CHICAGO JOURNALS

Sources of Sibling (Dis)similarity: Total Family Impact on Status Variation in the Netherlands in the Nineteenth Century

Author(s): Antonie Knigge, Ineke Maas, and Marco H. D. van Leeuwen

Source: *American Journal of Sociology*, Vol. 120, No. 3 (November 2014), pp. 908-948
Published by: The University of Chicago Press
Stable URL: http://www.jstor.org/stable/10.1086/679104
Accessed: 10/03/2015 11:25

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at http://www.jstor.org/page/info/about/policies/terms.jsp

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

The University of Chicago Press is collaborating with JSTOR to digitize, preserve and extend access to *American Journal of Sociology*.

http://www.jstor.org

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

Sources of Sibling (Dis)similarity: Total Family Impact on Status Variation in the Netherlands in the Nineteenth Century[1]

Antonie Knigge and Marco H. D. van Leeuwen
Utrecht University

Ineke Maas
Utrecht University and Vrije Universiteit Amsterdam

The authors describe and explain variation in the occupational status resemblance of brothers in the Netherlands during modernization. They 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. The authors 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, they find that brother correlations in status decreased slowly from about 1860 onward. Although this exactly parallels the period of modernization, the authors 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.

The stratification of society along status lines has intrigued many, because to which status group individuals belong is pivotal for their well-being (see

[1] We are grateful to Tom Snijders and Jeroen Weesie for their useful comments. Earlier versions of this work have been presented at the Dag van de Sociologie (2010), ISA

© 2015 by The University of Chicago. All rights reserved.
0002-9602/2015/12003-0006$10.00

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 examine to what extent children can attain a status that is different from that of the family they were born into (Ganzeboom, Treiman, and Ultee 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 19th 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 its influence (Collins 1971; Bourdieu and Passeron [1977] 1990). 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 1976; 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, Sheridan, and Hauser 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 var-

World Congress (2010), Cambridge Social Stratification Seminar (2010), 8th International Amsterdam Multilevel Conference (2011), European Social Science History Conference (2012), the spring meeting (2012) of the Research Committee on Social Stratification and Mobility (RC28) of the International Sociological Association (ISA), and Migration and Social Stratification Seminar Utrecht (2013). We thank the participants of these meetings for their fruitful comments. This research was supported by the European Research Council (ERC) Advanced Investigators Grant "Towards Open Societies." Direct correspondence to Antonie Knigge, Department of Sociology/ICS, Utrecht University, Padualaan 14, 3584 CH Utrecht, The Netherlands. E-mail: a.knigge@uu.nl

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

iables and are therefore sometimes referred to as the total family impact (Björklund, Jäntti, and Lindquist 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 19th 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 (see, e.g., Sieben and De Graaf 2001; 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.[2] 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

[2] For interesting discussions of 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, Alderson, and Nielsen (2009).

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

dependent variable in a meta-regression with the modernization indicators as predictors in a multivariate fashion.

Another reason 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 (e.g., Bourdieu and Passeron [1977] 1990; Blau and Duncan 1967; Treiman 1970; Grusky 1983; Knigge et al. 2014). 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 it studies simultaneously the value and inequality of family resources—the two probable sources of fraternal resemblance that 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).

THEORY

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. 163–64) 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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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

$$R = a \times F + b \times I, \tag{1}$$

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.[3] Employers will compete for those applicants who are highest in the resources required by 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.

In figure 1*A*, 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.[4] 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 fig. 1*A*). 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 fig. 1*B*). 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

[3] 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.

[4] 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 $I_{e2} = 59$.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

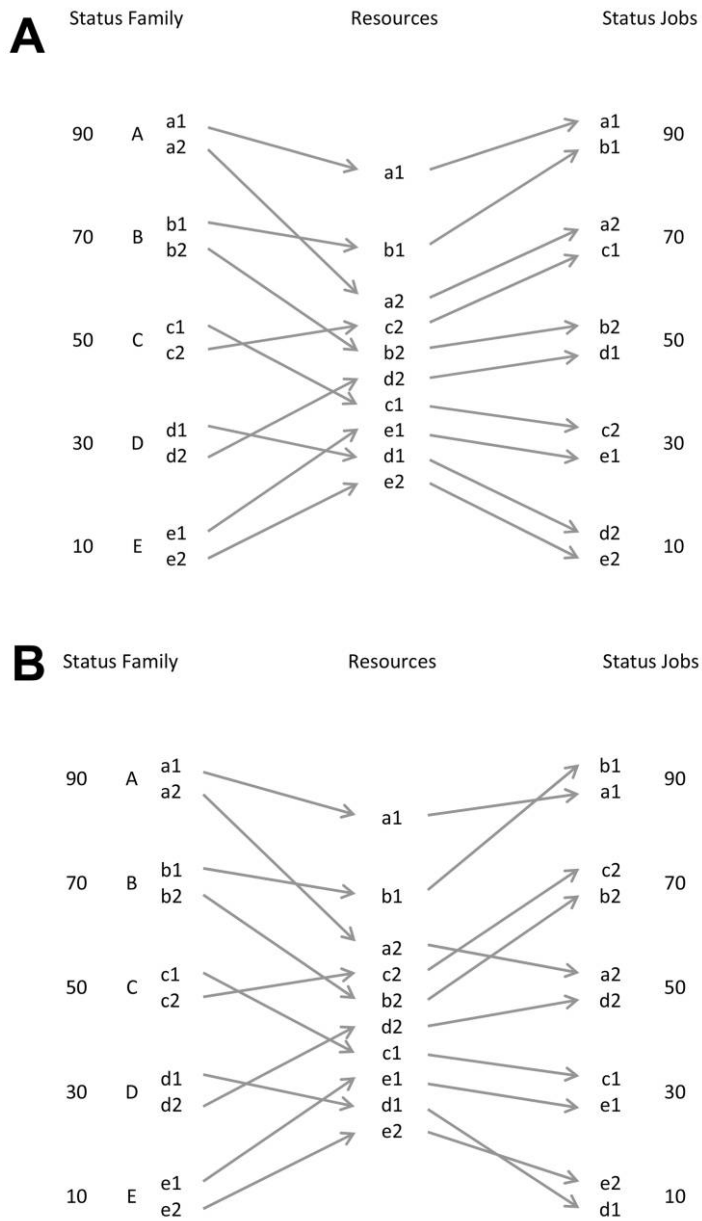

FIG. 1.—Status attainment as a matching process: a visual representation of the job competition model. The screening of resources by employers shown as perfect (A) and imperfect (B).

