Online appendix to:

Intergenerational mobility of sons and daughters: evidence from nineteenth-century West Flanders

Vincent Delabastita and Erik Buyst

European Review of Economic History

Volume 25, Issue 2, May 2021, Pages 300-327

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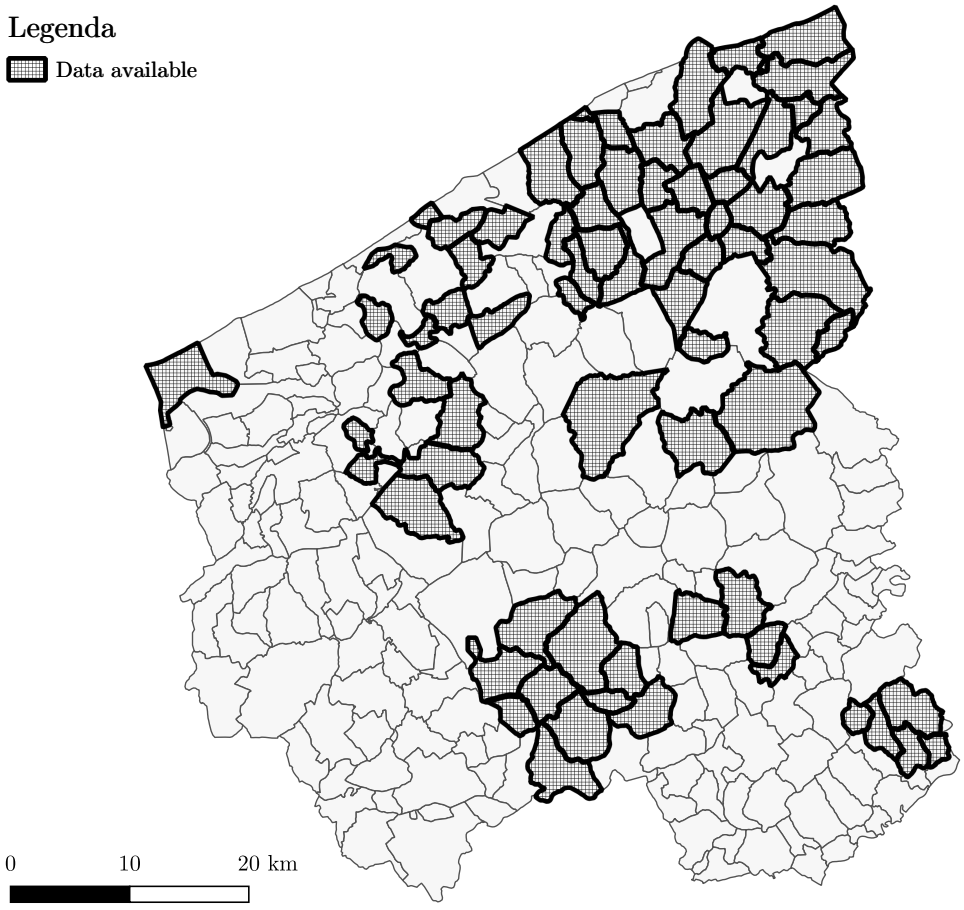
A Geographic coverage of the sample

Figure A1: **Geographic coverage of the sample (1846 borders)**



B Most frequent occupational codes in the marriage certificates

Table A1: **Most frequent occupational codes in the marriage certificates (male)**

HISCO	HISCO occupation	Frequency	%
9-99.00	Worker, No Further Information	28494	29.59
6-11.10	General Farmer	11890	12.35
7-54.00	Weaver, Specialisation Unknown	5859	6.08
8-01.10	Shoemaker, General	3557	3.69
6-21.05	Farm-Worker, General	3516	3.65
9-54.10	Carpenter, General	2371	2.46
9-99.20	Day-Laborer	2133	2.21
7-51.90	Other Fibre Preparers	1932	2.01
9-51.20	Bricklayer (Construction)	1903	1.98
4-10.25	Working Proprietor (Wholesale or Retail Trade)	1845	1.92

Table A2: **Most frequent occupational codes in the marriage certificates (female)**

HISCO	HISCO occupation	Frequency	%
9-99.00	Worker, No Further Information	28122	29.20
7-50.00	Spinner, (...) or Related Worker, Specialisation Unknown	13485	14.00
6-11.10	General Farmer	10173	10.56
7-52.20	Spinner, Thread and Yarn	9663	10.03
-56060	Capital Owner	8522	8.85
-2	Not Working	6068	6.30
7-95.10	Hand and Machine Sewer, General	4221	4.38
6-21.05	Farm-Worker, General	2325	2.41
7-91.00	Tailor, Specialisation Unknown	1908	1.98
5-10.20	Working Proprietor (Hotel and Restaurant)	1523	1.58

