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.

Keywords

intergenerational social mobility, status attainment, modernization, sibling models, historical large-scale database

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

(Breen and Jonsson 2005; Ganzeboom, Treiman, and Ultee 1991).

One classic theory in this field—the modernization thesis—claims that in Western societies during the nineteenth and twentieth

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centuries, modernization processes caused a shift from ascription to achievement (Blau and Duncan 1967; Kerr et al. 1960; 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 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 (Grusky and Hauser 1984; Hazelrigg and Garnier 1976; Sieben 2001; Treiman and Yip 1989; Tyree, Semyonov, and Hodge 1979; Yaish and Andersen 2012; Zijdeman 2009), 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 (De Graaf and Huinink 1992; Hauser and Mossel 1985; Hauser and Sewell 1986; Jencks et al. 1972; Olneck 1977; Sieben 2001; Toka and Dronkers 1996; 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.

THEORY

Blau and Duncan's (1967) status attainment model (see Figure 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 1b), whereas education gained importance as a determinant of getting a good job (path C is
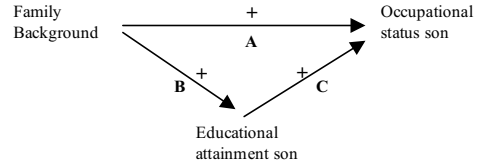

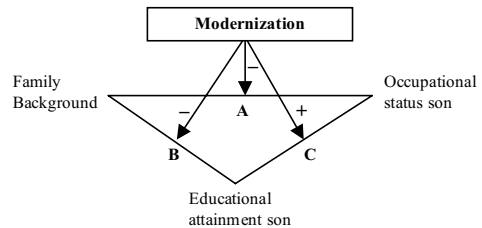**Figure 1a.** Blau and Duncan's Status Attainment Models

Figure 1b. Expected Effect of Modernization on Status Attainment

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,[1] 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.

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 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 (1955:265) 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 jobs. 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).

The Industrialization Mechanism

Treiman (1970) expects the direct positive influence of family resources on a son's occupational status (see Figure 2a, path A) to have decreased with industrialization, because the shifts in demand for labor mean many sons performed different jobs than 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
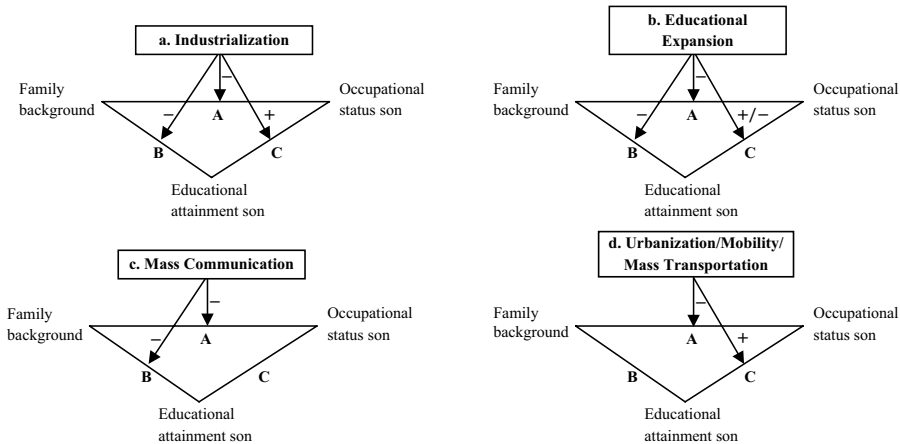
Figure 2. Expected Effects of Different Modernization Components on the Status Attainment Process

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.

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 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.

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 1970:219). 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 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.

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 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.

METHODS

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 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 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 and colleagues [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 percent could not be linked to their parents' marriage certificate and are thus excluded. This
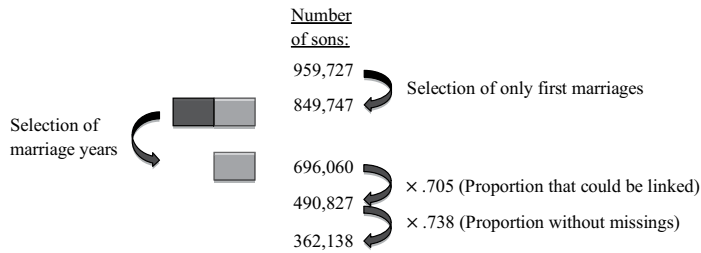
Number
of sons:

