Family Background, Educational Qualifications, and Meritocratic Labor Market Allocation: Evidence from Danish Siblings
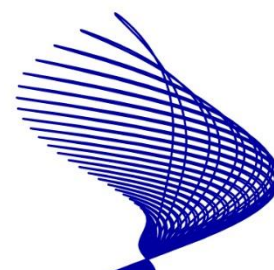
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Family Background, Educational Qualifications, and Meritocratic Labor Market Allocation: Evidence from Danish Siblings

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Abstract

A prominent strand of research in sociology analyzes how family background affects labor market outcomes among offspring with similar formal educational qualifications. Yet, previous studies are limited either by the way in which they measure family background or by the detail level by which they measure educational attainment. To address these two limitations, we develop a novel approach based on sibling similarities in labor market outcomes. Applying the approach to data on all Danes born 1965–1971, we examine the direct effect—other than through extremely granular education measures—of all combined effects of family background on occupational and income destinations. Our analyses show that the extremely fine-grained education measures can account for more than 90 percent of the total family background effect on occupational destinations, leaving little room for the processes associated with the direct effects of social origins to operate. For income destinations, however, the extremely fine-grained education measure accounts for merely three-quarters of the total family background effect. Roughly half of this direct effect on income destinations can be explained by sibling similarities in occupational choice, suggesting that family background affects income destinations through processes that operates equally within and between occupations. We discuss different mechanisms that may account for these results.

Keywords: social mobility, sibling correlation, occupational mobility, income mobility, family background, siblings

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Acknowledgments

Introduction

A key question in sociological stratification research is how family background affects the labor market outcomes among children with similar levels of acquired schooling (Breen and Jonsson 2005). This "direct effect of social origins" is interpreted as how important ascriptive factors—such as cultural capital cues or social connections—are in the allocation to different labor market positions (Treiman 1970). While theories disagree on how this direct effect should change as countries industrialize and educational systems expand (Grusky 1983; Knigge, Maas, and van Leeuwen 2014), more than five decades of empirical research provides evidence in support of a persistent direct effect, suggesting that the promises of meritocratic labor market allocation remain unfulfilled (e.g., Blau and Duncan 1967; Treiman and Yip 1989; Ishida, Müller, and Ridge 1995; Breen and Jonsson 2007; Ballarino and Bernadi 2016; Breen and Müller 2020).

Despite its prominence in the sociological stratification literature, most studies reporting the direct effect other than through schooling rely on a single measure of family background such as social class, status, or income (e.g., Treiman and Yip 1989; Blanden, Gregg, and Macmillan 2007; Breen and Müller 2020). Although recent studies emphasize the need for including several measures of family background (Gugushvili, Bukudo, and Goldthorpe 2017; Sullivan et al. 2018), the literature is still limited by a focus on how education mediates the effect of certain measurable aspects of family background on a given labor market outcome, thus potentially missing how education mediates the total impact of all, both measured and unmeasured, aspects of family background. While the literature on sibling similarities in educational and occupational attainment resolves this issue by estimating the total impact of all aspects of family background (e.g., Hauser and Mossel 1985; Sieben and de Graaf 2001), both sibling correlation studies and most origins-education-destinations studies use relatively crude measures of educational attainment. Such crude measurement may conceal important heterogeneity both in terms of how family background affects educational attainment broadly conceived (Andrade and Thomsen 2017), and in terms of the differential returns to different fields of study (Davies and Guppy 1997; Kirkeboen, Leuven, and Mogstad 2016), potentially leading to the conclusion that the direct effect is more important than it actually is (Hällsten 2013).

In this paper, we examine how a very detailed measure of education mediates the total impact of family background on destinations in Denmark once we evaluate this total family background effect in terms of sibling similarities in labor market outcomes. We innovate by integrating the literature on sibling correlations (e.g., Hauser and Mossel 1985; Sieben and de Graaf 2001; Karhula et al. 2019) with the literature emphasizing the need for using detailed education measures to arrive at a proper estimate of the direct effect of social origins (Mastakaasa 2011; Hällsten 2013; Triventi 2013). We analyze the degree to which the totality of family background—i.e., all unmeasured aspects of family background—affects labor market outcomes among individuals with similar educational attainment, when we measure education at an extremely granular level and with high reliability. This approach is the most

comprehensive yet taken in the literature that analyzes whether and how family background affects labor market allocation processes net of formal schooling.

