The Geography of Social Mobility in Germany

Majed Dodin
University of Mannheim

Sebastian Findeisen
University of Mannheim

Lukas Henkel
University of Mannheim

Dominik Sachs
European University Institute

February 15, 2017

Abstract

We characterize intergenerational social mobility in Germany using administrative data on the educational attainment of 230.000 children and their parent's earnings. Access to college is strongly associated with parental income. On average, a 10 percentile increase in parent income is associated with a 4.8 percentage point increase in access rates. Once we control for parental education, the number is only 3.0 percentage points. The parental income gradient is surprisingly similar across gender, urban or rural areas and single versus two-parents households. For migrants, the parental income gradient is about 20% lower than for natives. Finally, there is substantial geographic variation in both, the baseline probability of college access as well as in the parental income gradient. For example, in the former socialist East Germany, the parental income gradient is almost 25% higher than in the west.

JEL-**classification: J62, I24**

Keywords: Social Mobility, Equality of Opportunity

Contact: majed.dodin@gess.uni-mannheim.de, lukas.henkel@gess.uni-mannheim.de, findeisen@uni-mannheim.de, dominik.sachs@eui.eu.

1 Introduction

Historically, Germany has had smaller levels of income and wage inequality than the US, the UK, or many southern European countries. Although also Germany has seen a notable uptick in inequality in the last 30 years, this increase has been much less pronounced compared to other countries (Fuchs-Schuendeln et al. 2010). Moreover, Germany is often portrayed as a country with particularly inclusive labor market institutions. In the public debate, the German apprenticeship system is often lauded as a role model in the provision of practical labor-market skills for young people.[1] It seems to be no coincidence that Germany has Europe's lowest youth unemployment rate. These consideration suggest that equality of opportunity and social mobility must be high in Germany.

But the public perception in Germany is a different one.[2] The public debate seems to have converged on the view that equality of opportunity is "too low" in Germany, and that the German school system is failing the disadvantaged and is exacerbating differences in family background.[3] The practice of tracking students at the relatively early age of 10 or 12 is often cited as a major culprit of this, and many pundits believe that it is a major impediment to social mobility in Germany, although academic studies have, so far, not detected negative causal effects of tracking (Dustmann et al. 2016).

Can this conflicting views of social mobility and equality of opportunity in Germany be reconciled? In this paper, we inject a new set of facts into the debate. We present new empirical evidence on the level and geography of intergenerational social mobility in Germany using deidentified administrative data on the educational attainment of 230.000 children and their parent's earnings. First, we study this relationship at the new national before we, in the second step focus on regional heterogeneity in the social mobility gradient.

We find a strong relationship between educational attainment and parental income ranks. We estimate that a 10 percentile increase in the parent's rank in the income distribution is on average associated with a 4.5% increase in the probability of college access. Remarkably, we find that the gradient is very similar across different sub-groups: girls and boys, urban versus rural areas, migrants versus non-migrants, and also between East and West Germany. But turning to the geography of social mobility, our maps show that Germany is very heterogenous

[1] See, for example, https://www.washingtonpost.com/news/in-theory/wp/2016/07/27/heres-what-american-universities-can-learn-from-germany/?utm_term=.4dca787947f1.

[2] See, for example, https://www.welt.de/politik/deutschland/article113082544/In-Deutschland-bleibt-Chancengleichheit-ein-Traum.html.

[3] See, for example, http://www.tagesspiegel.de/politik/chancenungleichheit-welche-chance-hat-ein-kind-in-deutschland/9556636.html.

when it comes to the spatial distribution of equality of opportunity. So although variables like gender, urban/rural, or migration status, which normally have large predictive power for economic outcomes, do not show differences in the effect of parental income, places have strong predictive power for upward mobility. This is consistent with the strong causal effects of place found in the US (Chetty and Hendren 2016).

The paper is organized as follows. Section II discusses our approach to the measurement of social mobility in the German institutional framework. Section III describes the data and provides details on the sample construction. In Section IV, we report our results on the national level. Section V reports our results by relevant subgroups. In Section VI we report spatial variation patterns in our mobility measures. Section VII discusses ongoing work and concludes.

2 Measuring Social Mobility

The study of intergenerational mobility requires a characterization of the joint distribution of parent outcomes and child opportunities. Since economic and social opportunities are difficult to measure, empirical studies of intergenerational mobility have generally aimed at the joint distribution of outcomes. The standard approach in the literature has focused on the joint distribution of child and parent income and summarized it by the intergenerational elasticity of earnings (IGE) (e.g. Zimmerman 1992, Solon 1999, Mazumder 2005, Black et al. 2011) or more recently by rank-rank correlations (Dahl and Deleire 2008, Chetty et al. 2014).

While the intergenerational income elasticity, usually obtained by regressing log child income on log parent income, is a straightforward measure of relative mobility, it is in practise sensitive to the treatment of zero incomes and non-linearities in the relationship between log child and log parent income (Dahl and Deleire 2008). As a consequence studies using this approach have, despite the use of large high quality administrative data sets, provided a wide range of IGE estimates, ranging from 0.2 to 0.7 for the US (Mitnik et al. 2015).

Rank-rank correlations are robust to non-linearities and measurement issues at the bottom of the income distributions and have recently been successfully employed in the seminal paper by Chetty et al. (2014). However, both approaches require the researcher to observe child earnings and are therefore only feasible for relatively old birth cohortes. Typically parent and child earnings are averaged over multiple years, usually between the ages of 30-40 to mitigate potential life cycle bias (Mazumder 2015).

In the light of these challenges, and in the absence of data sets of compareable size and quality to those recently employed in the US context, it is perhaps not surprising that the empirical

evidence regarding the level of social mobility in Germany is mixed. In a recent study Schnitzlein (2016), based on the German socioeconomic panel (SOEP), shows that existing estimates of the IGE in Germany are sensitive to small variations in sampling criteria, resulting in a wide range of plausible estimates, preventing a clear classification of relative mobility in Germany compared to the US.

In contrast to most previous studies[4] of social mobility, we focus on the joint distribution of parental income and the educational attainment of children. This approach is driven by data limitations and motivated by the growing importance of education, especially higher education, for the cross sectional variance in earnings, and has the advantage that we are able to provide relatively recent statistics, as we do not need to observe earnings for children. Moreover, the relationship between parental income and educational attainment is of interest in itself, due to the nonpecuniary returns of schooling and the fact that divergence in educational attainment between children from different parental income groups imply that socioeconomic background effects materialize long before children enter the labor market.

The German institutional framework is particulary suited to study social mobility through the lense of educational opportunities. We utilize the fact that Germany has a three-track system of secondary education, where only the highest track allows for direct access to the university system. The tuition free university system is widely viewed as central promoter of upward mobility in Germany and our approach reflects the belief hat educational opportunities are a suitable proxy for social and economic opportunities. In order to do so we measure the shares of children completing the highest track at each percentile of the parent income distribution and characterize mobility in terms of properties of their joint distribution.

2.1 Relative and Absolute Mobility

We define two sets of mobility statistics with the aim to distinguish between two mobility concepts: relative and absolute mobility. Measures of relative mobility, such as the IGE or rank-rank correlations, compare the outcomes of children from low-income families to those of children from high-income families. Most prior research on social mobility has focused on relative mobility, presumably because the comparison of outcomes for children from different income groups provides a direct framework for interpretation. However, as Chetty et al. (2014) point out, increases in relative mobility, such as lower IGEs or rank-rank correlations, can in

[4]We are not the first to investigate the relationship between parental income and educational attainment. For example, Chetty et al. (2014) report College-Income gradients and show that the correlation between college attendance rates and parent income is a strong predictor of differences in intergenerational income mobility as measures by rank-rank correlations across areas within the U.S.

princinple be undesireable if they are driven exclusively by worse outcomes for children from high-income families. We capture relative mobility by the slope coefficient of a regression of shares on income ranks as well as functions of shares at given percentiles of the parent income distribution, e.g. the ratio of the 75th and 25th percentile.

The potentially ambiguous normative implications of changes in relative mobility motivate our second mobility concept: absolute mobility. Measures of absolute mobility describe the outcomes for children from families in a specified income group. To capture absolute mobility we focus on average A-level shares in the bottom half of the parent income distribution. Since we compute income percentiles with respect to the national income distribution, we are able to compare our measures across regions and investigate potential determinants of social mobility.

3 Data

Our data source is the Mikrozensus (MZ), a census data set and a yearly representative one percent sample survey of the German population. The sampled households are subject to the obligation to provide information and the unit non-response rate is roughly 3 percent. It contains rich information on individual and household characteristics including the household's structure and location as well as information on socio-economic variables such as net income, education, employment status, occupation for each member of the household. We observe a child's educational attainment directly if schooling is completed and the schooltype for those children who are still attending school. In our analysis, we utilize the waves of the MZ from the years 2009 to 2014.

