The Birth Order Effect: A Modern Phenomenon?*

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Abstract

We provide a historical perspective on the birth order effect by examining differences in adult occupational rank among brothers in 19th and early 20th century Netherlands. Using a rich historical dataset compiling administrative birth and marriage registry records linking family members, we further analyze the role of family composition and socio-economic status in modulating the birth order effect. While consistent with findings in modern developed countries, we find that later-born males hold lower-ranked occupations than their older male siblings, we also find that, consistent with modern evidence from emerging economies like India and China, this negative birth order effect is primarily driven by differences between the first- and the last-born and their siblings, and by the number of brothers (but not sisters) in the family. Birth order differences—particularly the first-born advantage—are larger among socio-economically advantaged families and in more urbanised areas, while the opposite is true for the last-born effect. Surprisingly, the first-born advantage or son-preference is not driven by inheritance rules or transmission of occupations to children born earlier in the family. Taken together, our findings suggest that birth order effects and quantity-quality tradeoffs in families, are not merely modern phenomena but have been a source of context-dependent intrahousehold inequality throughout the centuries.

Keywords: Birth order, first-born, last-born, siblings, occupational rank, gender, the Netherlands, historical data.

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1 Introduction

Family composition has long been recognized as one of the long-term determinants of human capital, labour market outcomes, and socio-economic status (Becker, 1960). Economists and historians have described the so-called "quality-quantity tradeoff" in families—a negative relationship between family size and children's outcomes—both in modern and historical settings (Fernihough, 2017; Becker et al., 2010). Recent economic research on families in modern developed countries shows that growing up in a large family is largely explained by the so-called "birth order effect"—a negative association between birth order and socio-economic outcomes. Thus, larger families with children who sistematically have children with higher birth orders will have systematically worse socioeconomic outcomes, on average, than smaller families.

Significantly negative and sizable birth order effects (e.g., up to one year of educational attainment in certain settings) have been widely documented in a range of developed countries nowadays such as the United States (Behrman and Taubman, 1986), the United Kingdom (Booth and Kee, 2009), Norway (Black et al., 2005), and the Netherlands (Belmont and Marolla, 1973). Nonetheless, the causes and origins of birth order effects are still being unraveled. Some studies, including Brenøe and Molitor (2018), Buckles and Kolka (2014), and Lehmann et al. (2018), highlight the role of parental differences in investments worsening by birth order, while others find that biology also plays a relevant role. For example, Black et al. (2011) find improvements in health indicators with increasing birth orders, on average, which suggests that earlier born-children may have health-related *disadvantages* at birth.

Taken together, the current economic literature suggests that there is likely a range of socio-economic and biological factors affecting the direction and the magnitude of the birth order effect under different contexts. Indeed, the birth order effect has been found to be *positive* in modern-day *developing* countries. For example, De Haan et al. (2014) find a *positive* birth order effect in Ecuador and Ejrnæs and Pörtner (2004) report similar findings for the Philippines.[1] Moreover, recent papers studying birth order effects in emerging economies with a strong gender preference for boys like China and India show *negative* but heterogenous birth order effects with worse outcomes for later-born girls than boys, as well as a strong first-born effect (Congdon Fors and Lindskog, 2023; Oliveira, 2019).

To date, little is known about whether the observed heterogeneity in the direction and size of birth order effects is a recent phenomenon that reflects modern-day cross-country differences in economic, institutional, historical, and/or cultural practices. An analysis of birth order effects in a historical setting, therefore, provides insights into (i) whether disparities in outcomes by birth order is a modern-day phenomenon, (ii) the relative contribution of socio-economic factors on birth order effect, and (iii) the role of birth order effects on any observed quality-quantity trade-offs in the historical context.

In this study, we use a rich historical administrative Dutch dataset spanning almost a century

[1] While Ejrnæs and Pörtner (2004) propose an optimal stopping point approach to the birth order effect that may explain the different results, De Haan et al. (2014) use a very similar estimation approach to the one used in this paper and elsewhere in the literature. Dammert (2010) or Emerson and Souza (2008) also report positive birth order effects for countries like Nicaragua, Guatemala or Brazil.

of family-linked birth and marriage records to identify siblings within a family and construct a birth order using information of both sisters and brothers. This allows us to examine whether there exist within-family birth-order differences in adult occupational rank of brothers. Second, we exploit differences in family composition and socio-economic status to investigate sources of variation in birth order effects. To the best of our knowledge, this is the first paper to shed light on birth order effects in economic outcomes in the historical context in Europe.[2] Consistent with the birth-order literature on modern-day developed countries, we find a negative birth order effect on within-birth cohort occupation rank among Dutch men born between 1838 and 1922. In other words, within the same family, later-born males are, on average, less likely to have a higher occupational rank compared to other males among the same birth cohort.

Next, we explore heterogeneity in birth order effects across varying family structures and socio-economic statuses. First, we find that the gender composition of siblings is related to the size of the observed birth order effect. The birth order penalty increases only with the number of older male siblings, but not sisters. This finding indicates a stronger resource competition among male siblings.[3] We also find that, consistent with modern-day birth-order effects in India and China, most of the estimated negative birth order effect is driven by the first-born male. Surprisingly, we do not find any evidence that the birth order effects are driven by regions with traditional first-born inheritance rules, or by parental transmission of occupations to first-borns. In our analysis of the relationship between birth order and socio-economic status, we find that men born to parents with higher occupational status or in industrial regions or urban areas are also more likely to experience an occupational disadvantage with respect to their first-born sibling. Interestingly, however, in poorer families, last-born children report better occupations—a finding consistent with modern-day studies on birth order effects in some developing countries like Ecuador (De Haan et al., 2014).

Our contribution to the birth order literature is threefold. First, we present the earliest historical fixed effects estimates of the birth order in the economic literature. Second, the setting of our research allows us to explore the contribution of a variety of factors on the direction and magnitudes of birth order effects, including level of economic development, inheritance rules, family gender-composition, and other socio-economic factors. Third, we do not find evidence that the nature of birth order effects changed systematically over the course of economic development in historical Netherlands.[4]

The remainder of this paper is structured as follows. Section 2 describes the historical context of the Netherlands during this period. Section 3 describes the dataset, sample selection, and summary statistics. Section 4 presents results from our analysis, and Section 5 concludes.

[2]Sociologists have also studied the Netherlands in the same historical period. Using a larger dataset of Dutch registry records, Knigge et al. (2014) examine the role of family background on siblings occupation attainment, while Knigge et al (2014b) study the evolution of occupational correlation between brothers over time. Both studies abstract from the role of birth order.

[3]While most of the birth order literature on developed countries does not report differences by gender of the siblings, recent work by Black et al. (2018) reports heterogeneous results along this dimension. While we do e construct a true birth order effect within a family using both men and women, we detail at the end of Section 2 why the historical context prevents studying women's outcomes specifically.

[4]Our results are consistent with current work in progress in the U.S. by Karbownik et al.

