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Parental background, secondary school track choice, and wages

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The way parents take influence on the education of their children is a crucial aspect of intergenerational mobility. Unlike in the UK or in the US, in Germany an important decision about which educational track to follow is made at a relatively early stage: after primary school, at the age of ten. In this paper, we use micro data to analyse the association between parents' education and profession, and secondary track school choice and subsequent career prospects of the child. Our analysis covers the last six decades. We demonstrate that parental background is strongly related to the secondary track choice of the child, and subsequent educational achievements. We find a slight convergence for individuals from different parental background over the last decades. We also find a positive trend for females to follow higher secondary school tracks, keeping parental background constant. The association between parental class and educational choice translates into substantial earnings differentials later in life.

1. Introduction

The degree to which poverty, or wealth is transmitted from one generation to the next is a key research area in social sciences. In economics, one growing strand of research investigates intergenerational mobility of income status, trying to establish the correlation between parents' and childrens' position in the income distribution.[1] This research, although carefully addressing identification problems of earlier studies, does little to explain the mechanisms that underly intergenerational income mobility.

In this paper, we investigate a particular aspect of intergenerational transmission. We argue that one of the crucial factors for intergenerational mobility is the way educational institutions allow parents to influence the education of their children. Education is a process that proceeds in stages, and early educational career decisions have a strong effect on the choices available at later stages. At what age these decisions are taken, and how heavily they affect future opportunities, varies between countries, and may be a key factor in explaining across-country variations in intergenerational mobility.

[1] See recent studies by Zimmerman, 1992, and Solon, 1992, for the US; Dearden *et al.*, 1997, for the UK; Bjoerklund and Jaenti, 1997, for Sweden; and Wiegand, 1999, for Germany. Solon, 1999, provides a comprehensive overview of this literature.

Traditional models on investment in human capital (for instance, Ben Porath, 1967) work on the assumption that education is primarily a matter of individual choice. This may be the case at later stages of the individual's educational career. However, early educational decisions are likely to be heavily affected by parental background. A recent literature provides strong empirical evidence for a link between overall educational achievements and parental background (see, for instance, Feinstein and Symons, 1999, and Ermisch and Francesconi, 2001, for the UK).

A most important stage in this process is the choice of schools that qualify pupils for different post-secondary education tracks, like university education. In Britain, the choice for continued schooling that qualifies pupils for university or other academic education is generally taken at the age of 16. In the US, high school attendance that qualifies for college education is almost compulsory—according to the Bureau of Labour Statistics, about 85% of a cohort finish high school successfully. Germany has a three-track system of secondary education. In 1990, only 27% of school graduates graduated from the highest secondary track schools. It is only the highest track (corresponding to high school in the US, or A-levels in the UK) that allows for direct access to the university system. The decision about which track to follow is made at a relatively early stage: after primary school, at about the age of ten.

Most research in economics does not address the secondary school track decision, but starts with transitions after secondary school education.[2] In this paper, we investigate the way the choice of secondary school is related to parental characteristics, and to future wages.[3] Our analysis is for Germany, where the decision about a particular educational track coincides with the primary–secondary school transition.[4]

Germany has a standardised secondary education system, where all primary and secondary schools are state schools. Schools at all levels (including universities) have offered (since the 1950s) tuition free education. Ability tests which provide some indication about the child's potential (and which are common in the UK and in the US) do not exist (any more) in Germany. There are recommendations by the primary school teacher about which secondary track to choose, but these recommendations are not binding. These features of the German education system,

[2] See Riphan, 1999, Merz and Schimmelpfennig, 1998; Couch, 1994, provides comparisons of transition patterns between the US and Germany; Ryan, 2001, provides an excellent cross-national analysis. Winkelmann, 1996a,b, Steedman, 1993, and Buechtemann *et al.*, 1993, discuss the apprenticeship training scheme and subsequent transitions into the labour market.

[3] There are some studies that investigate income effects on educational pathways for Germany. Buechel *et al.*, 2000, find a strong association between income and the tendency to attend higher track. Jenkins and Schlueter, 2002, examine income effects on childrens' choice of secondary school tracks in more detail.