3.1 Linking Children to Parents

The MZ data allows us to directly observe family ties within each household. Household members are obliged to provide information on every person registered[5] at their respective household. Consequently, we are able to match children to their parents as long as they are still registered at their parents' household. This restricts us from using income of children as an outcome variable. Also college attendance would be a problematic measure as only around 25% of college freshmen live with their parents.[6] To deal with that issue we make use of the particularity of the German education system. Due to the German tracking system, only those

[5]German Law requires every individual to be registered at a specific address.

[6]Hilger (2015) provides a method to deal with this issue by making a parallel trend (the parental income gradient is the same among students living with and without their parents) and a smooth cohort assumption (share of parents with a certain income is stable across cohorts).

children can go to college that complete the A-level track. In our sample, 40 percent of children between 16 and 22 that still live with their parents are enrolled in the last 2 years of this track or have already completed it. The A-level is obtained after 12 or 13 years of schooling, which depends on the respective state. Usually, students obtain their A-level at the age of 18 or 19. While 84% of all 19-year olds are still registered at their parents home, this number is down to 36% at the age of 24.

Table 1: Share of Children living with their parents by age group

Age	Share living with parents
16	0,99
17	0,97
18	0,93
19	0,84
20	0,73
21	0,62
22	0,52
23	0,44
24	0,36

3.2 Measuring Education of the Children

The German education system is characterized by tracking. Concretely, depending on the state, children are separated after 4 or 6 years of school intro 3 tracks: Hauptschule, Realschule or Gymnasium. The latter is the A-level track and its completion is a necessary condition to go to college. There are opportunities to top up degrees from the Hauptschule or the Realschule with an A-level at vocational schools.

Generally, we look at two measures for educational attainment. Our preferred measure assigns an A-level to a child between 16-22 if the child either has completed an A-level, if the child is enrolled in the final two years of the A-level track or if the child is enrolled in a vocational school to top up her prior education with an A-level.[7] Throughout the paper this will be our benchmark specification.

Due to the fact that some children are not living at home while obtaining their A-level (in particular if they are topping up their prior education on a vocational school), there is

[7]Between 0% and 6%, dependent on the state, of children enrolled in the last 2 years of the A-level track leave school without obtaining an A-level degree.

a potential sample selection bias. Therefore, we also look at a second outcome that focuses on children between 11 and 19. We assign an A-level to each child which is enrolled on the A-level track or has already obtained her A-level. The latter measure probably overstates the parental income gradient because rather children with weaker parental background obtain an A-level on vocational schools at a later stage. Results, however, are generally quite similar for both definitions of the outcome variable. For this reason, we delegate the results for the latter measure to the appendix.

3.3 Measuring Parental Income

We observe reported monthly post-tax income on the individual and household level. Since our aim is to capture the importance of the parental background, we define household income as the sum of all incomes in the household *minus* the income of all children. We exclude households with zero household income from the analysis.

We then follow three different approaches. First, we just consider household income and do not adjust for household size. This approach has, e.g., been pursued by Chetty, Hendren, Kline, and Saez (2014) and Hilger (2015). We then consider two ways to account for differences in household size. The first way is to divide the household income by the household size n. A potential issue with that measure is that it assigns large households too little income because consumption needs do not increase linearly in the number of household members, see e.g. Pollak and Wales (1979) for a discussion of household equivalence scales. To account for that, we consider a third scenario where we divide household income by $n^{\frac{1}{2}}$.

The first approach rather looks at how the performance of children varies with the economic success of parents whereas the second and third that approach rather measure how the economic performance of children with the economic resources. All approaches have their up- and downsides. Most of our results are, however, quite similar for all the three approaches.

Income Percentiles For every household, we compute parental income ranks with respect to the national income distribution in our sample. That is, in our benchmark, we rank parents based on their incomes relative to all other parents in this sample. We do not account for regional differences in price levels, but adjust for that in future versions of this paper.

3.4 Further Details on Sample Construction

Our primary sample consists of all children between 16 to 22 living in their parents household in the 2009-2014 microcensus waves. This sample includes roughly 230.000 children aged 16 to 22 living with their parents. Around 40% of children in our sample are enrolled in the last 2 years of the A-level track or have already completed it. Around 21% of children in our sample live in single-parent households. The median monthly net household income is 2650€. The median age of the children in our sample is 19. 46% of children are female.[8] 33% of children live in a household where at least one parent has an A-level degree and 16% of children live in a household where at least one parent has a college degree.[9] 25% of children are (descendants of) migrants.[10]

Table 2: Descriptive Statistics - Children 16-22

	Children 16-22		
$N = 231341$	Mean	SD	Median
HH size	3,84	1,16	4
Share A-level	0,401	0,49	.
No. children in HH	2,01	0,99	2
Single parent share	0,21	0,40	.
Income	3048,49	2221,79	2650
Age	18,72	1,94	19
Share Female	0,46	0,49	.
Share Parent A-level	0,33	0,47	.
Share Parent College Education	0,16	0,37	.
Migrant	0,25	0,43	.
Fathers Age	49,71	6,26	49
Mothers Age	46,9	5,39	47

[8] This might be driven by the fact that women move out earlier than men, so we do not observe as many women in our sample.

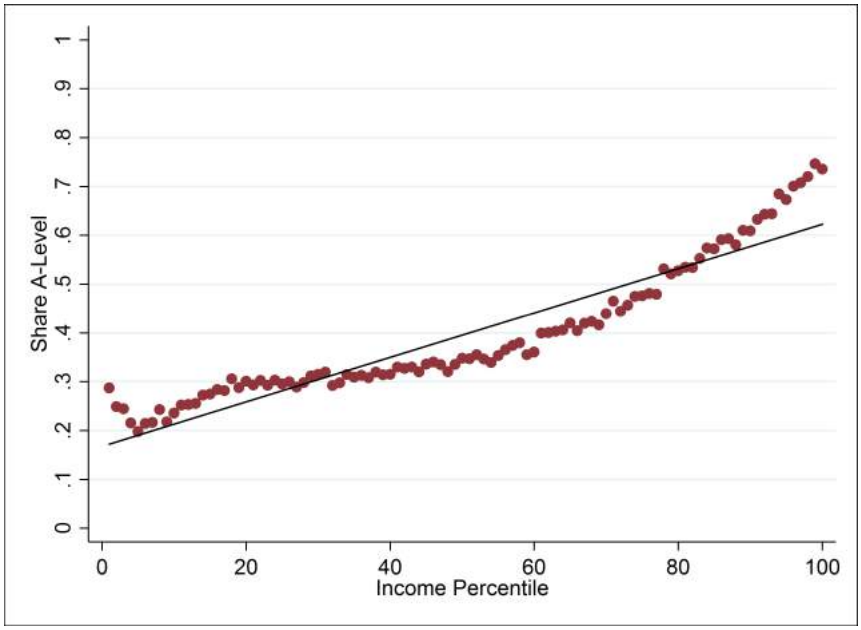
[9] We define college as Universität (University) or Fachhochschule (University of Applied Sciences).

[10] We define migrants as children where at least one parent was not born in Germany. In the appendix, we also consider alternative definitions.

4 National Results

4.1 Different Measures of Household Income

Figure 1: Social mobility at the national level: No adjustment for Household size



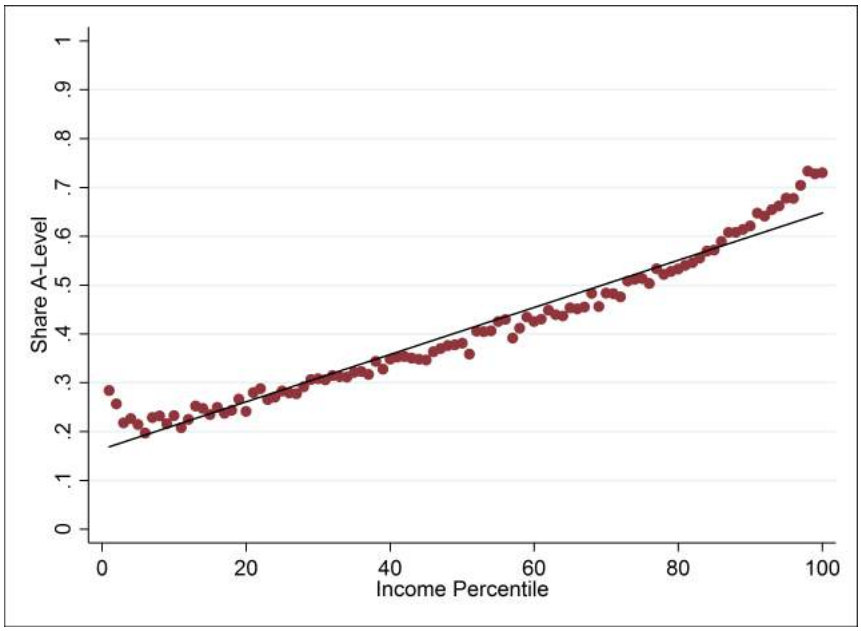
This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size (x-axis). The figure is constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The figure is based on $N = 231341$ children living with their parents. The OLS regression of the A-level dummy on the parent income rank (black line) yields a slope coefficient of 0.0045 and a constant of 0.167.