We find that an extremely detailed education measure accounts for more than 90 percent of the total family background effect on occupational destinations, suggesting that labor market allocation in Denmark is almost perfectly meritocratic. However, we also find that this education measure accounts for merely three-quarters of the total family background effect on permanent wages. Further analyses show that this direct effect on wages can only partially be accounted for by sibling similarities in occupational choice, even when we measure occupation at an extremely detailed level. This result suggests that ascriptive factors equally affects wages through processes that operate between occupations (who gets the higher-paying job) and within occupations (who gets the higher pay in the job). We conclude the paper with a discussion of the mechanisms that may account for this pattern of results.

Background

In analyzing the role of education in social reproduction, sociologists have long drawn on the origins-education-destinations framework (Treiman 1970). As Figure 1 illustrates, in this framework, social origins affect social destinations both via and not via education. The effect not operating through education is known as the direct effect of social origins. This effect regarded as capturing the extent to which non-meritocratic factors such as social or cultural capital help advantaged families pass on their advantages to their offspring, irrespectively of the formal education attained. For example, in hiring or promotion decisions, employers may use cues other than educational credentials (Bills, Di Stasio, and Gërxhani 2017). These cues may be either directly or indirectly linked to class advantage, providing children born into advantage with better opportunities for eventually ending up getting the job (Jackson 2007, 2009; Petersen, Saporta, and Seidel 2000; Rivera and Tilcsik 2016; Witteveen and Attewell 2017; Friedman and Laurison 2019). The direct effect is thus a measure of the extent to which labor market allocation is non-meritocratic in the sense that job hires depend not only on formal educational qualifications but also on ascribed family background characteristics.

Figure 1. The Origins-Education-Origins Triangle
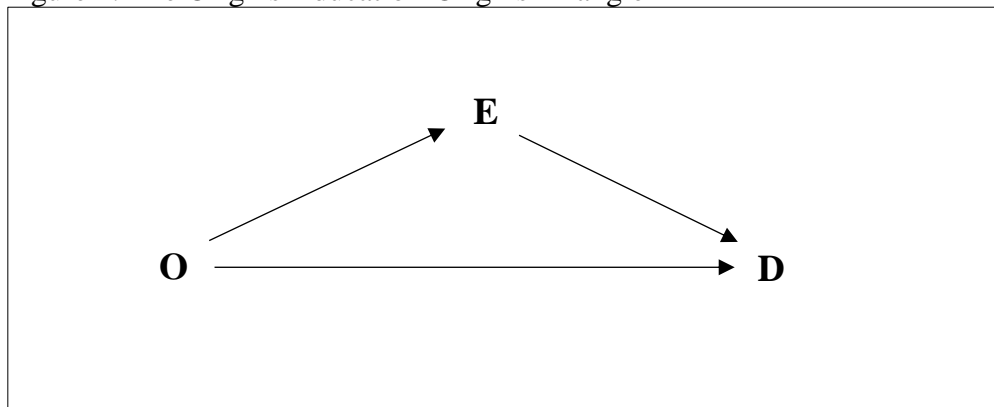
Despite its important insights into the nature of how inequalities in labor market outcomes are reproduced across generations, the existing literature is hampered by two not mutually exclusive shortcomings. On the one hand, the majority of studies examining the direct effect of social origins on destinations uses a single measure of observed family background characteristics such as parental class, status, or income (e.g., Treiman and Yip 1989; Ishida, Müller, and Ridge 1995; Blanden et al. 2007). However, as Gugushvili, Bukudo, and Goldthorpe (2017) argue, such an approach potentially ignores the direct impact of other aspects of family background. Although Gugushvili, Bukudo, and Goldthorpe (2017) resolve this issue by including multiple measures of family background (see also, e.g., Sullivan et al. 2018), their empirical strategy still leaves open the possibility that other, unmeasured family background characteristics affect social destinations net of schooling. Indeed, as the literature on sibling similarities in occupational attainment demonstrates (e.g., Hauser and Mossel 1985; Sieben and de Graaf 2001), observed family background characteristics such as parental socioeconomic status and schooling account only for a moderate portion of the between-family variance component in occupational status.

On the other hand, the majority of studies of the direct effect of social origins use crude measures of schooling, typically capturing overall degrees or levels (e.g., Ishida, Müller, and Ridge 1995; Ballarino and Bernardi 2016; Breen and Müller 2020). While crude education measures provide important insights into cross-national variation in the direct effects of social origins, controlling for them most likely overestimates the direct effect. This would be the case if crude measures ignore important (unmeasured) heterogeneity in schooling that is both correlated with social origins and has different labor market returns (e.g., different returns to fields of study or educational tracks). As Hällsten (2013) demonstrates, controlling for very detailed measures of education changes the magnitude of the direct effect. Nonetheless, Hällsten (2013) examines the direct effect using observed measures of family background, thus neglecting the overall impact of family background.