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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.

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 eq. [1]). To illustrate this, we show in figure 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 screening ability by employers as in figure 1*A*.[5] 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 19th 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

[5] In fact, panel (Unequal, Middle) is the same as fig. 1*A*, except that for the visual clarity of fig. 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.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

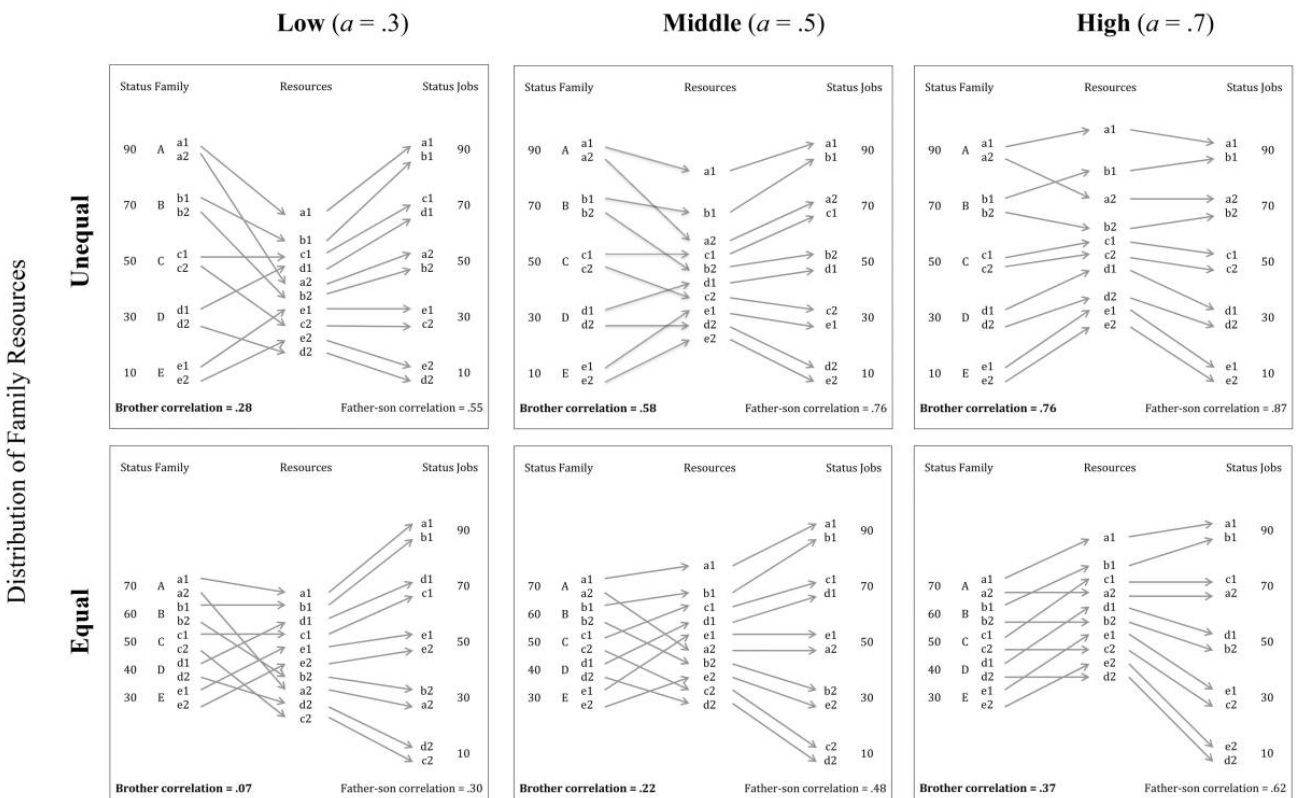

FIG. 2.—Simulation of the status attainment process: brother correlations for a low, middle, and high value of family resources and for an equal and unequal distribution of family resources. The y axis (Equal/Unequal) indicates the distribution of family resources; the x axis indicates the value of family resources.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 19th century. The expansion of the secondary school system really took off only from 1910 onward (Mandemakers 1996).

In preindustrial 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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 (Collins 1971; Bourdieu and Passeron [1977] 1990).[6] 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" of no difference asserted by status maintenance theorists.[7] A summarizing overview of all hypotheses can be found at the end of the theory section in figure 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 fig. 1*B* with fig. 1*A*). If family resources become difficult to judge, employers may try to order applicants on the basis of 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

[6] 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.

[7] 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.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 19th century, but to varying degrees depending on the region and time period. Urbanization was already quite high in the Netherlands by the beginning of the 19th 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). Also, in the municipalities that we study, the number of train stations surged in this period. 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 fig. 4).

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 fig. 2) instead of 90, 70, 50, 30, and 10 as before (in the upper panel Unequal in fig. 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, and .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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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. 4, panel *H*).

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 "nonlinear" 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 19th century. The number of post offices and 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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 (fig. 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 toward 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*, fig. 3).

