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How Has Educational Expansion Shaped Social Mobility Trends in the United States?

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Abstract

This contribution provides a long-term assessment of intergenerational social mobility trends in the United States across the 20th and early 21st century and assesses the determinants of those trends. In particular, we study how educational expansion has contributed to the observed changes in mobility opportunities across cohorts. Drawing on recently developed decomposition methods, we empirically identify the contribution of each of the multiple channels through which increased rates of educational participation may shape mobility trends.

We find that a gradual increase in social class mobility can nearly exclusively be ascribed to an interaction known as the compositional effect, according to which the direct influence of social class backgrounds on social class destinations is reduced among the growing number of individuals attaining higher levels of education. This dominant role of the compositional effect is also due to the fact that, despite pronounced changes in the distribution of education, class inequality in education has remained stable while class returns to education have shown no consistent trend.

Our analyses also provide a cautionary tale about mistaking increasing levels of social class mobility for a general trend towards more fluidity in the United States. The impact of parental education on their offspring's educational and class attainment has grown or remained stable, respectively. Here, the compositional effect pertaining to the direct association between parental education and children's class attainment counteracts a long-term trend of increasing inequality in educational attainment tied to parents' education.

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Introduction

The empirical study of intergenerational class mobility is generally regarded as one of the workhorses of sociological stratification research (Ganzeboom et al. 1991, Hout and DiPrete 2006). After a paucity of research on U.S. class mobility trends for about a quarter century, we have seen a recent resurgence of work in this area (e.g., Beller and Hout 2006a, Beller 2009, Mitnik et al. 2013). These renewed attempts at describing the broader historical patterns of progress towards an open society come at an interesting time – on the heels of the most significant economic downturn since the Great Depression (Grusky et al. 2011, Danziger 2013), when worries about decreasing levels of opportunity in the U.S. are widespread (e.g. Duncan and Murnane 2011, Corak 2013).

Nevertheless, reliable descriptions of long-term trends in class mobility are largely elusive for the U.S. case (unlike for most European countries, Breen 2004), and remain hotly debated (Long and Ferrie 2013, Xie and Killewald 2013, Hout and Guest 2013). We also still lack a full understanding of the determinants of long-term trends in social mobility. In particular, we do not know how social mobility trends have been shaped by one of the main mediators of intergenerational mobility, education, and the fundamental shifts in its distribution, educational expansion. Given that the U.S. has lost ground and surrendered its former leadership role in educational participation to other countries over the past three decades (Goldin and Katz 2008, Garfinkel et al. 2010), this channel of social mobility is of profound interest in examinations of historical trends in the U.S.

This contribution aims to establish cohort trends in social mobility over the entire 20th century and to provide an estimate of the degree to which changes in educational attainment and opportunity contributed to these trends. Earlier research, reviewed below, has yielded partial evidence on the question of whether educational expansion contributes to social mobility. We provide an empirical assessment of this question that joins prior evidence and expands on research that has directly estimated the relationship between educational expansion and social mobility for other countries (Breen 2010) and for an earlier historical period in the U.S. (Rauscher 2013). We test and ultimately confirm hypotheses developed in earlier work about the specific channels through which educational expansion impacts social mobility (Hout 1988).

We begin by reviewing existing theory and evidence that speak to the questions addressed here and also argue for the benefits of expanding our view beyond that of inequalities in opportunities tied to parental class. The empirical part of this paper begins with a description of educational expansion and changes in the class structure over the last seven decades. Our main analyses then focus on cohort changes in social class mobility and the role of

education – first as a descriptive assessment and then in a decomposition analysis to dissect the contribution of different mechanisms through which educational expansion has shaped those mobility trends. We then repeat these analyses based on a different specification of individuals' social origins, namely their parents' educational status instead of their parents' social class.

Theoretical Background and Prior Evidence

Trends in Intergenerational Class Mobility

As discussed in more detail in our methods section, we study trends in social mobility that are more precisely termed trends in "exchange mobility" or "social fluidity" – that is, changes in the association of socio-economic origin and destination independent of shifts in the occupational structure. During the 1970s and 1980s, the particularly laborious field of sociological research on class mobility established a general, slow upward trend in this type of mobility for much of the 19th and 20th century (Featherman and Hauser 1978, Grusky 1986, Hout 1984, Hout 1988, DiPrete and Grusky 1990). The validity of recent contrary findings by Long and Ferrie (2013) has been challenged based on data limitations and modeling idiosyncrasies, including those lending undue influence to occupational mobility in the farming sector (Xie and Killewald 2013, Hout and Guest 2013). The general tendency of increasing U.S. class mobility thus remains a valid description for the century leading up to the 1980s – a finding that also coincides with evidence for most other Western industrialized countries during this period (Breen 2004).

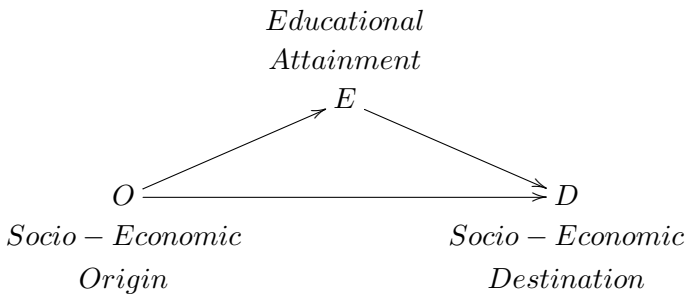
Recent research on trends since the mid-1980s has yielded some evidence that this trend towards increasing mobility may have stalled or, in select dimensions of the class structure, even reversed. Although Beller (2009) finds a general pattern of stability in mobility chances, she shows variance in recent trends by whether and how maternal social class status is taken into account. Specifically, she finds a significant decline in social mobility for the cohort born 1965-1979 based on a specification of class background that includes a homemaker category for mothers that is further differentiated by educational status (Beller 2009: pp. 521-523). Another recent contribution by Mitnik and colleagues (2013) analyzes period changes in class mobility and finds some evidence for a very recent decrease in class mobility concentrated in the top-most cells of the mobility table, that is, an increase in the intergenerational transmission of managerial/professional class status.

The effects of educational expansion

Partial Effects

The lack of reliable estimates of long-term mobility trends is mainly due to prior data limitations and changing occupational coding schemes (see data section). The comprehensive identification of factors that account for mobility trends, on the other hand, has been limited chiefly by conceptual and methodological problems. Figure 1 depicts the standard view of the socio-economic attainment process, in which socio-economic origin (e.g. parents' social class) exerts direct influences on socio-economic destination (e.g. children's social class) as well as indirect effects through offspring's educational attainment (Blau and Duncan 1967). The basic challenge we face in explaining trends in the total association between social origins and destinations, or social mobility trends, is that each of these pathways – the direct transmission of socio-economic status across generations (OD association), the extent of socio-economic inequality in educational attainment (OE), and the socio-economic returns to educational degrees (ED) – may be subject to change over time. Furthermore,

Figure 1: The mobility triad



as we discuss below, interactions among the three variables may further complicate the assessment of overall mobility trends, such as when the direct transmission of status differs by levels of educational attainment.

Most of the above associations have been subject to extensive empirical study and – in the context of fundamental changes in the distribution of education – to much theoretical discussion. Here, we briefly review some of the main debates and findings on trends in selected parts of the mobility triad for the United States,[1] knowing that they alone do not allow us to draw firm conclusions about the determinants of social mobility trends. We focus on evidence involving measures of social class as indicators of socio-economic standing to inform our own analyses that draw on this conceptualization of social inequality and mobility.

A theory devised explicitly to explain trends in educational inequality (OE) in the context of expanding educational participation is that of *Maximally Maintained Inequality* (Raftery and Hout 1993). MMI posits that massive educational expansion does not necessarily lower educational inequalities because privileged groups profit from it at higher rates. In this sense, MMI fits the aggregate in the U.S. reasonably well, where massive educational expansion had little effect on the level of social class inequality in educational attainment (Mare 1981, Mare 1993, Hout et al. 1993, Hout and Dohan 1996, Roksa et al. 2007). This is notably dissimilar to many European nations where class inequality in education decreased with educational expansion (Breen and Jonsson 2005, Breen et al. 2009). The specific patterns that MMI proposes to account for stability in educational inequality, however, do not correspond well to the U.S. case (unlike to some other countries, see Hout and DiPrete 2006). MMI proposes that inequality at a given educational level decreases with expansion only when enrollment at that level is already saturated for the privileged classes. Inequality may then simply shift upward to the next educational level. The stability of educational inequality in the U.S. runs counter to both predictions. First, despite saturation of secondary education among upper classes in the U.S., inequality at that level appears to have remained stable. Second and related, educational expansion does not appear to have raised class inequality at the tertiary level. Arum et al. (2007) have argued that the potential upward shift of inequality to the post-secondary level implied by MMI depends on the pace of education expansion: In most countries, post-secondary education expanded faster than did eligibility for it, allowing them to accommodate the growing pool of applicants without tightening social selection. The same may apply to the U.S. case.