2 Historical Context

From mid-1800s to early 1990s, the Netherlands experienced significant socio-economic changes, marked by rapid economic growth associated with industrialization and a gradual transition to a modern fertility pattern. The modernization experience of the Netherlands was distinct from that of other European countries during the same time period. Since the "Dutch Golden Age" of the 17th century, the Netherlands had vibrant trade and manufacturing sectors, which had already accounted for a large share of its GDP (Acemoglu et al., 2005). The Netherlands also had well-developed educational institutions promoting literacy and human capital accumulation (Akçomak et al., 2016). However, partly due to the high wages, the Netherlands was a relatively late-comer to the industrial revolution, lagging behind the United Kingdom and neighbouring Belgium, both in time and the intensity of industrialization. Economic growth was relatively widespread in Europe during the entire nineteenth century, before the start of the Dutch industrialization in the1880s (Crafts, 1984). As such, our study sample covers a set of male cohorts who began participating in the economy during a period of high economic growth and the Dutch industrial revolution.

Economy: Real GDP per capita doubled between 1840 and 1900, while the share of population in the agrarian sector and the agriculture share of the GNP decreased substantially over the same period.[5] At the same time, the manufacturing sector grew, yet at a much slower rate compared to other European countries.

Population: Economic changes in the Netherlands were accompanied by significant population growth. The 1830 Dutch census recorded around 2.5 million inhabitants. By 1880, the population reached 4 million; by 1930, the population almost doubled.[6] While the rest of Europe also experienced a population growth over the same time period, the growth in the Netherlands outpaced other European countries, largely driven by significant decline in mortality rates and slower decline in high Dutch fertility rate (Wintle, 2000). Infant mortality more than halved from an average of over 19 deaths by 1,000 births in the 1860s to 8.7 by the start of the 20th century (Van Poppel and Beekink, 2002).

Education: The Dutch education system was already quite developed by the 1830s. Although compulsory schooling for children aged 6-12 only officially began in 1900, enrollment in primary schools increased steadily over the second half of the nineteenth century, leading to high literacy rates for both genders by the start of the 20th century.[7] Child labour was illegal after the passing of the *Kinderwetje* (Children's little law) in 1874, although it excluded home or agricultural work.

[5] Figure A.1 presents a complete time series using data from the Maddison Project Database. (Bolt et al., 2018). https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2018 [Last accessed on October 1st, 2019]. Using data from the Dutch census, Smits et al. (2000) reports a decrease of 10 percentage points between the 1849 census, with 40.3% of the population working in agriculture, and the 1909 census, with 30.4%. They also report the agricultural share of the GNP decreasing from 25.2% in 1850 to 15.9% in 1913.

[6] See Figure A.2 in the Appendix presenting trends in the Dutch census population. http://www.volkstellingen.nl [last accessed July 12th, 2021]

[7] 62% of boys and 47% of girls were enrolled in primary school in 1826, reaching 90% for both genders by 1900 (Wintle, 2000).

Regional Differences in Economic Activity: Economic development in the Netherlands—like in the rest of Europe at the time—was rather unequally distributed. A handful of regions had benefited from the Atlantic trade in the Netherlands and were highly industrialized prior to mid-1800s, while the rest remained agricultural. Following Wintle (2000), Figure 1 shows the 11 provinces of the Netherlands classified into three groups based on their economic activity in 1830.[8] The northern provinces of Noord-Holland and Zuid-Holland– had the most important Dutch trade ports and thus were the center of the vast majority of the industrial economic activity at the time. In our analysis, we classify these two provinces as "industrial', due to their high levels of development and urbanization, while the rest of the country relied on agriculture. Nonetheless, a subset of these non-industrialised areas carried rather modern, market-based activities ("modern agricultural"), while others were closer to a subsistence type of economy ("rural/traditional"). The provinces of Zeeland in the west and Groningen and Friesland in the east are classified as modern agricultural provinces, while the remaining provinces (Drenthe, Gelderland, Overijsse, Utrecht, Noord-Braband, and Limburg) are classified as rural/traditional.

Figure 1: Map of the Dutch provinces.

Urbanization: Despite these regional differences, the Netherlands, as a whole, was one of the most urbanized countries of Europe in early 19th century, with almost 25% of its population living in municipalities with over 20,000 inhabitants, and Amsterdam's population reaching well over 200,000. While urbanization stagnated in the first half of the nineteenth century, it increased gradually in the second half of the century. Some areas experiencing industrialization and economic growth were predominantly located in rural areas, as was the case of Maastricht

[8] A 12th province, Flevoland, was established in 1986. The majority of the territory belonging to Flevoland was reclaimed to the Zuiderzee over the 1950s and 1960s.

in the south of Limburg or Eindhoven in Noord-Brabant. Although migration to urban areas in the Netherlands did not occur as rapidly as in the United Kingdom—which had a higher level of urbanization at the time—the rate was higher than in neighbouring countries such as France or Germany.

3 Data and Descriptive Statistics

In our analysis, we rely on the Historical Sample of the Netherlands (hereafter HSN), a rich dataset constructed from family-linked administrative birth and marriage registry records with information on individuals' occupations.

3.1 Data

Historical Sample of the Netherlands: The HSN (*Data Set Life Courses Release 2010.01)* (International Institute for Social History, 2010) is a representative sample constructed from historical Dutch registry records (i.e. birth, marriage, divorce, and death) which have been digitized by the *Centrum voor Familiegeschiedenis* (Center for Family History), a Dutch research centre for genealogical and heraldic studies. Records are available from as early as the 17th century; however, most of them are from the 19th and early 20th century. Registries contain a variety of information on the individual, including name, date and place of the relevant event, religion (when declared), and, most importantly, the occupation of the individual and his/her kin. For example, in addition to the date and location of the event, a marriage record might contain such information not only for the bride and the groom, but also their parents and witnesses. Similarly, when a birth was recorded, information on the parents' occupation was also included. From these digitised records, a dataset containing a representative sample of the individuals was constructed by the International Institute for Social History, a labor and social history research institution located in Amsterdam.

The HSN includes approximately 85,500 individuals born in the Netherlands between 1812 and 1922. It selects a representative sample of "research persons", and links each person to their relatives, including parents, siblings, and spouses.[9] Hence, we can identify families across more than one generation, with each individual linked to their parents and siblings. Furthermore, individuals often appear more than once in the registries in the dataset. For example, an individual may appear in their own birth certificate (including place and date of birth), in one or more marriage and separation/divorce certificates, and in their children's births and marriage certificates. The availability of multiple records allows us to compare adult occupation outcomes across siblings, over time, and by family background.[10]

[9] To maintain consistent cohort sizes, the HSN includes as research individuals 0.75% of all births for the period 1812-1872 and 0.5% for the 1873-1922 period. Out of the full sample, around 30% of the records belong to the research individual.

[10] Although it would be interesting to analyse the effect of birth order on the age at death, death records have only been digitised for 4,000 out of the 85,000 individuals.

Occupational Classification: Dutch registry records contain information on self-reported occupations for individuals involved in a registered life event. The stated occupation in the sample is matched with occupational classifications and rankings frequently used in history and sociology (Mandemakers et al., 2018). We rely on the Historical CAMSIS (Cambridge Social Interaction and Stratification Scales), hereafter HISCAM, to construct an ordinal measure of occupational rank.[11] Using the ordinality of this ranking as given, we assign a percentile rank to each occupation within each cohort of birth that indicates the share of individuals in the same cohort (i.e., individuals born 10 years before and after) with a lower-ranked occupation according to HISCAM. To ensure representativeness, this ranking is constructed using only and all representative individuals with a valid HISCAM occupation.[12]

For reference purposes, about 15% of the population in our sample works in farming or holds a lower ranked occupation such as day labourer. A blacksmith would be lie around the 45th percentile in the distribution of occupations while a "working proprietor conducting business in wholesale trade or retail" around the 75th percentile.[13] To put these rankings into perspective, 5 percentage points reflects the difference between a warehouse porter and a building painter around the turn of the century.