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*, fig. 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*, fig. 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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

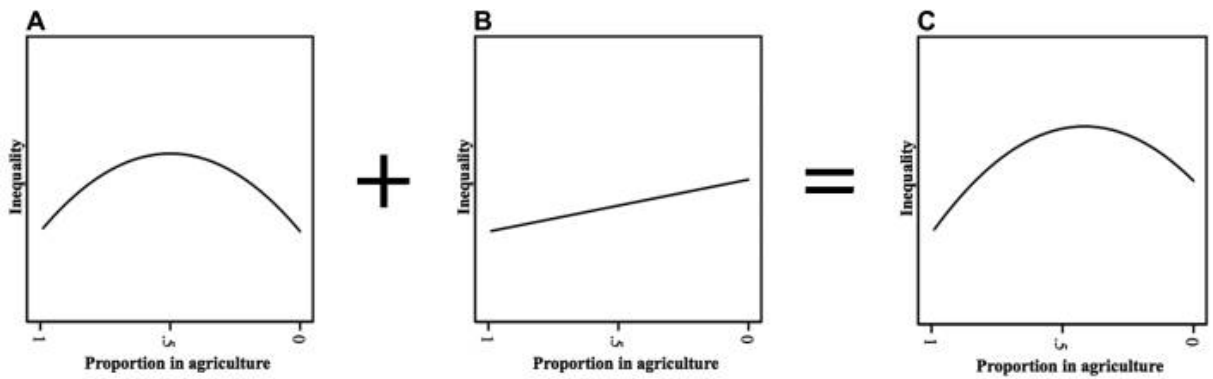

FIG. 3.—Expected partial effects (between sector and within sector, respectively) and total effect of a lowering proportion of people working in agriculture on inequality.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 19th 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.[8] 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 (fig. 4, last column of panel *G*).

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 et al. 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 (fig. 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 (fig. 4, last column of panels *C*, *D*, *E*, and *F*).

[8] 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.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

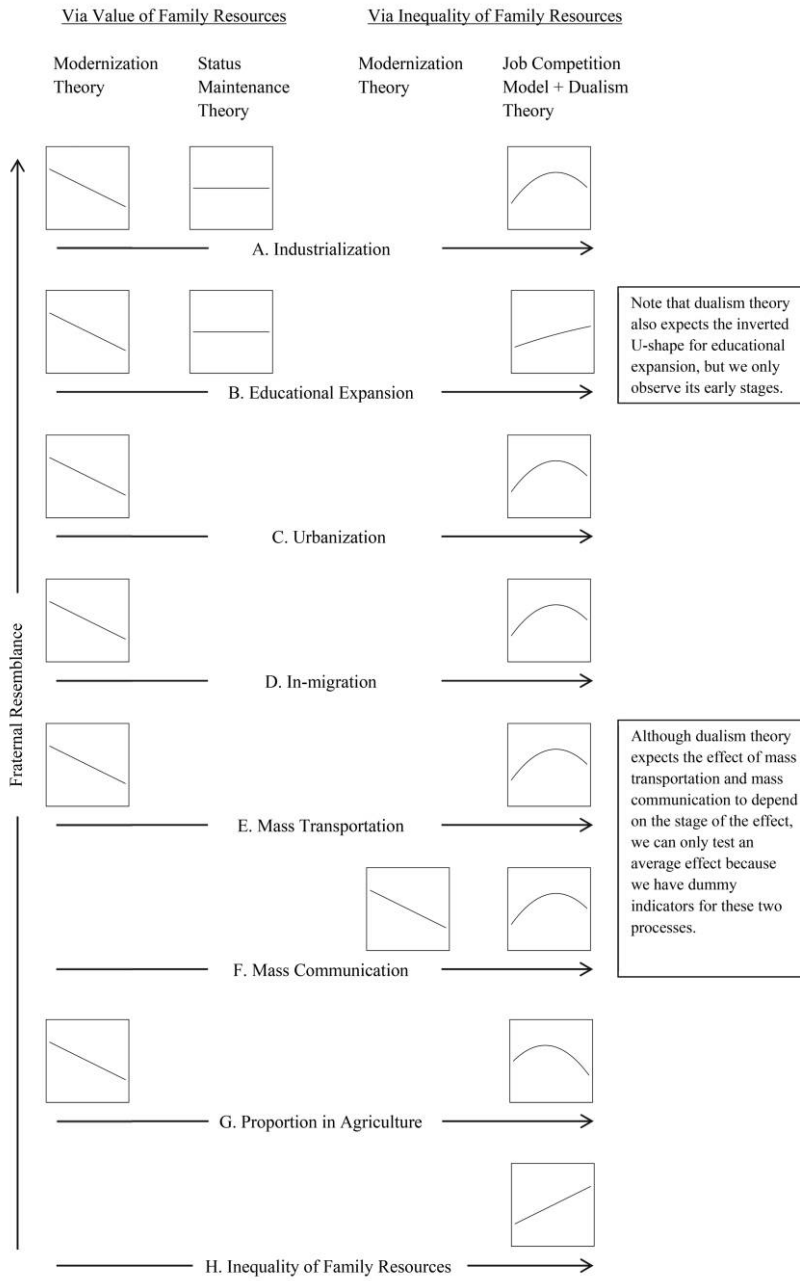

FIG. 4.—Hypothesized effects of community indicators on fraternal resemblance

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

METHOD

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).

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, Kok, and Mandemakers [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).

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 also married 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 because of 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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 1).

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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

TABLE 1
NUMBER OF OBSERVATIONS

	1827–97		1858–90		
	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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 of 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 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.[9]

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, Maas, and Miles 2002), the historical counterpart of the 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, Prandy, and Blackburn 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 2 for descriptives of all variables).

