

# **Sources of Sibling Similarity**

Status Attainment in the Netherlands during Modernization

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# **Sources of sibling similarity**

Status attainment in the Netherlands during modernization

Oorzaken van overeenkomsten tussen broers  
Statusverwerving in Nederland tijdens modernisering  
(met een samenvatting in het Nederlands)

Proefschrift

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door

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geboren op 27 april 1983 te Groningen

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*Voor mijn ouders*

*Voor Emma*



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# Chapter 1. Synthesis

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## 1.1 The Impact of Stratification

Los Angeles is a city of extremes. As part of my dissertation research, I spent a summer there visiting the California Center for Population Research at UCLA. After a weekend trip to San Diego, I returned to LA by Greyhound bus on Sunday late at night. Although I could have transferred to a city bus right across the street, I thought I could save some time by walking to an express bus stop. As I headed toward the bus stop, the streets became darker and less well lit. When I reached the bus stop, it turned out to be in the epicenter of what I later learned is Skid Row. I encountered drug addicts with hollow eyes walking around, and homeless veterans putting up their tents to prepare for the night. I was nervous and, to ease my nerves, struck up a conversation with another passenger waiting for the bus. He told me he lived a couple of blocks away, and I asked him what bus he was waiting for. When he replied, “I don’t care, I just wanna get out of here as soon as possible”, I started to panic. Walking on was not an option since there seemed to be some sort of altercation going on further down the street. The minutes it took for the bus to come seemed like hours, but I got on safely. As the 720 express bus made its way west on Wilshire Boulevard, it went from one extreme to the other. By the time my heartbeat returned to normal, I had passed the Aston Martin, Maserati, and Ferrari showrooms in Beverly Hills, home to many celebrities and where houses have an average listing of \$5.32 million.<sup>1</sup> When we finally reached the UCLA campus, where one year of education costs \$56,238,<sup>2</sup> I felt extremely lucky that this was my final destination.

A ride on LA’s 720 express bus illustrates how the positions individuals occupy in the social and economic hierarchy of society have a great impact on their access to resources and opportunities in life. Those of high socioeconomic standing—often expressed by their educational attainment, income, wealth, occupational status, or class—have more favorable living conditions and life outcomes than those of low socioeconomic status. This is well documented in academic research as well. For example, compared with those with low socioeconomic status high socioeconomic status individuals live a healthier and

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<sup>1</sup> Numbers for the fall of 2014 as retrieved from [www.trulia.com/real\\_estate/90210-beverly\\_hills/market-trends/](http://www.trulia.com/real_estate/90210-beverly_hills/market-trends/) on November 10, 2014.

<sup>2</sup> This is the estimated budget for 2014-2015 out-of-state students as retrieved from [www.aim.ucla.edu/tuition.aspx](http://www.aim.ucla.edu/tuition.aspx) on November 10, 2014. For California residents it is “just” \$33,360.

longer life<sup>3</sup> (Elo 2009), report a higher quality of life (Schuessler and Fisher 1985), and are happier (Clark, Frijters, and Shields 2008; Hout 2012). Socioeconomic circumstances influence life outcomes even before a person is born. Strully, Rehkopf, and Xuan (2010) show that mothers who experience poverty during pregnancy bear children with lower birth weights on average, which in turn inhibits their child's cognitive and physical development and reduces educational attainment and adult earnings.<sup>4</sup> There is much variation between societies in how stratified they are. When considering income inequality, the World Bank reported that in the most equal country in the world in 2010, Slovenia, the top 10% earn 20.7% of the national income, while in the most unequal country, Namibia, the top 10% earn as much as 51.8% of the national income.<sup>5</sup> Obviously, all else being equal, the larger the inequality in a society the more detrimental it is to be at the bottom of the socioeconomic hierarchy and the more advantageous it is to be at the top.<sup>6</sup>

To what extent an individual's socioeconomic position determines opportunities depends not only on *how* stratified a society is but also on how easy it is to get from one stratum to another. If individuals are destined to keep the same socioeconomic position that they "inherited" at birth from their parents for the rest of their life, their socioeconomic position will be highly determinative for later life conditions.<sup>7</sup> If, on the other hand, where individuals start out low and have a reasonable chance to climb the social ladder during their lifetime, or vice versa, their current socioeconomic position will be much less decisive. In other words, the higher the degree of social mobility, that is, the more individuals change socioeconomic position, the more inequalities in life conditions average out over the life course. Because social mobility mitigates the impact of inequality, social stratification scholars in sociology and economics have a long tradition

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<sup>3</sup> For example, the life expectancy in 2000 of Americans aged 25 with some college education is predicted to be seven years longer than that of those with no more than a high school diploma (Meara, Richards, and Cutler 2008).

<sup>4</sup> Behrman and Rosenzweig (2004) estimate that increasing the weight of low-birth-weight US babies to the average US birth weight would increase their lifetime earnings by as much as 26%.

<sup>5</sup> In the Netherlands and the United States, the top 10% earn 22.9% and 29.6% of national income respectively. The data were retrieved on January 8, 2015 from <http://data.worldbank.org/indicator/SI.DST.10TH.10/countries>.

<sup>6</sup> Inequality is detrimental not only for those at the bottom of the hierarchy, but also for the functioning of society as a whole (Neckerman and Torche 2007). For example, Wilkinson and Pickett (2010) show that many societal problems, such as ill health, lack of community life, violence, drug abuse, obesity, mental illness, and imprisonment rates, are worse in more unequal societies.

<sup>7</sup> The caste system in India, although officially abandoned, is an extreme example of a closed stratification system.

of describing patterns in social mobility and of trying to understand its causes. It is this tradition of which this dissertation is a part.

## 1.2 Aims of this Dissertation

The first aim of this dissertation is to describe social mobility patterns in the Netherlands in the nineteenth century. Whereas Dutch cities currently do not exhibit such extreme inequalities as those found in Los Angeles, in the past they did so to a greater extent (Lesger and Van Leeuwen 2012). In Amsterdam in the first half of the nineteenth century, for example, a small group of exceptionally wealthy citizens lived along the canals, while the paupers, consisting of one-third of the city's population, lived just around the corner (Lesger, Van Leeuwen, and Vissers 2013). Piketty (2014) recently reignited the debate on inequality by showing that in many Western societies wealth inequality is returning to levels encountered before and during industrialization. Describing long-term trends in inequality is one way of understanding how stratification systems have developed over time. However, because social mobility alleviates the impact of inequality, descriptions of long-term trends in social mobility are needed to complete the picture.

The second aim is to *explain* the observed social mobility patterns. A classic sociological theory—modernization theory—claims that social mobility was low in traditional Western societies but that modernization processes have increased the opportunities to be socially mobile (Treiman 1970). For example, industrialization led to a more formalized allocation of jobs, which meant job allocation was based less on ascribed characteristics such as family background and more on achieved characteristics such as educational qualifications, while educational expansion made access to education more universal. The modernization processes referred to by Treiman (1970) started in the Netherlands in the second half of the nineteenth century. The Netherlands in the nineteenth century offers the variation in social contexts needed to gain insight into what causes social mobility rates to differ between contexts. In particular, it allows one to test the claim that modernization processes caused social mobility to increase.

## 1.3 The Contributions of this Dissertation

Common sense seems to be in line with the idea of increased openness over time as predicted by modernization theory. At social occasions, when people asked me out of

politeness what my dissertation was about, I would spare them the details, also out of politeness, and say that I had been researching whether social mobility had increased over time as a result of modernization. Often people responded along the lines of “Didn’t we already know this?”, or, “Yes, I think social mobility has increased. If I look at my family, my grandfather went only to elementary school, my parents finished high school, but my siblings and I all went to university”. To justify why it took me so many years to reach the same conclusion (see **chapters 2 and 3**) reached in a few seconds by most of my dialogue partners, I think now is a good time to argue in more detail why things are a bit more complicated than they seem.

First, although many Dutch people did indeed attain a higher educational level than their parents (Tolsma and Wolbers 2010), this tells us only that there were opportunities to be upwardly socially mobile. The fact that average status increased over time (see **Table 2.3**) is very relevant for the general level of well-being, but it does not say whether the *relative* chances of being socially mobile have increased. If children from low-status families gain on average, say, five status points more than their parents but children from middle- and high-status families do too, the children from low-status families will still end up at the bottom of the hierarchy. In this dissertation, I am interested therefore in changes in relative social mobility, which I usually refer to simply as social mobility, and sometimes as the openness or fluidity of society.<sup>8</sup> As an indicator of socioeconomic standing I use occupational status, which is considered an excellent measure (Blau and Duncan 1967, p. 6).

Second, even if relative mobility increased from our grandparental generation to our own generation, this cannot be regarded as supporting the modernization thesis because the bulk of industrialization occurred much earlier. For a proper test, one needs to study the period before and during modernization. Many modernization processes, for example industrialization, are thought to have started in the Netherlands somewhere around 1865 (De Jonge 1968). Previous studies were unable to examine the relevant period adequately because most relied on survey research, which only became available in the 1950s, while the few studies on the period we will be considering were limited in time, to one or two villages, or to a specific subpopulation, such as the elites. More recent studies have made significant progress because they were able to draw on digitized information from

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<sup>8</sup> By relative mobility I am not referring to the strict meaning of the term as used in log-linear analysis, a method to study intergenerational social mobility that I do not employ in this dissertation.

historical registers (Van Leeuwen and Maas 2010).<sup>9</sup> In this dissertation, I will be taking advantage of this relatively novel source of data by using all Dutch marriage certificates for five out of eleven provinces for the period 1812-1922 as contained in the GENLIAS database. A great benefit of marriage certificates is that they typically provide occupational information (for further details on the data, see §2.3.1, 3.3.1, 4.3.1, and 5.3.1). I study only men as most women stopped working as soon as they married (Bras 2002; Schulz 2013; Schulz, Maas, and Van Leeuwen 2014a). These data are extraordinary because they cover a long period of time, a broad geographical area, and are quite representative of the general population (for discussions about their representativeness, see the paragraphs mentioned above).

Third, for a proper test of the modernization thesis it is not enough to establish that social mobility increased during the period of modernization; such a trend could also have been the result of other processes that happened to occur simultaneously. Therefore, colleagues and I collected and standardized indicators for all the modernization processes—industrialization, educational expansion, urbanization, migration, mass communication, and mass transport—as identified in the modernization thesis by Treiman (1970). Because the indicators are available at the municipal and annual level, they allow one to compare whether social mobility is higher where one municipality is more modern than another, and also whether social mobility increases if a municipality becomes more modern over time (for further details on the modernization indicators, see §2.3.2 and 3.3.2).

Fourth, a conventional indicator of relative social mobility, or actually the lack of it, is the association or correlation between father's status and son's status. The family offers children many resources that advantage them in attaining a good job. For example, children can inherit the family business, parents can teach their children skills, and they provide them with genetic endowment. Although a father's status will reflect the availability of such resources to a large extent, it will never be able to measure all relevant resources perfectly, if only because the relevant resources of the mother might not be captured correctly (Beller 2009). Another indicator of social mobility (or the lack thereof), the status correlation between siblings, overcomes this problem to a large extent. The status similarity of siblings reflects all common influences, including *all* shared

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<sup>9</sup> This dissertation is part of a larger research project, “Towards Open Societies”, where others have also demonstrated the value of historical register data for studying questions relating to social stratification. For example, Zijdeman (2010) studied intergenerational social mobility in the Netherlands (but only for one province, and not using sibling data), Schulz (2013) studied *intragenerational* social mobility in the Netherlands, while Lippényi (2014) focused on intergenerational mobility in pre-communist and communist Hungary.

family resources but also shared neighborhood characteristics and the influence of siblings on each other (Jencks et al. 1972).<sup>10</sup> This more encompassing indicator is used less often because occupational information on siblings is rare. However, I am able to utilize this indicator and exploit the advantages of having sibling data. I will also employ the conventional indicator because it makes comparing results with other studies easier. Moreover, it allows one to assess to what extent the conventional indicator performs worse than the more encompassing measure.

Fifth, theoretically, although modernization theory posits the seemingly plausible argument that modernization led to greater openness, it is by no means obvious that that argument is indeed correct. For one, status maintenance theorists offer counterarguments: they argue that elites found alternative strategies to transfer their advantages to their children, such as making sure their children received the best education (Bourdieu and Passeron [1977] 1990; Collins 1971). Perhaps more importantly, the arguments adduced by modernization theory, and status maintenance theory for that matter, are incomplete and too simplistic (Coleman 1987). They neglect, especially, the importance of interdependency, i.e. the competition element, between individuals on the labor market (Coleman 1991). While I test the original arguments of modernization theory in **Chapter 2**, I provide a theoretical amelioration by developing a job competition model in **Chapter 3**. Using this model, it becomes clear that modernization theory incorporates arguments only about the *value of family resources*, while other aspects of the status attainment process play a crucial role as well. In the remainder of the dissertation I investigate how some of these aspects might alter our understanding of the development of social mobility over time and with modernization.

In **Chapter 3**, I consider, besides the value of family resources, the *inequality* of family resources *between families* in a given community. According to the Kuznets curve, modernization initially caused inequality to increase (Kuznets 1955). I argue that this increase in inequality over time should, in turn, decrease social mobility, which is counter to what modernization theory predicts. In this chapter I simplify the analysis by assuming, *inter alia*, that siblings all receive the same amount of family resources and that siblings do not influence each other.

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<sup>10</sup> Although I sometimes therefore refer to the sibling correlation as the total family impact, one should be aware that it is, in fact, a lower-bound estimate of total family impact because it does not reflect family influence that is not shared by siblings (Björklund and Jäntti 2012).

In **Chapter 4**, I challenge the parent-offspring approach that has conventionally been adopted in the stratification literature (and that is manifested in modernization theory too) and research *the role of extended family members*. Relatively recently, the idea has gained momentum that a two-generational approach might be too limited and that a multigenerational view of social reproduction is warranted (Mare 2011; Chan and Boliver 2013). If, for example, in the Netherlands, grandparents influenced the social position of their grandchildren in the nineteenth century, their influence might have become stronger because increasing life expectancy during modernization augmented the scope for contact. However, empirical evidence about where and when the role of grandparents (or other extended family members) is important is still limited. Furthermore, evidence on *how* grandparents influence their grandchildren is even scarcer. I therefore establish whether a two-generational approach is sufficient and I test the two main mechanisms proposed for multigenerational influence: influence through direct contact and influence through durable resources. I also test whether an augmented scope for influence through contact counteracted the trend toward more openness predicted by modernization theory.

Finally, in **Chapter 5**, I relax the assumption that siblings share family resources equally and explore stratification processes within the family, i.e. how *inequality* of family resources *between siblings* comes about, which includes the *influence of siblings on each other*. Whereas modernization theory focuses only on between-family stratification, I argue that understanding developments in within-family stratification is equally important for explaining trends in social mobility because a sibling correlation is a proportional relation of the two. Based on evolutionary theory, differences between siblings in life outcomes might be the result of competition between them for parental resources, and this sibling rivalry has been shown to be very fierce in some species. The GENLIAS data allow for an innovative way to test whether sibling rivalry is important among humans as well. Moreover, I test explanations for status differences between siblings offered by sociologists—aspects of family background that are non-identical for siblings and cross-socialization of siblings—that are at odds with evolutionary theory.

## 1.4 Brief Summary of each Chapter

### 1.4.1 Status Attainment of Siblings

In Chapter 2, I test whether the claim of the modernization thesis, namely that intergenerational social mobility increased over time due to industrialization and other modernization processes, is true. I study approximately 360,000 brothers from 189,000

families covering more than 500 municipalities in the Netherlands and a 70-year period (1827 to 1897). I complement these sibling- and family-level data with municipal indicators of the degree of industrialization, mass communication, urbanization, educational expansion, geographic mobility, and mass transportation. I analyze these data by applying sibling models, that is, multilevel regression models where brothers are nested in families, which in turn are nested in communities. I found that the total—unmeasured—family effect on sons' status attainment decreases slightly over the period studied and is higher than that found for contemporary societies. The measured influence of the family, operationalized by father's occupational status, decreased gradually in the Netherlands in the second half of the nineteenth century. A substantial part of this decrease was due to some, but not all, of the modernization processes adduced by the modernization thesis.

#### **1.4.2 Total Family Impact on Status Variation**

In chapter 3 I describe and explain variation in total family influence (instead of measured family influence) in the Netherlands during modernization. I test opposing hypotheses about how modernization processes influenced fraternal resemblance through the value and inequality of family resources. The hypotheses are derived from a job competition model in combination with modernization theory, status maintenance theory, and dualism theory. I analyze approximately 450,000 linked Dutch marriage certificates from 250,000 families, complemented with historical indicators for six modernization processes for over 2,500 communities. Using multilevel meta-regression models, I found that brother correlations in status decreased slowly from about 1860 onward. Although this exactly parallels the period of modernization, I did not find that modernization processes (except possibly urbanization and mass transportation) were responsible. In fact, in line with dualism theory, fraternal resemblance increased with most processes (i.e. industrialization, educational expansion, in-migration, and mass communication) because they amplified inequality.

#### **1.4.3 Beyond the Parental Generation**

Studies on intergenerational social mobility usually examine to what extent the social positions of one generation determine the social positions of the next. Chapter 4 investigates whether the persistence of inequality can be expected to stretch beyond *more than two* generations in the context of a Western modernizing society. It describes and explains the influence of grandfathers and great-grandfathers on the occupational status attainment of 119,662 men in the Netherlands during industrialization by using a multigenerational version of the GENLIAS database. Multilevel regression models show



that both a grandfather's and great-grandfather's status have an effect on the status attainment of men, after taking into account the influence of fathers and uncles. Whereas the influence of the father and uncles decreases over time, the influence of the grandfather and great-grandfather remains stable. The results further suggest that grandfathers influence their grandsons through contact, but also *without* being in contact with them. I conclude that, even though the gain in terms of "explained variance" from using a multigenerational model is moderate, leaving out the influence of the extended family considerably misrepresents the influence of the family on status attainment.

#### **1.4.4 Status Differences between Brothers**

Whereas evolutionary biologists argue that status differences between siblings are larger when competition between them for parental resources is stronger, sociologists argue that status differences are larger when siblings share fewer aspects of family background, and when there is less inter-sibling cross-socialization. The sociological predictions are often at odds with those of evolutionary theory. In chapter 5 I test these opposing predictions by studying differences between brothers in occupational status attainment in the Netherlands in the period before and during modernization. Again, I make use of the marriage certificates contained in GENLIAS, which allows one to study 326,890 brother pairs from 125,182 families for the period 1842-1922. Contrary to evolutionary theory, status differences between brothers do not increase when competition between them intensifies. I did find that brothers are more different: if 1) they share fewer aspects of family background (e.g. their birthplaces are less similar, and their father's status fluctuates more), supporting the "non-identical family background" explanation; and 2) interaction between them is less likely (e.g. when they differ more in age, and when there are other brothers born in between), supporting the "inter-sibling influence" explanation.

## **1.5 Conclusions**

### **1.5.1 Aim 1: Describing Social Mobility Patterns in the Netherlands (1827–97)**

#### *How Much Social Mobility Was There?*

An old Dutch proverb says, "If you're born a nickel, you'll never become a dime," expressing the idea that it is very difficult to escape the social class into which you are born. I conclude that this adage applies more to the Netherlands in the nineteenth century than to the Netherlands nowadays. The status correlation of father and son, the conventional indicator for intergenerational status reproduction, was on average 0.57 (see **Table 2.3**). Estimates for the second half of the twentieth century are much lower and

range from 0.25 to 0.40 (Björklund and Jäntti 2000; Ganzeboom 2002). Ganzeboom, Treiman, and Ultee (1991) report that, in a study of 21 contemporary countries, only India, with its history of a caste system, has an intergenerational status correlation (0.55) that is comparable with that of the Netherlands in the nineteenth century (one has to keep in mind, however, that the survey data are not perfectly comparable with the historical register data).

Although the father–son correlation was relatively high, it actually underestimated the true influence of the family on the status attainment of their children. If the father–son correlation had measured family influence perfectly, the expected brother correlation should have been  $0.57 \times 0.57 = 0.32$ . However, the brother correlation was much higher: around 0.53 (see **chapters 2 and 3**).<sup>11</sup> Father’s occupational status captures thus only 60% of all factors that make siblings more alike. Because this underestimation is constant over time (see Figure 2.6; Van Eijck 1996; Ganzeboom 2002), using the father–son correlation leads only to wrong predictions in absolute terms, but not to wrong conclusions when discussing relative developments over time. Hence, similar to the father–son correlation, the brother correlation was much higher in the nineteenth century (0.53) than in contemporary Dutch society (0.18–0.38) (Sieben and De Graaf 2001; Ganzeboom 2002).

One reason why the brother correlation is higher than expected based on the father–son correlation is that it was not only parents who mattered for status attainment; extended family members did too. I found that uncles (0.07), grandfathers (0.12), and great-grandfathers (0.06) had an influence besides that of the father (0.42) (see **Table 4.4**).<sup>12, 13</sup> Thus the socioeconomic position of one generation created advantages or disadvantages not only for the next generation, as is assumed in most studies, but also for the generation after that, and even the generation after that. In other words, inequalities existing in one generation had an enduring impact and persisted over multiple generations, underlining the limited opportunities for social mobility in the Netherlands in the nineteenth century.

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<sup>11</sup> It is 0.52 when calculated over all communities together, as in Chapter 2, and 0.54 when calculated for each community separately, as in Chapter 3.

<sup>12</sup> Note that this table shows regular regression coefficients, while I present here results of the same analyses but with the variables standardized (the resulting correlations are not shown in a table).

<sup>13</sup> It must be noted, however, that taking extended family members into account brings the expected brother correlation only a little closer to the observed brother correlation. The reason is that if the extended family is not taken into account, their effects are partly assumed by father’s occupational status (it is then 0.50 instead of 0.42).

Because the estimates I have just presented are averages, they do not apply equally to all municipalities and all time periods. There was quite some variation in social mobility rates—especially between municipalities, but also over time. In what follows, I will discuss whether a general trend can be discerned in the variation over time.

#### *Did Social Mobility Increase over Time?*

Social mobility was rather stable in the first half of the nineteenth century, but a slow trend toward more openness started in the second half of the century. This pattern is shown both by the father–son correlation and the brother correlation. The father–son correlation lingered at around 0.58 until just after the midpoint of the century and decreased to 0.53 by the end of the century (see **Figure 2.7**), while the brother correlation fell from around 0.57 to 0.50 in that same period (see **Figure 3.5**).<sup>14</sup> The increasing possibilities for social mobility are reflected also in the decreasing influence of uncles (see **Figure 4.4**) during the second half of the century.<sup>15</sup> As discussed in more detail later, the influence of grandfathers and great-grandfathers remained stable.

### **1.5.2 Aim 2: Explaining Social Mobility Patterns in the Netherlands (1827–97)**

#### *Were Modernization Processes the Driving Forces behind the Trend toward Openness?*

The increase in social mobility started right around the time that modernization processes also commenced in the Netherlands, suggesting modernization theory might be correct in its claim that modernization led to more openness. To test whether one or more of the modernization processes were actually responsible, I examined whether communities that were more modern, and so which scored high on measures for industrialization, educational expansion, urbanization, migration, mass transportation, and mass communication, were also the ones that exhibited more social mobility. The father–son correlation was indeed lower, and so social mobility was higher, for communities that score high on a modernization scale, which combines the different modernization measures into one indicator (see **Table 2.4**). Although the evidence so far clearly supports the ideas of modernization theory, closer inspection reveals that matters might not be so straightforward.

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<sup>14</sup> When the brother correlation is calculated for all communities together, the decrease is from 0.53 to 0.48 (see **Figure 2.5b**).

<sup>15</sup> Research using survey data suggests that the trend toward more openness continued in the twentieth century, because the father–son correlation was 0.38 in the period after the Second World War, and only 0.25 in the 1980s, climbing to 0.40 in the 1990s again, while for these same periods the brother correlation was 0.35, 0.18, and 0.38 respectively (Ganzeboom 2002).

Modernization theory identifies industrialization and educational expansion as the main driving forces behind increasing social mobility, and urbanization, migration, mass transportation, and mass communication as their “concomitants” (Treiman 1970). Yet, not combining the measures into one single scale but treating them separately yields a father-son correlation that is significantly lower only for the concomitants and not for the asserted main factors. If this finding is not due to limitations of my observation period (educational expansion, especially, soared really only from around 1910 onward), it would imply that it was not so much that industrialization and educational expansion made the hiring process more meritocratic.<sup>16</sup> Instead, the results are in line with the theoretical ideas that increasing urbanization, mass transportation, and migration allowed individuals to apply for jobs more anonymously, and this made it more difficult for employers to judge applicants based on their family background since they were increasingly unaware of this background. Moreover, it became harder to deduce an applicant’s social background based on cultural cues, because mass communication created a more “common culture”: social classes differed less in their attitudes and behavior because access to information depended less on one’s social circles, making acculturation easier (Treiman 1970).

Whereas this merely leads us to qualify modernization theory, more fundamental objections arise when studying the brother correlation instead of the father–son correlation. The brother correlation did not decrease with modernization processes, except possibly for urbanization and mass transportation. In fact, the brother correlation *increased* with many of those processes (industrialization, educational expansion, immigration, and mass communication), and for some of these processes this increase leveled off at later stages. This presents a puzzle: why did the father–son correlation decrease with most modernization processes while the brother correlation increased with most modernization processes? Because modernization theory provides, in principle, an explanation of why the father–son correlation would decrease, I focus next on whether there are arguments, based on **chapters 3 and 4**, that can help us to understand why the brother correlation would increase.

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<sup>16</sup> Schulz, Maas, and Van Leeuwen (2014b) tested directly whether the hiring process became more meritocratic by looking at whether job-related requirements became a more important selection criterion in Dutch job advertisements than job-unrelated requirements, such as social origin, but they found no change in the period 1870-1939.

*Why Did the Brother Correlation Increase with Most Modernization Processes?*

The fact that the statuses of brothers are correlated means that brothers are more similar to each other than to children from another family. In trying to find possible explanations as to why the brother correlation would increase with modernization, it is thus useful to first ask: what makes brothers similar in status? One reason is that the amount of resources that individuals can bring to the job market to obtain a job depends for a large part on the level of their family resources, and because brothers profit from a similar level of family resources they are likely to attain a similar status. The original arguments of modernization theory are basically that employers valued parental resources less with modernization, and thus that brothers became less alike. However, I would argue, and demonstrate, that modernization theory is too simplistic. Besides the value of family resources, there are other aspects influencing sibling similarity that might have changed with modernization.

A fundamental simplification of modernization theory is that it views an actor's status attainment too much as the outcome of his own resources and decisions, while actors are in reality interdependent because they compete with each other on the job market (Coleman 1987). Whether individuals get a certain job depends not only on the level of resources they themselves have, but also on the level of resources their competitors have (Coleman 1991). Therefore, to assess the impact of the family one should consider not only to what extent family resources are valued on the job market (compared with resources not dependent on the family), but also how family resources are distributed over families. Using a job competition model (for details see §3.2.1) I show that if family resources are more equally distributed over families, they provide less of a competitive advantage and should thus make less of a difference than when they are more unequally distributed (see **Figure 3.2**). The job competition model hereby gives a theoretical underpinning for an empirical regularity that has been labeled the Great Gatsby curve: societies with greater income inequality tend to have lower intergenerational social mobility (Corak 2013). I found that this relation holds for family resources at the community level too: in communities where father's status is more unequally distributed the brother correlation is much higher (so social mobility is much lower). Moreover, I found evidence that this relation is causal: if inequality increases in a municipality, the brother correlation increases as well.

Because inequality influences the brother correlation, it is important to find out whether inequality changed with modernization. A famous empirical regularity, the Kuznets curve, shows that inequality increases with modernization when modernization is still in its early

stages, and that this increase levels off as modernization progresses; after a peak somewhere in the middle, inequality decreases again in the later stages of modernization (Kuznets 1955; Lindert and Williamson 1985; Nielsen 1994).<sup>17</sup> Because the modernization processes were mostly still in their early stages of development in the Netherlands in the nineteenth century, one would expect to observe especially the first part of this inverted U-shaped curve. As described before, this is exactly the pattern that the brother correlation displays for many of the modernization processes: an increase that levels off for higher levels of a process, and sometimes even becomes a decrease at very high levels (see **Figure 3.6**). In other words, the finding that the brother correlation increases with most modernization processes can be understood by the effect that these modernization processes have on inequality.

Another explanation for the increase in the brother correlation with most modernization processes could lie in a changing role of the extended family. As argued, family resources might consist not only of parental resources but also of resources from the extended family. If the extended family became more important with modernization, father's status would not detect this, whereas the brother correlation would. For grandparents, it is a reasonable conjecture that they became more important, because the overlap in lives between grandparents and grandchildren was enlarged in the period of modernization due to increasing life expectancy. This increased the possibilities for direct contact between grandparents and grandchildren, which is one of the two main mechanisms that have been proposed by which grandparents can have an influence.

I found that the influence of grandfathers was, indeed, larger when it was more likely that they had contact with their grandsons (see **Table 4.3** and **Figure 4.5**). At the same time, grandfathers and great-grandfathers had an influence even when it was virtually impossible for them to have been in contact, suggesting that the other main mechanism—durable resources, which do not require contact—played a role too (see **Table 4.4**). It seems that, on the one hand, grandparents lost influence because durable resources became less important (as modernization theory predicts), even though they gained influence through increased direct contact on the other hand. This explains the finding presented earlier that grandfathers' influence remained stable, while that of uncles (and fathers) decreased. However, because none of the extended family members became more important over time, it seems unlikely that their role became more significant with modernization. Therefore, whereas the intermediating role of inequality seems a plausible

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<sup>17</sup> Although the original theory relates to income inequality, I argue that it should also hold for inequalities in other family resources (see §3.2.3).

explanation for the finding that the brother correlation increases with most modernization processes, an intermediating role of extended family resources does not.

*What Else, besides Modernization, Could Explain the Trend toward More Openness?*

Although the intermediating role of inequality makes it intelligible why the brother correlation increased with some of the modernization processes, this leaves us with another puzzle: why did the brother correlation decrease over time if it was not because of modernization? In **Chapter 5** I explored a potential explanation that is related to status differences between siblings. A brother correlation might decrease because between-family differences diminish but it might also decrease because within-family differences, so differences between brothers, become larger.<sup>18</sup> Ideally, one would thus investigate whether the factors responsible for creating status differences within families gained importance over time. However, how differences within families come about has been investigated much less than how differences between families come about and hence is much less understood (even though, as we have seen, both account for half of the total variation in sons' status toward the end of the nineteenth century). In this dissertation I therefore took only the first step and studied possible explanations of status differences between brothers, without looking how these potential factors changed over time. I did so by testing existing ideas about intra-family stratification from different strands of the literature.

In evolutionary biology and psychology it is argued that differences between siblings might result from intensive competition between them for parental resources (Trivers 1985; Sulloway 1996). Because siblings share only about half of their genes, behavior that favors their own fitness at the expense of their siblings' fitness could be beneficial for their own gene reproduction. Sibling rivalry among some species is known to be so fierce that one sibling kills the other (Sulloway 2007). Although sibling competition among humans hardly ever results in siblicide, it could result in one sibling obtaining more parental resources than another sibling, which should then lead to differences in status attainment later in life. However, I did not find evidence that sibling rivalry plays an important role among humans. Stronger competition between brothers should lead to larger status differences between them. I hypothesized that competition between brothers would be stronger, and thus status differences larger, if family resources were lower,

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<sup>18</sup> This is easily seen from the conventional definition of a sibling or brother correlation:

$$\rho = \frac{\text{Between-family variance}}{\text{Within-family variance} + \text{Between-family variance}}$$

family size larger, and age differences smaller, but I actually found the opposite (see **Table 5.2**).

The results are more in line with explanations offered by sociologists, who present a more harmonious view of sibling interactions. They argue that human siblings provide each other with resources just like parents do, especially if their relationship is strong (Conley, Pfeiffer, and Velez 2007). Therefore, if one fares well other siblings are likely to profit from this and do better too, making siblings more alike in status. Interaction makes siblings more similar, too, because they cross-socialize each other, through passive role modeling (Benin and Johnson 1984) and active teaching (Zajonc 1976). In this view, status differences are larger if siblings interact less. The finding that status differences between two brothers are larger if they differ more in age supports this explanation, as does the finding that they differ more in cases where another brother was born in between them, since this provides them with an intervening opportunity for interaction.

The result that brothers differ more in status if age differences are larger also supports another sociological explanation, namely that status differences between siblings arise when aspects of family background are not identical for them (Conley 2004). I have already argued that siblings tend to be similar in status because they share the same family background. However, siblings will not share all the aspects of family background. By the time one sibling reaches the age of an older sibling, aspects of family background might have changed, and this is more likely when age differences are larger. Specific examples of change include the family moving, which alters the environment in which a child grows up, or if the father switches jobs, which alters the available parental resources. I found that status differences between two brothers were, indeed, larger the more their birthplaces differed and the more their father's status fluctuated over time.

In the analyses in **Chapter 5** I thus identify factors that influence intra-family stratification, but can these factors explain the downward trend in the brother correlation over time? I have argued above that the brother correlation might have diminished because differences between siblings increased over time. Although I did not explicitly test this, the results in **Chapter 5** certainly allow for such an explanation. Take, for example, the finding that differences between siblings were larger where family size was smaller and father's status was higher. Because average family size started to drop and average status increased in this period, one would expect this to have enlarged differences between siblings over time. Although this hypothesis is worth testing, I do not expect this



explanation to fully account for the trend toward openness, because the within-family variance explained by family size and father's status is small.

## 1.6 Issues for Future Research

I was able to explain many, but not all, of the observed patterns in social mobility over time and between municipalities in the Netherlands. Furthermore, the findings of this dissertation raise interesting new questions. In other words, there are plenty of issues left for future research, and of these I will discuss three.

### 1.6.1 Explaining further the different relationship of the father-son correlation and the brother correlation with modernization

A first issue is the observed difference between both indicators of social mobility in their relationship with modernization: the father-son correlation decreased with most modernization indicators, whereas the brother correlation increased with most modernization indicators. This seeming inconsistency is, in principle, possible because the brother correlation is a more encompassing measure of family impact than father's status is. In other words, the brother correlation may detect developments that the father-son correlation does not.

One such development could be the increase in inequality of status between families that occurs in the early phases of a modernization process. If the father-son correlation is sensitive only to a decrease in the value of family resources but not to an increase in the inequality of family resources, the seemingly inconsistent pattern would be explained. However, simulations based on the job competition model suggest that changes in inequality should be detected not only by the brother correlation but by the father-son correlation too (see **Figure 3.2**). To see whether it is also empirically true that the father-son correlation is higher when inequality is greater in a community, a logical next step would be to perform the same analyses for the father-son correlation as I performed for the brother correlation.

Another development could be that family resources directly related to father's status were devalued with modernization, whereas family resources less related to father's status gained value. Let us suppose that status maintenance theory and modernization theory are right in that the direct influence of family resources on status attainment decreased and that the influence of own education increased with modernization. Family resources that

exert a direct influence on status attainment are likely to be those captured well by father's status, such as money, the family business, or a father's professional skills. Family resources that are important for doing well in school might be those that are captured to a lesser extent by father's status, such as cultural capital, climate of ambition, or help with homework. With education becoming more important during modernization, it is possible that total family impact increased while the effect of father's status decreased (cf. Bourdieu and Passeron [1977] 1990; Collins 1971). This would imply that father's status explained less of the total family impact for higher levels of modernization. Based on the findings of this dissertation it does not seem likely that this is the case, because father's status explained an equal share of the total family impact over time (see **Figure 2.6**), but a more direct test involving modernization indicators instead of time would be required to resolve this properly.

One reason why father's status captures resources important for educational attainment to a lesser extent might be that the mother played an important role in the transfer of such resources because she was the one most at home and most involved in raising the children (Schulz et al. 2014a). One would then expect the characteristics of the mother to have become more important with modernization. Testing the implication that the effect of mother's status increased with modernization would be worthwhile, although using mother's occupational status is not unproblematic because only a selective group of women remained in the labor market after marriage. These women were more likely to have husbands of lower status, and because men's average status increased over time the proportion of women who could "afford" to withdraw from the labor market grew as well (Schulz et al. 2014a).

### **1.6.2 Further explaining the trend toward openness**

A second issue is that modernization processes were not able to fully account for the trend toward more openness. One possible explanation is that other societal developments, besides modernization, were responsible for this trend. As discussed, one possible development is that differences within the family became larger, for example because the demographic transition led to a decrease in the average size of the family. Future research should follow up on the preliminary steps taken in this dissertation to test this explanation. This could be done by relating the factors that influence intra-family stratification to the sibling or brother correlation to see whether they explain any trend. I think it would be even better to distinguish between the effects these factors have on within-family variance and on between-family variance separately. More generally, to understand variation in the sibling correlation I think much could be learned if future research not only examined the

effect of an explanatory variable on the sibling correlation itself but also on its two constituent parts, i.e. on the within-family and between-family variance. This is, in principle, possible within the multilevel framework used in this dissertation, but it is currently more common in the structural equation framework (in research into twins, for example, such as that by Turkheimer et al. (2003)).

Developments I did not explicitly research are the rise of democratic institutions and of universalistic values. In 1848 the Netherlands became a parliamentary democracy, although the right to vote was limited to those men over 23 who paid enough taxes (about 11% of all men). In the period 1870 onward there were fierce debates about expanding the right to vote, resulting in a widening of the franchise in 1887 and again in 1896 (raising the percentage of men eligible to vote to 49% in 1900 and to 65% in 1913). In 1917 all men were given the right to vote; this was extended to all women in 1919.<sup>19</sup> The call for more universalistic institutions is also reflected by the rise of the social democratic/socialist parties and the women's movement in this period (Van der Laarse 2000), and by the implementation of certain social security legislation in 1901.<sup>20</sup> Democratic institutions developed at the national level and could therefore have had an effect independent of the more local forms of modernization studied in this dissertation, such as industrialization. Universalistic values could be expected to have spread in cities before they did in the countryside. Therefore, of all the indicators used in this dissertation, urbanization would probably reflect best the spread of universalistic values. Indeed, urbanization was the strongest predictor of greater social mobility (both for the father-son and the brother correlation). However, for a proper test of these explanations more direct measures of social democratization and the spread of universalistic values are warranted.

A development that deserves attention because it was important and typical of the Netherlands is the so-called pillarization, which started around 1870. Pillarization was the process by which the organization of society and everyday life became vertically segmented into ideological groups (Protestants, Catholics, liberals, and socialists), each with their own political parties, newspapers, schools, and so on (Van der Laarse 2000). On the one hand, one could argue that if employers select employees on the basis of their ideology and not their talent, this would counteract any trend toward openness. On the other hand, one could argue that if employers select their employees on the basis of their

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<sup>19</sup> Information retrieved from [http://www.parlement.com/id/vh8lnhrre0zr/van\\_censuskiesrecht\\_naar\\_algemeen](http://www.parlement.com/id/vh8lnhrre0zr/van_censuskiesrecht_naar_algemeen) on January 15, 2015.

<sup>20</sup> Information retrieved from [http://www.parlement.com/id/vh8lnhrp8wsn/kabinet\\_pierson\\_1897\\_1901](http://www.parlement.com/id/vh8lnhrp8wsn/kabinet_pierson_1897_1901) on January 15, 2015

ideology, they can be less critical with respect to other aspects of family background, such as social standing. If the latter is the case, pillarization could be one explanation for the observed increase in social mobility. Although this hypothesis is worth testing, the importance of pillarization for social mobility could also turn out to be marginal. Pillarization was based mostly on religion in this period, but there were not many municipalities with a mix of Protestants and Catholics since there was a strong geographic divide, with Catholics mostly concentrated in the south. As labor markets were still relatively local in nature, this might have minimized the influence of ideology on employers' hiring decisions.

Another possible reason why my variables do not fully explain the trend toward openness is that, though the modernization processes I measured were fully responsible, the indicators did not measure the processes perfectly and therefore missed part of their effect. Even though the modernization indicators used in this dissertation are a great improvement compared to previous research, they are certainly not perfect. Ideally, one would have multiple indicators for each modernization process. It will not be easy to get additional indicators that are as detailed (i.e. for each municipality in each year) as the ones used. However, in future, new data sources might become accessible, or scholars might find inventive new ways to use existing data. An alternative approach is to repeat this research in other countries because this will also yield more—although not necessarily multiple—indicators for the same processes. More generally, it is desirable and necessary to repeat the analyses in this dissertation for other countries in order to get a better sense of what patterns are specific to the Netherlands, or the data used, and of what patterns are characteristic of other (modernizing Western) societies as well.

### **1.6.3 Finding the “optimal” stratification system**

At the beginning of this synthesis I argued that it is important to study social mobility because social mobility mitigates the impact of stratification: the more individuals change socioeconomic position, the more inequalities in life conditions average out over the life course. Moreover, I argue at several points in this dissertation that an important motive for social mobility research is that it is inefficient (and often considered unfair) if social background, instead of talent, determines status attainment. With this in mind, many scholars and readers might—implicitly—come to regard more social mobility as necessarily better. From that point of view, the finding of this dissertation that the father-son correlation and the brother correlation decreased over time would be good news for society.