The shortcoming associated with measuring education crudely also pertains to the literature on sibling similarities in labor market attainment. Even if this literature examines the role of education in the status attainment process—estimating among other things the extent to which sibling similarities in years of schooling affect sibling similarities in occupational status (Hauser and Mossel 1985; de Graaf and Huinink 1992; Toka and Dronkers 1996; Sieben and de Graaf 2001)—it is based on the parametric structural equations models developed in Hauser and Mossel (1985) in which the family factor for years of schooling is a latent variable that affects the latent variable capturing the family factor for occupational status. The studies using this approach consequently model the effect of years of schooling with a single fixed parameter, thereby ignoring potential educational heterogeneity (perhaps especially in many European countries) and risking overestimating the direct effect.[1]

In this study, we go beyond the existing literature by merging the sibling correlation approach with an empirical strategy in which we control for extremely detailed measures of education. In other words, we bring together the best from two approaches in the field to provide the most comprehensive picture of the direct effect of social origins on labor market outcomes. To meet this goal, we draw on rich administrative register data from Denmark,

which provide us with granular information on the educational and labor market attainment of siblings. Denmark is characterized by high levels of economic equality, and by having very high levels of both educational and income mobility in international comparisons (Hertz 2007; Pfeffer 2008; Black and Devereux 2011).[2] With its generous redistribution, collective wage-setting, and heavily subsidized educational system, we would expect that labor market allocation in Denmark largely follows meritocratic principles. Cues of family background advantage should play less of role in hiring decisions compared to countries that are not characterized the same level of potentially equalizing institutions (Ishida, Müller, and Ridge 1995). We test this hypothesis analyzing sibling similarities in occupational and income destinations among Danes born 1965-1971, once we control for extremely detailed measures of education.

Given the well-documented relationship between occupation and income, we further investigate whether the direct effect of social origins on income destinations can be explained by sibling similarities in occupational choice. Hällsten (2013), for example, discusses and evaluates how family background differentials in wages should depend on different job characteristics. Extending Hällsten's (2013) work, we ask whether the direct effect of social origins on wages mainly resides within or between occupations. We examine this question by controlling for a granular occupation measure in addition to the granular education measure. Put differently, we test the hypothesis that the direct effect on income destinations can be explained by sibling similarities in occupational destinations. Insofar as we can refute this hypothesis, we may conclude that the direct effect largely operates independently of occupations, thus suggesting that the direct effect operates in terms of wage negotiations within occupations rather than in job hiring processes that operate between occupations.

Data

We analyze sibling similarities in occupational and income destinations for all Danes born 1965–1971 using data from the Danish administrative registers. These registers contain a wealth of high-quality annual information on all citizens. Analyzing these birth cohorts allows us to (a) study labor market outcomes through age 44, (b) link individuals to their parents and siblings, and (c) include observed measures of the socioeconomic and demographic characteristics of the rearing environment. Following the way in which the registers are structured, we define siblings as those who share the same legal, be it biological or adoptive, mother. Siblings born outside the birth cohort window 1965–1971 are excluded from the analyses. Our final sample comprises 461,498 individuals among which 252,001 (55 percent) are singletons as they have no siblings born inside the birth cohort window, 181,296 (39 percent) have one sibling, 25,962 (6 percent) have two siblings, and 2,239 (<1 percent) have three or more siblings.[3] We follow previous literature and include singletons to increase the precision of the estimated variance components (Björklund, Jäntti, and Lindquist 2009).

For our measure of *occupational destinations*, we recode ISCO88 occupational codes at age 40 into the International Socio-Economic Index (ISEI) (Ganzeboom and Treiman 1996).

In a supplementary analysis reported in the Appendix, we also show results using as an occupational outcome whether the individuals are members of the Service class (I + II) as defined by the EGP schema. For our measure of *income destinations*, we use a nine-year average of individuals' pre-tax hourly wages between ages 36–44, i.e., a measure of permanent income that takes into account the volatility of income trajectories. We measure wages as earnings normalized by actual annual work experience in log Danish Kroner in 2016 prices.[4] To avoid long tails in the log wage distribution, we censor the top one percent of the distribution to the value of the 99th percentile, and we consider hourly wages below 20 Danish Kroner (roughly 3 USD) to be effectively zero wages.[5] Moreover, as the earnings variable in the registers does not include income from self-employment, we exclude self-employed individuals (~6 percent) from the analysis. In a supplementary analysis reported in the Appendix, we also show results based on a measure of post-tax disposable income from earnings, self-employment, property, and public transfers.