[4] Investigation of primary–secondary school transitions has a history among educationalists. This literature focus primarily on the disruptions of transfers and transitions for pupils, affecting pupils' attitudes, motivation, and academic performance (see e.g. Galton *et al.*, 1999, for the UK, and Caterall, 1998, for the US).

and in particular the state provided financing, contribute to the view still held by some that the system provides equal opportunities of educational choice.

We demonstrate in this paper that educational mobility is nevertheless limited. We argue that one reason is the early choice of the secondary school education track, which is heavily affected by the advice and the influence of the parents, leading to intergenerational immobility in educational achievements. We demonstrate further that the secondary school track the child follows is strongly correlated with post-school educational choices, and that parental background, by way of association with secondary track schools, has a most significant association with the wage career of the individual.

This particular feature of the German education system—a strong institutional differentiation instead of a comprehensive education at secondary level—had been hold partly responsible for the low mean and the high variance of 15 years old practical literacy scores in the PISA 2000 study, an assessment of knowledge and skills of 15-year-olds in the principal industrialised countries (OECD, 2000). We argue that it may also lead to low educational mobility. Results of our analysis are complementary to work by Shavit and Mueller (1998), who conclude that early streaming of lower secondary school students in Germany creates a particularly strong association between educational attainment and labour market inequality.

We commence by analysing the association of parental education and profession with the choice of secondary school education of the child over the last six decades. We demonstrate that this association is very strong. There is a tendency of convergence for individuals from different parental background over time. There is also a tendency of convergence between males and females, with a substantial move of females towards higher track education. We then illustrate that secondary school track choice has strong consequences for after-secondary education, and for the earnings position of the individual. We estimate wage regressions, and simulate educational achievements and subsequent earnings for individuals with different parental background. We illustrate the difference in wage careers of individuals of different parental background, and how it changes due to a convergence in educational achievement.

We base our analysis on micro data from the German Socio-Economic Panel. Our study covers the last six decades, the years of most dramatic changes in demand for education in Germany. The paper is organised as follows: in Section 2 we provide a brief summary of the German educational system and present some descriptive statistics. Section 3 discusses the data. Section 4 presents the results of the empirical analysis, and Section 5 concludes.

2. The German education system

We give here only a brief account of the German education system. The system is described in much detail elsewhere (see for instance Soskice, 1994; Winkelmann, 1996b).

Education in Germany[5] is the responsibility of the states, not of the federal government. The main features of the educational system are nearly identical across states, as are teachers' employment conditions and salaries. Education starts with the voluntary pre-school kindergarten. Compulsory school attendance begins at the age of six, and ends at the age of 18. Primary school covers the first four years, and provides basic education in reading, writing, and arithmetic. In addition, children are taught preparatory classes in natural sciences, social studies, and history. After completing primary school, children continue their education in secondary schools. The three traditional secondary school types are secondary general school (*Hauptschule*), intermediate school (*Realschule*), and high school (*Gymnasium*).[6]

The secondary general school provides general education as a basis for apprenticeship training[7] in years five to nine (or ten). The intermediate school provides traditionally the basis for further apprenticeship training in white-collar occupations (years five to ten). High school involves completion of an entire upper secondary cycle, leaving usually at age 18–19 (years five to 13), and serves as a basis for academic education at universities and other institutions of higher education.

The transition from primary school to secondary school, around the age of ten, coincides with the choice of the secondary school track. After the initial secondary track choice, switching tracks is in principle possible, but rare. Pischke (1999) reports that in 1966, about 7% of pupils who decided first for general or intermediate secondary school switched to high school—most of them within three years of the initial decision.

The transition from primary school to secondary school underwent a number of changes since 1945. Up to the middle of the fifties, pupils had to pass formal tests if they wished to enrol in higher track secondary schools. The states' ministers of education decided in 1960 to abolish formal tests, and to base the transition procedure on recommendations of primary school teachers, the parents' preferences, and, if necessary, a 'trial-time' in the higher secondary school. Furthermore, the tuition fees for higher secondary schools (dropped by most states already in the second half of the fifties) were also abandoned.

The demand for the type of secondary school education changed considerably over time. Figure 1 is based on numbers from the 1987 census (the last census in Germany), and displays the evolution in the distribution of secondary school degrees over time. There is a visible trend towards higher track schools. The decline

[5] The discussion (as well as the empirical analysis) refers to West Germany only. The education system in former East Germany is similar, with slight differences in the length of the various tracks (for instance, high school education takes eight, rather than nine years).