However, is more social mobility always better? From an efficiency standpoint the answer is no. In an efficient society talent should matter for status attainment, that is talented people should attain high positions. Because talent is partly genetically determined children of talented parents are more likely to be talented too, which gives rise to a form of status reproduction that is not inefficient. This raises the question: what level of social mobility is optimal for a society? Is it when genes fully determine the degree of social mobility in society, or are there other considerations as well? And if genetic endowment were the only relevant factor, how high would the level of social mobility be? We might also wonder how high the impact of genes compared with environmental factors currently is, and whether this differed for societies in the nineteenth century. Hypothetically speaking, research might reveal that the level of social mobility hardly changed, but that the underlying source of status reproduction did change because genes played a smaller or larger role. This shows that research should not only look at the level of social mobility but also study the nature or source of social reproduction. There is a solid body of work emerging that does this, often by using methods similar to those I employed and by applying them to twins (see, e.g., Behrman, Taubman, and Wales 1977; Björklund, Jäntti, and Solon 2005; Björklund, Lindahl, and Plug 2006; Jencks and Tach 2006; Adkins and Guo 2008; Rietveld et al. 2013; Conley, Fletcher, and Dawes 2014). Addressing these questions is therefore a natural extension—theoretically and methodologically—of the questions addressed in this dissertation, and forms a promising avenue for future research.



# Chapter 2. Status Attainment of Siblings during Modernization\*

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**Abstract.** The modernization thesis claims that intergenerational social mobility increased over time due to industrialization and other modernization processes. Here, we test whether this is indeed the case. We study approximately 360,000 brothers from 189,000 families covering more than 500 municipalities in the Netherlands and a 70-year period (1827 to 1897). We complement these sibling- and family-level data with municipal indicators for the degree of industrialization, mass communication, urbanization, educational expansion, geographic mobility, and mass transportation. We analyze these data by applying sibling models, that is, multilevel regression models where brothers are nested in families, which in turn are nested in communities. We find that the total—unmeasured—family effect on sons' status attainment decreases slightly and is higher than that found for contemporary societies. The measured influence of the family, operationalized by father's occupational status, decreased gradually in the Netherlands in the second half of the nineteenth century. A substantial part of this decrease was due to some, but not all, of the modernization processes adduced by the modernization thesis.

## 2.1 Introduction

Individuals' socioeconomic positions shape, to a large extent, their life chances, attitudes, and political behavior (Weeden and Grusky 2012). A fundamental issue in the social inequality literature thus concerns what determines whether people attain high or low status. People generally believe it is unfair if positions in society are determined by the family into which one is born (ascription) rather than distributed based on capabilities (achievement). Moreover, it is economically inefficient if certain positions are closed off to people on account of their social standing, regardless of their talents. Much scholarship thus examines the extent to which status is transferred from one generation to the next (Ganzeboom et al. 1991; Breen and Jonsson 2005).

One classic theory in this field—the modernization thesis—claims that in Western societies during the nineteenth and twentieth centuries, modernization processes caused a shift from ascription to achievement (Kerr et al. 1960; Blau and Duncan 1967; Treiman 1970). Other scholars cast doubt on this change toward more open societies by arguing that resource-rich families found alternative strategies to retain their influence (Bourdieu

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and Passeron [1977] 1990; Collins 1971; Grusky 1983). Although many empirical studies have been conducted, we do not have a conclusive answer to the question of whether family influence has declined (compare, for example, Breen and Luijkx (2004) and Ganzeboom, Luijkx, and Treiman (1989) versus Erikson and Goldthorpe (1992) and Featherman, Jones, and Hauser (1975)). It has proven even more difficult to attribute possible changes directly to modernization (Hazelrigg and Garnier 1976; Tyree, Semyonov, and Hodge 1979; Grusky and Hauser 1984; Treiman and Yip 1989; Sieben 2001; Zijdemans 2009; Yaish and Andersen 2012), primarily because most studies lack the appropriate data to perform a comprehensive test. In this article we take a different approach to shed new light on this enduring sociological question.

Our first aim is to describe the regional and temporal variation in the total—measured and unmeasured—influence that the family had on occupational status attainment during modernization. This provides us with evidence on whether Western modernizing societies became more open. The second aim is to see whether we can explain this regional and temporal variation in a society's openness as a result of industrialization, educational expansion, mass communication, urbanization, geographic mobility, and mass transportation, as the modernization thesis claims.

To do so, we apply multilevel models with children nested in families (i.e., sibling models) and families nested in municipalities to long-term historical data from the Netherlands, a good example of a Western modernizing country. We use digitized information from marriage records that form part of the GENLIAS vital register database. These marriage records contain information on occupations of spouses and their parents for the nineteenth and the beginning of the twentieth century (a period in which just a small percentage of people did not marry). We consider only fathers and sons, because most employed women left work as soon as they married (Bras 2002). We use a linked version of the database: for five of the eleven Dutch provinces, each marriage record for a couple is linked to the marriage records of their siblings. This gives us a unique opportunity to apply sibling models to approximately 360,000 brothers from 189,000 families in 500 municipalities over a 70-year period (1827 to 1897). We supplement this individual- and family-level information with indicators for the degree of modernization of the community in which a son was socialized.

By applying sibling models to historical data, we make three valuable contributions to the existing literature. Our first contribution relates to the use of sibling models, which have a long tradition in sociology (Jencks et al. 1972; Olneck 1977; Hauser and Mossel 1985;

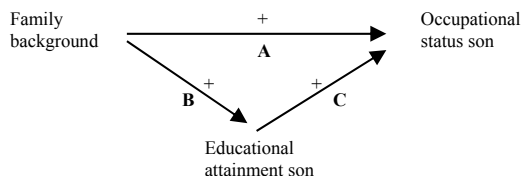


Hauser and Sewell 1986; De Graaf and Huinink 1992; Toka and Dronkers 1996; Sieben 2001; Warren, Sheridan, and Hauser 2002), and even more so in economics (for a recent overview, see Black and Devereux 2011), but have not been used to test hypotheses on long-term change in status attainment. Sibling models analyze how similar siblings are in the status they attain, relative to unrelated persons. A great advantage of sibling models is that they yield an indication of the total impact the family has on status attainment, because sibling similarity captures all aspects of family background shared by siblings. These factors include not only all—measurable and non-measurable—shared family resources, but also, for example, shared neighborhood characteristics and siblings' influence on one another (Jencks et al. 1972). Sibling resemblance is therefore regarded as a more encompassing indicator of family impact than family background variables (Björklund, Jäntti, and Lindquist 2009). Yet, father's occupational status remains the most widely used measure for the influence of family background in sociological mobility research. Usually we have no idea what proportion of the total family impact is accounted for by father's occupational status. Sibling models can estimate this, and thus help assess the merit of father's occupational status as a measure of family influence.

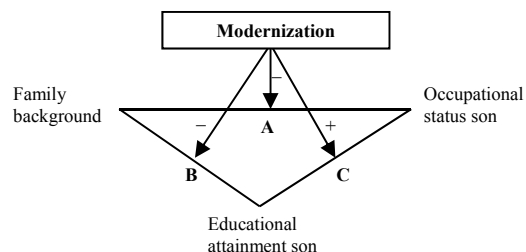
Our second contribution relates to our data's temporal and geographic coverage. Most research focuses on relatively recent periods, because scholars rely on survey data that did not become generally available in most countries until the 1950s. Using historical data, we can study the period in which industrialization and other modernization processes should have been most prominent. Previous historical studies are almost all narrow in scope: they are restricted to specific subpopulations, small regions, or compare only a few years (for an overview, see Van Leeuwen and Maas 2010). The fact that our data cover a long period of time and contain many cases makes it possible to detect changes even if they occur at a slow rate. Furthermore, the inclusion of five (out of eleven) provinces enhances generalizability and ensures we have regional variation in the degree of modernization.

Third, we move beyond describing the trend in the openness of society to explaining it. By including macro indicators for each municipality on a yearly basis, we can directly test whether components of modernization affect the status attainment process as the modernization thesis claims.

The combination of these improvements leads us to believe we will be more successful at assessing whether society became more open, and we can perform a more valid test of the modernization thesis than previous research has done.



**Figure 2.1a** Blau & Duncan's Status Attainment Model



**Figure 2.1b** Expected Effect of Modernization on Status Attainment

## 2.2 Theory

Blau and Duncan's (1967) status attainment model (see Figure 2.1a) claims that parental resources can help children obtain a good position in society, either directly or indirectly (namely via education). The main message of the modernization thesis as presented by Treiman (1970) is that, with modernization, the strength of the direct path decreased (path A is less positive, see Figure 2.1b), whereas education gained importance as a determinant of getting a good job (path C is more positive). Moreover, with modernization, parental resources became less influential on children's educational attainment (path B is less positive). Although no overall effect of modernization can be deduced from the expected changes in the direct and indirect paths,<sup>1</sup> the modernization thesis predicts the overall association between family background and occupational status attainment will become smaller with modernization.

Unfortunately, we do not have information on individuals' educational attainment. Therefore, we cannot test modernization's effect on separate paths but only its effect on the overall association between family resources and occupational status attainment. Nonetheless, we distinguish the separate paths of the status attainment process in our exposition of the modernization thesis, as it aids our understanding of the arguments made by modernization theorists.

### 2.2.1 Components of Modernization

The modernization thesis has four main sets of arguments. The first we label the *industrialization mechanism*; the second the *educational expansion mechanism*; the third

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<sup>1</sup> It is possible that the indirect effect ( $B \times C$ ) becomes stronger if path C increases more than path B decreases. Only if this offsets the weakening of the direct effect (path A) will the overall association ( $A + B \times C$ ) become higher.

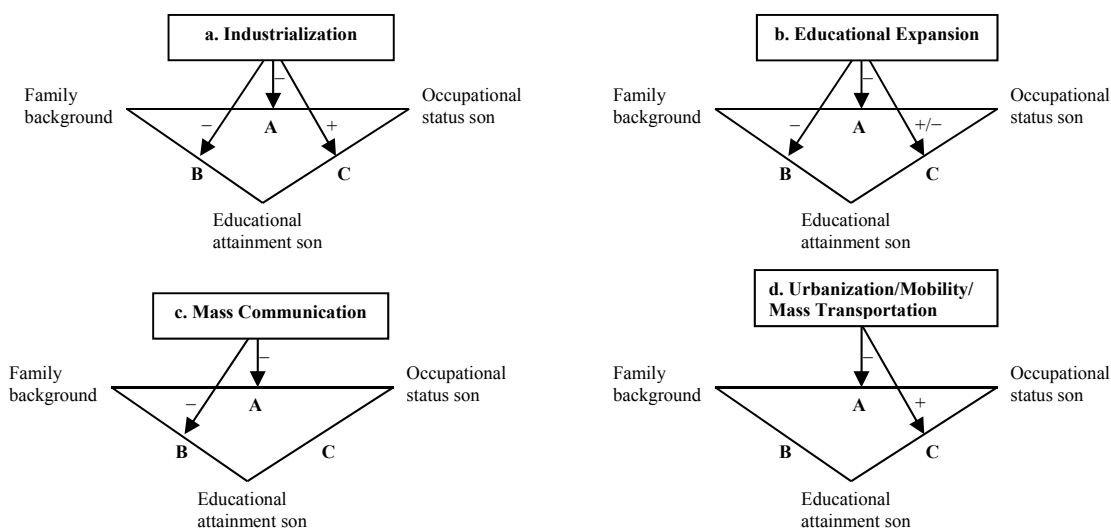
the *common culture* mechanism (which identifies effects of mass communication); and the fourth we label the *anonymization mechanism* (which deals with mass transportation, urbanization, and geographic mobility). Along with discussing these mechanisms in more detail, we show that these modernization processes took place in the Netherlands in the period of our study, and thus it is an excellent case with which to test the modernization thesis. Before doing so, however, we will look at the process of industrialization and how modernization processes relate to one another.

Davis (1955, p. 265) defines industrialization as “the use of mechanical contrivances and inanimate energy (fossil fuels and water power) to replace or augment human power in the extraction, processing, and distribution of natural resources or products derived therefrom.” According to Treiman (1970), industrialization caused three changes in types of job. First, industrialization (in the form of mechanization) contributed to the efficiency of agricultural production, which meant relatively fewer workers were needed in agriculture. Second, the rationalization of production led to a shift from crafts to assembly lines. In the first, tasks are performed within a single occupation; in the latter, each task is the specialization of a different jobholder. With mechanization, new jobs, such as machine attendant, came into being. Finally, while the number of industrial jobs grew at the expense of agricultural jobs, the number of clerical and administrative jobs grew even faster, because the increase in scale and complexity of production required more administrative personnel, whereas the increased efficiency of labor meant manpower could be transferred to the production of services instead of goods.

The other modernization processes Treiman (1970) describes are related to industrialization and to one another. For example, the shift in the distribution of labor increased demand for formally trained personnel, thus requiring an expansion in the educational system. The invention of steam engines made mass transportation possible, while mass transportation itself is a prerequisite for industrialization to develop fully. However, these processes occur to a certain extent autonomously. For example, although industrialization increased demand for educated personnel, the actual extent of educational expansion depended in part on the political ideology and efficiency of government (Wintle 2000).

### **2.2.2 The Industrialization Mechanism**

Treiman (1970) expects the direct positive influence of family resources on a son’s occupational status (see Figure 2.2a, path A) to have decreased with industrialization, because the shifts in demand for labor mean many sons performed different jobs than



**Figure 2.2** Expected Effect of the Different Modernization Components on the Status Attainment Process

their fathers did. The direct inheritance of occupation from father to son also decreased because many new occupations (e.g., factory and service jobs) were not easily taught at home, while bureaucratization made the allocation of such jobs more formal.

The modernization thesis further argues that the influence of family resources on a son’s educational attainment (path B) decreased, because the need for child labor was less pressing among industrial workers than among agricultural workers. With the shift in the distribution of labor, fewer children from the lower classes were pressured to leave school. With the displacement of the craft system and the specialization of labor, formal education became the way to learn relevant skills (as training at home by parents became less feasible). An educational qualification was increasingly explicitly required for employment. With the demand for a mobile and adaptable labor force, allocation of jobs was based more and more on universalistic achievement criteria instead of ascriptive criteria. In other words, the theory predicts that the link between educational qualification and occupational attainment (path C) became stronger.

An initial wave of industrialization came in the form of more mechanized labor in the Netherlands around 1865, and a second, more powerful, wave was seen from 1895 to 1914 (De Jonge 1968; Van Zanden and Van Riel 2004). Based on arguments of the modernization thesis and the observation that industrialization occurred during our period of study, we expect a higher level of industrialization in a municipality in a certain year to have led to a smaller influence of the family on a son’s status attainment.

### 2.2.3 The Educational Expansion Mechanism

The modernization thesis claims that the demand for educated personnel resulted in an expansion of the educational system. Whereas secondary education used to be available primarily to the elite, it was increasingly available to the masses and free of charge. Continuation of schooling depended much more on previous academic achievement and less on financial means. Together, this means that, with educational expansion, the link between family background and a son's educational attainment (Figure 2.2b, path B) became weaker.

As stated earlier, in modernizing societies the family loses importance in the transfer of human capital as school becomes the place to acquire skills. Treiman (1970) further argues that schools are also a locus of socialization. Children from the lower and middle social strata come into contact with those from the higher strata: their social networks change and they learn, to some extent, the manners and morals (i.e., cultural capital) of the higher strata. This lowers barriers that prevent children from being socially upwardly mobile. The direct influence of family background on status attainment (path A) should thus decrease with educational expansion.

The effect of educational expansion on the link between educational attainment and occupational attainment (path C) depends on whether demand for educated personnel is higher or lower than its supply (Treiman 1970). Educational expansion leads to a tighter link between educational and occupational attainment if the demand for education exceeds supply. Educational expansion then lowers the gap between demand and supply and makes it easier for employers to allocate jobs based on educational qualifications. However, if the educational system expands too quickly, such that supply exceeds demand, diplomas will be devalued. From among the large group of people with the required diploma, employers will hire those who have another competitive advantage, that is, using criteria other than educational qualification. The link between educational attainment and occupational attainment thus becomes weaker.

The Dutch case was likely characterized by educational expansion leading to a tighter link between educational and occupational attainment. The number of secondary schools increased steadily after the Secondary Education Act passed in 1863. However, the number of students enrolled in secondary education did not start to expand at a high rate until the first decade of the twentieth century (Mandemakers 1996). In conclusion, we

expect educational expansion to reduce the influence of family background on a son's status attainment.

#### **2.2.4 The Common Culture Mechanism: Mass Communication**

Treiman (1970) states that mass communication leads to a common culture, whereby social classes differ less with respect to attitudes and behavior. Therefore, in societies with mass communication "occupational mobility is not likely to require acculturation to as radically different a style of life as would be the case in traditional societies" (Treiman 1970, p. 219). Zijdeman (2010) elaborates this argument by stating that before the inception of mass communication, information spread mostly from person to person. In such a context, the particular information individuals receive depends heavily on which social circles they belong to. With the rise of mass communication, information about job openings, fashion trends, or conversational topics became less exclusive because of its public availability through newspapers and magazines. The modernization thesis thus expects that increasing mass communication will reduce the direct influence of family background on a son's status attainment (Figure 2.2c, path A).

Zijdeman (2010) further claims that where mass communication leads to a common culture, it should also decrease the influence of family background on educational attainment (path B). As children from different social classes become more alike in their speech, clothes, attitudes, and behavior, the disadvantages of being from a lower class diminish within the educational system.

Information was indeed disseminated more easily, at lower cost, and over greater distance in the Netherlands in the second half of the nineteenth century (Knippenberg and De Pater 2002). The number of post offices, the volume of mail, and the number of newspapers and magazines increased exponentially. Arguments adduced from the modernization thesis should thus apply to our case: the influence of family background on status attainment should be lower in communities where mass communication was possible.

#### **2.2.5 The Anonymization Mechanism: Urbanization, Geographic Mobility, and Mass Transportation**

Treiman (1970) asserts that a father's status is less likely to either help or hinder a son's job search (Figure 2.2d, path A) if this status is unknown to employers. Family background is almost always common knowledge in small communities, but it is not necessarily known to employers in a town or city. Similarly, if people leave their hometowns, employers are less likely to be part of their family's social network.

Zijdeman (2010) adds that this argument should hold for mass transportation, which makes it possible to work some distance from where one lives, allowing one to apply “anonymously” for jobs. With increasing urbanization, geographic mobility, and mass transportation, the modernization thesis expects the direct influence of family background on occupational status attainment to diminish.

In addition, Zijdeman (2010) theorizes that if information about one’s family is not retrievable through the employer’s social network, family background can no longer be used as a reputation mechanism. Employers must then select from among applicants on the basis of other indicators. Educational qualification is a logical candidate to signal competence. Therefore, with increasing urbanization, geographic mobility, and mass transportation, the influence of educational attainment on occupational attainment (path C) will likely increase. In general, the modernization thesis predicts that the decreased strength of path B will outweigh the increased strength of path C and thus the overall association will diminish.

By the beginning of the nineteenth century, the Netherlands was already quite urbanized compared with the rest of Europe (Wintle 2000). Between 1800 and 1850, urbanization stagnated before picking up in the second half of the nineteenth century. Regarding geographic mobility, Wintle (2000) argues that there was not much inter-provincial movement before the 1870s. From the 1870s onward, migration levels started to increase. The first modern form of mass transportation, the train, was introduced in 1842. Mass transportation became widely available with the rapid development of a dense train and tram network beginning in 1860 and 1880, respectively. Travel time and costs dropped considerably compared with previous forms of transportation over land (walking, carriages) and water (canal boats) (Knippenberg and De Pater 2002). We thus expect to find increasing levels of urbanization, geographic mobility, and mass transportation during our study period. Furthermore, we expect the influence of family background on a son’s status attainment to be lower in communities where these modernization processes were more developed.

## **2.3 Methods**

### **2.3.1 Individual- and Family-Level Data**

Our main data source is GENLIAS (Oosten and Mandemakers 2007), a digital database that contains information from marriage certificates for the period 1812 to 1922 (for more

details, see Bras, Kok, and Mandemakers 2010). These certificates include information on date and place of marriage; name, birthplace, age, and occupation of bridegroom and bride; and names and occupations of the couple's parents. We use a version of GENLIAS (version 2007\_03) that links the marriage certificates of children to those of their parents. From this, we know which married children are siblings. Links are based on matching the first and last names of the parents on both marriage certificates using a computer algorithm that allows for minor variations in the spelling of names (a conservative approach was taken, meaning that the number of wrong links is minimized at the expense of not maximizing the total number of links made). To avoid wrong links, additional information was used, such as age of the bride and groom (for more details, see Oosten 2008). This linkage method was applied within and between the provinces of Groningen, Overijssel, Gelderland, Limburg, and Zeeland.

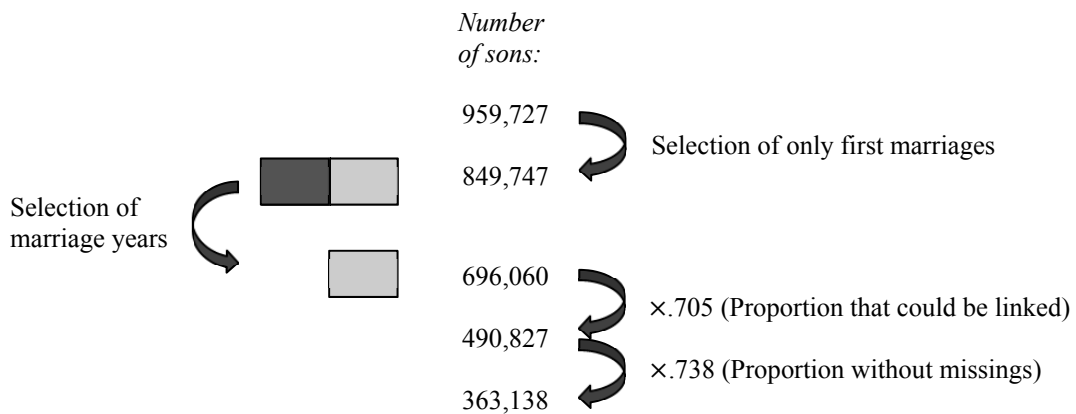
### *Selections and Missing Data*

We made several selections from the original database (see Figure 2.3a). First, as discussed in the introduction, we study only grooms. Second, because the influence of family background might work differently for grooms marrying a second time, we study only grooms marrying for the first time.

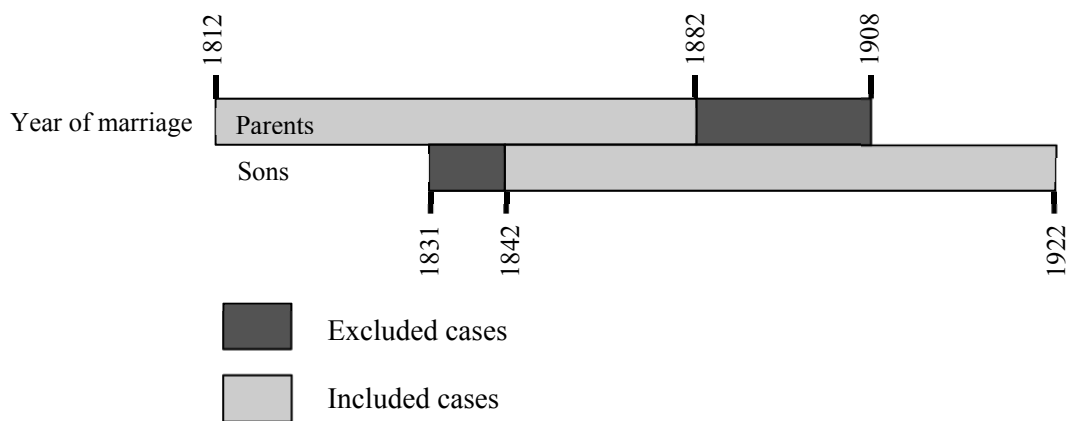
Third, grooms marrying at the beginning and parents marrying at the end of the observation period are, for present purposes, problematic. For grooms married shortly after 1812, their parents' marriage certificates will not be part of the database. For parents who married in 1812, their sons are first observed when marrying 19 years later, in 1831 (see Figure 2.3b). However, we chose to take a longer margin to give grooms in all time periods the same chance of having parents in the database. We therefore only include families in which no son was married before 1842 (following Bras et al. (2010) in taking a 30-year margin). For parents who married not much earlier than 1922, there is a fair chance one or more of their children married after 1922 and will thus not be part of our database. As we want complete families only, we are also forced to take a margin at the end of the observation period. We only include families in which the parents married no later than 1882 (for parents who married after 1882, the average number of sons per family recorded in our linked data drops steeply).

Fourth, of the resulting grooms, 29.5% could not be linked to their parents' marriage certificate and are thus excluded. This left us with 490,827 grooms who married between 1842 and 1922, and whose parents married between 1812 and 1882. Fifth, we cannot study grooms for whom occupational information on the marriage certificates was either





**Figure 2.3a** Overview of Selections and Missing Data



**Figure 2.3b** Selection of Marriage Years, Parents and Sons

missing or insufficient to allow us to assign an occupational status to either the groom (2.2% of cases) or his father (24.7% of cases). After list-wise deletion of these cases (26.2% combined), we are left with 362,138 grooms for our analysis.

*Possible Selection Biases*

These data form a rich source of information and offer astonishing temporal and geographic coverage: they allow us to study phenomena hitherto impossible to study. However, historical data always come with certain drawbacks. An obvious limitation of using marriage certificates is that we miss people who never married. This problem is less severe than one might expect because the percentage of men born between 1800 and 1905 who married at some point is quite high: at least 86% (Ekamper et al. 2003). Still, one can

imagine that men who married are systematically different in some respects from those who never married. This would imply a slight overestimate for sibling correlations, as those who married are more similar to one another. However, Engelen and Kok (2003) do not find many significant differences (e.g., by family background, religion, region, or birth cohort) in the likelihood of men born between 1890 and 1909 remaining unmarried. With respect to family background, they find sons of the elite were more likely to remain unmarried than were sons from other social classes, and sons of skilled manual workers were less likely to remain unmarried. With respect to socioeconomic position, Schulz (2013) finds no significant difference in status between married and unmarried men in the Netherlands during the period 1865 to 1930.

Because we linked within and between five out of eleven provinces, we miss sons who migrated from this region as well as family members of sons who migrated to this region. Migrants are not selected randomly—they tend to have a higher status—but we do not believe this will influence our results substantially, for the following reasons. First, the number of people we miss due to migration is not very large. Census data show that the number of people who lived in a province other than the one in which they were born was just 8% in 1849, 13% in 1899, and 15% in 1930 (Knippenberg and De Pater 2002). Note that we do include people who moved between the five provinces or who moved after marrying. Moreover, we performed a check by examining how different the results would be if we could have included more migrants. We estimated correlations for two provinces with and without migrants from and to the other three provinces in our dataset. The correlation between father's status and son's status, as well as that between brothers' statuses, is slightly lower without information on those who migrated (.54 and .51, respectively) than it is with information on the migrated (.56 and .53; averages taken over all possible pairs of provinces). This underestimation was similar in both the first and second half of the nineteenth century.

Finally, it is a known problem of using marriage certificates that information on father's occupation is frequently missing. Because we have linked data, we reduced the incidence of this problem from 41.8 to 24.7% of our cases by using siblings' marriage certificates as additional sources of information on a father's occupation. We find little difference in the correlation of brothers' statuses where the father's status is missing (.55) versus where it is not missing (.52). Other studies also find little difference between those with information on a father's occupation and those without (Zijdeman 2010; see Maas et al. 2011).

### 2.3.2 Community-Level Data

For the explanatory analyses, we complement individual- and family-level data with information on the community in which siblings grew up from the Historical International Standardized Community Indicators-Netherlands (HISCI-NL) dataset (Knigge, Schulz, and Zijdeman 2012). It is quite a challenge to construct historical measures for the modernization processes available for *every* municipality in *each* year, but Zijdeman (2009, 2010) and Schulz (2013) successfully cover long periods. Measures for all modernization processes are available for the period 1858 to 1890 (for details, see the Measures section).<sup>2</sup> Part of our explanatory analyses will therefore be restricted to this 32-year subperiod. Although imperfect, it is a good period to study modernization processes, because there was much diversity in the shape and timing of these processes between regions—as shown in the Measures section. This geographic diversity in modernization allows us to test the modernization thesis not only over time, but also by comparing municipalities within a given year.

Choosing the relevant community for a person is not a straightforward exercise. We use the community in which a groom lived when he started to look for a job, as many of the arguments underlying the modernization thesis concern the matching process in the labor market. Arguably, a groom's place and year of birth (+ around 15 years) are the best approximation. However, we simplify this by using the place and year of marriage (+15 years) of the parents as being the community of their sons. This way, children from the same family will be part of the same community, resulting in a hierarchical structure. If we allow brothers to be part of different communities, our models become too complex to estimate because of the cross-classified structure. The decision to add 15 years to the year in which parents married is based on the assumption that the first child will be about 15 years old around that time. Studies on contemporary societies typically choose this as the prime age of socialization (“What job did your father have when you were 15 years old?”), and in the period covered by our study, this was the age at which children started to enter the labor market (Bras and Kok 2003).<sup>3</sup>

### 2.3.3 Measures

A *son's occupational status* is based on the occupation stated on his marriage certificate, coded into HISCO (Historical International Standard Classification of Occupations), which was developed by Van Leeuwen, Maas, and Miles (2002) and is the historical

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<sup>2</sup> More details can be found in the codebook for the HISCI-NL dataset, which is available upon request.

<sup>3</sup> We repeated our analyses by defining the year of socialization to be 0, 5, 10, and 20 years after the parents married. This did not change our results substantively.

equivalent of the ILO's ISCO68. To translate occupational categories into a status score, we used HISCAM, a stratification scale (Lambert et al. 2013) that uses the same technique as CAMSIS scales do for contemporary societies (Stewart, Prandy, and Blackburn 1980). The scale ranges theoretically from 1 to 99, but we observe 10.6 (domestic servant) to 99 (e.g., lawyer) (see Table 2.1 for descriptives on all variables).

*Father's occupational status* is measured as the average occupational status of the father as derived from his children's marriage certificates. The reliability of this group-averaged score is given by the Spearman-Brown prediction formula (Winer, Brown, and Michels 1991, Appendix E) and is estimated by Stata's "lone" command to be .875 for the average-sized family. This indicates the correlation between father's and son's status will be somewhat underestimated, but not much.<sup>4</sup>

*Time* is the point at which sons were socialized, which we assume to be 15 years after their parents' marriage. The first observed year (1827) was coded 0 (for the explanatory analyses where we study only the subperiod 1858 to 1890, the year 1858 was coded 0). We divided the scale by 10.

The number of steam engines (per 1,000 inhabitants) purchased in a municipality in the year of socialization serves as an indicator for the degree of *industrialization* of that community. These data were taken from the Registers of the Dutch Department for Steam Engineering by Lintsen and Nieuwkoop (1989–1991); these are the only data available on industrialization at a regional level for the period of our analyses. The registers do not provide sufficiently detailed information on the capacity of steam engines or their actual use. Therefore, we follow Zijdemans (2009, 2010) in using the number of steam engines. These data are available up to 1890. Figure 2.4a shows that, over time, municipalities saw on average a moderate increase in the number of steam engines per 1,000 inhabitants. Variation between municipalities is high: whereas most municipalities industrialized hardly at all, some industrialized rapidly (see the range within which 80% of municipalities fall).

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<sup>4</sup> If we correct for the attenuation due to measurement error in father's status, the intergenerational correlation becomes .587 instead of .549 (see Table 2.3, Model 2). Although the reliability slightly decreases from .891 in the first decade to .860 in the last decade, this hardly influences the shape of the time-trend. We chose to report attenuated estimates to keep our results comparable with other studies, which usually report attenuated estimates.

**Table 2.1** Descriptives

Variables	Years of Socialization: 1827 to 1897				Years of Socialization: 1858 to 1890			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Occupational status son	46.33	12.58	10.60	99.00	46.63	12.51	10.60	99.00
Occupational status father	46.88	10.20	10.60	99.00	46.73	10.16	10.60	99.00
Time	4.07	1.98	0.00	7.00	1.77	.94	.00	3.20
Control Variables								
Son's age at marriage	27.84	5.47	16.00	79.00	27.53	5.32	16.00	70.00
Birth order	2.64	1.68	1.00	15.00	2.65	1.70	1.00	15.00
Sibship size	4.27	2.06	1.00	15.00	4.29	2.08	1.00	15.00
Father farmer	.32		.00	1.00	.34		.00	1.00
Modernization Indicators								
Modernization scale	.75	1.74	-.58	10.44	.87	1.77	-.54	8.98
Industrialization: steam engines/1000 inh.					1.52	2.43	.00	24.53
Educational expansion: students in sec. educ./1000 inh.					2.14	5.36	.00	62.93
Mass communication: post office (yes/no)					.31		.00	1.00
Urbanization: inhabitants/1000					7.81	10.19	.21	56.41
Geographic mobility: in-migrants/1000 inh.					51.82	30.21	.00	566.06
Mass transportation: train station (yes/no)					.34		.00	1.00
Number of Sons								
Number of Families		362,138				193,426		
Number of Communities		189,018				100,303		
Number of Municipalities		29,208				13,628		
		543				456		

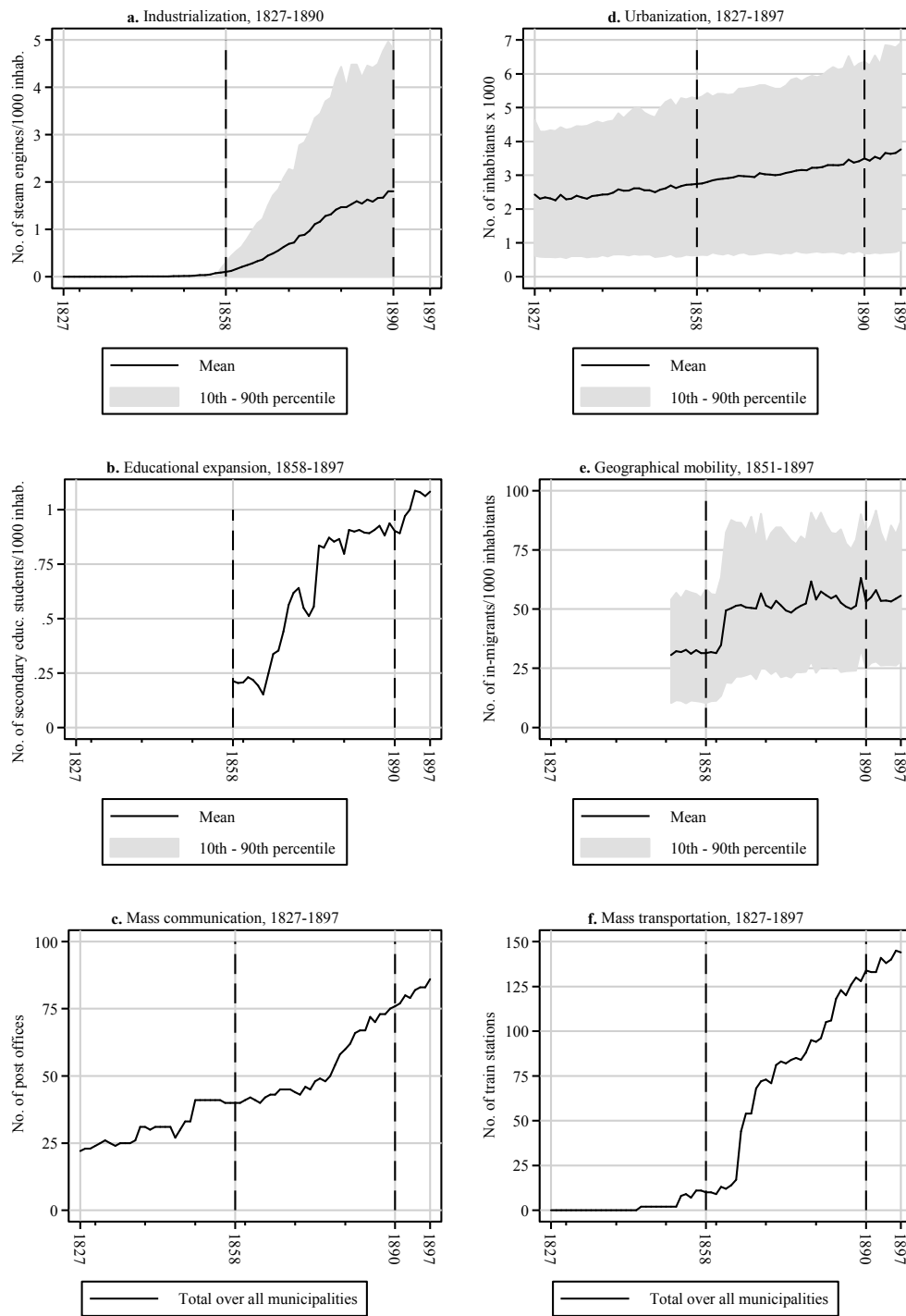
The number of students (per 1,000 inhabitants) enrolled in secondary education in a municipality in a given year represents the *educational expansion* in that community. This information was derived from annual reviews on Dutch education (Scholen 1862–1917). These data are available for the period 1858 onward. Figure 2.4b demonstrates that although, on average, the number of students in secondary education quadrupled, over 90% of municipalities had no students enrolled during this period.

A dichotomous variable reflecting whether there was a post office present (1) or not (0) in a municipality in a certain year expresses the possibility for *mass communication* in that community. Personal communications (letters and telegrams) and mass media (newspapers, magazines, fashion brochures) were all distributed through post offices (Zijdeman 2009, 2010). The information was gathered from annual reviews of the Dutch service for mail and telegraphy (Posterijen 1880–1916). Figure 2.4c shows that the total number of municipalities with a post office more than tripled from 1827 to 1897.

*Urbanization* is measured by the number of inhabitants (in 1,000s) in a municipality in a given year. These data are contained in the Historical Ecological Database (HED) and the Historical Database for Dutch Municipalities (HDNG) (Beekink et al. 2003). Figure 2.4d shows that not only the average number of inhabitants but also the variation in population size increased over time.

*Geographic mobility* is measured by the number of people migrating to a municipality (per 1,000 inhabitants) in a given year, as recorded in the HED and HDNG from 1851 onward. Initially, geographic mobility rose sharply, but it increased only slightly during the remaining period studied here (see Figure 2.4e). However, there was quite a high degree of spatial variation in in-migration, as indicated by the wide range within which 80% of municipalities fell.

A dichotomous variable reflecting whether a train station was present (1) or not (0) in a municipality in a certain year expresses the possibility for *mass transportation* in that community. For all train stations in the Netherlands, data on the years they opened or closed were retrieved from the website <http://www.stationsweb.nl/>. Figure 2.4f shows that the number of municipalities in our data with a train station rose exponentially.



**Figure 2.4** Modernization Indicators over Time (the Netherlands, 1827 to 1897)

**Table 2.2** Correlations between Modernization Indicators (Panel A) and Path Coefficients of Confirmatory Factor Analysis (1 Factor Model) (Panel B)

	A					B	
	Steam Engines	Students	Post Office	Inhabitants	In-migrants	Train Station	$b^a$
Steam Engines	1.00						.37 (.01)
Students	.33	1.00					.49 (.02)
Post Office	.35	.52	1.00				5.17 (.25)
Inhabitants	.22	.60	.60	1.00			.80 (.02)
In-migrants	.12	.20	.19	.13	1.00		
Train station	.25	.39	.46	.47	.22	1.00	1.58 (.05)

<sup>a</sup>All continuous variables were standardized in the path model; standard errors in parentheses; factor variance set at 1.

To get an overall indicator of a community's degree of *modernization*, we performed exploratory factor analysis on the six modernization items in Mplus. Mplus has the advantage of being able to handle categorical variables (post office and train station in our case), missing values (so we can obtain a modernization score for the years for which not all measures are available), and clustered data (we nested the various measurement years within municipalities). We found that all items except in-migration can be represented well by one modernization factor. Whereas most items have a fair amount in common with one another (for correlations among the items, see Table 2.2, panel A), in-migration seemed to operate to a large extent autonomously of the other items (factor loading < .30). We therefore chose to create factor scores based on five items,<sup>5</sup> using confirmatory factor analyses (see Table 2.2, panel B).<sup>6</sup>

We control for several individual- and family-level variables that might be confounding factors (see Bras et al. 2010). A son's *age at marriage* can be found on the marriage certificate. *Birth order* was approximated from the birth years of a son's married siblings. *Siblingship size* was approximated by the number of married children from the same family. Finally, we control for whether an individual's father was a *farmer* (cf. Erikson and Goldthorpe 1992). We label a father as a farmer if more than half the children from the same family list their father's occupation as farmer (HISCO codes 61110 through 61290).