To determine the mediating role of education, we use three different measures of educational attainment by age 30. First, a broad measure consisting of eight categories roughly consistent with the ISCED classification: compulsory education, vocational upper secondary, academic upper secondary, short-cycle tertiary, medium-cycle tertiary, university bachelor, university master, and doctoral degree. Second, a detailed measure which disaggregates educational levels into 67 categories based on main field of study. Third, the actual degree, distinguishing between 1,083 different educational titles in the Danish education system.

In the analyses, we also include observed family background variables describing the socioeconomic and demographic composition of the household when the individual is 15 years old. These variables include highest educational level of the parents, parental social class as measured by EGP, parents average income rank, family type, number of siblings, and municipality of residence.

Methods

We quantify family background effects on our labor market outcomes using linear mixed models. Our approach is related to that of Hauser and Mossel (1985), who examine sibling resemblance in educational and occupational attainment using structural equation modeling. However, while Hauser and Mossel (1985) explicitly models the sibling resemblance in both educational and occupational attainment, our approach does not assume a linear in effects sibling model for years of schooling, but instead includes a large number of education categories as fixed effects. In other words, we control for education in a nonparametric way that does not assume any particular functional form. To quantify the direct effect of social origins in a sibling similarity design, we draw on the approach developed by Mazumder (2008).[6] We quantify the direct effect in terms of the extent to which education can account for the between-family variance component in the linear mixed model. Before we introduce this measure, we first define the models that we are estimating. We estimate the models using the maximum likelihood estimator for linear mixed models.

Let Y_{ij} denote the labor market outcome of sibling i in family j. The null model is given by

$$Y_{ij} = \mu + \omega_j + \varepsilon_{ij} \tag{1}$$

where μ is the global mean in Y_{ij}, ω_j is a between-family error term, and ε_{ij} is a within-family error term. Assuming that ω_j and ε_{ij} are independent, the total variance in Y_{ij} is given by

$$\text{var}(Y_{ij}) = \text{var}(\omega_j) + \text{var}(\varepsilon_{ij}),$$

and the sibling correlation—i.e., the overall family background effect—in the labor market outcome is given by the intra-class correlation,

$$ICC = \frac{\text{var}(\omega_j)}{\text{var}(\omega_j) + \text{var}(\varepsilon_{ij})}, \tag{2}$$

which is the fraction of the total variance in the labor market outcome that can be attributed to systematic differences between families on average in the population. Now let S_{ijk} denote a set of dummy variables indicating whether sibling i from family j has education k, where $k = 1, 2, ..., K$. The model controlling for this schooling measure is then given by

$$Y_{ij} = \mu^* + \sum_{k=2}^{K} \beta_k^* S_{ijk} + \omega_j^* + \varepsilon_{ij}^* \tag{3}$$

where β_k^* captures the main effects of the schooling dummies. To obtain the direct effect other than through schooling in this framework, we compare the between-family variance component in Models (1) and (3). We define the direct effect as the fraction of the unconditional between-family variance component that *cannot* be explained by the schooling variable:

$$DESO = 1 - \frac{\text{var}(\omega_j) - \text{var}(\omega_j^*)}{\text{var}(\omega_j)} = \frac{\text{var}(\omega_j^*)}{\text{var}(\omega_j)}. \tag{4}$$

The direct effect measure in Equation (4) provides an overall measure of the extent to which family background affects a given labor market outcome among children with identical educational qualifications.[7] In our empirical approach, we control for both crude and detailed measures of S_{ijk}, and we analyze occupational destinations in terms of socioeconomic status (ISEI), and income destinations in terms of wages. In the Appendix, we report additional results using EGP service class I+II membership as an alternative to ISEI and a measure of disposable (post-tax, post-transfer) income as an alternative to wages. These supplementary analyses support the overall conclusions that we draw in the main text.