959,727

849,747 ⟩ Selection of only first marriages

Selection of
marriage years

696,060 ⟩ × .705 (Proportion that could be linked)

490,827 ⟩ × .738 (Proportion without missings)

362,138

Figure 3a. Overview of Selections and Missing Data

1812   1882   1908

Year of marriage   Parents
                     Sons

1831   1842   1922

■ Excluded cases
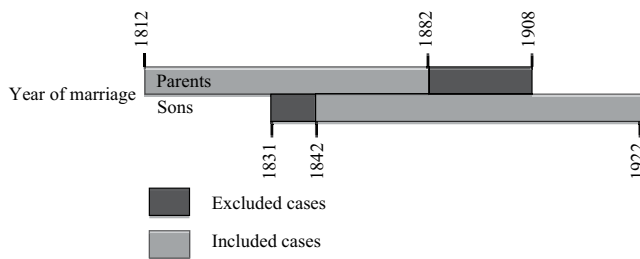
■ Included cases

Figure 3b. Selection of Marriage Years, Parents and Sons

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 missing or insufficient to allow us to assign an occupational status to either the groom (2.2 percent of cases) or his father (24.7 percent of cases). After list-wise deletion of these cases (26.2 percent 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 percent (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 percent in 1849, 13 percent in 1899, and 15 percent 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 percent 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 (see Maas et al. 2011; Zijdeman 2010).

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).[2] 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).[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 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 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 "loneway" 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.[4]

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 Zijdeman

(2009, 2010) in using the number of steam engines. These data are available up to 1890. Figure 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 percent of municipalities fall).

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 4b demonstrates that although, on average, the number of students in secondary education quadrupled, over 90 percent 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 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 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

Table 1. Descriptives

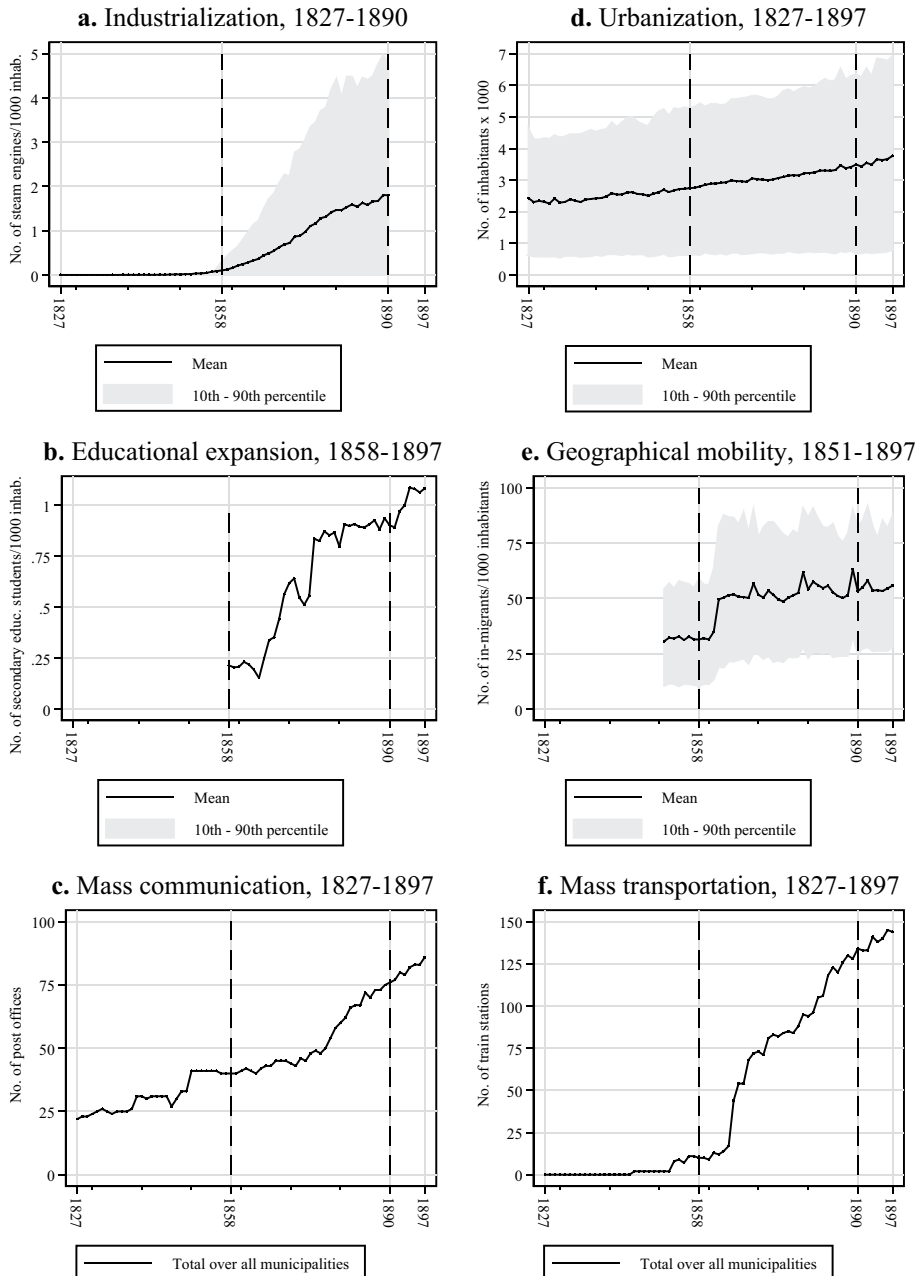|	Years of Socialization: 1827 to 1897				Years of Socialization: 1858 to 1890			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Variables								
Son's occupational status	46.33	12.58	10.60	99.00	46.63	12.51	10.60	99.00
Father's occupational status	46.88	10.20	10.60	99.00	46.73	10.16	10.60	99.00
Time	4.07	1.98	.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/1,000 inh.					1.52	2.43	.00	24.53
Educational expansion: students in sec. educ./1,000 inh.					2.14	5.36	.00	62.93
Mass communication: post office (yes/no)					.31		.00	1.00
Urbanization: inhabitants/1,000					7.81	10.19	.21	56.41
Geographic mobility: in-migrants/1,000 inh.					51.82	30.21	.00	566.06
Mass transportation: train station (yes/no)					.34		.00	1.00
Number of Sons	362,138				193,426			
Number of Families	189,018				100,303			
Number of Communities	29,208				13,628			
Number of Municipalities	543				456			

