Family Size and Intergenerational Social Mobility during the Demographic Transition

A Case Study in 19th Century Antwerp, Belgium

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Abstract

It has been argued on theoretical grounds in sociology, economics, and in other disciplines that family size limitation by parents enhances the upward mobility chances of their children in industrial and post-industrial populations. Yet, the empirical record supporting or contradicting the theoretical expectations is surprisingly limited. The aim of this contribution is to test empirically the effects of family size limitation on children's intergenerational mobility in an urban, late nineteenth century population in Western Europe. More specifically, we use a new database with life course data on the individual level about people who ever lived in the Belgian city of Antwerp between 1846 and 1920. The database allows us to reconstruct reproductive life courses and occupational status for two consecutive generations.

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Introduction

In sociology, the Weberian notion of social closure points at a wide variety of strategies, such as the formation of interest groups and marriage partner selection, that are used by groups to increase or maintain their own and family members' life chances. A crucial part of this is the transmittance of economic, cultural and social capital to one's children. During the nineteenth century, the latter strategy became even more important. Indeed, due to the rise of modern economy and meritocracy, it is often assumed that it became ever more difficult to directly transmit one's social position to one's children. Instead, each new generation was supposed to achieve its own social position, typically through education. Family size limitation may have been one of the strategies that could be employed to invest more resources in fewer offspring in order to help them achieve a better position in the social status hierarchy.

In his 1890 classic Dépopulation et civilisation, the French social scientist Arsène Dumont argued that adults with ambition tend to limit their family size because a numerous offspring is an obstacle to success and achievement. For people who want to go up, he wrote, many children make inconvenient luggage (Dumont, 1890(1990), p.77). The same holds for those who project their social status ambitions onto their children: a large seed dilutes parental resources and therefore complicates or aggravates the social situation in the next generation (Dumont, 1890(1990), pp.73-91). Ariès (1980), referring to Dumont, argues in an article amply cited by demographers that the decline of fertility in the West is the consequence of the emergence of a child-oriented society. In such a society, parents' main investment consists of helping the children to get ahead. In the English-speaking world, the classic reference in Joseph A. Banks' Prosperity and Parenthood (1954). Banks, also

explicitly referring to the work of Dumont, argued that social ambition was one of the motivating forces of family size limitation in the English middle classes.

In economics, the negative effect of family size on the future social status of children is known under the heading of the quality-quantity trade-off. Becker (1991) calls proper consideration of the interaction between child quantity and quality "probably the major contribution of the economic analysis of fertility" (p.135). Becker's economic theory implies that a reduction in the number of children raises investments in child quality, where quality is measured by the current as well as the future well-being of children, including their income when they become adults.

Despite their longstanding record in social and demographic theory, there is little empirical evidence backing these theoretical claims. The connection between fertility control and intergenerational mobility is so cogently described in the literature that one tends to believe that this is an established, well-tested fact, which is not true. Becker, for example, only cites some aggregate statistics to show that at times when the birth rate was falling, the educational level of children was rising (see Becker, 1991, pp.148-151). Yet, recent work in economics casts doubt on the postulate that there would be a trade off between child quality and child quantity within the family (Black, Devereux & Salvanes, 2005).

The aim of our contribution is to replicate the analysis conducted in the Belgian city of Leuven (Van Bavel 2006) in a very different Belgian city: we test whether the size of the family of orientation indeed affected the upward or downward mobility chances adult children in the city of Antwerp. Were children with fewer brothers and sisters more likely to climb higher on the social ladder than were children who had more siblings? Were sons and daughters originating from large families more likely to loose social status as compared to their parents? We will elaborate this debate by also discussing the role of gender and migration. Indeed,

investigating differences by sex may reveal different strategies. For sons, a limited family size may result in better career prospects. For daughters, a limited family size may result in better chances to attract a suitable marriage partner. Also geographical origin may play a role. Migrants and non-migrants may have other attitudes towards family limitation and also their position in the local labour market is likely to be different.

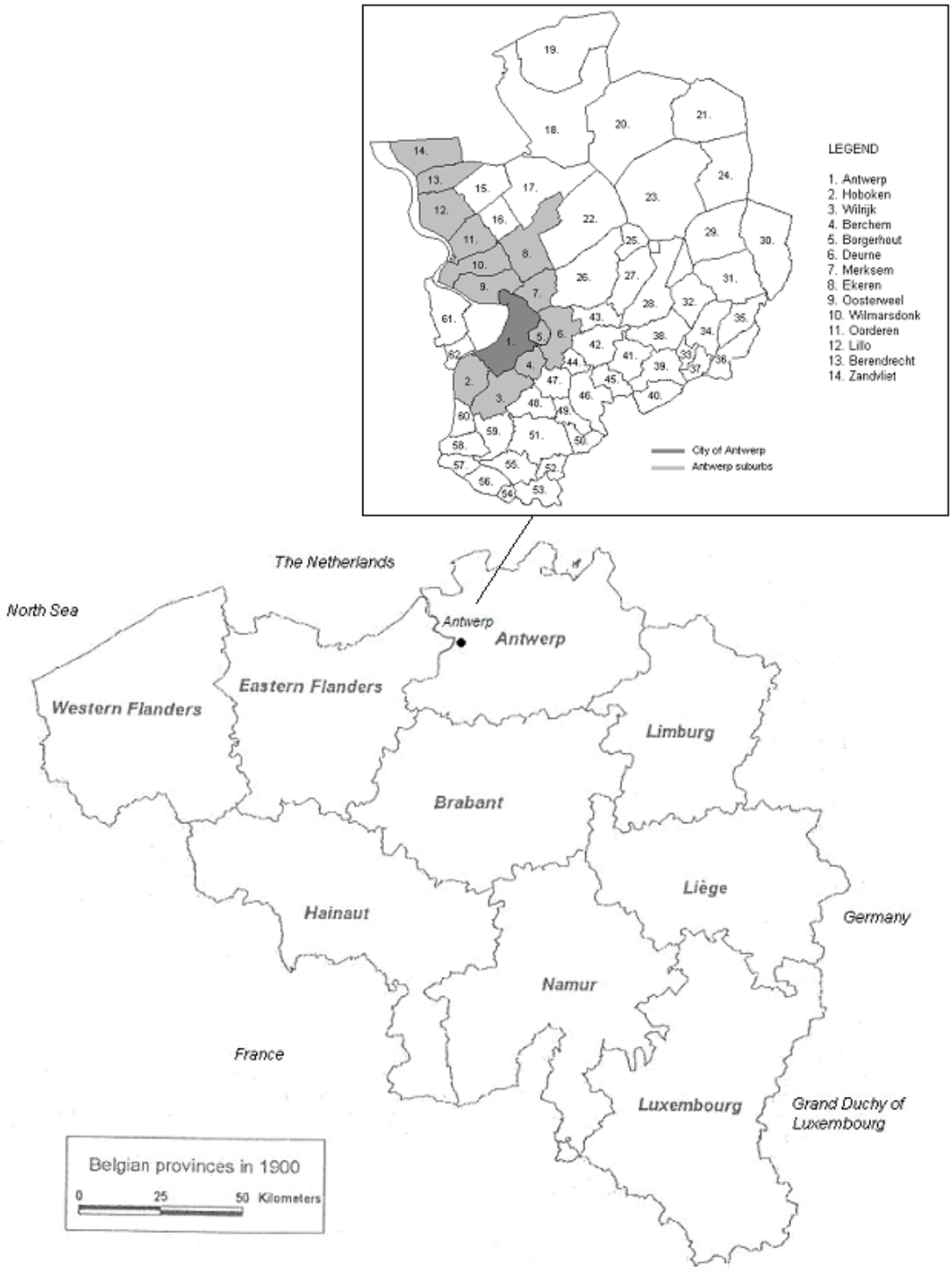
Context

We test the relation between family limitation and intergenerational social mobility with data from the Belgian city of Antwerp. During the 19th century, this important port city experienced major socio-economic and demographic transformations and became the beating heart of the province of Antwerp. From about 55 thousand inhabitants at the start of the 19th century, the Antwerp population grew fast in the following decades. In 1846, more than 88 thousand people were living in the port city. During the period 1846-1900, the demographic context changed even more dramatically. The port town then surpassed the front runner Brussels and developed into the biggest city of Belgium, with about 273 thousand inhabitants at the end of the 19th century. The annual average growth-rate evolved from 0.7 per cent in 1801-1810 to 3.2 per cent in 1881-1890.