In predicting trends in educational returns (ED) caused by educational expansion, we may distinguish two competing theoretical approaches (cf. Bills 2003, Goldthorpe 2013):[2] Within human capital theory (Becker 1964, Mincer 1974), theories on skill-biased technological change (SBTC) posit that the growth in labor market sectors requiring high technical skills accounts for increasing returns to higher education. Educational expansion should thus coincide with growing returns to education, in particular, to higher education. On the other hand, signaling (Arrow 1973, Thurow 1975) and screening theories (Spence 1973) hold that education serves to sort individuals according to their productive capacity in the labor market. Unlike human capital theory, this approach thus views education as a positional or relative good (Hirsch 1976), with its value dependent on the overall distribution of educational degrees. Educational expansion would therefore be expected to inflate the value of degrees and result in decreased returns to education. Widely cited findings of increasing income returns to education (Goldin and Katz 2008, Autor et al. 2008) and particularly to college degrees, correspond to the predictions of SBTC. However, here, we are concerned

with trends in *social class* returns (rather than income returns) to education – which may differ to the degree that within-class income variation has changed over time (Weeden and Grusky 2012). While empirical evidence for the U.S. shows a general pattern of stability in occupational returns to education when they are measured in terms of occupational status (Grusky and DiPrete 1990, Hauser et al. 2000), we know of no direct evidence on recent trends in social class returns to education in the United States. Findings from many European countries, however, show decreasing social class returns (Breen and Luijkx 2004), which are more in line with predictions from screening and signaling theories.[3]

Finally, on the question of trends in the direct intergenerational transmission of status (OD), the industrialism thesis (Treiman 1970) proposes that industrial development necessarily results in a shift from ascriptive to achievement forces in the attainment of socio-economic positions. In fact, the thesis offers predictions for all legs of the mobility triad: as a functional necessity, modernization weakens the link between social origins and educational attainment (OE) while strengthening the link between educational attainment and social destination (ED), resulting in an increasing mediating role of education in processes of social mobility and, conversely, a decreasing direct effect of social origins on destinations (OD). In this perspective, educational expansion is a necessary response to the functional needs of an increasingly meritocratic industrial society. Given the ample empirical counter-evidence to the industrialism thesis (Hout and DiPrete 2006), coherent alternative narratives to it have been surprisingly slow to emerge (see MacLean and Grusky 2014 for one attempt). Overall, we find a lack of empirical evidence that tracks changes in the direct effects of social class origins on social class destinations, independent of educational attainment, for the United States. A few contributions that have taken a cross-national comparative approach to this topic have yielded conflicting evidence of similarity and differences in the overall role of education in processes of social class mobility across European countries (Ishida et al. 1995 and Breen and Luijkx 2004, respectively). In the next section, we turn our attention to the role of a more specific phenomenon in the direct transmission of social class status – namely, the way in which the direct OD association depends on the level of education attained.

The Compositional Effect

In an influential paper on trends in social class mobility, Hout (1988) elaborated on an interaction effect that he had seen in some of his earlier mobility research (Hout 1984: p. 1400). A detailed analysis of intergenerational mobility based on 14 occupational categories lead him to conclude: "The effect of origins on destinations differs by level of education. The extreme case is college graduates. For them, current occupational status is independent of origin status. This finding provides a new answer to the old question about education's

overcoming disadvantaged origins. A college degree can do it." (Hout 1988: p. 1391). This finding has come to be known as the *compositional effect* in the mobility literature. Torche (2011) recently provided an overdue empirical update on the question of whether this compositional effect also can be observed for the decades since Hout's original analyses. The short answer is yes. A college degree continues to eradicate the direct effects of socio-economic origins on socio-economic destinations in the U.S. – whether those are measured in social class categories or using a range of other conceptualizations, such as occupational status, individual earnings, and family income.

Based on the compositional effect, educational expansion should lead to an increase in social mobility since a large share of individuals move to an educational level, bachelor's attainment, for which social destinations are decoupled from social origins. This expectation holds in spite of an additional finding by Torche (2011) that a stronger OD association exists among those with a postgraduate degree than those with a bachelor's degree. While the expansion of post-graduate education may tend to dampen the overall mobility-inducing effects of expansion of the post-secondary education sector, the overall effect remains positive since both the share and expansion of post-graduate degrees are smaller than they are for bachelor's degrees – a situation unlikely to change any time soon.

The compositional effect has also been observed in other national contexts, including France, Germany, Great Britain, and Sweden (Vallet 2004a, Breen and Luijkx 2007, Breen and Jonsson 2007, Breen 2010). Also, some cross-national comparative work has interpreted the finding that nations with larger post-secondary sectors tend to also have higher rates of social class mobility as indirect evidence for the compositional effect (Beller and Hout 2006b).

Hout's proposition on the importance of the compositional effect is quite bold. He notes, "I am tempted to ascribe *all the change* in inequality of occupational opportunity to the increase in college graduates in the labor force" (Hout 1988: p. 1384, emphasis added). In that work, he goes on to demonstrate the complexity in teasing out the relative contribution of this compositional effect next to changes in the other legs of the mobility triad (pp. 1384-1389). We attempt to do just that in this paper, ultimately testing whether Hout's quarter-century-old proclamation has empirical traction.

Joint Consideration

Above, we reviewed extensive research on separate aspects of the role of educational expansion in shaping social class mobility exists. However, these theories and pieces of evidence are not easily pulled together into one coherent prediction and empirical test of the effects of educational expansion. Two recent contributions, however, have made great progress along

those lines.

Rauscher (2013) provides an innovative analysis using late 19th and early 20th century U.S. Census data. She takes advantage of state-to-state variation in the introduction of compulsory schooling laws to identify the causal effects of educational expansion on social mobility rates. Rauscher finds that the early phase of educational expansion (compulsory schooling) triggered a slight decrease in social class mobility among those who, because of their age at the time, were required to only attend a few more years of education, but that it increased social mobility among those who fully benefited from expansion. The strengths of Rauscher's study lie in its identification of a causal effect of educational expansion on social mobility – a quite unique addition to a literature focused on associational evidence – and in its examination of a highly interesting historical setting. However, this study – like much current research that draws causal inferences – does not empirically address the mechanisms through which these causal treatment effects occur.

Breen (2010), in contrast, has provided a new methodological approach and empirical (but non-causal) evidence on the mechanisms discussed here. Breen's decomposition method overcomes the described challenges of jointly taking into account the interdependence and possible interactions within the mobility triad and allows analysis of the relative importance of each distinct mechanism. Breen's empirical evidence, developed from data on men in Sweden, the UK, and Germany, indicates a strikingly different pattern for each of these cases: Social mobility trends in Sweden have been positively influenced chiefly by educational equalization, more by the compositional effect than by educational equalization in Germany, and solely by the compositional effect in the UK.

Our analysis uses Breen's approach to generate the same type of evidence for the United States. We describe the benefits of Breen's decomposition method in detail below.

Expanding our view of social origins

Occupation-based measures of social class continue to be influential and frequently used in sociological research. The main argument for their use is that they are not simply convenient proxy measures of other dimensions of socio-economic standing, such as permanent income (Zimmerman 1992, Hauser and Warren 1997), but that they also capture a much more extensive range of socio-economic conditions central to individuals' lives, opportunities, and consumption patterns (Wright 1996, Lareau and Conley 2008). While recent sociological work debates the best level of aggregation of social class measures (Weeden and Grusky 2012, Jonsson et al. 2009), our data do not allow us to assess whether social mobility trends are best conceptualized and measured in big, meso, or micro classes. We focus on trends in

"big class" mobility and return to a critical discussion of the implications of this decision in the conclusion.

At the same time, we acknowledge that occupation-based measures are not the only way to capture social origins (Blau and Duncan 1967). We certainly appreciate the symmetry of an approach that draws on class measures to assess both social origins and social destinations. However, "maintaining the metaphor of social mobility" (Hauser et al. 2000: p. 192) should not keep us from considering other dimensions of social background that we know to have strong and independent associations with educational and occupational attainment. As Jencks and Tach (2006) remind us, "the best way to measure changes in equal opportunity is to track the effects of specific sources of intergenerational economic resemblance that offend our sense of justice" (pp. 24-25). The specific source of inequality in opportunity that we additionally take into account here is parental education.