[6] This institutional differentiation is not dissimilar to the co-existence of secondary modern school, technical school, and grammar school in the early post-war period in the UK, see Sanderson (1994) for details.

[7] Ryan (2000) provides a discussion on the German apprenticeship system and compares it to the similar systems in other countries.

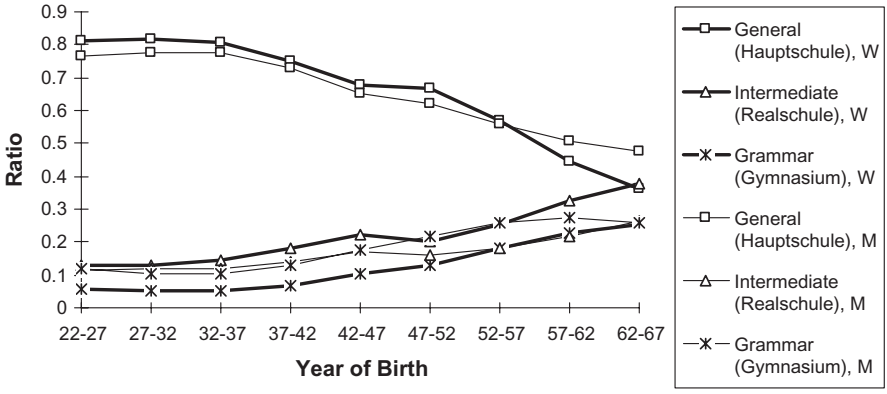

Fig. 1. Secondary school degrees, various cohorts, Germany

in the percentage of general school degrees is matched by an increase in the shares of intermediate and high school degrees. After birth cohort 1952, the proportion of females who graduate from general schools drops strongly, being mainly absorbed by intermediate schools, and to a lesser extent by high schools. For the last birth groups, Fig. 1 displays nearly the same percentage for female high school graduates as for males, and females seem to overtake males for intermediate school degrees.

3. The data

The data used for this analysis stem from the German Socio-Economic Panel (GSOEP). The GSOEP is a household based panel data set, similar in structure to the British Household Panel Survey (BHPS), where households are surveyed in successive years. The first wave of the panel was collected in 1984 and contains information on 6000 households. Of those, 1500 are a boost sample, consisting of households with a household head of foreign nationality. We restrict our analysis to the 4500 households of the main sample. The third wave of the survey contains detailed information about educational characteristics and job characteristics of each respondent's parents. We construct the educational characteristics of respondents from preceding waves. Because some high school pupils may not finish secondary education before the age of 20, we exclude all individuals younger than 21 years from our analysis. Furthermore, to reduce selection due to mortality, we exclude individuals older than 66 years of age.

Our data does not allow us to identify individuals who have changed schools. Information about secondary school degrees refers to the highest degree awarded; it therefore refers not to the initial choice, but to the track that has been successfully completed. As explained above, transfers between types of secondary schools are possible, but not frequent, and take place within two to three years of the initial choice being made. We allocate individuals to one of three groups: individuals who graduated from general school (*Hauptschule*), intermediate school

(*Realschule*), or high school (*Gymnasium*), respectively. Dropouts are allocated to special schools, which we subsume under the category 'general school'. Our final working sample contains 3147 females and 2970 males. Table 1 describes the variables used in the analysis and reports sample means.

On average, 64% of females have a general secondary school degree; this number is slightly lower for males (60%). While 22% of males hold a high school degree, this number is considerably lower for females (13%). Females do however attend intermediate schools more frequently.

All information on the parents refers to characteristics when the individual was 15 years old. Besides educational characteristics, we also have information about the professional class of the father, and whether the respective parent participated in the labour force. The numbers reveal that, on average, educational attainments of both mother and father are lower than those of the offspring. In particular, there seems to be a remarkable increase in high school education. Also, the differences between males and females are much more pronounced in the parents' generation. While intermediate school certificates are about equally frequent for male and female parents, fathers hold a high school degree nearly three times as often, and an academic degree five times as often.