As aforementioned, HSN records can include more than one occupation for a given individual if they appear across multiple records as an adult. For example, a man can appear in a marriage record as a husband, and their children's birth and marriage record as a father. Whenever we encounter differences in the occupations stated by the same individual in a range of records, we keep the highest ranked one[14] and the regressions include dummies for the age at which the highest occupation was recorded.[15]

Sample restrictions: We restrict our analysis to men. Although women are included in the HSN dataset, more than a half do not report having an occupation, and those who do are likely to belong to a selected sample of the population. For instance, Van Nederveen Meerkerk and Paping (2014) highlight the prevalence of under-recording of the work of women in agriculture because it was deemed an undesirable occupation of women and was rarely reported officially.[16]

Individuals in our sample may marry multiple times due to separation or spousal death,

[11] CAMSIS uses pairs of occupations linked by different social interactions (marriage, parent-child or friendship) and social proximity to extract a hierarchical component of social stratification using correspondence analysis. Lambert et al. (2013) apply this methodology to 12 different historical datasets, including Dutch registry data to construct HISCAM, an ordinal index of occupational rank. Our dataset includes a wide range of 604 different possible occupations. Further details on the methods and classification can be found on the CAMSIS project website www.camsis.stir.ac.uk (last accessed 12th April 2019).

[12] Our results are robust to using different classifications of occupations and more coarse measures, such as the probability of holding a non-manual occupation.

[13] Note that while these occupations are ranked in a lower percentile (by about 5 percentile points) in later cohorts, we will compare occupational differences among men belonging to the same cohort.m

[14] Nonetheless, our results are robust to using the median-ranked occupation instead. Results available upon request to the authors.

[15] For a small number of observations do not include age. We control separately for age at best occupation being missing.

[16] Unfortunately, it is not possible to use husband's occupation as our outcome variable for women because family relationships are defined with respect to the initial research or focus individual, and we are unable to reconstruct marriages for their family members.

and have children with more than one partner. Hence, siblings may share one or both parents. Considering the time period of our study, we construct our variable of interest, birth order, among all siblings (sisters and brothers) born to the same *father* because this measure is more likely to be representative of the resources that were available to be shared among siblings.[17]

Hence, our analysis is restricted to men for whom their father and at least one brother can be identified. In addition, given that our outcome of interest is occupation, we also require that the individual, his father, and at least one brother have an occupation reported in the data.[18] It is relevant to emphasize that our measure of birth order is constructed by taking all siblings into account, i.e., both brothers and sisters, regardless of their occupation status. This allows us to use the true birth order in the family and to investigate the birth order effect relative to the gender composition of siblings within families.

3.2 Descriptive Statistics

Table 1 presents the descriptive statistics for our analysis sample of 27,389 men. Individuals were born between 1838, the year the Dutch Civil Code was enacted, and 1922, the last year for which we have at least a hundred births in our sample.[19] Family size ranged from two to 15 children with an average of 8 children per family.[20]

Given the small number of outliers in the birth order and age gap measures between siblings, we top-code these variables in our analysis to reduce the influence of outliers in our estimates. Our measure of birth order is top-coded at 10, which accounts for approximately 95% of our observations; the number of older brothers is also top coded at 6.[21] Men in our sample have an average age gap of less than two years from their immediately preceding sibling and around 95% have age gaps of four years or less from their immediately preceding sibling. Thus, we also restrict age distance to 5 in our analysis.

On average, men in our sample hold an occupational rank at the 44th percentile within their cohort. Fathers of these men hold an occupation rank at the 48th percentile within their son's cohort. As discussed above, our analysis is based on the highest occupational rank observed each individual and the age at which this occupation is observed.[22] Approximately 41%, 14%,

[17] Out of our 9875 fathers, only 112 of them are linked to more than one spouse with children. However, mother information is missing for over 5,000 children.

[18] Note that we only observe occupations for a subsample of the HSN. Individuals may be missing if (i) they died before reaching adulthood, (ii) they never appeared in registry records as adults (i.e., never married or never fathered a child), or (iii) their records do not report an occupation or this is not adequately matched to an occupational classification (due to, for instance, severe misspelling). On a sample of *all* men with a valid order of birth measure, having observable occupation record is negatively related with the order of birth. Under the reasonable assumption having no occupation record is negatively (or at least not positively) correlated with the quality of adult outcomes, our estimates of negative birth order effects should be interpreted as, if anything, a lower bound of the magnitude for that effect. However, we do not find evidence of order of birth being correlated with the probability of being observed within family for men in our sample period.

[19] The 1838 Dutch Civil code (*Wetboek*) replaced the Napoleon code, but maintained the existent regulation regarding inheritance, according to which the estate was to be divided equally among all children and the surviving spouse. Some limited exceptions were allowed, and are addressed later in the paper.

[20] Note that this figure accounts for children who had passed away in early years as well as those who reached adulthood.

[21] 95% of men in our sample have five brothers or fewer.

[22] On average, the highest occupational rank for a given men in our sample is observed at 20.5 years old. Age

Table 1: Descriptive Statistics

	Mean	Std. Dev.	Min.	Max.
Birth order	4.168	2.576	1	10
Number of older brothers	1.737	1.596	0	6
Year of birth	1891.859	15.828	1,838	1,922
Family size (# of children)	8.246	2.887	2	15
Age difference from immediately preceding sibling	1.849	1.309	0	5
Age at highest occupation	20.493	7.930	0	50
Born in a city	0.406	0.491	0	1
Protestant	0.446	0.497	0	1
Catholic	0.367	0.482	0	1
Occupation				
Occupation rank	0.440	0.273	0	1
Father occupation rank	0.473	0.261	0	0.998
Region by economic development				
Industrial region	0.411	0.492	0	1
Modern agricultural region	0.138	0.345	0	1
Rural region	0.451	0.498	0	1
Number of observations	27,389			

and 45% of men our sample were born in industrial, modern agricultural, and rural regions, respectively.

3.3 Mortality, Fertility, and Selection

In this section, we discuss how the lack of death records in the HSN might potentially impact the interpretation of our regression estimates. The wide availability of birth records allows us to construct an accurate measure of birth order using all siblings (both brothers and sisters) ever born within a family. However, we only observe these individuals again if they participate in a recorded life event (marriage, fathering a child), so not observing an individual does not imply a death during childhood. As such, the absence of complete death records prevents us from constructing reliable measures of order of birth at later ages.