Figure 1 shows how the share of children with A-level depends on the position of the parents in the income distribution if household income is not adjusted for household size. The fitted linear line slightly overestimates the parental income gradient up to the 80th percentile and then underestimates it. The slope implies that climbing up the income distribution by 10 percentiles increases the probability of obtaining an A-level by 4.5 percent.

In Figure 2, we use the percentile in the distribution of household incomes adjusted for household incomes.[11] This gives, interestingly, a much more linear relationship. The slope is slightly higher . In the following we measure household income in per capita terms. The main

[11] In Figure 11 in the appendix, we also show the relationship for our third measure for household income which resembles an equivalence scale.

Figure 2: Social mobility at the national level: Income per Household Member



This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis). The figure is constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The figure is based on $N = 231341$ children living with their parents. The OLS regression of the A-level dummy on the parent income rank (black line) yields a slope coefficient of 0.0048 and a constant of 0.167.

reason is that the relationship is very close to linear – this allows a clear comparison of the parental income gradient between certain subgroups. Before we move to studying the geography of social mobility in Section 6, we look at differences between gender, parental education, urban and rural environments as well as West (Former FRG) and East (Former DRG) Germany in Section 5.

4.2 Interpretation of Results and Relation to Literature

Figure 2 implies a very clear interpretation. A 10 percentile increase in parental income increases the share of children with A-level by 4.8% percentage points. This number is relatively similar to the findings of Chetty, Hendren, Kline, and Saez (2014) for the U.S. They find that a 10 percentile increase in parental income implies an increase in the share of college attendance by 6.7%. Of course, college attendance in the U.S. and A-level in Germany do not measure exactly the same outcome. Further, the number for college attendance in Germany is likely to be higher than 4.7% because the possibility to go to college, conditional on having completed

an A-level, is likely to depend on parental resources. Further note that this similarity between Germany and the U.S. in nationwide results for social mobility is similar to the findings of **?**.

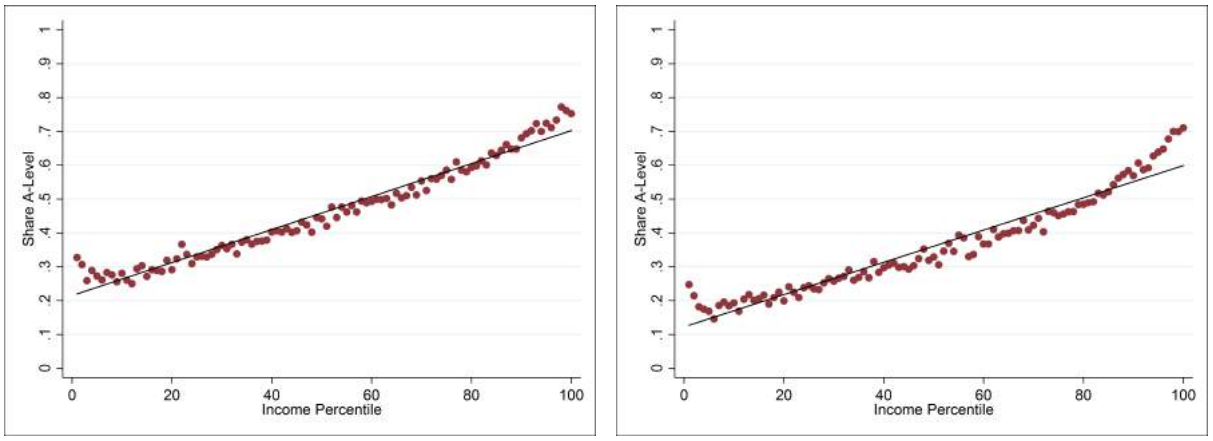
5 Comparing Subgroups

In this section we compare social mobility across various subgroups.

5.1 The Role of Gender

In figure 3 we look at the social mobility of boys and girls separately. We do find a significant difference across genders. The baseline share of having an A-level is 10 percentage points higher for girls. Interestingly, the slope coefficients are nearly identical.

Figure 3: Differences by Gender



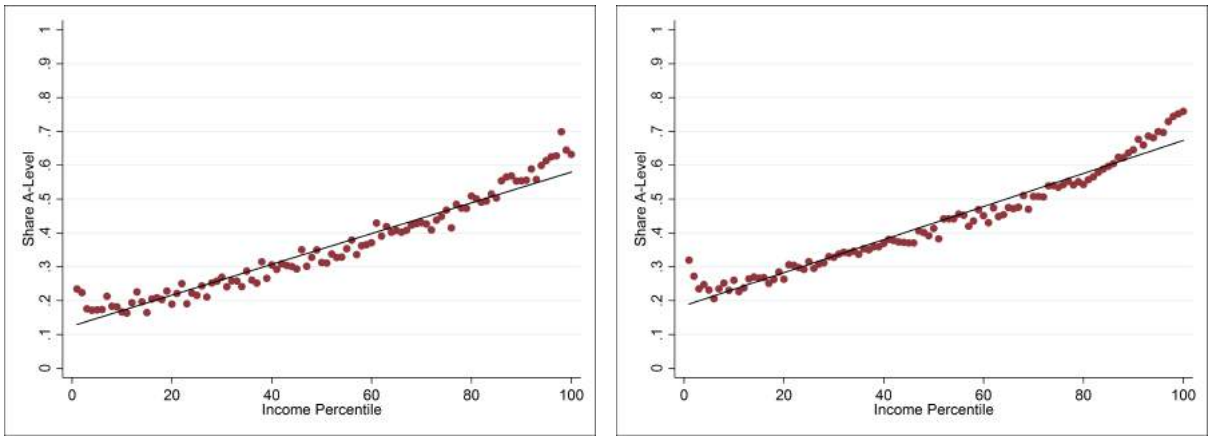
(a) Girls (b) Boys

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate by gender of the child. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (girls) is based on $N = 106896$ observations, the right figure (boys) is based on $N = 124445$ observations. For girls, the slope and constant of the OLS regression (black line) are 0.0048 and 0.21, for boys the slope and constant are 0.0047 and 0.122.

5.2 Urban versus Rural

Figure 4 contrasts social mobility in rural areas and in urban areas. The slope is slightly higher in urban areas, whereas the baseline share of attending the highest school tier is roughly 6 percent higher for children in urban areas.

Figure 4: Difference by urban or rural area



(a) Rural Area (b) Urban Area

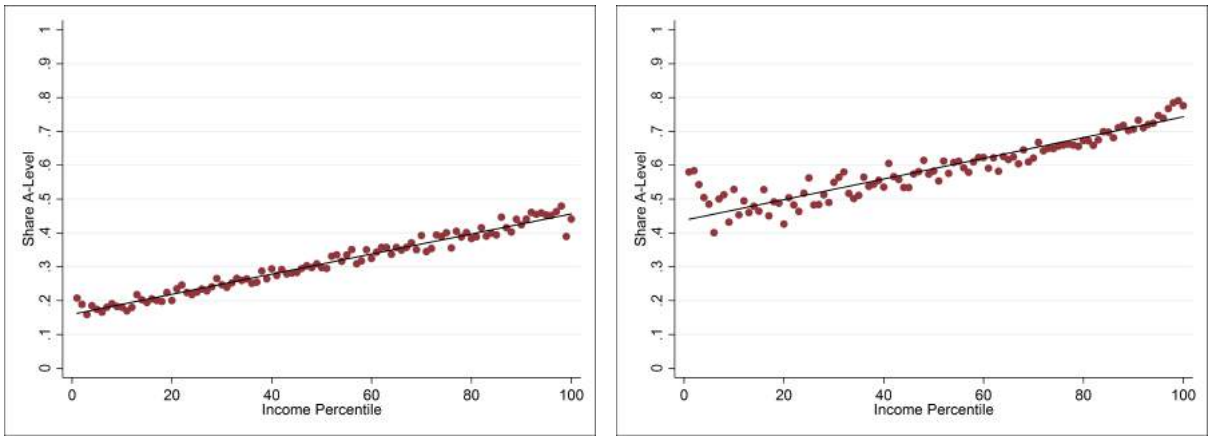
This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate for children living in rural (left) and urban (right) areas. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (rural areas) is based on $N = 70387$ observations, the right figure (urban areas) is based on $N = 160954$ observations. For rural areas, the slope and constant of the OLS regression (black line) are 0.0045 and 0.124, for urban areas the slope and constant are 0.0048 and 0.184.

5.3 The Role of Parental Education

In Figure 5 we distinguish between parents with different educational levels. In the right panel, we look at children where at least one of the parents has an A-level. In the left panel we look at all other children. Results are very similar if we distinguish by college graduation instead of A-level. Two results are striking here. First, there is a huge shift in the intercept of 30 percentage points. Thus parental education plays a decisive role. Second, conditional on education, the slope is almost the same for both parental education groups. A 10 percentile increase in parental income increases the share of children with A-level by 3% percentage points. Compared to the

overall picture in Figure 2, we can see a 36% reduction of the parental income gradient once we control for education.