Based on the year of birth of the individuals in the sample we define four cohorts. The first cohort comprises individuals who were born between 1920 and

Table 1 Description and means of variables

Males	Females	Variable
40.89	41.64	Age of individual
60.41	64.12	General school (*Hauptschule*)
18.14	23.31	Intermediate school (*Realschule*)
21.92	12.98	High school (*Gymnasium*)
81.68	83.61	Father: general school (*Hauptschule*)
10.34	8.19	Father: intermediate school (*Realschule*)
7.96	8.19	Father: high school (*Gymnasium*)
40.96	42.24	Father: blue collar apprenticeship
10.84	9.83	Father: technical (full time) school after secondary school
9.87	10.00	Father: white collar apprenticeship
6.09	6.16	Father: university or polytechnics
40.17	40.25	Father: blue collar worker
13.04	12.66	Father: white collar worker
17.07	18.53	Father: self employed
9.53	8.92	Father: civil servant
87.38	88.06	Mother: general school (*Hauptschule*)
9.79	8.87	Mother: intermediate school (*Realschule*)
2.82	3.06	Mother: high school (*Gymnasium*)
14.93	14.15	Mother: blue collar apprenticeship
1.13	1.39	Mother: vocational technical (full time) school after secondary school
12.35	11.20	Mother: white collar apprenticeship
1.13	1.39	Mother: university or polytechnics education

Table 2 Definition of cohort dummies, number of cases

Variable	Description	Males		Females	
		Cases	Mean	Cases	Mean
Cohort 1	Born between 1920 and 1936	886	25.30	886	28.34
Cohort 2	Born between 1937 and 1946	750	25.81	732	23.76
Cohort 3	Born between 1947 and 1956	624	21.48	690	22.40
Cohort 4	Born between 1957 and 1966	796	27.40	785	25.48

1937. We chose this date because these individuals decided about secondary school before or during the Second World War. Individuals in cohort 2 were born before 1946, and therefore entered secondary school during the first ten years after World War Two. Individuals in cohort 3 were born before 1956, and individuals in cohort 4 before 1966. Since our working sample is restricted to those individuals who were at least 21 years of age in 1987, all individuals decided upon secondary schools no later than 1975. Table 2 shows the cohort definition and the number of cases in each cohort. The percentage of women in cohort one is slightly higher than the percentage of men, which is a result of the Second World War as well as the higher life expectancy of females.

4. Empirical analysis

The empirical analysis consists of five parts: first, we illustrate the transitions from secondary school to post school education. Second, we analyse the association between parents' characteristics, and secondary school track of the individual. Third, we illustrate changes over time, and point out differences between males and females. Fourth, we investigate the association between educational achievements and wages. Fifth, we illustrate the impact of parental background on the earnings of the individual via its influence on the secondary school track. We estimate models where we allow parental characteristics to affect the child's wages by shifting probabilities of different secondary school tracks.

Our analysis does not attempt to answer questions like whether the higher probability of high school attendance of children born to academic parents is due to these children having higher learning abilities, or due to academically educated parents tending to choose higher track secondary schools for the child. To disentangle these effects creates serious identification problems, which we feel we can not satisfactorily address with our data, due to lack of identifying information. The coefficients we estimate are a combination of the two effects.

4.1 Secondary school choice and post school education

We argue above that the choice of the secondary school track is strongly associated with later educational choices. In Tables 6 and 7 in the Appendix, we show cross

tabulations for secondary school degrees and subsequent educational choices for females and males, respectively. The numbers refer to the first three cohorts only, since individuals in the fourth cohort may still be in education, predominantly at universities. The three panels distinguish between the three secondary schools: general, intermediate, and high school. The variable 'other' summarises individuals with post secondary education not included in any of the other categories.

Table 3 displays Goodman–Kruskal correlation coefficients, which summarise the cross tabulations. This coefficient is bounded between -1 and 1, and can be interpreted as the difference in probability of like rather than unlike responses for the two education measures when two individuals are chosen at random. We have printed significant positive correlations in bold. The numbers reflect the same pattern as the percentages in Tables 6 and 7 in the Appendix.