C Sensitivity checks

C.1 Marriage behavior

This paper makes extensive use of marriage certificates. Despite the considerable advantages of working with this type of documentation, we must be vigilant for any selection biases this approach might induce. First and foremost, we cannot, of course, alter the fact that we only observe people that marry. The selection bias with respect to individuals who found a match on the marriage market is inherent to research with data of this kind and, consequently, we have to make do with this limitation.[1] It is, however, possible to assess whether the intensity of marriage behavior changes. This might possibly drive any changes in mobility we observe over time. Vandenbroeke (1981, 74) in his seminal study on the demographic history of Flanders described how marriage intensity declined drastically in the run-up to the subsistence crisis of the 1840s. From then on, the situation stabilized until the 20th century. A direct effect of this is that we observe a lower share of the West-Flemish population, resulting in more difficulties to generalize our findings on the married population to West Flanders in general. Because the marriage coefficients remained relative stable throughout the later stages of the 19th century, however, there is little reason to assume that this might affect any conclusions we draw about time trends in intergenerational mobility.[2]

Second, our analysis does not only use occupational titles from first marriages, but also utilizes remarriages. This is possibly more prevalent within certain socio-economic groups. Moreover, men tended to remarry more frequently than women (Vandenbroeke, 1981, 84). To avoid a positive selection bias towards people who remarry more often, a more conservative occupation variable was also constructed. We then re-estimated the Altham statistics using only occupational titles from first marriages.[3] This confirms our findings in the previous section given the limited changes in the odds ratios.

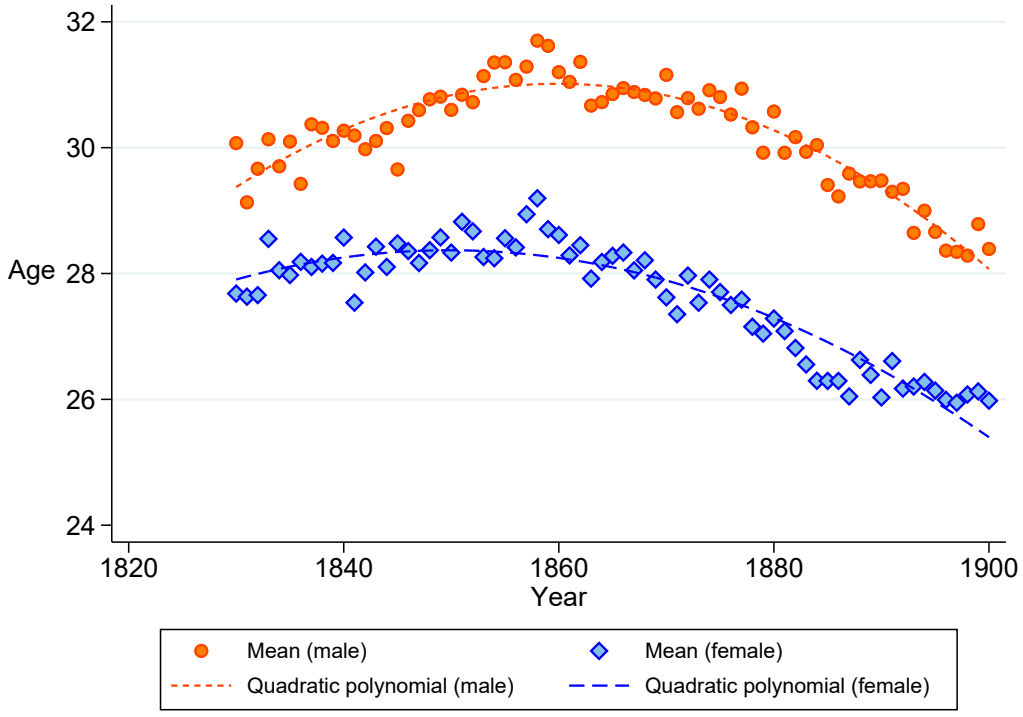
[1] It should also be emphasized that the odds ratios approach is not affected by a multiplication of a row or column and is consequently robust to a biased selection towards children with fathers of a specific occupation. This only becomes concerning when the selection is effectively on mobility.

[2] Additionally, celibacy rates differed by gender, with men being more likely to stay single (Vandenbroeke, 1981, 65). This implies that we possibly under-sample men with poor endowments. However, given that we find a negative male effect on mobility, this might only result in an underestimation of this effect.

[3] The results of this exercise are not shown, but are available on request.