Figure 5: Difference by parental education



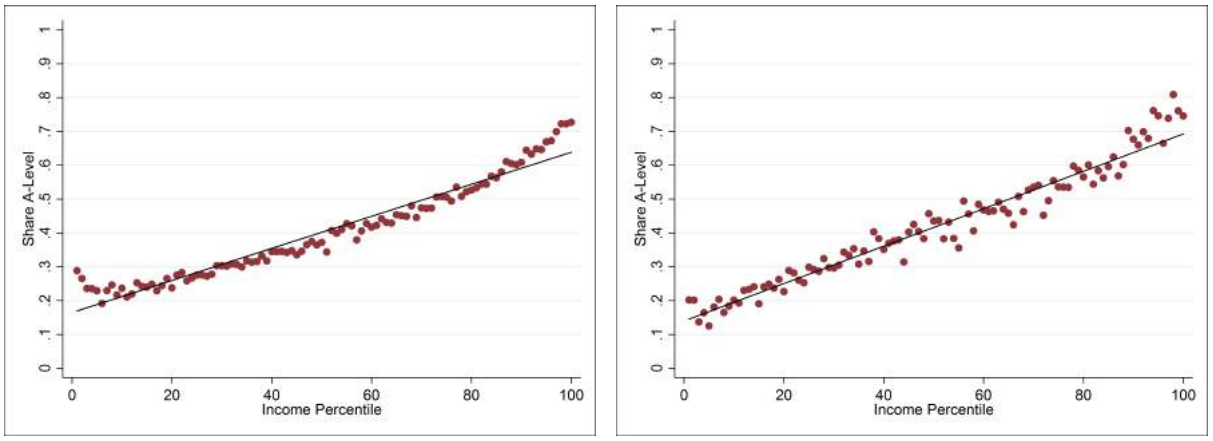
(a) Parents do not have A-level (b) At least one parents does have A-level

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate by the education level of the parents. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (neither parent living in the same household as the child has an A-level degree) is based on $N = 152778$ observations, the right figure (at least one parent living in the same household as the child has an A-level degree) is based on $N = 78563$ observations. For children whose parents do not have an A-level degree, the slope and constant of the OLS regression (black line) are 0.0029 and 0.159, for children with at least one parent with an A-level degree the slope and constant are 0.0030 and 0.437.

5.4 East versus West Germany

Parental income seem to matter more in East Germany as the probability of attending the highest tier increases by 5.5 percent for a 10 percent increase in the income percentile of the parents, rather than 4.7 percent as in the west.

Figure 6: Difference by east/west



(a) West Germany (b) East Germany

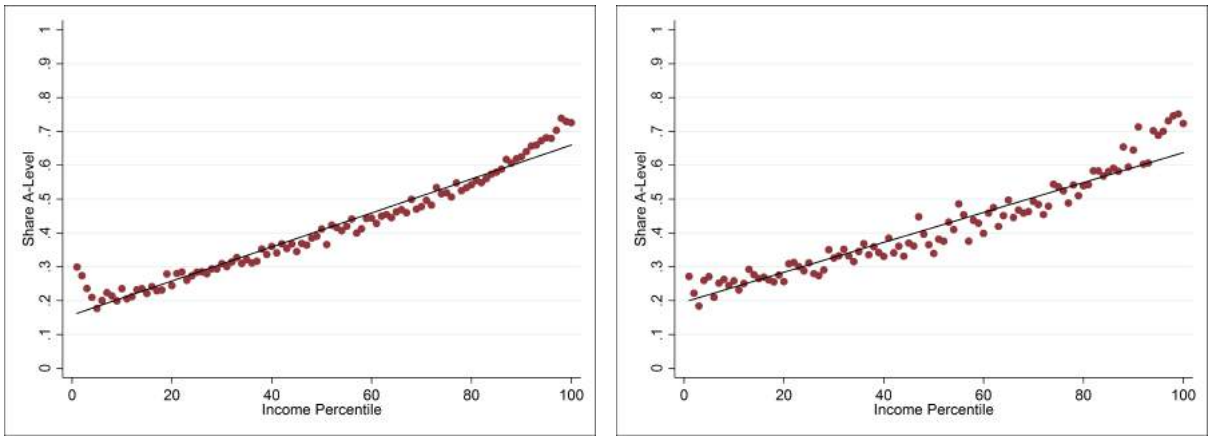
This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate for children living in West Germany (left) and East Germany (excluding Berlin) (right). The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (West Germany) is based on $N = 197863$ observations, the right figure (East Germany excluding Berlin) is based on $N = 26004$ observations. For West Germany, the slope and constant of the OLS regression (black line) are 0.0047 and 0.164, for urban areas the slope and constant are 0.0055 and 0.133.

5.5 Migrants versus Natives

In Figure 7 we compare migrants and natives, where we define a migrant as a child, where at least one parent was not born in Germany. In the appendix, we also consider alternative definitions and results are similar.

A first result that stands out is that, conditional on income, migrants and natives perform relatively similar. This is a striking result because it shows that, once one controls for parental income, migrants' children have about the same chances of obtaining an A-level as natives' children. The small differences even point out that social mobility is slightly higher among migrants than among natives. For natives, a 10 percentile increase in parental income increases the share of children with A-level by 5% percentage points, while for migrants, a 10 percentile increase in parental income increases the share of children with A-level by 4.4% percentage points. Furthermore, the intercept is about 4 percentage points higher for migrants.

Figure 7: Difference migrants versus natives: migrant if at least one parent not born in Germany



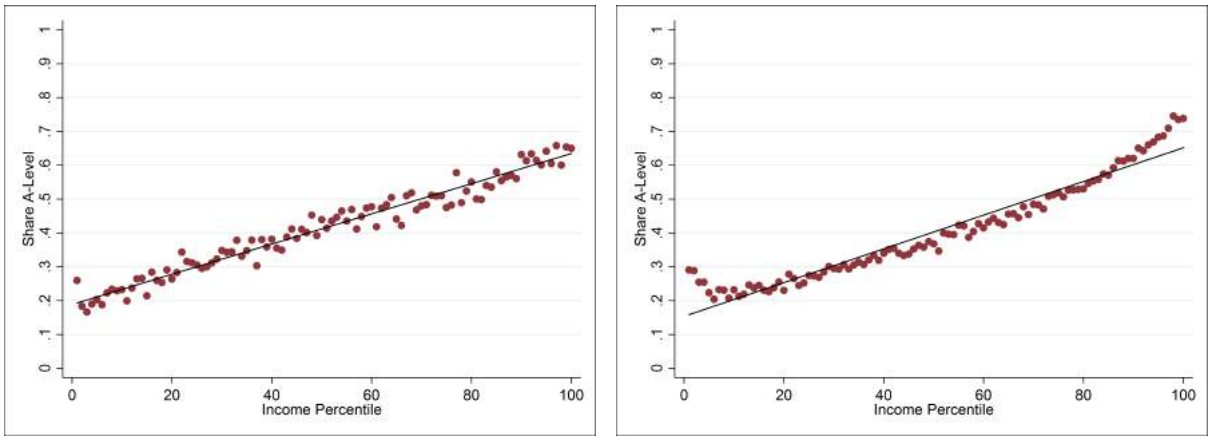
(a) Natives (b) Migrants

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate by migration status. Migrants are defined as children with at least one parent not born in Germany. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (natives) is based on $N = 142116$ observations, the right figure (migrants) is based on $N = 48090$ observations. For this figure, only the MZ waves from the years 2010 to 2014 have been used. For natives, the slope and constant of the OLS regression (black line) are 0.0050 and 0.157, for migrants the slope and constant are 0.0044 and 0.195.

5.6 Single Parents

Lastly, we consider the role of two or single parent households in Figure 8. Results are quite similar for single-parent and two-parent households. What stands out is that the drop in the share of A-level for very low incomes is only present for two-parent households. One reason for this could be that those parents with very low income are those where one parent stays at home and can help their children more with homework etc.

Figure 8: The role of single parents



(a) Single-Parent Households (b) Two-Parent Households

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate for single-parent and two-parent households. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin.