Because we investigate whether occupational choice can explain any of the remaining residual between-family variance in wages once education has been controlled, we also

estimate a model in which we control for a large set of occupation dummies. Let I_{ij} denote the wages of individual i in family j, and let O_{ijm} denote individual i in family j being in occupation m. The model is then given by

$$I_{ij} = \mu^{\dagger} + \sum_{k=2}^{K} \beta_k^{\dagger} S_{ijk} + \sum_{m=2}^{M} \delta_k^{\dagger} O_{ijm} + \omega_j^{\dagger} + \varepsilon_{ij}^{\dagger} \tag{5}$$

In this model, the between-family variance component, $\text{var}\left(\omega_j^{\dagger}\right)$, can be interpreted as the partial effect of family background on wages once we control for both education and occupation. The extent to which this variance component differs from the variance component in Equation 3, $\text{var}\left(\omega_j^{*}\right)$, provides a way of testing our hypothesis of whether the direct effect mainly operates between or within occupations.

Results

Sibling Correlations in ISEI and Wages
Table 1 reports sibling correlations in occupational and income attainment. The sibling correlation in ISEI is 31 percent, meaning that of the total variation in socioeconomic status for Danes born 1965–1971, roughly one-third can be attributed to systematic differences between sibling groups. The sibling correlation is also slightly larger among brothers than among sisters, suggesting that family background has a larger impact on the occupational outcomes of men than women in Denmark. The estimate of 35 percent for brothers is very similar to the 37 percent reported by Sieben and de Graaf (2001) for brothers born over the 20th century in six different countries. Furthermore, the sibling correlation in log wages is lower than that reported for ISEI, with family-specific unmeasured heterogeneity accounting for 23 percent of the total variance in permanent wages. As was the case for ISEI, the correlation is also larger for brothers than for sisters, thus corroborating the finding that family background is more decisive for men than for women when it comes to labor market outcomes.

Table 1. Sibling correlations in ISEI and log wages.

	All	Brothers	Sisters
ISEI (N = 461,498)	0.306	0.352	0.310
Log wages (N = 447,951)	0.229	0.302	0.253

Direct Effects of Social Origins
To measure the direct effect of family background other than through formal schooling, in Table 2 we report within and between sibling group variance components from the unconditional null model and three models that control for education measured at a crude, a

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detailed, and a very detailed level. The crude indicator explains a substantial portion of the total family background effect on the occupational outcomes (81 percent) and a moderate portion of the total effect on wages (63 percent). Controlling instead for the detailed and the very detailed education indicators, respectively, further increases the percent explained. For ISEI, the very detailed education indicator accounts for 91 percent, whereas it accounts for 73 percent for wages. Thus, for occupational destinations, education accounts for virtually all of the family background effect once we measure it with great detail, suggesting that labor market allocation is close to perfectly meritocratic in Denmark, at least for the cohorts we study here.

Table 2. Within and between sibling group variance components in ISEI and log wages.

ISEI	Within variance		Between variance	
Empty model	198.433		87.451	
Educ. (crude)	172.930	13%	16.787	81%
Educ. (detailed)	157.912	20%	11.514	87%
Educ. (very detailed)	142.324	28%	7.815	91%
Educ. (very detailed) + Parent SES	141.472	29%	6.241	93%
Log wages	Within variance		Between variance	
Empty model	0.095		0.028	
Educ. (crude)	0.089	7%	0.010	63%
Educ. (detailed)	0.082	14%	0.009	68%
Educ. (very detailed)	0.077	20%	0.008	73%
Educ. (very detailed) + Parent SES	0.076	20%	0.006	79%
Educ. (very detailed) + ISCO	0.063	34%	0.004	85%
Educ. (very detailed) + Parent SES + ISCO	0.061	36%	0.003	88%

Still, family background appears to affect wages among offspring with exactly the same educational qualifications—a result which should be viewed in conjunction with us reporting lower sibling resemblance in wages than in status (table 1). As Table 3 shows, these results also hold when we compare only brothers or only sisters, although for wages, education (however measured) explains a larger fraction of the total effect among women than among men. This difference between men and women suggests that the direct effect is somewhat larger for men, particularly in light of the larger sibling correlations reported for men (table 1).

Table 3. Between sibling group variance components in ISEI and log wages, by gender.

ISEI	Brothers		Sisters	
Empty model	104.779		85.084	
Educ. (crude)	19.463	81%	19.573	77%
Educ. (detailed)	12.000	89%	14.763	83%

Educ. (very detailed)	9.383	91%	9.077	89%
Educ. (very detailed) + Parent SES	8.094	92%	7.520	91%
Log wages	Brothers		Sisters	
Empty model	0.040		0.023	
Educ. (crude)	0.017	58%	0.008	67%
Educ. (detailed)	0.014	66%	0.007	71%
Educ. (very detailed)	0.012	70%	0.005	77%
Educ. (very detailed) + Parent SES	0.011	74%	0.004	83%
Educ. (very detailed) + ISCO	0.007	81%	0.003	86%
Educ. (very detailed) + Parent SES + ISCO	0.006	84%	0.002	89%