The demographic expansion in the city of Antwerp was strongly influenced by migration. Because of the extensive lodging facilities in the suburb municipalities like Berchem, Borgerhout, Deurne, Hoboken and Merksem (see figure 1), large proportions of immigrants also settled in these suburb areas. The migration balance was positive due to a continuous, mostly male immigration to the port city. At the start of the nineteenth century, about 22% of the migrants were not born in the city of Antwerp. This proportion increased to 43% at the end of the nineteenth century

(Dierickx, 1954; Hannes & Soetewey-Campers, 1969; Kruithof, 1964; Lesthaeghe, 1977; Stockmans, 1886; Stockmans, 1900; Veraghtert, 1986; Vrielinck, 2000, 1668-1669; Winter, 2007).

Figure 1. Map of Belgium with the district of Antwerp, 1900.



In the first half of the 19th century, the economic context changed drastically in the city of Antwerp. Due to a shortage of investments, the textile production which was one of Antwerps main industries, imploded. By 1850, the employment in this sector was completely lost, whereas the harbour activities developed strongly. In the following decades, Antwerp evolved from an inland port to an international port characterized by an intensive exchange of goods. Both external and internal factors were responsible for this impressive expansion. The liberalization of the trading climate and the competition of neighbouring ports, together with the continuing industrialisation of Belgium, the rapid transformation in the Ruhr and the Rhineland (Germany) and the invasion of the European market by cheap foreign grain stimulated the development of port activities externally. Moreover, local initiatives were also undertaken to stimulate the industrial and commercial activities in Antwerp. The increasing shipping traffic of raw materials and the expansion of the railway network promoted the market possibilities. The concentration of economic activities, together with the increasing employment in the harbour and the strong demographic growth created a favourable climate for the establishment of industry. In 1896, more than 35% of industrial employment of the province of Antwerp was established in the port city and about two third was to be found in the surrounding area of Antwerp.

However, these transformations also had negative complications for the urban population of the port city: employment was much less regular, dock work was physically more demanding for men and women were much more needed in the tertiary industry. The thousands of immigrants who went to Antwerp because of the new employment possibilities were often confronted with housing, sanitary and integration problems. Moreover, the more than one million European migrants who

emigrated via Antwerp with the 'Red Star Line' to the United States also strengthened these problems during the last decennia of the 19th century (De Caigny, 2000; Jeuninckx, 1964; Kruithof, 1964; Lampo, 2002; Lis, 1986; Veraghtert, 1986; Winter, 2007)

Data

We use a new dataset called COR*. The database covers the period 1846 to 1920 in the city of Antwerp. The two main sources for the COR*-database are the population registers and the vital registration records. The data collection began in the population registers and has been supplemented with information from the vital registration records (birth, marriage and death certificates). The Belgian population registers are a high quality source that enables us to follow individuals, and their offspring, over time. From 1846 onwards, all Belgian municipalities were obliged to keep up a population register. This register is a repertory of demographic and social information on all official inhabitants of the municipality and the information is stored per house. For each house, all changes were recorded, such as births, deaths, marriages, divorces but also internal moves and external migration (Gutmann & van de Walle 1978, Leboutte & Obotela 1988).

After evaluation of the pros and cons of different sampling strategies, it has been decided to proceed by letter sampling: all persons registered in civil registration whose family name starts with a particular letter combination are selected in the sample (cf. the TRA*-sample in France, cf. Dupâquier and Kessler, 1992). The letter combination that is the basis of this sample, COR*, satisfies a number of conditions: a good geographical distribution over the Flemish territory, socio-demographic representativety and language sensitiveness (especially with regard to foreign people) (Van Baelen, 2007, 5-15).

Sample selection

The Antwerp COR*-database contains all persons who were living in the city of Antwerp during the years 1846-1920. For the present analyses, we selected men and women (called index or referece persons) and who were born between 1830 and 1900 (both birth years included) who were ever recorded to live in the city of Antwerp between 1846 and 1920. We look at intergenerational mobility by comparing male occupations in two generations, so the occupation of the father of the index persons has to be known in order to be included in the analysis. We then compare their occupations with the occupations of their sons (i.e. male index persons) or sons-in-law (for female index persons).

For men, we use their own occupational titles as recorded in their marriage act or in the population register. If different occupations were recorded at different occasions (for example at census, marriage, or immigration date), we selected the occupation recorded on the occasion of the first marriage, if applicable and available, or the occupation recorded closest to age 25 otherwise. By applying these criteria, we obtained 749 pairs of observations of occupations for both father and son. Yet, in 82 of these cases, the son's occupation was recorded when he was at most 13 years old and no occupation was recorded at a later date. We consider these child occupations to contain insufficient information about their own social status of destination and, therefore, removed them from the analysis. This leaves 667 father-son pairs of occupations available for analysis.

For female index persons, we use the occupation of their first marriage partners, if applicable and available. As a consequence, only women who married during the study period are included in the analysis. This amounts to 211 father – son-in-law pairs available for analysis. In sum, there are 878 pairs of occupations to

be analyzed: 667 father-son plus 211 father-son-in-law pairs. There are 523 different fathers involved. The regression analysis will apply random effects multilevel modelling in order to deal with the nested structure of the data.

Measuring social class: the SOCPO classifiation

In order to classify individuals in a social status hierarchy based on occupational information, we use the SOCPO classification scheme. SOCPO represents a hierarchy of social power (hence the acronym) and was designed to complement the Historical International Standard Classification of Occupations (HISCO, van Leeuwen et al., 2002), which distinguishes between occupations on the basis of the specific tasks associated with them.

The central concept of the SOCPO-scheme is social power. Social power is defined as the potential to influence one's destiny or life chances through control of scarce resources (Van de Putte & Miles, 2005). In this way, social power is seen as the general principle underlying the class structure. SOCPO distinguishes between economic and cultural sources of social power. Economic power is based on material resources of power, such as property. Cultural power is based on non-material power sources, namely societal evaluation. Both forms of power are, typically, related but they do not overlap completely.

SOCPO distinguishes between five dimensions underlying economic and cultural power:

1. property;
2. hierarchical position, i.e. the command position one has in an organizational structure (e.g. 'manager', 'foreman');
3. skill;

4. whether a person's work comprises predominantly manual or non-manual tasks;
5. pure status, i.e. a title that refers to basically ascribed qualities (such as 'knight') and does not directly refer to skill, property or hierarchical position. In historical sources these titles are often used as an alternative for an occupation. Often they are based on economic power, but these titles of pure status also reflect the presence of additional cultural power.

An important principle of the scheme is that these dimensions cannot be combined in a rigid or dichotomous way. For example, although it can be an important discriminator (Parkin, 1972), being a manual rather than a non-manual worker is not a dimension that divides all manual and all non-manual workers into separate groups. In SOCPO, this dimension is not operationalised for unskilled and semi-skilled workers, and therefore, for example, manual and non-manual semi-skilled workers belong to the same class (SP-level 2). This is because the additional social power related to the non-manual aspect of unskilled and semi-skilled work is irrelevant given the fact that there are virtually no material power sources present. An average shop assistant, for example, has a similar social power position to a semi-skilled manual worker. Therefore, it is important that a class scheme not only defines dimensions and their relation to social power but makes explicit how the dimensions are connected to each other. In this regard, the SOCPO-scheme is founded upon a clear set of arguments and practical procedures (Van de Putte & Miles, 2005).

The result is a scheme with five Social Power Levels. These levels are labelled 'elite' (SP-level 5), 'middle class' (SP-level 4), 'skilled workers' (SP-level 3), 'semi-skilled workers' (SP-level 2) and 'unskilled workers' (SP-level 1). Table 1 presents the basic dimensions of the SOCPO-scheme.