[9] More detailed information can be found in the HISCI-NL code book, which can be sent by the corresponding author on request.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

TABLE 2
DESCRIPTIVES

Variable	Years of Socialization							
	1827–97				1858–90			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Individual level:								
Occupational status son	46.47	12.84	10.60	99.00	46.99	12.74	10.60	99.00
Community level:								
Five-year cohorts			1	14			7	13
Steam engines/100 inhabitants					.11	.21	0	2.42
Students in secondary education/100 inhabitants					.07	.33	0	5.98
Post office (yes/no)					.15		0	1
ln(inhabitants)					7.77	.79	5.56	10.94
ln(in-migrants/1,000 inhabitants)					3.77	.50	.32	6.17
Train station (yes/no)					.20		0	1
Proportion farmer					.36	.25	0	1
Proportion in services					.19	.14	0	1
Gini family resources					.10	.04	0	.21
Brother correlation (ρ)	.49	.22	.00	1.00	.48	.22	.00	1.00
SE (σ_e)	.14	.07	.00	.42	.13	.07	.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.

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 1989–91). 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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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.

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 *immigration* 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).

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

TABLE 3
CORRELATIONS BETWEEN COMMUNITY CHARACTERISTICS

	Time	Steam Engines	Students	Post Office	Inhabitants	Immigrants	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		
Immigrants	.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).

Method of Analyses

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

$$y_{ij} = \beta_{00} + \varepsilon_{ij}, \tag{2}$$

where β_{00} is the population mean status and ε_{ij} the residual, which is further decomposed as follows:

$$\varepsilon_{ij} = a_i + b_{ij}, \tag{3}$$

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

$$y_{ij} = \beta_{00} + a_i + b_{ij}. \tag{4}$$

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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

$$\sigma_y^2 = \sigma_a^2 + \sigma_b^2. \tag{5}$$

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

$$\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_b^2}. \tag{6}$$

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 σ_e using the delta method (cf. Mazumder 2008). Descriptive results of these estimates are found in table 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 σ_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

$$r_c = \rho_c + e_c, \tag{7}$$

where ρ_c is the true brother correlation of community c, and e_c is the deviation from this due to sampling error with known variance σ_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 we include only those communities for which we have 20 or more observations.

The true brother correlation ρ_c is assumed to vary between communities, so

$$\rho_c = \gamma_0 + u_c, \tag{8}$$

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

where γ_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 σ^2_u. Substituting equation (8) into (7) leads to

$$r_c = \gamma_0 + u_c + e_c. \tag{9}$$

The idea of the model is thus that brother correlations differ between communities in part because of true differences between communities (σ^2_u) and in part because of sampling error (σ^2_e). 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

$$u_{mc} = v_m + w_{mc}, \tag{10}$$

where v_m is the average deviation of all communities within municipality m from the overall population mean γ_{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

$$\sigma^2_u = \sigma^2_v + \sigma^2_w, \tag{11}$$

which shows that the true variation between communities, σ^2_u, stems from differences *between* municipalities, σ^2_v, and from differences *within* municipalities, σ^2_w. By substituting (10) into (9), we get

$$r_{mc} = \gamma_{00} + v_m + w_{mc} + e_{mc}. \tag{12}$$

We estimate equation (12) through a multilevel model with two "real" levels, the municipality and the community levels (which yield σ^2_v and σ^2_w, respectively), and one "pseudo-level" (which yields σ^2_e). It can be shown that σ^2_e 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 σ_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 (σ^2_v) and within municipalities (σ^2_w).

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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

$$\sigma_u^2 = \sigma_w^2. \tag{13}$$

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-effects models—will be of no avail, but interacting terms with the mean value of each municipality will reach this goal (technically, this gives the first-order Taylor approximation of the quadratic function).

RESULTS

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

To form an impression of how large fraternal resemblance was and whether it changed over time in the Netherlands in the 19th century, we first estimated equation (12) in model 1 (see table 4). We see that the brother correlation in Dutch communities was, on average, $\gamma_{00} = 0.538$. 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.

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 4, and as a visual aid we plotted them in figure 5 as well. The brother correlation is 0.574 in the first cohort (1827–32), which serves as the reference category. It remains rather stable during the second quarter of the 19th 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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

TABLE 4

Estimated Brother Correlations in Occupational Status over Time

	Model			
	(1)	(2)	(3)	(4)
Fixed part:				
Intercept	.538***	.574***	.522***	.557***
	(.006)	(.013)	(.007)	(.012)
1827–32		ref.		
1833–37		.003		
		(.017)		
1838–42		−.033		
		(.017)		
1843–47		−.021		
		(.017)		
1848–52		−.012		
		(.016)		
1853–57		−.002		
		(.017)		
1858–62		−.013		ref.
		(.017)		
1863–67		−.027		−.015
		(.016)		(.015)
1868–72		−.021		−.006
		(.016)		(.015)
1873–77		−.066***		−.051***
		(.016)		(.015)
1878–82		−.052**		−.036
		(.016)		(.015)
1883–87		−.068***		−.052***
		(.016)		(.015)
1888–92		−.080***		−.063***
		(.016)		(.015)
1893–97		−.073***		
		(.016)		
Random part:				
σ_v^2 (between municipalities)	.010***	.010***	.011***	.011***
	(.001)	(.001)	(.001)	(.001)
σ_w^2 (within municipalities)	.027***	.026***	.023***	.022***
	(.001)	(.001)	(.001)	(.001)
σ_e^2 (sampling error)	1.000	1.000	1.000	1.000
	(constrained)	(constrained)	(constrained)	(constrained)
Observations	4,947	4,947	2,539	2,539

Note.—Numbers in parentheses are SEs.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