The entries in the upper panel of Table 3 refer to males. They illustrate that secondary school attendance for males is strongly associated with post-secondary education. Having attended a secondary general school is strongly and significantly correlated with subsequent blue-collar apprenticeship training. Intermediate school graduates tend to obtain further education by attending technical schools, or joining white collar apprenticeship schemes. Being a high school graduate is strongly correlated with attending university. While the low occurrence of upward transitions (from general school to university) is not so surprising, the numbers also suggest that downward transitions are not frequent. The numbers in the last block indicate that the association between high school degree, and a blue collar apprenticeship is very low.

The numbers for females (lower panel) are similar. While males with general secondary school degrees tend to enrol in blue-collar apprenticeships, and males with intermediate school degrees in white collar apprenticeships or technical schools, females from both intermediate and high schools tend to enrol in white rather than blue collar apprenticeship schemes.

The numbers in Tables 6 and 7 in the Appendix show that the ratio of females with a general school education and without further vocational training dropped dramatically over cohorts. On the other side, the share of former general school pupils in technical schools nearly doubles from cohort 1 to cohort 2. The fraction of females and males with a general secondary school degree who decide to obtain no further education drops systematically over cohorts.

The picture that emerges from these numbers is that for males there is a strong association between general school degrees and blue-collar vocational training, intermediate school degrees, and white-collar or vocational school training, and high school and academic degrees. For females, both general and intermediate school graduates tend to attend technical schools and white, rather than blue collar apprenticeship schemes. These strong associations emphasise the importance of secondary school choices for understanding subsequent choices within the German educational system.

Table 3 Correlation secondary school—post-secondary education

Secondary education	No further education		Blue collar apprenticeship		Technical school		White collar apprenticeship		University degree		Other	
	Corr.	StdE.	Corr.	StdE.	Corr.	StdE.	Corr.	StdE.	Corr.	StdE.	Corr.	StdE.
Males												
General	**0.68**	0.059	**0.76**	0.025	−0.30	0.052	−0.01	0.066	−0.97	0.007	−0.05	0.137
Intermediate	−0.68	0.092	−0.43	0.055	**0.66**	0.036	**0.29**	0.069	−0.42	0.086	0.19	0.154
High school	−0.69	0.086	−0.92	0.020	−0.48	0.075	−0.31	0.089	**0.98**	0.003	−0.09	0.182
Females												
General	**0.67**	0.032	**0.51**	0.071	−0.10	0.048	−0.53	0.047	−0.99	0.007	−0.41	0.105
Intermediate	−0.59	0.043	−0.39	0.089	**0.39**	0.045	**0.53**	0.048	−0.43	0.119	0.49	0.098
High school	−0.80	0.050	−0.67	0.124	−0.68	0.070	**0.22**	0.096	**0.99**	0.002	−0.05	0.235

Notes: Goodman–Kruskal correlation coefficients (standard errors), computed as $\gamma = (P - Q)/(P + Q)$, where P is the number of concordant, and Q the number of discordant pairs of observations.

4.2 Factors associated with secondary school choice

We now have a closer look at the association between parental characteristics, and the children's secondary school track. We model the allocation to secondary school tracks as an ordered probit model, where we distinguish between the three categories of general, intermediate, and high school. We first estimate models for males and females separately where we pool all cohorts. We allow for cohort effects in a flexible way by introducing a polynomial of the year of birth of degree 4.[8] Secondary school choice is explained by variables that reflect parents' school and post-school education, and variables about the father's professional class.

To interpret the estimation results, we calculate the differential marginal effects of explanatory variables on the probability that an individual attends high school or intermediate school, as compared to general school.[9] Table 4 presents the estimates and standard errors. All effects are calculated for the average sample individual in the respective subgroup.

There are several noteworthy results in Table 4. While for males, an intermediate or high school degree held by the father increases the probability that the individual attends high school by more than the probability that the individual attends intermediate school (relative to general school), the opposite is the case for females. This indicates that intermediate school attendance is considered to be a sufficient education for female offsprings, while better educated fathers tend to send their sons to a high school rather than an intermediate school. Interesting is also that mother's academic education is significantly associated with attending intermediate or high school (relative to general school) for girls, but not for boys.