Table 1. The SOCPO-scheme, basic dimensions, categorisation and merging

SP-level	Property	Hierarchical position	Skill and manual/non-manual	Pure status
SP-level 5 Elite	Macro-scaled self employed	High commanders	Non-manual super skilled	Nobility
SP-level 4 Middle class	Medium-scaled self employed	Medium commanders	Non-manual skilled, manual super-skilled	
SP-level 3 Skilled		Low commanders	Manual skilled	
SP-level 2 Semi-skilled	Micro-scaled self employed		Semi-skilled	
SP-level 1 Unskilled			Unskilled	

The occupations mentioned in the Antwerp data have first been coded into HISCO, using the guidelines involved in that coding scheme. Next, standard recoding algorithms can be used to classify HISCO-codes into the SOCPO-levels. In Antwerp, the unskilled occupational group (SOCPO 1) consists mainly day labourers and dockworkers. Semi-skilled working class occupations (SOCPO 2) include soldiers as well as apprentices of traditional arts and crafts like forging, tailoring, and painting. Skilled occupations within the working classes (SOCPO 3) include mainly the traditional arts like the ones just mentioned. In addition, and typical of Antwerp, it also includes many apprentice diamond polishers; they are counted as skilled (and not semi-skilled). Middle class occupations (SOCPO 4) include white collar clerks and other office employees, next to experienced diamond polishers, and captains of ships and barges. Among the elite (SOCPO 5), we find professionals, engineers, merchants, and industrialists.

The upper panels of Tables 2 and 3 are the contingency tables for the pairs of father-son SOCPO-codes and for the pairs of father-son-in-law codes, respectively. For both tables, the hypothesis of statistical independence can safely be rejected (with $\chi^2 = 140.5$ and $\chi^2 = 49.4$, respectively, df=16 and $p<0.001$ in both cases). Note, however, that this is not really a fair statistical test since many fathers feature several times in it, i.e. once for every son c.q. every married daughter. The nested structure of the data will be dealt with in the multilevel regression analysis.

The lower panels of tables 2 and 3 report standardized residuals in order to get a first idea of the pattern of association. Standardized residuals behave like *z*-scores and are calculated as the difference between the observed frequency and the frequency expected under independence, divided by the standard error of that difference (Agresti and Finlay 2009: 229-231). Positive values indicate higher frequencies than expected under independence, negative values indicate lower than expected frequencies. Hence, values lower than -2 indicate a statistically significant negative association between the categories involved, values higher than +2 indicate a significantly positive association. Significant residuals are put in bold.

Table 2. Contingency table for occupations of fathers and sons, city of Antwerp, 1846-1920

Observed frequencies

Occupational status of father	Occupational status of son: 1. Unskilled	2. Semi-skilled	3. Skilled	4. Middle class	5. Elite	Total
1. Unskilled	108	39	26	30	2	205
2. Semi-skilled	36	47	26	32	2	143
3. Skilled	14	38	29	36	4	121
4. Middle class	32	31	34	81	5	183
5. Elite	5	0	1	6	3	15
Total	195	155	116	185	16	667

Standardized residuals

Occupational status of father	1. Unskilled	2. Semi-skilled	3. Skilled	4. Middle class	5. Elite
1. Unskilled	**8.87**	-1.72	**-2.14**	**-5.03**	-1.60
2. Semi-skilled	-1.20	**3.08**	0.28	-1.61	-0.88
3. Skilled	**-4.72**	**2.35**	**2.11**	0.55	0.72
4. Middle class	**-4.10**	**-2.37**	0.50	**5.86**	0.35
5. Elite	0.35	**-2.16**	-1.11	1.07	**4.51**

Inspection of the residuals for the father-son-table reveals that the unskilled are the most immobile group: sons of unskilled working class fathers are very likely to end up staying in the same social class they were born into. Second in terms of intergenerational immobility are the elite and the middle class (with standardized residuals equal to 4.51 and 5.86, respectively). There is significant positive association between the semi-skilled and the skilled working classes, and significant negative association between the middle classes and the semi-skilled and unskilled working classes. Associations with the elite, either in the paternal generation or in the sons', are mostly not significant due to low frequencies. Therefore, nothing much can be said about this group in particular.

Table 3. Contingency table for occupations of fathers and sons-in-law, city of Antwerp, 1846-1920

Observed frequencies

Occupational status of father	Occupational status of son-in-law: 1. Unskilled	2. Semi-skilled	3. Skilled	4. Middle class	5. Elite	Total
1. Unskilled	28	20	14	4	0	66
2. Semi-skilled	15	8	11	21	1	56
3. Skilled	11	4	4	12	0	31
4. Middle class	7	7	8	33	2	57
5. Elite	0	0	0	1	0	1
Total	61	39	37	71	3	211

Standardized residuals

Occupational status of father	1. Unskilled	2. Semi-skilled	3. Skilled	4. Middle class	5. Elite
1. Unskilled	**2.92**	**2.98**	0.95	**-5.72**	-1.18
2. Semi-skilled	-0.41	-0.94	0.48	0.71	0.27
3. Skilled	0.87	-0.87	-0.73	0.65	-0.72
4. Middle class	**-3.24**	-1.41	-0.81	**4.53**	1.56
5. Elite	-0.64	-0.48	-0.46	1.41	-0.12

The same holds for most of the cells in the contingency table for the status of fathers and their sons-in-law (Table 3): due to low frequencies, most associations between occupational groups are not statistically significant. Yet, an interesting exception is the significantly positive association between unskilled fathers and semi-skilled sons-in-law. There is no equivalent positive association in the father-son table, which suggests that it was easier for daughters from the lowest social class to marry somewhat up into the (semi-)skilled labouring classes than it was for sons from the same social class to reach the same occupational position themselves.

Given the small number of observations in many of the cells, especially in the highest social status group (socpo=5), and generally for the pairs of fathers and sons-in-law, we decided to merge some of the occupational groups. First, the elite were merged with the middle class to represent the “high” social status group. The working

classes, blue collar or not (SOCPO 1 to 3), were grouped based on the criterion of whether the occupation mentioned implies any trained skill (SOCPO 2 and 3) or not (SOCPO 1). So, the merging was done on these grounds as follows:

- elite + middle class (socpo 4 and 5): called “middle class”;
- skilled + semi-skilled (socpo 2 and 3): called “skilled working class”;
- uskilled group (socpo 1): called “unskilled working class”.

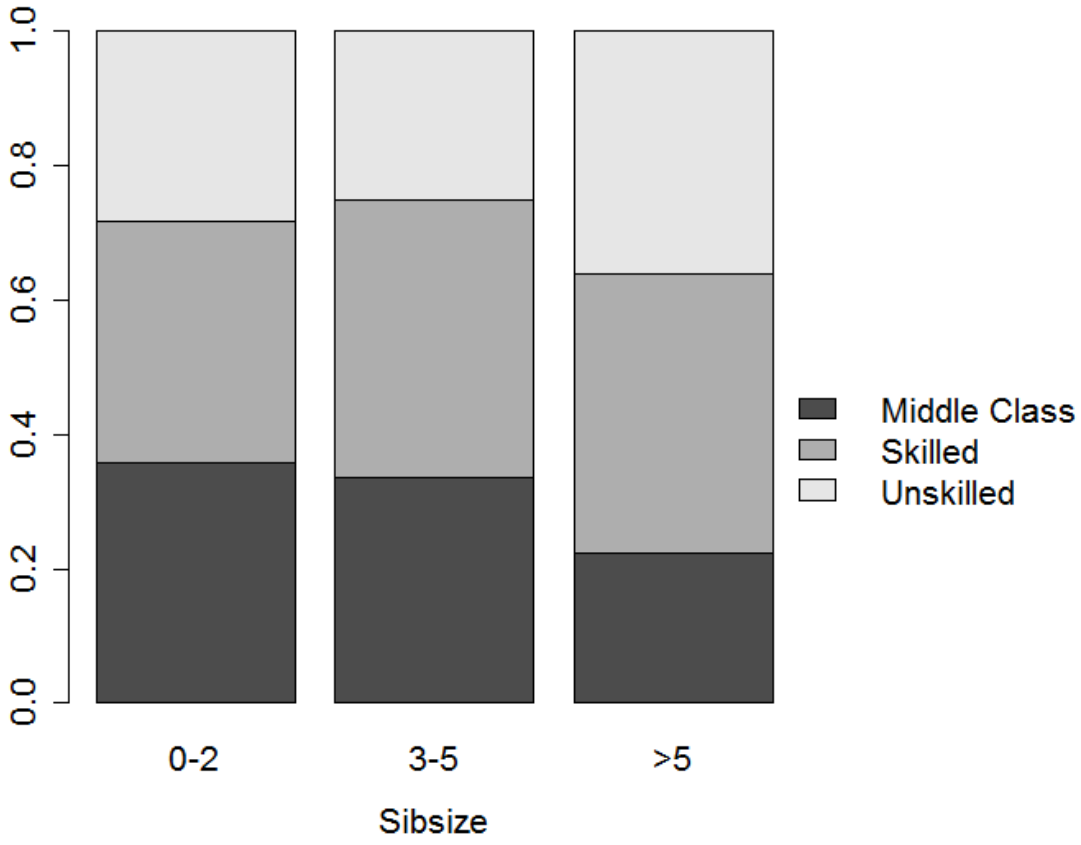
We now jointly analyze the social class destinies of sons and daughers, measuring the social class of sons by their own occupations, and the social class of daughters by the occupations held by their first marriage partners.

