár | 6.649 | 9.571 | 12.544 | 18.218 | 24.124 | 29.61 | 32.715 | 33.515 | 33.535 |
| Kazár | 0.743 | 0.835 | 1.035 | 1.37 | 1.57 | 1.383 | 1.853 | 1.924 | 2.00 |
| Kecskemét | 42.319 | 44.887 | 49.993 | 59.225 | 68.424 | 73.109 | 79.467 | 87.269 | 88.369 |
| Kópháza | 1.302 | 1.501 | 1.735 | 1.849 | 1.855 | 1.795 | 1.811 | 1.909 | 1.813 |
| Köveskál-Szentbékkálla | 1.024 | 0.962 | 1.098 | 1.017 | 1.086 | 1.006 | 0.946 | 0.915 | 0.8 |
| Lánycsók | 1.954 | 1.988 | 2.232 | 2.171 | 2.405 | 2.332 | 2.264 | 2.354 | 2.297 |
| Mindszent | 9.814 | 1210.859 | 9.203 | 9.667 | 10.057 | 10.069 | 9.946 | 9.63 | 9.54 |
| Mohács | 12.14 | 12.385 | 14.403 | 15.832 | 17.092 | 15.734 | 17.369 | 18.355 | 19.093 |
| Mosonmagyaróvár | 16.898 | 17.662 | 17.252 | 18.922 | 23.062 | 16.898 | 17.662 | 17.252 | 18.922 |
| Mosonszentmiklós | 1.794 | 1.842 | 1.94 | 2.19 | 2.228 | 2.297 | 2.427 | 2.4 | 2.482 |
| Murakeresztúr | 1.144 | 1.23 | 1.402 | 1.454 | 1.663 | 1.893 | 2.195 | 2.235 | 2.175 |
| Nagycenk | 1.773 | 1.921 | 1.855 | 1.754 | 1.74 | 2.004 | 2.126 | 1.886 | 1.826 |
| Nagykanizsa | 15.125 | 18.398 | 20.619 | 23.978 | 26.524 | 30.037 | 30.869 | 30.792 | 28.46 |
| Nagykőrös | 20.091 | 22.769 | 24.584 | 26.638 | 28.575 | 28.701 | 28.591 | 28.977 | 29.397 |
| Németkér | 1.44 | 1.552 | 1.675 | 1.862 | 1.932 | 2.007 | 2.142 | 2.411 | 1.893 |
| Nyúl | 2.875 | 2.974 | 3.135 | 3.243 | 3.301 | 3.311 | 3.438 | 3.487 | 3.426 |
| Öttevény | 1.38 | 1.615 | 1.515 | 1.417 | 1.494 | 1.707 | 1.988 | 2.025 | 2.156 |

| *Name* | *1869* | *1880* | *1890* | *1900* | *1910* | *1920* | *1930* | *1941* | *1949* |
|---|---|---|---|---|---|---|---|---|---|
| Pápa | 14.223 | 14.654 | 14.261 | 17.426 | 20.15 | 19.255 | 21.356 | 23.736 | 21.815 |
| Rákóczifalva | 0.373 | 1.521 | 2.727 | 3.589 | 4.14 | 4.325 | 5.222 | 5.386 | 5.807 |
| Rákospalota-Budapest | 3.203 | 3.844 | 5.971 | 11.424 | 24.426 | 35.033 | 42.949 | | |
| Salgótarján | 3.7 | 6.316 | 9.478 | 13.552 | 13.746 | 15.213 | 16.98 | 20.318 | 20.128 |
| Somoskőújfalu | 1.08 | 1.235 | 1.303 | 1.514 | 1.831 | 1.737 | 2.342 | 2.863 | 2.602 |
| Sopron | 21.108 | 23.222 | 27.213 | 33.478 | 33.932 | 35.248 | 35.895 | 45.646 | 35.164 |
| Szakmár | 2.683 | 2.616 | 2.7 | 2.946 | 2.934 | 3.225 | 3.565 | 3.545 | 3.712 |
| Szegvár | 5.611 | 5.952 | 6.81 | 7.249 | 7.369 | 7.872 | 7.979 | 7.902 | 7.58 |
| Szentes | 27.658 | 28.712 | 30.791 | 31.308 | 31.593 | 32.387 | 32.861 | 33.119 | 32.509 |
| Szolnok | 15.847 | 17.15 | 20.748 | 25.379 | 28.778 | 32.539 | 38.764 | 42.011 | 30.935 |
| Szulok | 1.841 | 1.945 | 1.996 | 1.855 | 1.773 | 1.758 | 1.879 | 1.742 | 2.127 |
| Tarján | 1.872 | 1.958 | 2.038 | 1.98 | 1.922 | 2.007 | 2.065 | 2.162 | 2.627 |
| Taszár | 0.78 | 0.801 | 0.811 | 0.759 | 0.788 | 0.763 | 0.811 | 0.921 | 0.794 |
| Tatabánya | | | | 4.881 | 8.104 | 8.491 | 6.844 | 37.955 | 40.221 |
| Tataháza | 1.504 | 1.693 | 1.764 | 1.814 | 1.675 | 1.703 | 1.862 | 1.926 | 2.012 |
| Tiszakécske | 6.069 | 7.226 | 9.708 | 10.583 | 11.459 | 12.107 | 13.05 | 13.371 | 13.421 |
| Törtel | 1.99 | 2.354 | 2.971 | 3.339 | 3.629 | 4.158 | 4.589 | 4.414 | 4.854 |
| Újszász | 2.671 | 3.023 | 3.535 | 4.045 | 4.26 | 4.388 | 5.46 | 5.468 | 5.807 |
| Újpest-Budapest | 6.977 | 11.929 | 23.814 | 42.178 | 55.918 | 57.464 | 67.4 | | |
| Vaszar | 1.737 | 1.886 | 1.946 | 1.957 | 2.126 | 2.153 | 2.229 | 2.189 | 2.244 |
| Véménd | 2.049 | 1.992 | 2.208 | 2.255 | 2.388 | 2.381 | 2.38 | 2.479 | 2.568 |
| Vértesszőlős | 1.076 | 1.13 | 1.213 | 1.391 | 1.392 | 1.504 | 1.739 | 1.757 | 1.725 |
| Zalaszentbalázs | 1.134 | 1.205 | 1.326 | 1.565 | 1.453 | 1.498 | 1.486 | 1.548 | 1.535 |
| Budapest | 270.685 | 390.551 | 491.938 | 732.322 | 889.889 | 929.69 | 1006.184 | 1711.106 | 1589.065 |