Our measure of birth order (at birth) might not adequately capture the competition of resources within families, as it accounts for older siblings that might no longer be present due to childhood mortality, putting our estimates potentially at risk of suffering measurement error and mitigation bias. As in the rest of Europe, infant mortality was a frequent occurrence at the time, but it decreased substantially over the period we study. It more than halved from an average of over 19 deaths by 1,000 births in the 1860s to 8.7 by the start of the 20th century (Van Poppel and Beekink, 2002). Reassuringly, we do not find any significant changes in our estimates when dividing the sample by cohorts. Similarly, a large family size might imply that older and younger children might not cohabit or compete for certain parental investments if

at highest occupation is set to 0 if missing and all of our specifications include a series of dummies for age at best occupation.

older siblings have moved out of the household when the youngest children are born.

Nonetheless, because the order of birth measured among siblings ever born might still capture adequately any unobserved biological or socio-economical drivers, it should be read as an upper bound of the competition for resources. Therefore, the differences estimated in Section 4 should be interpreted as a lower bound of the differences by order of birth, particularly so for the linear effect estimates. Additionally, the order of birth among siblings ever born would be a more accurate measure of the order of birth among surviving siblings towards the end of the sample period. However, as mentioned above, we do not observe a significant change on our estimates of the birth order effect over time.

Finally, our measure of order of birth might capture differences in fertility choices, with higher orders of birth being more prevalent among certain types of families. However, contraception or family planning was not widespread at the time. Fertility only started to decline in the second half of our sample, but did so at a slower rate than the infant mortality, resulting in the population increase observed for the period Wintle (2000). These decline might have been distributed unequally among different types of families, making higher orders of birth more frequent among particular families. However, the average family was still large, and our estimates do not show a clear pattern by completed family size (see Table A.3 in the Appendix).

4 Results

We take advantage of the family-linked structure of the HSN to analyze within-family variations in occupational outcomes among male siblings by order of birth (including sisters). Our main specification estimates the following model:

$$Y_{ifrc} = \alpha + \beta \text{Birth order}_{ifrc} + \gamma X_{ifrc} + \mu_f + \eta_r + \delta_c + \varepsilon_{ifrc},$$

where Y_{ifrc} is our outcome of interest (occupational percentile rank) for individual i from family (father) f born in region r in cohort c. Birth order$_{ifrc}$ is a variable measuring the individual's order of birth top-coded at 10.

Our first specification estimates an average linear effect of birth order. We also estimate a series of more flexible specifications allowing for non-linear effects of birth order or gender composition of sibling, by (i) separately estimating effects of the number older brothers and sisters; or (ii) including indicator variables for first and last born. In further specifications, we allow for non-linearity in the birth order effect by including a series of indicator variables for birth order (1 to 10) rather than including birth order as a continuous measure. Given evidence that age differences between siblings can exacerbate birth order differences (Buckles and Munnich, 2012), X_{ifrc} includes controls for the age gap between the individual and his immediately-preceding brother or sister, as well as dummies for living in an urban area as defined for Dutch Census in 1849, and the age at which the highest occupation was measured. μ_f, η_r and δ_c are family, region (province) and cohort (year of birth) fixed-effects. Standard errors are clustered at the family-level to allow for within-family correlation.

4.1 Birth Order Effect and Family Composition

Table 2 presents our baseline results. The odd columns presents OLS results without family (father)-fixed effects, while the even columns presents our family-fixed effects results in our main specification. Columns (1) and (2) present estimates from our main specification assuming linear birth order effects, with the coefficient showing the estimated change in occupational percentile ranking associated with having one additional older sibling. The remainder of Table 2 presents more flexible estimates.

Later-born men have, on average, occupations that are lower-ranked in their cohorts compared to their male siblings, controlling for all time-invariant family characteristics. In our main linear-effect specifications shown in columns (1) and (2), Dutch men, on average, have an occupation ranked 0.6 percentile points lower (or 0.2 percentiles in non-FE specification) in their cohorts per additional older sibling. Although the estimated birth order effect is statistically significant at the 1%-level, its magnitude is small. The effect size is similar to the effect of a reduction of two percentile points in the father's occupational rank in the OLS specification, controlling for region and year of birth.

Consistent with previous birth order literature, OLS and fixed-effects estimates both show negative birth order effects on occupational rank. Fixed effects capture differences in family size linked to socio-economic status, and related to economic outcomes. For example, one would expect that larger families with higher birth order indexes, have are relatively poorer than their counterparts. Note that, also in line with previous literature, fixed effects estimates are larger than OLS, although this difference is not significant.

Table 2: Birth order and occupation quality

	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
Birth order	-0.002***	-0.006***			-0.003***	-0.004*
	(0.001)	(0.002)			(0.001)	(0.002)
No. older brothers			-0.003*	-0.008***		
			(0.001)	(0.002)		
No. older sisters			-0.002	-0.003		
			(0.001)	(0.003)		
First born child					0.006	0.010*
					(0.006)	(0.006)
Last born child					0.050***	0.011**
					(0.005)	(0.005)
N	27389	27389	27389	27389	27389	27389
F-stat	17.554	6.482	17.448	6.480	18.081	6.431

Notes: Fixed-effects regressions control for family (father) dummies. Robust standard errors clustered at the father level are included in parentheses. All regressions control for age difference with immediately older sibling, year of birth dummies, age at record of highest occupation, and region of birth and living in a city dummies. Significantly different from 0 at a level of confidence of ***1%, **5%, and *10%.

Given the historical context, it is likely that parental investments depend on children's gender and sibling competition. As such, the presence of older brothers is likely impact men more than having older sisters. Columns (3) and (4) present results from our specification

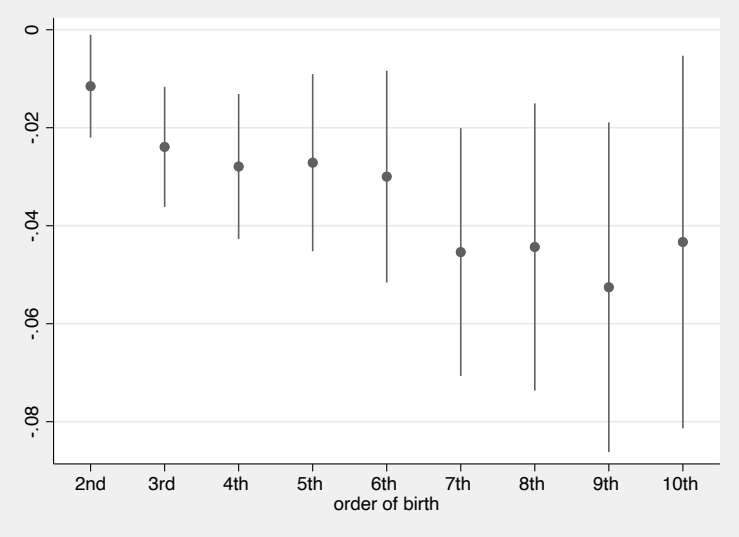

Figure 2: Birth order effect on occupation quality (fixed-effects specification).

allowing for the birth order effect to vary by sibling gender composition. In contrast to most of the literature on birth order effects in developed countries nowadays, including the Netherlands, we observe differences in the estimated birth order effect by sibling gender composition. The Dutch men's occupational rank decreases in 0.8 percentile points per additional older brother, but only by 0.3 percentile points with every additional older sister. The effect of having older sisters is not significantly different from 0, but it is significantly different than the effect of older brothers. These results are in line with the findings in modern emerging economies. For example, Jayachandran and Pande (2017) and Congdon Fors and Lindskog (2023) show that in India, birth order effect on the height and education of males is significantly smaller with the presence of older sisters compared to older brothers. Similarly in China, having an additional younger siblings increases the first-born advantage in educational attainment for boys but not for girls (Oliveira, 2019).[23]

The specifications presented thus far impose a linear birth order effect, i.e., differences in the individual's occupational rank from the immediately preceding sibling is assumed to be the same regardless of how many siblings are ahead. Although these functional form restrictions can increase the precision of estimates, they may also hide interesting non-linearities in birth order effects. Figure 2 presents the results from a more flexible specification, which allows the birth order effect on occupational rank to vary by the number of older of siblings, controlling for all variables as in those shown in Table 2. Each point estimate is shown with its corresponding 95% confidence interval representing the difference in occupational percentile rank from the first-born brother for each birth order. Given the demands such fixed-effects model places on the data, the estimates are imprecise; however, the point estimates suggest a strong positive "first-born effect" and an increasing birth order effect.