Descriptive results

Sibsize and social class

A person’s sibsize is defined as his or her number of siblings. Sibsize evolves over time: it increases when new brothers or sisters are born and decreases when some of them die. In all subsequent analyses, we have measured sibsize at age 20. Only full brothers and sisters have been counted, i.e. only people sharing the same biological mother and father were considered as siblings. Another limitation is that we could only count brothers and sisters who had at some point in time been registered in the Antwerp civil registration system. As a result, we may underestimate the sibsize of people whose parents did not stay in Antwerp during their complete reproductive lives. In order to account for this, we constructed a dummy variable indicating whether or not the mother of the index person stayed in Antwerp between ages 15 and 49. If this was not the case, the reported sibsize may be lower than it actually was. Therefore, we enter the dummy variable in the regression analyses to see how it affects our results.

Figure 2. Distribution of children's social status destination by number of siblings, City of Antwerp, generations born between 1830 and 1920



Bivariate descriptive statistics do suggest that the social class destinies of sons and daughters from Antwerp fathers were related to their sibsizes (see Figure 2). For example, the more siblings a man or woman had, the less likely he or she would end up in the middle class (as measured by own occupation for sons or by the husband's occupation for daughters): 36% of those with at most two brothers and sisters had a middle class destination, as compared to 34% of those with three to five siblings and only 22% of those with more than five siblings. The relations between sibsize and the other social status destinations are more erratic. Still, whereas between 25 and 28%

of people with at most five siblings ended up in the unskilled working classes, this amounted to more than 36% of those with more than five siblings.

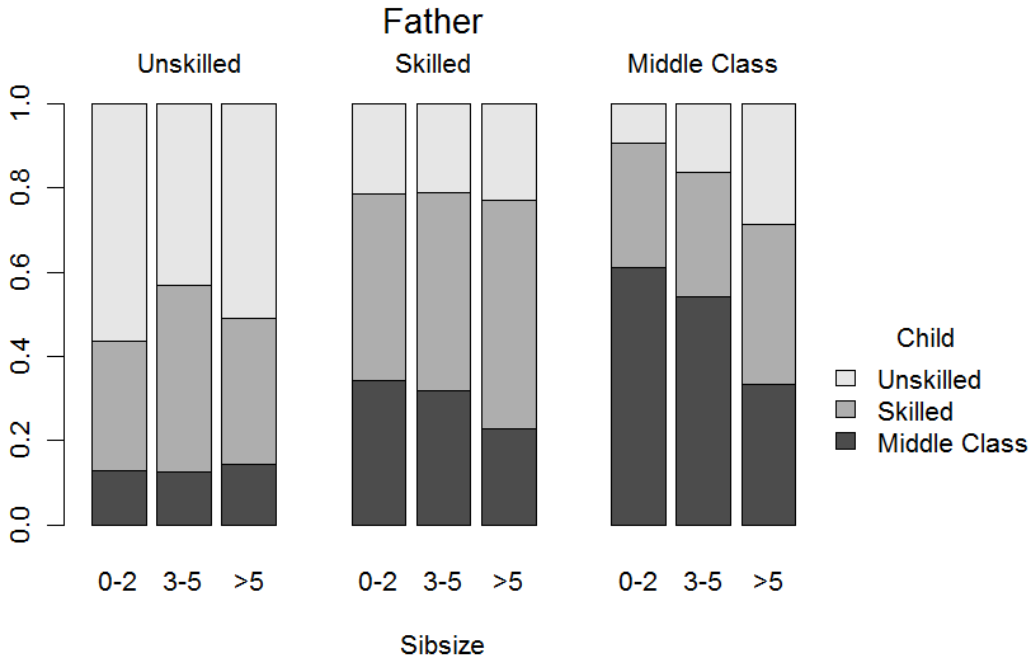
Yet, the suggested negative relationship between sibsize and social status destination may be spurious because, as a rule, birth control was first practiced, or practiced more intensely, in the middle and higher classes and only later in the working classes. Therefore, the relationship suggested in Figure 2 may reflect what is in fact inheritance of social class: middle class fathers may have been more likely to limit their offspring, resulting in their sons and daughters having smaller sibsizes, while at the same time being more likely to attain a middle class status, not because of the sibsize but due to inheritance through other mechanisms.

In order to check whether the relationship between sibsize and the social class destination of children still holds after controlling for their social class origin, Figure 3 gives the relevant distributions by social class of the father. It appears that sibsize is still negatively associated with children's own social class after controlling for their social class background. The figure does suggest, however, that the association may hold only for the skilled working and middle classes, not for the unskilled working classes. Children from the skilled working and middle classes were more likely to achieve a middle class position and less likely to end up in the unskilled group if they had fewer brothers and sisters. There is no such clear pattern for children from unskilled fathers.

Descriptive statistics about the relationship between father's social class and sibsize suggest that small families were just as common in the unskilled and the skilled working classes as in the middle classes during the study period in Antwerp (see Figure 4). That is: 31 to 33% of the study generation had at most 2 siblings alive in the city of Antwerp when they reached age 20. This also suggests that the observed association between small sibsize and middle class status destination was not

spurious in Antwerp. On the other hand, large families (more than 5 siblings) were clearly more common in the unskilled (36%) than in the skilled (21%) working classes or in the middle class (26%). The differences between the social classes of origin in average sibsize remain small and are not significant (as far as can be judged from t-tests): 4.1 (unskilled), 3.6 (skilled), and 3.9 (middle class), with standard deviation equal to about 2.5 in all cases.

Figure 3. Distribution of children's social class destination by social class of the father and by number of siblings, City of Antwerp, generations born between 1830 and 1920



Sibsize is defined as the number of brothers and sisters alive when the reference person reaches age 20. Hence, small sibsize may be the result of two different mechanisms: low fertility or high child mortality, or both at the same time. The equal prevalence of small families in all social classes may therefore reflect

differences in child mortality rather than equality of fertility. This was indeed the case: child mortality was higher in the unskilled than in the skilled working class, and it was higher in the skilled working than in the middle class (see Figure 5). 21% of the people from the unskilled working class had at least two deceased siblings, wheareas this was 18% in the skilled working class and only 8% in the middle class.