**Note:** municipalities listed with their present-day names. Alsógalla, Felsőgalla és Bánhida merged with Tatabánya in 1947. Tiszakécske was established in 1950, following the merger of Ókécske and Újkécske. Újpest and Rákospalota merged with Budapest in 1951. Mosonmagyaróvár was established in 1939 following the merger of Moson and Magyaróvár.

## NOTES

1 European Research Council, Advanced Grant, no: 230279, 2009–14 "Towards Open Societies? Trends, Variations and Driving Forces of Intergenerational Social Mobility in Europe over the Past Three Centuries"

2 We targeted studying father-to-son social mobility because in this historical period only few women remained in the labor force after getting married. The occupation of daughters was nevertheless digitized when it was present on the marriage record.

3 1904: XXXVI. 10.§, the 80,000/1906. Ministry of Interior Affairs 55. and 57.§

4 During data digitizing, research assistants were provided with an extensive list of occupational titles in Latin and their translation to Hungarian. Based on this they could identify those marriages that have occupation for digitizing. The amount of German-language Jewish marriages was small; these marriages were also digitized and translated back to Hungarian.

[5] From personal communication with Prof. Dr. Tamás Faragó (Eötvös Loránd University)

[6] For more information about the method and its advantages see a non-statistical exposition by Lohr (2008)

[7] For the South Hungarian town of Kalocsa, two surrounding villages and their outskirts, marriage records had already been digitized by the historical archives of the Kalocsa Archbishopric, and were put at our disposal. We would like to thank dr. Andor Lakatos for providing us access to these data. Our estimates for the data collection, e.g., the expected number of marriages per period, were based upon the inspection of these data.

[8] These villages were Szulok, Tataháza, and Köveskál (the neighboring village, Szentbékkálla was also included as it had the same Roman Catholic parish as Köveskál)

[9] 1920–1930 figures for the present-day territory of Hungary (Kövér and Gyáni 1998:216)

[10] We were unable to weight the data we found for the 1850s because we had no information about sizes of the municipalities before 1869 that was of comparable quality to what was in the censuses. We therefore excluded data from before 1865 from weighting procedures, giving us a total weighted sample size of 85,430.

[11] RCII models were used for the analyses of social fluidity, performed on Table2A-B. The model was parameterized as multinomial conditional logistic regression so that father's death can be included as individual-level covariate (Hendrickx and Ganzeboom 1998). Social fluidity is measured with the off-diagonal (equal-) scaled association, and two additional parameters that represent relative immobility (general immobility and agrarian class immobility). The indicator of father's death entered the model as uniform difference parameters on the off-diagonal and diagonal parameters (Xie 1992), measuring the difference in social fluidity between those whose father was alive at the time of their marriage and those whose father was deceased. The uniform difference parameters were not significant, indicating that the social fluidity of the two groups did not differ from each other.

[12] We used the model fit measure BIC which is advocated to use for testing competing models in datasets with large numbers of observations (Raftery 1995).