Given the well-documented link between occupation and wages, how come that education explains a smaller fraction of the family background effect for wages than for occupational attainment? To investigate this question and test our hypothesis related to the role of occupational choice in explaining the direct effect of social origins on wages, we estimate the model in Equation 5 in the methods section in which we add a large set of occupation dummies. The guiding idea behind this strategy is to estimate the extent to which the direct effect of family background on wages can be explained by sibling similarities in occupational choice among offspring with exactly the same educational qualifications. In other words, do offspring from advantaged families receive higher wages than offspring from disadvantaged families with similar educational qualifications simply because their family background advantage gives them a higher-paying job?

Table 2 provides a tentative answer to this question. Further adjusting for ISCO dummies in the wage model leads to 85 percent of between-family variance component being explained; that is, the occupation dummies account for 12 percentage points incrementally explained between-family variance. We interpret this additionally explained variance as suggesting that roughly half of the direct effect of social origins on wages in Denmark is a result of sibling similarities in occupational choices. Thus our estimates do not provide strong support for the hypothesis that getting the higher-paying job accounts for the family background advantage in income destinations among children with identical educational qualifications. In contrast, it appears that the direct family background effect operates equally between and within occupations: Family background gives advantaged children a higher-paying job, and it conveys advantage in wage negotiations.

Additional Results

A key concern in the sibling correlation literature is the extent to which observed characteristics of the family of origin can explain sibling similarities in education, occupation, and income (e.g., Sieben and de Graaf 2001; Björklund, Lindahl, and Lindquist 2010). Therefore, in Tables 2 and 3, we also report estimates from models that allows us to gauge the incrementally explained between-family variance by the observed family background variables in our data (i.e., parental education, parental EGP class, parental income rank, family type, number of siblings, and municipality of residence). However, these variables explain a negligible fraction of the residual direct family background effect on both ISEI and wages, ranging from 2 to 4

percentage points incrementally explained variance. We interpret this result as suggesting that our detailed education measure, and for wages, the detailed occupation measure, captures virtually all of the influence of the observed family background variables on sibling similarities in the two labor market outcomes (i.e., they share the same common source of family-specific variation). This finding also means that 12 percent unexplained between-family variance in wages in the final row in Table 2 appears to be explained by characteristics not captured by the "usual family background suspects," a point to which we return in the discussion.

Given the sensitivity of the sibling similarity designs to choice of data and model specifications, we also conduct three supplementary analyses that each assesses the stability of our results under different specifications. We present results from these analyses in the Appendix (see tables A3 and A4). In the first analysis, to test for the potential effects of business cycles, we control for birth year dummies in the baseline model to assess their impact on the intra class correlations (Björklund, Lindahl, and Lindquist 2010). We find no differences in the results. In the second analysis, we estimate the wage model for siblings with low birth spacing only (i.e., less than 2 years; N = 73,616) to explicitly compare siblings who enter labor markets at similar points in time and experience similar economic cycles. While the intra class correlation in this specification is slightly larger at 24 percent, the percentages explained by the different schooling measures are virtually the same as in the original specification. In the third analysis, we compare estimates from the wage model in which we measure occupational attainment at age 40 to models in which we measure occupational attainment at age 36 and 44, respectively, to ensure that results are not driven by differing wage growth across occupations in the period under study. We find substantively similar results to those based on measuring occupational attainment at age 40, thus suggesting that age of measurement does not drive our findings.

Discussion

This paper is the first to present estimates of the direct effect of social origins on occupational and income destinations, when we measure this effect as the influence of all family background characteristics on the labor market outcomes among individuals with the same education measured at an extremely granular level. We consider this approach the most comprehensive way of determining the extent to which labor market outcomes follow from meritocratic processes. Our estimates for Denmark show that for occupational attainment—for which the sibling correlation is very similar to that reported for other countries—the processes is close to perfectly meritocratic. Our very detailed education measure can account for 91 percent of the total family background effect on occupational attainment, as measured by sibling similarities in ISEI. The recent and comprehensive analyses in Bernardi and Ballarino (2016) show that broad education measures explain 50–75 percent of the intergenerational socioeconomic association measured in terms of ISEI, and that the degree of mediation is not higher in Scandinavian countries (Sweden and Norway) than in other European nations. Thus previous

studies have likely overestimated the direct effects of social origins on occupational destinations.