Figure 4. Distribution of sibsize by father's social class, City of Antwerp, generations born between 1830 and 1920

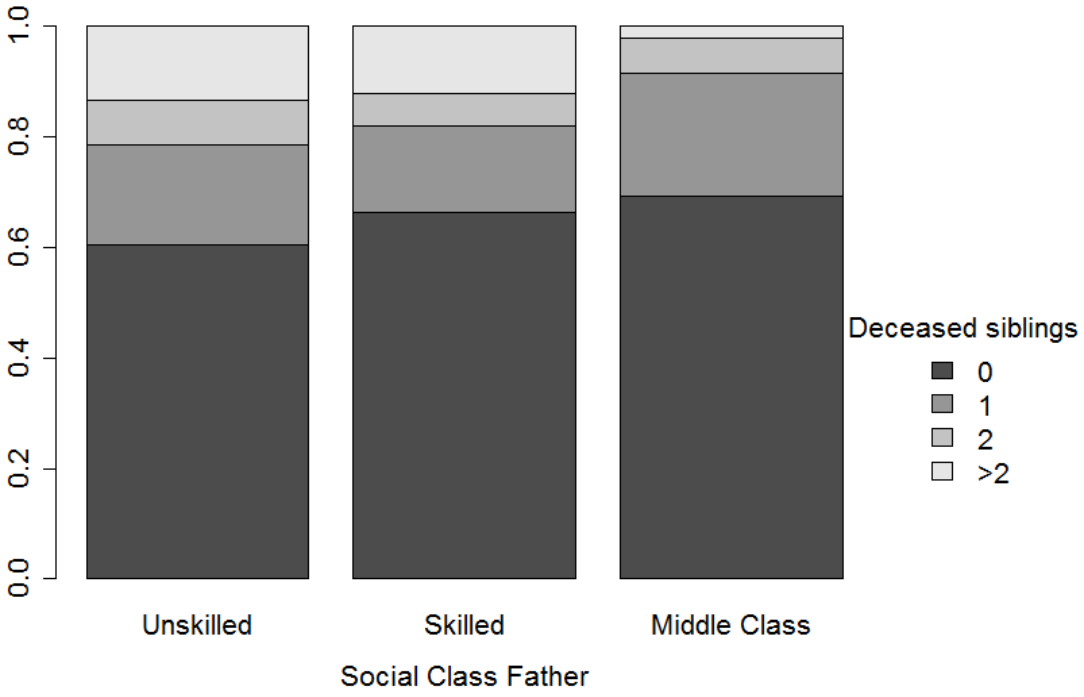


Birth order

Even if the relationship between sibsize and a child's own social class still holds after controlling for the father's social class, it may still be spurious for another reason. The number of siblings is correlated with birth order: people with one or two siblings cannot have birth order six or seven, and first-born children are more likely to be

found among families with one or two children than among bigger families. As a consequence, if birth order has an effect on social status, it may be captured by sibsize.

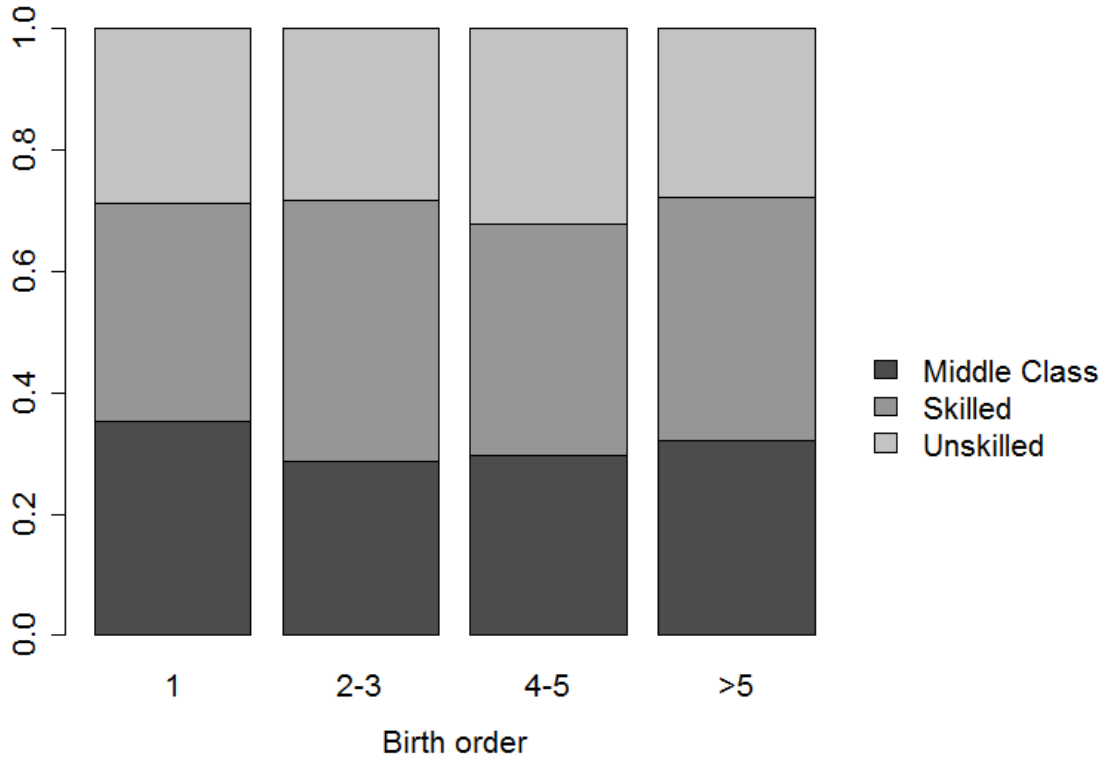
Figure 5. Distribution of the number of deceased siblings by social class of father



Yet, Figure 6 suggests that the correlation between birth order and social status is weak at most. There were somewhat more first-born children ending up in the middle class than children with higher birth orders, but otherwise, the pattern is rather erratic. A chi-squared test for the underlying contingency table indicates that there is no significant dependence ($\chi^2=4.79$, df=6, $p>0.57$). It remains to be seen how this variable is related to the social class destination of children in a multiple

regression framework, controlling at the same time for social class background, sibsize, and other possibly confounding factors.

Figure 6. Distribution of children's social status destination by birth order, City of Antwerp, generations born between 1830 and 1920



Migration and incomplete sibsize

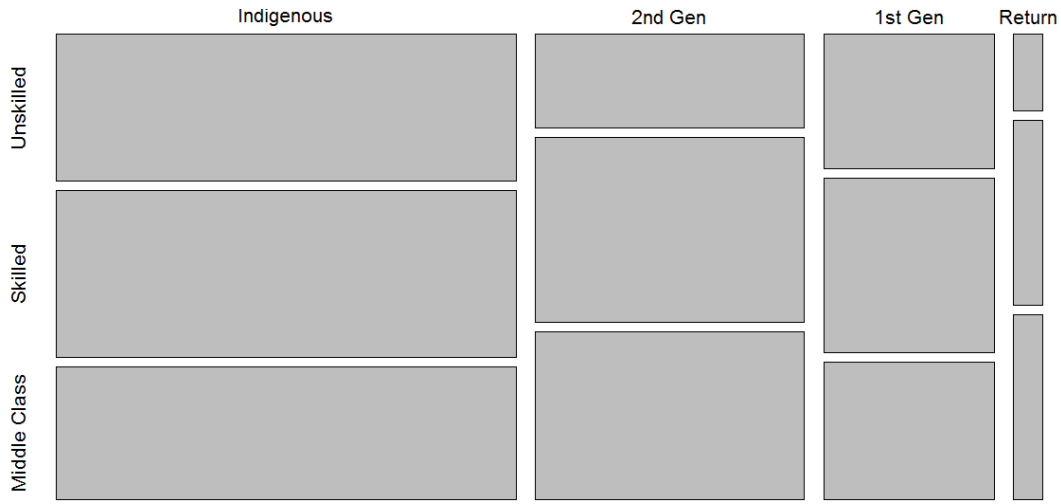
One of these other, potentially confounding factors may be whether or not we have complete information about the reproductive lives of the parents of our study persons. Most parents of the study persons did not live in the city of Antwerp during their complete reproductive lives. This implies that we may be lacking any information brothers or sisters of the study persons who never lived or died in

Antwerp. As a result we may be underestimating the sibsizes of sons and daughters from migrant families. If migration is related to social class, then our estimates of the impact of sibsize on social class will be biased.

As said, in order to account for this, we constructed a dummy variable indicating whether or not the mother of the reference person had been registered in the population registers of the city of Antwerp all the time between reaching age 15 and reaching age 49. In addition, we constructed a set of dummies indicating the migration history of the family we are looking at.

We consider persons as indigenous when both the father and the reference person were born in the city of Antwerp. These amount to nearly half of the reference persons. First generation migrants are the ones who where born outside Antwerp themselves, as well as their fathers. They make up about 18% of the study generation. Second generation migrants are persons who where born in Antwerp themselves, but whose fathers were born outside the city. They represent 30% of the study population. Finally, persons who were born outside Antwerp, but whose fathers were born inside the city, we call return migrants. They account for 3% of the study generation only (see Table 4). Judging from the bivariate relationship, it seems that skilled working class as well as middle class occupations where more frequent among second generation migrant families as well as among return migrants (see Figure 7). Among the indigenous and first generation migrants, people divided between the three social classes in about equal shares.