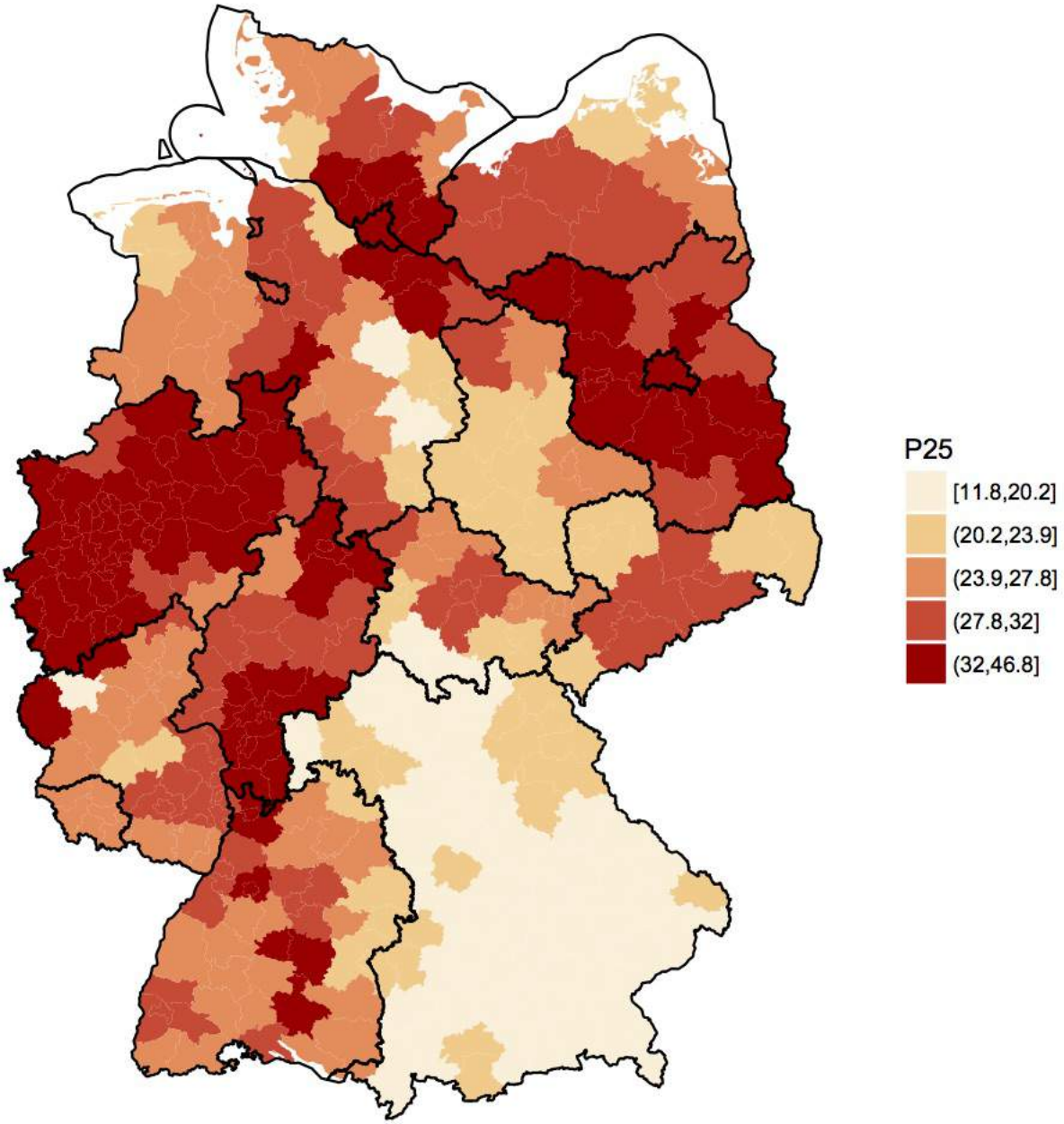
6 The Geography of Social Mobility in Germany

We now present our first results on the geography of social mobility. We therefore compare social mobility in 141 local labor markets according to IAB. They present an aggregation of counties into local labor markets based on commuting flows. They are comparable units to the popular commuting zones used for US studies (Chetty, Hendren, Kline, and Saez 2014, Autor, Dorn, and Hanson 2013) .

6.1 The Geography of Absolute Mobility

First of all we compare absolute mobility across local labor markets by comparing the share of children with A-level from the bottom 25% of the income distribution. Figure 9 illustrates in which quintile a certain labor market region is for this statistic. Absolute mobility is very high in north rhine westphalia. By contrast, it is very low in Bavaria. The other German states are more heterogeneous. The share of children from the bottom 25% obtaining an A-level is above 34% in Bonn or Frankfurt (Oder) and below as 10% in Bavarian regions like Ingolstadt, Nürnberg or Landshut.

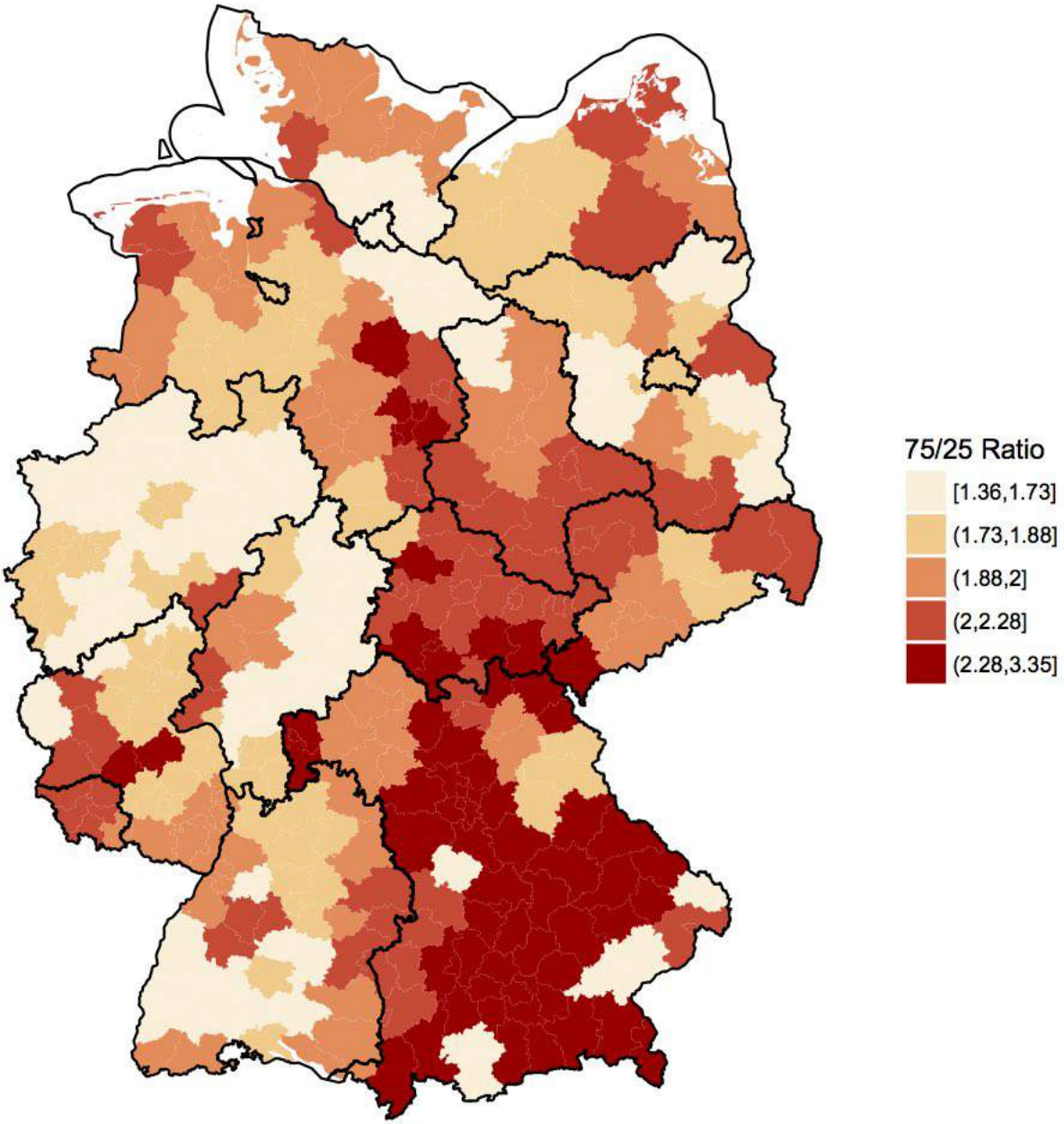
Figure 9: The Geography of Absolute Mobility



6.2 The Geography of Relative Mobility

Next, we compare relative social mobility. We compare the ratio of the 75th and the 25th percentile. This ratio differs between 1.4 and 3.3. For example, in Frankfurt (Oder) or Sigmaringen relative mobility is very high: the share of children with A-level of the 75th percentile is less than 40% higher than that of the 25th percentile. By contrast, in the Bavarian region of

Figure 10: The Geography of Relative Mobility



Ansbach, the share is 230% higher for the 75th than the 25th percentile, i.e. more than three times as large.

7 Conclusion

In the next steps of our analysis, we plan to extend the analysis in the following way. In the literature, next to nothing is known about the causal factors which determine social mobility.