The variables that characterise the post school education of the father are all significant and positive. Again, while any after school degree of the father increases the probabilities of the son's high school attendance more than the probability of son's intermediate school attendance, the opposite is the case for daughters. White collar apprenticeship, or vocational after school education of the father affects higher school track attendance of the individual more strongly than blue collar after school education. As one should expect, the association between the child's higher secondary school track education and academic education of the father is strong. The same patterns prevails for mother's after school education.

All job characteristics of the father are strongly significant predictors for child's (relative) secondary school choice. Notice that coefficient estimates of father's

[8] The null hypothesis for equal parameters for both genders is rejected at the 5% level, using a likelihood-ratio test. We therefore base our further analysis on gender specific estimations.

[9] These parameters are given by $[2\phi(x'b) - \phi(\mu - x'b)]b$ for intermediate vs general school, and by $[\phi(\mu - x'b) + \phi(x'b)]b$ for high school vs general school, where x is a vector of characteristics, b the corresponding vector of parameter estimates, and ϕ the density of the standard normal. The model is normalised by setting its variance equal to one, so that μ is the estimated threshold parameter. Standard errors of these parameters can in principle be computed using the Delta method. Easier is computation by simulation. We draw 500 observations of the estimated parameters b from their asymptotic normal distribution, and compute the standard errors of the predicted differential marginal probabilities.

Table 4 Marginal differential effects of parents' characteristics

	Males				Females			
	Intermediate vs. general		High school vs. general		Intermediate vs. general		High school vs. general	
Variable	Coeff.	StdE.	Coeff.	StdE.	Coeff.	StdE.	Coeff.	StdE.
Father high school	0.275	0.072	0.343	0.090	0.359	0.074	0.297	0.061
Father intermed school	0.286	0.045	0.357	0.055	0.273	0.054	0.226	0.044
Mother high school	0.360	0.106	0.450	0.133	0.282	0.115	0.234	0.095
Mother intermed school	0.260	0.053	0.325	0.068	0.204	0.058	0.169	0.048
Father academic ed	0.546	0.084	0.682	0.104	0.471	0.086	0.390	0.071
Father blue col. appr.	0.175	0.038	0.219	0.047	0.147	0.042	0.121	0.034
Father white col. appr.	0.302	0.056	0.377	0.069	0.342	0.060	0.283	0.049
Father technical sch.	0.229	0.055	0.286	0.068	0.308	0.062	0.254	0.051
Mother academic ed	0.041	0.131	0.051	0.164	0.376	0.139	0.311	0.114
Mother blue col. appr.	0.072	0.038	0.090	0.047	0.022	0.043	0.018	0.036
Mother white col. appr.	0.120	0.039	0.150	0.048	0.198	0.045	0.164	0.037
Mother technical sch.	−0.002	0.113	−0.003	0.141	0.207	0.123	0.171	0.102
Father white collar job	0.198	0.045	0.247	0.056	0.309	0.050	0.255	0.041
Father self employed	0.182	0.039	0.227	0.049	0.259	0.041	0.214	0.033
Father civil servant	0.301	0.054	0.375	0.067	0.322	0.060	0.266	0.050
Year born/10	−2.769	2.107	−3.456	2.625	−4.652	2.235	−3.849	1.840
Year born^2/10^3	10.191	7.822	12.719	9.747	19.861	8.490	16.431	6.991
Year born^3/10^5	−15.015	12.453	−18.743	15.520	−33.587	13.794	−27.787	11.355
Year born^4/10^7	7.739	7.194	9.662	8.967	19.957	8.113	16.510	6.678

Notes: Ordered probit models. Marginal differential effects and their standard errors are reported.

professional characteristics are conditional on father's educational achievement. Accordingly, the working environment and the associated social relations and peer group of the father seem to play an important role for the secondary school education of the child.

These estimates suggest that the association between parental educational attainment and profession and the secondary track education the child follows is substantial. The estimates show some interesting differences between males and females: characteristics of parents which are strongly associated with a high school education for males, are strongly associated with intermediate school education for females. This is in line with the relative overall tendency of females to enrol in intermediate schools, as depicted in Fig. 1.