Figure 7. Mosaic plot of social class destination by family migration history



Age at recording of occupation

The occupational class of a person may change over time as a result of career mobility. Therefore, occupational status is contingent on the age at which it is measured. From our data source, we can tell in most cases at what date an occupation was recorded, so we can calculate the age at measurement of the occupational status.

We tried to use as much as possible the occupations mentioned at the time of first marriage. Yet, no marriage act was available for all study persons (or their spouses, in case the reference person is a woman). If no occupational information was available for the time of marriage, we selected the occupation mentioned as close as possible to the date of the 25th birthday (of the male reference persons, or of the male spouses of female reference persons). We excluded all cases from the analysis if the only occupation available was recorded when the person was below age 14, since

we consider most occupations pursued below that age are typical for childhood. These may not be representative for the occupation pursued during adulthood.

Figure 8 displays the frequency distributions of the age at recording of occupational status by social class destination. In most cases in all social classes, most occupations were recorded around age 25. The average ages at the recording of the occupational status are 23.2, 22.4, and 24,2 for the unskilled, skilled, and middle classes respectively. The differences are not statistically significant (according to t-tests).

Figure 8. Histograms of age at recording of occupational status, by social class destination

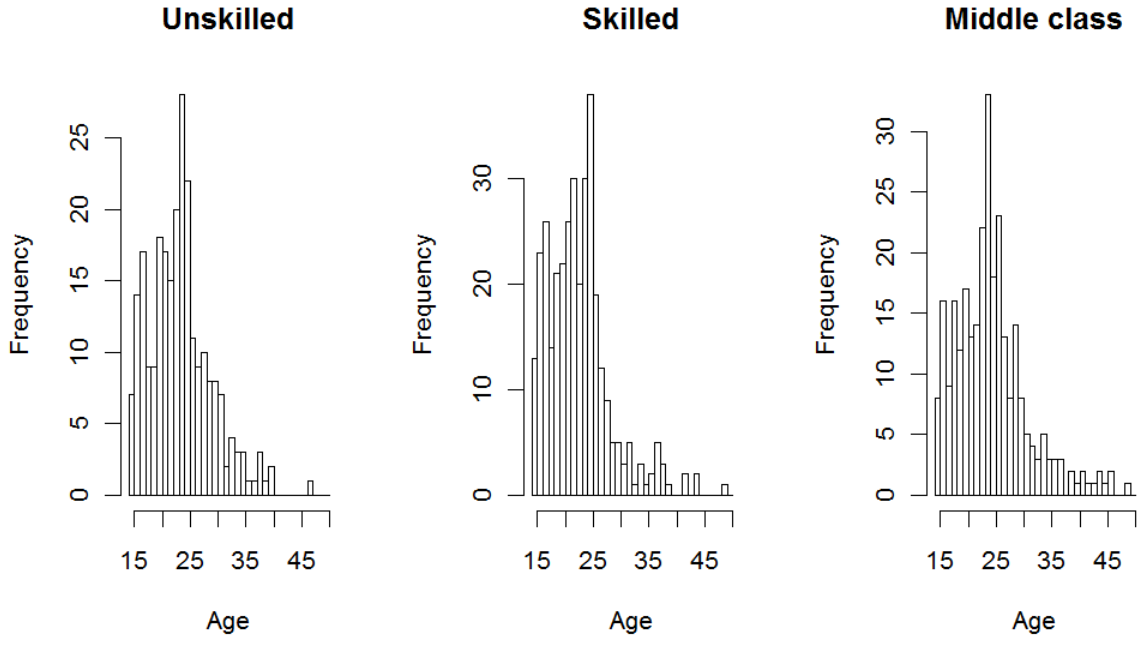


Table 4. Basic descriptive statistics of the variables used in the analysis

	N	%	Min	Max	Mean	STD
Social Class Father						
- Unskilled working class	292	30.2				
- Skilled working class	386	39.9				
- Middle and upper class	290	30.0				
Total	968	100.0				
Gender of reference person						
- male	784	77.2				
- female	231	22.8				
Year of birth of reference person	1015		1830	1900	1872	17.2
Age at recording of occupation	994		14	54	22.5	6.4
Birth order	1015		1	15	2.9	2.2
Sibsize	1015		0	15	3.9	2.6
Complete info reproductive life of mother?						
- yes	574	56.6				
- no	441	43.4				
Migration history of family						
- Indigenous	495	48.8				
- First generation	184	18.1				
- Second generation	304	30.0				
- Return migrant	32	3.2				
Total	1015	100.0				
Own Social Class						
- Unskilled working class	262	28.5				
- Skilled working class	359	39.0				
- Middle and upper class	299	32.5				
Total	920	100.0				

Regression analysis

Our basic modelling strategy follows Van Bavel (2006) in that we model the probability for reference persons of ending up in a particular social class by means of logistic regression. In the descriptive analyses presented so far, all reference persons from the study generation were treated as independent observations. We did not take into account that different reference persons may be sons and daughters from one and the same father. Fathers, and their families, may differ in their ability and eagerness to enhance or maintain the social status of their children. This may affect the social class destination of several of their children in the same way.

In the following regression analyses, we take the nested structure of the data into account, i.e. the fact that several children may belong to one and the same father. We do this by applying two-level random effects modelling. In these kinds of models, variation in the dependent variable is explicitly modelled to stem from two different sources. In our case, we distinguish between variation on the father- or family level (i.e. sources of variation shared by children from the same father), and variation on the level of individual sons and daughters:

$$\text{logit}(P_{ijk}) = \mathbf{x_{ij}}'\boldsymbol{\beta}_\mathbf{k} + \mathbf{z_j}'\boldsymbol{\gamma}_\mathbf{k} + u_{jk} + e_{ijk} \qquad (1)$$

The probability that a reference person *i*, son or daughter from father *j*, ends up in social class *k* is modelled to be a function of a vector of individual-specific characteristics (like birth order and gender) $\mathbf{x_{ij}}$ with associated, class-specific slopes $\boldsymbol{\beta}_\mathbf{k}$, and of a vector of family-specific characteristics (like social class as measured from the father's occupation) $\mathbf{z_j}$, again with associated, class-specific slopes $\boldsymbol{\gamma}_\mathbf{k}$. In addition, we add a random effect u_{jk}, specific for family *j* and social class destination *k*. In order to estimate the model, we assume u_{jk} to have a normal distribution with mean zero and variance to be estimated. We add this term mainly to get robust estimates for the standard errors for the fixed effects (i.e. for the slopes $\boldsymbol{\beta}_\mathbf{k}$ and $\boldsymbol{\gamma}_\mathbf{k}$); without this term, estimated standard errors would be biased (Snijders & Bosker 1999; Agresti 2002). The residual on the individual level (e_{ijk}) is fixed to have unit variance, as usual in logistic regression. All models were fit using the Laplace approximation, implemented in R's package *lme4* (Bates and Sarkar 2007).

In a first step, the social class destinations of children are modelled as a function of the father's social class, the gender of the reference person, his or her

(centered) birth year, the age at the recording of the occupation in the child generation, the completeness of the information about the mother's reproductive live, and, last but not least, birth order and sibsize. The estimates of the fixed and random effects are in table 5 (Model I).