As is the case for parental class, we may think of multiple mechanisms through which parents' educational status shapes their offspring's educational (ED) and occupational attainment (OD). For instance, parents' educational success may provide informational advantages when it comes to navigating educational careers and labor market entry (Baker and Stevenson 1986, Lareau 1989, Pfeffer 2008). Also, parents with higher levels of education may be able to provide more resourceful learning environments at home, with their own knowledge acquired through education serving as a resource itself. Parents' own educational status may additionally serve as an anchor to define the minimum level of educational attainment aspired for their children (Breen and Goldthorpe 1997, Davies et al. 2002).

The theoretical reasons for choosing parental education as an indicator of social origins are manifold. In addition, from an empirical perspective we may be interested in the association between parents' education and their offspring's outcomes because (a) it may be interpreted as a zero-order association between social origins and attainment (since parental education precedes and predicts parental occupation and other parental characteristics, such as earnings and income) and (b) this association typically has the highest independent influence among other dimensions of social background.

Empirical evidence on trends in the association between parental education and offspring's own educational status and social class in the U.S. is rather limited and mostly concerned with the OE leg of the mobility triad – the link between parental and children's education, or educational mobility. Most empirical research has indicated overall stability in the intergenerational association of education over the first three quarters of the 20th century (Mare 1981, Mare 1993, Hout et al. 1993, Hout and Dohan 1996, Bloome and Western 2011). Since then, however, the association appears to be increasing. For instance, Roksa et al. (2007) observe increases in the influence of parental education on college entry during

the 1980s and 1990s. Buchmann and DiPrete (2006) report gender-specific trends according to which the influence of parents' education has increased for the higher educational attainment of their same-sex offspring. In particular, they detect a growing influence of father's low educational status (high school attainment or less) on son's higher educational attainment. Hout and Janus (2011) find overall stability in the effects of parental education, but their assessment of absolute educational mobility rates reveals decreasing rates of intergenerational upward mobility (i.e., children attaining more education than their parents) and increasing rates of educational downward mobility since the 1970s. The more pessimistic conclusions about stable and potentially increasing educational inequality tied to parental education are in line with international evidence that typically finds much more stability in this association than for trends in social class inequalities in education (Vallet 2004b, Pfeffer 2008, Shavit et al. 2007, Breen et al. 2009). Evidence on cohort changes in the relationship between parental education and offspring's class attainment (ED association) in the U.S. is elusive. The same applies to evidence of a potential compositional effect tied to parental education. Notably, Torche's (2011) expansive analyses of the sensitivity of the compositional effect to different measures of socio-economic origins did not include parental education.

Method

First, we use log-linear and log-multiplicative models (Hout 1983; Powers and Xie 2000) to describe trends in each leg of the mobility triad. We test whether each association (OD, OE, ED) is constant across cohorts or whether we can parsimoniously describe a cohort trend drawing on the "log-multiplicative layer effects" or "uniform difference" (unidiff) model (Xie 1992; Erikson and Goldthorpe 1992). For the assessment of cohort trends in social class mobility (OD) this model is

$$f_{ijl} = \mu\gamma_l^C\gamma_i^O\gamma_j^D\gamma_{li}^{CO}\gamma_{li}^{CD}exp(\Psi_{ij}\Phi_l) \tag{1}$$

where Φ_l describes the cohort-specific deviation in the association between class origin, O, and class destination, D (Ψ_{ij}). The model thus produces a single parameter (Φ_l) for each cohort that can be used to parsimoniously describe different levels of social mobility (independent of the overall class distribution) for each cohort while fitting a common pattern of association across all categories of O and D in the mobility table that is collapsed across cohorts (Xie 1992: p. 382). A further, even more parsimonious model imposes linearity on the cohort trend in Φ_l, i.e., a linear increase or decrease in social mobility (Breen and Luijkx 2004).

We draw on a decomposition method developed by Breen (2010) to compare observed trends in social mobility to counterfactual mobility trends derived from specific assumptions about the role of education (for a detailed description of the method, see Appendix A). In particular, we assess how educational expansion has altered social mobility trends through the following three mechanisms: the compositional effect (OED), cohort changes in class inequality in education (COE), and cohort changes in the returns to education (CED). We begin with a baseline counterfactual mobility trend that constrains all meaningful interactions between origin, education, and destination to be constant across cohorts – resulting in a flat trend. We then investigate mobility trends based on counterfactual COD distributions that we derive from separately freeing up the parameters entailing the three mechanisms described above. We then assess how closely each of these counterfactual mobility trends approximates the observed mobility trend. This decomposition approach thus allows us to gain an insight into the relative importance of each mechanism through which educational expansion may contribute to social mobility trends.

All of our models are estimated using the program `R` (R Core Team 2013, Turner and Firth 2012).

Data and Measures

We draw on data from 29 repeated cross-sectional surveys from the General Social Survey (GSS) administered between 1972 and 2012. Our analytic samples (N=14,588-14,608) consist of men aged 30 to 64 in each year of data collection. We follow Breen (2010) in restricting our analyses to men and compare our results to his male-only evidence from other countries. At any rate, our GSS sample sizes would be insufficient to reliably model the vast changes in women's labor market participation rates across historical time and the life course (for instance, even a separate class category for labor market non-participation would still require the exclusion of the earliest cohorts). We also restrict our analytic sample to respondents who had lived in the U.S. at age 16 to capture those most likely to be exposed to educational expansion in the U.S. (as opposed to those who have attained their basic education outside of the United States).

Our analyses distinguish six birth cohorts, covering individuals roughly born before and during WWI (1883-1921), in the interbellum period (1922-1933), during WWII (1934-1945), post-WWII (1946-1957), during the fordist growth phase of the 1950s and 1960s (1958-1969), and during the recession era of the 1970s and early 1980s (1970-1982). We typically label our cohort members by the years they turned 30 to focus on the time period in which they completed their educational and occupational attainment.

Respondents' educational attainment is measured as the highest degree attained in the following four categories: less than high school, high school, some college (including associate's degree), and bachelor's degree or higher. As a measure of social origin, we use the highest educational status of parents based on the same degree categories. Because our sample sizes do not allow us to distinguish between the attainment of a bachelor's degree and post-graduate degrees for our decomposition analysis, they are instead based on a weighted average of the educational inequalities, returns to education, and most of all, the compositional effect (Torche 2011) among these two levels of post-secondary attainment.

Respondents' reports of their current occupation are the basis for the assessment of their social class destination. Drawing on the EGP class scheme (Erikson and Goldthorpe 1992), which has been widely used in quantitative research on social class, we distinguish six occupation-based social classes: higher-grade professionals and managers / higher service class (I), lower-grade professionals and managers / lower service class (II), routine nonmanual workers (IIIab), the self-employed and farmers (IVabc), skilled manual workers and supervisors (VI+V), and unskilled manual workers (VIIab).[4]

We assess respondents' class origin by applying the same EGP class scheme to respondents' reports of their father's occupation when they were growing up. We use father's occupation as the measure of origin because information on mother's occupation is not available in earlier years. While this focus on male lineages again follows most prior research, we again acknowledge that estimates of class mobility trends in the U.S. for the most recent cohorts vary depending on how mother's social class status is taken into account (Beller 2009). In stability analyses reported in Appendix B, we replicate some of those findings but the study of the mechanisms behind these diverging trends through our decomposition approach is beyond the scope of this paper and the statistical power of our sample. Based on Beller's findings, we note that we may underestimate a recent decrease in social class mobility.

We impute missing values on our main measures of education, destination, and origin using the Stata `mi` command. The results reported here are stable to a wide range of different approaches to treating missing values, different specifications of our social class measure, and different sample constructions. These stability analyses are reported and discussed in more detail in Appendix B.

Changes in the Educational and Class Structure

We begin by describing cohort trends in the two societal features that are at the heart of this assessment: the educational structure and the class structure (see Table 1). In terms of shifts in the educational distribution, ample empirical research has of course already

Table 1: Cohort Trends in Education and Class Structure

	Year turned 30					
	before 1951	1952-1963	1964-1975	1976-1987	1988-1999	2000-2012
Highest Degree						
Less than HS	44.9%	35.8%	20.7%	11.0%	9.8%	10.5%
HS	41.8%	43.7%	50.1%	50.5%	53.6%	50.2%
Some college	0.4%	1.8%	4.2%	7.6%	8.5%	7.6%
BA and more	12.9%	18.7%	25.1%	30.9%	28.1%	31.6%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Destination Class						
High Service	16.4%	22.1%	25.6%	23.7%	23.3%	22.0%
Low Service	11.2%	11.4%	13.4%	16.4%	15.9%	18.5%
Routine Non-Manual	8.7%	9.7%	7.3%	8.2%	7.8%	9.2%
Self-Employed	14.3%	12.3%	10.7%	9.3%	8.1%	7.2%
Skilled Manual	24.8%	20.5%	20.2%	20.2%	22.5%	21.8%
Unskilled Manual	24.6%	24.0%	22.7%	22.2%	22.4%	21.4%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

described the rapid pace of educational expansion during much of the 20th century and its tapering off during the latter decades (Fischer and Hout 2008, Goldin and Katz 2008, Garfinkel et al. 2010). Our own data capture these trends well: The share of individuals with a post-secondary degree rose rapidly and linearly from 12.9% in the first cohort (who turned 30 before 1951) to 30.9% in the fourth cohort (who turned 30 between between 1976 and 1987). Since then, however, the share of post-secondary degree holders has remained stable, as has the share of those with some college. These trends are mirrored at the lower level of the educational distribution, where high school dropout rates decreased sharply and linearly for the first four cohorts (from 44.9% to 11%) and then remained at that level for the last two cohorts. These trends, once again, underline the dramatic success in expanding education during most of the last century and the ebbing of that trend in recent decades.