<sup>5</sup> Factor scores in Mplus can only be obtained using confirmatory factor analyses. We also performed factor analyses and principal component analyses in Stata. The resulting scales correlate at .96 or higher.

<sup>6</sup> Including geographic mobility in the scale or separately in the analyses does not change the results qualitatively.



### 2.3.4 Analytic Strategy

We perform multilevel regression analyses where sons are nested in families, which in turn are nested in communities (and son's occupational status is the dependent variable). We use the package that runs MLwiN from within Stata (Rasbash et al. 2012; Leckie and Charlton 2013).

In the first part of the analyses, we answer the question whether society became more open in the Netherlands during the nineteenth century. First, to describe the total family impact, we estimate an intercept-only model:

$$Y_{ijk} = \beta_{000} + c_{0k} + f_{0jk} + s_{0ijk}, \quad (\text{M1})$$

where  $Y_{ijk}$  is the occupational status of son  $i$  from family  $j$  from community  $k$ ;  $\beta_{000}$  is the population mean status;  $c_{0k} \sim (0, \sigma_{c_{0k}}^2)$  is the error term at the community level;  $f_{0jk} \sim (0, \sigma_{f_{0jk}}^2)$  is the error term at the family level; and  $s_{0ijk} \sim (0, \sigma_{s_{0ijk}}^2)$  is the error term at the individual level (Snijders and Bosker 1999). The proportion of variance at the family and community levels is given by

$$\rho_{c+f} = \frac{\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2}{\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2 + \sigma_{s_{0ijk}}^2}, \quad (1)$$

which is the expected correlation between two randomly selected brothers, often called the *total family impact*. It is helpful to disentangle the proportion of variance at the family and community levels, respectively,

$$\rho_f = \frac{\sigma_{f_{0jk}}^2}{\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2 + \sigma_{s_{0ijk}}^2} \quad (2)$$

$$\rho_c = \frac{\sigma_{c_{0k}}^2}{\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2 + \sigma_{s_{0ijk}}^2}. \quad (3)$$

The latter is the expected correlation between two randomly selected individuals from the same community. To see whether society becomes more open over time, we consider whether these measures change over time by estimating Equation M1 for different time periods.

In the second model, we add father's occupational status as an explanatory variable:

$$Y_{ijk} = \beta_{000} + \beta_{010}FOCC_j + c_{0k} + f_{0jk} + s_{0ijk}. \quad (\text{M2})$$

The regression coefficient  $\beta_{010}$  shows how much measured family resources pay off in attaining status. In addition, this model shows to what extent the measured part of family

influence explains the variance shared by brothers. We will also analyze whether this explained variance by measured family influence differs between time periods by estimating Equation M2 for different time periods.

In our third model, we consider to what extent the effect of father's status differs between communities by adding a random slope  $c_{1k} \sim (0, \sigma_{c_{1k}}^2)$  for father's status at the community level:<sup>7</sup>

$$Y_{ijk} = \beta_{000} + \beta_{010}FOCC_{jk} + c_{1k}FOCC_{jk} + c_{0k} + f_{0jk} + s_{0ijk}, \quad (M3)$$

where  $\beta_{010}$  is the slope of father's status for the average community and  $\sigma_{c_{1k}}^2$  shows how much variation in this slope there is between communities. Next, we consider whether the slope of father's status changes over time by estimating models that have interactions of father's status with year of socialization. In general, a cross-level interaction of father's status with a community-level variable  $Z_k$  (e.g., time or degree of modernization) is modeled by adding to Equation M3 the term  $\beta_{001}Z_k + \beta_{011}FOCC_{jk} \times Z_k$ . If  $\beta_{011}$  is negative, this means the effect of measured family influence is smaller for larger values of  $Z_k$ .

In the second part of the analyses, we try to explain the openness of a community by that community's degree of modernization. We begin by looking at whether father's status had less of an effect on son's status in communities that scored high on the modernization scale (basically, we test Figure 2.1b). Next, we explore *how* exactly modernization processes led to the results we found. More specifically, we test the four mechanisms subsumed under the modernization thesis by including the modernization indicators individually (we then test the panels in Figure 2.2). Because not all indicators are available for the entire period, this part of the analysis covers sons socialized between 1858 and 1890. Testing the mechanisms separately is theoretically more sophisticated and prevents drawing wrong conclusions when using the modernization scale (e.g., because mechanisms cancel each other out if the modernization thesis is partly correct and partly false). However, testing the mechanisms will give more tentative answers than the test using the modernization scale, because it is more certain that what the six items have in common measures modernization than that, for example, the item *post office* measures *mass communication* perfectly.

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<sup>7</sup> We also add here random slopes at the family and individual levels, not for theoretical reasons but because otherwise the assumption of homoscedasticity would be violated (Snijders and Bosker 1999). We also add the control variables here (not shown in the equation).

**Table 2.3** Total Family Impact and the Effect of Father’s Status on Son’s Status (the Netherlands, 1827 to 1897)

	Model 1		Model 2		Model 3	
	<i>b</i>	$\beta^a$	<i>b</i>	$\beta^a$	<i>b</i>	$\beta^a$
<b>Fixed Part</b>						
Intercept	45.549 (.038)	-.062***	45.915 (.027)	-.033***	44.611 (.085)	.025***
Father’s status <sup>b</sup>			.671 (.002)	.549***	.697 (.003)	.570***
Time					.199 (.052)	.031***
Time <sup>2</sup>					-.060 (.007)	-.073***
Age at marriage <sup>b</sup>					.191 (.003)	.084***
Birth order <sup>b</sup>					.473 (.011)	.063***
Sibship size <sup>b</sup>					-.433 (.011)	-.071***
Father farmer					-1.868 (.046)	-.148***
<b>Random Part<sup>c</sup></b>						
	<u>95% Conf. Int.</u>		<u>95% Conf. Int.</u>		<u>95% Conf. Int.</u>	
<i>Community level</i>						
$\sigma_{c_{0k}}^2$ (intercept)	15.130	14.528 15.731	6.118	5.816 6.419	4.458	4.205 4.711
$\sigma_{c_{1k}}^2$ (father’s status)					.008	.007 .010
<i>Family level</i>						
$\sigma_{f_{0jk}}^2$ (intercept)	67.468	66.647 68.289	27.038	26.512 27.565	20.298	19.727 20.868
$\sigma_{f_{1jk}}^2$ (father’s status)					.051	.046 .055
<i>Individual level</i>						
$\sigma_{s_{0ijk}}^2$ (intercept)	76.823	76.320 77.325	75.956	75.472 76.440	71.664	71.072 72.215
$\sigma_{s_{1ijk}}^2$ (father’s status)					.033	.029 .037
Log Likelihood	-1395517		-1350317		-1341518	

Note: Standard errors in parentheses (only for unstandardized coefficients).

<sup>a</sup>Dependent variable and all continuous independent variables standardized prior to estimation.

<sup>b</sup>Centered around the mean.

<sup>c</sup>Model 3 also includes covariance between *intercept* and *father’s status* to improve fit. To keep the table readable, this is not shown.

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001 (two-tailed tests).

## 2.4 Results

### 2.4.1 Describing Openness

#### *Total Family Impact*

From Model 1 in Table 2.3, we can calculate, using Equation 1, that total family impact  $\rho_{c+f}$  was, on average, .518 in the Netherlands for sons socialized between 1827 and 1897, which is high compared to contemporary societies, as we will see in the discussion. The largest part of this fraternal resemblance in occupational status was due to brothers sharing the same family ( $\rho_f = .423$ , see Equation 2), and part of the total impact was due to brothers sharing the same community ( $\rho_c = .095$ , see Equation 3).

These results are an average for the entire 70-year period. Figure 2.5 shows results for the same analyses, but now for seven decades apart. Individual-level variance is rather stable over time; family- and community-level variance both decrease somewhat, especially toward the end of the period (see Figure 2.5a). This means the total family impact  $\rho_{c+f}$  decreased from a little over .53 in the first decade to .48 in the last decade. The difference between the first and last decade is highly significant<sup>8</sup> and implies a decrease of about 10% in 70 years (see Figure 2.5b).

#### *Measured Family Influence*

In our theory section we argued that systematic differences between families are due to differences in resources that families pass on to their children. We use father's occupational status as an indicator of the influence of family resources. Model 2 in Table 2.3 shows children benefit greatly from having a high-status father: on average, each additional status point of a father results in  $b_{010} = .671$  higher status points for the son. We also show results with son's and father's status standardized. This yields the correlation between son's and father's status ( $\beta_{010} = .549$ ), which takes into account the different standard deviations of son's and father's status and makes comparisons with studies using other status scales easier.

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<sup>8</sup> The 95 percent confidence interval of the difference between the  $\rho_{c+f}$  of the first and last decade lies well above zero: (.037, .067). To obtain this confidence interval, an estimation of the standard errors of both  $\rho_{c+f}$ 's is needed (see Ramasundarahettige, Donner, and Zou 2009). As MLwiN does not provide these, we repeated the analyses using Stata's "xtmixed" and postestimation command "estat ICC" (differences in results between MLwiN and Stata were negligible).

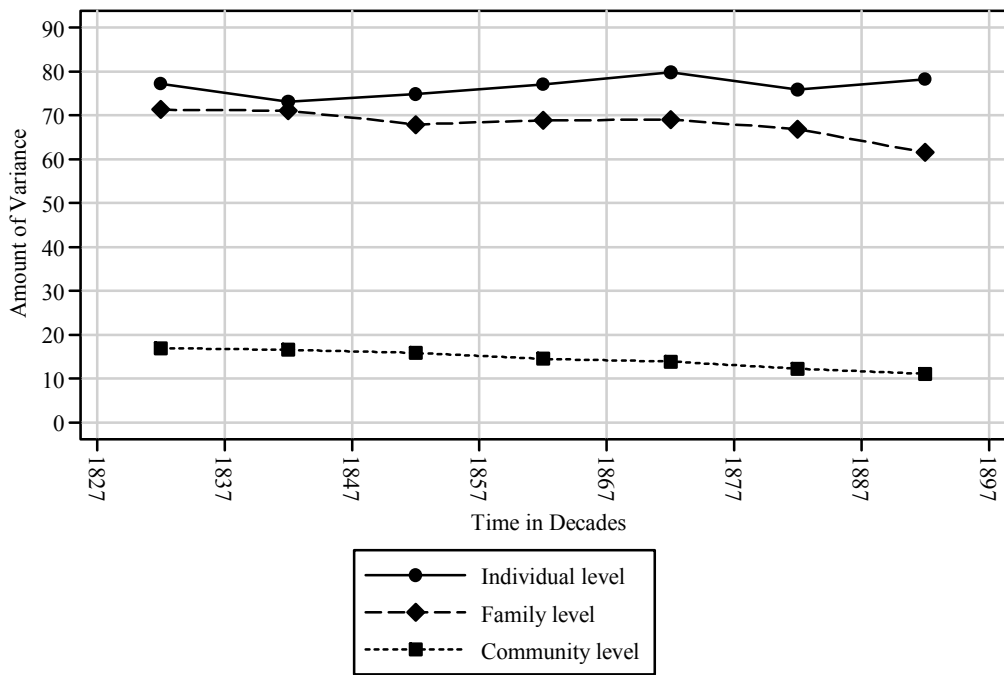


Figure 2.5a Variance at Each Level per Decade (1827 to 1897)

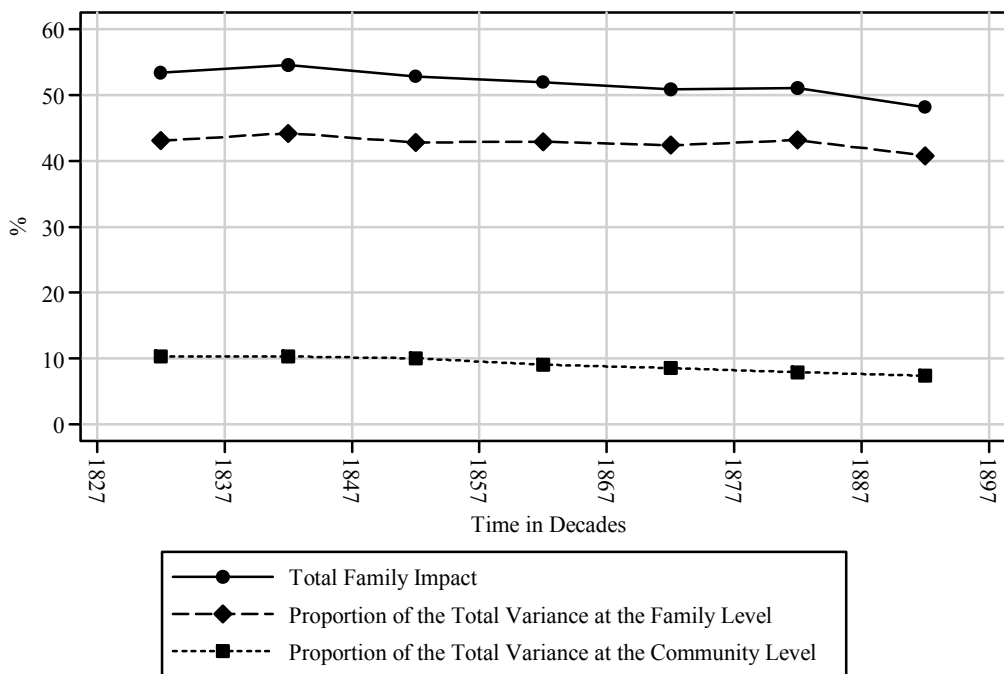
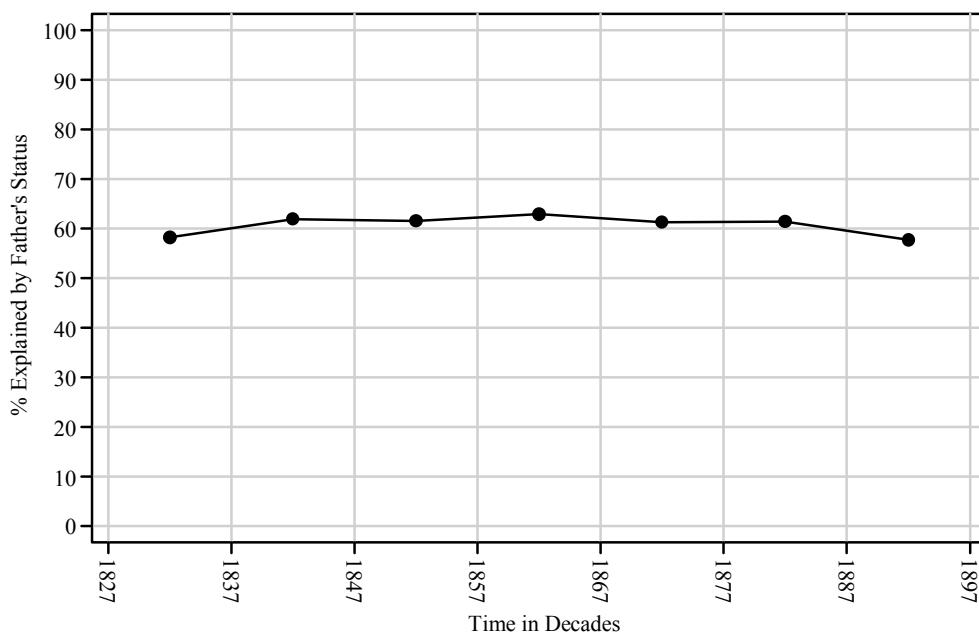


Figure 2.5b Total Family Impact per Decade (1827 to 1897)

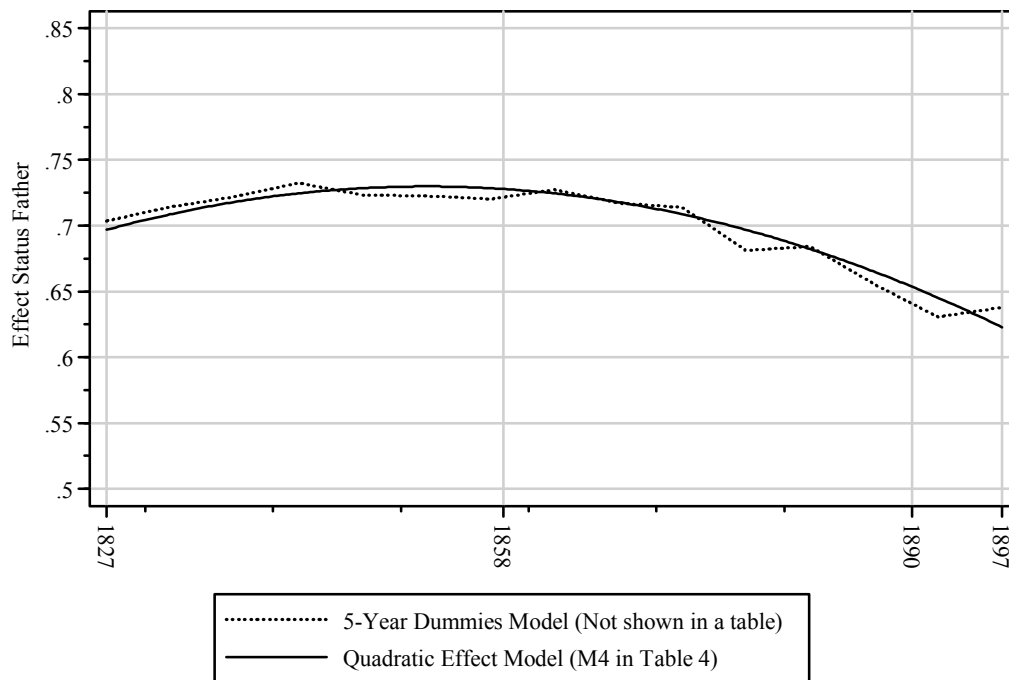


**Figure 2.6** Variance Explained by Measured Family Influence per Decade (1827 to 1897)

With Model 2 we can also assess how much of the total family impact we capture by using father’s status as a measure. The total variance that brothers share is reduced by 59.9% going from Model 1 ( $\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2 = 82.596$ ) to Model 2 ( $\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2 = 33.156$ ). Father’s occupational status explains about as much variance at the family level (59.9%) as it does at the community level (59.6%). The latter means families from the same social strata tend to cluster together, and differences between communities are partly family composition effects.

Figure 2.6 shows results of performing the same analyses, again for the seven decades apart. The percentage of the total shared variance explained is stable over time. In other words, father’s occupational status captures the family and community impact on son’s status attainment to the same extent over time. By looking at father’s status we can account for about 60%, but not all, of the total impact a family has on a son’s status attainment, and we can do so for all time periods.

From the estimation of Model 3, we learn the effect size of father’s status differs quite substantially between communities:  $\sigma_{c_{1k}}^2 = .0085$ . This means 95% of communities have a slope for father’s status in the range .513 to .881 (this can be found by taking the average slope and subtracting and adding two standard deviations, respectively, that



**Figure 2.7** Measured Family Influence on Son's Status over Time (1827 to 1897)

is,  $.697 \pm 2 \times \sqrt{.0085}$  (Snijders and Bosker 1999). Based on the modernization thesis, we would expect part of these differences between communities was due to communities becoming more open later on.

To see whether the effect of father's status does indeed decrease over time, we first add interactions of father's status with five-year dummies (results not in table, shown only in Figure 2.7). Based on this, we expect the trend in the effect of father's status can be modeled parsimoniously by a quadratic model (see Model 4 in Table 2.4). Visual inspection of Figure 2.7 and a formal test support this expectation. The Bayesian Information Criterion (BIC) clearly favors the quadratic model (BIC = 2,683,104) over the model with five-year dummies (BIC = 2,683,402). For sons socialized in 1827, the expected effect size of father's status is .697. The effect size was at first rather stable or increased slightly over time. After peaking in 1852 at .729, it started to decrease to .622 in 1897. This denotes a substantive drop of .1 in 45 years. By modeling the slope of father's status to change in a curvilinear way over time, the variation in the slope between communities is reduced by 17.6%, from  $\sigma_{c_{1k}}^2 = .0085$  (Model 3) to  $\sigma_{c_{1k}}^2 = .0070$  (Model 4). Because a general time trend explains only 17.6% of the effect, we conclude there was much regional variation either in the slope of father's status, in how slopes changed over time, or both.

**Table 2.4** Effect of Father's Status on Son's Status as a Function of Time and the Modernization Scale (the Netherlands, 1827 to 1897)

	Model 4		Model 5			
	<i>b</i>	$\beta^a$	<i>b</i>	$\beta^a$		
<b>Fixed Part</b>						
Intercept	44.632 (.086)	.026***	44.655 (.082)	.059***		
Father's status <sup>b</sup>	.697 (.009)	.570***	.686 (.008)	.555***		
x time	.026 (.005)	.043***	.026 (.005)	.043***		
x time <sup>2</sup>	-.005 (.001)	-.065***	-.005 (.001)	-.058***		
x modernization			-.027 (.002)	-.038***		
Time	.221 (.052)	.035***	.201 (.049)	.031***		
Time <sup>2</sup>	.056 (.007)	.067***	.043 (.006)	.053***		
Modernization			1.008 (.021)	.137***		
Age at marriage <sup>b</sup>	.191 (.003)	.084***	.195 (.003)	.086***		
Birth order <sup>b</sup>	.473 (.011)	.063***	.474 (.011)	.063***		
Sibship size <sup>b</sup>	-.438 (.011)	-.072***	-.434 (.011)	-.071***		
Father farmer	-1.887	-.150***	-1.700 (.047)	-.136***		
<b>Random Part<sup>c</sup></b>						
<i>Community level</i>		<i>95% Conf. Int.</i>		<i>95% Conf. Int.</i>		
$\sigma_{c_{0k}}^2$ (intercept)	4.404	4.153	4.654	2.875	2.662	3.088
$\sigma_{c_{1k}}^2$ (father's status)	.007	.005	.009	.006	.004	.007
<i>Family level</i>						
$\sigma_{f_{0jk}}^2$ (intercept)	20.302	19.731	20.872	20.767	20.197	21.337
$\sigma_{f_{1jk}}^2$ (father's status)	.051	.046	.056	.049	.044	.054
<i>Individual level</i>						
$\sigma_{s_{0ijk}}^2$ (intercept)	71.664	71.113	72.214	71.633	71.082	72.183
$\sigma_{s_{1ijk}}^2$ (father's status)	.033	.029	.037	.033	.029	.037
Log Likelihood		-1341431		-1340261		

Note: Standard errors in parentheses (only for unstandardized coefficients).

<sup>a</sup>Dependent variable and all continuous independent variables standardized prior to estimation.

<sup>b</sup>Centered around the mean.

<sup>c</sup>Models 4 and 5 also include covariance between *intercept* and *father's status* to improve fit. To keep the table readable, this is not shown.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$  (two-tailed tests).



## 2.4.2 Explaining Openness

### *Variation in Measured Family Influence and Modernization Processes*

The decrease in the effect of father's occupational status in the second half of the nineteenth century is in line with predictions of the modernization thesis. However, for a more comprehensive test we check whether both temporal and geographic differences in openness can be directly linked to modernization processes in communities. To that end, we added the interaction of father's status with the modernization scale in Model 5. In Table 2.4, we see measured family influence is indeed lower in more modernized communities ( $b = -.027$ ;  $\beta = -.038$ ). The moderating effect of modernization is substantial: little modernized communities (in the 5th percentile on the modernization scale) have an expected effect as high as  $b = -.683$ , whereas for very modernized communities (the 95th percentile) it was as low as  $b = .544$ . Surprisingly, the moderating effect of time on the effect of father's status is not much altered by introducing the interaction with the modernization scale. In the next section, we see that we do explain a considerable part of the moderating effect of time if we study the subperiod in which most of the modernization processes took place.

### *Testing the Four Mechanisms of the Modernization Thesis*

Now that we have evidence that something about modernization results in greater openness, it is worth exploring further *how* exactly modernization leads to more openness. Therefore, we now test the four different mechanisms of the modernization thesis separately for sons socialized in the period 1858 to 1890.<sup>9</sup>

The *industrialization* and *educational expansion* mechanism states that due to industrialization, sons were less likely to directly inherit the job of their father as new types of jobs required skills taught in schools, not at home. And these skills became increasingly accessible to children from all social strata due to educational expansion. Although the effects of industrialization ( $\beta = -.003$ ;  $p = .381$ , two-tailed) and educational expansion ( $\beta = -.003$ ;  $p = .394$ , two-tailed) are in the expected direction, the effects are not significant (see Table 2.5, Model 7). We do not find convincing support for these mechanisms, even though they are the most central arguments of the modernization thesis. There appear to be other reasons why modernization led to greater openness.

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<sup>9</sup> We repeated the steps in Table 2.3 for this subset of data and found the results are comparable to those for the entire period. If we model only the period 1858 to 1890, the decrease in the effect of father's status over time turns out to be well represented by a linear decrease (see Table 2.5, Model 6). This straight line is compatible with Figure 2.7.

**Table 2.5** Effect of Father's Status on Son's Status as a Function of the Modernization Processes Separately (the Netherlands, 1858 to 1890)

	Model 6		Model 7	
	<i>b</i>	$\beta^a$	<i>b</i>	$\beta^a$
Fixed Part				
Intercept	45.697 (.074)	.030***	46.091 (.080)	.027***
Father's status <sup>b</sup>	.742 (.007)	.573***	.758 (.009)	.582***
x time	-.024 (.003)	-.018***	-.011 (.004)	-.009**
x industrialization <sup>b</sup>			-.001 (.001)	-.003
x educational expansion <sup>b</sup>			-.001 (.001)	-.003
x mass communication <sup>b</sup>			-.054 (.009)	-.045***
x urbanization <sup>b</sup>			-.002 (.000)	-.013***
x geographic mobility <sup>b</sup>			-.000 (.000)	-.007**
x mass transportation <sup>b</sup>			-.043 (.008)	-.035***
Time	.739 (.036)	.055***	.497 (.036)	.037***
Industrialization <sup>b</sup>			.112 (.015)	.022***
Educational expansion <sup>b</sup>			.084 (.008)	.036***
Mass communication <sup>b</sup>			1.149 (.094)	.092***
Urbanization <sup>b</sup>			.070 (.006)	.057***
Geographic mobility <sup>b</sup>			.005 (.001)	.012***
Mass transportation <sup>b</sup>			.123 (.080)	.010
Age at marriage <sup>b</sup>	.224 (.004)	.096***	.231 (.004)	.099***
Birth order <sup>b</sup>	.567 (.015)	.077***	.569 (.015)	.077***
Sibship size <sup>b</sup>	-.478 (.015)	-.079***	-.476 (.015)	-.079***
Father farmer	-.059 (.063)	-.165***	-1.788 (.065)	-.143***

*(continued)*

**Table 2.5** (continued)

Random Part <sup>c</sup>	Model 6			Model 7		
	95% Conf. Int.			95% Conf. Int.		
<i>Community level</i>						
$\sigma_{c_{0k}}^2$ (intercept)	3.849	3.532	4.165	1.901	1.657	2.146
$\sigma_{c_{1k}}^2$ (father's status)	.006	.004	.008	.004	.002	.006
<i>Family level</i>						
$\sigma_{f_{0jk}}^2$ (intercept)	19.579	18.806	20.353	20.140	19.367	20.912
$\sigma_{f_{1jk}}^2$ (father's status)	.052	.046	.059	.050	.044	.057
<i>Individual level</i>						
$\sigma_{s_{0ijk}}^2$ (intercept)	72.081	71.322	72.839	72.058	71.299	72.816
$\sigma_{s_{1ijk}}^2$ (father's status)	.032	.027	.038	.033	.027	.038
Log Likelihood	-1341431			-1340261		

Note: Standard errors in parentheses (only for unstandardized coefficients).

<sup>a</sup>Dependent variable and all continuous independent variables standardized prior to estimation.

<sup>b</sup>Centered around the mean.

<sup>c</sup>Models 6 and 7 also include covariance between *intercept* and *father's status* to improve fit. To keep the table readable, this is not shown.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$  (two-tailed tests).

Indeed, we find evidence that other mechanisms are at work. The *common culture mechanism* asserts that mass communication leads to a common culture whereby social classes differ less with respect to attitudes and behavior, which lowers the hurdle to changing social classes. We find that if a post office was present in a municipality, the correlation between father's and son's status is .045 less than in a municipality without a post office. The *anonymization mechanism* claims that with increasing urbanization, geographic mobility, and mass transportation, employers are less likely to know one's family background, so family background is less likely to help or hinder job seekers. We find support for this claim: the influence of measured family influence becomes lower for all three processes ( $\beta = -.013$ ,  $\beta = -.007$ , and  $\beta = -.035$ , respectively).

By adding the interactions with the indicators for modernization processes, the decrease in the effect of father's status becomes half of what it was (from  $\beta = -.018$  in Model 6 to  $\beta = -.009$  in Model 7). Thus, the observation that family resources became less influential over time can largely be linked to certain modernization processes included in the model (this is also the case if we use the modernization scale in this subperiod [results not shown]). Moreover, the variation in the slope of father's status at the community level declines from  $\sigma_{c_{1k}}^2 = .0061$  to  $\sigma_{c_{1k}}^2 = .0037$ , which means that 39.3% of this variance is accounted for by modernization processes. The remaining differences between communities could be either the result of imperfectly measuring modernization processes

or processes other than modernization playing a role in how large (measured) family influence is in society.

## 2.5 Conclusions and Discussion

To understand how people are allotted their share in the unequal distribution of resources in society, many scholars have studied the transfer of status from one generation to the next. A classic theory in this field claims that intergenerational social mobility increased over time because of modernization processes. Gradually, this theory fell out of fashion as it failed to generate convincing support. We argue, however, that previous studies lacked the appropriate data to perform a compelling test. In this study, we performed a thorough test by applying sibling models to historical data for the case of the Netherlands in the nineteenth century. Our findings show the modernization thesis deserves a reappraisal.

Using sibling models, we described both unmeasured and measured aspects of family influence. We found that brothers share, on average, 52% of the variance in occupational status. As expected by the modernization thesis, this measure for total family impact decreased gradually over time during our study period. If this trend toward lower family influence continued after our observation period, it would explain why most studies on more recent periods have found the family's total impact on status attainment to be much smaller: around 37% for both Dutch (Sieben 2001) and U.S. society (Hauser and Mossel 1985; Hauser and Sewell 1986). In other words, if the difference is not an artifact because different data and measures are used, it provides another—tentative—indication that Western stratification systems have opened up, moving from traditional to more modern societies.

For the measured aspect of family influence the trend is more clear-cut. We found the influence of father's occupational status, the conventional indicator for family resources, on son's occupational status remained rather stable in the first half of the nineteenth century, but started to decrease at a slow but substantial rate in the second half of the century. For the entire period 1827 to 1897, the correlation between father's and son's occupational status was much higher (on average .56) than for most contemporary societies (although one must keep data comparability issues in mind). Ganzeboom et al. (1991), Björklund and Jäntti (2000), and Yaish and Andersen (2012) report that the average intergenerational status correlation was .35 (over 21 countries), .41 (over 10

countries), and .35 (over 26 countries), respectively. The Netherlands is usually characterized by slightly lower averages, as is the United States. Only India, with its history of a caste system, has an intergenerational status correlation (.55) comparable to that of Dutch society in the nineteenth century (Ganzeboom et al. 1991).

An advantage of sibling models is we were able to establish that father's occupational status explains—during the entire period—about 60% of the total family impact. This means measured family resources capture a similar amount of the total family impact as the 61% for contemporary time periods (Van Eijck 1996). Because father's status captures such a big part of the role family plays, and in such a stable way, we believe its decreasing effect is a strong indication that Dutch society became more open in the second half of the nineteenth century.

This is an interesting finding, as several influential studies have concluded that intergenerational mobility did not display a clear trend over time in Western countries in the second half of the twentieth century (Featherman et al. 1975; Erikson and Goldthorpe 1992). If Dutch society is exemplary of other Western industrializing countries, it may indeed be that stratification systems changed before the second half of the twentieth century and remained stable thereafter. Or, later stages of modernization may have seen a change toward more open societies, but only at a very slow rate, as noted by other major studies in the field (Ganzeboom et al. 1989; Breen and Luijkx 2004). This would imply it is possible to detect such changes only if one has enough cases that cover a long period of time—undoubtedly a major strength of the present study.

Although the decrease in family influence coincides exactly with the onset of modernization processes in the Netherlands, we wanted to test directly whether it was modernization that led to greater openness. Therefore, we included a factor scale of five measures of modernization processes identified by the modernization thesis: industrialization, educational expansion, mass communication, urbanization, and mass transportation. Indeed, we found that in more modernized communities, measured family influence was lower. In other words, our results show a direct link between modernization and openness; the modernization thesis is thus worth exploring further.

One way to further examine the modernization thesis is to investigate *how* exactly modernization leads to greater openness. The modernization thesis can be summarized in terms of four main mechanisms, which we labeled the *industrialization mechanism*, the *educational expansion mechanism*, the *common culture mechanism*, and the

*anonymization mechanism*. In this article we took a first step in testing the four mechanisms separately. Our results suggest it is not so much the central arguments of the modernization thesis—the industrialization and educational expansion mechanisms—that are at work, but mainly the “concomitants” of industrialization that lead to greater openness by creating a common culture and making it less likely that employers know an applicant’s family background.

However, the limitations of our measurements and data make these conclusions regarding the underlying mechanisms tentative. For example, our period of observation stops before the most significant advances in industrialization and, especially, educational expansion took place in the Netherlands. It is possible we have too little variation between communities in the degree of industrialization and educational expansion to pick up their effects on the status attainment process. This would be consistent with the fact that our results are in the expected direction but not significant.

Our results suggest the need for further empirical investigations. Although the Netherlands had its particularities (e.g., its service sector was already highly developed), it was a prototypical case in the sense that all the modernization processes described by Treiman (1970) took place. Based on this, one would expect our results to be similar to those for other Western industrializing countries. Empirically, however, we cannot at this stage be sure. An exciting development in this respect is the progress being made in digitizing vital registers across the world (see Van Leeuwen and Maas 2010), allowing scholars to replicate this study for other historical societies and to overcome some of our limitations.

Besides replicating our study, the application of sibling models to historical data opens up other promising avenues to better understand the status attainment process in societies and the factors responsible for changes in that process. First, while we explained variation in measured family influence, future research could focus on explaining variation in total family impact (which is not straightforward with the methods used in this study). Furthermore, an extensive literature explains status differences *within* families, giving more insight into the processes that take place in the family, such as how parents transfer and divide resources and how siblings influence one another (Conley 2004; Björklund and Salvanes 2010; Bras et al. 2010). Finally, and related to this, sibling models can be extended to include twins, making it possible to study whether the importance of genes relative to socialization in the intergenerational transfer of status shifted over time (Adkins and Guo 2008; Björklund and Salvanes 2010; Black and Devereux 2011). To

conclude, although historical data come with limitations that are often difficult (or sometimes simply impossible) to resolve, we hope to have shown that as a source of information, vital registers and other historical data are of huge value, especially when they allow one to exploit the benefits of sibling models.





# Chapter 3. Sources of Sibling (Dis)similarity. Total Family Impact on Status Variation in the Netherlands in the Nineteenth Century\*

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**Abstract.** We describe and explain variation in the occupational status resemblance of brothers in the Netherlands during modernization. We test opposing hypotheses about how modernization processes influenced fraternal resemblance through the *value* and *inequality* of family resources based on a job competition model in combination with modernization theory, status maintenance theory, and dualism theory. We use the high-quality large-scale database GENLIAS, yielding digitized information for approximately 450,000 linked Dutch marriage certificates from 250,000 families, complemented with historical indicators of six modernization processes for over 2,500 communities. Using multilevel meta-regression models, we find brother correlations in status decreased slowly from about 1860 onward. Although this exactly parallels the period of modernization, we find that modernization processes were not responsible (except possibly urbanization and mass transportation). In fact, in line with dualism theory, fraternal resemblance *increased* with most processes (i.e., industrialization, educational expansion, in-migration, and mass communication) because they amplified inequality.

## 3.1 Introduction

The stratification of society along status lines has intrigued many because it is pivotal for the well-being of individuals to which status group they belong (see Weeden and Grusky 2012 for a recent overview). To what degree socioeconomic status determines the life course of individuals depends not only on *how* stratified a society is, but also on how easy it is to get from one stratum to another. There are several ways to qualify how open a society is, that is, how permeable social strata are. Status attainment studies look to what extent children can attain a status that is different from that of the family they were born into (Ganzeboom et al. 1991; Breen and Jonsson 2005). Placed within this line of research, we study the impact that the family has on status attainment in the Netherlands in the nineteenth century, a period in which the Netherlands—like many other Western countries—modernized rapidly. Some claim that modernization led to more open societies (Kerr et al. 1960; Blau and Duncan 1967; Treiman 1970), while others contest this and argue that the family found alternative strategies to maintain their influence

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(Bourdieu and Passeron [1977] 1990; Collins 1971). We are able to shed new light on this long-standing unresolved sociological issue by using historical data of extraordinary quality to study sibling correlations in status.

Sibling correlations are considered an attractive measure of family impact on status attainment in sociology (Jencks et al. 1972; Olneck 1977; Sweetser and McDonnell 1978; Hauser and Mossel 1985; Hauser and Sewell 1986; De Graaf and Huinink 1992; Toka and Dronkers 1996; Van Eijck 1996; Sieben and De Graaf 2001; Warren et al. 2002) and economics (for a recent overview, see Black and Devereux 2011). Because siblings are socialized in, and profit from, the same family background, they are expected to be more similar in attained status to one another than to children from another family. A great advantage of using sibling correlations is that they capture the proportion of the variance in occupational status that is attributable to *all* aspects of family background that siblings share. These shared factors include not only all—measurable and unmeasurable—common family resources such as financial, human, genetic, cultural, and social capital, but also common community characteristics, and the influence of one sibling on the other (Jencks et al. 1972).

In this respect, sibling correlations are a more encompassing indicator of family impact than the inclusion of one or more family background variables, and are therefore sometimes referred to as the *total* family impact (Björklund et al. 2009). With the use of conventional measures such as parental occupational status and educational attainment, one misses part of the total family impact. For the contemporary Netherlands, it has been found that such measures together explain about 60% of the variance in status that is attributable to all childhood conditions that siblings share (Van Eijck 1996).

Despite the advantage of so-called sibling models, they are not the conventional approach in status attainment studies. The reason is that sibling data are scarce. For this same reason, status attainment studies using sibling correlations are—to our knowledge—completely absent for periods in which industrialization and other modernization processes occurred. In this article we do conduct such a study by using GENLIAS, a large-scale database that contains the digitized information from Dutch marriage certificates covering most of the nineteenth century (a period in which only a small percentage never married). Besides including occupational information, an additional amenity is that the marriage certificates are linked such that we know who are siblings of whom for five out of 11 provinces. We limit ourselves to studying men since women

often quit working as soon as they got married in this period (Bras 2002). Altogether, we analyze 450,690 men from 249,122 families.

The first aim of this article is to *describe* the trend in the status similarity of brothers in the Netherlands between 1827 and 1897. Our second aim is to *explain* the variation in fraternal resemblance that we observe between regions and over time. More specifically, we want to see whether variation in the total family impact can be directly linked to modernization. Many studies using sibling or brother correlations have remained descriptive or bivariate in nature (Sieben and De Graaf 2001; see, e.g., Conley and Glauber 2008). Data limitations are certainly one reason: studies usually make cross-sectional country-level comparisons, yielding too few observations for multivariate analyses. To overcome this problem, we study brother correlations at the *community* level—that is, a municipality over a five-year period—instead of the country level.<sup>1</sup> Moreover, we collected historical indicators for the modernization processes for almost all communities (although some of the modernization indicators are available for only a subperiod). This allows us to estimate brother correlations for almost 5,000 communities (i.e., almost 500 municipalities over a maximum of 14 five-year cohorts) and then subsequently use these estimations as the dependent variable in a meta-regression with the modernization indicators as predictors in a multivariate fashion.

Another reason why almost all studies have remained descriptive or bivariate in nature may be that the strength of brother correlations as an omnibus measure also provides a great challenge. Since fraternal resemblance stems from many different sources, it is hard to pinpoint which source is responsible for a change in brother correlations if we observe one. In discussing the effect of modernization on family impact, the literature focuses mostly on whether modernization affects the value that family resources have for obtaining status (Bourdieu and Passeron [1977] 1990; e.g., Blau and Duncan 1967; Treiman 1970; Grusky 1983; Knigge et al. 2014 / Chapter 2). However, we show, using a job competition model, that another crucial source of family impact is how equally or unequally family resources are divided. Although there is an extensive literature on how modernization affects inequality (e.g., Kuznets 1955; Lindert and Williamson 1985; Nielsen 1994), these insights have not been used to explain variation in family impact. An important contribution of this article is that we study simultaneously the value and inequality of family resources—the two probable sources of fraternal resemblance that

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<sup>1</sup> For interesting discussions why studying social stratification at the community rather than the country level not only increases the number of observations but also is more appropriate theoretically, see e.g., Grusky (1983) and Moller et al. (2009).

play such a prominent role in the social stratification literature. We leave for future research for that matter, the role of other possible sources of fraternal resemblance (e.g., the influence of brothers on each other, how equally parents treat their children, and demographic aspects such as family size).