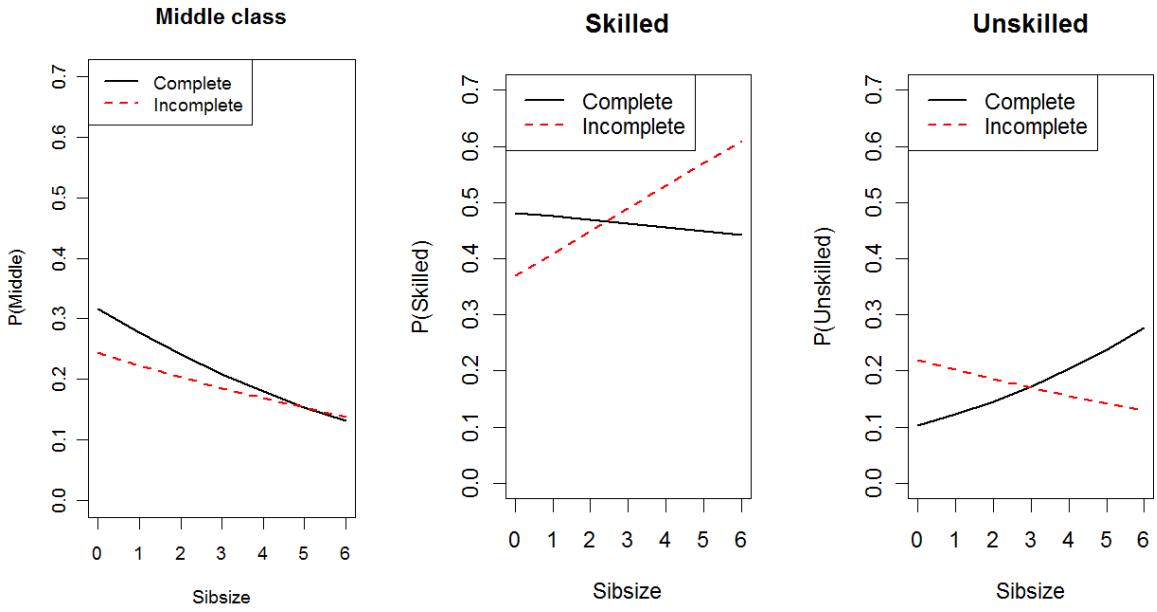
First, the results confirm strong social class inheritance effects: children are likely to end up in the same social class as they were born into. A higher age at registration of the occupation is associated with somewhat higher chances to attain a middle class status and lower chances to attain skilled working class status. There are no significant effects of birth year, gender, or birth order.

Sibsize, in contrast, appears to have a significantly negative effect on the chances to reach a middle class status and a significantly positive effect on the chances to end up in the unskilled working class. However, not only the strength but also the sign of the effect in some cases depends on whether or not we can consider the sibsize observed in Antwerp as complete or not. Indeed, there are some significant interactions of the effect of sibsize with whether or not we have full information about the reproductive history of the mother. These interactions are illustrated in Figure 9.

Chances to attain a middle class status where hindered by a large sibsize, but the effect is weaker if the sibsize is likely to be underestimated, as could be expected. The expected probability to reach a skilled working class status is not affected by sibsize in case of full information about the reproductive history of the mother. However, there is a strong positive effect if the real sibsize might be bigger due to incomplete information about the mother's reproductive history. The reverse holds for the probability to end up in the unskilled working class: there is a significantly positive association between large sibsize and going for this lowest social class when the information about sibsize is complete; the association is negative, however, in

case of potentially incomplete information. The last model will tell us whether this has something to do with the migration history of the families involved.

Figure 9. Effect of the observed sibsize on the chances to end up in the social class indicated above the graphs, by completeness of the information about the reproductive career of the mother*



* predicted probabilities are for first-born sons with a skilled working class father born in 1865 who recorded their occupation at age 25

The set of models just discussed assume that sibsize has the same effect on the social status destination, irrespective of the father's social class background. To relax this assumption, the second set of models allows the effect of sibsize to vary by father's social class (Model II in Table 5). The sizes of the estimated effects are graphically presented in Figure 10.

Sibsize appears to have no effect at all on the chances of children with an unskilled working class background to reach a middle class status themselves. For

children with a skilled working class father, there are indications of a small positive effect of having just a few borthers and sisters on the likelihood to climb into the middle class, but the effect is statistically not significant. For sons and daughters of a middle class father, however, sibsize clearly matters a lot: large sibsize is associated with a steep decline in the likelihood to maintain the social status of the father.

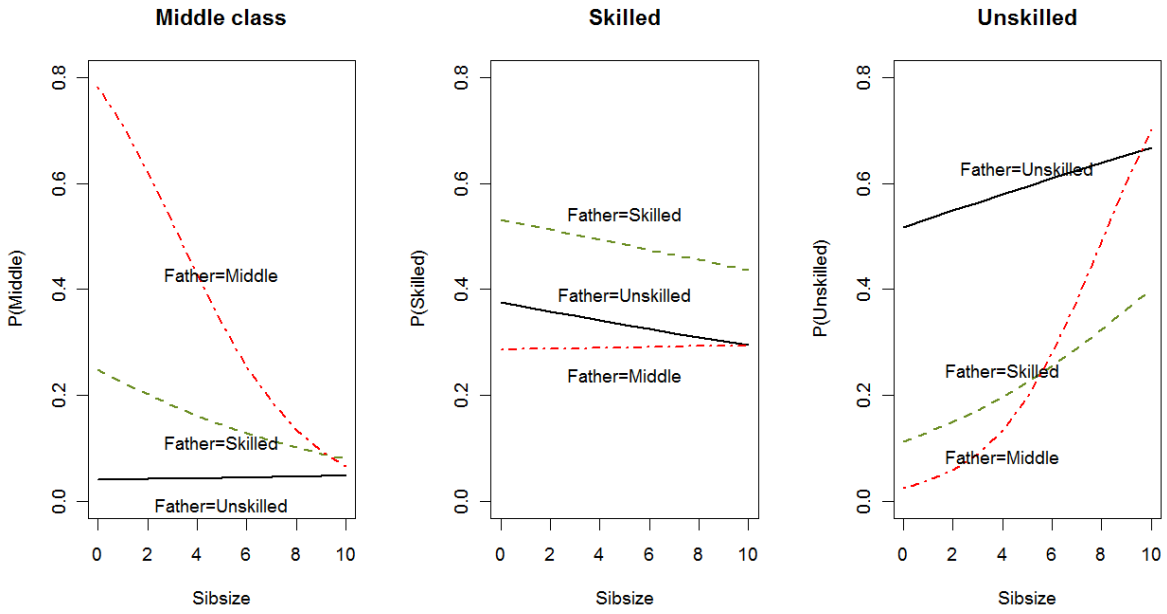
The estimates suggest that a large sibsize decreases the probability to reach or maintain a skilled working class status for children with an unskilled or skilled working class father, respectively. Yet, the effects are small at most and not statistically significant. Further down the social ladder, sibsize again matters a lot for children born in the middle class: having many brothers and sisters is strongly associated with steeply rising chances to end up in the unskilled working classes (see the graph to the right of Figure 10). This mirrors the strong negative effect of sibsize on the likelihood to maintain a middle class status (as illustrated in the graph to the left of Figure 10). For children who were born in the skilled or unskilled working class, there is also some evidence of a positive association between large sibsize and a high probability to go down to, or stay in, the lowest status group. Again, the latter effects are smaller and not statistically significant.

The last set of models (Model III in Table 5) includes indicators for the migration status as well as an interaction between the social status of origin and the sex of the reference person. The latter interaction was included to check whether status inheritance would be stronger or weaker for women than for men.

Looking at the model for a middle class status destination first, it appears that women born to a father with a skilled working class or a middle class background are significantly more likely to marry with a man with at least a middle class status than sons with the same social class background have to attain a middle class occupation themselves. This suggests that daughters were more instrumental for a family than

sons if the issue was to maintain or climb to a middle class status in the next generation.

Figure 10. Predicted probability of reaching the social class indicated above the graphs, by social class of the father and sibsize



Finally, there is no evidence that migration, either by the parent or by the child, mattered significantly for the chances to have a skilled working class or middle class destination. However, second generation children, i.e. children who were born in Antwerp but their fathers were not, had a lower likelihood to end up in the unskilled working class than did natives. This is remarkable since there is no significant difference between natives and first generation migrant children – i.e. children who migrated into Antwerp themselves.

Table 5. Multilevel logistic regression models of the probability to attain a particular social status destination, city of Antwerp, generations born between 1830 and 1900.