The second panel of Table 1 shows cohort changes in the class structure during the same period. Highly skilled white-collar positions (high service class) expanded significantly for the first three cohorts of our sample (from 16.4% to 25.6%) but then slowly declined to 22% for the most recent cohort. On the other hand, the share of lower-grade professionals and managers (lower service class) rose steadily from 11.2% in the oldest cohort to 18.5% in the youngest cohort. The working classes experienced a contraction that was comparatively modest in size and mainly due to the decreasing share of unskilled manual labor (from 24.6% to 21.4%). Routine non-manual labor shows no pronounced cohort trends. The share

of self-employed (including farmers) has been cut in half (14.3% to 7.2%), mostly due to the rapid decline of small farm holders. Given these changes in the class structure, it is important to emphasize that our analyses assess relative rates that describe the level of social fluidity without considering social mobility that is due to these structural shifts (and, for convenience, we continue to use the label social mobility rather than social fluidity).

Educational Expansion and Class Mobility

Observed trends

We begin by assessing cohort trends in each leg of the mobility triad. Table 2 reports the fit statistics for three different models of trends in social mobility (ODC), trends in educational inequality tied to parental class (OEC), and trends in class returns to education (EDC). In each case, the first model assumes the association to be constant across cohorts, the second model imposes a linear cohort trend in the strength of association (while holding the pattern of association constant), and the third model allows the strength of association to differ freely across cohorts. For all three processes studied, the first model (no trend) generally

Table 2: Parental Class: Fit statistics for observed trends in mobility components

		G^2	df	p	Δ	BIC	p vs #.1	p vs #.2
ODC (Trends in Social Class Mobility)								
1.1	Constant	150.1	125	0.0623	0.037	-1,049		
1.2	Linear UniDiFF	146.7	124	0.0804	0.036	-1,042	0.0652	
1.3	UniDiFF	146.3	120	0.0516	0.036	-1,004	0.5786	0.9825
OEC (Trends in Educational Inequality tied to Parental Class)								
2.1	Constant	101.8	75	0.0214	0.027	-617		
2.2	Linear UniDiFF	100.8	74	0.0208	0.027	-609	0.3173	
2.3	UniDiFF	98.1	70	0.0150	0.027	-573	0.5934	0.6092
EDC (Trends in Class Returns to Education)								
3.1	Constant	105.4	75	0.0119	0.024	-614		
3.2	Linear UniDiFF	105.2	74	0.0101	0.024	-604	0.6547	
3.3	UniDiFF	94.1	70	0.0291	0.023	-577	0.0458	0.0255
UniDiff parameters		Linear	C=1	C=2	C=3	C=4	C=5	C=6
	OD (1.2 & 1.3)	-0.030	1.000	0.946	0.913	0.889	0.843	0.864
	OE (2.2 & 2.3)	0.021	1.000	0.884	1.024	0.979	1.030	1.030
	ED (3.2 & 3.3)	-0.006	1.000	1.032	1.161	1.035	1.101	0.945

Note: Authors' calculations based on GSS (1972-2012); N=14,608

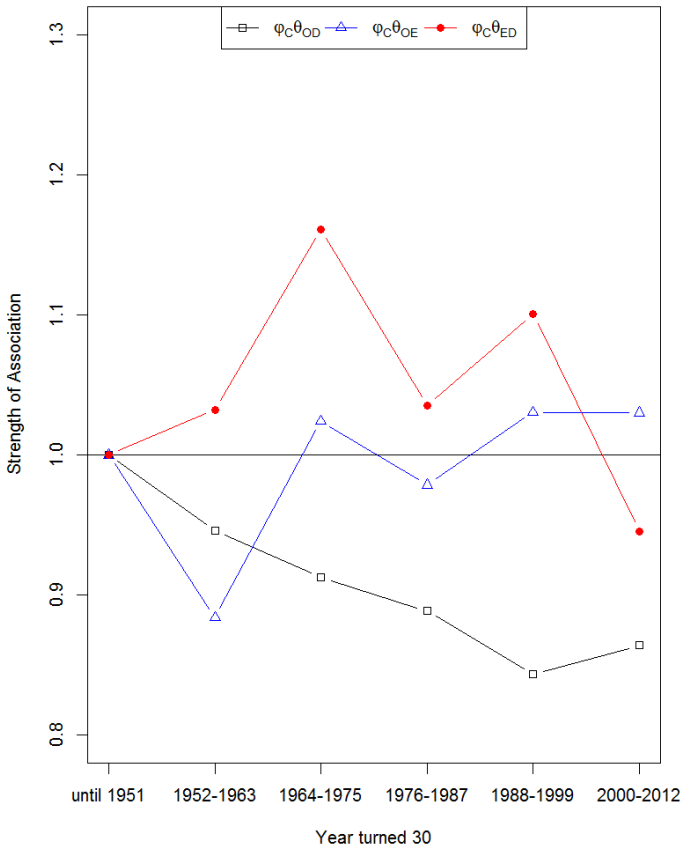
yields a satisfactory model fit with non-significant deviations between predicted and observed frequencies at p>0.01-0.06 and the share of misclassified cases (Δ) between 2.4 and 3.7%. It could be chosen as the preferred model when also considering its parsimony (BIC values 7-10 points lower compared to linear unidiff models). In general, this finding indicates that cohort trends in these associations are of relatively modest size, if present at all.

In fact, for the description of cohort trends in class inequality in education, we can accept the model of constant association as the best model. In contrast, for the analyses of both social mobility and returns to education, we find some evidence for modest cohort differences. For trends in social mobility, the linear unidiff model provides an improvement in model fit over the constant association model (p<.065). The bottom panel of Table 2 shows a negative linear unidiff parameter for social mobility (-0.030), denoting a linearly decreasing association between class origin and class destination across cohorts. For trends in class returns to education, the unidiff model also provides a significant improvement in model fit over the constant association model (p<.046), although the cohort differences do not follow a clear pattern (bottom panel of Table 2).

In plain terms, we find stability in class inequality in education, modest but continuous increases in social class mobility, and relatively trendless fluctuation in class returns to education. Although not the preferred model in all cases, the unconstrained unidiff models yield parameter estimates that reinforce this conclusion. We display these unidiff parameters in Figure 2 for further illustration. Again, we observe overall stability in the association between class origin and education (θ_{OE}), a linear decline in the association between class origin and destination (θ_{OD}) at least up to the youngest cohort,[5] and largely directionless fluctuation across cohorts in the association between education and class destination (θ_{ED}). For θ_{OE}, we note one interesting exception: The second oldest cohort seems to have a much lower level of class inequality in educational attainment than all other cohorts, an anomaly that might reflect the egalitarian effects of the GI bill (Bound and Turner 2002).

The evidence presented here is new and interesting in its own right, indicating that while social class mobility increased modestly across birth cohorts over the last seven decades, class inequality in education and class returns to education did not vary consistently across cohorts.[6] However, as explained above, these findings yield informative but insufficient evidence regarding the overall role of education and its expansion in explaining the increase in social class mobility. To investigate how these three trends fit together we therefore now turn to the decomposition analysis.