## 3.2 Theory

### 3.2.1 Status Attainment as a Matching Process

Status attainment is the outcome of a system of interdependent actions with many complexities that are easily overlooked (e.g., Boudon 1974; Thurow 1975). Coleman (1987, pp. 163–164) phrases this as follows: “Ordinarily research in social stratification treats a change of job as if it were an individual decision ..., however, ... taking a new job involves two mutually contingent decisions: a decision of the job seeker and a decision of the organization in which the job is located. Both decisions are made in the presence of other competing jobs or job seekers. ... That is, the final action depends intrinsically and directly on the distribution of other job seekers and of other jobs.” In line with this view, we employ here a job competition framework that takes these crucial interdependencies into account by modeling the status attainment process as a market in which matches between applicants and jobs occur (cf. Coleman 1991).

The general idea is that applicants bring resources (e.g., human, cultural, and financial capital) to the job market, which they can use to obtain a good position. The resources  $R$  that an applicant has depend in part on family background. We assume that parents with higher status are able to transmit more family resources  $F$  to their children. However, we assume that resources are not fully determined by family background, but that there is also an individual component  $I$  to resources that is independent of family background. In other words, the resources of an applicant are given by

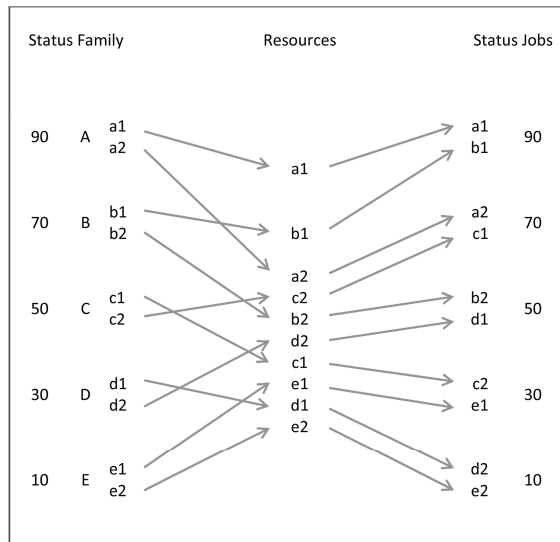
$$R = a \times F + b \times I, \quad (1)$$

where  $a$  is an (ascription) parameter that reflects how valuable family resources are and  $b$  an (achievement) parameter that reflects how valuable individual resources are. Applicants use these resources to compete for the job that offers the highest status.<sup>2</sup> Employers will compete for those applicants who are highest in the resources required by

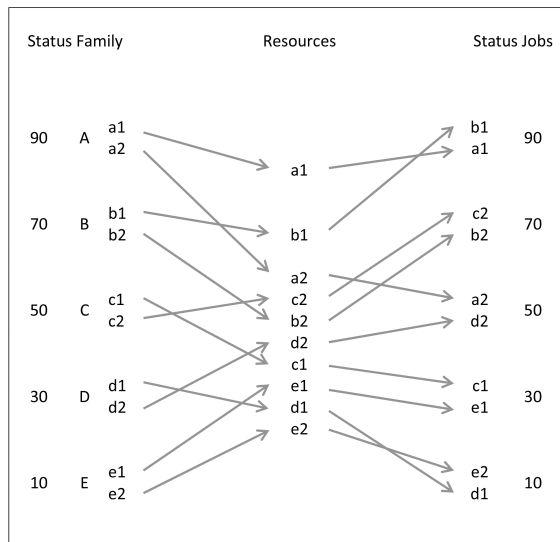
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<sup>2</sup> Of course applicants consider other aspects of a job in choosing where to apply. Only if these other aspects have a very low correlation with status or the correlation with status changes drastically is this simplification problematic.

the job. Jobs that are highest in status are usually also the ones that require the most resources on behalf of the applicants. This way, applicants with a lot of resources are most likely to be matched to a job with a high status and those with few resources to a low-status job.



a. Perfect Screening of Resources by Employers



b. Imperfect Screening of Resources by

**Figure 3.1** Status Attainment as a Matching Process: A Visual Representation of the Job Competition Model

In Figure 3.1a, we visualize a simplified version of this process to give insight into the factors that influence how similar the status of brothers is at the end of the process. On the left are five families from different social statuses (family A has status 90, family B has status 70, and so on), and each family has two sons. We equate  $F$  with family status, and for  $I$  we randomly pick a number between 10 and 90 from a uniform distribution.<sup>3</sup> In this particular example, we assume furthermore that  $a = b = .5$ , such that family resources  $F$  and individual resources  $I$  are equally important in determining the resources  $R$  of a son/applicant.

From this we calculated with equation (1) the resources of each applicant and ordered the applicants from high to low on the basis of their resources (see the middle column of Figure 3.1b). The person with the most resources, in this case  $a1$ , is first in line and gets the first chance to apply to the highest-status job available (cf. Thurow 1975). In a job market in which employers can perfectly screen the resources of applicants, this would mean that the highest-status job available is always matched to the first applicant still in line (later we will relax this assumption and discuss Figure 3.1b). In the resulting status distribution, one can see that brothers take a position that is more similar to one another than to children from another family. How high the status correlation between brothers is at the end of the matching process depends on several characteristics of the stratification system. In the remainder of the theory section we will focus on two of them (the value of family resources and the distribution of these resources over families) and hypothesize how they are likely to have changed with modernization processes. Moreover, we discuss to what extent the modernization processes identified in the literature occurred in the Netherlands (and the part of it that we study), which will make clear that the Netherlands forms an excellent case to study these issues.

### 3.2.2 The Value of Family Resources

#### *The Value of Family Resources Relative to Individual Resources*

The most obvious characteristic that influences fraternal resemblance is how valuable family resources are compared to individual resources (so how large  $a$  is in comparison to  $b$  in terms of equation [1]). To illustrate this, we show in Figure 3.2 the matching process for three different values of  $a$ , namely  $a = .3$  (see panel Unequal, Low),  $a = .5$  (panel Unequal, Middle), and  $a = .7$  (panel Unequal, High), while keeping  $b = .5$  and perfect

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<sup>3</sup> The individual resources that resulted for the 10 applicants are  $I_{a1}=81$ ,  $I_{a2}=26$ ,  $I_{b1}=75$ ,  $I_{b2}=35$ ,  $I_{c1}=36$ ,  $I_{c2}=56$ ,  $I_{d1}=42$ ,  $I_{d2}=64$ ,  $I_{e1}=66$ , and  $I_{e2}=59$ .

screening ability by employers as in Figure 3.1b.<sup>4</sup> If we compare the three upper panels, we see that family resources determine the order of the line of applicants to a lesser degree for lower values of  $a$  than for higher values of  $a$ . For example, the brothers  $b1$  and  $b2$  of family B are further apart in the queue in (Unequal, Middle) than in (Unequal, High) and even further apart in (Unequal, Low). In other words, individual differences between brothers become more pronounced as they gain weight compared to the resources that brothers have in common. This is also reflected in a lower similarity of brothers' attained status. To get an idea how fraternal resemblance changes, we repeated the matching process with 1,000 families instead of just five (so 200 families at each status level). The resulting brother correlation in status is .28 when  $a = .3$ , .58 when  $a = .5$ , and .76 when  $a = .7$ , indicating that if the value of family resources becomes higher, sibling correlations increase. This is also shown in the lower panels of the figure with more equally distributed family resources, but we will discuss the lower panels later.

As a result of modernization processes such as industrialization, the Netherlands saw profound changes in the organization of the economy and society during the nineteenth century, which possibly had consequences for the relative value of family resources. A first wave of industrialization in the form of mechanization of labor occurred around 1865, and a second, more abundant, wave in the period 1895–1914 (De Jonge 1968; Van Zanden and Van Riel 2004). Our measure of industrialization, the number of steam engines per 100 inhabitants, covers the first wave and shows a marked increase in this period in the part of the Netherlands that we study (details about the measures are found in the method section). The proportion of the labor force employed in industry and services grew at the expense of that in the agricultural sector. From 1807 to 1909, the proportion in industry changed from 26.2% to 34.4%, that in services from 30.8% to 35.4%, and that in agriculture from 43.1% to 30.4% (Smits, Horlings, and Van Zanden 2000). Even though the number of schools in secondary education rose steadily in the Netherlands after the passing of the Secondary Education Act in 1863, the absolute number of students enrolled in secondary education remained modest in the nineteenth century. The expansion of the secondary school system really took off only from 1910 onward (Mandemakers 1996).

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<sup>4</sup> In fact, panel (Unequal, Middle) is the same as Figure 3.1a, except that for the visual clarity of Figure 3.2, we decided to always give the first son the most resources, such that the arrows of two brothers never cross. This way, when two arrows do cross, it indicates that the ordering of applicants does not follow the order of family resources perfectly. In other words, more arrows crossing then visualizes more social mobility and thus a lower brother correlation.

In pre-industrial societies the family is thought to have been important in transferring resources that help secure a job. A rather direct way of help was the son's inheritance of the family business or farm. The family was also important for obtaining the resources that were valued by employers, such as human capital (e.g., a blacksmith taught his son how to forge metal) and cultural capital (e.g., parents taught their children the right manners and parlance). Because it was difficult for employers to judge productivity directly, family background was their best guess in absence of other signaling mechanisms such as diplomas. This way, family background may have turned into a valuable resource itself (whether one had the productivity that was hoped for or not).

There are two opposing claims made in the literature about whether modernization decreased the value of family resources or not. Modernization theorists claim that family resources became less valuable in the labor market, and resources less dependent on (although certainly not independent of) the family, such as education, became more valuable to employers (Treiman 1970). An important set of arguments for this asserted change from ascription to achievement is related to industrialization. As industrialization created new jobs, fewer sons could directly inherit the job of their father. The direct benefits of family resources thus became less. Moreover, because the new jobs were more complex and specialized, they were not easily taught at home but required formal training. This means that family resources formed a less accurate proxy for productivity and employers relied more on diplomas for their ordering of applicants.

A crucial assumption of modernization theorists is that having a diploma depended less on family background than the resources that were important to employers before diplomas became valued. This assumption is contested by status maintenance theorists, who argue that families found alternative strategies to maintain their influence: families compensated for their loss in direct influence by utilizing their resources to secure a good education for their children (Bourdieu and Passeron [1977] 1990; Collins 1971).<sup>5</sup> Only empirical evidence can provide an answer to this puzzle. Therefore, we test the claim of the modernization theorists that fraternal resemblance is lower in communities with higher levels of industrialization and educational expansion against the “null hypothesis”

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<sup>5</sup> Grusky (1983) argues that status maintenance also occurs in later stages of industrialization and educational expansion, but then families compensate for a lessening influence on educational attainment by increasing their direct influence on status attainment. This argument does not apply to our observation period that covers earlier stages of modernization.



of no difference asserted by status maintenance theorists.<sup>6</sup> A summarizing overview of all hypotheses can be found at the end of the theory section in Figure 3.4.

#### *The Ability of Employers to Screen Family Resources*

Employers must be able to judge an applicant's family resources in order for family resources to form an effective device to order applicants. If it becomes more difficult for employers to screen family resources, there is an increased chance that employers think that they pick the person in front of the line but in fact hire somebody with fewer family resources. This would mean that being first in line does not guarantee the best job and thus that family resources are less valuable. Put differently, even though two children have a similar amount of resources because they are from the same family, the chance that they still end up quite differently becomes larger if there is more stochasticity in the allocation of jobs (compare Figure 3.1b with Figure 3.1a). If family resources become difficult to judge, employers may try to order applicants based on other signals of productivity (such as diplomas). In that case the value of family resources would decrease too.

In a small, close-knit community, most people will know each other, and family resources are therefore often common knowledge. According to the modernization thesis, it becomes more difficult for employers to screen applicants on the basis of family resources the more people live in a community. Besides, if there are many people migrating into a community, their family background may be unknown to employers. Further, if it is possible to live in one place and commute to another to work, it becomes less feasible for employers to screen applicants on the basis of family background (Treiman 1970; Zijdeman 2009). In other words, the degree of imperfect information about family resources will be larger for employers as urbanization, in-migration, and mass transportation increase. As argued, this will lead to either using another screening device or more perturbations in the matching process, implying in both cases a decrease in the value of family resources and thus a decrease in the total family impact.

All three processes took place in the Netherlands in the nineteenth century, but to varying degrees depending on the region and time period. Urbanization was already quite high in

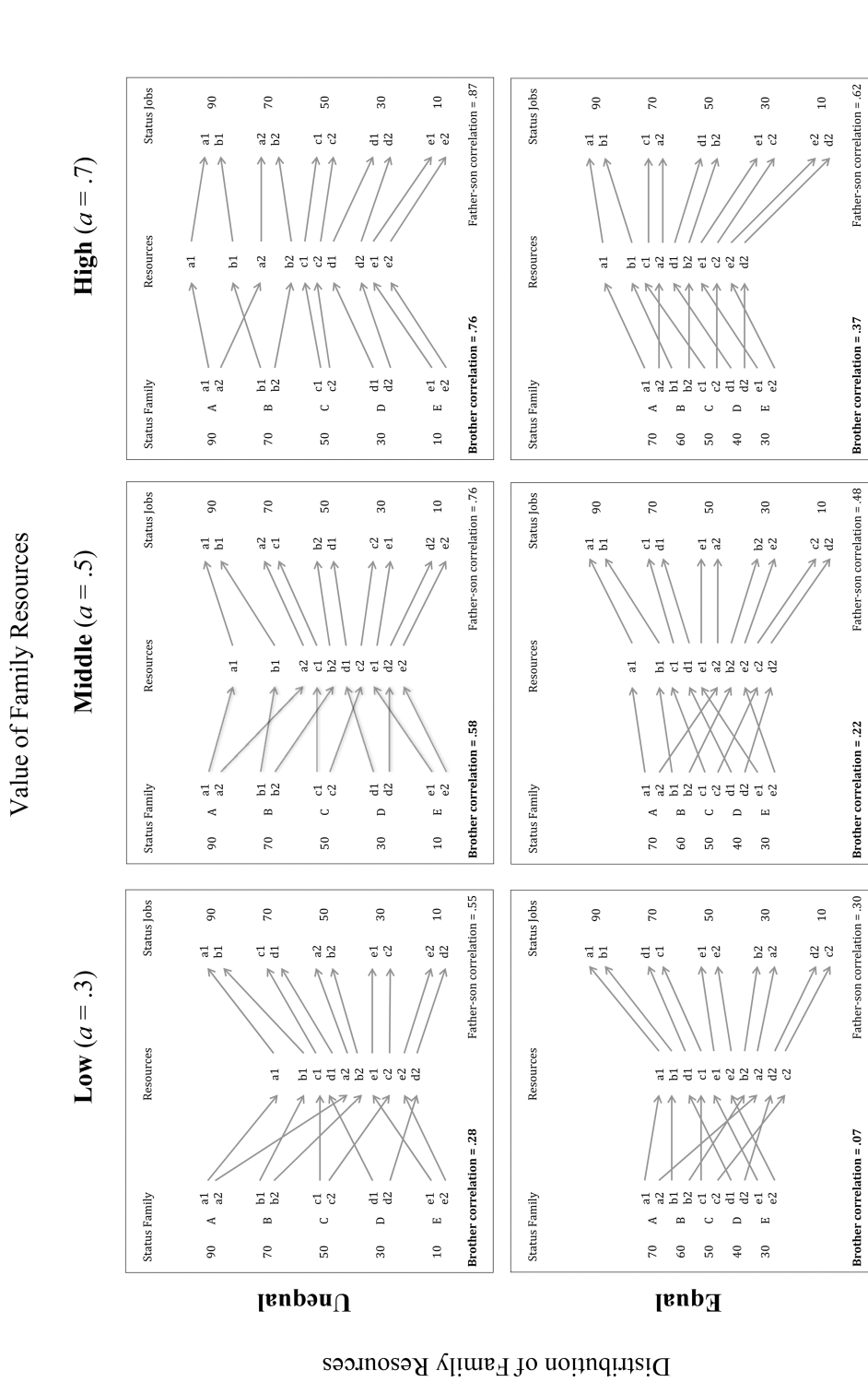
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<sup>6</sup> Unfortunately, we do not have individual-level information on educational attainment. Therefore, we will not be able to test to what extent fraternal resemblance in occupational status is due to fraternal resemblance in educational attainment and whether this changes with modernization. We can test the implications of modernization only for the overall impact of the family on status attainment that results from direct family influence and indirect family influence via education.

the Netherlands by the beginning of the nineteenth century compared to the rest of Europe (Wintle 2000). In the first half of the century, urbanization did not increase much, but it sped up in the second half of the century. The total population rose at an increasing rate from 2,115,368 in 1800 to 6,212,701 in 1913 (Smits et al. 2000). The communities in our data display a similar pattern. Wintle (2000) indicates that geographic mobility between provinces appears to have been limited before the 1870s and to have taken substantial form only afterward. Our own measure, the number of in-migrants per 1,000 inhabitants, shows a sharp increase from around 1860 to 1870. Before and after this, in-migration increased at a steady but slow pace. The Netherlands saw its first modern form of mass transportation with the introduction of the train in 1842. Travel time and travel costs diminished significantly compared to previous modes of transportation over land (walking, carriages) and water (canal boats). The train and tram network developed rapidly into a dense structure from 1860 onward, making mass transportation widely available (Knippenberg and De Pater 2002). The number of train stations surged in this period also in the municipalities that we study. Therefore, fraternal resemblance can be expected to be lower in those Dutch communities with more inhabitants, in-migrants, and possibilities for mass transportation (see first column of panels *C*, *D*, and *E* in Figure 3.4).

### 3.2.3 Inequality of Family Resources

The extent to which the family determines the order in the line of applicants depends not only on the value of family resources but also on how equally or unequally family resources are distributed over families. We repeated the matching process discussed earlier, but now with a more equal division of family resources: the families have status 70, 60, 50, 40, and 30 (see the lower panel Equal in Figure 3.2) instead of 90, 70, 50, 30, and 10 as before (in the upper panel Unequal in Figure 3.2). For all three values of  $a$  (.7, .5, and .3), the brother correlation calculated over 1,000 families is lower (.37, .22, and .07, respectively) than when the family resources are more unequally distributed (.76, .58, .28). In other words, with a more equal distribution the family is less decisive in determining the order of the applicant queue (as can be seen in panel Equal by the greater number of arrows crossing each other than in panel Unequal). The reason is that if all children are more similar in the amount of family resources they receive, family resources form less of a competitive advantage and individual resources are more likely to make a difference in getting ahead. We expect thus that fraternal resemblance is higher in communities in which family resources are more unequally divided over families (fig 3.4, panel *H*).



**Figure 3.2** Simulation of the Status Attainment Process: Brother Correlations for a Low, Middle, and High Value of Family Resources and for an Equal and Unequal Distribution of Family Resources

### *Effects of Modernization on Inequality*

There are several arguments in the literature on how modernization affects the distribution of resources over families. Most arguments are about income inequality, but they can often be extended to other forms of family resources, as we will show. Nielsen (1994) makes a broad division between arguments that expect a linear relationship between modernization and inequality, and arguments that expect the effect of modernization on inequality to depend on the stage of modernization. The “linear” arguments roughly all predict inequality, and thus fraternal resemblance, to decrease with modernization. In a sense, they provide additional arguments for the hypotheses we already derived but do not lead to new hypotheses. Only one linear argument leads to a new hypothesis as it deals with a modernization process (mass communication) not yet considered. Therefore, we will discuss this argument first in more detail but focus further on the “non-linear” arguments.

### *Mass Communication and Inequality*

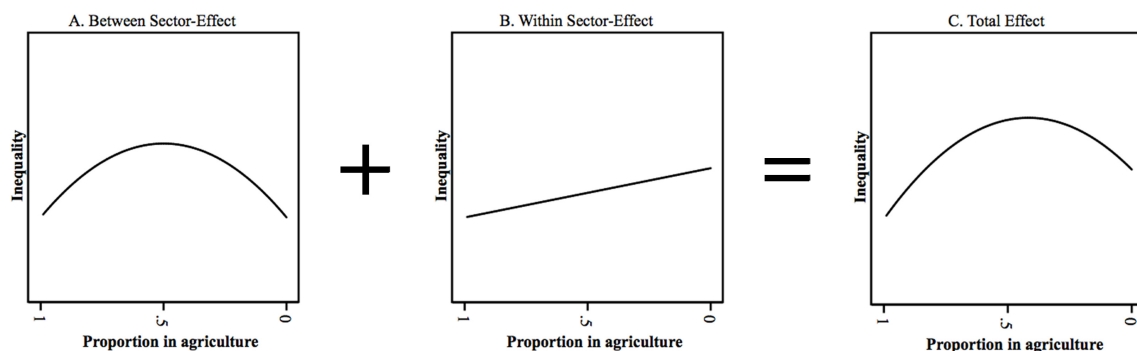
The modernization thesis states that certain family resources become more equally distributed over families if mass communication increases (Treiman 1970; Zijdeman 2009). Without newspapers, radio or television, the information people receive depends mostly on what they hear from their social network, which is shaped to a large extent by family background. Information forms a useful resource in the labor market in at least two ways. First, information about a job opening is necessary in order to apply for that job. Restricted access to information about job openings thus implies restricted access to status. Second, and in a more indirect way, information can help people acquire cultural capital, which in turn is a valuable resource in the labor market. It has been argued that if mass communication rises, information about job openings becomes available to a wider public. Likewise, more people can read in newspapers and magazines about manners and etiquette, what was fashionable, and so forth. This leads to a more common culture: social classes start to differ less with respect to attitudes and behavior.

Mass communication expanded quickly in the Netherlands in the second half of the nineteenth century. The number of post offices, the amount of mail, newspapers, and magazines exploded in this period (Knippenberg and De Pater 2002). In the five provinces that we study, there were 20-30 post offices in the first half of the century, while there were more than 80 by the end of the century. Therefore, we expect mass communication to have made access to information about job openings and the distribution of cultural capital over families more equal, which should have led to a

lowering of the total family impact according to the argumentation above (Figure 3.4, third column of panel *F*).

### *Sector Dualism and Inequality*

A well-documented empirical observation is that the relation between income inequality and modernization over time follows an inverted U-shaped pattern, the so-called Kuznets curve (Kuznets 1955; Lindert and Williamson 1985; Nielsen 1994). On the basis of country-level data, it has been shown that in the early stages of modernization, inequality increases, reaches a peak, and then decreases during the mature stages of modernization. The explanation in the literature deals with the proportional shift of the workforce from the traditional sector towards the modern sector. Income is assumed to be higher in the modern, more productive, sector than in the traditional sector (i.e., there is between-sector inequality, labeled *sector dualism* by Nielsen (1994)). Moreover, if we assume that everybody has the same income within each sector (i.e., within-sector equality), it follows that there is perfect equality if everybody works in the traditional sector. Inequality arises as soon as some people start earning their income in the modern sector. The increase in inequality levels off when around half of the people work in each sector, and inequality decreases beyond that point. Perfect equality is reached again when everybody works in the modern sector. Thus, the simple mechanics of a lowering proportion of people working in the traditional sector can account for the observed inverted U-shaped pattern (see panel *A* in Figure 3.3).



**Figure 3.3** Expected Partial and Total Effect(s) of a Lowering Proportion of People Working in Agriculture on Inequality

Kuznets (1955) showed, using numerical examples, that this general pattern also holds under (most occurrences of) within-sector inequality. The exact shape of the pattern depends on, among other things, how high within-sector inequality is and whether it differs between the two sectors. For Western modernizing societies such as the Netherlands, it is often assumed that within-sector inequality is larger in the modern than in the traditional sector because in an agricultural society, many perform the same job and have a relatively similar status compared to the much broader range in status found in modern economies (Kuznets 1955; Nielsen 1994). In that case, a decreasing proportion working in agriculture means moving from a less to a more unequal system (see panel *B* in Figure 3.3). This effect of increasing inequality comes on top of the inverted U-shaped pattern that results from the income differences between the two sectors. Together this leads to a tilted inverted U-shape: inequality rises to a higher peak and decreases less compared to the inverted U when within-sector inequality is equal in both sectors (compare panel *C* with panel *A* in Figure 3.3).

These arguments can easily be extended to forms of family resources other than income. If the mean level of status (wealth, human capital, etc.) is higher in the modern than in the traditional sector, a shifting proportion from the traditional to the modern sector can be expected to trace the inverted U-shaped pattern in status (wealth, human capital, etc.) inequality. Similarly, if status (wealth etc.) inequality within the modern sector is higher than within the traditional sector, a shifting proportion from the traditional to the modern sector will decrease status (wealth etc.) inequality. Our data show that both mean status and status inequality increased over time in the Netherlands in the nineteenth century (results not shown). With the proportion working in agriculture decreasing in Dutch communities in this period, we therefore expect inequality in family resources to follow the tilted inverted U-shaped pattern of panel *C* in Figure 3.3.<sup>7</sup> Because we argued that inequality in family resources is positively related to fraternal resemblance, we hypothesize that fraternal resemblance traces the same tilted inverted U-shaped pattern as the decrease in the proportion working in agriculture progresses (Figure 3.4, last column of panel *G*).

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<sup>7</sup> The percentage drop in agriculture in our period is not as spectacular as in most other countries because the percentage working in the service sector was already quite high in the beginning of the century. However, the drop in agriculture is likely to underestimate the shift from the traditional to the modern sector in absolute terms because there were also shifts from artisanal to industrial production.

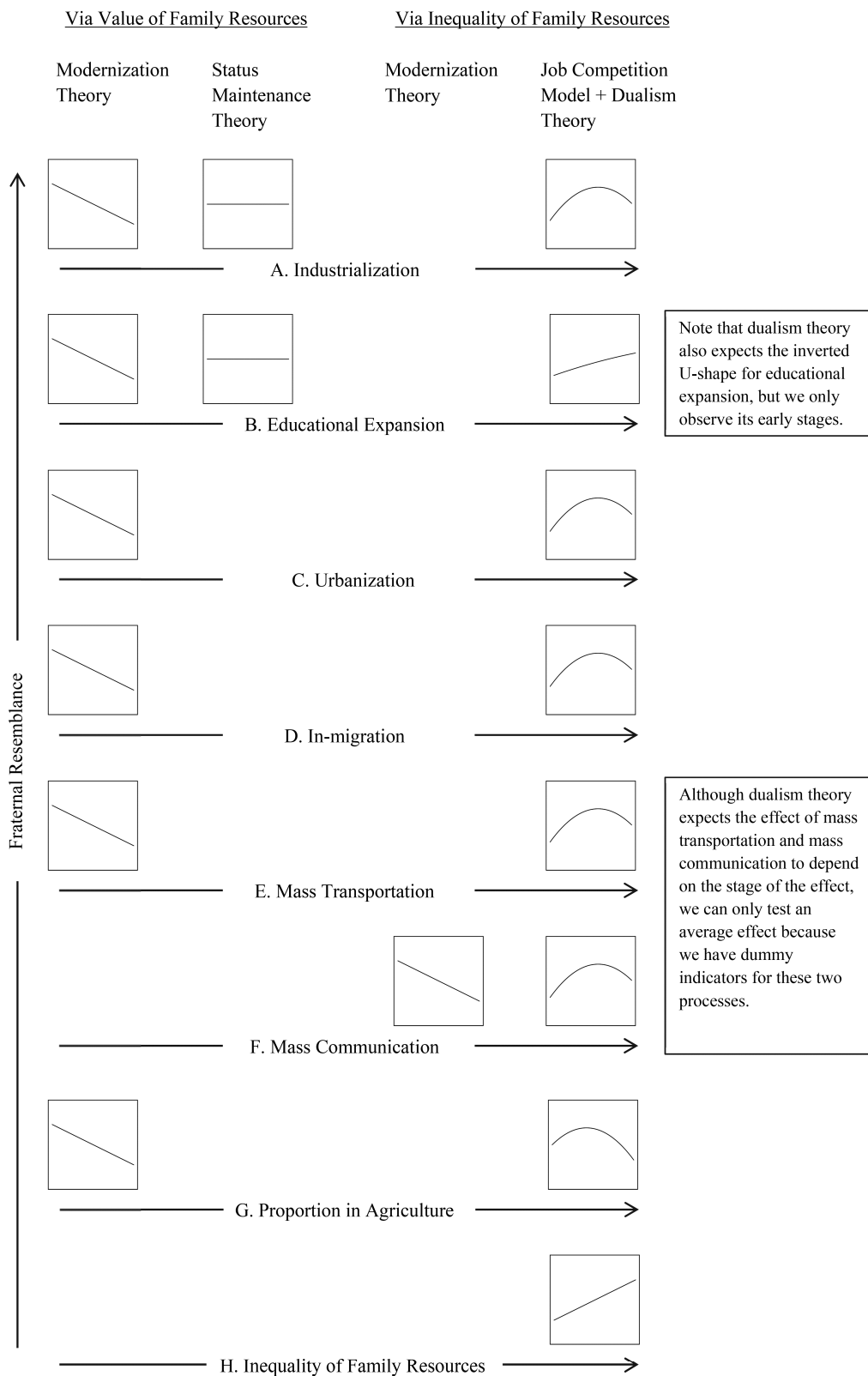


Figure 3.4 Hypothesized Effects of Community Indicators on Fraternal Resemblance

*Other Forms of Dualism*

Nielsen (1994) has argued that the inverted U-shaped pattern in income inequality may result not only from sector dualism but from any form of modernization that creates an income advantage not taken up by everybody at the same time. A good example is the asynchronous diffusion of a certain level of education. Education creates an income advantage for those holding the degree compared to those who do not have this degree, which depends in part on family background. The spread of education thus creates income inequality between (educational) elite families and the rest. As educational expansion progresses, income inequality will follow the same inverted U-shaped pattern as described for the partial and selective diffusion of modern forms of production (Nielsen 1994; Moller, Alderson, and Nielsen 2009). However, because we observe educational expansion in the early stage (see numbers presented earlier), we expect it to only increase inequality and, hence, fraternal resemblance (Figure 3.4, last column of panel *B*).

Similarly, inequalities are likely to arise between families who profit and families who do not profit from urbanization, in-migration, mass transportation, and mass communication. Moreover, because not all families profit from these processes at the same time, the arguments of dualism theory apply. Because urbanization, in-migration, mass transportation, and mass communication had a broad range of development in our time period, we expect inequality, and thus fraternal resemblance, to follow the inverted U-shaped pattern (Figure 3.4, last column of panels *C*, *D*, *E*, and *F*).

### **3.3 Methods**

We use a two-step procedure to describe and explain variation in the fraternal resemblance in occupational status between communities. First, we estimate for each community the brother correlation in occupational status as a measure of fraternal resemblance based on individual- and family-level register data. In the next step, these estimates become the dependent variable in a meta-analysis with the modernization indicators based on community-level data as independent variables. Next, we present details about these steps (e.g., data, exact definition of a community, and estimation methods).



### 3.3.1 Individual- and Family-level Data

Our primary data source is GENLIAS, a digital database with information from all Dutch marriage certificates for the period 1812–1922. A marriage certificate typically provides name, place of birth, age, and occupation of bridegroom and bride; names and occupations of parents of the couple; and the date and place of marriage (for more detailed information, see, e.g., Bras et al. 2010). We use a version of GENLIAS (version 2007\_03) in which marriage certificates have been linked to those of the parents. Hereby we also have information on married siblings. An obvious drawback of these otherwise tremendous data is that we miss all persons who never got married. However, this limitation is less severe than one might expect, as the percentage of men born in a year between 1800 and 1905 that ever married is quite high: 86% or more (Ekamper et al. 2003).

#### *The Linking of Marriage Certificates*

A child's marriage certificate is linked to the parents' marriage certificate if the first and family names of the parents on both certificates match (allowing for minor variations in the spelling of names). To avoid establishing wrong links, additional information such as the age of the bride and groom was used to link within only a limited framework of time. This method of linking marriage certificates has been executed within and between the provinces Groningen, Overijssel, Gelderland, Limburg and Zeeland. In other words, it was possible to link a marriage certificate only if the parents were married also in one of these provinces. We expect the number of children that we cannot link because their parents married in a province not part of our database to be small, as most people did not seem to migrate very far. For example, census data show that the number of people who live in a different province than where they were born was only 8% in 1849, 13% in 1899, and 15% in 1930 (Knippenberg and De Pater 2002, p. 88). Note that the percentage we will miss due to migration will be less than these percentages because we have five out of 11 provinces in our database, and we do not miss people who migrated after their marriage. The included provinces are roughly the bordering provinces with Germany (in the east) and Belgium (in the south). Although the excluded provinces (roughly bordering the sea in the west) were more urbanized, on average, the included provinces contained plenty of large cities as well (see Knippenberg and De Pater 2002, p. 85).

#### *Selections and Missing Information*

As discussed in the introduction, we study only grooms. Grooms marrying at the beginning (1812) and at the end (1922) of the observation period are, for present purposes,

problematic. For those grooms married shortly after 1812, parents' marriage certificates are not part of the database, and these grooms therefore cannot be linked to their brothers. We want to give grooms in all time periods the same chance that their parents have a marriage certificate in the database. Therefore, we take a 30-year margin (following Bras et al. 2010) and include only families for which no son was married before 1842. For parents who married in the decades before 1922, there is a fair chance that one or more of their children got married later than 1922 and are thus not part of our database. As we want only complete families, we leave out those families for which the parents married after 1882 (from this point on the average number of sons per family recorded in our linked data starts to drop steeply).

After these selections, 29.5% of the grooms could not be linked to the marriage certificate of their parents and are excluded. We performed a check for selection bias and found that the grooms who could not be linked do not differ substantially in average status from the linked grooms (about 3 points on an 88-point scale). For the analysis of the time trend in fraternal resemblance, this results in 490,827 linked grooms who are married between 1842 and 1922 and for whom the parents married between 1812 and 1882. The community-level data (see below) are available only for a subperiod. This means that for the explanatory analyses there are 304,962 grooms for whom the parents married between 1843 and 1875. We cannot study all of these grooms because sometimes—in less than 2.5% of the cases—required information is missing (such as the occupational title of the groom on the marriage certificate). After listwise deletion of these cases, we are left with 479,864 grooms for the time trend and 274,768 grooms for the explanatory analyses (see Table 3.1).

### **3.3.2 Community-Level Data**

A community is the geographic location and time period in which families socialize their children and transfer the resources that children use in the labor market. Perhaps the best definition would be the place of residence of the family when the children are around the age of 15, because this is the age at which children started to enter the labor market in our study period (Bras and Kok 2003). Since we do not have this information, we approximate the place of socialization by taking the parents' municipality of marriage. We approximate the timing of socialization using the year in which parents have been married for 15 years. We create five-year cohorts out of these to make sure communities are large enough to estimate a brother correlation (details how the cohorts are constructed are presented later). In other words, a community comprises all families of which the parents married in the same municipality during the same five-year time period. There are

6,548 communities for the period 1827–97 and 3,239 communities for the period 1858–90. However, we can reliably estimate brother correlations only for communities with at least 20 observations (see method of analyses section), resulting in 4,947 and 2,576 communities respectively. Moreover, in the explanatory analyses, the 2,539 communities that have no missing information on the community indicators can be studied (see Table 3.1)

For the modernization indicators, we use the Historical International Standardized Community Indicators for the Netherlands (HISCI-NL) data set that was specially developed for this and related projects. The measures are at the level of the municipality and are annual but are averaged over the five-year cohorts to fit our definition of a community. Indicators for the percentage in agriculture and in services and for inequality of family resources are based on aggregated information from the GENLIAS database. Basic information about the source of each community indicator is presented in the measures section.<sup>8</sup>

**Table 3.1** Number of Observations

	1827 to 1897		1858 to 1890		
	All Communities	Communities with at Least 20 Sons	All Communities	Communities with at Least 20 Sons	Communities with at Least 20 Sons and No Missing Values on Community Indicators
Number of municipalities	555	491	469	444	437
Number of communities	6,548	4,947	3,239	2,576	2,539
Number of families	266,652	249,122	151,022	143,157	142,041
Number of sons	479,864	450,690	274,768	261,467	259,366

<sup>8</sup> More detailed information can be found in the HISCI-NL code book, which can be sent by the corresponding author on request.

### 3.3.3 Measures

#### *Individual-level*

*Occupational status* of a person is based on the occupation as stated on his marriage certificate. Occupations have been coded into the Historical International Standard Classification of Occupations (HISCO; Van Leeuwen et al. 2002), the historical counterpart of International Labor Organization's ISCO68. Next, these occupational categories are assigned a status score by mapping them onto the HISCAM stratification scale (Lambert et al. 2013), which is the historical equivalent of the CAMSIS scales (Stewart et al. 1980). The scale ranges theoretically from 1 to 99, but we observe in Dutch society a range from 10.6 (house servant) to 99 (e.g., lawyer). In 2.2% of our cases, occupational status is missing in the descriptive analyses (2.0% in the explanatory analyses), for example, because no occupation was stated on the marriage certificate or the information was too vague to classify into HISCO (see Table 3.2 for descriptives of all variables).

#### *Community-level*

*Time* is the time period in which sons are socialized, which we decided to approximate by the five-year cohorts in which parents have been married for 15 years (see above). For the descriptive analyses, where we observe parents married between 1812 and 1882, we thus assume sons to be socialized between 1827 and 1897. The first cohort comprises six years (1827–32), while the remaining 13 cohorts comprise five years (1833–37, ..., 1893–97). For the explanatory analyses, where parents are married between 1843 and 1875, the years of socialization are 1858–90. The last cohort is hereby cut off to three years (1888–90). To have a flexible specification of possible time trends, we make a dummy for each cohort.

Following Zijdeman (2009), the number of steam engines that were ever purchased per 100 inhabitants in a municipality in the cohort of socialization indicates the degree of *industrialization* of that community (we took the average over the five years of a cohort). The data were taken from the Registers of the Dutch Department for Steam Engineering (Lintsen and Nieuwkoop 1989–1991). The information is available only until 1890, determining the end year of our explanatory analyses. *Educational expansion* is gauged by the number of students enrolled in secondary education per 100 inhabitants in the cohort of socialization (averaged over the years of a cohort). We derived this information from annual reviews on Dutch education (Scholen 1862–1917). These data are available for the period 1858 onward (except for 15 missing cases), determining the starting year of our explanatory analyses.

Table 3.2 Descriptives

Variable	Years of Socialization							
	1827 to 1897				1858 to 1890			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
<b>Individual Level:</b>								
Occupational status son	46.47	12.84	10.60	99.00	46.99	12.74	10.60	99.00
<b>Community Level:</b>								
Five-year cohorts			1.00	14.00			7.00	13.00
Steam engines/100 inhabitants					.11	.21	0.00	2.42
Students in secondary education/100 inhabitants					.07	.33	0.00	5.98
Post office (yes/no)					.15		0.00	1.00
Ln(Inhabitants)					7.77	.79	5.56	10.94
Ln(ln-migrants/1000 inhabitants)					3.77	.50	.32	6.17
Train station (yes/no)					.20		.00	1.00
Proportion farmer					.36	.25	.00	1.00
Proportion in services					.19	.14	.00	1.00
Gini family resources					.10	.04	.00	.21
Brother correlation ( $\rho$ )	.49	.22	.00	1.00	.48	.22	.00	1.00
Standard error ( $\sigma_e$ )	.14	.07	.00	.42	.13	.06	.00	.39

Note: For individual-level variables,  $N = 450,690$  for 1827–97 and 259,366 for 1858–90; for community-level variables,  $N = 4,947$  for 1827–97 and 2,539 for 1858–90.

The number of inhabitants in a municipality (averaged over the years of the cohort) measures the degree of *urbanization* of that community. We take its natural logarithm to normalize the indicator. For 22 communities, information on the number of inhabitants is missing. The degree of *in-migration* is measured by the natural logarithm of the number of people who migrate into a municipality per 1,000 inhabitants (averaged over the years of a cohort). These data were extracted from the Historical Ecological Database and the Historical Database for Dutch Municipalities (Beekink et al. 2003). A dichotomous variable whether there is a train station present (1) or not (0) in a municipality in at least half of the years of a certain cohort expresses the possibility for *mass transportation* in that community. The opening and closing years of all train stations of all train lines in the Netherlands were retrieved from the website <http://www.stationsweb.nl/>.

A dichotomous variable whether there is a post office present (1) or not (0) in a municipality in at least half of the years of a certain cohort expresses the possibility for *mass communication* in that community. Not only was personal communication (i.e., letters and telegrams) distributed through post offices, but also the dispersion of mass media (e.g., newspapers, magazines, fashion brochures) relied on post offices (Zijdeman 2009). The information was gathered from the annual reviews of the Dutch service for mail and telegraphy (Posterijen 1880–1916).