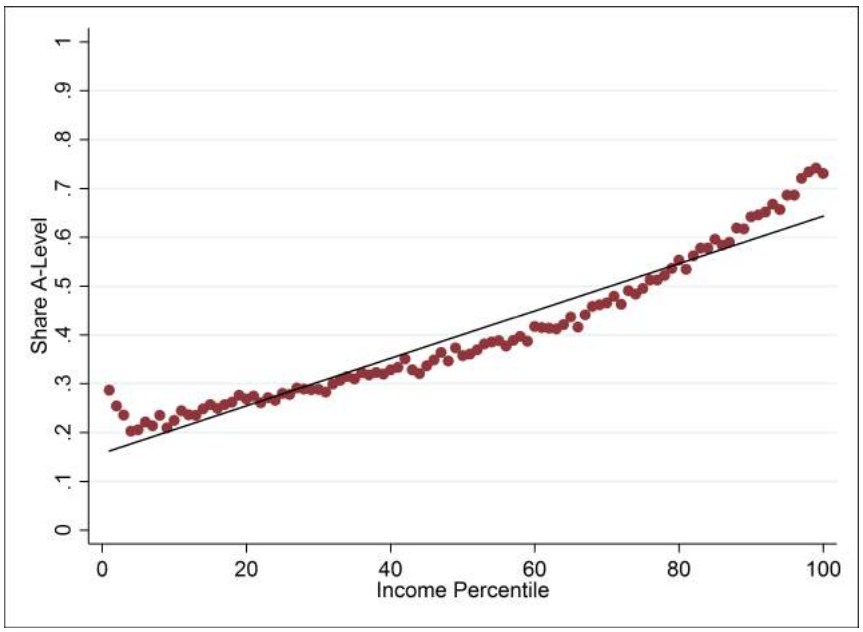
In ongoing work, we are exploiting the large migration influx of foreign workers Germany saw in the 1960's to satisfy its demand for labor in the post-war economy. There was a lot of heterogeneity in the spatial distribution of migrants, which we use as quasi-experimental variation. This will allow us to answer a host of interesting questions, concerning the causal link between immigration and social mobility for different groups of the population. It will also, hopefully, shed light on the underlying causal mechanisms which make some places so much more successful than others in generating upward mobility for children from low income households.

A Appendix

Table 3: Descriptive Statistics - Children 11-19

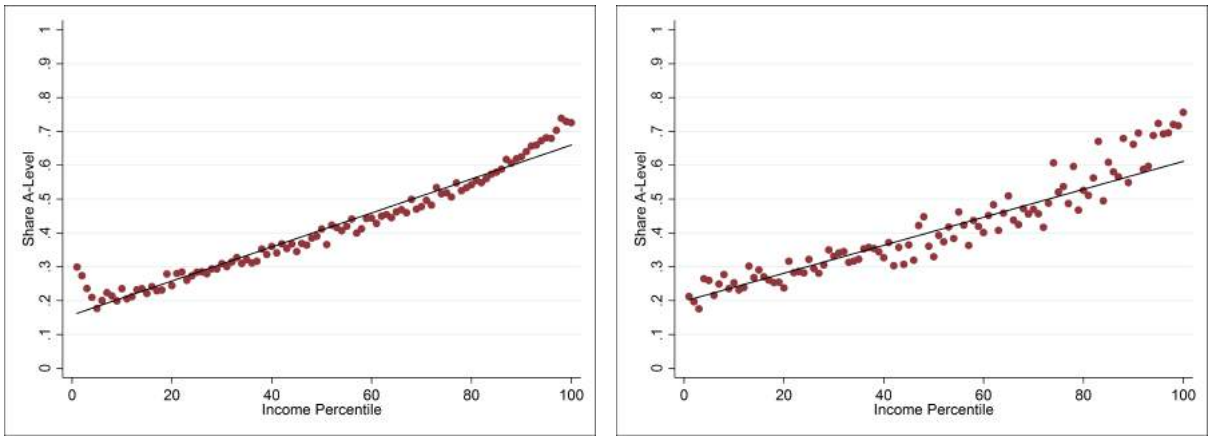
	Children 11-19		
$N = 335427$	Mean	SD	Median
HH size	3,98	1,18	4
Share A-level	0,506	0,49	.
No. children in HH	2,15	1,01	2
Single parent share	0,20	0,40	.
Income	3145,31	2290	2724
Age	14,96	2,55	15
Share Female	0,48	0,49	.
Share Parent A-level	0,37	0,48	.
Share Parent College Education	0,18	0,38	.
Migrant	0,26	0,44	.
Fathers Age	46,83	6,36	47
Mothers Age	43,94	5,63	44

Figure 11: Social mobility at the national level: equivalence scale



This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national equivalence scale net income distribution (x-axis). The figure is constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The figure is based on $N = 231341$ children living with their parents.

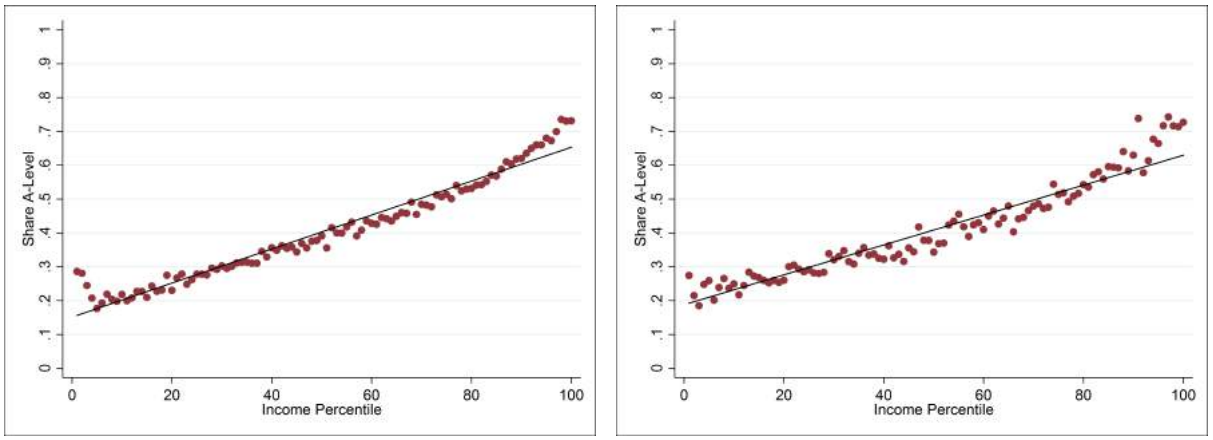
Figure 12: Difference migrants versus natives: migrant if both parents not born in Germany



(a) West Germany (b) East Germany

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate by migration status. Migrants are defined as children with both parents not born in Germany. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national net income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (natives) is based on $N = 142116$ observations, the right figure (migrants) is based on $N = 30013$ observations. For this figure, only the MZ waves from the years 2010 to 2014 have been used. For natives, the slope and constant of the OLS regression (black line) are 0.0050 and 0.157, for migrants the slope and constant are 0.0041 and 0.198.

Figure 13: Difference migrants versus natives: native if born in Germany and both parents also born in Germany

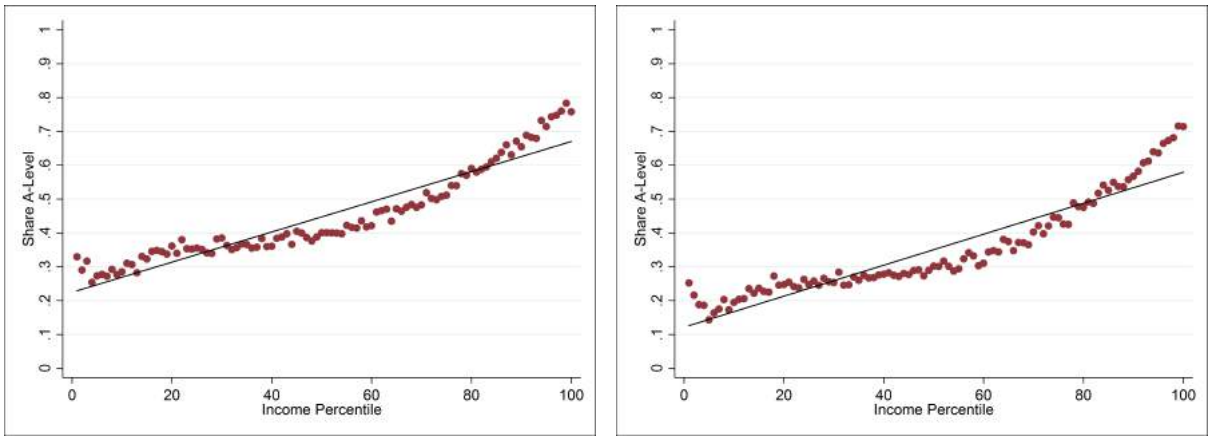


(a) Native (b) Migrant

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution (x-axis), separate by migration status. Natives are defined as children born in Germany, whose parents are also born in Germany as German citizens. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national net income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (natives) is based on $N = 173318$ observations, the right figure (migrants) is based on $N = 58023$ observations. For natives, the slope and constant of the OLS regression (black line) are 0.0050 and 0.151, for migrants the slope and constant are 0.0044 and 0.187.