Figure 2: Parental Class: Observed trends in mobility components

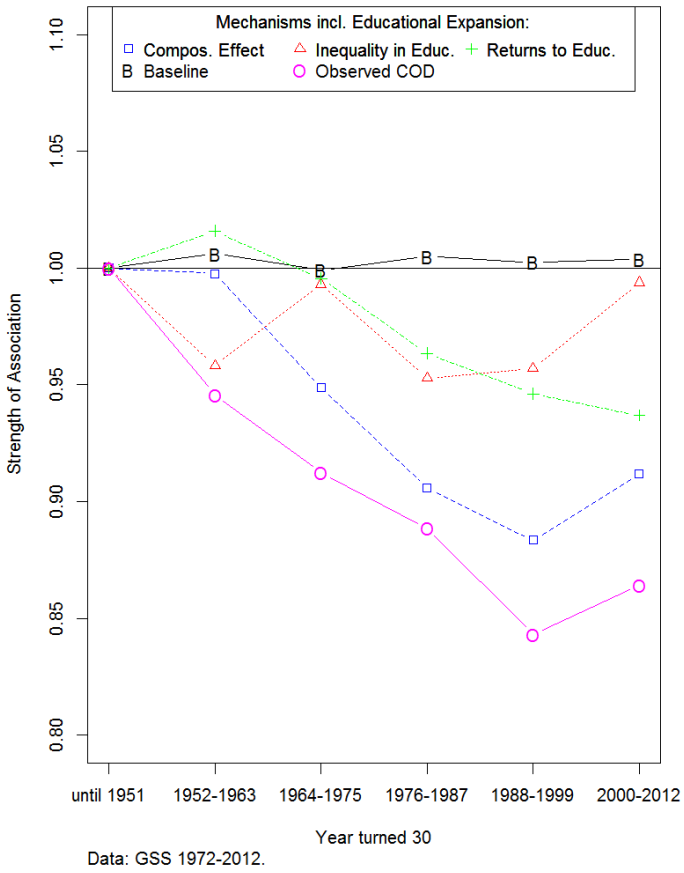


Note: Displaying UniDiff parameters for trends in social class mobility ($\phi_C\theta_{OD}$), class inequality in education ($\phi_C\theta_{OE}$), and class returns to education ($\phi_C\theta_{ED}$) in reference to the oldest cohort. Fit statistics see Table 2.

Decomposition Analysis

As described earlier, the aim of our decomposition analysis is to reveal the relative importance of each of the three mechanisms through which educational expansion may shape trends in social class mobility. In essence, we are interested in how closely each counterfactual mobility trend approximates the observed trend. Figure 3 displays the observed trend in social mobility (O) that we already described above. The baseline mobility trend (B), based on a counterfactual mobility table derived from a model that fixes all relevant parameters to be constant (see Appendix A), unsurprisingly is one of stability. Our main interest lies in the three lines in between the baseline (B) and the observed mobility (O) trend. Each of these trend lines is based on a counterfactual mobility table that fits the effects of educational expansion in combination with one of the following: the compositional effect (□), changes

Figure 3: Parental Class: Counterfactual trends in social mobility



Note: Displaying UniDiff parameters from separate models fitted to counterfactual and observed cross-classifications of parental class, education, and class destination (see Appendix A).

in class inequality in education (△), and changes in returns to education (+), respectively. Again, we assess the relative importance of these three mechanisms by observing how closely each corresponding counterfactual trend approximates the observed trend.

The answer is quite clear: The counterfactual trend that best and quite closely approximates the observed trend is that produced by the model that accounts for the effect of educational expansion via the compositional effect (□). The flattening out of this counterfactual trend for the last three cohorts also corresponds well to the demonstrated slowdown in educational attainment among those cohorts. In contrast, class inequality in education and class returns to education, which we found to be largely trendless, do not contribute to increases in social mobility. Our graphical inspection thus leads us to conclude that the compositional effect alone accounts for the positive relationship between educational expansion and social mobility rates – a conclusion very much in line with Hout's original hypothesis

(Hout 1988). We can further quantify this effect using our decomposition results: Based on the linear unidiff parameters, 90% of the observed trend in social class mobility is tied to the effects of educational expansion via the compositional effect (linear unidiff parameter estimates for baseline=0.000, compositional effect=-0.027, observed=-0.030).

A complementary view: Inequalities tied to Parental Education

Observed trends

We now turn our attention to a view of social mobility that relies on a different indicator of individuals' socio-economic origin – their parents' educational attainment. As discussed above, there are sound theoretical reasons to expand our assessment of trends in educational and class attainment opportunities in this direction. Also, from an empirical perspective, we are interested in describing an alternative dimension of attainment inequality that may have been subject to a different development over time than one based on father's occupational status.

Table 3: Parental Education: Fit statistics for observed trends in mobility components

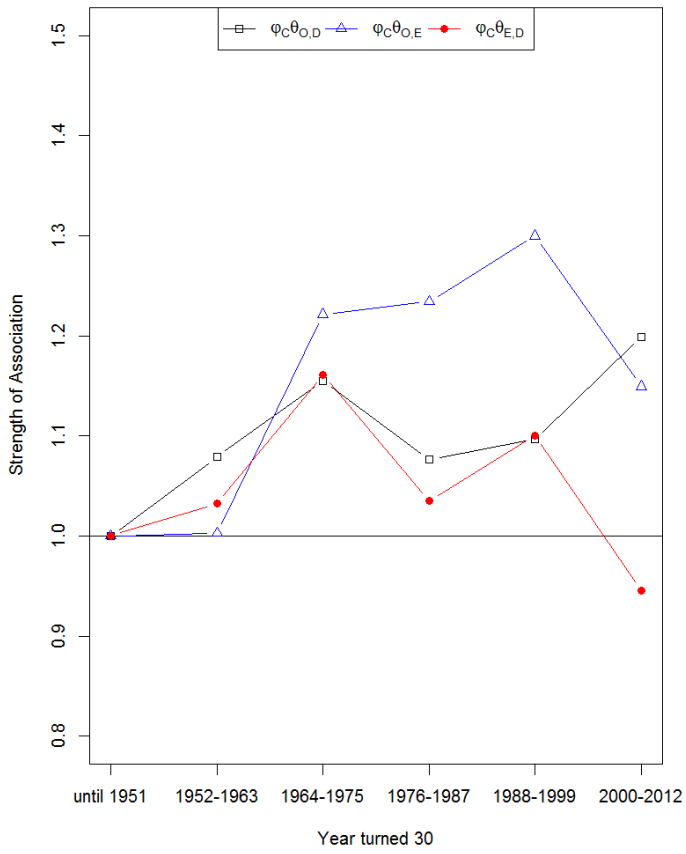
							p	
		G^2	df	p	Δ	BIC	vs #.1	vs #.2
ODC (Trends in Association between Parental Education and Class Destination)								
1.1	Constant	56.1	75	0.9496	0.018	-663		
1.2	Linear UniDiFF	55.8	74	0.9434	0.018	-654	0.5839	
1.3	UniDiFF	54.1	70	0.9204	0.018	-617	0.8492	0.7907
OEC (Trends in Educational Inequality tied to Parental Education)								
2.1	Constant	70.5	45	0.0090	0.017	-361		
2.2	Linear UniDiFF	61.5	44	0.0414	0.014	-360	0.0027	
2.3	UniDiFF	53.1	40	0.0805	0.012	-330	0.0038	0.0780
EDC (Trends in Class Returns to Education)								
3.1	Constant	105.4	75	0.0119	0.024	-614		
3.2	Linear UniDiFF	105.2	74	0.0101	0.024	-604	0.6547	
3.3	UniDiFF	94.1	70	0.0291	0.023	-577	0.0458	0.0255
UniDiff parameters		Linear	C=1	C=2	C=3	C=4	C=5	C=6
	OD (1.2 & 1.3)	0.014	1.000	1.079	1.155	1.077	1.097	1.199
	OE (2.2 & 2.3)	0.060	1.000	1.003	1.222	1.234	1.300	1.149
	ED (3.2 & 3.3)	-0.006	1.000	1.032	1.161	1.035	1.101	0.945

Note: Authors' calculations based on GSS (1972-2012); N=14,588

Our empirical models, which mirror those presented above, now capture inequality in educational attainment and class attainment (measured in the same way as above) tied to parental education (OD and OE, respectively) and, as before, class returns to education (ED). Table 3 reports the fit statistics of our main models for each of these associations. We will not repeat our discussion of cohort trends in class returns to education, since the models estimated for this association are equivalent to those reported earlier.

Our new analyses yield trends that sharply differ from the trends described above. For our assessment of the association between parental education and class destination (OD), the constant association model provides a great fit upon which neither the linear unidiff nor the unidiff model may improve upon, suggesting that cohort trends in this association should be minimal. The unidiff estimates (bottom of Table 3 and displayed in Figure 4) yield a slightly different impression, namely one of a generally increasing association. A

Figure 4: Parental Education: Observed trends in mobility components



Note: Displaying UniDiff parameters for trends in association between parental education and class destination ($\phi_C\theta_{OD}$), inequality in education tied to parental education ($\phi_C\theta_{OE}$), and class returns to education ($\phi_C\theta_{ED}$) in reference to the oldest cohort. Fit statistics see Table 3.

conservative interpretation of this evidence is that, unlike the influence of class origin, the influence of parental education on class destination has not declined, and may even have increased somewhat, across cohorts.