4.3 Changes in secondary school education

We now illustrate changes in the probabilities of track choice over time. We simulate school track attendance probabilities for parents with different educational background, and different professional class, based on the estimates in the previous section. We allow for changes in educational choices of individuals of the same parental background, according to the cohort individuals are born into, which is captured by a cohort polynomial.[10]

We choose two parental background scenarios: A typical working class family, and a family with academic background. We define parental working class background as a father with general secondary school education, blue collar apprenticeship and a blue collar job, and a mother with general secondary school education. We define an academic background as a father who has a high school degree, an academic degree, and a white collar job, and a mother who has a high school degree and an academic education.

Probabilities for individuals who come from a family with typical working class background are displayed in Fig. 2, and for individuals from an academic background in Fig. 3. The figures illustrate the evolution of probabilities of general, intermediate and high school attendance according to birth year, for birth cohorts between 1921 and 1966. Solid lines represent males, and dashed lines represent females. The lines for the various school types carry different symbols, which are explained in the figures.

The figures show the dramatic differences in probabilities of high school attendance for individuals with different parental background. While the probability of high school attendance is always below 20% for a male working class individual, it is always above 70% for an individual with academic family background.

For individuals with working class background, a decline in the share of general school education is visible, accompanied by an increase in intermediate and high schools. This is more pronounced for females than for males. For individuals with academic background, the probability of attending high school is about 60% for

[10] For both males and females, the polynomial terms are jointly significant at the 1% level.