	SOCIAL STATUS DESTINATION											
	MIDDLE CLASS				SKILLED WORKING				UNSKILLED WORKING			
MODEL I	b	se	p<=		b	se	p<=		b	se	p<=	
Intercept	-3.168	0.559	0.000	***	0.054	0.406	0.894		-0.547	0.475	0.250	
Social Class of Father (unskilled=ref)												
- Skilled working class	1.441	0.341	0.000	***	0.635	0.213	0.003	**	-1.747	0.249	0.000	***
- Middle class	2.934	0.350	0.000	***	-0.249	0.235	0.288		-2.202	0.291	0.000	***
Reference person is daugher (ref=son)	0.295	0.239	0.218		-0.237	0.189	0.211		0.036	0.221	0.872	
Year of birth (centered around 1865)	0.010	0.007	0.170		-0.002	0.005	0.673		-0.007	0.007	0.314	
Age at recording of occupation	0.034	0.017	0.046	*	-0.031	0.014	0.025	*	0.008	0.016	0.602	
Birth order	0.093	0.059	0.114		0.006	0.046	0.888		-0.090	0.054	0.094	.
Sibsize	-0.186	0.072	0.010	*	-0.026	0.052	0.613		0.202	0.061	0.001	***
Reprod. history mother incomplete	-0.357	0.415	0.390		-0.461	0.316	0.145		0.905	0.387	0.019	*
... X Sibsize	0.069	0.096	0.470		0.190	0.070	0.007	**	-0.309	0.087	0.000	***
Family STD	1.556				0.92965				1.1593			
BIC	996.3				1179				989.2			
-2LL	922				1104				914.8			
MODEL II												
Intercept	-3.915	0.696	0.000	***	0.102	0.451	0.822		-0.033	0.5055	0.947	
Social Class of Father (unskilled=ref)												
- Skilled working class	2.046	0.632	0.001	**	0.637	0.382	0.096	.	-2.138	0.431	0.000	***
- Middle class	4.434	0.662	0.000	***	-0.402	0.429	0.349		-3.736	0.5804	0.000	***
Reference person is daugher (ref=son)	0.332	0.240	0.167		-0.241	0.190	0.204		-0.009	0.2216	0.966	
Year of birth (centered around 1865)	0.009	0.007	0.206		-0.002	0.005	0.681		-0.006	0.0066	0.359	
Age at recording of occupation	0.034	0.017	0.052	.	-0.031	0.014	0.025	*	0.0095	0.0161	0.557	
Birth order	0.087	0.059	0.142		0.007	0.046	0.881		-0.085	0.0529	0.107	
Sibsize	0.018	0.122	0.881		-0.036	0.075	0.628		0.0625	0.0808	0.439	
Reprod. history mother incomplete	-0.344	0.425	0.418		-0.467	0.317	0.140		0.8788	0.394	0.026	*
... X Sibsize	0.073	0.096	0.443		0.189	0.070	0.007	**	-0.301	0.086	0.000	***
Sibsize X ...												
... Skilled working class father	-0.152	0.132	0.250		-0.002	0.084	0.984		0.1041	0.0953	0.275	
... Middle class father	-0.410	0.139	0.003	**	0.040	0.093	0.666		0.3897	0.1154	0.001	***
Family STD	1.5211				0.92875				1.1175			
BIC	999.8				1192				990.7			
-2LL	912				1104				902.8			
MODEL III												
Intercept	-3.567	0.719	0.000	***	-0.445	0.484	0.358		0.379	0.534	0.477	
Social Class of Father (unskilled=ref)												
- Skilled working class	1.598	0.651	0.014	*	1.173	0.413	0.005	**	-2.505	0.465	0.000	***
- Middle class	3.975	0.675	0.000	***	-0.031	0.454	0.945		-3.820	0.593	0.000	***
Reference person is daugher (ref=son)	-1.624	0.879	0.065	.	0.806	0.339	0.017	*	-0.322	0.351	0.358	
... X Skilled working class father	2.190	0.945	0.020	*	-1.683	0.451	0.000	***	0.903	0.485	0.063	.
... X Middle class father	2.574	0.971	0.008	**	-1.217	0.515	0.018	*	-0.504	0.679	0.458	
Year of birth (centered around 1865)	0.008	0.007	0.287		-0.003	0.006	0.633		-0.003	0.007	0.642	
Age at recording of occupation	0.031	0.018	0.083	.	-0.026	0.014	0.061	.	0.007	0.016	0.668	
Birth order	0.072	0.060	0.231		0.001	0.047	0.985		-0.056	0.054	0.301	
Sibsize	0.009	0.123	0.943		-0.001	0.077	0.985		0.022	0.081	0.789	
Reprod. history mother incomplete	-0.297	0.427	0.487		-0.493	0.321	0.124		0.852	0.395	0.031	*
Migration history (ref=Indigenous)												
- First generation migrant	-0.146	0.335	0.662		0.074	0.246	0.764		0.092	0.285	0.747	
- Second generation migrant	0.334	0.281	0.233		0.293	0.209	0.162		-0.802	0.264	0.002	**
- Return migrant	1.055	0.688	0.125		0.029	0.542	0.958		-1.061	0.722	0.142	
Sibsize X ...												
...Reprod. history incomplete	0.080	0.096	0.407		0.174	0.071	0.014	*	-0.280	0.086	0.001	**
... Skilled working class father	-0.137	0.133	0.303		-0.036	0.085	0.670		0.138	0.096	0.150	
... Middle class father	-0.400	0.140	0.004	**	0.020	0.094	0.833		0.418	0.115	0.000	***
Family STD	1.5006				0.94078				1.0744			
BIC	1019				1211				1006			
-2LL	897.4				1089				884.2			
N children	863				863				863			
N fathers	454				454				454			

Conclusions

This paper has shown that the number of siblings affected the social class destination of people born between 1830 and 1900 who ever lived in the city of Antwerp between 1846 and 1920. Due to data limitations, we distinguished between three social classes, based on the occupations mentioned in civil registration: the unskilled working class, the skilled working class, and the middle class. The latter social class also includes the elite, but their number is so low that it is not feasible to put them in a separate category.

Sibsize mattered in Antwerp particularly for sons and daughters born into the middle class: a high number of brothers and sisters was associated for them with steeply declining chances to maintain the relatively high occupational status of their fathers. Remarkably, in case of a very high sibsize (more than 5 siblings), middle class sons and daughters were more likely to end up in the unskilled than in the skilled working classes. The effect of sibsize on the intergenerational mobility of sons and daughters with a working class background were much smaller and often not statistically significant. Yet, the effects all run in the direction of a large number of siblings increasing the odds to go down the social ladder.

Overall, if family size limitation was used by parents in order to support the positions of children on the social ladder, the results in Antwerp suggest that it was only effective as a defensive strategy. Limiting the number of offspring would increase the chances that sons and daughters would maintain their social status, especially in the middle classes. Having a large seed resulted in a significant proportion of the children going down the social ladder.

All this holds when we do have complete information about the reproductive life stage of the mother. In situations when the information is incomplete and when there is a serious risk of underestimating the actual sibsize, the effects went sometimes in unexpected, opposite directions. These could not be explained away by migration.

There is no evidence that migration mattered significantly for the chances to have a skilled working class or middle class destination. Yet, remarkably, second generation children, who were born in Antwerp while their fathers were not, had lower chances to end up in the lowest, unskilled working class than did natives. There was no such significant difference between natives and first generation newcomers to Antwerp.

In all social classes, sons and daughters tended to inherit the social class of their fathers, but the inheritance effects were strongest in the middle class and in the unskilled working class. There are significant gender differences with respect to the inheritance of social class: daughters from a middle class or skilled working class father were significantly more likely to marry a man with at least a middle class status occupation than sons born into the same classes were likely to have at least a middle class status occupation themselves. From the perspective of family strategies with respect to their social status, this suggests that having daughters would be more instrumental than having sons to climb the ladder, or to maintain a favourable position.

If we assume that parents have a preference for their children to maintain or enhance their social status, fertility can be expected to decline when society evolves in such a way that lower fertility enhances the probability that children climb the social ladder, or maintain a favourable position on that ladder. They would be motivated to limit their family sizes if a large seed would increase the chances of social devaluation

in the next generation. The analysis in this paper showed, for one urban population in Belgium, that fertility limitation would indeed be effective in enhancing the likelihood that children would maintain their social status. Yet, it would not have been effective as a strategy to enhance their children's status as compared to their own. In sum, family size limitation worked as a defensive rather than as an offensive social strategy.

If the relation between family size and intergenerational mobility has a major explanatory value for the fertility transition, the kind of effects found here should not be found before the demographic transition. Maybe the number of children was less important for children's social mobility in pre-industrial Europe? Maybe this connection emerged only during the economic modernization? If that were true, the linkage between family size and intergenerational mobility may well be important in explaining the fertility transition.

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