The statistical evidence on trends in inequality in educational attainment tied to parental education (or educational mobility) is more clear-cut. Both the linear unidiff model and the unidiff model yield statistically significant improvements in model fit over the constant association model ($p<.003$ and $p<.004$, respectively) and Figure 4 reveals a pronounced upward trend in this association with a decline for the youngest cohort.

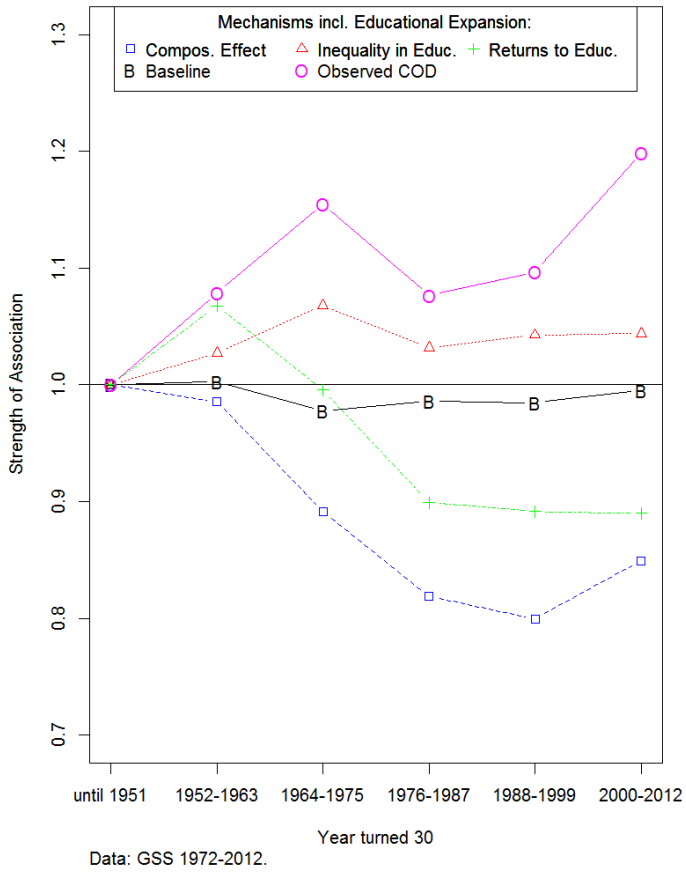
In sum, while we earlier showed a relatively steady decrease in the association between social origin based on parental class and individuals' class, here we find no such decrease based on parental education as the measure of social origin. In terms of individuals' own educational attainment, we even see evidence of an increasing role of parents' educational status. We believe that our analyses based on parental education as the marker of social origin provide important findings that complement the more frequently analyzed relationship between class origin and attainment opportunities – and, in particular, we find them interesting enough to engage in a final decomposition analysis geared at revealing the mechanisms that drive these differential trends.

Decomposition Analysis

Figure 5 reports the results of our decomposition analysis. Again, we compare how each of the three mechanisms we discussed contributes to the observed trends in social mobility, here measured as the association between parents' educational status and their offspring's class attainment. Above, we already established that this association tends to increase over cohorts. Although, as we note, we are not able to establish that this trends is statistically significantly different from a stable association, we use our decomposition analysis to assess which mechanisms emerge as possible candidates that contribute to a non-decreasing pattern of association.

Again, the findings from our decomposition analysis provide a quite clear-cut answer. Educational expansion contributed to a decrease in the association between parental education and individuals' class destination (OD) through the compositional effect and, at least for the youngest three cohorts, through changing class returns to education (although, as shown above, these changes show no consistent pattern). As a side note, this suggest that the compositional effect also applies to the influence of parental education on class attainment opportunities (i.e. the direct association between parental education and class destination decreases for higher levels of individuals' educational attainment), which constitutes

Figure 5: Parental Education: Counterfactual trends in social mobility



Note: Displaying UniDiff parameters from separate models fitted to counterfactual and observed cross-classifications of parental education, education, and class destination (see Appendix A).

a further generalization of the compositional effect to other dimensions of socio-economic standing (Torche 2011). More importantly for this analysis, however, is that these two mechanisms hold no explanatory power for the cohort trend in the OD association that, in reality, shows no signs of a decrease. Instead, we are left with just one possible explanatory mechanism: increasing educational inequality. As established above, educational inequality tied to parental education has increased over cohorts, and this increase appears to have contributed to decreasing social mobility or, following the more conservative interpretation of stable mobility trends, to have counterbalanced the otherwise positive effects of educational expansion through the compositional effect.

Conclusion

Increasing intergenerational social mobility is a policy goal that many agree upon, whether out of considerations of social justice or economic efficiency. The education system has long been acknowledged as a central sphere for the provision of such opportunities for mobility (Durkheim 1922, Coleman 1968, Labaree 1997). In this analysis, we expand on recent work (Breen 2010) to shed new light on the role of education for social mobility by means of tracking the relationship between educational expansion and long-term trends in social mobility for the United States. We identify three main channels through which educational expansion may shape mobility trends – changes in educational inequality, changes in returns to education, and the compositional effect – and we test their relative importance in accounting for cohort changes in social mobility.

In terms of social class mobility, we find a slow but steady increase in mobility across cohorts born throughout the first eight decades of the 20th century. This finding constitutes a separate contribution to an ongoing controversy about long-term trends in class mobility (Long and Ferrie 2013, Xie and Killewald 2013, Hout and Guest 2013). We find that the mobility-inducing effects of educational expansion are nearly entirely accounted for by the compositional effect (the fact that the direct link between social origins and destinations is severed among those who attain a college degree; Hout 1988, Torche 2011). Because educational expansion has increased the share of the population with college degrees, its effects on mobility has been positive. In contrast, educational expansion did not contribute to higher rates of social class mobility by equalizing educational outcomes. We have shown, in line with prior evidence, that it left the degree of class inequality in education largely unchanged. Also, increasing levels of social class mobility cannot be ascribed to the way that educational expansion may have impacted class returns to educational degrees, whose development across cohorts does not follow a consistent pattern.

Hout and Dohan have argued that "the lack of coordinated or sustained policy regarding equality of educational opportunity makes the United States a prototypical example of a nation that has relied on expansion more than policy to promote equality of educational opportunity" (Hout and Dohan 1996: p.212). We have shown – in line with prior research – that educational expansion alone is a poor policy when aimed at decreasing class inequality in education, which has persisted quite stubbornly. While more targeted policies are needed to decrease inequality in education in the U.S. (Haveman and Smeeding 2006), our findings suggest that educational expansion has nevertheless contributed in a major way to increasing mobility opportunities (see also Breen 2010: p. 382). As hypothesized a quarter century ago by Hout (1988), the greatest part of the increase in mobility (in our empirical results, 90%)

can be ascribed to the compositional effect.

In comparison to the three national cases presented by Breen (2010), our findings for the U.S. are most akin to the results from the United Kingdom, where the compositional effect emerged as the only mobility-inducing factor. The evidence that the compositional effect is the near exclusive channel through which educational expansion has positively influenced social mobility in these two Anglo-Saxon countries corresponds to findings from cross-national comparative work that has hypothesized that the compositional effect is "most pronounced in the liberal welfare setting where the association would otherwise be greatest" (Beller and Hout 2006b: p. 353).

We have argued that despite a long sociological tradition of assessing trends in mobility opportunities tied to parents' social class, we have sound reasons to be interested in other dimensions of socio-economic inequality in opportunity as well. Having analyzed inequalities tied to parental education, we are wary of broad claims about about social progress based analyses using just one selected measure of social origin. Unlike the picture of growing social mobility generated by our analyses based on parents' occupational status, the changing role of parental education for individuals' educational and class attainment offers a less dynamic view. We find no evidence for a decrease in the association between parental education and individuals' class attainment (social mobility); if anything, we find that this association has increased over time. Also, the intergenerational association in educational status has increased, accounting for the non-decrease in social mobility measured this way and effectively counterbalancing the positive compositional effect tied to parental education.

The divergent trends in educational inequality and social mobility based on two different indicators of social origins may indicate that the channels of intergenerational status transmission change across time (Sorokin 1927). While one dimension of socio-economic advantage may lose some power in enabling the success of the next generation, another dimension of advantage may gain traction. Based on the findings presented here, such story could be told about social class inequalities in opportunity making way for inequalities tied to parental education (Bourdieu 1984, 1996). However, our conclusions about the role of educational expansion hold for both of these divergent trends: educational expansion contributed to more equal opportunities for social class attainment by breaking the direct intergenerational transmission of status among those attaining a college degree – and by thereby counterbalancing the stability of class inequalities in educational attainment and the increase of educational inequalities tied to parental class.