B Comparing Subgroups: No adjustment for Household Size

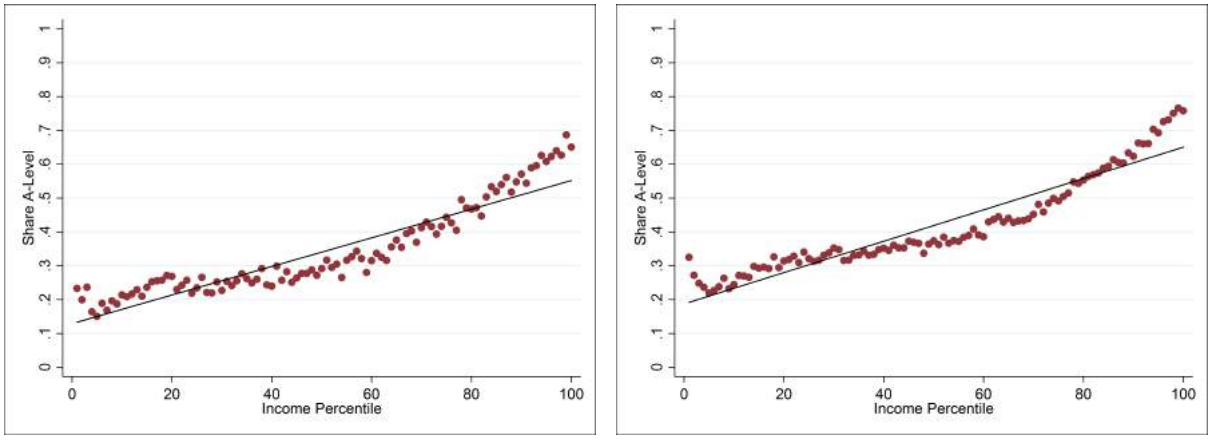
Figure 14: Differences by Gender: No adjustment for Household Size



(a) Girls (b) Boys

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size (x-axis), separate by gender of the child. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (girls) is based on $N = 106896$ observations, the right figure (boys) is based on $N = 124445$ observations. For girls, the slope and constant of the OLS regression (black line) are 0.0044 and 0.224, for boys the slope and constant are 0.0045 and 0.121.

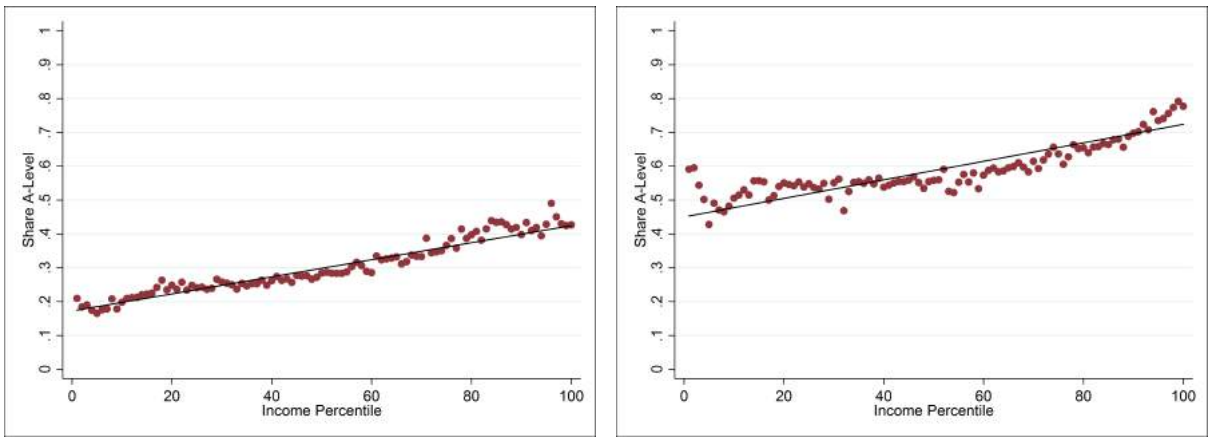
Figure 15: Difference by urban or rural area: No adjustment for Household Size



(a) Rural Area (b) Urban Area

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size (x-axis), separate for children living in rural (left) and urban (right) areas. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (rural areas) is based on $N = 70387$ observations, the right figure (urban areas) is based on $N = 160954$ observations. For rural areas, the slope and constant of the OLS regression (black line) are 0.0042 and 0.128, for urban areas the slope and constant are 0.0046 and 0.187.

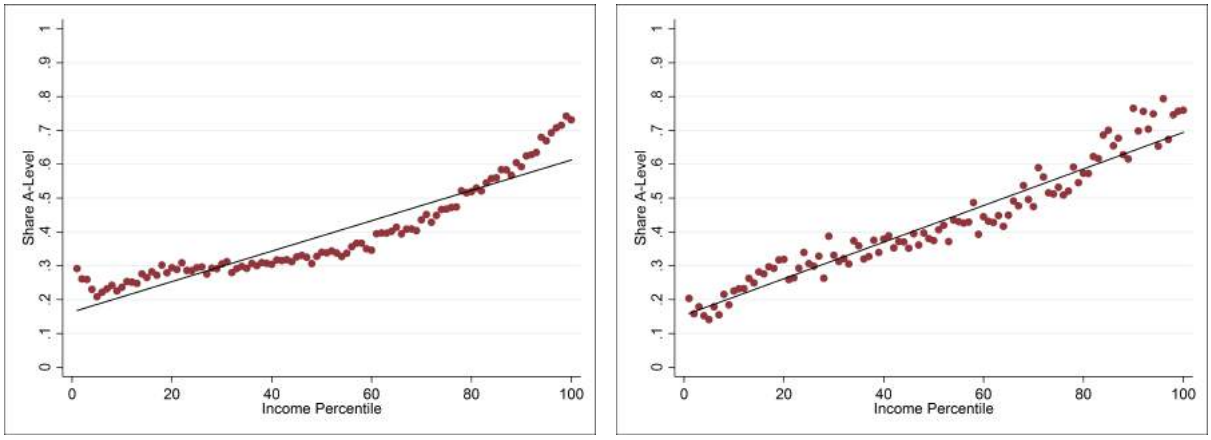
Figure 16: Difference by parental education: No adjustment for Household Size



(a) Parents do not have A-level (b) At least one parents does have A-level

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size(x-axis), separate by the education level of the parents. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (neither parent living in the same household as the child has an A-level degree) is based on $N = 152778$ observations, the right figure (at least one parent living in the same household as the child has an A-level degree) is based on $N = 78563$ observations. For children whose parents do not have an A-level degree, the slope and constant of the OLS regression (black line) are 0.0025 and 0.172, for children with at least one parent with an A-level degree the slope and constant are 0.0027 and 0.450.

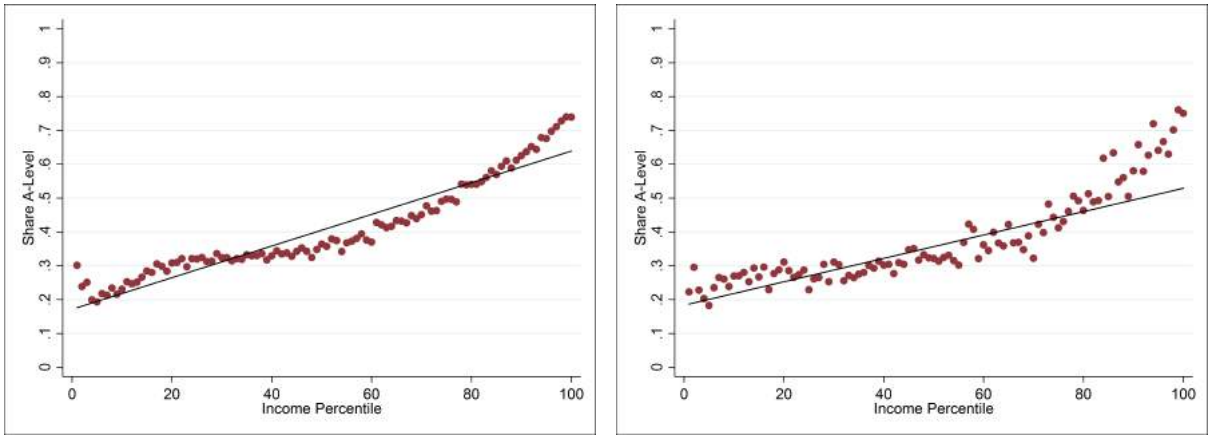
Figure 17: Difference by east/west: No adjustment for Household Size



(a) West Germany (b) East Germany

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size (x-axis), separate for children living in West Germany (left) and East Germany (excluding Berlin) (right). The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (West Germany) is based on $N = 197863$ observations, the right figure (East Germany excluding Berlin) is based on $N = 26004$ observations. For West Germany, the slope and constant of the OLS regression (black line) are 0.0044 and 0.163, for urban areas the slope and constant are 0.0054 and 0.153.