[23]It is worth noting that Spears et al. (2022) argues that these results may be driven by an imperfect control for family size. This is less of a concern for us, as we only examine completed families and adult outcomes. Nevertheless, we address the role of accounting for family size next.

In view of these results, columns (5) and (6) in Table 2 include controls for first-born to assess whether birth order effects are primarily driven by the positive first-born effect. We also include a last-born control, who may similarly benefit from a smaller number of children in the household during their early years, particularly if the age gap with the older siblings is large. Consistent with Figure 2, our results show a statistically significant first-born and last-born effects. Being a first-born or last-born is associated with a higher occupational rank. The estimated coefficient on birth order, while still statistically significant at the 10%-level, is slightly reduced in size in the fixed effects estimate. These results suggest that families experience binding resource constraints as the number of children in the household increase. On the other hand, the positive last-born effect is consistent with prior literature in developing countries finding that the presence of older, income-generating siblings increases education attainment of younger children in the family (Ejrnæs and Pörtner, 2004; De Haan et al., 2014).[24]

One might suspect that the significant first-born effect observed in the data could be explained by the presence of a primogeniture preference system. It is notable that our entire sample period is covered by the 1838 Dutch Civil Code inheritance regulation, which stipulated that the estate was to be divided equally among all children and the surviving spouse in case of death without a will (De Haan and Hoppenbrouwers, 1998). Thus, the social norm in the Netherlands during our period of study—as reflected in this regulation—was that of a more equitable division of inheritance among the father's children. Nonetheless, the 1838 Dutch Civil Code allowed Saxon inheritance laws and customs in certain regions located in eastern Netherlands.[25] Around 10% of our sample lived in one of these regions. To assess whether whether the primogeniture rules are driving the first-born effect, we dropped families living in these Saxon regions from our analysis. Our results are robust to excluding Saxon regions as shown in Appendix Table A.1.

Another explanation for the first-born effect may be that first borns were more likely to receive sections of the estates that were indivisible. To test this hypothesis, we analyse birth order effects excluding children of self-employed farmers (i.e., those who would work their own land). We do not find that this group is driving our results neither (see Appendix Table A.1).

Given the historical nature of our dataset, it is important to note that our analysis relies on observations of completed families and hence is unaffected by censoring due to incomplete fertility.[26] Families in the Netherlands during our period of study were still quite large, as

[24] De Haan et al. (2014) report younger children being less likely to be working at a young age, potentially benefiting of having older siblings that are already doing so. Our data do not allow to test for a similar mechanism. However, child labour was regulated except in agricultural work, and we do not report a stronger effect among farmers. It is nevertheless important to note that given the large average family size, older siblings are likely to be of working age when the last born child was an infant.

[25] In particular, Achterhoek, in the Gelderland province, and Tweente and Salland, in Overijssel, (see Figure A.3) allowed one child to inherit the land undivided. Compensation for siblings was regulated, but it is unclear whether it was enforced.

[26] Spears et al. (2022) have nevertheless emphasised recently the relevance of allowing the birth order effect to change by completed family size to disentangling it from the effect of number of children. Table A.2 shows results robust to the birth order index ($\frac{\text{birth order}}{(N+1)/2}$, where N is completed family size) developed by Booth and Kee (2009), a preferred measure of birth order when the children of higher birth orders are observed more often due to larger family sizes in fixed effects models.

the country lagged behind other European countries in fertility declines (Wintle, 2000). We find consistent birth order effects for larger families, while smaller families (5 or less children ever born) show some evidence of moving towards a modern birth order effect. However, these smaller families are rather infrequent in our sample. Table A.3 in the Appendix presents these results.

In sum, our results show consistent evidence of a negative, albeit small, birth order effect, in line with results for developed countries in modern times. We also observe strong first-born and last-born advantages. Interestingly, we report significant differences in birth order effects in men depending on the gender composition of siblings. Consistent with modern findings in emerging economics like India and China, greater number of older brothers was associated with a larger negative birth order effect on the occupational rank of men in the Netherlands compared to the presence of older sisters.

4.2 Birth Order Effect and Socio-economic Background

To further explore the role of the socio-economic background in modulating the birth order effect, we now explore heterogeneity in our sample. In the previous section, we report estimates that are overall consistent with developed countries, while others are more in line with recent research for emerging countries. In this section, we aim to disentangle further external factors that may be driving such differences. We present results by parental background (father's occupation, in our case), and type of geographical area.[27]

4.2.1 Parental Background

Table 3 presents the results by socio-economic background proxied by the quality of father's occupation. The first column presents our linear specification on the order of birth, Column (2) allows for a different effect by gender of the siblings, and Column (3) allows for a first and last born effect.

We observe a stronger negative birth order effect among families with a better socio-economic status as captured by father's occupational rank. Having an additional older sibling is correlated with a 0.39 lower rank for families with fathers in the 20th percentile of the distribution, 0.63 for sons of fathers with an median occupation, and 0.79 for sons of a father with an occupation in the 70th percentile. When we allow for a different effect by gender of the older siblings, we find no evidence of a negative effect of having older sisters among families of any socio-economic background. Older brothers alone explain the pattern observed for the linear birth order: having an additional older brother is correlated with a decline of 1.2 percentile points in occupational quality for those with fathers at the very top of the distribution, but only with an insignificant 0.2 decline at the bottom. Hence, richer families do not appear to be departing from a son-preference behaviour. Family size does not seem to be the mediating factor in this

[27]Even though previous literature has reported significant differences in investments between Protestants and Catholics (Becker and Woessmann, 2009), we do not find consistent differences along these dimensions. Results available upon request.

Table 3: Birth order by parental background

	(1)	(2)	(3)
Birth order	-0.002		-0.003
	(0.002)		(0.003)
Birth order*Father occupation rank	-0.008***		-0.002
	(0.003)		(0.003)
No. older brothers		-0.002	
		(0.003)	
No. older brothers*Father occupation rank		-0.012**	
		(0.005)	
No. older sisters		-0.002	
		(0.004)	
No. older sisters*Father occupation rank		-0.002	
		(0.008)	
First born child			-0.008
			(0.009)
First born*Father occupation rank			0.036**
			(0.016)
Last born child			0.035***
			(0.011)
Last born*Father occupation rank			-0.048**
			(0.019)
N	27389	27389	27389
F-stat	6.491	6.450	6.451

Note: All models include (father) fixed effects. Robust standard errors clustered at the father level are included in parentheses. All regressions control for age difference with immediately older sibling, year of birth dummies, age at record of highest occupation, and region of birth and living in a city dummies. Significantly different from 0 at a level of confidence of ***1%, **5%, and *10%.

case, as these patterns are preserved if we drop small families (5 or less children ever born) from the sample.