However, for income destinations, the very detailed education measure accounts for 73 percent of the total effect, suggesting that in relative terms the direct effect is substantially larger for wages than for ISEI. This difference should be considered in light of the sibling correlation reported for wages being roughly 25 percent smaller than that reported for ISEI, meaning that in absolute terms, the direct effects are substantially similar. Still, a decomposition of the direct effect on wages reveals that roughly half operates between occupations and roughly half operates within occupations. We interpret this finding as suggesting that family background affects both who gets the higher-paying job and who gets the highest pay within jobs, and these processes contribute equally to the direct effect on wages that we report in our analyses.

Our results provide ground for reflection on the underlying mechanisms of the direct social origins effect on income destinations. According to Erikson and Jonsson (1998), direct effects may be a product of at least four mechanisms: direct inheritance, social networks, favoritism, and productivity. Although we cannot fully disentangle these four mechanisms in this study, our findings are more in line with some than with others. First, direct inheritance arguably benefit mainly employers and the self-employed as inheritance of parental money can help them set up businesses and improve their success. Consequently, this mechanism should be less relevant for wages and is not likely to explain our results. Second, social networks may explain direct effects to the extent that individuals with advantaged social origins are more likely to have access to influential labor market contacts. Given that this mechanism likely operates in terms of the jobs that individuals from different family backgrounds but with the same educational merits are able to attract—rather than in terms of securing advantages in wage negotiations within jobs—our findings provide some support for this mechanism in that roughly half of the direct effect on wages resides between occupations.

Third, favoritism refers to employers´ tendency to hire and promote employees who exhibit certain social class cues that align with their own privileged background (Grusky 1983). Although this mechanism may account for the direct effect on wages that resides both within and between occupations, our study does not provide strong support for this mechanism. If this mechanism was dominating our results, then we would have expected to see our measured family background characteristics explain a much larger fraction of the direct effect in the wage (and ISEI) model. These variables account for very modest portions, ranging from two to four percentage points incrementally explained variance.[8]

Fourth, differences in productivity may result from differences in cognitive skills or non-cognitive traits (such as conscientiousness, assertiveness, or agreeableness) that are not fully captured by educational qualifications but are highly rewarded by employers (Breen and Goldthorpe 2001). As research in labor economics documents large family background gaps in early skill formation (e.g., Heckman 2006, 2008) and reports pronounced labor market returns to such skills even net of formal schooling (e.g., Murnane et al. 2000; Heckman, Stixrud, and Urzua 2006; Edin et al. 2017), our findings may be interpreted as supporting the productivity mechanism. Indeed, these skills and traits may be a product of subtle differences in

sociocultural rearing environments even among individuals with similar observable family characteristics, meaning that offer a plausible explanation of the residual direct effects we report in this paper.

One limitation of our study is that it requires very large samples of siblings and the availability of very detailed education measures, both of which make replicating our study in other countries that do not have access to high-quality register data difficult. Relying on register data also limits the possibilities for further examination of mechanisms, as registers rarely contain credible proxies for skills, social or cultural capital, or personality traits. One way for future research to overcome this difficulty could be to exploit information on academic performance from school registers or cognitive test scores from conscription registers, something that is not possible for the cohorts we study in this paper. Another way would be to exploit information from twin registers on identical and fraternal twins. Insofar as the direct effect would differ between identical and fraternal twins, we would be able to explore the role of the shared genetic makeup of siblings in labor market allocations among individuals with the same formal educational qualifications.

Another limitation of our study is that we control for education additively in the regression models. As Hout (1988) demonstrated more than 30 years ago, the association between occupational origins and destinations may likely vary across levels of educational attainment (Torche 2010; Karlson 2019). Extending this idea to the linear mixed sibling models we estimate in this paper would require schooling slopes to vary across sibling groups (i.e., a type of random slope model). While such approach might be feasible to implement with crude or somewhat detailed schooling measures, it would be infeasible with the very detailed education measure we use in this paper. Future research may therefore fruitfully consider the ways in which the sibling approach to the direct effect of social origins on labor market outcomes may be accommodated to consider how the total family background effect varies across educational categories.

Notes

[1] Our reading of the sibling correlation literature that is based on Hauser and Mossel's (1985) pioneering work is that it is not directly concerned with quantifying the direct effect on occupational status other than through schooling. Still, several studies show that schooling accounts for a substantial portion of the between-family variance component in socioeconomic status. For example, among persons born across the 20th century in England, Hungary, the Netherlands, Scotland, Spain, and the U.S. (Sieben and de Graaf 2001), net of three observed family background characteristics, the standardized regression coefficient for the family education factor on the family socioeconomic status factor is about 0.6, suggesting substantial predictive power.