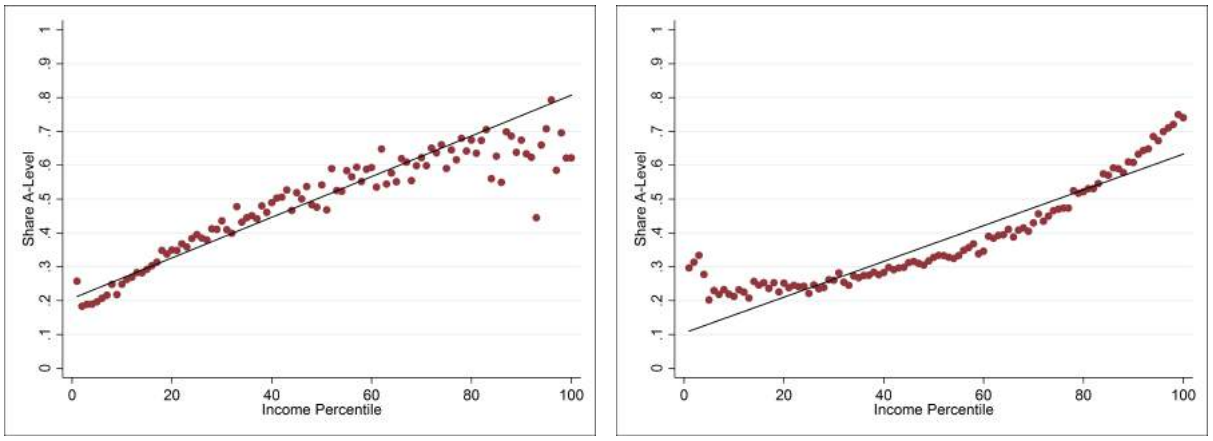
Figure 18: Difference migrants versus natives: migrant if at least one parent not born in Germany, not adjusted for Household Size



(a) Natives (b) Migrants

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size (x-axis), separate by migration status. Migrants are defined as children with at least one parent not born in Germany. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin. The left figure (natives) is based on $N = 142116$ observations, the right figure (migrants) is based on $N = 48090$ observations. For this figure, only the MZ waves from the years 2010 to 2014 have been used. For natives, the slope and constant of the OLS regression (black line) are 0.0046 and 0.171, for migrants the slope and constant are 0.034 and 0.183.

Figure 19: The role of single parents: Not adjusted for Household Size

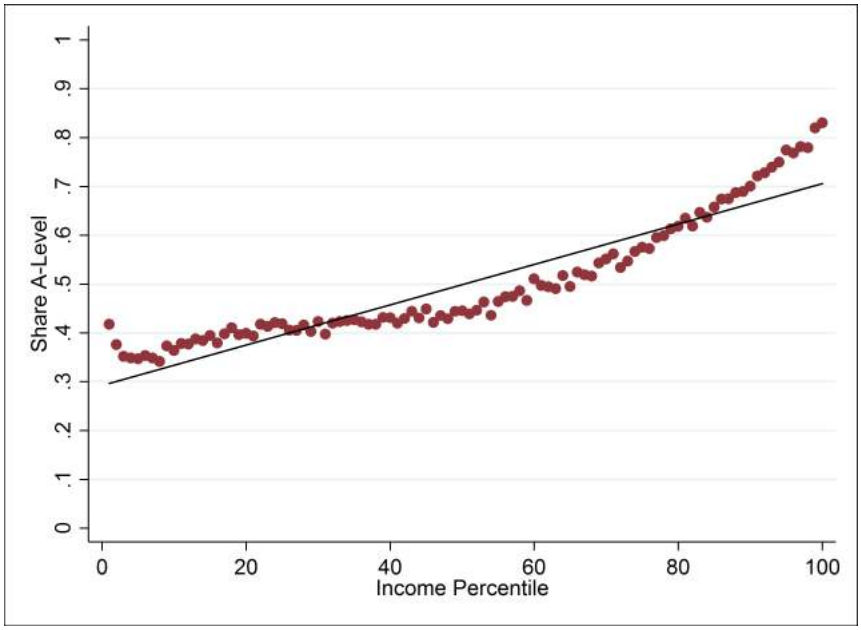


(a) Single-Parent Households (b) Two-Parent Households

This figure plots the fraction of children aged 16-22 (y-axis) that are either enrolled in the last two years of A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size (x-axis), separate for single-parent and two-parent households. The figures are constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) in the national income distribution and plotting the fraction of children aged 16-22 currently enrolled in the last two years of the A-level track or having already completed it vs. the parent rank in each bin.

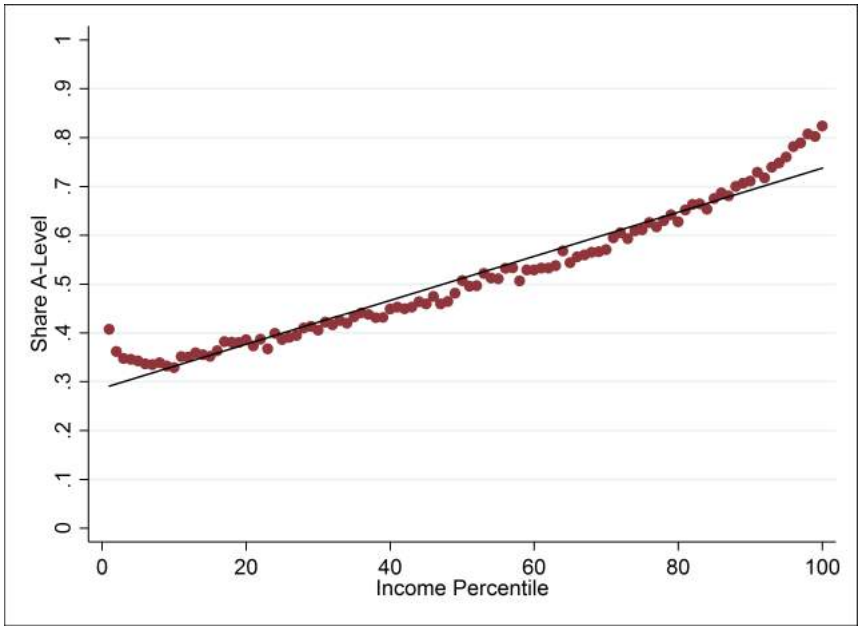
C Alternative Outcome Measure

Figure 20: Social mobility at the national level: Alternative Outcome Measure, no adjustment for Household size



This figure plots the fraction of children aged 11-19 (y-axis) that are either enrolled in the A-level track or have it already completed vs. the percentile rank of their parents in the national net income distribution not adjusted for household size (x-axis). The figure is constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) and plotting the fraction of children aged 11-19 currently enrolled in the A-level track or having already completed it vs. the parent rank in each bin. The figure is based on $N = 329556$ children living with their parents. The OLS regression of the A-level dummy on the parent income rank (black line) yields a slope coefficient of 0.0041 and a constant of 0.291.

Figure 21: Social mobility at the national level: Alternative Outcome Measure, Income per Household Member



This figure plots the fraction of children aged 11-19 (y-axis) that are either enrolled in the A-level track or have it already completed vs. the percentile rank of their parents in the national net income per household member distribution not adjusted for household size (x-axis). The figure is constructed by binning parent rank into one-percentile point bins (so that there are 100 bins) and plotting the fraction of children aged 11-19 currently enrolled in the A-level track or having already completed it vs. the parent rank in each bin. The figure is based on $N = 329556$ children living with their parents. The OLS regression of the A-level dummy on the parent income rank (black line) yields a slope coefficient of 0.0045 and a constant of 0.286.

References

Autor, D., D. Dorn, and G. H. Hanson (2013): "The China syndrome: Local labor market effects of import competition in the United States," *The American Economic Review*, 103(6), 2121–2168.

Black, S. E., and P. J. Devereux (2011): "Recent Developments in Intergenerational Mobility," *Handbook of Labor Economics*, 4(5), 1487–1541.

Chetty, R., N. Hendren, P. Kline, and E. Saez (2014): "Where is the land of opportunity? The geography of intergenerational mobility in the United States," *The Quarterly Journal of Economics*, 129(4), 1553–1623.

Dahl, M., and T. DeLeire (2008): *The Association Between Children's Earnings and Fathers' Lifetime Earnings: Estimates Using Administrative Data*, Discussion papers. University of Wisconsin-Madison, Institute for Research on Poverty.

Fuchs-Schündeln, N., D. Krueger, and M. Sommer (2010): "Inequality trends for Germany in the last two decades: A tale of two countries," *Review of Economic Dynamics*, 13(1), 103–132.

Hilger, N. G. (2015): "The Great Escape: Intergenerational Mobility in the United States Since 1940," *NBER Working Paper*.

Mazumder, B. (2005): "Fortunate Sons: New Estimates of Intergenerational Mobility in the United States Using Social Security Earnings Data," *The Review of Economics and Statistics*, 87(2), 235–255.

——— (2015): "Estimating the Intergenerational Elasticity and Rank Association in the U.S.: Overcoming the Current Limitations of Tax Data," Working Paper Series WP-2015-4, Federal Reserve Bank of Chicago.

Mitnik, P., V. Bryant, M. Weber, and D. B. Grusky (2015): "New Estimates of Intergenerational Mobility Using Administrative Data," .

Pollak, R. A., and T. J. Wales (1979): "Welfare comparisons and equivalence scales," *The American Economic Review*, pp. 216–221.

Schnitzlein, D. (2014): "How important is the family? Evidence from sibling correlations in permanent earnings in the USA, Germany, and Denmark," *Journal of Population Economics*, 27, 69–86.

——— (2016): "A New Look at Intergenerational Mobility in Germany Compared to the U.S," *Review of Income and Wealth*, 62, 650–667.

Solon, G. (1992): "Intergenerational Income Mobility in the United States," *The American Economic Review*, 82(3), 393–408.

Zimmerman, D. J. (1992): "Regression toward Mediocrity in Economic Stature," *The American Economic Review*, 82(3), 409–429.