Figure 4. Modernization Indicators over Time (the Netherlands, 1827 to 1897)

onward. Initially, geographic mobility rose sharply, but it increased only slightly during the remaining period studied here (see Figure 4e). However, there was quite a high degree of spatial variation in in-migration, as indicated by the wide range within which 80 percent 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

Table 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)

[a]All continuous variables were standardized in the path model; standard errors in parentheses; factor variance set at 1.

http://www.stationsweb.nl/. Figure 4f shows that the number of municipalities in our data with a train station rose exponentially.

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, 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,[5] using confirmatory factor analyses (see Table 2, panel B).[6]

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).

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 (Leckie and Charlton 2013; Rasbash et al. 2012).

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; β_{000} is the population mean status; $c_{0k} \sim (0, \sigma^2_{c_{0k}})$ is the error term at the community level; $f_{0jk} \sim (0, \sigma^2_{f_{0jk}})$ is the error term at the family level; and $s_{0ijk} \sim (0, \sigma^2_{s_{0ijk}})$ 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

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

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,

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

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

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:

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

The regression coefficient β_{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 $c_{1k} \sim (0, \sigma^2_{c_{1k}})$ for father's status at the community level:[7]

$$Y_{ijk} = \beta_{000} + \beta_{010}FOCC_{jk} + c_{1k}FOCC_{jk} + c_{0k}$$

$$+ f_{0jk} + s_{0ijk}, \quad (M3)$$

where β_{010} is the slope of father's status for the average community and $\sigma^2_{c_{1k}}$ 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 β_{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 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). 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 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.

RESULTS

Describing Openness

Total family impact. From Model 1 in Table 3, we can calculate, using Equation 1, that total family impact ρ_{c+f} was, on average,

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

Note: Standard errors in parentheses (only for unstandardized coefficients).
[a]Dependent variable and all continuous independent variables standardized prior to estimation.
[b]Centered around the mean.
[c]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).