Third, we evaluate the effects of the timing of marriage within the life course. More specifically, the timing of marriage in the life course affects at which moment we observe individuals in their career trajectory. If we observe parents and children at a different level of occupational maturity, intragenerational mobility might bias our estimates of intergenerational mobility. We plotted the evolution of the mean age of first marriage in our sample to illustrate the changing behavior with respect to the timing of marriage within the life course throughout the 19th century. The pattern in Figure A2 is very similar to the one in Vandenbroeke (1981, 80), which reinforces our belief that the sample of marriage certificates is representative of all marriage certificates. Unsurprisingly, we observe that mean average ages at marriage peaked in the 1860s, highlighting the moment at which decline of the West-Flemish agricultural and textile industries was at full momentum. Towards the end of the 19th century, however, the beginnings of West-Flanders' economic recovery translated into marriages at a younger age, as the delay of marriage became less necessary to make ends meet within the household. This could have an impact on our results, because we observe children at an earlier moment in their occupational career.

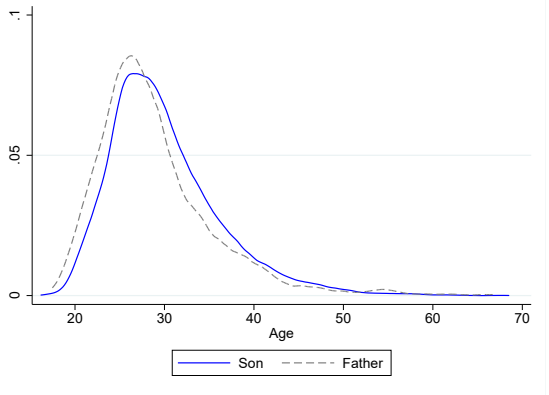
Figure A2: **Age at first marriage (mean), 1830-1900**



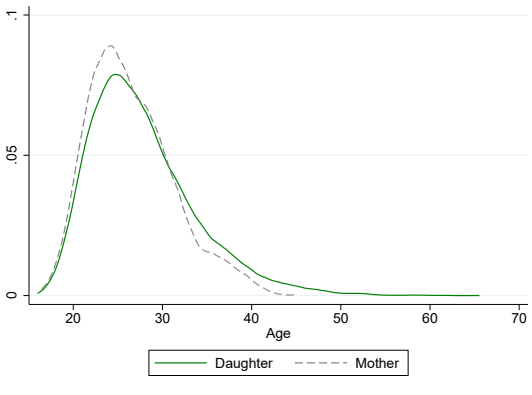
Source: West-Flemish civil marriage certificates (Aelvoet et al., 2016)

We alleviate such concerns by minimizing each person's distance to occupational maturity (i.e. by selecting the available occupation closest to the age of 30). The results of this exercise are presented in Figure A3. However, this strategy is constrained by the availability of the historical sources and does not entirely rule out selection effects due to higher or lower ages at marriage. To examine the effects of differential patterns in ages at the moment of occupational registration, we follow the empirical approach of Modalsli (2015) and include the ages of the child and the father as control variables in the estimation of the Altham distances. Doing so, we account for the differences in age composition which might arise in the different occupation groups. The results of this exercise are presented in Table A3. Our findings on increasing intergenerational mobility appear to be robust to the inclusion of the age covariates.

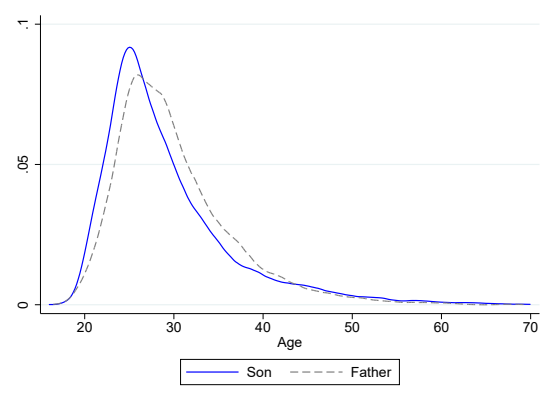
Figure A3: **Kernel density estimates of the age composition of the sample**



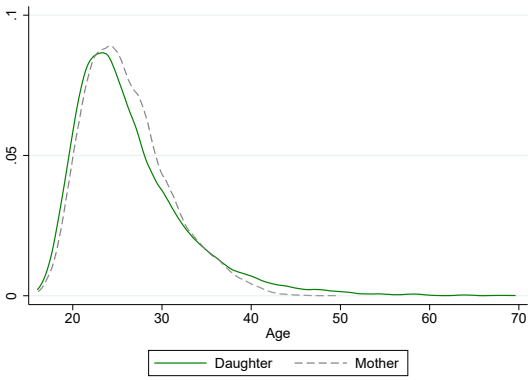
(a) **Father-son, pre-1870**



(b) **Mother-daughter, pre-1870**



(c) **Father-son, post-1880**



(d) **Mother-daughter, post-1880**

Note: Epanechnikov kernel functions are applied.