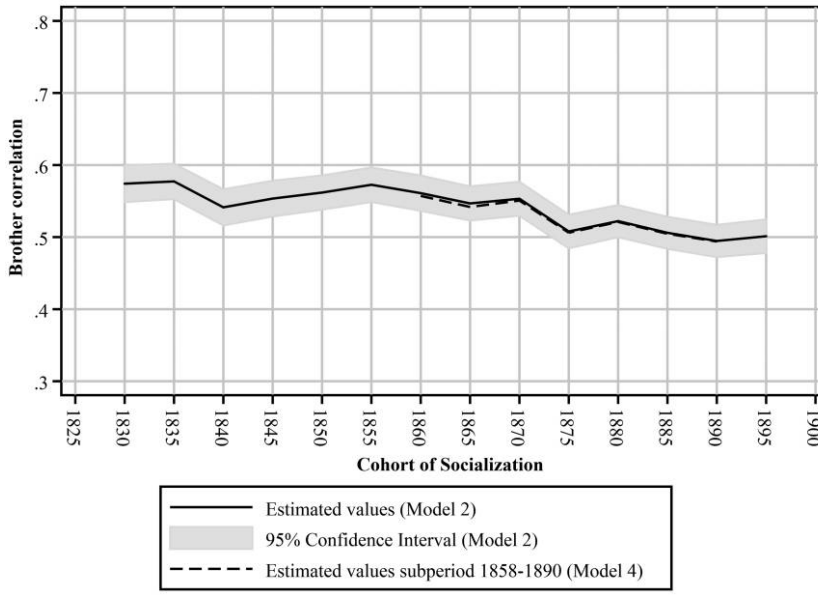

FIG. 5.—Fraternal resemblance over time (1827–97)

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 (σ^2_w 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 4). Figure 5 also shows nicely that the time trend predicted in model 4 can hardly be discerned from that in model 2.

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

To test our hypotheses regarding the influence of modernization on fraternal resemblance (see fig. 4), we add the modernization indicators in model 5 (see table 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).

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

TABLE 5
ESTIMATED BROTHER CORRELATIONS IN OCCUPATIONAL STATUS BY MODERNIZATION PROCESSES

	Model			
	(5)	(6)	(7)	(8)[a]
Fixed part:				
Intercept	.575***	.558***	.559***	.557***
	(.014)	(.013)	(.013)	(.068)
1858–62	ref.	ref.	ref.	ref.
1863–67	−.029	−.012	−.012	−.023
	(.016)	(.016)	(.016)	(.016)
1868–72	−.024	−.007	−.008	−.018
	(.016)	(.016)	(.016)	(.016)
1873–77	−.072***	−.053**	−.055***	−.062***
	(.016)	(.016)	(.016)	(.017)
1878–82	−.065***	−.039*	−.041*	−.053**
	.017)	(.017)	(.017)	(.019)
1883–87	−.081***	−.055**	−.058***	−.074***
	(.017)	(.017)	(.017)	(.020)
1888–90	−.093***	−.066***	−.069***	−.094***
	(.017)	(.017)	(.017)	(.021)
Steam engines[b]	.124*	.065	.078	.004
	(.049)	(.047)	(.046)	(.065)
Steam engines[2bc]	−.036	−.007	−.014	.061
	(.036)	(.035)	(.034)	(.090)
Students[b]	.025	.018	.018	−.016
	(.016)	(.015)	(.014)	(.018)
Inhabitants[b]	−.148	−.246**	−.224**	.073
	(.098)	(.088)	(.086)	(.050)
Inhabitants[2bc]	.006	.011*	.010	.017
	(.006)	(.006)	(.005)	(.041)
In-migrants[b]	.187*	.113	.114	−.001
	(.077)	(.075)	(.074)	(.017)
In-migrants[2bc]	−.022*	−.016	−.016	−.041
	(.010)	(.010)	(.010)	(.024)
Train station	−.026	−.023	−.022	.015
	(.014)	(.013)	(.013)	(.016)
Post office	.062***	.042*	.042**	.011
	(.018)	(.017)	(.016)	(.024)
Farmers[b]		.010	−.024	.095*
		(.079)	(.078)	(.045)
Farmers[2bc]		−.146	.029	−.103
		(.083)	(.086)	(.205)
Services[b]		.408***	.240*	.099
		(.098)	(.100)	(.056)
Services[2bc]		−.340*	−.187	.423
		(.163)	(.163)	(.373)
Gini status[b]			1.332***	1.227***
			(.190)	(.216)
Random part:				
σ_v^2 (between municipalities)	.008***	.004***	.004***	
	(.001)	(.001)	(.001)	

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

TABLE 5 (*Continued*)

	Model			
	(5)	(6)	(7)	(8)[a]
σ^2_w (within municipalities)	.022***	.022***	.022***	.014***
	(.001)	(.001)	(.001)	(.001)
σ^2_e (sampling error)	1.000	1.000	1.000	1.000
	(constrained)	(constrained)	(constrained)	(constrained)

NOTE.—N = 2,539. Numbers in parentheses are SEs.

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

[b] Mean centered.

[c] 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.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

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 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. 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 fig. 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,