We approximate the proportion working in *agriculture* in a community by the percentage of fathers who were farmers. We label a father as a farmer if more than half of his children stated their father's occupation as farmer on their marriage certificates (HISCO codes 61110–61290). We do not include farmworkers in our measure because they are sometimes listed as “laborer,” a category that also includes industrial workers; and it is likely that the percentage of agricultural workers listed as laborer varied nonrandomly over communities. Although we thus underestimate the absolute number working in agriculture, we are confident that we capture relative differences between communities well. Because the reference category would be made up of two sectors, we also add as a control the proportion of fathers working in *services* (HISCO major groups 0–5), such that the proportion in *industry* becomes the reference category.

We approximate the *inequality of family resources* in a community by measuring how unequal the distribution of fathers' occupational status is. To do so, we calculated the Gini coefficient of fathers' occupational status in HISCAM scores using Stata's “somersd” command (Newson 2006).

**Table 3.3** Correlations between Community Characteristics

	Time	Steam engines	Students	Post office	Inhabitants	In-migrants	Train station
Time	1.00						
Steam engines	.32	1.00					
Students	.17	.34	1.00				
Post office	.09	.36	.52	1.00			
Inhabitants	.08	.27	.53	.64	1.00		
In-migrants	.26	.21	.25	.26	.19	1.00	
Train station	.28	.23	.39	.46	.49	.26	1.00

We choose not to make one scale out of the modernization indicators for theoretical reasons: from our theoretical framework it becomes clear that each modernization process is expected to affect total family impact through its own mechanisms. In other words, the arguments of the theory could be correct for one process, while being wrong for another. Testing with one modernization scale does not allow for this possibility. We do not expect multicollinearity to form a problem given the moderate correlations between the modernization indicators (see Table 3.3).

### 3.3.4 Analytic Strategy

#### *Estimating Brother Correlations*

We stay close to the conventional statistical framework and notation used in the economics literature to study sibling or brother correlations in outcomes such as income (Solon et al. 1991; Björklund et al. 2002; Mazumder 2008). The occupational status of son  $j$  from family  $i$  is denoted by  $y_{ij}$  and is modeled by:

$$y_{ij} = \beta_{00} + \varepsilon_{ij}, \quad (2)$$

where  $\beta_{00}$  is the population mean status and  $\varepsilon_{ij}$  the residual, which is further decomposed as follows:

$$\varepsilon_{ij} = a_i + b_{ij}, \quad (3)$$

where  $a_i$  is a component common to all brothers from family  $i$  (i.e., the family mean deviation), and  $b_{ij}$  is an individual-specific component (i.e., the individual deviation from the family mean). Substituting equation (3) into (2), we get

$$y_{ij} = \beta_{00} + a_i + b_{ij}. \quad (4)$$

We treat  $a_i$  and  $b_{ij}$  as random effects and assume that they are independent. The variance of status  $y_{ij}$  then is

$$\sigma_y^2 = \sigma_a^2 + \sigma_b^2. \quad (5)$$

The first term captures the variance in occupational status that is due to differences between families, whereas the second term captures the variance that is due to differences within families. The expected status correlation between two randomly picked brothers is

$$\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_b^2}. \quad (6)$$

From this expression we can see that a brother correlation can be interpreted as the proportion of the total variance that is due to all factors shared by brothers, as discussed in the introduction.

We estimated equation (4), which is a two-level multilevel model with sons nested in families, for each community separately using MLwiN from within Stata (Leckie and Charlton 2013; Rasbash et al. 2013). From the results we calculated the brother correlation for each community  $c$  with equation (6) and obtained its standard error  $\sigma_e$  using the delta method (cf. Mazumder 2008). Descriptive results of these estimates are found in Table 3.2.

#### *Explaining Variation in Brother Correlations Using Multilevel Meta-regression*

The estimates of the brother correlations become the dependent variable in our actual analyses. The reliability of each estimate differs per community—depending on the number of observations in the community—and is reflected in its standard error  $\sigma_e$ . Meta-analysis provides us with the appropriate statistical framework to deal with this issue. More specifically, we use multilevel meta-analysis (Hox 2002), which is a more general case of the random-effects model for meta-analysis (Hedges and Olkin 1985). The estimated brother correlation  $r_c$  of community  $c$  is given in this model by

$$r_c = \rho_c + e_c, \quad (7)$$

where  $\rho_c$  is the true brother correlation of community  $c$ , and  $e_c$  is the deviation from this due to sampling error with known variance  $\sigma_e^2$ , that is, the square of the standard error that we estimated in the previous step. The sampling error is assumed to be normally distributed, which is a reasonable assumption if the estimate is based on at least 20 observations (Hedges and Olkin 1985). This is the reason why we include only those communities for which we have 20 or more observations.



The true brother correlation  $\rho_c$  is assumed to vary between communities, so

$$\rho_c = \gamma_0 + u_c, \quad (8)$$

where  $\gamma_0$  is the mean brother correlation over all communities, and  $u_c$  the residual error term for community  $c$ , which is assumed to have a normal distribution with variance  $\sigma_u^2$ . Substituting equation (8) into (7) leads to

$$r_c = \gamma_0 + u_c + e_c. \quad (9)$$

The idea of the model is thus that brother correlations differ between communities in part because of true differences between communities ( $\sigma_u^2$ ) and in part because of sampling error ( $\sigma_e^2$ ). Because we know the latter, we can estimate the former—the variance of interest.

#### *Variation between and within Municipalities: Random Effects versus Fixed Effects*

A community is a municipality at a certain time point, and we observe most municipalities at multiple points in time. To put this differently, our lowest-level observations, communities, are nested within municipalities. A great advantage of the multilevel meta-analysis approach is that it can easily be extended to include such an additional level. Namely, the residual  $u_c$  can be written as

$$u_{mc} = v_m + w_{mc}, \quad (10)$$

where  $v_m$  is the average deviation of all communities within municipality  $m$  from the overall population mean  $\gamma_{00}$ , and  $w_{mc}$  is the deviation of community  $c$  from its municipality mean.

We start by treating  $v_m$  and  $w_{mc}$  as random effects and assume that they are independent and normally distributed. It then follows that

$$\sigma_u^2 = \sigma_v^2 + \sigma_w^2, \quad (11)$$

which shows that the true variation between communities,  $\sigma_u^2$ , stems from differences *between* municipalities,  $\sigma_v^2$ , and from differences *within* municipalities,  $\sigma_w^2$ . By substituting (10) into (9), we get

$$r_{mc} = \gamma_{00} + v_m + w_{mc} + e_{mc}. \quad (12)$$

We estimate equation (12) through a multilevel model with two ‘real’ levels, the municipality and the community levels (which yield  $\sigma_v^2$  and  $\sigma_w^2$ , respectively), and one ‘pseudo-level’ (which yields  $\sigma_e^2$ ). It can be shown that  $\sigma_e^2$  is obtained by including the community as a random effect but constraining its variance to be one and then including a

variable containing the standard errors  $\sigma_e$  of the estimates as a random effect at this level (see the Stata multilevel mixed-effects models reference manual (StataCorp 2013, pp. 27–30)). We extend equation (12) by adding community-level variables, such as the modernization indicators, as fixed effects to test our hypotheses and see to what extent these variables explain the variance between ( $\sigma_v^2$ ) and within municipalities ( $\sigma_w^2$ ).

For our final model, instead of treating  $v_m$  as a random effect, we treat it as a fixed effect by including dummies for all municipalities. This takes out all variance between municipalities and leaves us only with variance within municipalities, so equation (11) becomes

$$\sigma_u^2 = \sigma_w^2. \quad (13)$$

An obvious disadvantage of this approach is that we lose valuable information by excluding differences between municipalities. The advantage of the approach, however, is that it takes out the effect of any unobserved stable municipality characteristic that may confound the relation between the community indicators of interest and fraternal resemblance and thus forms a stricter test. Note that we hypothesized the effect of most modernization processes to depend on the stage of the process but that the fixed-effects approach takes out the information about the stage at which a municipality is by discarding the mean differences between municipalities. Hence, adding the squared terms of each process—as we do in the random-effect models—will be of no avail, but interacting each term with the mean value of each municipality will serve the same purpose (technically, this gives the first-order Taylor approximation of the quadratic function).

## 3.4 Results

### 3.4.1 The Change in Fraternal Resemblance over Time (1827–97)

To form an impression how large fraternal resemblance was and whether it changed over time in the Netherlands in the nineteenth century, we first estimated equation (12) in Model 1 (see Table 3.4). We see that the brother correlation in Dutch communities was, on average,  $\gamma_{00} = .538$ . The Random part of the table shows that communities varied quite a bit around the average. About one-fourth of the variance arises because of differences between municipalities:  $\sigma_v^2 = 0.010$ , meaning that 95% of the municipalities have, on average, a brother correlation that lies in the range  $.341-.733$  (which can be found by calculating  $\gamma_{00} \pm 1.96 \times \sigma_v$ ). The remainder of the variance stems from

differences within municipalities:  $\sigma_w^2 = 0.027$ , which may in part be due to general trends over time.

**Table 3.4** Estimated Brother Correlations in Occupational Status over Time

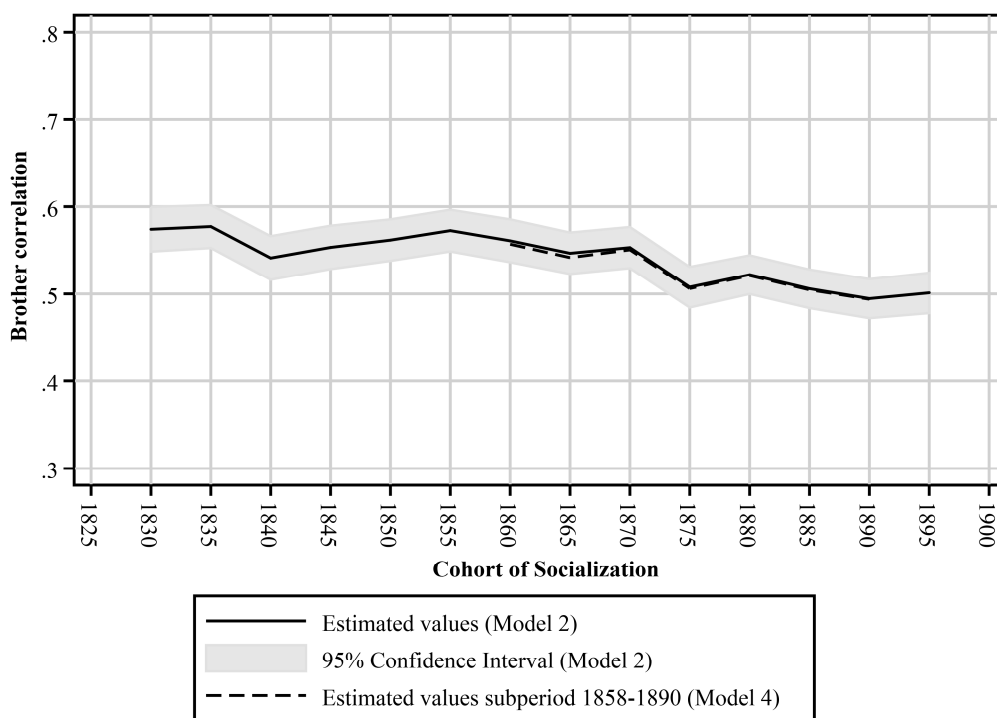
	Model 1	Model 2	Model 3	Model 4
Fixed Part				
Intercept	0.538*** (0.006)	0.574*** (0.013)	0.522*** (0.007)	0.557*** (0.012)
1827-1832		ref.		
1833-1837		0.003 (0.017)		
1838-1842		-0.033 (0.017)		
1843-1847		-0.021 (0.017)		
1848-1852		-0.012 (0.016)		
1853-1857		-0.002 (0.017)		
1858-1862		-0.013 (0.017)		ref.
1863-1867		-0.027 (0.016)		-0.015 (0.015)
1868-1872		-0.021 (0.016)		-0.006 (0.015)
1873-1877		-0.066*** (0.016)		-0.051*** (0.015)
1878-1882		-0.052** (0.016)		-0.036* (0.015)
1883-1887		-0.068*** (0.016)		-0.052*** (0.015)
1888-1892		-0.080*** (0.016)		-0.063*** (0.015)
1893-1897		-0.073*** (0.016)		
Random Part				
$\sigma_v^2$ (Between municipalities)	0.010*** (0.001)	0.010*** (0.001)	0.011*** (0.001)	0.011*** (0.001)
$\sigma_w^2$ (Within municipalities)	0.027*** (0.001)	0.026*** (0.001)	0.023*** (0.001)	0.022*** (0.001)
$\sigma_e^2$ (Sampling error)	1.000 (Constrained)	1.000 (Constrained)	1.000 (Constrained)	1.000 (Constrained)

Note:  $N = 4,947$  in Model 1 and 2;  $N = 2,539$  in Model 3 and 4. Standard errors in parentheses.

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

To see whether there is indeed a systematic change in the brother correlation over time, we add the cohort dummies in the second model. The results are found again in Table 3.4, and as a visual aid we plotted them in Figure 3.5 as well. The brother correlation is .574 in the first cohort (1827–32), which serves as the reference category. It remains rather stable during the second quarter of the nineteenth century. However, during the second half of the century, the brother correlation starts to decrease. Especially in the last quarter of the century this reduction is substantial and becomes significant. By the end of the century, the brother correlation is around .5, which means that it fell by more than 10% during the second half of the century. Although there is a clear time trend, it hardly helps us to understand the differences within communities ( $\sigma_w^2$  reduces only from 0.027 to 0.026 by adding the cohort dummies).

We repeated these analyses for the selection of communities for which we have all modernization indicators available (1858–90). The results are highly compatible with those for the entire period (see Models 3 and 4 in Table 3.4). Figure 3.5 also shows nicely that the time trend predicted in Model 4 can hardly be discerned from that in Model 2.



**Figure 3.5** Fraternal Resemblance over Time (1827 to 1897)

### 3.4.2 Differences in Fraternal Resemblance by Modernization Indicators (1858–90)

To test our hypotheses regarding the influence of modernization on fraternal resemblance (see Figure 3.4), we add the modernization indicators in Model 5 (see Table 3.5). We also include the squared term of all continuous measures for which we expect the inverted U-shaped patterns based on dualism theory. We do not include the proportion in agriculture and services yet because they are closely related to our measure for inequality (both are based on the distribution of fathers' occupations in a community).

For number of steam engines, the linear term is positive and significant ( $b = 0.124$ ,  $P = .012$ ), and the squared term is negative and insignificant ( $b = -0.036$ ,  $P = .314$ ). The solid line in panel *A* of Figure 3.6 shows what this means for the relation between fraternal resemblance and industrialization: the brother correlation is stronger when there are more steam engines in a community. This effect seems to flatten out and even to reverse for higher levels of industrialization, which would support dualism theory, but this curving is not significant. It is clear that the results are opposite to what would be expected from modernization theory and are not in line with status maintenance theory either. Note that the effect of industrialization does not include the effects it may have through the other modernization processes because we control for them (analogously, for the other modernization processes we look at their net effects as well).

Because educational expansion was at its early stages in the Netherlands in our period of observation, we do not expect to find any curvilinear effects, so we include only a linear term for the number of students in secondary education per 100 inhabitants. This term is positive, albeit nonsignificant ( $b = 0.025$ ,  $P = .105$ ; see also the solid line in panel *B* of Figure 3.6). This finding may be interpreted in several ways. One is that educational expansion neither decreases the value of family resources (in line with status maintenance theory) nor increases inequality of family resources. Another is that educational expansion decreases the value and increases inequality, and these opposing effects cancel each other out. A final interpretation is that educational expansion (mostly) increases inequality of family resources, but that the term is insignificant because we lack power with the bulk of the communities having no students in secondary education at all. In the next step of the analysis we present an argument why we have a slight inclination to favor the last interpretation.

**Table 3.5** Estimated Brother Correlations in Occupational Status by Modernization Processes

	Model 5	Model 6	Model 7	Model 8 <sup>a</sup>
Fixed Part				
Intercept	0.575 <sup>***</sup> (0.014)	0.558 <sup>***</sup> (0.013)	0.559 <sup>***</sup> (0.013)	0.557 <sup>***</sup> (0.068)
1858-1862	ref.	ref.	ref.	ref.
1863-1867	-0.029 (0.016)	-0.012 (0.016)	-0.012 (0.016)	-0.023 (0.016)
1868-1872	-0.024 (0.016)	-0.007 (0.016)	-0.008 (0.016)	-0.018 (0.016)
1873-1877	-0.072 <sup>***</sup> (0.016)	-0.053 <sup>**</sup> (0.016)	-0.055 <sup>***</sup> (0.016)	-0.062 <sup>***</sup> (0.017)
1878-1882	-0.065 <sup>***</sup> (0.017)	-0.039 <sup>*</sup> (0.017)	-0.041 <sup>*</sup> (0.017)	-0.053 <sup>**</sup> (0.019)
1883-1887	-0.081 <sup>***</sup> (0.017)	-0.055 <sup>**</sup> (0.017)	-0.058 <sup>***</sup> (0.017)	-0.074 <sup>***</sup> (0.020)
1888-1890	-0.093 <sup>***</sup> (0.017)	-0.066 <sup>***</sup> (0.017)	-0.069 <sup>***</sup> (0.017)	-0.094 <sup>***</sup> (0.021)
Steam engines <sup>b</sup>	0.124 <sup>*</sup> (0.049)	0.065 (0.047)	0.078 (0.046)	0.004 (0.065)
Steam engines <sup>2bc</sup>	-0.036 (0.036)	-0.007 (0.035)	-0.014 (0.034)	0.061 (0.090)
Students <sup>b</sup>	0.025 (0.016)	0.018 (0.015)	0.018 (0.014)	-0.016 (0.018)
Inhabitants <sup>b</sup>	-0.148 (0.098)	-0.246 <sup>**</sup> (0.088)	-0.224 <sup>**</sup> (0.086)	0.073 (0.050)
Inhabitants <sup>2bc</sup>	0.006 (0.006)	0.011 <sup>*</sup> (0.006)	0.010 (0.005)	0.017 (0.041)
In-migrants <sup>b</sup>	0.187 <sup>*</sup> (0.077)	0.113 (0.075)	0.114 (0.074)	-0.001 (0.017)
In-migrants <sup>2bc</sup>	-0.022 <sup>*</sup> (0.010)	-0.016 (0.010)	-0.016 (0.010)	-0.041 (0.024)
Train station	-0.026 (0.014)	-0.023 (0.013)	-0.022 (0.013)	0.015 (0.016)
Post office	0.062 <sup>***</sup> (0.018)	0.042 <sup>*</sup> (0.017)	0.042 <sup>**</sup> (0.016)	0.011 (0.024)
Farmers <sup>b</sup>		0.010 (0.079)	-0.024 (0.078)	0.095 <sup>*</sup> (0.045)
Farmers <sup>2bc</sup>		-0.146 (0.083)	0.029 (0.086)	-0.103 (0.205)
Services <sup>b</sup>		0.408 <sup>***</sup> (0.098)	0.240 <sup>*</sup> (0.100)	0.099 (0.056)
Services <sup>2bc</sup>		-0.340 <sup>*</sup> (0.163)	-0.187 (0.163)	0.423 (0.373)
Gini status <sup>b</sup>			1.332 <sup>***</sup> (0.190)	1.227 <sup>***</sup> (0.216)

*(continued)*

**Table 3.5** (continued)

	Model 5	Model 6	Model 7	Model 8 <sup>a</sup>
Random Part				
$\sigma_v^2$ (Between municipalities)	0.008*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	
$\sigma_w^2$ (Within municipalities)	0.022*** (0.001)	0.022*** (0.001)	0.022*** (0.001)	0.014*** (0.001)
$\sigma_e^2$ (Sampling error)	1.000 (Constrained)	1.000 (Constrained)	1.000 (Constrained)	1.000 (Constrained)

Note:  $N = 2,539$ . Standard errors in parentheses.

<sup>a</sup> Model 8 also includes a dummy for each municipality in the fixed part. To keep the table readable, their estimates are not shown.

<sup>b</sup> Mean centered.

<sup>c</sup> For the fixed effects model (Model 8), the term is in fact not the squared term but the interaction with the municipal mean value for the process. It can be interpreted in the same way, although technically it yields the linear approximation of the quadratic function and not the quadratic function itself.

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

The results for urbanization in panel *C* of Figure 3.6 seem to show that fraternal resemblance decreases as communities have more inhabitants, which is in line with the modernization theory. However, both the linear and quadratic terms are not significant ( $b = -0.148$ ,  $P = .130$ ;  $b = 0.006$ ,  $P = .355$ ). For number of in-migrants, the linear term is positive and significant ( $b = 0.187$ ,  $P = .015$ ) and the quadratic term is negative and significant ( $b = -0.022$ ,  $P = .035$ ). This means that the brother correlation traces the inverted U-shaped pattern as predicted by dualism theory (see panel *D* of Figure 3.6).

For mass transportation and mass communication, we have dummy measures, so we cannot test how their effects depend on the stage of the process; we can see only what their average effect is. If there is a possibility for mass transportation in a community (i.e., there is a train station), the brother correlation is somewhat lower than in a community without this possibility ( $b = -0.026$ ,  $P = .055$ ). Proponents of modernization theory may claim that this forms support for the modernization theory, yet the effect is not significant at the 5% level, only at the 10% level. The effect of mass communication is in the opposite direction: in communities with a post office, the brother correlation is  $b = 0.062$  points higher than in a community without a post office ( $P = .001$ ). This is not in line with modernization theory predicting that mass communication resulted in more equal accessibility to valuable information. On the basis of dualism theory, one could explain the positive effect by arguing that in most communities with a post office, still only a select group profited from these newly arisen possibilities of mass communication.

Altogether, the modernization indicators explain over a quarter of the difference in fraternal resemblance between municipalities (i.e.,  $\sigma_v^2$  reduces from .011 to .008). However, the modernization processes explain little of the variation within municipalities, and they are not able to explain the decrease over time in fraternal resemblance. In fact, if anything, the modernization processes even suppressed the general time trend toward more openness somewhat (the difference between the first and last cohorts increased from  $b = -0.063$  to  $b = -0.093$  by controlling for the modernization indicators). Although the results do not provide an unequivocal picture so far, overall they seem to offer most support for dualism theory because the effects of four out of six modernization processes can be interpreted along this way. Modernization theorists could at best claim two out of six processes to be in line with their ideas, whereas status maintenance theory is supported in one of the two test cases.

### 3.4.3 Differences in Fraternal Resemblance Resulting from Sectorial Shifts and Inequality

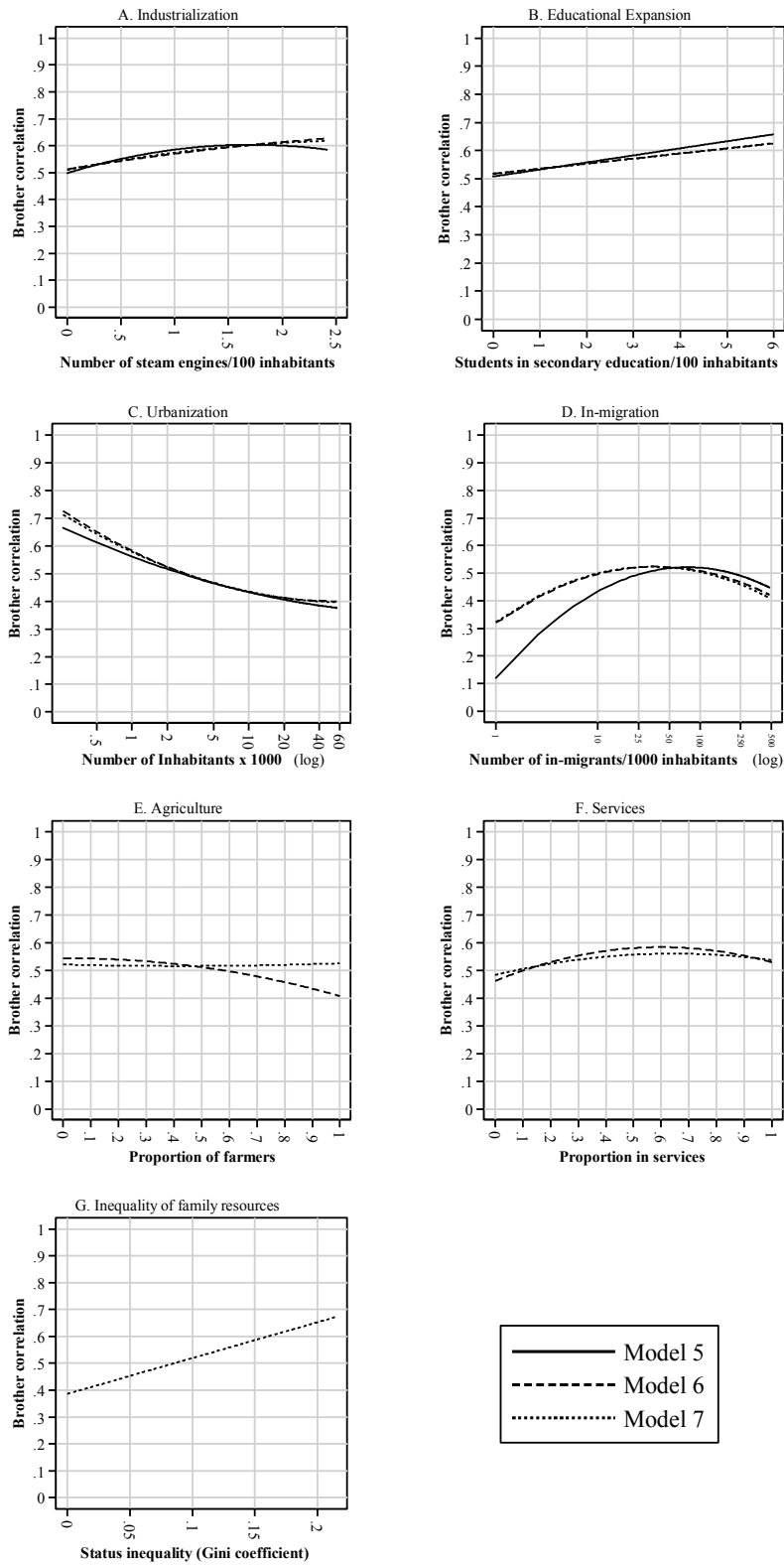
Dualism theory finds further support if we include the proportions of farmers and those working in services in Model 6 (see Table 3.5). Panel *E* of Figure 3.6 shows that fraternal resemblance is clearly higher in communities with fewer farmers (quadratic effect:  $b = -0.146$ ,  $P = .079$ ; the linear effect is not significant but would be negative and significant if we left out the quadratic term—results not shown). Although this effect seems to flatten out for low levels of farmers (if we read the graph from right to left), it does not reverse as expected and the curving is not significant. An obvious explanation is that the effect of within-sector inequality (see panel *B* of Figure 3.3) is stronger than expected because a community with a large proportion of farmers is highly status-homogeneous, more than if our measure for proportion in agriculture could also have included farmworkers. For the proportion working in services, the expected inverted U-shaped pattern is indeed clearer (see panel *F* of Figure 3.6). Both the linear term ( $b = 0.408$ ,  $P = .000$ ) and the quadratic term ( $b = -0.340$ ,  $P = .036$ ) are significant. The measures for sectorial distribution explain half of the variance between municipalities ( $\sigma_v^2$ ) left unexplained in Model 5 but hardly any of the variance within municipalities ( $\sigma_w^2$ ).

Interestingly, including the sectorial distribution measures alters many of the effects of the modernization indicators presented in Model 5 (see also the dashed lines in Figure 3.6). All positive effects become smaller and often insignificant, whereas the negative effect of urbanization becomes more pronounced and significant. In other words, contrary to what we expected, modernization processes and shifts between sectors did not make fraternal resemblance trace an inverted U-shape independent of each other. We conclude



from this that modernization processes led to the inverted U-shape in fraternal resemblance because they decreased the proportion of farmers and increased the proportion in services and industry. Consequently, communities became more heterogeneous in the type of jobs performed in the early and intermediate stages of the modernization processes. This made the amount and type of resources possessed by families more unequal, which led to higher fraternal resemblance. Although these results do not support modernization theory, we cannot rule out the possibility that modernization processes lowered the value of family resources because these effects may have been offset by the increasing inequality. Urbanization indeed lowered fraternal resemblance once we controlled for the sectorial distribution.

In Model 7 (see Table 3.5) we add the inequality measure to test our claim that the shifts in the labor force affect fraternal resemblance by increasing the inequality of family resources. Indeed, communities with a more unequal distribution of family resources, that is, with a larger Gini coefficient, exhibit higher fraternal resemblance ( $b = 1.332$ ,  $P = .000$ ; see also panel *G* of Figure 3.6). Moreover, inequality of family resources indeed mediates the effects of proportion in agriculture and services on fraternal resemblance: the effect of farmers vanishes completely, and we can also understand much of the effect of services (see also the dotted lines in panels *E* and *F* of Figure 3.6). As a final test of whether it is really inequality that is driving the patterns in fraternal resemblance and not some unobserved community characteristics related to both inequality and fraternal resemblance, we estimated a municipality fixed-effects model (see Model 8, Table 3.5). It shows that if a municipality becomes more unequal over time, this leads to an increase in fraternal resemblance in that municipality ( $b = 1.227$ ,  $P = .000$ ). The effects for urbanization and mass communication are not significant, meaning that the previously found effects may have been due to unobserved differences between municipalities. The changes in fraternal resemblance over time are not explained by changes in inequality but are rather more pronounced after we take these changes into account. This is in line with the fact that inequality mainly increased during this period.



**Figure 3.6** Fraternal Resemblance as Function of Modernization Processes

### 3.5 Conclusions and Discussion

We aimed to describe and explain temporal and regional variation of fraternal resemblance in occupational status in the Netherlands before and during modernization. Fraternal resemblance is considered an excellent measure for the impact of the family on status attainment because it captures all aspects of family background shared by brothers. Our job competition model identified two important sources of fraternal resemblance: the value of family resources and inequality of family resources. According to modernization theory, modernization processes lowered fraternal resemblance by reducing the value of family resources (Kerr et al. 1960; Blau and Duncan 1967; Treiman 1970). Status maintenance theory disputes this shift from ascription to achievement and claims that families found ways to preserve the value of their resources (Bourdieu and Passeron [1977] 1990; Collins 1971; Grusky 1983). On the basis of arguments about inequality of family resources, dualism theory expects that fraternal resemblance increased in the early stages and decreased in later stages of modernization (Kuznets 1955; Nielsen 1994). Because our historical dataset covers the period in which the modernization processes actually took place, a thorough test of these opposing hypotheses became possible.

Our results showed that Dutch brothers resembled each other considerably: the statuses of two brothers correlated .57 in the first half of the nineteenth century. Fraternal resemblance decreased from around 1860 onward to reach .50 by the end of the century. Other studies already concluded that changes toward more open societies occur at a slow pace (Ganzeboom et al. 1989; Breen and Luijkx 2004; Knigge et al. 2014 / Chapter 2). This means that it is possible to detect such changes only if data include many observations over a long time period. It also means that it is worthwhile putting our findings in long-term perspective: if the decrease continued at the same rate, the correlation would be about .40 in 1950 and .33 in 1985. In fact, Sieben and De Graaf (2001) found that fraternal resemblance in occupational status was about .35 around 1950 and .17 around 1985 in the Netherlands. In comparison, they found that the fraternal resemblance in the United States around the same periods was, respectively, about .42 and .20, not very different from what Hauser and Mossel (1985) found for the United States. In other words, even though there are certainly data comparability issues, it seems that the decline in total family impact we observed continued or even accelerated in the twentieth century—at least in the Netherlands and possibly in Western modernizing societies in general.

The findings appear to support modernization theory and refute status maintenance theory, because the decrease in fraternal resemblance started right when modernization processes also started in the Netherlands. However, we wanted to rule out the possibility of a spurious relationship. Therefore, we developed measures on the municipal level for industrialization, educational expansion, urbanization, in-migration, mass transportation, and mass communication. With this more direct test of the modernization thesis we cannot conclude that these modernization processes were the driving forces behind the observed downward trend in fraternal resemblance. In fact, if anything, our results suggest that fraternal resemblance would have decreased even more *without* the six modernization processes. Communities with higher degrees of industrialization, educational expansion, in-migration, and mass communication display mainly higher levels of fraternal resemblance.

These higher levels of fraternal resemblance in more modern communities can be well understood in terms of dualism theory. Because the modernization processes in most Dutch communities were still in the early stages of development in our study period, they reflect the left-hand side of the expected inverted U-shape relation between modernization and fraternal resemblance. For two out of three processes that we observe at the later stages (i.e., industrialization and especially in-migration, but not urbanization) the effect on fraternal resemblance flattens out and reverses at later stages of development. We found that this inverted U-shaped pattern resulted because the modernization processes were accompanied by population shifts in the proportion of workers from the traditional sector (i.e., agriculture) to the modern sectors (i.e., industry and services). Dualism theory argues that these sectorial shifts cause inequality to trace an inverted U-shaped pattern “as an automatic numerical consequence” (Nielsen 1994, p. 658), while our job competition model shows that fraternal resemblance should follow suit because it is positively affected by inequality. Indeed, we found that the development of inequality was mainly driving the relationship between modernization and the observed patterns in fraternal resemblance.

The question remains, what made fraternal resemblance decrease over time, if not the modernization processes studied here? One possible explanation is that, while we focused on changes in the value and inequality of family resources, other possible sources of fraternal resemblance changed over time as well. For example, we simplified matters by not considering the influence of brothers on each other. Although a careful exploration of historical sources may offer arguments why the influence of brothers on each other may have changed such that they became less similar, at present we can think only of an

argument that would expect the opposite. We can imagine that, because it became more difficult for employers to predict future productivity on the basis of social origin, they relied more on hiring immediate family members of employees already proven to be productive, increasing fraternal resemblance.<sup>9</sup> Indeed, there is historical evidence that middle- and high-class jobs at the national railway, post office, and tax office were filled through a patronage system of referral to ensure loyal and trustworthy personnel (Dehing 1989).

We further simplified matters by assuming that children do not benefit systematically differently from the resources of their parents, although in reality parents may (aim to) divide resources unequally. Especially if resources are scarce, they are more often directed toward one child (Conley 2004). This is probably also the reason why in some parts of the Netherlands in the nineteenth century it was customary among farming families to transfer the entire farm to only one child without compensating the other children, but these traditional inheritance practices lost importance over time (De Haan 1994). Nonfarming families may also have started to divide resources more equally over time. The availability of contraceptives allowed parents to trade off quantity for quality of children. Indeed, for the contemporary United States, it has been shown that a lower sibship size relates to a higher sibling similarity in socio-economic status (Conley and Glauber 2008). Moreover, ‘modern’ family resources such as time and energy to socialize children may be easier to split equally than ‘traditional’ family resources such as a farm. In other words, also changes in the distribution of resources within families are likely to have increased rather than decreased fraternal resemblance over time—a claim worth testing in future research.

A different type of explanation for the decreasing trend in fraternal resemblance may be that modernization decreased the value of family resources, but through other processes than the ones we studied. Treiman (1970) argued that the modernization processes discussed in this article were accompanied by the dissemination of universalistic values, which stress that everybody is equally worthy and should be judged by the same standards. However, it could also be that universalistic values were adopted, for example, by employers, to a large extent *independently* of the modernization processes such as industrialization. Related to this, also the rise of democratic institutions may have lowered fraternal resemblance by giving people from different social strata more equal rights and opportunities (Nielsen 1994).

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<sup>9</sup> We are indebted to an anonymous reviewer for suggesting this idea.

We started out this article by saying that the extent to which status determines one's life course does not depend only on how unequal society is but also on how easy it is to get from one stratum to the other. At the end of this article, we conclude that the ease of changing strata depends itself on inequality: we found that social mobility decreased when inequality increased. On the basis of our job competition model, this should be true for any society and not just the Netherlands in the nineteenth century. If so, inequality can be seen as a double-edged sword: it not only creates larger differences between people but also makes it more difficult for people to be socially mobile.

# Chapter 4. Beyond the Parental Generation. The Influence of Grandfathers and Great-Grandfathers on Status Attainment\*

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**Abstract.** Studies on intergenerational social mobility usually examine to what extent the social positions of one generation determine the social positions of the next. This study investigates whether the persistence of inequality can be expected to stretch over *more than two* generations in the context of a Western modernizing society. It describes and explains the influence of grandfathers and great-grandfathers on the occupational status attainment of 119,662 men in the Netherlands during industrialization. It uses a multigenerational version of GENLIAS, a large-scale database containing information from digitized Dutch marriage certificates for the period 1812 to 1922. Multilevel regression models show that both a grandfather's and great-grandfather's status have an effect on the status attainment of men, after taking into account the influence of fathers and uncles. Whereas the influence of the father and uncles decreases over time, the influence of the grandfather and great-grandfather remains stable. The results further suggest that grandfathers influence their grandsons through contact, but also *without* being in contact with them. I conclude that, even though the gain in terms of "explained variance" from using a multigenerational model is moderate, leaving out the influence of the extended family considerably misrepresents the influence of the family on status attainment.

## 4.1 Introduction

In a fair and efficient society individuals are matched to occupations—and their accompanying privileges, such as status and wealth—based arguably on their talent and not on the family they were born into. Many stratification scholars have studied therefore to what extent occupational attainment is determined by family background. The vast majority of these studies look at how the social position of one generation is influenced by the social position of their parents (Breen and Jonsson 2005; Ganzeboom et al. 1991). However, lately, it has been argued that in order to fully understand the social reproduction of families it may be important for certain contexts to look beyond parents and to take the extended family into account (Mare 2011).

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\* This chapter is currently under review at an international journal.

There is a growing body of research examining whether the dominant Markovian parent-offspring approach is adequate, or whether it is necessary to adopt a multigenerational perspective in order to understand intergenerational social mobility. Nevertheless, the number of studies carried out is still very limited and restricted mostly to grandfathers (for some notable exceptions see Campbell and Lee 2003, 2008, 2011). For occupational social mobility some find direct net effects of grandparents (Allingham 1967; Goyder and Curtis 1977; Pohl and Soleilhavoup 1982; Beck 1983; Chan and Boliver 2013), while others report that grandparents play no part once the role of parents has been accounted for (Warren and Hauser 1997; Erola and Moisio 2006).

Because the results are both limited and mixed, it is far from clear how pervasive the influence of generations more remote than that of the parents is. Partly, this is a *descriptive* empirical problem: more studies need to be conducted to get a reliable picture. However, it is also an *explanatory* empirical problem: we need to test the mechanisms thought to underlie multigenerational effects in order to understand in what contexts we can expect such effects to be prominent. This article seeks to confront both problems by studying the influence of grandfathers and great-grandfathers on the occupational status attainment of men in the Netherlands in the second half of the nineteenth century and the beginning of the twentieth century.

Two different mechanisms have been proposed concerning how grandparents and great-grandparents can have an influence (over and above that of parents) on the social positions of their grandchildren/great-grandchildren. One involves the transfer of resources through socialization and requires contact between the influencing and influenced generation (Bengtson 2001). The other does not presuppose contact as it involves the transfer of durable resources, which are likely to still be there for subsequent generations to benefit from even if the original holder has passed away (Mare 2011).

However plausible these mechanisms may be, they have not so far been systematically tested. It is not easy to test the mechanisms as there are several complicating factors. Probably the most important is that there are few large-scale datasets covering more than two generations, and even fewer that *also* contain detailed information on, for example, contact between grandparents and grandchildren, or the level of durable resources in family lineages. Because the data I use overcome these problems to a large extent (although certainly not completely), this article makes substantial headway in testing the “contact mechanism” and the “durable resource mechanism”.



I analyze a large-scale database, GENLIAS, which contains digitized information from Dutch marriage certificates for the period 1812-1922 (a period in which just a small percentage of the population did not marry). These marriage records contain information on the occupations of those who married and of their parents. It is important to note that, where possible, the marriage certificates have been linked to the marriage certificates of parents for five out of 11 provinces. I study only men, as the status attainment of women was quite different (Bras 2002; Schulz 2013) and deserves a separate study. Nor do I include the families-in-law, as it is unlikely in the context studied that they were willing to invest resources in the groom *before* marriage (and thus before the measurement of occupational status). Altogether, I am able to apply multilevel sibling models to 43,242 paternal grandfathers, 64,062 of their sons (fathers and fathers' brothers), and 119,662 of their grandsons. For 25,433 men, I can even study the influence of 9,116 great-grandfathers. An advantage of multilevel models is that they allow one to study both conventional measures of family influence (father-son and grandfather-grandson correlations) and what are often regarded as more comprehensive measures of family influence (brother and cousin correlations) (Jencks et al. 1972).

The Netherlands during industrialization forms a very fruitful context to study multigenerational influence. First of all, although the Netherlands had its own peculiarities (such as an early developed service sector), it can be considered exemplary for other Western modernizing societies in many respects (including the modernization processes that took place). The present study is the first to provide empirical evidence on whether the conventional two-generation view is adequate to enable one to understand intergenerational mobility in the context of a modernizing Western society, or whether a multigenerational view seems warranted.