Table A3: **Inclusion of age variables as covariates in the estimation of the Altham statistics of occupational mobility**

Relationship	**Covariates**	**Period**	$d(P, I)$
Father-Son	No covariates	Pre-1870	26.33***
		Post-1880	22.28***
	Son's age	Pre-1870	26.07***
		Post-1880	21.76***
	Father's age	Pre-1870	26.30***
		Post-1880	21.79***
	Father's and son's age	Pre-1870	26.10***
		Post-1880	21.42***
Mother-Daughter	No covariates	Pre-1870	24.11***
		Post-1880	22.18***
	Daughter's age	Pre-1870	24.02***
		Post-1880	21.69***
	Mother's age	Pre-1870	24.07***
		Post-1880	21.93***
	Mother's and daughter's age	Pre-1870	24.07***
		Post-1880	21.51***

Note: The inclusion of control variables such as age is possible due to Modalsli's specification (2015) of the Altham distance as the coefficients of a multinomial logit model with dummy variables for the parent's occupation as an individual-level covariate. The Altham distances without covariates presented here are slighly different to the ones presented in Table 1. This is not due to the distinct estimation procedure, but because of the omission of individuals for which we could not identify a birth date. The observation that the Altham statistics only change little, indicates that the birth-marriage linkages in our database are not selective.

C.2 Occupational classification

Finally, an important question is whether our results may possibly have been driven by the allocation rules used to assign thousands of occupational titles into four occupational groups. A primary concern with the use of the Altham statistic is that it gives equal weight to odds ratios, regardless of whether they are based on cells with a very high or a very low frequency. As a consequence, researchers have raised the concern that terms affecting the farmer group received undue weight (Hout & Guest, 2013; Xie & Killewald, 2013). Given the research context, however, we are confident that these low-frequency cells does not drive our results. First, our relatively large sample size limits the occurrence of said cases. Also, the period under observation does not include the 20th century and, by extension, the structural shift away from agriculture, which typically gives rise to this concern. Second, we also decompose the Altham statistic in two parts, based on whether the odds ratios include the intergenerational persistence of farmer's children or not.[4] The results in Table A4 reveal that our observations on both increasing mobility and more mobility daughters remain robust and are thus not solely driven by this group.

Another caveat is that in the context of self-reported occupations, differences between 'farmers' and 'farm workers' were inconsistently reported. The distinction between farmers and farm laborers in Long and Ferrie (2013) and subsequent studies depends on ownership and management status. It is arguable that the occupational titles in the West-Flemish marriage certificates are not tailored to make this difference. As an alternative exercise, we regard all agricultural workers as farmers. As the results in Table A5 show, this changes little to our conclusions on the evolution of social mobility for both sons and daughters. Unsurprisingly, a closer look at the odds ratios reveals that the comparatively high immobility of farmers becomes somewhat less distinct.

[4]Following Modalsli's notation (2017), we define d^F and d^N, which include 36 and 108 odds ratios respectively. It follows that $d(P,I) = \sqrt{d^N(P,I)^2 + d^F(P,I)^2}$.

Table A4: **Altham statistics of occupational mobility $d(P, I)$, decomposed into $d^N(P, I)$ and $d^F(P, I)$**

Relationship	Period	$d(P, I)$	$d(Q, I)$	$d(P, Q)$
Father-Son (F-S)	pre-1870 (P) vs. post-1880 (Q)	26.54*** $\langle 19.95 + 17.50 \rangle$	22.94*** $\langle 15.93 + 16.51 \rangle$	5.33** $\langle 4.59 + 2.70 \rangle$
Mother-Daughter (M-D)	pre-1870 (P) vs. post-1880 (Q)	23.14*** $\langle 15.83 + 16.88 \rangle$	21.76*** $\langle 14.18 + 16.51 \rangle$	3.89*** $\langle 2.27 + 3.16 \rangle$
F-S (P) vs. M-D (Q)	pre-1870	26.54*** $\langle 19.95 + 17.50 \rangle$	23.14*** $\langle 15.83 + 16.88 \rangle$	13.24*** $\langle 9.21 + 9.52 \rangle$
F-S (P) vs. M-D (Q)	post-1880	22.94*** $\langle 15.93 + 16.51 \rangle$	21.76*** $\langle 14.18 + 16.51 \rangle$	9.18*** $\langle 5.42 + 7.40 \rangle$