The findings presented here can inform future research that addresses related topics and unresolved questions. First, our finding of divergent trends tied to parental class and parental education raises the question of how other dimensions of inequality in opportunity

have evolved over time. Another such dimension would be income, the subject of a large field of research with some partial evidence that awaits integration. For example, recent research indicates that the intergenerational income correlation has remained largely stable (Lee and Solon 2009, Chetty et al. 2014); that income inequality in education has recently been increasing (Reardon 2011, Bailey and Dynarski 2011); that income returns to education have experienced a great upswing; and that the compositional effect also holds for this dimension (Torche 2011). Noting parallel trends in some legs of this mobility triad (Mazumder 2012, Corak 2013) is still far from establishing the overall role of education and educational expansion in explaining income mobility trends. Significant progress in this direction has been made by Bloome and Western (2011), but the relative role of the compositional effect in explaining changes in income mobility has not been studied.

Second, switching from occupation-based measures to income measures entails more than merely empirical curiosity – it requires us to cross a well-maintained chasm between categorical and gradational approaches to inequality and mobility (Weeden and Grusky 2012). One specific version of the categorical view that is still tied to occupations (and therefore comes with an explanatory rather than merely a descriptive aim) has been provided with the "micro class" view (Weeden and Grusky 2005). The idea that "big class are capturing a diminishing share of the total structure in the division of labor" has triggered the proponents of this approach to note that "any evidence of a weakening in class effects will have to be accompanied with a caveat that such weakening may simply be an artifact of applying a measurement tool that is conveying ever less information about the inequality space" (Weeden and Grusky 2012: p. 1755). While we dutifully repeat this caveat, we note that, to date, there is no reliable evidence on differential trends in U.S. social mobility by "macro classes" and "micro classes". Although the data requirements for a replication of our analyses using a micro-class approach are high, we certainly encourage such replication to allow an assessment of the extent of the hypothesized upward bias in our class mobility trends.

Third, our mobility analyses are limited to male-only lineages. We encourage future work to establish whether the processes studied apply in a similar fashion to women's mobility patterns as well as to the effects of mother's social class. Such work is highly relevant because educational expansion has followed different patterns for males and females (DiPrete and Buchmann 2006, Hout and Janus 2011) and because the speed and extent of the increases in educational participation among women make for a particularly interesting case to assess the underlying mechanisms.

Fourth, we stress that – like most other mobility research – our evidence is associational. We have followed Breen (2010) in focusing on a mechanistic explanation of the impacts of educational expansion to the detriment of causal inference (Rauscher 2013). Methodological

tools to unite causal inference methods and mechanistic approaches are developing (e.g., der Weele and Robins 2007, Knight and Winship 2013) and we may in the future get closer to identifying causal mechanisms, although the context for the questions studied here likely cannot be long-term historical trends but specific institutional and policy changes to education systems.

A Appendix: Decomposition method

Breen (2010) demonstrated that the three-way probability distribution of cohort by origins by destinations (COD) can be derived from saturated log-linear models for the cross-classification of cohort by origin by education (COE) and cohort by origin by education by destination (COED), that is:

$$f_{ikl} = \mu\gamma_l^C\gamma_i^O\gamma_k^E\gamma_{li}^{CO}\gamma_{lk}^{CE}\gamma_{ik}^{OE}\gamma_{lik}^{COE} \tag{A.1}$$

$$f_{ijkl} = \alpha\beta_l^C\beta_i^O\beta_k^E\beta_j^D\beta_{li}^{CO}\beta_{lk}^{CE}\beta_{lj}^{CD}\beta_{ik}^{OE}\beta_{ij}^{OD}\beta_{kj}^{ED}\beta_{lik}^{COE}\beta_{lij}^{COD}\beta_{lkj}^{CED}\beta_{ikj}^{OED}\beta_{likj}^{COED} \tag{A.2}$$

Leaving out selected, theoretically meaningful parameters from equations A.1 and A.2 produces counterfactual OEDC distributions, i.e., predicted frequency distributions across the four-way cross-classification of origin, education, destination, and cohort. Collapsing these counterfactual distributions over E yields an implied three-way relationship between O, D, and C, which serves as the basis for the assessment of counterfactual trends in social mobility.

Table 4 provides an overview of the parameters included in the generation of each counterfactual COD table analyzed in this paper. The order in which we proceed differs from Breen's original introduction of this decomposition method and broadly follows ongoing comparative work drawing on the same modeling framework (Breen et al. in preparation).

Baseline model (B) fits parameters in both the COE and COED tables that are of no substantive interest to this paper, namely, the main effects (C,O,E,D) and all relevant two-way interactions with the exception of γ_{ik}^{CE}, i.e. cohort changes in the education distribution (educational expansion). The three-way interactions that represent the main mechanisms studied in this paper (marked in grey in Table 4) are only freed up in the following models.

Model 1 additionally frees up the parameters for educational expansion, γ_{ik}^{CE}, and the compositional effect, β_{ikj}^{OED} (marked in grey). It creates a simulated mobility table (COD) that allows the compositional effect to impact mobility trends through educational expansion.

Model 2 instead frees up the parameters for educational expansion, γ_{ik}^{CE}, and changes in inequality in education, γ_{lik}^{COE}. Substantively, this allows us to assess the impact of changing educational inequalities at the backdrop of educational expansion.

Model 3 frees up the parameters for educational expansion, γ_{ik}^{CE}, and changes in class

Table 4: Parameters fitted to generate counterfactual mobility tables

		Main effects				Two-way interactions						Three-way interactions				4-way
Model	Table	C	O	E	D	CO	CE	CD	OE	ED	OD	COE	CED	OED	COD	COED
Baseline (B)	COE	x	x	x		x			x							
	COED	x	x	x	x	x	x	x	x	x	x	x				
1: Compositional	COE	x	x	x		x	x		x							
	COED	x	x	x	x	x	x	x	x	x	x	x		x		
2: Chang. Educ. Ineq.	COE	x	x	x		x	x		x			x				
	COED	x	x	x	x	x	x	x	x	x	x	x				
3: Chang. Ed. Returns	COE	x	x	x		x	x		x							
	COED	x	x	x	x	x	x	x	x	x	x	x	x			
Observed (O)	COE	x	x	x		x	x		x			x				
	COED	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

returns to education β_{lkj}^{CED}. That is, we assess the impact of changing educational returns at the backdrop of educational expansion.

Observed (O): The last remaining three-way interaction that has not been fitted so far is β_{lij}^{COD}, i.e. cohort changes in the direct effects of origins on destinations. However, fitting this parameter implies that the simulated COD cross-tabulation is equivalent to the observed COD cross-tabulation (see Breen 2010: 387). This hinders the separate assessment of the role of cohort changes in the direct inheritance of class status outside of the education system since we cannot separate it from the impact of freeing up the four-way COED interaction.

A few additional explanations may be in order:

- Note that the parameters CE and COE are always fitted in the COED table to yield consistent and unbiased parameters in the prediction of that cross-classification. However, fitting these parameters in the COED table does not require the same parameters to be fitted in the COE table. The method applied here re-weights the predicted COED frequencies by the values of the fitted COE margins (personal communication with Richard Breen, November 2013).

- We add CE concurrently with the three parameters of interest in models 1-3 (rather than including CE in the baseline model) for the reasons listed below. Doing so allows us to estimate the relative impact of each mechanism separately.

  - In line with our theoretical motivation, Model 1 assesses whether the compositional effect has gained a more pronounced role by virtue of educational expansion (since more individuals move into those educational positions where the OD association is lower). Freeing up OED separately would not capture this process.[7]
  - Model 2 mechanically requires fitting CE since we fit the higher-order COE interaction. Doing so, however, is also in line with our theoretical motivation that is chiefly interested in the development of educational inequalities at the backdrop of the educational expansion rather than independent of it.
  - By the same token, model 3 assesses whether educational returns have changed over time at the backdrop of the educational expansion rather than independent of it.

B Appendix: Stability of class mobility trends

We run several checks in order to evaluate the robustness of our conclusions about social class mobility trends. First, we assess whether the observed trends may be biased in any systematic way by survey effects, such as across-wave changes in GSS's sampling frames, oversampling strategies, sample sizes, or occupational coding schemes. A unidiff model assessing the relative strength of the overall OD association in each survey year indicates a linear decline in the association between origin and destination class across years and lends little support to any specific survey bias (results not shown but available from the authors).