Furthermore, the effects of the two mechanisms mentioned can be separated to some extent because of the specific characteristics of this period. Durable resources are thought to have been especially relevant for attaining status in the nineteenth century, but decreasingly so due to modernization processes. This claim can be tested because for great-grandfathers contact was virtually impossible given the prevailing life expectancy. This means that if great-grandfathers had an influence, this must have been through durable resources. The contact-mechanism, on the other hand, may have become more important in this period because increasing life expectancy resulted in a longer period of shared lives between grandfathers and grandsons. Although I do not have a direct measure of contact, I can measure the *likelihood* of contact by looking at whether grandfathers lived near (in time and space) their grandsons.

One final contribution made by this study is that it is the first to test to what extent the influence of grandfathers is actually one of uncles. If uncles mediate most or part of the effect of the grandfather, this might warrant a shift from the current focus on grandparents to developing a theory on the role of uncles (and aunts) as well.

## 4.2 Theory

### 4.2.1 Influence of Grandfathers and Great-grandfathers on Status Attainment

#### *Influence through Contact*

It is often argued that parents influence the status attainment of their children through the transfer of resources, such as financial, cultural, human and social capital (Bourdieu and Passeron [1977] 1990; Blau and Duncan 1967). Grandparents and great-grandparents can influence the status attainment of their grandchildren/great-grandchildren in the same way by taking over or complementing the parents' role (Bengtson 2001). For example, grandparents can look after their grandchildren while parents work, or grandparents/great-grandparents can make a financial contribution to the cost of educating their grandchildren/great-grandchildren. In the Netherlands in the nineteenth century it was almost impossible for great-grandfathers to help raise their great-grandsons because the low life expectancy made contact between them unfeasible.

For grandfathers, it can be argued that they did not play a central role in the lives of their grandchildren either. Nuclear families were the standard, with an average household size of around 4.8 (Kok and Mandemakers 2010). Most families consisted of a married couple with or without children, and extended-family households were not very common.<sup>1</sup> Moreover, life expectancy was much lower than it is nowadays. Men born in 1820 who reached the age of 30, the age at which they were likely to have their first son (Van Poppel 2012), were expected to die at the age of 63.<sup>2</sup> This means that many children never knew their grandfathers, as the “average” grandfather would die before or soon after the birth of their grandchildren. Because of the limited frequency of extended

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<sup>1</sup> In the southeastern Netherlands stem families were more common, mostly among farming families, than in the rest of the country (in the eastern Netherlands stem families were found in combination with impartible inheritance). As a result, in the southeastern provinces (Drenthe, Overijssel, Gelderland, Limburg) c. 22% of children were born into extended-family households, compared to 12% in the northwestern provinces (South Holland, North Holland, Friesland, Groningen), and 17% in an intermediate region (Utrecht, Brabant, Zeeland) (Kok, Vandezande, and Mandemakers 2011).

<sup>2</sup> Source: Generation life tables (“*generatie-sterfjetafels*”) from Statistics Netherlands (CBS).

households and the low life expectancy, only around 9% of children were born into a household with at least one grandparent present (and by the age of 15 hardly any children lived with their grandparents anymore).

However, it is not unlikely that grandfathers had an impact on the status attainment of their grandsons through direct contact. First, although co-residency was generally not common, most grandparents lived in close geographical proximity to their grandchildren (Van Poppel 2012). Furthermore, there was much variation in life duration and the age at which people had their first child. For example, 40% of men born in 1820 who reached the age of 30 died at the age of 70, and 15% at the age of 80.<sup>3</sup> Therefore, for many grandchildren their lives *did* overlap with the lives of at least one grandparent. Post et al. (1997) estimate using genealogical data that around 75% of children aged 0-20 in the period 1850 to 1900 had at least one grandparent still alive (but fewer than 5% had all four grandparents still alive). Because of this possibility for contact, I expect to find the following:

*H1.* The occupational status of grandfathers positively influenced the occupational status attainment of men in the Netherlands during modernization.

Transferring resources through contact was difficult if grandparents died soon after—and impossible if they died before—their grandchildren were born. Therefore, I expect the opportunities for grandparents to influence their grandchildren through direct contact to be fewer the shorter the lives of grandparents and grandchildren overlapped.

*H2a.* The positive influence of a grandfather's occupational status on the occupational status of a grandson is lower the less their lives overlap.

If grandfathers live far away from their grandsons, it is also more difficult for them to have an influence through direct contact. Geographic distance formed a serious obstacle in the Netherlands in the nineteenth century, with the development of mass transportation and mass communication only just starting (Knippenberg and De Pater 2002). This leads to the following hypothesis.

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<sup>3</sup> *Ibid.*

*H2b.* The positive influence of a grandfather's occupational status on the occupational status of a grandson is lower the greater the geographic distance between them.

*Influence without Contact: Durable Resources*

Mare (2011) proposed several arguments as to how grandparents could influence the status attainment of their grandchildren without being in contact with them; we classify these under the heading "durable resource mechanism". To start, he argues that many resources relevant for attaining status are quite durable. Resources such as human and cultural capital, relatively important for educational attainment, can typically be transferred only as long as the holder is alive. However, resources such as financial and physical wealth (land and property for instance) are much less perishable. This means that they may still be there for future generations to benefit from, even if the intermediate generation did not benefit. Such durable resources are expected to have been relatively important in the Netherlands in the nineteenth century because a large share of the population (40.3% in 1849) was employed in agriculture (Smits et al. 2000) and educational opportunities were still limited (Mandemakers 1996). The proportion of students enrolled in secondary education was only one per 1,000 inhabitants around 1900 (Schulz 2013).

Further, Mare (2011) argues that social institutions, too, outlive individuals and may therefore be seen as potential "durable resources" that have an enduring multigenerational influence. Especially at the top and bottom of the hierarchy, social institutions could lead to extreme advantages and disadvantages. As an example of institutionalized advantage, he mentions the university legacy admission systems in the US, by which grandsons can enter a top university more easily if their grandfather graduated there. This system did not exist in the Netherlands, but the nobility system and the student fraternities ("student corpora") are examples of institutionalized advantage in the Dutch case. Moreover, it is highly possible that informal reputation mechanisms produced similar effects ("I knew your grandfather, he was a great man and I owe him much, therefore I will help you"). In the absence of diplomas to signal productivity, employers may rely more on the reputation of family lineages. Also, the reputation of successful grandfathers may serve as a role model for their grandchildren.

In conclusion, it is highly possible that grandfathers influenced their grandsons through durable resources, providing a second mechanism for *H1*. Similarly, great-grandfathers,

too, can be expected to have had an influence on their great-grandsons through durable resources, but for them this would have been the only possible mechanism.

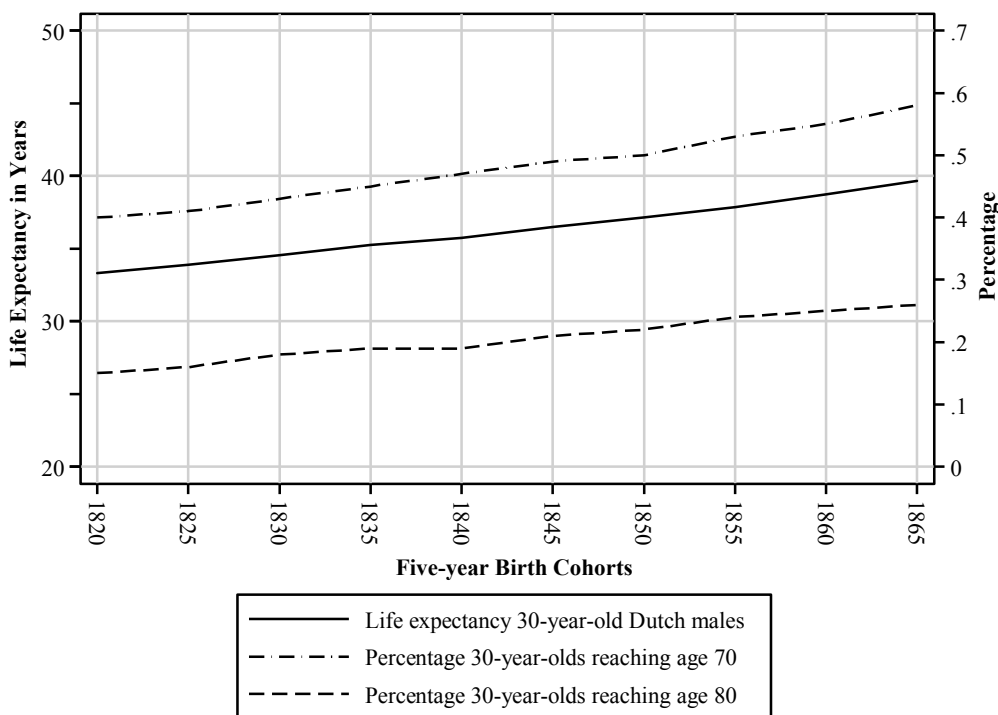
*H3.* The occupational status of great-grandfathers positively influenced the occupational status attainment of men in the Netherlands during modernization.

#### **4.2.2 Changes in the Influence of Grandfathers and Great-grandfathers over Time**

Many scholars have claimed that in Western societies in the past family background was much more important for attaining status than it is in contemporary societies. The argument is that modernization processes (such as industrialization, educational expansion, and mass communication) rendered ascriptive characteristics (roughly: family background) less decisive and achieved characteristics (roughly: educational attainment) more decisive in the status attainment process (Kerr et al. 1960; Blau and Duncan 1967; Treiman 1970). On the other hand, status maintenance theory argues that in modernized societies elites found alternative strategies to transmit status to the next generation, for example by ensuring that their children received a good education (Bourdieu and Passeron [1977] 1990; Collins 1971).

In the Netherlands, the modernization processes discussed by Treiman (1970) occurred in the second half of the nineteenth century. For example, an initial wave of industrialization in the form of mechanization of labor occurred around 1865, and a second, more significant, wave in the period 1895-1914 (De Jonge 1968; Van Zanden and Van Riel 2004). This caused shifts in the proportions of the labor force employed in agriculture, industry, and the service sector. In 1807, 43.1% of the total labor force was employed in agriculture, 26.2% in industry, and 30.8% in services; by 1909 these figures were 30.4%, 34.4%, and 35.4% respectively (Smits et al. 2000).

I found with colleagues, in line with modernization theory but not with status maintenance theory, that the influence of family background on the status attainment of men declined in the Netherlands in the second half of the nineteenth century, and was much higher overall than in contemporary societies (Knigge et al. 2014 / Chapter 2). Moreover, we show that family influence was less where communities were more modernized. If Dutch society did indeed become more open due to modernization, one would expect not only fathers to have had less influence but also grandfathers and great-grandfathers (and uncles), since a change from ascription to achievement meant that the extended family, too, would have been less of a help or a hindrance in attaining status.



**Figure 4.1** Life Expectancy of 30-year-old Dutch Males, and the Percentage of 30-year-old Dutch Males Reaching Ages 70 and 80 (5-year Birth Cohorts, 1820 to 1865)

Source: Generation life tables (“*generatie-sterftetafels*”) from Statistics Netherlands (CBS) and provided by Frans van Poppel

However, there is another development we must take into account before formulating hypotheses. There is evidence that the lives of grandfathers and grandsons overlapped more over time. Figure 4.1 shows that life expectancy at age 30 rose steadily, from 33 years for men born in 1820 to 37 years for men born in 1850.<sup>4</sup> Also, the percentage of 30-year-old males living at least another 40 years increased in the same period, from 40% to 50%. Although this evidence is far from conclusive, it suggests that the opportunities grandfathers had to influence their grandsons through contact increased over time. This would have counteracted the trend resulting from the lessened importance of (durable) family resources due to modernization. Since there is no convincing argument as to which of the opposing developments had the most impact on the influence of the grandfather, it

<sup>4</sup> Unfortunately, no earlier data are available, although *c.* 70% of the grandfathers in this study were born before 1820. Also, life expectancy is not the only factor determining the overlap in lives between generations; the age at which men have children is also relevant. Post et al. (1997) therefore use a different approach and study genealogical data. They conclude that overlap in lives increased mostly for children aged 0-20 from 1900 onwards (so basically after my period of observation). However, they point out that their approach, too, has several shortcomings.

seems appropriate to expect no change in grandfather influence over time. Because great-grandfathers were unable to influence through contact but only through durable resources, the influence of great-grandfathers is expected to have declined over time.

*H4.* The positive influence of a grandfather's occupational status on the occupational status of Dutch men remained stable during modernization.

*H5.* The positive influence of a great-grandfather's occupational status on the occupational status of Dutch men declined during modernization.

## 4.3 Methods

### 4.3.1 Data

I use the database GENLIAS (version 2007\_03), which contains digitized information from Dutch marriage certificates for the period 1812-1922. A marriage certificate typically states date and place of marriage; names, place of birth, age and occupation of the bridegroom and bride; and names and occupations of the couple's parents. For the provinces Groningen, Overijssel, Gelderland, Limburg, and Zeeland the marriage certificates have been linked to the marriage certificates of the parents. A computer algorithm matched the first and last names of the parents as stated on both certificates. To avoid wrong links, the computer algorithm used additional information such as the age of the bride and groom to ensure plausibility in terms of chronology (for more details, see Oosten 2008).

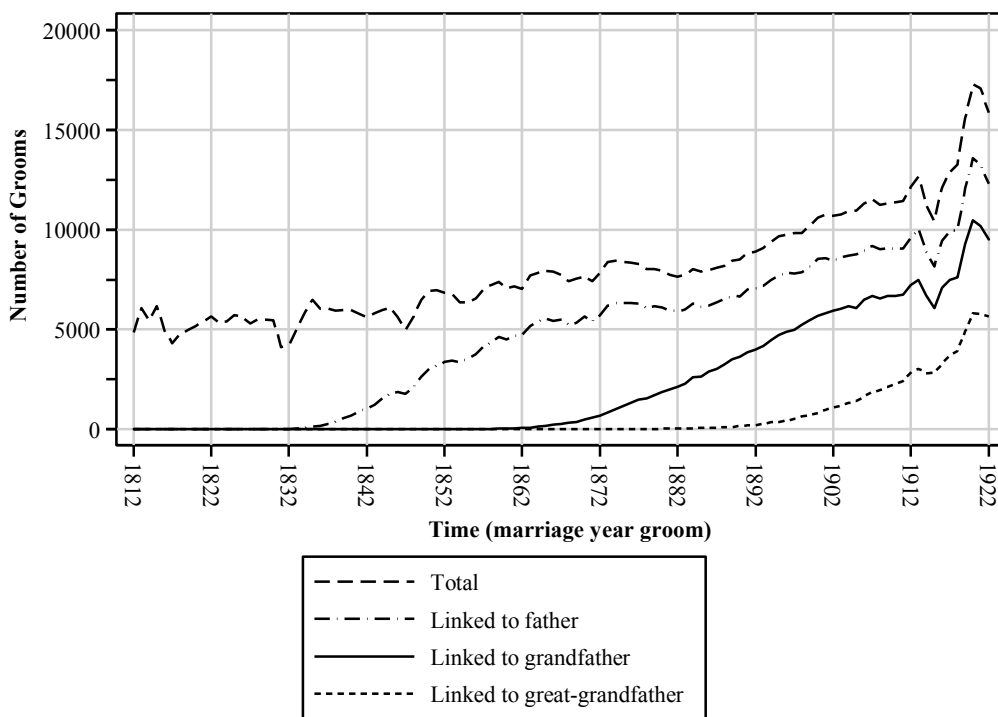
From this database I created a three- and four-generation version by matching the entries in which an individual is a groom in one and the father of the groom in another. Further filtering, and deleting cases with missing data (see next section), yields 43,242 grandfathers married between 1812 and 1881 on whose married sons and grandsons we have data. Put otherwise, in the case of 119,662 men married between 1854 and 1922 we know who their father and paternal grandfather is, as well as who their uncles (father's married brothers), brothers, and cousins are. For 25,443 grooms I can perform analyses that include 9,116 great-grandfathers.

#### *Selections and Missing Data*

As discussed in the introduction, I study neither women nor the families-in-law. Also, I include only men marrying for the first time, because I want to ensure each person

appears in the database only once, and because family influence might work differently when an individual marries for the second time. This results in a database of 952,587 grooms married between 1812 and 1922. The marriage certificates of 526,119 of these grooms could be linked to the marriage certificate of the father. In turn, in 248,777 of these cases the marriage certificate of the father could be linked to that of *his* father (the grandfather). In 67,964 of these cases we also know the great-grandfather.

There are several reasons why some of the marriage certificates cannot be linked. First, the fathers of grooms who married shortly after 1812 will certainly have married before 1812 and so will not be part of the database. None of the grooms who married before 1831 can be linked to their father. The same issue occurs of course in linking fathers' certificates to grandfathers' certificates (and for linking grandfathers to great-grandfathers). The earliest date for which I can link a groom (via the father) to his grandfather is when the groom married in 1854; and the earliest date for which I can link a groom to his great-grandfather is when the groom married in 1871. Few links could be made in the first few years after 1854 and 1871, and this should be kept in mind when interpreting the results (see Figure 4.2).



**Figure 4.2** Number of Grooms per Year



Second, individuals could be linked only within and between five out of 11 provinces, so grooms could not be linked where the father or grandfather/great-grandfather had married outside these five provinces. However, I do not expect the proportion that could not be linked for this reason to be very large, as I explain in the next section.

Third, variation in the spelling of names may result in failure to establish a link. The computer algorithm was designed to allow for minor variations in the spelling of names. However, a conservative approach was taken in this respect. This minimizes the number of wrong links, at the expense of not maximizing the number of total links. Finally, non-linkage may result from such things as errors in digitizing the certificates.

Cases cannot be analyzed when the certificates lack occupational data sufficient to assign a status score to grooms (in 1.44% of the cases in the three-generation dataset; in 1.14% of the cases in the four-generation dataset), to fathers (in 19.4%; 15.9%), grandfathers (in 23.6%; 21.3%), uncles (in 28.2%; 30.2%), and great-grandfathers (N.A.; 25.59%). List-wise deleting these cases (51.9%; 62.6%) results in the 119,662 and 25,443 grooms mentioned before.

#### *Reflection on Possible Selection Bias in the Data*

These data are truly extraordinary as they provide a rare opportunity to study multigenerational processes over an extensive period of time while covering a broad geographical area. Nevertheless, like most historical data, they have certain drawbacks. An obvious limitation of using marriage certificates is the exclusion of people who never married. This is less problematic than might be expected because marriage was common in the Netherlands in the nineteenth and early twentieth centuries: around 87% of all men born in 1800 and around 91% of all men born in 1900 married at some point (Ekamper et al. 2003). Furthermore, Engelen and Kok (2003) do not find many significant differences (in terms of family background, religion, region, birth cohort for instance) in the likelihood of men born between 1890 and 1909 remaining unmarried. Regarding social origin, they find only that the sons of the elite remained unmarried more often than sons from other social classes, and that the sons of skilled manual workers remained unmarried less often. Regarding the socioeconomic position of the individuals concerned, Schulz (2013) finds no significant difference in status between married and non-married Dutch men during the period she studied (1865 to 1930).

As records were linked within and between five out of 11 provinces, I lose grooms if they, their fathers, or paternal grandfathers migrated from the region; and I lose family

members if grooms, their fathers, or paternal grandfathers migrated to the region. Migrants are not a random selection as they tend to have a higher status, but I do not believe this will influence the results substantially, for two reasons. First, the number of people I miss due to migration is not very large. Census data show that in 1849 just 8% of people lived in a province other than the one in which they were born; the corresponding figures for 1899 and 1930 were 13% and 15% respectively (Knippenberg and De Pater 2002). Note further that the dataset does include those who migrated between the five provinces in the data, or who moved away after marrying. Second, I performed in Knigge et al. (2014) / Chapter 2 several checks on the same data and showed that the effect of family influence on status attainment changes hardly at all when including more or less information on migrants.

Finally, as is well known, marriage certificates frequently lack information on the father's occupation. Linking the data alleviates this problem because the marriage certificates of siblings can be used as sources of information on the father's occupation (for example, for fathers the problem is reduced by 40.7%: from 32.7% to 19.4% of cases). Still, because the problem affects grandfathers, great-grandfathers, and uncles as well, the combined number of missing cases is considerable. If a father's occupation is missing on his child's marriage certificate, the most likely reason is that the father was deceased, although there are other reasons such as migration or unemployment. Fortunately, in line with other studies (Zijdeman 2010; Maas et al. 2011), I find little difference between those with and those without information on the father's occupation. For example, occupational status differs less than one point on an 88-point scale (47.28 and 48.25 respectively), and the status correlation between brothers is also rather similar (0.51 and 0.54 respectively; see also Knigge et al. (2014) / Chapter 2). Moreover, the father-son correlation is not substantially different for those with and those without information on the grandfather's occupation (0.52 and 0.54 respectively).

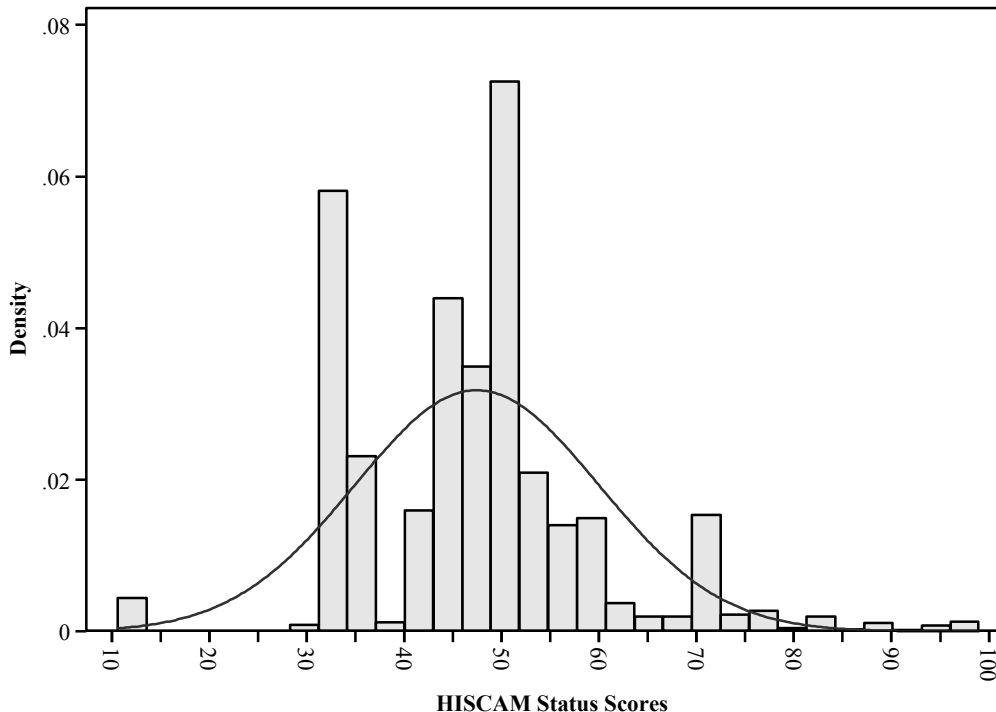
### **4.3.2 Measures**

#### *Dependent and Independent Variables*

Occupations have been coded using the Historical International Standard Classification of Occupations (Van Leeuwen et al. 2002). HISCO is the historical equivalent of the ILO's ISCO68. These occupational codes were subsequently mapped onto the HISCAM status scale (Lambert et al. 2013). This status scale uses the same technique as the contemporary CAMSIS status scales (Stewart et al. 1980). In theory, it runs from 1 to 99, but in practice it runs from 10.6 (servant) to 99 (judge for example). The *occupational status of the son*—the dependent variable—is based on the occupations stated on the marriage

certificate. Table 4.1 provides descriptive information on all variables (separately for the three- and four-generation datasets). Further, the histogram in Figure 4.3 gives more detail on the distribution of a groom's occupational status, showing that it approximates the normal distribution, but with a few spikes for frequent occupations such as “worker” (32.5) and “farmer” (50.7).

*Father's occupational status* is the average status of the occupations that he reported on his children's marriage certificates. The reliability of this group-averaged score can be calculated using the Spearman-Brown prediction formula (Winer et al. 1991, Appendix E) and is estimated by Stata's “loneway” command to be .875 for the average-sized family. This means that the intergenerational correlations will be slightly underestimated, but not much. The occupational status of a *great-grandfather*, a *grandfather*, and an *uncle* are similarly derived from their children's marriage certificates. As a groom may have more than one uncle, I subsequently took the mean of all married uncles. Moreover, to prevent losing cases, I substituted the father's occupational status for those who do not have an uncle (and adjusted for this in the analyses—see controls).



**Figure 4.3** Histogram of the Occupational Status of Dutch Men Married between 1854 and 1922

*Time* is operationalized as the marriage year of the grandson/great-grandson. I rescaled by subtracting the first year (1854 for analyses without the great-grandfather; 1871 for analyses with the great-grandfather) and then dividing by 10.

To approximate whether a grandfather influenced a grandson directly through contact, I use two indicators for the likelihood that they were in contact. *Temporal distance* is given by the age difference between grandfather and grandson. I assume that the smaller the age difference, the greater the chance that grandfather and grandson had overlapping lives. *Geographical distance* is given by the distance in kilometers between the grandfather's place of marriage and the grandson's place of marriage. Because this measure would be right-tailed, I have taken the natural log (after adding 1). I assume that the smaller the geographical distance between grandfather and grandson, the greater the chance that they were in contact.

#### *Control Variables*

I include several control variables that we know might be confounding factors (e.g. Bras et al. 2010). At the individual level these are the *age at marriage* of the groom as found on his marriage certificate, and *birth order*, the birth rank of a groom among his married siblings. At the family level, this is *sibship size*, which is approximated by the number of married full brothers and sisters; and a dummy representing whether the *father* is a *farmer* (1) or not (0) (cf. Erikson and Goldthorpe 1992) (a father is labeled a farmer if more than half of his children providing information about their father's occupation state that he is a farmer—HISCO codes 61110 to 61290). At the extended-family level, this is the *number of married uncles and aunts*, and whether the *grandfather/great-grandfather* was a *farmer* or not (constructed in the same way as for the father). Finally, to correct for substituting "uncles' status" with "father's status" for grooms without any uncles, I include a dummy representing whether a groom has at least one uncle (0) or *no uncles* (1). More importantly, I include an interaction of this dummy with the variable status of uncles to ensure the coefficient of status of uncles reflects only the effect for those who have an uncle (one would expect the effect for those without uncles to be insignificant). For the same reason, a three-way interaction with the dummy is included if the status of uncles is interacted with time in the analysis.<sup>5</sup>

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<sup>5</sup> As a robustness check, I also performed the analyses without those who have no uncles. The results are not substantially different.

**Table 4.1** Descriptives

	Analyses without great-grandfathers				Analyses with great-grandfathers			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
<b>Variables</b>								
Occupational status son	47.16	12.26	10.60	99.00	47.64	12.51	10.60	99.00
Occupational status father	46.70	9.89	10.60	99.00	46.90	10.29	10.60	99.00
Occupational status grandfather	45.19	9.11	10.60	99.00	44.90	9.06	10.60	99.00
Occupational status great-grandfather					44.56	8.69	10.60	98.40
Average occupational status uncles	46.81	9.67	10.60	99.00	47.04	10.06	10.60	99.00
Time	5.00	1.31	0.00	6.80	4.19	0.77	0.00	5.10
Temporal distance	66.84	9.50	38.00	125.00	62.19	7.64	38.00	95.00
Geographical distance (ln)	1.55	1.51	0.00	6.48	1.50	1.45	0.00	5.74
<b>Control variables</b>								
Age at marriage	26.48	4.72	16.00	69.00	25.19	3.79	16.00	55.00
Birth order	2.58	1.67	1.00	14.00	2.41	1.59	1.00	13.00
Sibship size	4.19	2.09	1.00	14.00	3.87	2.05	1.00	13.00
Father farmer	0.30		0.00	1.00	0.26		0.00	1.00
Number of uncles and aunts	3.33	2.17	0.00	14.00	3.33	2.20	0.00	12.00
Grandfather farmer	0.31		0.00	1.00	0.29		0.00	1.00
Having no uncles	0.30		0.00	1.00	0.30		0.00	1.00
Great-grandfather farmer					.31		0.00	1.00
Number of individuals			119,662				25,443	
Number of fathers			64,062				14,547	
Number of grandfathers			43,242				10,142	
Number of great-grandfathers							9,116	
Number of communities			16,142				5,343	

### 4.3.3 Analytic Strategy

I perform multilevel linear regression with four hierarchical levels (individuals, fathers, grandfathers, and communities)<sup>6</sup> using the package that runs MLwiN from within Stata (Leckie and Charlton 2013; Rasbash et al. 2013). I include communities as a fourth level because individuals growing up in the same time period and the same geographical area tend to be more similar to one another than to others. To keep the multilevel structure hierarchical, the communities are defined as the marriage year and marriage place of the grandfather.

To describe how large the influence of the family and extended family is on occupational status attainment, I start by estimating the “intercept-only” model

$$Y_{ijkl} = \beta_{0000} + c_{0l} + g_{0kl} + f_{0jkl} + s_{0ijkl}, \quad (M1)$$

where  $Y_{ijkl}$  is the occupational status of individual  $i$  with father  $j$  and grandfather  $k$  from community  $l$ ,  $\beta_{0000}$  the population mean status,  $c_{0l} \sim (0, \sigma_{c_{0l}}^2)$  the error term at the community level,  $g_{0kl} \sim (0, \sigma_{g_{0kl}}^2)$  the error term at the grandfather level,  $f_{0jkl} \sim (0, \sigma_{f_{0jkl}}^2)$  the error term at the father level, and  $s_{0ijkl} \sim (0, \sigma_{s_{0ijkl}}^2)$  the error term at the individual level (Snijders and Bosker 1999).<sup>7</sup> The proportion of variance at the father, grandfather, and community levels is given by

$$\rho_{c+g+f} = \frac{\sigma_{c_{0l}}^2 + \sigma_{g_{0kl}}^2 + \sigma_{f_{0jkl}}^2}{\sigma_{c_{0l}}^2 + \sigma_{g_{0kl}}^2 + \sigma_{f_{0jkl}}^2 + \sigma_{s_{0ijkl}}^2}, \quad (1)$$

which is the expected correlation between two randomly selected brothers. This brother correlation is often considered a comprehensive measure of family impact because it captures all the aspects of family background that siblings share (Björklund et al. 2009), including not only all—measurable and non-measurable—shared family resources, but also, for example, shared neighborhood characteristics, and brothers’ influence on each other (Jencks et al. 1972). As cousins share the same grandfather and the same community (but not the same father), the expected correlation between two randomly selected cousins is given by

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<sup>6</sup> A fifth level (great-grandfather level) is added when we analyze great-grandfathers.

<sup>7</sup> Multilevel models assume that the error terms are normally distributed. Although the residual errors deviate somewhat from normality, given the findings of Maas and Hox (2004), who show that the estimates of fixed and random effects, as well as the standard errors of the fixed effects, are robust against violations of the normality assumption, I do not expect serious problems.

$$\rho_{c+g} = \frac{\sigma_{c_{ol}}^2 + \sigma_{g_{okl}}^2}{\sigma_{c_{ol}}^2 + \sigma_{g_{okl}}^2 + \sigma_{f_{ojkl}}^2 + \sigma_{s_{ojkl}}^2}. \quad (2)$$

The observed values for these measures can be compared with what would be expected if intergenerational status transmission followed a Markovian pattern (i.e. one generation was directly influenced only by the previous generation and not by more remote generations).

Another way to assess whether a two-generation model adequately represents family influence is to add status measures of the (extended) family. In Model 2

$$Y_{ijkl} = \beta_{0000} + \beta_{0100}FSTAT_j + c_{ol} + g_{okl} + f_{ojkl} + s_{ojkl}, \quad (M2)$$

the regression coefficient  $\beta_{0100}$  shows to what extent the occupational status of the father contributes to attaining status. I subsequently add the status of the grandfather ( $+\beta_{0010}GSTAT_k$ ) in Model 3 and the average status of uncles ( $+\beta_{0200}USTAT_j$ ) in Model 4 to see if they have an effect over and above that of the father (H1).<sup>8</sup> Controls are added in Model 5. Model 6 shows how the three family effects change over time (H4) by including interactions with time ( $+\beta_{1100}FSTAT_{jkl}TIME_{ijkl} + \beta_{1010}GSTAT_{kl}TIME_{ijkl} + \beta_{1200}USTAT_{jkl}TIME_{ijkl}$ ).

To test the contact mechanism, I add the interactions of temporal distance (H2a) and geographical distance (H2b) with the grandfather's status in Model 7 ( $+\beta_{2010}GSTAT_{kl}TDIS_{ijkl} + \beta_{3010}GSTAT_{kl}GDIS_{ijkl}$ ).

Finally, to test the durable resource mechanism, I analyze the subset of cases that can be linked to their great-grandfather. I start in Model 8 by estimating an “intercept-only” model similar to Model 1, except that there is now an additional great-grandfather level  $h_{olm} \sim (0, \sigma_{h_{olm}}^2)$ , and—to keep a hierarchical structure—the community level is defined as the marriage year and the place of the great-grandfather instead of the grandfather. Model 9 includes controls and the status measures of father, grandfather, and uncles. Model 10 includes the status of the great-grandfather to see whether he has an additional influence (H3), and Model 11 tests whether this influence declines over time, as expected (H5).

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<sup>8</sup> To disentangle direct grandfather effects from indirect effects through the intermediate generation, I control, like most studies, for the father's status and additionally (unlike most studies) for the uncles' status. However, a concern in the literature is that such controls are not sufficient and that grandparental measures therefore simply reflect imperfectly measured parental effects (Chan and Boliver 2013; Clark 2014). I consider this further in my discussion below.

## 4.4 Results

### 4.4.1 Influence of Father, Grandfather, and Uncles on Occupational Status Attainment

#### *Family Influence: Status Resemblance of Brothers and Cousins*

Model 1 in Table 4.2 shows that for the Netherlands in the second half of the nineteenth and the early twentieth century the status resemblance of brothers, the comprehensive measure for family impact, is  $\rho_{c+g+f} = 0.502$  (Eq. 1).<sup>9</sup> Also, male cousins are rather similar in status ( $\rho_{c+g} = 0.321$ ; Eq. 2), even though they are much more “remote” family than brothers. Even the statuses of individuals not related by blood but whose grandfather married in the same community are somewhat correlated ( $\rho_c = 0.084$ ). These results are not congruent with the Markovian model where individuals are influenced only by their parents. A correlation between the status of father and son of 0.7 would produce the observed fraternal resemblance of about 0.49 ( $0.7 \times 0.7$ ). In a Markovian world, the expected correlation between the statuses of grandfather and grandson would then also be 0.49, and that of cousins would be 0.24 ( $0.49 \times 0.49$ ). However, the latter is much lower than the observed correlation between cousins (0.321). An explanation for this could be that the process of status attainment is influenced not only the parents but also by the grandparents.<sup>10</sup>

#### *Family Influence: Status Measures of the (Extended) Family*

Model 2 shows that men profit a lot from having a father with a high status: if father A has 10 status points more than father B, the son of father A is expected to have about 6.4 status points more than the son of father B ( $b_{0100} = 0.640$ ;  $p < 0.001$ ). By including the father’s occupational status, we can understand much of the impact that the family has. The variance that brothers share ( $\sigma_{c_{0l}}^2 + \sigma_{g_{0kl}}^2 + \sigma_{f_{0jkl}}^2$ ) is reduced from 76.6 in Model 1 to 32.5 in Model 2, a reduction of 57.6%. The largest proportions of explained variance are at the grandfather (76.8%) and community levels (64.6%), indicating compositional effects: communities and grandfathers tend to produce fathers with similar status.

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<sup>9</sup> This is much higher than in contemporary societies (cf. Hauser and Mossel 1985; Sieben and De Graaf 2001).

<sup>10</sup> Other possible explanations are that cousins influence one another directly, or that uncles influence their nephews.



**Table 4.2** Influence of Occupational Status of Fathers, Grandfathers, and Uncles on Occupational Status of Men Married in the Netherlands between 1854 and 1922

	Model 1	Model 2	Model 3	Model 4
Fixed Part <sup>a</sup>				
Intercept	47.300*** (0.058)	47.178*** (0.042)	47.188*** (0.041)	47.191*** (0.041)
Status father <sup>b</sup>		0.640*** (0.004)	0.564*** (0.004)	0.520*** (0.004)
Status grandfather <sup>b</sup>			0.177*** (0.005)	0.143*** (0.005)
Status uncles (average) <sup>b</sup>				0.105*** (0.005)
Random Intercepts				
$\sigma_{c_{ol}}^2$ (Community level)	12.796*** (0.570)	4.530*** (0.282)	4.208*** (0.270)	3.936*** (0.265)
$\sigma_{g_{okl}}^2$ (Grandfather level)	36.268*** (0.851)	8.423*** (0.528)	8.202*** (0.514)	8.475*** (0.511)
$\sigma_{f_{ojkl}}^2$ (Father level)	27.534*** (0.716)	19.539*** (0.594)	18.228*** (0.580)	17.646*** (0.575)
$\sigma_{s_{oijkl}}^2$ (Individual level)	76.119*** (0.445)	75.678*** (0.433)	75.662*** (0.432)	75.631*** (0.432)

<sup>a</sup> Standard errors in parentheses.

<sup>b</sup> Centered around the mean.

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

Based on Model 3 I conclude that grandfathers have an influence on the status attainment of men over and above that of fathers ( $b_{0010} = 0.177$ ,  $p < 0.001$ ). By including the grandfather's occupational status, the effect of the father is reduced somewhat from 0.640 in Model 2 to 0.564 in Model 3. In other words, part of the effect that we attributed to the father is actually an effect of the grandfather. The net benefits of having a grandfather with a high status are about one-third of the benefits of having a father with a high status. Although the effect of the grandfather is substantial, it does not help us explain much better the variation in status attainment: in Model 3 we explain 60% of the variance shared by brothers, only 2.4% more than in Model 2. One reason, as we saw above, is that if we omit the occupational status of the grandfather the father assumes part of the effect of the grandfather.

In the next step, I include the average status of the father's brothers to examine whether grandfathers still have a net effect after the inclusion of uncles. Model 4 shows that the effect of the grandfather's occupational status declines from 0.177 to 0.143 but remains significant ( $p < 0.001$ ). This means that, in line with H1, grandfathers have a direct influence on the status attainment of their grandsons. It also means that 19.2% of the grandfather effect found before (in Model 4) is an indirect effect: grandfathers influence their own sons (i.e., sons other than the father), who in turn influence their nephews. The average status of the uncles has a significant positive effect ( $b_{0200} = 0.105$ ,  $p < 0.001$ ) that is about one-fifth of the father's effect. Again the increase in explained shared variance is slight, only 0.8%. The effects of the extended family remain after adding controls in Model 5 (Table 4.3: if anything, the effects increase).

In conclusion, leaving out the grandfather's and uncles' occupational status would overestimate the effect of the father by 23.1% (0.640 instead of 0.520), and if we were to base statements about the influence of the family solely on the occupational status of the father, as is often done, we would substantially *underestimate* the family influence compared to statements based also on the occupational status of the extended family. An additional one status point for everybody in the extended family would have a combined effect of  $(0.520 + 0.143 + 0.105) = 0.768$ , which is 20% higher than the family effect in the parent-offspring model (0.640). Thus, although men benefit most from having a father with a high status, the status of their grandfather and uncles substantially helps (or hinders) their own social position too.