$***: p < 0.01, **: p < 0.05, *: p < 0.1$

Note: Decomposition is noted as $\langle d^N(\cdot,\cdot) + d^F(\cdot,\cdot) \rangle$

Table A5: **Altham statistics of occupational mobility, farm workers reallocated to agricultural laborers**

Relationship	**Period**	$d(P, I)$	$d(Q, I)$	$d(P, Q)$	$d^i(P, Q)$
Father-Son (F-S)	pre-1870 (P) vs. post-1880 (Q)	23.75***	20.26***	4.41***	1.58
Mother-Daughter (M-D)	pre-1870 (P) vs. post-1880 (Q)	21.46***	18.22***	4.60***	2.81**
F-S (P) vs. M-D (Q)	pre-1870	23.75***	21.46***	12.55***	11.19***
F-S (P) vs. M-D (Q)	post-1880	20.26***	18.22***	9.16***	8.48***

$***: p < 0.01, **: p < 0.05, *: p < 0.1$

D Coding the occupations of the West-Flemish civil register

The West-Flemish civil marriage certificates contain thousands of unique occupational titles, which require codification and organization. This can be done using HISCO, the Historical International Standard Classification of Occupations (van Leeuwen, Maas, & Miles, 2002), which is an adaption of the (1968 version of) ISCO by the International Labour Organization (ILO). The latter classification system starts with professionals at the top and ends with laborers at the bottom. The historical extension facilitates the storage of extra information concerning status, relationships and the outcome or product of the labor activity.

The marriage certificates, including the occupational titles, were mainly made up in Flemish, the regional variant of Dutch. Only for the older documents as well as a majority of the documents involving persons of a higher social status, the French language was used. As a consequence, we initiated the codification process using the Dutch dictionaries which can be found in van Leeuwen et al. (2002). Due to the differences between Dutch and Flemish and to the presence of French titles, a lot of occupations were linked manually with the fitting HISCO codes. As is common, we focused on the primary occupational title. If the secondary title provided more specific information, this was incorporated.

Consequently, we translated these HISCO codes to the HISCLASS structure of van Leeuwen and Maas (2011). These codes were used to differentiate between manual/non-manual and skilled/unskilled labor. Such distinctions are not easy to achieve in an unambiguous manner. As a result, we opted to follow a well-established system in the form of the HISCO- and HISCLASS-based structures and coding rules. Nevertheless, we do not believe that "one size fits all", so we made some alterations to reflect the economic-historic context of 19th-century West-Flanders. More specifically, we made the following changes:

- The HISCO system does not provide a specific code for capital owners (as it is only incorporated in the auxiliary status variable). We, however, consider capital ownership as a fully-fledged economic activity and assign capital and ground owners their own code (-56060). Their inclusion in the non-manual worker class

corresponds to the HISCLASS approach (van Leeuwen & Maas, 2011, 57). We consider members of the nobility to be capital owners as well.

- The historical sources often make mention of *fabrikanten* (manufacturers). It seems inaccurate to emphasize the managing duties of manufacturers in an historical context in which they likely only lead a small group of people and mainly contributed to the economic activities themselves, and thus to characterize them as managers or non-manual workers. Hence, we coded these titles according to the nature of their manual production (HISCO suggests a similar line of reasoning). We characterized those manufacturers as skilled to account for the coordination and organization capacities required on the job. How does this compare to the classification according to the HISCLASS scheme? HISCLASS does not reclassify occupations based on ownership, although manufacturers most likely also owned their small-scale manufacture. The system does suggest alterations based on their supervision tasks. These are largely similar to the corrections we applied, except that we also upgraded unskilled workers with coordinating responsibilities to the skilled manual class.
- Given the context of our research question, we did not account for timing-related information (as opposed to HISCLASS). Apprentices or retirees were placed under the same category as their active colleagues. We do not claim that this information is irrelevant to the skill development of an individual at the moment of observation, but it is nevertheless the result of timing of our historical source within the individual's life course and career and it does not necessarily provide relevant information on a moment of occupational maturity.

Finally, we grouped the occupations in four groups, following Long and Ferrie (2013). The titles were distinguished using the HISCLASS codes. Classes 1 to 5 make up the non-manual group. The cut-off point for skilled manual workers was determined to be at class 10, with classes 10 to 12 composing the unskilled group. Farmers were classified as a separate group. This follows Boberg-Fazlić and Sharp (2018) and Pérez (2019) and allows for direct comparisons (see Section 3.3 and Appendix B).

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