Our specification allowing for first and last born effects shows interesting heterogeneous patterns by socio-economic background. We observe a clear first born advantage among those whose fathers had occupations at the top of the distribution (as large as 3.6 percentile points), while it is not apparent in those families with worse economic backgrounds as captured by the father's occupation. On the other hand, being the last born in a family at the bottom of the distribution is correlated with higher occupational quality (by as much as 3.5 percentile points). This, however, is not the case for more economically advantaged families, that at the top of the distribution even present a negative last born effect.

Figure 3 aims to capture a more nuanced version of these non-linearities. Our estimates are, as expected, imprecise. Nevertheless, this more flexible specification further suggests that family background plays an important role in mediating the order of birth and adult outcomes in our setting, with the positive first born effect concentrated among more affluent families and the last born effect among poorer families. These results are consistent with resource constraints preventing poorer families from investing more in early born children (first borns in particular), as observed in richer families and in more recent and developed settings. Only when fertility is completed, and older children could provide their own stream of income, parents appear able to perform additional investments we would see otherwise in earlier children. This 'reversal' of

the birth order effect for families of different background was previously reported in Ecuador by De Haan et al. (2014).

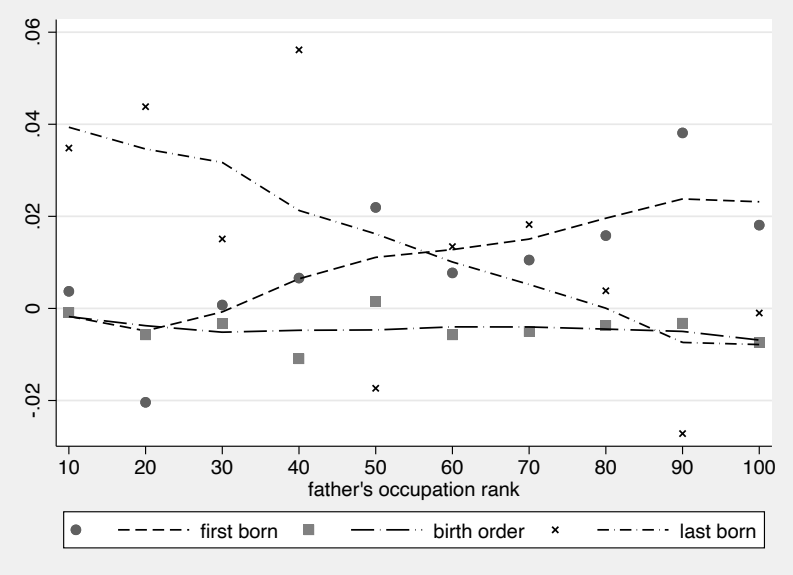

Figure 3: Estimates of birth order effect on occupational rank by family background (lowess fitted line)

In sum, we find that in 19th and early 20th century Netherlands, family background modulated the birth order effect, in a way that supports resource constraints as a key element behind these differences. Our results are consistent with more affluent families being able to devote more resources to earlier children and less affluent ones being able to do so only for their last children, potentially when earlier borns have joined the labour market and are providing additional resources for the family. On the other hand, richer families do not appear to depart from the son-preference behaviour and/or investments.

4.2.2 Intergenerational Transmission of Occupation

We briefly addressed the role of inheritance above; however, the stronger first-born effect among more affluent families suggest that these within-family differences could be driven by larger investments that were only possible among fathers holding better occupations themselves. First born sons could inherit tangible or intangible assets, such as knowledge, related to the father's occupation that may give them an advantage in the ranking. Although our data do not include information on such investments or assets, we do know whether father and son share a similar occupation.

Our self-reported occupations are coded into the HISCO classification up to a 5-digit level. We construct a variable that takes value 1 if father and son share the same occupation at that level of detail.[28] The top panel of Table 4 presents the estimation for our baseline specifications

[28] Around 27% of the individuals in our sample hold the same occupation as their father. We perform a robustness check where our dependent variable takes value 1 if the occupation is shared at 3-digit level, and our results are unchanged (available upon request).

with the probability of having the same occupation as our outcome of interest. For conciseness, only specifications with father-fixed effects are reported. We observe a very similar relation between the probability of having the same occupation as one's father and order of birth and the results using own occupational ranking as an outcome. Birth order is negatively correlated with holding the same occupation as your father, with a strong first born effect, and working exclusively through older brothers. As expected, being a last born has no effect on the probability of holding the same occupation as one's father.

Table 4: Order of birth and probability of same occupation as one's father

	(1)	(2)	(3)
Birth order	-0.012***		-0.009**
	(0.004)		(0.004)
No. older brothers		-0.017***	
		(0.004)	
No. older sisters		-0.006	
		(0.004)	
First born child			0.019**
			(0.009)
Last born			0.001
			(0.008)
N	27389	27389	27389
F-stat	2.766	2.756	2.762
Birth order	-0.016***		-0.011**
	(0.004)		(0.005)
Birth order*Father occupation rank	0.007		0.002
	(0.004)		(0.005)
No. older brothers		-0.025***	
		(0.006)	
No. older brothers*Father occupation rank		0.016*	
		(0.009)	
No. older sisters		-0.002	
		(0.007)	
No. older sisters*Father occupation rank		-0.007	
		(0.012)	
First born child			0.031*
			(0.017)
First born*Father occupation rank			-0.025
			(0.027)
Last born			-0.019
			(0.018)
Last born*Father occupation rank			0.041
			(0.030)
N	27389	27389	27389
F-stat	2.772	2.758	2.745

Note: All models include (father) fixed effects. Robust standard errors clustered at the father level are included in parentheses. All regressions control for age difference with immediately older sibling, year of birth dummies, age at record of highest occupation, and region of birth and living in a city dummies. Significantly different from 0 at a level of confidence of ***1%, **5%, and *10%.