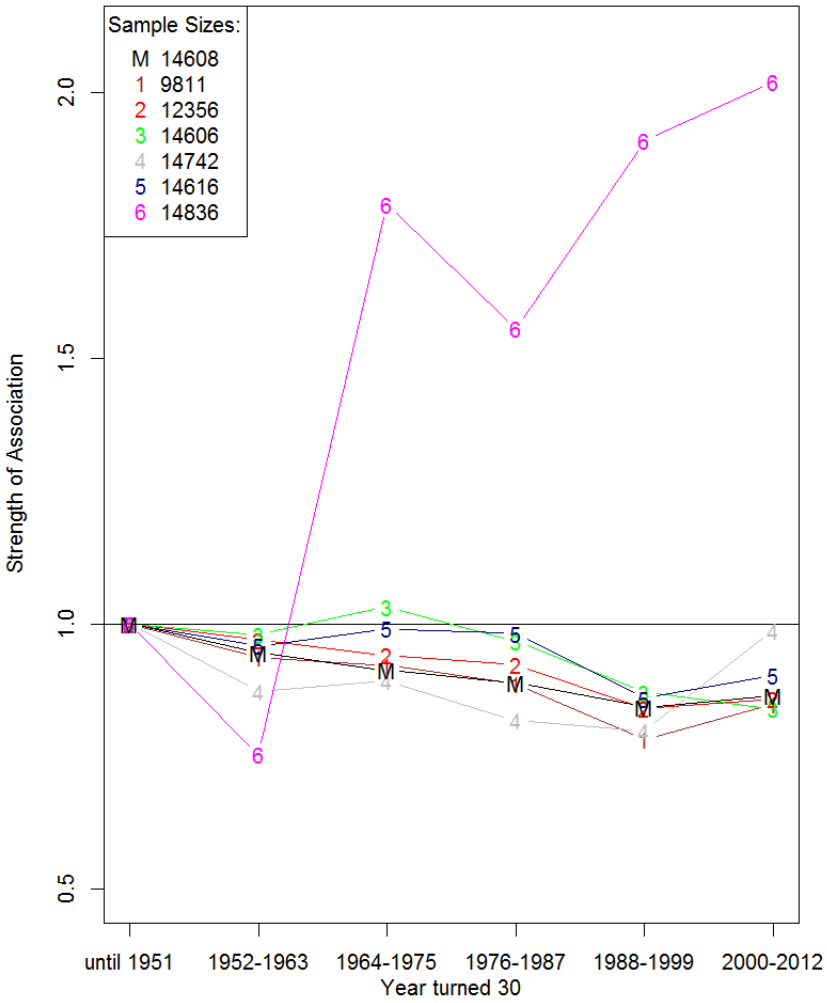
Second, we provide robustness checks based on six alternative samples that reflect different imputation strategies, variations in the class scheme for fathers, and different ways of including mother's class as an alternative measure of social origin. The main analyses of social class mobility reported in this paper draw exclusively on father's but not mother's class and impute class positions for fathers and sons where the information is missing or where they do not work. Below, we list how each of the samples used for our robustness checks differs from this final sample:

1. Drops fathers and sons without valid class information instead of imputing them
2. Drops non-working fathers and sons instead of imputing them
3. Retains only farmers in the self-employed origin category and re-assigns all other self-employed fathers to existing classes according to their occupational information
4. Uses mother's class where it is higher than father's class (dominance approach)
5. Uses mother's class, imputing a class position for mothers without occupational information (including homemakers)
6. Uses mother's class, imputing a class position for mothers and assinging a separate homemaker category

Figure 6 displays the class mobility trend reported in the main part of this paper (M, see also Figure 2) alongside the trends based on these alternative specifications (1-6). Mobility trends appear to be quite robust for the first five specifications – here, differences lie mostly in the magnitude rather than the direction of the change over cohorts. In particular, the mobility trends are robust to how missing class information is handled (imputed or listwise deleted), whether it arises from item-nonresponse (1) or non-working status (2). Also, a specification of social origins that singles out farmers among self-employed fathers (3) yields

a pattern of increasing mobility for the youngest cohorts (but stability for the older cohorts).

Figure 6: Observed trends in social class mobility: Stability checks



Analyses that consider mothers' social class as a measure of social origin are intended to respond to Beller's (2009) critique of the widespread neglect of mothers' social position in analyses of social mobility. Since information on mothers' occupations was not collected in GSS before 1994, the oldest cohorts in our sample comprise few such observations. Our stability analyses test different ways of integrating information on mother's class.[8] Replacing origin classes with mother's information where we are able to observe that mothers hold the higher position (4) also yields an increasing trend of mobility but produces a more pronounced decrease in social mobility for the youngest cohort, which is in line with Beller's

original argument and our earlier note of caution about the potential underestimation of this recent reversal (see fn. 5). Specifications 5 and 6 deal with the problem of vastly changing rates of labor market participation in the mother generation as well as missing occupational information in early waves. Imputing class information for non-working mothers and those without occupational reports – which necessitates quite heroic assumptions about the way in which the unobserved class status of these women relates to their partner's and children's outcomes – still yields a mobility trend that is broadly consistent with our main analysis for specification 5, which retains a 6-category class scheme. The only, and quite spectacular, difference in trends is produced by a specification that introduces a separate origin class category for non-working women (6). Here, the degree of social mobility decreases greatly and rapidly across cohorts. Explanations for the increasing influence of having a non-working mother on individuals' class attainment could come from two arguments concerning this group of mothers: First, the intergenerational penalty to single, non-working motherhood might have grown over time as social policy increasingly targeted this group following a welfare-to-work approach since the 1960s (Waldfogel 2013). This could have lead to increasing immobility for children from single-mother families. Second, as families increasingly rely on two earners in the household, the social selectivity of stay-home mothers may have also increased over time. That is, the growing economic advantage of families with a non-working mother and a very high-earning father may have fostered ever higher rates of immobility at the top. Both accounts, however, are rather speculative and would have to be addressed with more complex analyses than a simple robustness check demands for.

Overall, the similarity in the development of social class mobility across cohorts between our main sample and the samples based on a range of alternative specifications leaves us rather confident about the robustness of our finding of increasing social mobility rates.

Endnotes

[1]For a detailed study of the single legs of the mobility triad in eight European countries see Pollak (2009).

[2]Of course, there are a range of additional theories about the factors accounting for trends in educational returns that are not directly connected to changes in the educational structure but that locate these factors primarily in labor-market changes, such as those caused by rent-seeking behavior (e.g., MacLean and Grusky 2014)

[3]Again, alternative explanations focusing on labor market changes are feasible. For instance, Jackson et al. (2005) argue that structural changes towards service-oriented occupations have lowered the importance of technical skills but increased the demand for personal skills for which education credentials become "a 'more' noisy signal than previously" (Jackson et al. 2005: pp. 12-13). The expansion of the service sector should consequently produce a decreasing association between educational attainment and social class attainment (see also Goldthorpe 2013: p. 15-16).

[4]The GSS occupational coding scheme changed from 1970 to 1980 Census Occupational Classifications during the late 1980s. This change has hindered prior research from assessing long-term social mobility trends spanning all GSS waves (e.g. Beller and Hout 2006a). We have done extensive work to devise a cross-walk from 1970-based to 1980-based EGP codes (for a similar effort see Mitnik et al. 2013) and to validate it for the comparison of social mobility trends based on three double-coded GSS waves. Moreover, the routines and cross-walks used for the EGP assignment herein have been employed fruitfully in other analyses of intergenerational mobility in the U.S. (Hertel and Groh-Samberg 2014). For a revision of this manuscript we would likely also be able to draw on an ongoing NSF-funded project that is currently re-coding all occupational information in the GSS using a common occupational coding scheme.

[5]The uptick in the OD association for the last cohort is more pronounced (not shown, available from the authors) when we impose a lower age limit of 35 instead of 30 (which may generally be a preferrable age limit to assess class attainment but leaves us with a suboptimal sample sizes for the analyses to follow). Together with the possibility of a recent increase in intergenerational associations tied to mother's social class (Beller 2009) and concentrated in selected parts of the mobility table (Mitnik et al. 2013), one may interpret this as further suggestive evidence for a decline in social mobility in the most recent cohort and thereby as a worrying sign for future trends in social mobility.

[6]We have noted earlier that this finding is in line with international evidence and not at odds with the widely acknowledged finding of growing *income* returns to education, but these differences in trends may still necessitate the following observations to prevent misinterpretation: While occupations and earnings/income continue to be closely linked, the relationship between social classes and income may have weakened over time, which is of course itself a topic worthy of theoretical debate and empirical investigation (Mouw and Kalleberg 2010, Weeden and Grusky 2012). We are able to replicate the divergent trends in income returns and class returns to education based on our own data (results available from the authors).

[7]The strength of the compositional effect itself could, of course, also differ across cohorts (additional analyses, available from the authors, fail to yield direct evidence for this). This would require us to free up the COED parameter and leave us with a fully saturated model, i.e. the observed trends.

[8]We cannot replicate Beller's specifications that rely on the analysis of the joint classification of mother's class (M) and father's class (F) since the resulting CMFED table yields insufficient cell counts.

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