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

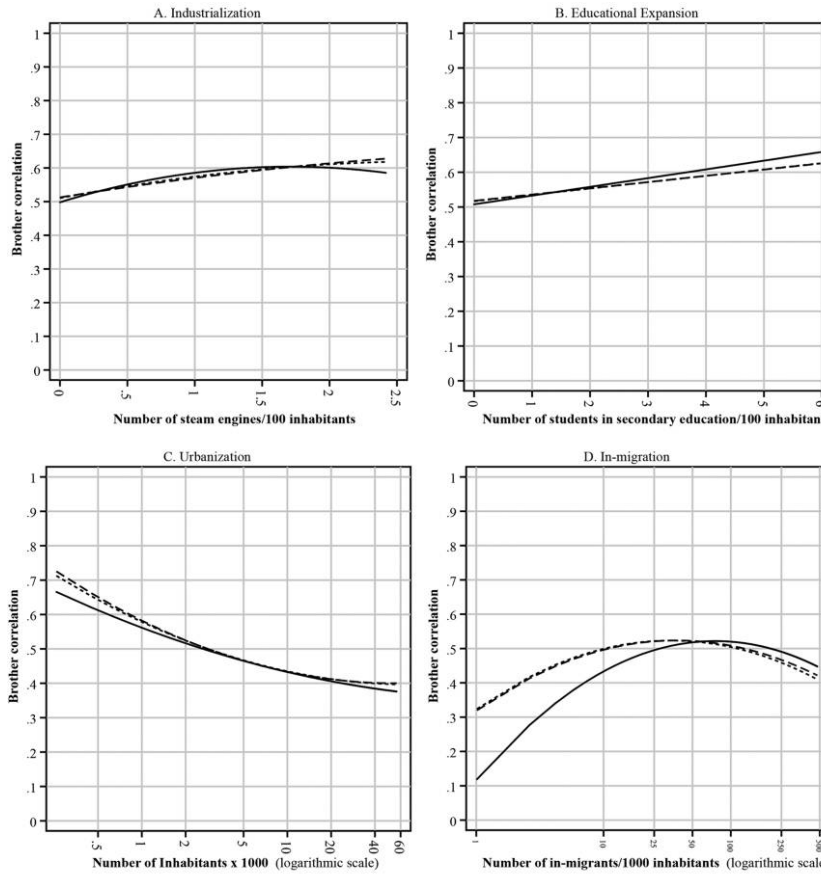

Fig. 6.—Fraternal resemblance as function of modernization processes

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.

The results for urbanization in panel *C* of figure 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 fig. 6).

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

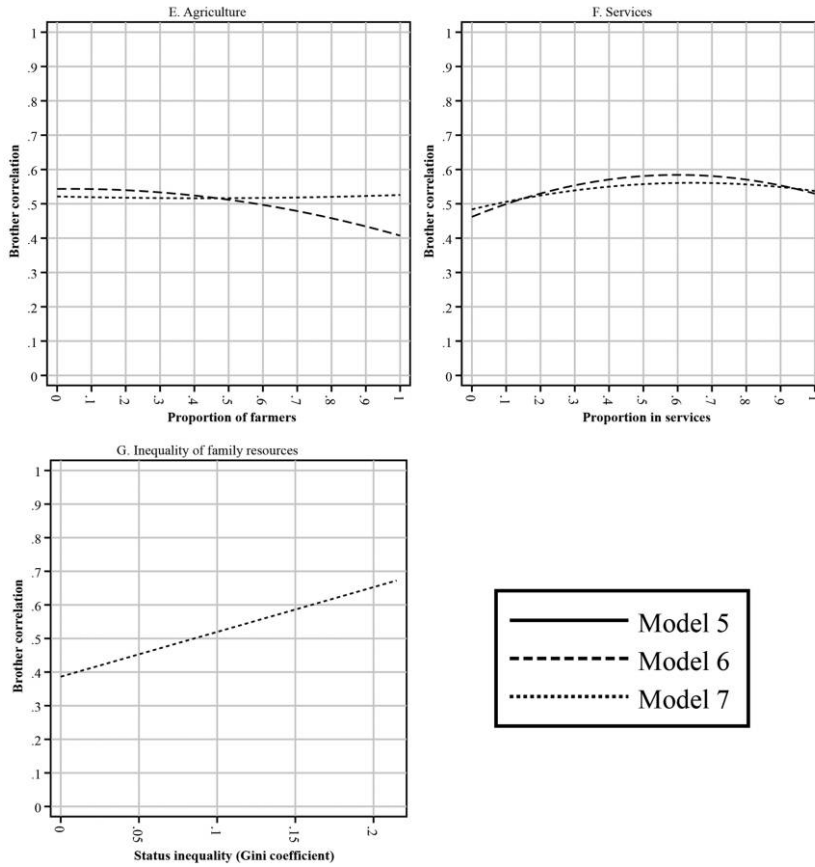

FIG. 6.—(*Continued*)

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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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., σ^2_v 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.

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 5). Panel *E* of figure 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 fig. 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 fig. 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 (σ^2_v) left unexplained in model 5 but hardly any of the variance within municipalities (σ^2_w).

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 fig. 6). All positive effects become smaller and often

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 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 fig. 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 fig. 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 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.

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

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 (Collins 1971; Bourdieu and Passeron [1977] 1990; 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 data set 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 19th 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, Luijkx, and Treiman 1989; Breen and Luijkx 2004; Knigge et al. 2014). 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 20th 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,

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

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 about 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 about 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.[10] Indeed, there is historical evidence that middle- and high-class jobs at the national railway, post of-

[10] We are indebted to an anonymous reviewer for suggesting this idea.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

fice, 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 19th 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). Also, nonfarming families may 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 socioeconomic 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, 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).

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 19th 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.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

REFERENCES

Beekink, Erik, Onno Boonstra, Theo Engelen, and Hans Knippenberg. 2003. *Nederland in Verandering: Maatschappelijke Ontwikkelingen in Kaart Gebracht, 1800–2000*. Amsterdam: Aksant.

Björklund, Anders, Tor Eriksson, Markus Jäntti, Oddbjørn Raaum, and Eva Österbacka. 2002. "Brother Correlations in Earnings in Denmark, Finland, Norway and Sweden Compared to the United States." *Journal of Population Economics* 15:757–72.

Björklund, Anders, Markus Jäntti, and Matthew J. Lindquist. 2009. "Family Background and Income during the Rise of the Welfare State: Brother Correlations in Income for Swedish Men Born 1932–1968." *Journal of Public Economics* 93:671–80.

Black, Sandra E., and Paul J. Devereux. 2011. "Recent Developments in Intergenerational Mobility." Pp. 1487–1541 in *Handbook of Labor Economics*, edited by Orley Ashenfelter and David Card. Amsterdam: Elsevier.