.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 5 shows results for the same analyses, but now for seven decades
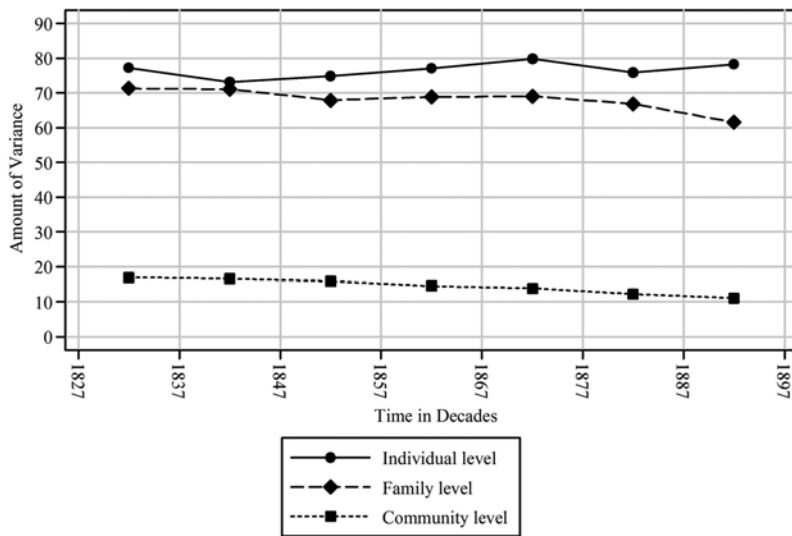
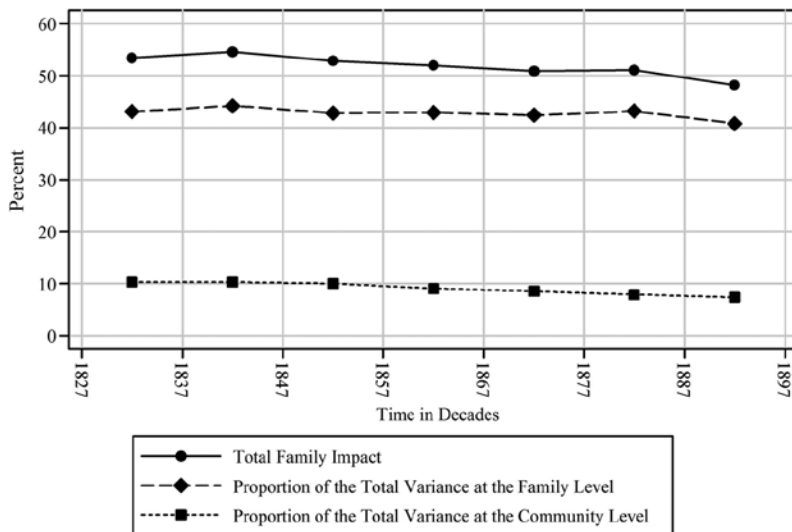**Figure 5a.** Variance at Each Level per Decade (1827 to 1897)

Figure 5b. Total Family Impact per Decade (1827 to 1897)

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 5a). This means the total family impact ρ_{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[8] and implies a decrease of about 10 percent in 70 years (see Figure 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
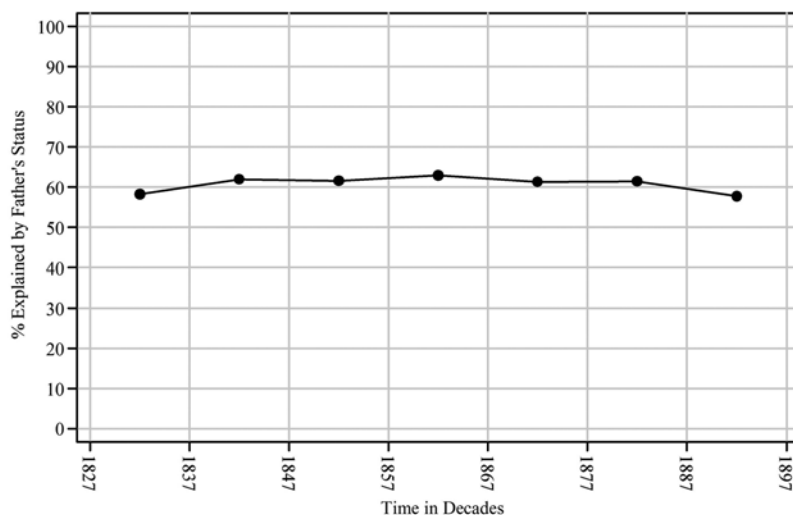
Figure 6. Variance Explained by Measured Family Influence per Decade (1827 to 1897)

indicator of the influence of family resources. Model 2 in Table 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.