#### *Influence of the (Extended) Family over Time*

In line with the modernization thesis and previous findings (see H3), the effect of the father decreased during the nineteenth and early twentieth centuries ( $b_{1100} = -0.014$  per 10 years;  $p < 0.001$ ; see Model 6 in Table 4.3). A new finding, again consistent with modernization theory, is that the effect of uncles, too, decreased during modernization ( $b_{1200} = -0.012$  per 10 years;  $p < 0.01$ ). I expected that grandfathers would have been able to retain their influence: by expanding their role in the lives of their grandsons (as life expectancy increased), they compensated for the development towards a more meritocratic society. Indeed, the effect of the grandfather did not decrease but remained constant ( $b_{1010} = -0.000$ , n.s.). Figure 4.4 graphs the changes in the (extended) family effects. The influence of the father's occupational status is about 0.6 for men who married in 1854 and about 0.5 for men who married in 1922, a decrease of 16.7% in 67 years. The influence of the occupational status of uncles became almost half (0.09) of what it was

(0.17). If we add up the effect of the father, grandfather, and uncles, the family influence decreased 18.3%, from 0.93 in 1854 to 0.76 in 1922.<sup>11</sup>

**Table 4.3** Influence of Occupational Status of Extended Family on Occupational Status of Men Married in the Netherlands between 1854 and 1922 Further Specified

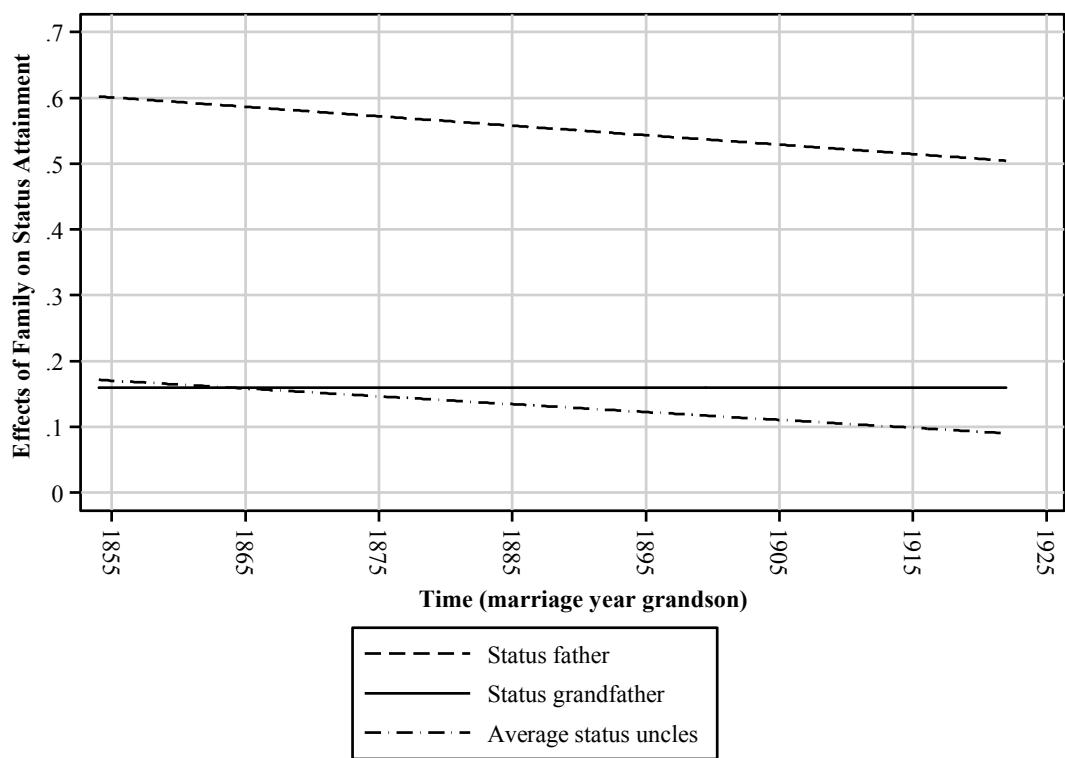
	Model 5	Model 6	Model 7
<b>Fixed Part<sup>a</sup></b>			
Intercept	43.619*** (0.152)	43.664*** (0.152)	42.884*** (0.160)
Status father	0.529*** (0.005)	0.602*** (0.018)	0.597*** (0.018)
× time		-0.014*** (0.003)	-0.015*** (0.003)
Status grandfather <sup>b</sup>	0.162*** (0.005)	0.160*** (0.017)	0.165*** (0.018)
× time		-0.000 (0.003)	0.002 (0.003)
× temp dis			-0.001* (0.000)
× geo dis			-0.011*** (0.002)
Status uncles (average) <sup>b</sup>	0.111*** (0.005)	0.172*** (0.019)	0.170*** (0.019)
× time		-0.012** (0.004)	-0.012*** (0.004)
× no uncles	-0.055*** (0.008)	-0.130*** (0.029)	-0.126*** (0.028)
× time × no uncles		0.015** (0.005)	0.014* (0.005)
Time	0.852*** (0.028)	0.846*** (0.028)	0.800*** (0.029)
Temporal distance <sup>b</sup>			0.028*** (0.004)
Geographic distance (ln)			0.611*** (0.021)
No uncles	0.284** (0.092)	0.272** (0.092)	0.287** (0.092)
No. of uncles and aunts <sup>b</sup>	-0.046* (0.020)	-0.048* (0.020)	-0.064** (0.020)
Grandfather farmer	-0.737*** (0.096)	-0.718*** (0.096)	-0.736*** (0.096)
Sibship size <sup>b</sup>	-0.476*** (0.020)	-0.477*** (0.020)	-0.439*** (0.020)
Father farmer	-2.174*** (0.091)	-2.196*** (0.091)	-2.027*** (0.091)
Age at marriage <sup>b</sup>	0.186*** (0.007)	0.187*** (0.007)	0.179*** (0.007)
Birth order <sup>b</sup>	0.311*** (0.022)	0.308*** (0.022)	0.214*** (0.024)
<b>Random Part</b>			
$\sigma_{cot}^2$ (Community level)	2.478*** (0.227)	2.458*** (0.227)	2.813*** (0.232)
$\sigma_{gokl}^2$ (Grandfather level)	7.708*** (0.486)	7.710*** (0.486)	7.523*** (0.481)
$\sigma_{fojkl}^2$ (Father level)	16.899*** (0.555)	16.882*** (0.555)	16.559*** (0.550)
$\sigma_{soijkl}^2$ (Individual level)	74.119*** (0.422)	74.093*** (0.422)	73.557*** (0.419)

<sup>a</sup> Standard errors in parentheses.

<sup>b</sup> Centered around the mean.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

<sup>11</sup> I also looked at how family influence changes over time based on a two-generation model (model not shown). The effect of the father's status is estimated to have decreased from 0.75 in 1854 to 0.60 in 1922. This 20.0% decrease is not much different from the 18.3% decrease found for the extended family model.

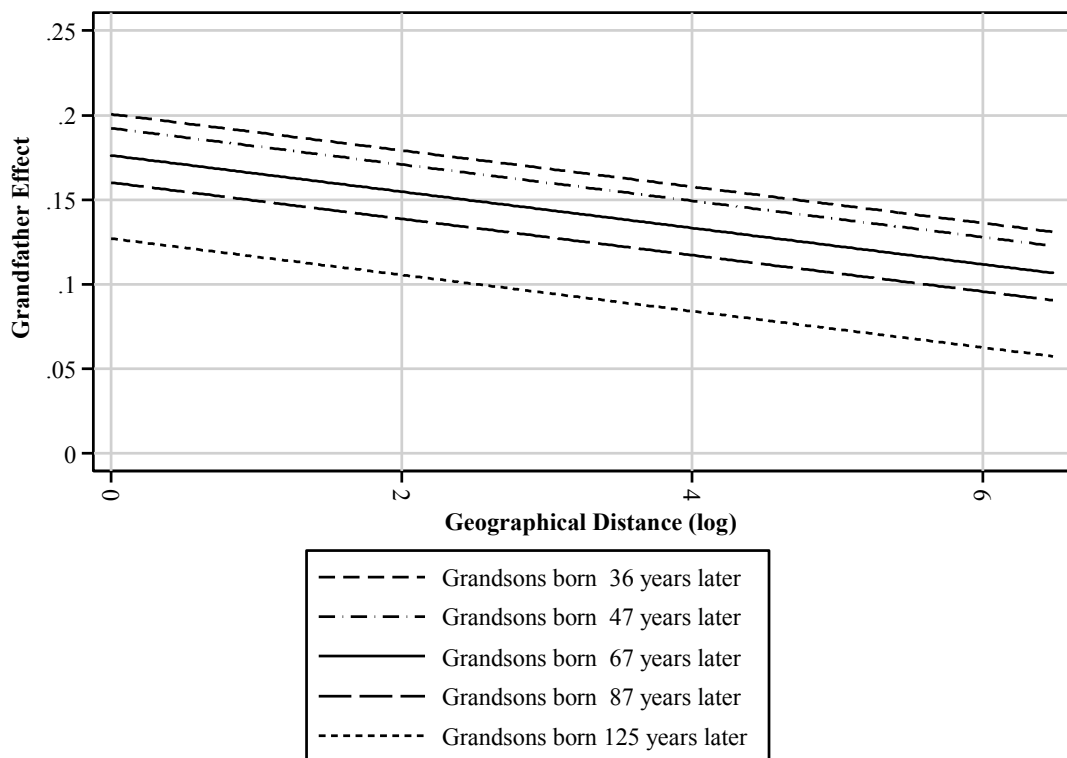


**Figure 4.4** Influence of Status of Fathers, Grandfathers, and Uncles over Time

**4.4.2 Multigenerational Influence through Direct Contact**

How did grandfathers influence the status attainment of their grandsons? The most obvious mechanism is through direct contact, by which resources can be passed on directly. I predicted that if this mechanism was at work, the grandfather effect would decline the less likely direct contact between the grandfather and his grandson(s) was, namely when the temporal (H2a) and geographical distance (H2b) between them increased. Model 7 supports both these predictions: the grandfather effect becomes smaller with increasing temporal distance ( $b_{2010} = -0.001$ ;  $p < 0.05$ ) and geographical distance ( $b_{3010} = -0.011$ ;  $p < 0.001$ ). In Figure 4.5 I plotted the grandfather effect against geographic distance (for those married in 1904—the mean marriage year). I did this for five different values of temporal distance, namely the minimum value (grandson born 36 years after his grandfather), two standard deviations below average (born about 47 years later), average (67 years), two standard deviations above average (87 years), and the maximum value (125 years). The graph shows that if the temporal distance increases, the predicted grandfather effect starts to move towards zero, but without ever becoming zero. With respect to geographical distance, the graph shows that the grandfather effect is about

0.04 (26.7%) higher for those grandfathers and grandsons who married in the same municipality (value 0 in the graph) than for those who married about 50 kilometers apart (*c.* value 4 in the graph; 95% of the cases married within 50 kilometers of each other). Taken together, the grandfather effect is predicted to be 0.20 for those most likely to be in contact (temporal distance = 36 years; geographical distance = 0 km), and around 0.06 for those for whom it was practically impossible to have been in contact (temporal distance = 125; geographical distance =  $e^6 \approx 400$  km). This large difference is evidence that in the Netherlands in the nineteenth century grandfathers influenced the status attainment of their grandsons through direct contact. The fact that the effect never becomes zero may indicate that grandfathers can also have an influence without necessarily being in direct contact with their grandsons.



**Figure 4.5** Influence of Status of Grandfathers by Temporal and Geographical Distance

#### 4.4.3 Multigenerational Influence without Contact: The Influence of Great-grandfathers

To further examine the idea that one generation can influence another without there necessarily being direct contact, I test for a subset of the data whether great-grandfathers have an influence (as it was more or less impossible for them to have been in contact with their great-grandchildren). As those who can be linked to their great-grandfather may form a special selection, I first check whether results for the subset differ in any way from the results presented for all cases. Model 8 in Table 4.4 shows that the brother correlation is virtually the same ( $\rho_{c+h+g+f} = 0.503$ ) as that found in Model 1 ( $\rho_{c+g+f} = 0.502$ ). Also the (extended) family effects are of the same order (compare Model 9 with Model 5). This gives me confidence that the results presented next are not biased by the selection of those who could be linked to great-grandfathers.

In Model 10 we see that, in line with H3, great-grandfathers have a significant positive effect ( $b = 0.092$ ,  $p < 0.001$ ) on status attainment, independent of fathers, grandfathers, and uncles. This supports the idea that a certain generation may influence subsequent generations “well beyond the grave” because durable resources and certain institutions do not cease to exist after a generation passes away. If great-grandfathers are able to influence their great-grandchildren without being in contact, grandfathers, too, must be able to influence their grandsons without contact. Furthermore, Model 8 shows that the status resemblance of second cousins, i.e. those sharing the same great-grandfather but a different grandfather, is  $\rho_{c+h} = 0.196$ . This is 66.1% higher than the expected correlation between second cousins if the transfer of status were to follow a two-generation, Markovian process:  $0.7^3 \times 0.7^3 = 0.118$  ( $0.7^3$  is the expected correlation between great-grandson and great-grandfather given a father-son correlation of 0.7, which is deduced from the observed correlation between brothers:  $0.7 \times 0.7 \approx 0.5$ ).

I expected that the importance of durable resources and institutions that promote multigenerational influences would have declined with modernization. Therefore, I predicted that the possibility for great-grandfathers to influence their great-grandchildren also decreased as modernization proceeded (H5). Although I find that the great-grandfather effect diminished, this change is not significant ( $b = -0.008$ , n.s.; see Model 11). This could mean that influence without contact did not lose importance in the period studied, but alternatively that the period of observation is too short (see Figure 4.2), as the literature suggests fairly long periods are necessary in order to detect trends in social mobility (Ganzeboom et al. 1989; Breen and Luijkx 2004).

**Table 4.4** Influence of Occupational Status of Great-grandfather on Occupational Status of Men Married in the Netherlands between 1871 and 1922

	Model 8	Model 9	Model 10	Model 11
<b>Fixed Part<sup>a</sup></b>				
Intercept	48.087*** (0.119)	44.282*** (0.472)	44.387*** (0.471)	44.378*** (0.472)
Status Father <sup>b</sup>		0.511*** (0.010)	0.506*** (0.010)	0.506*** (0.010)
Status Grandfather <sup>b</sup>		0.192*** (0.010)	0.158*** (0.011)	0.158*** (0.011)
Status Uncles (av) <sup>b</sup>		0.096*** (0.010)	0.089*** (0.010)	0.089*** (0.010)
... × no uncles		-0.052** (0.017)	-0.051** (0.016)	-0.051** (0.016)
Status Great-Grandfather <sup>b</sup>			0.092*** (0.011)	0.128** (0.044)
... × time				-0.008 (0.010)
Time		0.997*** (0.108)	1.013*** (0.108)	1.015*** (0.108)
Great-grandfather farmer			-0.742*** (0.217)	-0.740*** (0.217)
No uncles		0.348 (0.203)	0.324 (0.203)	0.325 (0.203)
No. of uncles and aunts <sup>b</sup>		-0.105* (0.044)	-0.101* (0.044)	-0.101* (0.044)
Grandfather farmer		-1.012*** (0.212)	-0.797*** (0.233)	-0.795*** (0.233)
Sibship size <sup>b</sup>		-0.538*** (0.050)	-0.529*** (0.050)	-0.528*** (0.050)
Father farmer		-2.718*** (0.205)	-2.681*** (0.206)	-2.685*** (0.206)
Age at marriage <sup>b</sup>		0.317*** (0.019)	0.313*** (0.019)	0.313*** (0.019)
Birth order <sup>b</sup>		0.268*** (0.055)	0.263*** (0.055)	0.261*** (0.055)
<b>Random Part</b>				
$\sigma_{com}^2$ (Community Level)	14.563*** (1.573)	3.578*** (0.709)	3.267*** (0.658)	3.257*** (0.658)
$\sigma_{h_{0lm}}^2$ (Great-Grandfather Level)	16.762*** (3.173)	0.104 (1.744)	0.000 (0.000)	0.000 (0.000)
$\sigma_{g_{0klm}}^2$ (Grandfather Level)	19.830*** (3.156)	8.349*** (1.931)	8.262*** (1.192)	8.258*** (1.192)
$\sigma_{f_{0jklm}}^2$ (Father Level)	29.010*** (1.687)	16.502*** (1.293)	16.552*** (1.292)	16.572*** (1.292)
$\sigma_{s_{0ijklm}}^2$ (Individual Level)	79.322*** (1.044)	77.029*** (0.982)	77.031*** (0.982)	77.022*** (0.982)

<sup>a</sup> Standard errors in parentheses.

<sup>b</sup> Centered around the mean.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

## 4.5 Conclusions and Discussion

Studies in the field of intergenerational social mobility usually take a two-generation approach: the influence of the family on status attainment is equated with the influence of the parents. The first aim of this article was to study whether this assumption is justified in the context of a modernizing Western society. More specifically, I studied whether taking a multigenerational perspective by including grandfathers and great-grandfathers leads to a more accurate understanding of the occupational status attainment process of Dutch men who married between 1854 and 1922.

I conclude that a parent-offspring perspective is too narrow and misrepresents the impact of family background on the Dutch status attainment process during modernization. I base this conclusion on the finding that grandfather's and great-grandfather's occupational status have a substantial influence on the status attainment of their grandsons (independent of fathers and uncles), and on the finding that the status correlation between (second) cousins is higher than would be expected had family influence been limited only to that of parents. The association between the status of father and son—sometimes referred to as the intergenerational status correlation / elasticity—is often used to compare societies in terms of their openness (Ganzeboom et al. 1991; see e.g. Björklund and Jäntti 2000; Yaish and Andersen 2012). The multigenerational model shows that this two-generational measure underestimates the influence of (extended) family background in the Netherlands during modernization. However, in terms of predicting an individual's status (“explained variance”) the gain from a multigenerational model is moderate.

The second aim of this article was to gain more insight into the operation of multigenerational influence. Two important sets of arguments have been proposed in the literature: influence through contact, and influence without contact through durable resources and institutions. I found evidence suggesting that both mechanisms are at work. On the one hand, the grandfather influence was stronger the greater the likelihood of contact between grandfather and grandson. On the other hand, a grandfather effect remained even if it was highly unlikely for a grandfather to have been in contact with his grandson. Moreover, since contact was virtually impossible for great-grandfathers, I see their effect as further support for Mare's (2011) claim that multigenerational influence does not necessarily require contact: some privileges may endure even after the original holder has passed away.



The Netherlands modernized rapidly after 1850. Treiman (1970) and other modernization theorists claim that societies became more open because of these modernization processes. Therefore, durable resources were expected to have lost importance over time as a mechanism for multigenerational influence: in a more meritocratic society status-maintaining institutions are likely to break down, and durable resources (physical capital for instance) are likely to lose ground to more perishable resources (human capital for example). In line with this predicted change from ascription to achievement, I found that the influence of fathers, uncles, and great-grandfathers on status attainment decreased over time (although the latter was not significant).

In the same period, life expectancy increased in the Netherlands. Therefore, in the case of grandfathers, the contact mechanism was expected to have gained importance over time because contact between grandparents and grandchildren was more likely. In other words, while grandfathers were expected to lose influence because of modernization processes, they were also expected to gain influence because of the greater overlap in lives with their grandsons. The results suggest that these opposing developments cancelled each other out: grandfathers were able to retain their influence (unlike fathers, uncles, and great-grandfathers, whose possibilities for contact did not increase so much).

Because the Netherlands is a prototypical case in the sense that these developments (modernization and increasing life expectancy) occurred in many Western countries, one would expect similar findings for other Western societies. Since only empirical evidence can prove whether this is true, an exciting development is the ongoing digitization of vital registers across the world (Van Leeuwen and Maas 2010). Hopefully, it will be just a matter of time before the generations within these data are linked, so that this study can be replicated.

Although the historical data used are rich in terms of allowing one to study the influence of fathers, uncles, grandfathers, and even great-grandfathers over a long period of time and for a large geographical area, they have their limitations. As mentioned in the method section, a difficult issue for studies on grandfather effects is to rule out the possibility that an observed grandfather effect is partly or wholly a statistical artifact, due to our inability to measure perfectly all the relevant resources of the intermediate generation (parents, uncles, and aunts) (Clark 2014). Whereas most studies control only for the father's status, an advantage of this study is that it controls, too, for the status of uncles. Still, these measures may not be detailed enough to filter out all indirect effects through the intermediate generation. Chan and Boliver (2013) show for contemporary Britain that a

grandfather effect remains even after adding additional measures for parental resources (parental education, income, and home ownership). This result may offer some comfort (but only to the extent that their results are generalizable to the Dutch historical context). Unfortunately, it is impossible to apply such a strategy using historical data, and so the results of this study should be interpreted with some caution.

In this regard it is worthwhile noting that, although mistaking unobserved parent effects for grandfather effects is substantively problematic in some instances, the distinction is not always as relevant, as the following example illustrates. Consider a farmer who decides to pass on his land not to his baker son, but to his grandson, who uses it to start his own farm. Now consider the case where the grandfather passes the land on to his baker son, who passes it, without ever using it, on to his son, who becomes a farmer. Strictly speaking, the first case is a grandfather effect and the second a parent effect, although both situations are effectively the same.<sup>12</sup> This suggests that, in both cases, if one is to understand the status attainment of the grandson it is important to have information not only about the father's occupational status but also about the grandfather's occupational status. In other words, no matter whether grandfathers and other extended family members have a direct or indirect influence, it is advisable to include their status since this prevents one from underestimating the influence of family background in both instances.

Currently, studies tend to establish whether there is a grandfather effect in a certain context or not. With evidence growing that, in many contexts, such effects are indeed present (Allingham 1967; Goyder and Curtis 1977; Pohl and Soleilhavoup 1982; Beck 1983; Campbell and Lee 2003, 2008, 2011; Chan and Boliver 2013, 2014), we also need to start explaining these effects. I have taken an initial step in testing the mechanisms thought to underlie grandfather effects, although the indicators used are certainly not perfect. For example, less overlap in lives might indicate fewer possibilities for contact, but also reflect greater cultural differences between generations (a larger generation gap), which could inhibit the influence of grandfather on grandson even if there was contact.<sup>13</sup> Future research could take these efforts further by shifting the focus towards using data with more direct measures of durable resources and of contact between grandparents and grandchildren. Such studies can also provide additional confidence that grandparent effects reflect real influence and not just unobserved parent effects.

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<sup>12</sup> Mare (2011) might well regard the second case as a good example of a grandfather effect through durable resources.

<sup>13</sup> I would like to thank an anonymous reviewer for pointing out this alternative explanation.

Finally, the realization that a parent-offspring approach may be too limited in scope to allow one to understand social stratification in certain contexts has prompted studies mainly of grandparents. However, this study found that uncles had an influence almost as large as that of grandfathers, and found that even great-grandfathers had an impact. Clearly, we need to widen our view to include not just grandparents, but also other extended family members.



# Chapter 5. Competition and Sharing among Siblings. Status Differences between Brothers in the Netherlands in the Nineteenth Century

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**Abstract.** Whereas evolutionary biologists argue that status differences between siblings are greater when competition between them for parental resources is stronger, sociologists argue that status differences are greater when siblings have fewer aspects of family background in common, and when there is less inter-sibling cross-socialization. The sociological predictions are often at odds with those of evolutionary theory. I test these opposing predictions by studying differences between brothers in occupational status attainment in the Netherlands in the period before and during the first demographic transition. I make use of GENLIAS, a large-scale database containing information from Dutch marriage certificates, which allows one to study 326,890 brother pairs from 125,182 families for the period 1842-1922. Contrary to what evolutionary theory would lead us to suppose, status differences between brothers decreased when competition between them intensified. I found that brothers were more different if 1) they shared fewer aspects of family background (e.g. their birthplaces were less similar, and their father's status fluctuated more), supporting the "unshared family background" explanation; and 2) interaction between them was less likely (e.g. when they differed more in age, and when there were other brothers born in between), supporting the "inter-sibling influence" explanation.

## 5.1 Introduction

A much researched and well-established regularity in the social sciences is that children from a high socioeconomic family background attain on average a higher status than children from a low socioeconomic background (Ganzeboom et al. 1991; Breen and Jonsson 2005). Because to a large extent siblings share the same family background, this means that siblings are much more similar in socioeconomic status to one another than to children from other families (Jencks et al. 1972; Warren et al. 2002; Black and Devereux 2011). However, despite this sibling similarity, more than half of all status differences in contemporary societies are the result of status differences *between* siblings (Hauser and Mossel 1985; Solon et al. 1991; Sieben and De Graaf 2001). In other words, even though cross-family stratification is strong and is the phenomenon most focused on in the literature, it is intra-family stratification that is responsible for most of the inequality in society (Conley 2004).

On the basis of evolutionary biology and psychology, it can be argued that socioeconomic differences within families are the result of competition for parental resources between siblings. From this perspective, individuals ought to prefer their own reproduction to that of their siblings because siblings share only about half of their genes (Hamilton 1964). Among some species, especially birds, sibling rivalry is known to be so fierce that the fittest sibling kills the other (Sulloway 2007). Although sibling competition among humans is usually not as lethal,<sup>1</sup> it may have a profound influence on the life chances of siblings. Especially if parental resources are scarce, one can expect most able siblings to secure more parental resources than the less able (Trivers 1985).<sup>2</sup> Discrepancies between siblings in terms of the parental resources obtained result in differential socioeconomic success later in life. Those parental resources might be similar to those that are important among animals, such as nutrition (Behrman and Rosenzweig 2004), but they might also take other forms, such as investment (financial or otherwise) in a child's education (Blau and Duncan 1967).

Sociology offers explanations for socioeconomic differences between siblings based on the extent to which aspects of family background are non-identical for each sibling (instead of shared by all siblings) (Conley et al. 2007), and on the extent to which siblings influence each other (Jencks et al. 1972; Zajonc 1976; Benin and Johnson 1984; Vandezande, Matthijs, and Kok 2011). These sociological explanations lead to predictions opposing in some instances those drawn from evolutionary theory. For example, siblings who are close in age tend to interact more often, and interaction is expected to lead to similarity through cross-socialization. Moreover, closely spaced siblings are more likely to experience a similar family environment than siblings born many years apart, because many aspects might change over time (parents might switch jobs, move, divorce, or die). On the basis of evolutionary theory, however, one might predict that the closer siblings are in age, the stronger the competition between them, so the more magnified differences in ability and thus socioeconomic status become. With respect to status differences between siblings, these different theoretical traditions have

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<sup>1</sup> Siblingicide is not common among humans, despite the famous account of the first two brothers in the bible, in which Cain kills Able.

<sup>2</sup> Some evolutionary theorists present arguments as to why sibling competition might be stronger when resources are *less* scarce (Gibson and Lawson 2011). Although we test the more traditional evolutionary arguments, we also reflect on these alternative ideas in the discussion.

not been fully developed,<sup>3</sup> and it is therefore also unclear how the three mechanisms and their effects relate to each other.

The aim of this article is to study how differences in the occupational status attainment of brothers came about in the Netherlands from 1842 to 1922, with a specific focus on the relative importance of “sibling competition”, “unshared family background”, and “inter-sibling influence” as explanations. We study only men because most women in this period stopped working as soon as they married (Bras 2002; Schulz et al. 2014a). For substantive and methodological reasons, for the years before and during the first demographic transition the Netherlands is a particularly valuable context in which to study differences between brothers.

One substantive reason is that, historically, Western societies offer natural variations in the extent to which brothers had to compete with each other. For example, competition between brothers can be expected to increase with the scarcity of resources as well as with family size (Trivers 1985; Sulloway 2007). Scarcity of resources was more of a factor than it is nowadays because the general living standard was lower (Van Zanden et al. 2014). Moreover, there was a greater variation in family size because birth control was less widespread and infant mortality was higher (Ekamper et al. 2003). I can use these variations to test whether intensified competition leads to larger fraternal status differences.

Moreover, data with information on the occupational status of brothers are rare, but for Dutch society of the past there are truly extraordinary data. I make use of GENLIAS, a large-scale database containing digitized information from marriage certificates for five out of eleven Dutch provinces. A marriage certificate typically contains information on the bride’s and groom’s occupations, year and place of birth, year and place of marriage, as well as their parents’ occupations. Moreover, marriage certificates have been linked such that one knows who are siblings of whom. This gives me a unique opportunity to study occupational status differences among 326,890 brother pairs from 125,182 families for the 80-year period 1842–1922.

This study contributes to several branches of the literature. First, for evolutionary biologists and psychologists it forms a test of whether sibling rivalry is an important

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<sup>3</sup> For example, evolutionary theory also recognizes the potential for cooperation and altruism among siblings (Hamilton 1964), but the conditions under which competition, cooperation, or altruism among human siblings can be expected are not well-established (despite, for example, Gibson and Gurmu 2011).

aspect of human behavior. Second, for sociologists and economists it furthers insight into how intra-family stratification—the largest source of inequality in society—comes about. Finally, sociologists and economists regard sibling correlations as a high-quality measure for social mobility, and thus for cross-family stratification (Jencks et al. 1972; Black and Devereux 2011; Knigge, Maas, and Van Leeuwen 2014 / Chapter 3). However, a sibling correlation depends as much on intra-family stratification as it does on cross-family stratification (Björklund and Jäntti 2012).<sup>4</sup> This study helps us to understand how sibling correlations might vary between contexts as the result of differences in intra-family stratification processes, rather than of differences in cross-family stratification processes.

## 5.2 Theory

### 5.2.1 Competition among Brothers

In evolutionary biology and psychology it is argued that certain types of behavior can be understood to result from the evolutionary process of natural selection at the gene level: genes promoting behavior that benefitted their own reproduction have survived at the expense of genes promoting behavior less successful for their reproduction (Dawkins 2006). From this perspective, there is potential for sibling rivalry: because siblings share only about half of their genes, personal survival is more beneficial for gene reproduction than the survival of siblings. To be more precise, behavior that promotes an individual's survival at the expense of a sibling's survival is beneficial for one's personal gene reproduction as long as the increase in one's own survival chances is more than half of the decrease in the survival chances of a sibling (Hamilton 1964). This has been used to explain behavior observed in many species directed at obtaining more resources from parents than siblings do (Sulloway 2007).

Parents play a crucial role in whether sibling rivalry leads to differences between siblings. Parents should, in principal, not favor one of their children above another, because each of their children has an equal number of copies of their genes (Trivers 1985). However, unequal investment by parents may benefit the reproduction of their genes under certain conditions. If parental resources are not abundant enough to invest limitlessly in the survival of all children, it is beneficial to direct resources toward one or a few of the children most likely to reproduce. In other words, if competition for the same resources is

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<sup>4</sup> This is easily seen from the conventional definition of a sibling correlation:

$$\rho = \frac{\text{Between-family variance}}{\text{Within-family variance} + \text{Between-family variance}}$$



stronger, existing differences between siblings will be enlarged. On the other hand, if parental resources are so plentiful that the survival of the most able is more or less secured, it is beneficial to direct resources toward the less able in order to compensate them for their lower survival chances. In that case, natural differences between siblings would be attenuated.

If sibling rivalry plays an important role among humans, an intensification of the competition between them should thus lead to larger differences between brothers in the parental resources they obtain, which in turn should lead to larger differences in socioeconomic attainment later in life. There are several conditions under which I expect sibling competition to be stronger. First, if the socioeconomic status of a family is lower siblings will have to compete for fewer parental resources. Second, all else being equal, if the family has more children the available resources will have to be shared by more “competitors”. Finally, the closer siblings are in age, the more they will lay claim to the same parental resources (again, all else being equal). Therefore, from an evolutionary perspective, I would expect differences in occupational status between brothers to be larger if family status is lower (*H1*), sibship size is larger (*H2*), and the age difference between brothers is smaller (*H3a*).<sup>5</sup>

### 5.2.2 Unshared Family Background

Stratification scholars argue that children from the same family tend to be more similar in socioeconomic status to each other than to children from another family because siblings share the same family background. For example, siblings are likely to profit from the same level of parental resources, experience the same parenting style, and to grow up in the same neighborhood. Although siblings do indeed share many aspects of their family background, it is unlikely that all aspects of family background will be identical for each sibling. For example, the level of parental resources might change over the years because parents switch jobs or the economy changes, and siblings do not necessarily grow up in the same neighborhood because the family might move, or the neighborhood itself might

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<sup>5</sup> Economists and sociologists also theorize how competition between siblings might lead to status differences between them based on resource dilution theory (Blake 1981; Steelman et al. 2002). Unlike evolutionary theory, resource dilution theory does not argue that competition between siblings *itself* leads to differences between them, but merely that differences result from disparities in the *number of competitors/siblings* that they have on average during childhood. Therefore, apart from a birth order effect, resource dilution theory predicts, especially, differences between families (of different size for example). Economists and sociologists also have—mostly rational choice—arguments as to why parents might invest unequally in their children, which typically lead to the same hypotheses (Becker and Tomes 1976; Conley, Pfeiffer, and Velez 2007).

change. It follows that if fewer aspects of family background are shared, siblings should differ more in their later socioeconomic status attainment.

There are several conditions under which I expect family background to be less identical for brothers. First, and generally, the more years a pair of brothers are born apart, the more likely it is that aspects of family background will have changed over the years, making these aspects non-identical at the same point in the life cycle of each brother (Conley et al. 2007). Second, and more specifically, if father's occupational status differs between brothers at the same crucial point in their development, the level of parental resources they profit from is likely to be non-identical.<sup>6</sup> Finally, if brothers grow up in different places to some extent, they are likely to be socialized differently and have distinct opportunities. This is more likely if the places are further apart geographically, and if they differ more in population size. Hence, I expect fraternal differences in occupational status to be larger the more years the brothers are born apart (*H3b*),<sup>7</sup> the more their father's occupational status differs at the same point in their life cycle (*H4*), and the more their birthplaces differ with respect to geographic location (*H5*) and population size (*H6*).

### 5.2.3 Inter-Sibling Influence

The sociological and psychological literature stresses that siblings might become more alike in socioeconomic attainment by influencing each other (Jencks et al. 1972). Benin and Johnson (1984), for example, argue that siblings might assist each other by providing resources, just as parents provide resources to their children (see, also, Vandezande et al. 2011). Further, siblings might become more alike through cross-socialization (Conley et al. 2007). This can take the form of role modeling, where siblings model after their (older) siblings (Benin and Johnson 1984), but there is also an extensive literature on the active tutoring role of siblings (see, e.g., Zajonc 1976). Where dependency and interaction between siblings is weaker, the inter-sibling influences that make siblings more alike in their occupational status attainment will be less salient.

Dependency and interaction is likely to be weaker between brothers born many years apart rather than a few years apart. The degree of interdependency might depend not only on the number of years separating two brothers, but also on whether there are other

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<sup>6</sup> Schulz (2010) show that in the nineteenth century occupational status fluctuated quite significantly during the careers of Dutch men.

<sup>7</sup> Note that this mechanism predicts an effect that opposes the effect predicted by the "competition mechanism" (see *H3a*).

brothers born in between. If a first-born son gets his first brother five years after he is born, he is likely to play with his younger brother, look after him, and act as a role model. However, if there are already one or more brothers separating them, this interdependency is likely to be less, because both have “intervening opportunities” for interaction. In other words, I expect the inter-sibling influence to be weaker, and hence status differences to be larger, if brothers differ more in age (*H3c*), and if brothers are “nonadjacent” rather than “adjacent” (*H7*).

## 5.3 Method

### 5.3.1 Data

I use a large-scale database, GENLIAS, containing digitized information from Dutch marriage certificates for the period 1812 to 1922. A certificate typically provides place and date of marriage; name, age, birthplace, and occupation of bride and groom; and names and occupations of the couple’s parents. I use a version of GENLIAS, version 2007\_03 (Oosten and Mandemakers 2007), in which the marriage certificates of children have been linked to those of their parents. This means that I know for each groom who his married siblings are. Linkage was based primarily on matching the pair of full names of the parents on both certificates using a computer algorithm (Oosten 2008). Minor variations in spelling were allowed for, but a conservative approach was taken (minimizing the number of wrong links at the expense of not maximizing the number of total links). The years of birth of children and parents were used to match within a limited timeframe. For example, a match was made only if the potential mother had been in her childbearing years (15-53) when the bride or groom was born. This linkage method was used within and between the provinces of Groningen, Overijssel, Gelderland, Zeeland, and Limburg. After making several selections and deleting the cases with missing values (see next section), this results in 479,864 brothers from 266,652 families. From this, I created all possible pairs of brothers, as they are the observations used in the analysis (326,890 from 125,182 families if those with father’s status missing are included, and 166,368 from 69,330 families if they are excluded).

#### *Selections and Missing Data*

As mentioned in the introduction, I study only grooms. Further, I include only grooms marrying for the first time, to prevent having the same person twice in the analysis. Grooms marrying at the beginning or end of the observation period are, for present purposes, problematic. If a man married shortly after 1812, he cannot be linked to his

brothers because their parents' marriage certificate will not be part of the database (since the parents must have married before 1812). To ensure it is equally likely that for grooms from all time periods their parents' certificate will be in the database, we take a 30-year margin (following Bras et al. 2010) and include only families in which no son married before 1842. If parents married in the decades before 1922, there is a fair chance that one or more of their children will not be part of the database because they will have married after 1922. To ensure I have only complete families, I exclude families where parents married after 1882 (from this point on the average number of sons per family recorded in our linked data starts to drop steeply).

After these selections, 29.5% of the grooms cannot be linked to their parents' marriage certificate and are excluded, resulting in 490,827 linked grooms married between 1842 and 1922 and whose parents married between 1812 and 1882. It is not possible to analyze all of these grooms because sometimes there were missing values on variables used in the analyses. In creating the dependent variable (see below), the 2.2% of the cases with missing values are excluded, resulting in the 479,864 grooms mentioned above.

From these grooms, all possible brother pairs were created (339,376). There are a modest number of brother pairs that have missing values for the variables geographic distance (3.0%) and population size difference (3.5%) and they are excluded (3.7% combined), resulting in the 326,890 brother pairs mentioned before. For the variable father's status difference, the number of brother pairs with missing values is considerable (49.1%). To gauge the possible influence of this, I perform the analyses once, where possible, with these pairs included and once with these pairs excluded (yielding the 166,368 pairs referred to above).

#### *Possible Selection Bias*

Although I do not observe brothers who never married, this is less problematic than one might suspect because marriage was common in the Netherlands. The percentage of men born in the nineteenth century that ever married was about 88% (Ekamper et al. 2003). Moreover, Engelen and Kok (2003) do not find many significant differences (in terms of family background, religion, and region for instance) in the likelihood of Dutch men born between 1890 and 1909 remaining unmarried. With respect to social background, they find only that the sons of skilled manual workers remained unmarried less often than sons from other social classes, and that the sons of the elite remained unmarried more often. Also, Schulz (2013) finds no significant difference in attained status between married and unmarried Dutch men in the period 1865 to 1930.

I do not observe people who married outside one of the five provinces included. Although migrants are not a random group, as they tend to attain a higher status, I do not expect the results to be influenced substantially, one reason being that the group I miss due to migration is not very large. The number of people who lived in a province different from that in which they were born was just 8% in 1849 and 13% in 1899 (Knippenberg and De Pater 2002). Of these migrants, I do observe those who migrated between the five provinces, and those who moved away after marriage. Furthermore, I showed that family influence on status attainment hardly depends on including more or less information on migrants (see Knigge et al. 2014 / Chapter 2).

It is a known problem of using marriage certificates that information on father's occupation is regularly lacking. The most likely reason for missing information is that the father was deceased at the time of his son's marriage. Previous studies did not find alarming differences between those with and those without information on father's status (Zijdeman 2010; Maas et al. 2011; Knigge et al. 2014 / Chapter 2; Chapter 4). Although this is reassuring, I perform a robustness check in this study as well. As its results will show (see results section), missing information on father's status does not seem to alter the conclusions of this study either.

### 5.3.2 Measures

#### *Dependent Variable*

The dependent variable is the *absolute difference in occupational status* between each brother pair (see Table 5.1 for descriptives of all measures). The status of a brother is based on the occupation he gave on his marriage certificate. Occupations were coded using HISCO (Historical International Standard Classification of Occupations; Van Leeuwen et al. 2002), the historical equivalent of the ILO's ISCO-68. These occupational categories were assigned a status score based on the HISCAM stratification scale (Lambert et al. 2013), which employs the same technique as CAMSIS scales do for contemporary societies (Stewart et al. 1980). Theoretically the scale runs from 1 to 99, but the range we observed was 10.6 (servant) to 99 (lawyer, for example).

Because I use marriage certificates, the status of brothers is likely to be measured at different ages and in different years. Status develops quadratically with age (Schulz and Maas 2010), and average status in society increases over time (Knigge et al. 2014 / Chapter 2). Therefore, we need to purge the status scores of these age and period effects before we can make a fair comparison between two brothers. Solon et al. (1991) provide a

simple way to do this, namely by using the residuals of a regression analysis with status as the dependent variable and any confounding variables as controls. I include age at marriage, age at marriage squared, and dummies for year of marriage as the controls, and then use the residuals of the analysis—as they are now status scores purged of age and period effects—to calculate the status differences between brothers.

### *Independent Variables*

Family status is operationalized by *father's status*, which is based on the occupation(s) he stated on his children's marriage certificates (if father's status differed between his children's marriage certificates, I took the average over all certificates).

Family size, or *sibship size*, is approximated by the number of married children in a family.

The *age difference* between brothers is the number of years they were born apart according to the year of birth on their marriage certificate.

*Father's status difference* is the absolute difference in father's status between the occupation(s) stated on both brothers' marriage certificates.

*Geographical distance* between the places of socialization of two brothers is approximated by the straight-line distance in kilometers between their municipalities of birth, which was calculated from the Euclidean coordinates contained in the dataset HISCI-NL (Historical International Standardized Community Indicators–Netherlands; Knigge et al. 2012). I took the natural logarithm of this to make the distribution less skewed (after adding 1, such that those who were born in the same place have value 0 in the transformed scale as well).

The *difference in population size* between the places of socialization of two brothers is calculated by taking the difference in the number of inhabitants in their municipalities of birth in the year of birth. Again, I took the natural logarithm after adding 1. The population size information was also obtained from HISCI-NL, but stems originally from the Historisch-ecologische databank (HED) / Historische Databank Nederlandse Gemeenten (HDNG) (Beekink et al. 2003).

A dummy variable indicates two brothers to be *nonadjacent* if there is at least one other married brother born in between the two.