Blau, Peter M., and Otis D. Duncan. 1967. *The American Occupational Structure*. New York: Wiley.

Boudon, Raymond. 1974. *Education, Opportunity, and Social Inequality: Changing Prospects in Western Society*. New York: Wiley.

Bourdieu, Pierre, and Jean-Claude Passeron. (1977) 1990. *Reproduction in Education, Society and Culture*. London: Sage.

Bras, Hilde. 2002. *Zeeuwse Meiden: Dienen in de Levensloop van Vrouwen, ca. 1850–1950*. Amsterdam: Aksant.

Bras, Hilde, and Jan Kok. 2003. "'Naturally, Every Child Was Supposed to Work': Determinants of the Leaving Home Process in the Netherlands, 1850–1940." Pp. 403–50 in *The Road to Independence: Leaving Home in Western and Eastern Societies, 16th–20th Centuries*, edited by F. Van Poppel, M. Oris, and J. Z. Lee. Bern: Peter Lang.

Bras, Hilde, Jan Kok, and Kees Mandemakers. 2010. "Sibship Size and Status Attainment across Contexts: Evidence from the Netherlands, 1840–1925." *Demographic Research* 23:73–104.

Breen, Richard, and Jan O. Jonsson. 2005. "Inequality of Opportunity in Comparative Perspective: Recent Research on Educational Attainment and Social Mobility." *Annual Review of Sociology* 31:223–43.

Breen, Richard, and Ruud Luijkx. 2004. "Conclusions." Pp. 383–410 in *Social Mobility in Europe*, edited by Richard Breen. Oxford: Oxford University Press.

Coleman, James S. 1987. "Microfoundations and Macrosocial Behavior." Pp. 153–73 in *The Micro-Macro Link*, edited by J. C. Alexander, B. Giesen, R. Münch, and N. J. Smelser. Berkeley and Los Angeles: University of California Press.

———. 1991. "Matching Processes in the Labor Market." *Acta Sociologica* 34:3–12.

Collins, Randall. 1971. "Functional and Conflict Theories of Educational Stratification." *American Sociological Review* 36:1002–19.

Conley, Dalton. 2004. *The Pecking Order: Which Siblings Succeed and Why*. New York: Pantheon.

Conley, Dalton, and Rebecca Glauber. 2008. "All in the Family? Family Composition, Resources, and Sibling Similarity in Socioeconomic Status." *Research in Social Stratification and Mobility* 26:297–306.

De Graaf, Paul M., and Johannes J. Huinink. 1992. "Trends in Measured and Unmeasured Effects of Family Background on Educational Attainment and Occupational Status in the Federal Republic of Germany." *Social Science Research* 21:84–112.

De Haan, Henk. 1994. *In the Shadow of the Tree: Kinship, Property, and Inheritance among Farm Families*. Amsterdam: Het Spinhuis.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

Dehing, Petrus W. N. M. 1989. *". . . Eene Soort van Dynastie van Spoorwegbeambten": Arbeidsmarkt en Spoorwegen in Nederland, 1875–1914*. Hilversum: Uitgeverij Verloren.

De Jonge, Jan A. 1968. *De Industrialisatie in Nederland tussen 1850 en 1914*. Amsterdam: Scheltema & Holkema.

Ekamper, Peter, Rob van der Erf, Nicole van der Gaag, Kène Henkens, Evert van Imhoff, and Frans W. A. van Poppel. 2003. *Bevolkingsatlas van Nederland: Demografische Ontwikkelingen van 1850 tot Heden*. Rijswijk: Uitgeverij Elmar.

Ganzeboom, Harry B. G., Ruud Luijkx, and Donald J. Treiman. 1989. "Intergenerational Class Mobility in Comparative Perspective." *Research in Social Stratification and Mobility* 8:3–84.

Ganzeboom, Harry B. G., Donald J. Treiman, and Wout C. Ultee. 1991. "Comparative Intergenerational Stratification Research: Three Generations and Beyond." *Annual Review of Sociology* 17:277–302.

Grusky, David B. 1983. "Industrialization and the Status Attainment Process: The Thesis of Industrialism Reconsidered." *American Sociological Review* 48:494–506.

Hauser, Robert M., and Peter A. Mossel. 1985. "Fraternal Resemblance in Educational Attainment and Occupational Status." *American Journal of Sociology* 91:650–73.

Hauser, Robert M., and William H. Sewell. 1986. "Family Effects in Simple Models of Education, Occupational Status, and Earnings: Findings from the Wisconsin and Kalamazoo Studies." *Journal of Labor Economics* 4:S83–S115.

Hedges, Larry V., and Ingram Olkin. 1985. *Statistical Methods for Meta-Analysis*. Orlando, Fla.: Academic Press.

Hox, Joop J. 2002. *Multilevel Analysis: Techniques and Applications*. Mahwah, N.J.: Erlbaum.

Jencks, Christopher, Marshall Smith, Henry Acland, Mary Jo Bane, David Cohen, Herbert Gintis, Barbara Heyns, and Stephan Michelson. 1972. *Inequality: A Reassessment of the Effect of Family and Schooling in America*. New York: Basic Books.

Kerr, Clark, John T. Dunlop, Frederick H. Harbison, and Charles A. Myers. 1960. *Industrialism and Industrial Man: The Problems of Labor and Management in Economic Growth*. Cambridge, Mass.: Harvard University Press.

Knigge, Antonie, Ineke Maas, Marco H. D. van Leeuwen, and Kees Mandemakers. 2014. "Status Attainment of Siblings during Modernization." *American Sociological Review* 79:549–74.

Knippenberg, Hans, and Ben De Pater. 2002. *De Eenwording van Nederland: Schaalvergroting en Integratie sinds 1800*. Nijmegen: Sun.

Kuznets, Simon. 1955. "Economic Growth and Income Inequality." *American Economic Review* 45:1–28.