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 percent going from Model 1 ($\sigma^2_{c_{0k}} + \sigma^2_{f_{0jk}} = 82.596$) to Model 2 ($\sigma^2_{c_{0k}} + \sigma^2_{f_{0jk}} = 33.156$). Father's occupational status explains about as much variance at the family level (59.9 percent) as it does at the community level (59.6 percent). The latter means families from the same social strata tend to cluster together, and differences between communities are partly family composition effects.

Figure 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 percent, 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: $\sigma^2_{c_{1k}} = .0085$. This means 95 percent 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 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 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 4). Visual inspection of Figure 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
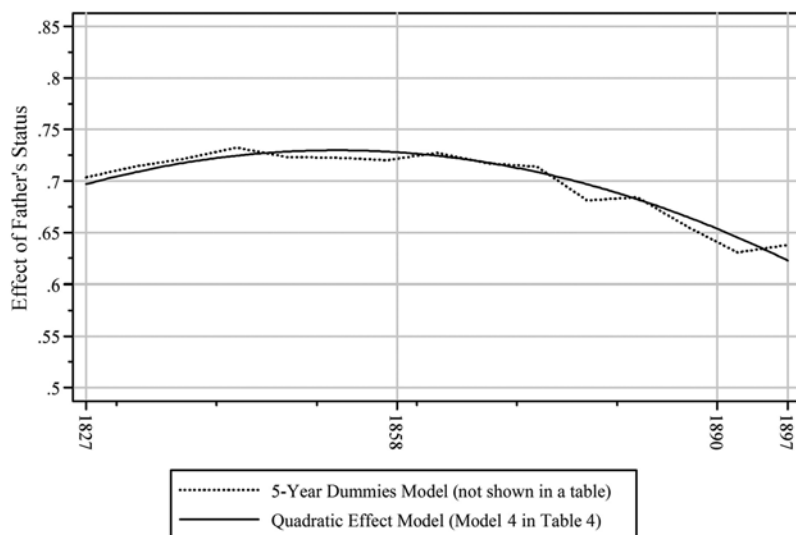
Figure 7. Measured Family Influence on Son's Status over Time (1827 to 1897)

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 percent, from $\sigma^2_{c_{1k}}$ = .0085 (Model 3) to $\sigma^2_{c_{1k}}$ = .0070 (Model 4). Because a general time trend explains only 17.6 percent 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.

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 4, we see measured family influence is indeed lower in more modernized communities ($b = -.027$; β $-.038$). 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.[9]

The *industrialization* and *educational expansion* mechanism states that due to industrialization, sons were less likely to

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

Note: Standard errors in parentheses (only for unstandardized coefficients).
[a]Dependent variable and all continuous independent variables standardized prior to estimation.
[b]Centered around the mean.
[c]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).

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 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.

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 percent 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.

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 percent 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 percent 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

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

Table 5. *(continued)*

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

Note: Standard errors in parentheses (only for unstandardized coefficients).
[a]Dependent variable and all continuous independent variables standardized prior to estimation.
[b]Centered around the mean.
[c]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).

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 and colleagues (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 percent of the total family impact. This means measured family resources capture a similar amount of the total family impact as the 61 percent 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 (Erikson and Goldthorpe 1992; Featherman et al. 1975). 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 (Breen and Luijkx 2004; Ganzeboom et al. 1989). 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 investigation. 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 (Björklund and Salvanes 2010; Bras et al. 2010; Conley 2004). 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.

Acknowledgments

Notes

1. It is possible that the indirect effect (B × 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 × C) become higher.
2. More details can be found in the codebook for the HISCI-NL dataset, which is available upon request.
3. 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.
4. If we correct for the attenuation due to measurement error in father's status, the intergenerational correlation becomes .587 instead of .549 (see Table 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.
5. 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.
6. Including geographic mobility in the scale or separately in the analyses does not change the results qualitatively.
7. 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).
8. The 95 percent confidence interval of the difference between the ρ_{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 ρ_{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).
9. We repeated the steps in Table 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 5, Model 6). This straight line is compatible with Figure 7.

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