**Table 5.1** Descriptives

	Mean	SD	Min.	Max.	N
<i>Individual level</i>					
Son's status	46.33	12.86	10.60	99.00	479,864
Age at marriage	28.15	5.65	16.00	79.00	479,864
Marriage year	1887	19.99	1842	1922	479,864
<i>Dyad level</i>					
Status difference	7.84	9.42	0.00	84.56	326,890
Father's status	45.97	9.24	10.60	99.00	166,368
Sibship size	5.38	2.01	2.00	15.00	326,890
Age difference	6.75	4.52	0.00	33.00	326,890
Father's status difference	2.98	6.55	0.00	64.70	166,368
Geographic distance	0.31	0.89	0.00	5.73	326,890
Population size difference	5.30	1.88	0.00	13.02	326,890
Nonadjacent brothers	0.38		0.00	1.00	326,890

### 5.3.3 Analytic Strategy

I analyze the absolute status differences between each brother pair using multilevel regression analysis, with brother pairs nested in families, which in turn are nested in communities. Communities are defined as the combination of the municipality and year of marriage of the parents. Multilevel analysis takes into account the fact that brother pairs from the same family are not independent observations, nor are families from the same community. For the purposes of my analysis I use the package that runs MLwiN from within Stata (Leckie and Charlton 2013; Rasbash et al. 2013).

First, I estimate an “intercept only” model

$$Y_{ijk} = \beta_{000} + c_{0k} + f_{0jk} + d_{0ijk}, \quad (M1)$$

where  $Y_{ijk}$  is the occupational status difference between brothers of dyad  $i$  from family  $j$  from community  $k$ ;  $\beta_{000}$  the population mean fraternal status difference;  $c_{0k} \sim (0, \sigma_{c_{0k}}^2)$  the error term at the community level;  $f_{0jk} \sim (0, \sigma_{f_{0jk}}^2)$  the error term at the family level; and  $d_{0ijk} \sim (0, \sigma_{d_{0ijk}}^2)$  the error term at the dyad level (Snijders and Bosker 1999). Because dyads (i.e. brother pairs) from the same family are not independent observations, the fraternal status differences might, on average, be much larger in some families than in

others. The proportion of variance at the family and community level shows to what extent this is the case, because it represents the expected correlation between two randomly selected dyads from the same family:

$$\rho_{c+f} = \frac{\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2}{\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2 + \sigma_{d_{0ijk}}^2}. \quad (1)$$

Dyads from the same community might also resemble each other more than dyads from a different community. The expected correlation between two randomly selected dyads from the same community is given by

$$\rho_c = \frac{\sigma_{c_{0k}}^2}{\sigma_{c_{0k}}^2 + \sigma_{f_{0jk}}^2 + \sigma_{s_{0ijk}}^2}. \quad (2)$$

In the second model, I add the indicators for the degree of “competition”, “shared family background”, and “inter-sibling influences” as explanatory variables to test the hypotheses:

$$Y_{ijk} = \beta_{000} + \boldsymbol{\beta}_{0x0}\mathbf{X}_j + \boldsymbol{\beta}_{00x}\mathbf{X}_i + c_{0k} + f_{0jk} + d_{0ijk}. \quad (M2)$$

The vector  $\boldsymbol{\beta}_{0x0}$  comprises the regression coefficients for the family level variables  $\mathbf{X}_j$  (father’s status and sibship size), and the vector  $\boldsymbol{\beta}_{00x}$  for the dyad level variables  $\mathbf{X}_i$  (age difference, father’s status difference, geographical distance, population difference, and adjacency). Because father’s status is missing in many cases, I run models M1 and M2 separately for the cases for which father’s status is missing and for all cases (leaving father’s status out of the model) as a robustness check.

## 5.4 Results

On average, brothers differ about  $\beta_{000} = 7.76$  status points from one another (see Model 1a in Table 5.2). About 64% of the total variance around this population average occurs within families, and 36% between families ( $\rho_{c+f} = .36$ ; see equation (1)). This correlation between dyads from the same family indicates that the family determines to a substantial degree how large the status differences between brothers are. The community, on the other hand, has only little impact on how large the status differences in fraternal dyads are ( $\rho_c = .03$ ; see equation (2)). This descriptive analysis included dyads where father’s status is missing for at least one of the two brothers, but these dyads have to be excluded when analyzing the effect of father’s status in the next step. The estimates for



the descriptive analysis are nearly the same as they would have been had we already excluded those with father's status missing in the first step (see Model 1b:  $\beta_{000} = 7.31$ ;  $\rho_{c+f} = .37$ ;  $\rho_c = .03$ ).

**Table 5.2** Multilevel Regression Analysis of Absolute Status Differences between Dutch Brothers in the Nineteenth Century<sup>a</sup>

	Model 1a	Model 1b	Model 2a	Model 2b	Model 2c
<b>Fixed Part</b>					
Intercept	7.758*** (0.026)	7.311*** (0.033)	6.496*** (0.111)	6.793*** (0.113)	7.392*** (0.083)
Father's status <sup>b</sup>			0.085*** (0.003)		
Sibship size			-0.038* (0.016)	-0.050** (0.016)	-0.069*** (0.013)
Age difference			0.044*** (0.006)	0.051*** (0.006)	0.054*** (0.004)
Father's status difference			0.174*** (0.003)		
Geographical distance (log)			0.142*** (0.031)	0.156*** (0.031)	0.270*** (0.023)
Population size difference (log)			0.044** (0.016)	0.071*** (0.017)	0.047*** (0.012)
Nonadjacent brothers			0.150** (0.050)	0.163** (0.051)	0.085* (0.037)
<b>Random Part</b>					
$\sigma_{c_{ok}}^2$ (Community level)	2.818*** (0.132)	2.660*** (0.190)	2.279*** (0.178)	2.574*** (0.189)	2.762*** (0.131)
$\sigma_{f_{ojk}}^2$ (Family level)	29.508*** (0.263)	28.202*** (0.357)	26.491*** (0.342)	28.241*** (0.357)	29.487*** (0.262)
$\sigma_{d_{oijk}}^2$ (Dyad level)	57.465*** (0.175)	52.917*** (0.232)	52.397*** (0.229)	52.791*** (0.231)	57.332*** (0.175)
Number of communities	26,832	21,602	21,602	21,602	26,832
Number of families	125,182	69,330	69,330	69,330	125,182
Number of dyads	326,890	166,368	166,368	166,368	326,890

Notes: Standard errors in parentheses.

<sup>a</sup> Status scores for brothers are purged of age and period effects (see Measures section).

<sup>b</sup> Centered around the population mean.

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

According to evolutionary theory, status differences between brothers should be larger where competition is stronger. However, although competition should be stronger if family resources are scarcer (see *H1*), status differences are larger in high status families than in low status families (see Model 2a:  $\beta_{010} = 0.085$ ,  $p < .001$ ). Similarly, competition and fraternal status differences should be stronger the larger the family (see *H2*), but results show, if anything, the exact opposite ( $\beta_{020} = -0.038$ ,  $p < .05$ ). Also, the final hypothesis regarding competition (*H3a*) is falsified: if brothers differ more in age, the difference in status between them does not become smaller but larger ( $\beta_{001} = 0.044$ ,  $p < .001$ ).

Proponents of the “unshared family background” mechanism would argue that this last finding occurs because brothers who differ more in age are less likely to share exactly the same aspects of family background (see *H3b*). In line with this explanation, I find that the more father’s status changes between the years in which two brothers are married, the larger the status difference between them ( $\beta_{002} = 0.174$ ,  $p < .001$ ; see *H4*).<sup>8</sup> Moreover, I find that status differences are greater if the environment in which siblings were likely to grow up is less similar, that is, if the geographical distance between birthplaces is greater ( $\beta_{003} = 0.142$ ,  $p < .001$ ; see *H5*) and the difference in population size of their birthplace is larger ( $\beta_{004} = 0.044$ ,  $p < .01$ ; see *H6*). These unshared aspects of family background do indeed explain partly why brothers who differ more in age also differ more in status (the effect of age difference is 0.044, but it would have been 0.068 had the variables father’s status difference, geographical distance, and population size difference not been included in Model 2a; results not shown).

The finding that brothers with a wider age gap have larger status differences could also be the result of less inter-sibling influence between such brothers (see *H3c*). If the degree of inter-sibling influence does indeed impact status differences, I hypothesized that status differences would be larger if brothers are nonadjacent (see *H7*), which finds support ( $\beta_{005} = 0.150$ ,  $p < .01$ ). Furthermore, less inter-sibling influence seems to explain partly why brothers who differ more in age also differ more in status (the effect of age difference is 0.044, but it would have been 0.054 had the variable nonadjacent not been included in Model 2a; results not shown). In other words, although it is impossible to determine to what extent unshared family background and inter-sibling influence

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<sup>8</sup> This result suggests that a father’s resources during the early adulthood of his sons play an important role in their status attainment (perhaps because fathers provide sons with jobs directly, or indirectly through their contacts).

contribute to the effect of age difference observed, the results suggest both mechanisms are at work.

In the explanatory analysis, testing the effects of variables including father's status implies that those with father's status missing are excluded. I checked whether this influences the estimates for the other variables. First, I checked whether the results change if father's status and father's status difference are excluded (and those with father's status missing are still excluded, see Model 2b). The only change is that the remaining effects become a bit stronger (in other words, their effects are partly explained by father's status and father's status difference). Next, I included those with father's status missing (see Model 2c). Although the size of some of the effects changes, the conclusions with respect to the hypotheses do not.<sup>9</sup>

The results show significant effects for the characteristics included of families and of dyads. However, they do not explain much of the variance between families and between dyads: the total variance is reduced from 83.779 in Model 1b to 81.167 in Model 2a, a reduction of 3.1%. In a way, this is not so surprising as a large part of the status differences between brothers will be due to differences in individual characteristics, which are difficult to measure in this case but also less relevant for present purposes.

## 5.5 Conclusions and Discussion

This article has furthered our understanding of intra-family stratification processes by studying status differences between brothers in the Netherlands in the nineteenth century. One factor that might influence variation in status differences between siblings is the nature of sibling relations. Evolutionary theory stresses the potential for sibling relations to be characterized by conflict over parental resources: the stronger this competition, the larger the status differences are expected to be. However, sibling rivalry does not seem to play an important role among humans, at least not in the status attainment of Dutch brothers in the nineteenth century. Scarcer parental resources and greater interdependency

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<sup>9</sup> The only difference worth perhaps mentioning is the effect of nonadjacent brothers, which is 0.163 when those with father's status missing are excluded and 0.085 when those with father's status missing are included. Possible explanations for this should be sought in the fact that the most likely reason for information on father's status being missing is that the father had died by the time his son married. For example, it could be that a nonadjacent brother partly took over the role of the father after the father died, making interaction and cross-socialization between nonadjacent brothers stronger and therefore their differences weaker.

between siblings did not mean increased competition and larger status differences between brothers; it meant *smaller* status differences instead. The results are therefore more in line with the ideas of sociologists and social psychologists, who tend to view sibling relations as more harmonious and cooperative. They stress that greater interdependency between siblings means that they help and socialize each other more, which in turn makes them more similar in status.

Sociologists argue that another important factor in explaining status differences between siblings is the extent to which siblings share the same environment. The results support this view by showing that status differences are larger if family background is less identical for brothers. Furthermore, this mechanism might form another explanation as to why increased interdependency leads to smaller status differences, and not, as evolutionary theory predicts, to larger status differences: siblings who can be expected to be in stronger competition with each other also tend to share more aspects of their family background.

Do the results of this study mean that sibling rivalry is never an important aspect of human life, and something that pertains only to some animal species? Of course, it is possible that, even when resources are scarce, sibling relations among humans might be cooperative in nature because evolutionary forces simply do not drive them. If one is unwilling to reject the evolutionary framework so easily, several points can be made. One point is that evolutionary theory fully recognizes the possibility of cooperative siblings, and even the potential for altruism among siblings (Hamilton 1964). In other words, it could be that the environment of humans has been such that cooperative behavior among siblings is always more beneficial for gene reproduction than competitive behavior.

It could also be that sibling rivalry was not important in the Netherlands in the nineteenth century, but that it is important in other contexts. Some bird species are shown to commit siblicide only when resources are very scarce (Sulloway 2007). Although resources were scarcer in the Netherlands in the nineteenth century than they are now, resources were perhaps still not scarce enough for sibling competition to benefit gene reproduction. It would be interesting to test whether sibling rivalry does play a role in contexts in which resources are more scant than in the Netherlands in the nineteenth century, such as in some of Africa's failed states (Rotberg 2003; Lawson, Alvergne, and Gibson 2012). Other evolutionary theorists, however, have argued that sibling rivalry among humans might be especially strong when resources become *less* scarce (Gibson and Lawson 2011). Because this perspective could explain some of the findings in this article, it is worth

investigating further whether evidence of sibling rivalry is indeed found precisely in contexts where resources are plentiful. If so, it would present an interesting puzzle: why would sibling rivalry play the exact opposite role among humans to the role it plays among other species?

Furthermore, it is possible that while sibling rivalry did not have a crucial impact on status attainment, it did do so on other life chances of Dutch brothers. If sibling rivalry is important only in situations of extreme scarcity, maybe it also results in more extreme differences in life outcomes than just status differences. Around 1870, as many as one in every three children born alive died before their first birthday in some parts of the Netherlands (Ekamper et al. 2003). If the children with the lowest fitness received the least in terms of parental resources, they might simply have died in infancy. In other words, those who grew up to attain a status might have been the ones who had already won the competition, so to speak. If so, it would mean that siblings competed especially over elementary resources, such as nutrition and care, and less so over resources that became important later in life, such as the family business or parental investment in their children's human capital. The resources important early in life are more indirectly related to status attainment than those later in life. This implies that future research might find evidence of sibling rivalry in outcomes such as physical or cognitive development at a very young age (before most selection took place), but not in outcomes such as occupational status or income.

Whatever role sibling rivalry might or might not play among humans, if one's goal is to explain variation in status differences between siblings then evolutionary theory does not seem to be the most logical candidate for the purpose. In this respect, the "unshared family background" and "inter-sibling influence" mechanisms are more promising, although much more work needs to be done to test their applicability in other contexts. Moreover, the factors included in this study explained little of the variation in status differences, so in future research it would seem worthwhile to search for other factors. Note, however, that much of the variation in status differences between siblings is very difficult to explain. For example, part of the status differences between siblings is the result of genetic differences, but exactly how much will differ from sibling pair to sibling pair. For many purposes, this variation will not display the type of patterns a researcher would like to understand, but can instead be considered "random noise". Therefore, for most social scientists the purpose should not be to explain *all* intra-family stratification, but to identify the factors that are responsible for systematic variation in intra-family stratification, for example between families, regions, or over time.



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# Samenvatting

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## Achtergrond en doelen

Mensen met een hoge sociaaleconomische status leven over het algemeen langer, gezonder en gelukkiger dan mensen met een lage sociaaleconomische status. De positie op de maatschappelijke ladder—vaak afgemeten aan bijvoorbeeld opleidingsniveau, beroepsstatus, of inkomen—heeft dus grote gevolgen voor iemands welzijn en levenskansen. Logischerwijs geldt dat hoe groter de sociaaleconomische ongelijkheid in een samenleving, des te groter de onderlinge verschillen in welzijn. Bovendien laat onderzoek zien dat ongelijkheid negatieve gevolgen heeft voor het functioneren van de maatschappij als geheel. Landen met grotere ongelijkheid kampen bijvoorbeeld met meer criminaliteit en onderling wantrouwen, wat duidt op geringere sociale cohesie. De discussie over de oorzaken en gevolgen van sociale gelaagdheid—een klassiek sociologisch vraagstuk bij uitstek—staat sinds de economische crisis van 2008 weer centraal in het maatschappelijk debat. Zo kon het dat het werk van Piketty over langetermijntrends in ongelijkheid een bestseller werd. Hij laat zien dat veel Westerse maatschappijen terugkeren naar het niveau van de ongelijkheid aan het eind van de negentiende en begin van de twintigste eeuw. Echter, de impact van sociale gelaagdheid in een samenleving wordt niet alleen bepaald door de mate van *ongelijkheid*, maar ook door de mate van *sociale mobiliteit*. Als mensen immers altijd tot dezelfde sociale laag blijven behoren als waarin ze geboren worden, dan behouden ze ook hun hele leven dezelfde privileges of beperkingen behorende bij die positie. Als mensen daarentegen regelmatig stuivertje wisselen, dan middelen verschillen in welzijn uit over de levensloop. Omdat sociale mobiliteit de impact van ongelijkheid vermindert, is het van belang om niet alleen langetermijntrends in ongelijkheid te bestuderen, maar ook inzicht te krijgen in de ontwikkelingen van sociale mobiliteit. Deze dissertatie levert hier een bijdrage aan.

Een bekend Nederlands spreekwoord luidt: “Wie voor een dubbeltje geboren is, wordt nooit een kwartje”. Een klassieke theorie in de sociologie—de moderniseringstheorie—claimt dat dit vooral gold voor de pre-industriële periode, maar dat met moderniseringsprocessen zoals industrialisatie en onderwijsexpansie er meer kansen kwamen om te stijgen en te dalen op de maatschappelijke ladder. Deze processen zouden er namelijk voor gezorgd hebben dat het minder makkelijk werd om posities direct van vader op zoon over te dragen, onder meer doordat bij het aannemen van personeel opleiding steeds belangrijker werd. Andere theoretici claimen echter dat de elite

alternatieve strategieën vond om de afgenomen mogelijkheid tot directe overdracht te compenseren. Door bijvoorbeeld hun hulpbronnen zo aan te wenden dat hun kinderen de beste opleiding kregen, zouden ze hun voorsprong hebben weten te behouden. Tot nu toe is het niet duidelijk hoe de sociale mobiliteit zich in de periode voor en tijdens de modernisering precies ontwikkeld heeft, en dus ook niet welk van beide claims correct is. Daarom is het eerste doel van deze dissertatie om de sociale mobiliteit in Nederland in de periode voor en tijdens de industrialisatie te beschrijven. Het tweede doel is om de gevonden verschillen in sociale mobiliteit tussen gemeentes en in de tijd te verklaren, met specifieke aandacht voor de rol van moderniseringsprocessen hierin.

## **Bijdragen aan de literatuur**

Een belangrijke reden waarom er nog geen bevredigend antwoord bestaat op dit klassieke sociologische vraagstuk, is dat er tot voor kort geen goede data over de juiste periode voorhanden waren. Recentelijk is er wat dat betreft enorme progressie geboekt door de digitalisering van historische registerdata. Ook ik benut deze relatief nieuwe bron van informatie door in deze dissertatie gebruik te maken van alle Nederlandse trouwaktes uit vijf van de elf provincies in de periode 1812-1922 zoals opgenomen in de GENLIAS-database. Trouwaktes uit deze periode zijn bijzonder waardevol voor onderzoek naar sociale mobiliteit omdat ze doorgaans informatie bevatten over het beroep van de bruidegom en dat van zijn vader. Dit biedt de mogelijkheid om na te gaan in hoeverre beroepsstatus van vader op zoon wordt overgedragen (ik bestudeer alleen mannen omdat de meeste vrouwen stopten met werken zodra ze getrouwd waren). Bovendien beslaan de data een lange periode, een groot en gevarieerd geografisch gebied, en vormen ze een behoorlijk representatieve afspiegeling van de bevolking.

Voor een deugdelijke test van de moderniseringstheorie is het niet afdoende om vast te stellen dat sociale mobiliteit is toegenomen in de periode van modernisering: een dergelijke trend zou ook het gevolg kunnen zijn van andere processen die gelijktijdig plaatsvonden. Daarom hebben mijn collega's en ik indicatoren gecreëerd voor alle moderniseringsprocessen die volgens de moderniseringstheorie van belang zijn: industrialisatie, onderwijsexpansie, urbanisatie, geografische mobiliteit, massacommunicatie en massatransport. Omdat de indicatoren voor elke gemeente in elk jaar beschikbaar zijn, kan ik testen of sociale mobiliteit groter is in een gemeente wanneer die moderner is dan een andere gemeente, en ook of sociale mobiliteit binnen een gemeente toeneemt als deze moderner wordt in de tijd.

Een conventionele indicator van sociale mobiliteit, of eigenlijk van het gebrek daaraan, is de overeenkomst in status tussen vaders en zonen. De familie biedt kinderen velerlei hulpbronnen (en restricties) bij het bereiken van een goede baan, zoals geld, kennis, sociale contacten, en genetisch materiaal. Hoewel de beroepsstatus van de vader sterk samenhangt met de in een familie aanwezige hulpbronnen, zal die status nooit een perfecte indicatie van alle relevante familiehulpbronnen vormen. Een andere indicator van (een gebrek aan) sociale mobiliteit, de overeenkomst in status tussen broers, lost dit probleem grotendeels op. De statusovereenkomst tussen broers is een resultante van alle invloeden die broers gemeenschappelijk hebben, zoals *alle* gedeelde familiehulpbronnen, maar ook gedeelde kenmerken van de buurt en de invloed van broers op elkaar. Ondanks dat deze indicator meeromvattend is, wordt hij in onderzoek minder gehanteerd dan de vader-zoon associatie omdat data over de beroepen van broers zeldzaam zijn. Naast de eerder genoemde voordelen, is het bijzondere aan de GENLIAS-data dat ze mij in staat stellen om informatie over broers te benutten. Ik gebruik ook de conventionele indicator omdat dat vergelijkbaarheid met andere studies vergroot. Bovendien kan ik op die manier beoordelen in hoeverre de conventionele indicator minder adequaat is dan de meeromvattende maat.

Wanneer het doel is om patronen in sociale mobiliteit te beschrijven en te verklaren, en de daarbij gehanteerde maat voor sociale mobiliteit de statuscorrelatie tussen broers is, dan is een logische vervolgvraag: wat maakt nou precies dat broers meer of minder overeenkomsten vertonen in bereikte beroepsstatus? De moderniseringstheorie beargumenteert dat broers in een tijd van modernisering minder gelijk worden in status omdat werkgevers minder waarde gaan hechten aan door broers gedeelde kenmerken (familiehulpbronnen) en meer waarde aan individuele kenmerken (zoals opleiding). Het gaat er echter niet alleen om hoeveel hulpbronnen waard zijn, maar ook hoe ze over families en binnen families verdeeld worden. De moderniseringstheorie veronachtzaamt deze interdependentie, het competitie-element, tussen mensen op de arbeidsmarkt. Waar ik in **hoofdstuk 2** nog de originele argumenten van de moderniseringstheorie toets, breng ik daarom in **hoofdstuk 3** een theoretische verbetering aan door een competitie-model te ontwikkelen. Op basis van het competitie-model kan verwacht worden dat hoe ongelijker familiehulpbronnen over families verdeeld zijn, hoe gelijkjer broers in status zullen zijn. De dualisme theorie, of de zogenaamde Kuznets-curve, zegt dat ongelijkheid in de beginfase van de modernisering toenam, wat zou betekenen dat de broerrelatie in deze fase toenam. Deze voorspelling, die precies tegen de verwachting van de moderniseringstheorie ingaat, toets ik ook in hoofdstuk 3.

Een andere reden waarom broers gelijk aan elkaar kunnen zijn in status, en gelijk dan op basis van de vader-zoon associatie verwacht zou kunnen worden, is dat andere familieleden ook een invloed kunnen hebben. Recentelijk is er in de literatuur aandacht voor het idee dat een twee-generatie model, zoals gebruikelijk in de stratificatieliteratuur, te beperkt is en dat een multigenerationele benadering van sociale reproductie vereist is voor een correct beeld. Daarom verlaat ik in **hoofdstuk 4** het gebruikelijke ouder-kind paradigma en bestudeer de rol van de grootvaders en overgrootvaders. Ik kijk niet alleen of een twee-generatie model afdoende is om statusreproductie tussen generaties te begrijpen in het Nederland van de negentiende eeuw, maar ik test ook de twee belangrijkste mechanismes die multigenerationele effecten teweeg zouden kunnen brengen: invloed door middel van direct contact en invloed door middel van duurzame hulpbronnen (die geen contact tussen generaties vereisen om van invloed te zijn). Als grootvaders invloed hebben op hun kleinzonen via directe interactie, dan zou de groeiende levensverwachting in de negentiende eeuw meer contact en dus een grotere familie-invloed kunnen betekenen, wat tegen de door de moderniseringstheorie verwachte effecten in zou gaan.

Tenslotte bestudeer ik in **hoofdstuk 5** een andere belangrijke factor die bepaalt hoe gelijk of ongelijk broers in status zijn, namelijk hoe statusverschillen binnen families tot stand komen. Het gaat hier dus bijvoorbeeld om hoe gelijk of ongelijk familiehulpbronnen tussen broers verdeeld worden, maar ook welke invloed broers op elkaar hebben. Waar de moderniseringstheorie alleen aandacht heeft voor ontwikkelingen in stratificatie *tussen* families, beargumenteer ik dat ontwikkelingen in stratificatie *binnen* het gezin even belangrijk zijn om trends in sociale mobiliteit te begrijpen, aangezien de broerrelatie beide stratificaties weerspiegelt. Op basis van de evolutietheorie zouden statusverschillen tussen broers het resultaat kunnen zijn van onderlinge competitie over de ouderlijke hulpbronnen. Deze rivaliteit tussen broers (en zussen) blijkt onder sommige diersoorten erg hevig te zijn, en met de GENLIAS-data kan ik op innovatieve wijze testen of dit ook onder mensen het geval is. Bovendien test ik sociologische verklaringen voor statusverschillen die effecten voorspellen tegengesteld aan de evolutietheorie. Het gaat daarbij om aspecten van de familie-achtergrond die niet identiek zijn voor broers en om onderlinge socialisatie van broers.



## Samenvatting per hoofdstuk

### Hoofdstuk 2

In hoofdstuk 2 test ik of de claim van de moderniseringstheorie klopt dat intergenerationele sociale mobiliteit toenam in de tijd als gevolg van industrialisatie en andere moderniseringsprocessen. Ik bestudeer daartoe ongeveer 360.000 broers uit 189.000 families verspreid over meer dan 500 Nederlandse gemeentes en gedurende een tijdspanne van 70 jaar (1827 tot 1897). Ik vul de informatie over broers en families aan met indicatoren voor de mate van industrialisatie, massacommunicatie, urbanisering, onderwijsexpansie, geografische mobiliteit en massatransport per gemeente. Ik analyseer deze gegevens aan de hand van zogenaamde 'sibling modellen', oftewel multilevel regressie modellen waarbij broers ingebed zijn in families, die op hun beurt weer ingebed zijn in gemeenschappen. Uit mijn onderzoek blijkt dat het totale familie-effect op de statusverwerving van zonen licht daalde gedurende de bestudeerde periode, en dat dit effect groter is dan doorgaans gevonden wordt voor hedendaagse Westerse samenlevingen. Het familie-effect gemeten door middel van de beroepsstatus van de vader daalde geleidelijk in de tweede helft van de negentiende eeuw in Nederland. Een substantieel deel van deze daling kan toegeschreven worden aan sommige, maar niet aan alle, bestudeerde moderniseringsprocessen.

### Hoofdstuk 3

In dit hoofdstuk beschrijf en verklaar ik variatie in de 'totale invloed van familie' in Nederland tijdens de modernisering (in tegenstelling tot de gemeten familie-Invloed zoals in hoofdstuk 2). Ik test tegengestelde hypothesen over hoe moderniseringsprocessen de statusovereenkomst tussen broers beïnvloedden, via hun effect op de waarde en de ongelijkheid van familiehelpbronnen. De hypothesen zijn opgesteld op basis van een competitie model in combinatie met moderniseringstheorie, status-behoud theorie en dualisme theorie. Ik analyseer ongeveer 450.000 gelinkte trouwaktes uit 250.000 families, aangevuld met historische indicatoren van zes moderniseringsprocessen voor meer dan 2.500 gemeenschappen. Met behulp van multilevel meta-regressie modellen concludeer ik dat de statuscorrelatie van broers vanaf ongeveer 1860 licht begon te dalen. Hoewel dit precies parallel loopt aan de periode van de modernisering, blijkt uit mijn onderzoek niet dat de moderniseringsprocessen (behalve wellicht urbanisering en massatransport) verantwoordelijk zijn voor de daling. Sterker nog, in lijn der verwachting met de dualisme theorie, groeide de statusovereenkomst tussen broers met de meeste processen (Industrialisatie, onderwijsexpansie, geografische mobiliteit en massacommunicatie) doordat ze ongelijkheid versterkten.

#### Hoofdstuk 4

Studies over intergenerationele sociale mobiliteit kijken meestal in hoeverre de sociaaleconomische posities van één generatie de posities van de volgende generatie beïnvloeden. Dit hoofdstuk onderzoekt of de instandhouding van ongelijkheden zich over *meer dan twee* generaties uitstrekt in de context van een moderniserende Westerse maatschappij. Ik beschrijf en verklaar de invloed van grootvaders en overgrootvaders op de statusverwerving van 119.662 mannen in industrialiserend Nederland door gebruik te maken van een multigenerationele versie van de GENLIAS-database. Multilevel regressie modellen laten zien dat de beroepsstatus van zowel grootvaders als overgrootvaders een positief effect heeft op de beroepsstatus van mannen, los van de invloed die de vader en ooms hebben. Waar de invloed van vaders en ooms in de tijd vermindert, blijft de invloed van grootvaders en overgrootvaders stabiel. De resultaten suggereren verder dat grootvaders hun kleinzoons beïnvloeden via onderling contact, maar ook *zonder* in contact met ze te staan. Ik concludeer dat, hoewel een multigenerationeel model weinig winst oplevert in termen van “verklaarde variantie”, het weglaten van andere familieleden dan de ouders leidt tot een onjuiste weergave van de familie-invloed op statusverwerving.

#### Hoofdstuk 5

Waar op grond van de evolutietheorie verwacht kan worden dat statusverschillen tussen broers groter zijn wanneer competitie om ouderlijke hulpbronnen sterker is, verwachten sociologen dat statusverschillen groter zijn wanneer broers minder aspecten van familie-achtergrond gemeen hebben, en wanneer er minder onderlinge socialisatie is. De sociologische verwachtingen behelzen vaak effecten die tegengesteld zijn aan die van de evolutietheorie. In dit hoofdstuk test ik deze tegengestelde voorspellingen door statusverschillen tussen broers te bestuderen in Nederland in de periode voor en tijdens de modernisering. Wederom gebruik ik de trouwaktes uit de GENLIAS-database, wat me in staat stelt om 326.890 paar broers uit 125.182 families in de periode 1842-1922 te analyseren. Anders dan de evolutietheorie verwacht, constateer ik dat statusverschillen tussen broers niet groter waren wanneer onderlinge competitie heviger was. Mijn onderzoek biedt wel steun voor de sociologische verklaringen, namelijk dat broers minder overeenkwamen wanneer: 1) ze minder aspecten van familie-achtergrond gemeen hadden (zoals wanneer hun geboorteplaatsen sterker verschilden en de status van hun vader meer fluctueerde); en 2) onderlinge interactie minder waarschijnlijk was (zoals wanneer leeftijdsverschillen groter waren en wanneer er tussentijds andere broers geboren waren).

## Conclusies

### Eerste doel: beschrijven sociale mobiliteit

Ik concludeer allereerst dat de sociale mobiliteit in Nederland in de negentiende eeuw een stuk lager was dan tegenwoordig het geval is. De statuscorrelatie tussen vaders en zonen, de conventionele indicator, was gemiddeld 0.57, terwijl schattingen voor de tweede helft van de twintigste eeuw variëren tussen 0.25 en 0.40; de statuscorrelatie tussen broers, de meeromvattende maat, was rond de 0.53, terwijl schattingen voor contemporair Nederland tussen de 0.18 en 0.38 liggen. Dit betekent verder dat de vader-zoon correlatie de daadwerkelijke invloed van de familie onderschat: de vader-zoon correlatie meet maar 60% van de totale familie-invloed (als de vader-zoon correlatie een perfecte meting was, zou de broerrelatie immers  $0.57 \times 0.57 = 0.32$  moeten zijn in plaats van de gevonden 0.53). Omdat deze onderschatting voor elk tijdvak even groot is, leidt het gebruik van de vader-zoon correlatie niet tot verkeerde conclusies wanneer er relatieve veranderingen in het tijdsverloop mee worden beschreven.

Eén reden waarom de broerrelatie groter is dan men zou verwachten op basis van de vader-zoon correlatie is dat, niet alleen ouders, maar ook andere familieleden een rol speelden in het statusverwervingsproces. Deze dissertatie laat zien dat ooms (0.07), grootvaders (0.12) en overgrootvaders (0.06) van invloed waren, los van de invloed die de vader had (0.42). Met andere woorden, de sociaaleconomische positie van één generatie leidde niet alleen tot voor- of nadelen voor de volgende generatie, maar ook voor de generatie daarna, en zelfs de generatie daarna.

Sociale mobiliteit was betrekkelijk stabiel in de eerste helft van de negentiende eeuw, maar begon langzaam te stijgen vanaf de tweede helft van de eeuw. Tot net over de helft van de eeuw schommelde de vader-zoon correlatie rond de 0.58, om daarna te dalen naar 0.53 tegen het einde van de eeuw, terwijl de broerrelatie in dezelfde periode daalde van 0.57 naar 0.50. De gestegen kans om sociaal mobiel te zijn, blijkt ook uit een dalende invloed van ooms, hoewel de invloed van grootvaders en overgrootvaders wel stabiel bleef.

### Tweede doel: verklaren sociale mobiliteit

Hoewel de zojuist beschreven stijging in sociale mobiliteit precies start wanneer de modernisering op gang komt, is het niet evident dat de moderniseringsprocessen ook daadwerkelijk verantwoordelijk zijn. Voor de vader-zoon correlatie geldt wel dat een aantal moderniseringsprocessen een deel van de stijging in mobiliteit verklaart, maar voor

de broercorrelatie niet. De broercorrelatie stijgt zelfs in de beginfase van veel van de moderniseringsprocessen, en deze stijging vlakkt af, of daalt soms zelfs, voor latere fases van de processen.

Ik concludeer dat de toegenomen levensverwachting van grootvaders, en de daarmee gepaard gaande toename in contactmogelijkheden met kleinzonen, geen verklaring vormt voor de stijging van de broercorrelatie met de modernisering. Deze stijging valt wél te verklaren met behulp van het in hoofdstuk 3 ontwikkelde competitie-model in combinatie met de dualisme theorie. Het competitie-model laat zien dat de broercorrelatie groter wordt als ongelijkheid stijgt, en de dualisme theorie beargumenteert dat ongelijkheid toeneemt in de beginfasen van de modernisering en in de latere fases weer afneemt. Een belangrijke conclusie die ik hier uit trek, is dat het niet alleen van belang is hoe de waarde van familie-hulpbronnen zich met de modernisering ontwikkelt, maar ook hoe de verdeling er van beïnvloed wordt. Zonder nadrukkelijke aandacht voor het competitie-element op de arbeidsmarkt, wordt deze relatie tussen ongelijkheid en sociale mobiliteit gemakkelijk over het hoofd gezien.

Ik beargumenteerde dat gestegen sociale mobiliteit het gevolg kan zijn van minder ongelijkheid tussen families, maar ook van meer ongelijkheid binnen families, en heb daarom een eerste stap gezet om het stratificatieproces binnen gezinnen te begrijpen. Ik vind weinig bewijs dat verschillen binnen families tot stand komen door rivaliteit tussen broers, zoals kan worden verwacht op basis van de evolutietheorie en zoals dat bij sommige diersoorten wel het geval is. De resultaten bieden meer ondersteuning voor sociologische verklaringen, die benadrukken dat broers juist van nut kunnen zijn: als één broer een goede positie bereikt, kan hij met zijn hulpbronnen andere broers helpen of als rolmodel fungeren. Daarnaast lijkt belangrijk te zijn hoeveel aspecten van familie-achtergrond broers met elkaar gemeen hebben.

## **Discussie**

In het synthesehoofdstuk bespreek ik een aantal zaken die in deze dissertatie onopgelost blijven en doe ik suggesties hoe deze mogelijk alsnog op te lossen zijn in toekomstig onderzoek. Ten eerste is het niet precies duidelijk waarom de vader-zooncorrelatie en de broercorrelatie een verschillend effect laten zien van de moderniseringsprocessen op de sociale mobiliteit. In principe valt dit verschil te verklaren doordat de broercorrelatie een meeromvattende maat is dan de vader-zoon correlatie. Het verschil zou optreden als er

factoren zijn die belangrijker worden met de modernisering, maar die niet door de beroepsstatus van de vader en wel door de broerrelatie gemeten worden. Als potentiële factoren die nader onderzoek verdienen, wijs ik onder andere op de hulpbronnen van de moeder en op ontwikkelingen in ongelijkheid.

Ten tweede, de moderniseringsprocessen kunnen de trend naar meer sociale mobiliteit niet volledig verklaren, dus is de vraag welke ontwikkelingen nog meer een rol gespeeld hebben. Ik heb niet expliciet gekeken naar de ontwikkeling van democratische instituties en universele waarden, die ook vaak in de literatuur genoemd worden als oorzaken van meer sociale mobiliteit. Hoewel deze ontwikkelingen deels in samenspel met de bestudeerde moderniseringsprocessen plaatsvonden, vonden ze waarschijnlijk ook deels onafhankelijk van de moderniseringsprocessen plaats. Een andere belangrijke ontwikkeling die in de tweede helft van de negentiende eeuw begon, was de verzuiling. Toch is het niet evident dat de verzuiling in deze periode een groot effect op sociale mobiliteit gehad zal hebben, zo beargumenteer ik. Veranderingen in de factoren waarvan deze dissertatie laat zien dat ze stratificatie binnen gezinnen beïnvloeden, zoals kleiner wordende gezinnen, zijn wat dat betreft veelbelovender als verklaring.

Ten slotte, aan het begin van deze samenvatting gaf ik aan dat het belangrijk is om sociale mobiliteit te bestuderen doordat zij de (negatieve) gevolgen van ongelijkheid vermindert. Toch is het niet zo dat meer sociale mobiliteit altijd beter is. Vanuit het oogpunt van efficiëntie zouden de meest getalenteerde mensen de meest veeleisende, en dus vaak meest gewaardeerde, posities moeten bekleden. Omdat talent deels erfelijk is, is een zekere mate van statusoverdracht efficiënt. Dit roept vragen op als: wat is het optimale niveau van sociale mobiliteit? Is dit wanneer alleen genen een rol spelen, of zijn er nog andere overwegingen? En als statusverwerving puur en alleen op basis van genen zou gebeuren, hoe groot zou dan statusoverdracht zijn? Hypothetisch gezien zou het zo kunnen zijn dat het niveau van sociale mobiliteit nauwelijks verandert in de tijd, maar dat de onderliggende oorzaken wel verschuiven, bijvoorbeeld van een kleinere naar een grotere rol van genen. Er komt steeds meer onderzoek naar dit type vragen waarbij de statusovereenkomsten tussen eenige tweelingen wordt vergeleken met die van “gewone” broers en zussen. Zowel methodologisch als theoretisch is het onderzoeken van dit vraagstuk dus een natuurlijke vervolgstap op deze dissertatie en een veelbelovend pad voor toekomstig onderzoek.



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<sup>1</sup> En mijn huis was nog steeds een bouwval geweest.

leren kennen, maar ik ben blij dat dit toch nog is gebeurd: ik waardeer je bijzonder als kamergenoot, maar meer nog als persoon. Verder mag mijn eigen jaargroep (de beste ICS jaargroep ooit, of niet Mariska en Esther;) niet onvermeld blijven, evenmin als Lieselotte, Dominik (MoSI4life!), Bas (inmiddels ook MoSI4life), Rense (MoSI baas), Sander, Sara, en Sanne, en ik zou eigenlijk nog wel even door kunnen gaan. De afdeling is ook zo'n prettige plek om te werken vanwege het ondersteunend personeel (o.a. Bärbel, Dave, Ellen, Mariëlle, Marjet, Miranda, Pim en Tineke) omdat ze echt steun bieden en altijd klaar staan.

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## Curriculum Vitae

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Antonie Knigge was born in Groningen, the Netherlands, on April 27, 1983. After graduating *cum laude* from the Willem Lodewijk Gymnasium in Groningen in 2001, he studied for a year at Elizabethtown College, Pennsylvania, USA. In 2007 he obtained his Bachelor's degree in sociology with extracurricular courses in mathematics, followed in 2009 by his Research Master's degree in sociology and social research, both *cum laude*, at Utrecht University, the Netherlands. In September of that year he started working as a Ph.D. researcher at the Interuniversity Center for Social Science Theory and Methodology (ICS) and the Department of Sociology of Utrecht University, resulting in the present dissertation. As part of his Ph.D. trajectory he conducted a two-month research visit in 2012 to the California Center for Population Research (CCPR) at the University of California, Los Angeles, USA. In April 2014 he took up a position as a postdoctoral researcher at the ICS / Department of Sociology, and since July 2015 he has been assistant professor of sociology at Utrecht University.



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