Lambert, Paul S., Richard L. Zijdeman, Marco H. D. van Leeuwen, Ineke Maas, and Kenneth Prandy. 2013. "The Construction of HISCAM: A Stratification Scale Based on Social Interactions for Historical Comparative Research." *Historical Methods* 46:77–89.

Leckie, George, and Chris Charlton. 2013. "Runmlwin: A Program to Run the MLwiN Multilevel Modelling Software from within Stata." *Journal of Statistical Software* 52:1–40.

Lindert, Peter H., and Jeffrey G. Williamson. 1985. "Growth, Equality, and History." *Explorations in Economic History* 22:341–77.

Lintsen, Harry W., and Jurgen A. W. Nieuwkoop. 1989–91. *De registers van de Dienst voor het Stoomwezen*. Amsterdam: NEHA.

Mandemakers, Kees. 1996. *Gymnasiaal en Middelbaar Onderwijs: Ontwikkeling, Structuur, Sociale Achtergrond en Schoolprestaties, Nederland, ca. 1800–1986*. Amsterdam: Stichting Beheer IISG.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

Mazumder, Bhashkar. 2008. "Sibling Similarities and Economic Inequality in the US." *Journal of Population Economics* 21:685–701.

Moller, Stephanie, Arthur S. Alderson, and François Nielsen. 2009. "Changing Patterns of Income Inequality in U.S. Counties, 1970–2000." *American Journal of Sociology* 114:1037–1101.

Newson, Roger. 2006. "Confidence Intervals for Rank Statistics: Somers' D and Extensions." *Stata Journal* 6:309.

Nielsen, François. 1994. "Income Inequality and Industrial Development: Dualism Revisited." *American Sociological Review* 59:654–77.

Olneck, Michael R. 1976. "On the Use of Sibling Data to Estimate the Effects of Family Background, Cognitive Skills, and Schooling: Results from the Kalamazoo Brothers Study." Pp. 125–62 in *Kinometrics: Determinants of Socioeconomic Success within and between Families*, edited by Paul Taubman. Amsterdam: North-Holland.

Posterijen. 1880–1916. *Verslagen aan den Koning betrekkelijk de Dienst der Posterijen en der Telegrafen in Nederland*. The Hague: s.n.

Rasbash, Jon, Christopher Charlton, William J. Browne, Michael Healy, and Bruce Cameron. 2013. *MLwiN Version 2.28*. Bristol: Centre for Multilevel Modelling, University of Bristol.

Scholen. 1862–1917. *Verslag van den Staat der Hooge-, Middelbare en Lagere scholen*. The Hague, Netherlands.

Sieben, Inge J. P., and Paul M. De Graaf. 2001. "Testing the Modernization Hypothesis and the Socialist Ideology Hypothesis: A Comparative Sibling Analysis of Educational Attainment and Occupational Status." *British Journal of Sociology* 52:441–67.

Smits, Jan-Pieter, Edwin Horlings, and Jan L. Van Zanden. 2000. *Dutch GNP and Its Components, 1800–1913*. Groningen: Groningen Growth and Development Centre.

Solon, Gary, Mary Corcoran, Roger Gordon, and Deborah Laren. 1991. "A Longitudinal Analysis of Sibling Correlations in Economic Status." *Journal of Human Resources* 26:509–34.

StataCorp. 2013. *Stata: Release 13. Statistical Software*. College Station, Texas: StataCorp.

Stewart, Alexander, Kenneth Prandy, and Robert M. Blackburn. 1980. *Social Stratification and Occupations*. London: Macmillan.

Sweetser, Dorrian A., and Patrick McDonnell. 1978. "Social Origins, Education, and Fraternal Mobility." *American Journal of Sociology* 83:975–82.

Thurow, Lester C. 1975. *Generating Inequality: Mechanisms of Distribution in the U.S. Economy*. New York: Basic Books.

Toka, Gabor, and Jaap Dronkers. 1996. "Sibling Resemblance in Educational Attainment, Occupational Prestige, and Wealth in Hungary during the Communist Regime." *European Sociological Review* 12:251–69.

Treiman, Donald J. 1970. "Industrialization and Social Stratification." Pp. 207–34 in *Social Stratification: Research and Theory for the 1970s*, edited by Edward Laumann. Indianapolis: Bobbs-Merrill.

Van Eijck, Cornelis J. M. 1996. *Family and Opportunity: A Sibling Analysis of the Impact of Family Background on Education, Occupation and Consumption*. Tilburg: Tilburg University Press.

Van Leeuwen, Marco H. D., Ineke Maas, and Andrew Miles. 2002. *HISCO: Historical International Standard Classification of Occupations*. Leuven: Leuven University Press.

Van Zanden, Jan L., and Arthur Van Riel. 2004. *The Strictures of Inheritance: The Dutch Economy in the Nineteenth Century*. Princeton, N.J.: Princeton University Press.

Warren, John R., Jennifer T. Sheridan, and Robert M. Hauser. 2002. "Occupational Stratification across the Life Course: Evidence from the Wisconsin Longitudinal Study." *American Sociological Review* 67:432–55.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions

Weeden, Kim A., and David B. Grusky. 2012. "The Three Worlds of Inequality." *American Journal of Sociology* 117:1723–85.

Wintle, Michael J. 2000. *An Economic and Social History of the Netherlands, 1800–1920: Demographic, Economic and Social Transition*. Cambridge: Cambridge University Press.

Zijdeman, Richard L. 2009. "Like My Father before Me: Intergenerational Occupational Status Transfer during Industrialization (Zeeland, 1811–1915)." *Continuity and Change* 24:455–86.

This content downloaded from 131.211.86.246 on Tue, 10 Mar 2015 11:25:47 AM
All use subject to JSTOR Terms and Conditions