The benefits of occupational inheritance should be greater the higher the inheritance, and hence, probably the higher the occupational rank of the father. The bottom panel of Table 4 allows for the relation between the probability of holding the same occupation of one's father and order of birth to vary by family background. Although the precision with which we can measure

the estimate varies, we find that the probability that individuals hold the same occupation as their fathers does not follow the same pattern as our birth order effect when family background is considered. Having an additional older brother reduces the probability of holding the same occupation as one's father by 2.5 percentage points at the bottom of the distribution (from a baseline of 27%), but only around 1 for those at the top. A similar effect is observed for the first born effect – first borns are more likely to have the same occupation as their parents than their siblings, but only among *less* advantaged families. The opposite is true for last borns in well-off families who, although not significantly different from 0, are more likely to have the same occupation as their parents than their siblings. Given that more affluent families appear to be driving our results, the results in Table 4 suggest that the additional investments children receive works through being able to depart from their father's occupation, rather than inheriting it.[29]

4.3 Geographical Context

Despite the Netherlands being a relatively small European country, it presents interesting geographic variation over our period of study, allowing to gain insights into the drivers of the historical birth order relationship. Unlike its neighbouring Belgium, the Netherlands did not industrialize as fast during the 19th century, and our sample period still saw predominantly agricultural provinces. We follow one of the most used division of the Dutch territory as described by Drukker and Tassenaar (1997) in three differentiated areas: industrial, modern agricultural and rural/traditional. The first group, including Noord-Holland and Zuid-Holland, was the most developed with large towns, some of which had been important ports or urban industry centres during the seventeenth century. Zeeland in the south and Groningen and Friesland in the north were at this time mostly agricultural provinces characterized by a market-oriented agriculture and farming, thanks to its more advantageous natural conditions for production. Finally, the remaining provinces of Drenthe, Overijssel, Gelderland, Utrecht, Noord-Brabant and Limburg are considered rural traditional. Figure 1 shows such regional division.[30]

Panel A of Table 5 presents our baseline fixed-effects results when allowed to vary by type of province.[31] The linear birth order effect appears consistently across different provinces, but a more flexible specification shows interesting differences. The first-born advantage appears to be concentrated in families living in the richest region, with a higher level of industrialization and urbanization. This area has the lowest concentration of farmers, hence, this points once again towards the first born effect not being driven by indivisibility of agricultural land transfers supporting previously discussed results in Table A.1. Nonetheless, we observe less precise patterns for the positive last born effects than in our baseline specifications in Table 2.

The Netherlands experienced a rather early urbanization process. In the 1849 Census, over

[29] While these could be interpreted as "bad-controls", adding flexible controls for holding the same occupation as one's father does not affect our results in tables 2 and 3.

[30] A quick analysis of our data supports this division. For instance, on average, 12% of individuals are self-employed farmers. In industrial provinces, this share is only 5.7%, while it is almost 20% in rural provinces.

[31] We do not find any significant regional differences when we allow the effect of older brothers and sisters to vary by location. Results available upon request.

Table 5: Birth Order Effect and Geographical Variation

	(1)	(2)
Panel A: Type of region		
Birth order	-0.006***	-0.003
	(0.002)	(0.002)
Birth order*Modern agricultural	0.000	-0.003
	(0.002)	(0.003)
Birth order*Rural region	0.000	-0.001
	(0.001)	(0.002)
First born child		0.024***
		(0.008)
First born*Modern agricultural		-0.026*
		(0.015)
First born*Rural region		-0.024**
		(0.010)
Last born child		0.013
		(0.008)
Last born*Modern agricultural		0.007
		(0.016)
Last born*Rural region		-0.007
		(0.011)
N	27389	27389
F-stat	6.388	6.208
Panel B: City		
Birth order	-0.005**	-0.004*
	(0.002)	(0.002)
Birth order*City	-0.003**	-0.001
	(0.001)	(0.002)
First born child		-0.002
		(0.006)
First born*City		0.031***
		(0.009)
Last born child		0.012*
		(0.007)
Last born*City		-0.003
		(0.010)
N	27389	27389
F-stat	6.388	6.330

Note: All models include (father) fixed effects. Robust standard errors clustered at the father level are included in parentheses. All regressions control for age difference with immediately older sibling, year of birth dummies, and age at record of highest occupation. Panel B controls for whether the location was considered a city in the first 1849 census. Significantly different from 0 at a level of confidence of ***1%, **5%, and *10%.

35% of the population already lived in cities, a share that raised to 45% by 1920. Even the most agricultural areas already had important urban centres, such as Maastricht or Utrecht. Thus, the rural/urban divide may further modulate the observed differences by order of birth. As expected, individuals living in cities have a higher occupation rank, but also similar family sizes and orders of birth.

As an alternative measure of urbanisation, Panel B of Table 5 includes interactions with whether the location of birth was considered a city in the 1849 census. It classifies 87 municipalities as cities, with an average population of over twelve thousand inhabitants. Again, the results are consistent with more developed, less agricultural areas showing a stronger effect for first borns, with non-urban areas showing no advantage for first-born children. Taken together, our results suggest that the birth order effect (particularly the first born advantage) may be driven by more economically developed areas.

5 Discussion

We document the existence and characteristics of the birth order effect in a historical context to learn whether the large within-families differences in adult outcomes observed by order of birth are exclusively a modern phenomenon or whether it might have been a source of historical inequality for centuries. Taking advantage of a unique Dutch dataset of family-linked administrative records including information on occupation covering from 1838 to 1922, we report a persistent relationship between occupation quality and order of birth. Furthermore, we highlight the role of family composition and socio-economic circumstances in modulating birth order differences.

We find that, in 19th and 20th century Netherlands, men born later in the family held, on average, a lower ranked occupation; and that the higher the share of male older siblings, the larger the birth order effect becomes. The negative birth order effect is line with findings from previous studies in developed countries, although the differences we can capture in occupations would suggest substantially more modest differences in education or wages than the ones captured in current settings. On the other hand, most of the effects noted in developed countries do not vary by gender composition of older siblings, while ours do, suggesting either a historically stronger male preference or a diversity of investments being performed on sons and daughters at the time. Some of our results, however, are consistent with the heterogeneous effects reported in current, emerging countries: the first born child concentrates most of the advantage among brothers, with much smaller differences between younger siblings but a positive last born effect. Similar results have been reported in settings such as Ecuador, India or China. This partial consistency with both developed and developing countries points towards an evolving nature of the relationship between order of birth and adult outcomes.

Furthermore, results by family composition and socio-economic circumstances reveal informative heterogeneous patterns. Even though family size does not modulate the effect during a time of high fertility and reducing child mortality resulting in predominantly large families, family resources, as proxied by parental occupation and location does shape the relationship

between order of birth and adult outcomes. We find stronger birth order effects among siblings with fathers with a better occupation themselves, and in areas that are more economically developed, such as more industrial provinces (North and South Holland) and cities. This is particularly relevant in the case of the first born advantage, that appears almost exclusively among more affluent families and locations. Interestingly, inheriting land or other assets related to paternal occupation does not appear to be a driving factor of the effect. Self-employed farmers are not a driving group of our estimated differences by order of birth, and the increase in the probability of first born children having the same occupation as their fathers when compared to their younger brothers is *lower* in richer families than in poorer ones. The Netherlands experienced important changes to its structural composition over this period, thus the first born advantage might have taken the form of investments to profit of new opportunities, moving to better occupations rather than by transmission of an already existing occupation. These new opportunities appeared as well more frequently in cities or more developed areas of the country.

Finally, while richer families show a stronger first born effect, among poorer families, the last born child appears to perform better than the rest of his brothers. Previous research on the birth order effect in developing countries has reported a positive effect for later born siblings (De Haan et al., 2014; Ejrnæs and Pörtner, 2004). Our last born effect is consistent with their interpretation of resource constraints early in the family life playing a significant role, particularly given the type of families among which it is more prevalent. Unfortunately, our data do not allow for testing whether child labour plays a role in relieving constraints for last born children. However, given the regulation at the time, it is likely that child labour was more frequent in agricultural setting; our results fail to capture differences in last born effects between different regions or urban environments. Nevertheless, it is worth pointing out that families were still large at the time, and age difference between younger and older siblings might be substantial.