[2] Björklund et al. (2002), for example, find a brother correlation of 0.230 in earnings for persons born 1951–1968, which is much lower than that reported for the U.S. Unfortunately, we do not know much about how Denmark fares in terms of occupational (class or status) mobility, as Denmark has been absent in most of the major comparative studies in this area.

[3] For the analysis of income destinations, the sample comprises 447,951 individuals with a similar distribution of family size.

[4] The registers include very detailed annual information on work experience.

[5] For the cohorts we consider, the average hourly wage is 223 Danish Kroner (2016 prices), which amounts to roughly 33 USD (the median wage is approximately 30 USD).

[6] While Mazumder (2008) examines how a large set of different covariates, including years of schooling, account for the between-family variance component, he does not examine disaggregated measures of schooling.

[7] One objection to this measure of the direct effect of social origins is that R-squared type measures depend on the number of categories in the predictor variable. Given that we include over 1,000 dummy variables in some of the regressions, we might be concerned that the R-squared measures we report understate the direct effect (and overstates the indirect effect). However, in light of the very large sample size, adjusting our R-squared for the number of dummy regressors will have very little impact on the estimates. For example, for 100,000 sibling groups and 1,000 education categories, the adjustment would be one percent, something that cannot change the major conclusions that we draw in this paper. Indeed, given that we analyze more than 200,000 sibling groups, the effect of adjustment on the R-squared would be about a half percent.

[8] We acknowledge that it might be the case that these observable family background characteristics do not capture subtle cultural capital signals that are important in both hiring processes and wage negotiations. Still, we would expect such cues to be significantly related to the large range of characteristics we control for.

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Appendix

Table A1. Sibling correlations in service class (I+II) membership and log disposable income.

	All	Brothers	Sisters
Service class (N = 461,231)	0.247	0.288	0.248
Log disposable income (N = 500,959)	0.230	0.280	0.239

Table A2. Within and between sibling group variance components in service class (I+II) membership and log disposable income.

Service class	Within variance		Between variance	
Empty model	0.178		0.058	
Educ. (crude)	0.160	10%	0.010	82%
Educ. (detailed)	0.152	15%	0.008	86%
Educ. (very detailed)	0.139	22%	0.005	92%
Educ. (very detailed) + Parents SES	0.138	22%	0.004	93%
Log disposable income	Within variance		Between variance	
Empty model	0.116		0.035	
Educ. (crude)	0.108	7%	0.014	61%
Educ. (detailed)	0.104	10%	0.012	67%
Educ. (very detailed)	0.101	13%	0.010	71%
Educ. (very detailed) + Parent SES	0.100	13%	0.009	74%
Educ. (very detailed) + ISCO	0.088	24%	0.007	79%
Educ. (very detailed) + Parent SES + ISCO	0.088	24%	0.006	81%

Table A3. Sibling correlations with and without control for birth year.

	No control for birth year	Control for birth year
ISEI	0.306	0.302
Service class	0.247	0.244
Log wages	0.229	0.227
Log disposable income	0.230	0.228

Table A4. Within and between sibling group variance components using different specifications of the wage model.

Log wages – low birth spacing	Within variance		Between variance	
Empty model	0.093		0.029	
Educ. (crude)	0.086	7%	0.010	64%
Educ. (detailed)	0.080	14%	0.009	69%
Educ. (very detailed)	0.074	20%	0.008	74%
Educ. (very detailed) + Parent SES	0.074	21%	0.006	79%
Educ. (very detailed) + ISCO	0.062	34%	0.005	84%
Educ. (very detailed) + Parent SES + ISCO	0.061	34%	0.004	88%
Log wages – ISCO age 36	Within variance		Between variance	
Empty model	0.095		0.028	
Educ. (very detailed) + ISCO	0.066	31%	0.005	83%
Educ. (very detailed) + Parent SES + ISCO	0.066	31%	0.004	86%
Log wages – ISCO age 40	Within variance		Between variance	
Empty model	0.095		0.028	
Educ. (very detailed) + ISCO	0.063	34%	0.004	85%
Educ. (very detailed) + Parent SES + ISCO	0.061	36%	0.003	88%
Log wages – ISCO age 44	Within variance		Between variance	
Empty model	0.095		0.028	
Educ. (very detailed) + ISCO	0.064	33%	0.004	84%
Educ. (very detailed) + Parent SES + ISCO	0.064	33%	0.004	87%