Taken together, our results suggest that differences between siblings within the same family have been a source of inequality for centuries. Nevertheless, the nature of the relationship between order of birth and outcomes might evolve as families acquire more resources to share among varying number of siblings. Finally, the role of social norms, particularly those gender related, should not be highlighted when studying differences among siblings in settings with a strong son preference.

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Appendix

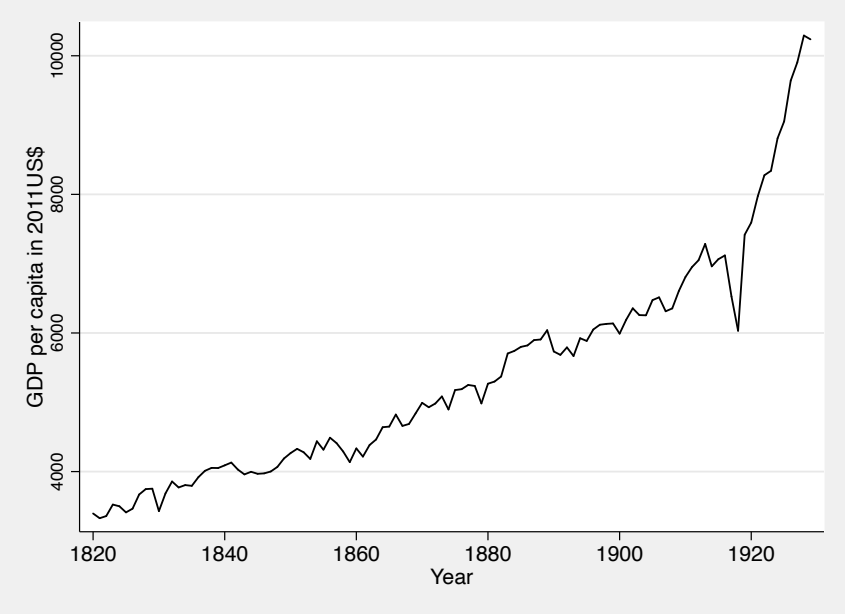

Figure A.1: Dutch GDP per capita over time (Maddison Data Project)

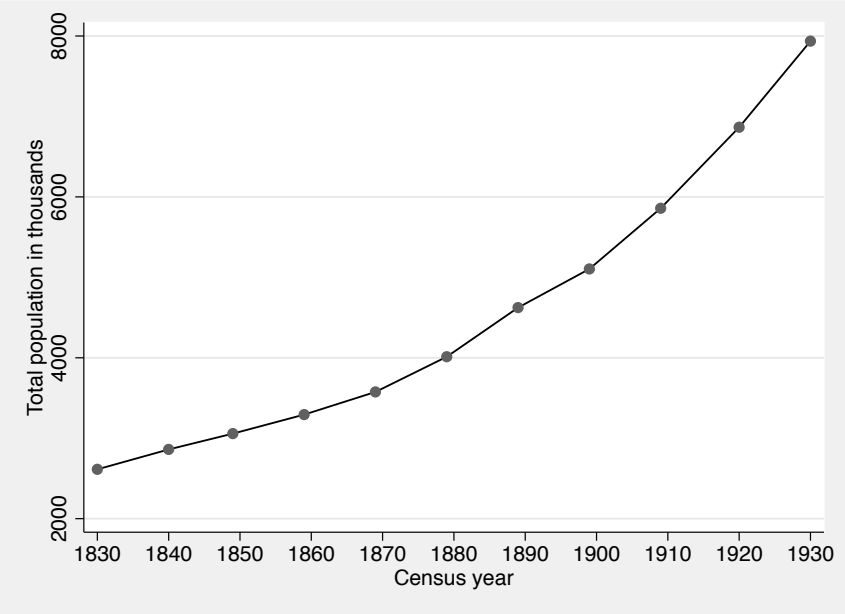

Figure A.2: Dutch population over time (Dutch Census)

Figure A.3: Municipalities under a modified Saxon inheritance rule

Table A.1: Birth Order Effect by Parental Background – robustness check.

	Excluding Saxon regions		Excluding farmers fathers	
	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)
Birth order	-0.003***	-0.007***	-0.003***	-0.007***
	(0.001)	(0.002)	(0.001)	(0.002)
N	24394	24394	22715	22715
F-stat	16.879	5.894	12.446	5.737
No. older brothers	-0.003*	-0.008***	-0.003**	-0.008***
	(0.001)	(0.003)	(0.001)	(0.003)
No. older sisters	-0.004**	-0.003	-0.003**	-0.005
	(0.002)	(0.003)	(0.002)	(0.003)
N	24394	24394	22715	22715
F-stat	16.804	5.895	12.384	5.710
First born child	0.009	0.012**	0.007	0.011*
	(0.006)	(0.006)	(0.006)	(0.006)
Birth order	-0.004***	-0.004*	-0.005***	-0.005*
	(0.001)	(0.002)	(0.001)	(0.003)
Last born child	0.054***	0.010*	0.063***	0.010*
	(0.006)	(0.006)	(0.006)	(0.006)
N	24394	24394	22715	22715
F-stat	17.452	5.853	13.218	5.690

Note: Robust standard errors clustered at the father level are included in parentheses. All regressions control for year of birth dummies, region of birth dummies. Fixed-effects regressions control for family (father) dummies.

Table A.2: Birth Order Effect using Booth and Kee Index (2009)

	(1)
Table A: Birth order index	
Birth order index	-0.020**
	(0.009)
N	27389
F-stat	6.423
Panel B: Parental occupation interactions	
Birth order index	0.006
	(0.011)
Birth order index*Father occupation rank	-0.050***
	(0.013)
N	27389
F-stat	6.485
Panel C: Type of region interactions	
Birth order index*Urban	-0.023**
	(0.010)
Birth order index*Rural	-0.018*
	(0.009)
Birth order index*Modern Agricultural	-0.018
	(0.012)
N	27389
F-stat	6.333

Note: Robust standard errors clustered at the father level in parentheses. All regressions control for age difference with immediately older sibling and region and year of birth dummies.

Table A.3: Birth order effect on occupation quality by family size (FE specification)

	≤ 5	6 to 8	> 8
	(1)	(2)	(3)
Panel A			
Birth order	-0.016***	-0.006	-0.004
	(0.006)	(0.004)	(0.003)
N	5116	9756	12517
F-stat	3.622	2.893	3.909
Panel B			
No. older brothers	-0.013*	-0.009**	-0.006*
	(0.007)	(0.004)	(0.003)
No. older sisters	-0.025***	-0.001	0.000
	(0.010)	(0.005)	(0.004)
N	5116	9756	12517
F-stat	3.078	2.894	4.108
Panel C			
First born child	-0.010	0.011	0.013
	(0.014)	(0.010)	(0.009)
Birth order	-0.020**	-0.003	-0.001
	(0.008)	(0.004)	(0.003)
Last born	0.004	0.015	0.016
	(0.011)	(0.010)	(0.010)
N	5116	9756	12517
F-stat	5.467	2.894	4.455

Note: Robust standard errors clustered at the father level are included in parentheses. All regressions control for age difference with immediately older sibling, year of birth dummies, region of birth dummies. Fixed-effects regressions control for family (father) dummies.