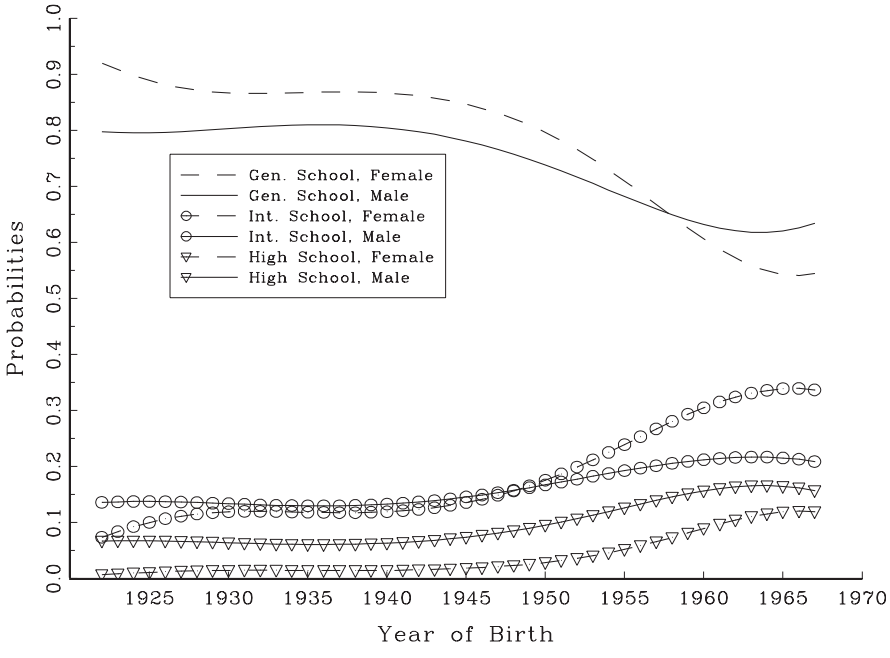

Fig. 2. School attendance probabilities, working class parents

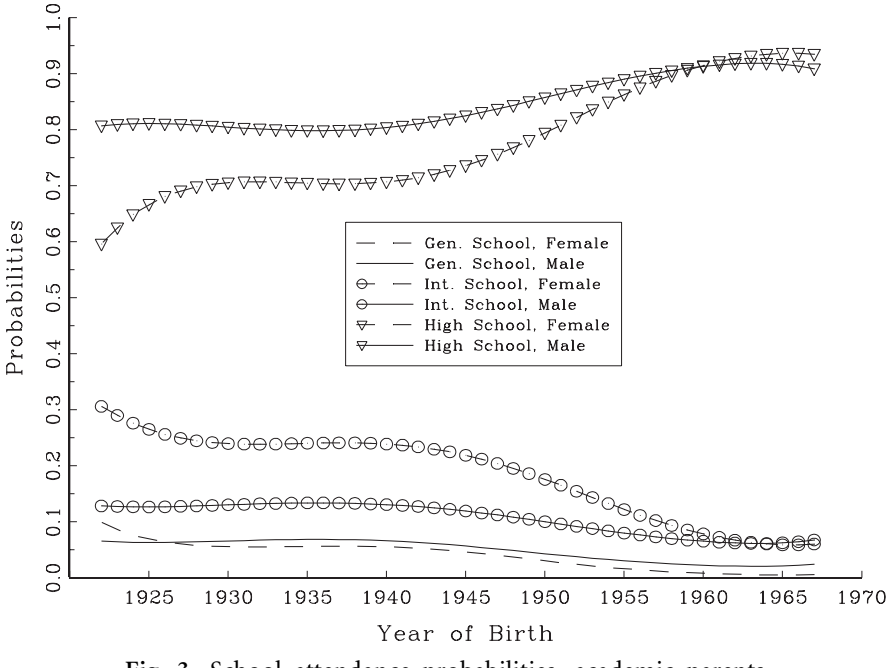

Fig. 3. School attendance probabilities, academic parents

females, and 80% for males, for the cohort born in 1921. For males, this probability is relatively stable over time, with only a slight increase in the second half of the last century. For females, there is a strong increase, and probabilities equalise with those for males for the 1960s cohorts. On the other hand, the probability of general school education is never higher than 10%, and it approaches zero for both genders in the last cohort.

The figures suggest low educational mobility, with a tendency towards limited convergence of school allocations across family backgrounds over time. Furthermore, they illustrate an overall shift towards better education for females, and a closing gap between males and females during the second half of the last century.

4.4 Educational achievements and wages

In the last section, we have illustrated that parental background is strongly related to educational achievements of the child. In this section, we investigate how educational achievements are associated with wages. In the next section, we analyse how parental background affects wages, via its association with educational attainments.

We de-trend wages first by making use of administrative longitudinal data for Germany (see Bender *et al.*, 1996, for details on this data). We construct a sample of young workers, whose first spell in the labour market we observe for the years 1984–1990 (see Dustmann and Meghir, 2004, for details on this data). Variation in entry wages of these workers are due to variation in educational background and entry year only, since their labour market experience is equal to zero. We use the estimated time effects from wage regressions of this sample of entrants to de-trend wages for the first seven years of the panel (between 1984 and 1990). We then estimate wage regressions, conditioning on educational achievements, an age polynomial, and cohort dummies, which are defined according to the classification in Table 1. The panel information allows us to identify both cohort- and age effects.

The wage equations we estimate are given by

$$\ln w_{it}^g = \alpha_0^g + \alpha_1^g isch_i + \alpha_2^g gsch_i + \alpha_3^g coh_i + P_i(age)\beta^g + TR_i'\gamma^g + u_{it} \qquad (1)$$

where $\ln w$ is the log of (de-trended) wages, *isch* and *gsch* are dummy variables for intermediate and high school attendance, *coh* are cohort dummies, *TR* is a vector of further educational achievements, and $P(age)$ is a polynomial in age of degree 3. The indices i, t, g stand for individuals, time, and gender. We define the coefficients to be such that $\mathrm{E}(u_{it} \mid isch, gsch, coh, P(age), TR) = 0$.

In columns 1 and 3 of Table 5, we display estimates where we condition on secondary school education, as well as after-secondary school attainments. Omitted category is individuals with a general school degree, and no further training. According to these estimates, an intermediate school degree is associated with an increase in log wages of 0.15 and 0.24 for males and females, respectively. A high school degree is associated with an increase in log wages by about 0.26 (males) and 0.32 (females).

Table 5 Wage regressions

	Males				Females			
	1		2		3		4	
Variable	Coeff.	StdE.	Coeff.	StdE.	Coeff.	StdE.	Coeff.	StdE.
Constant	1.611	0.155	1.246	0.160	2.196	0.239	1.324	0.246
Intermediate school	0.148	0.007	0.196	0.006	0.236	0.010	0.289	0.010
High school	0.257	0.010	0.433	0.006	0.317	0.016	0.546	0.012
Blue collar apprenticeship	0.105	0.008	–	–	0.026	0.015	–	–
White collar apprenticeship	0.180	0.010	–	–	0.165	0.010	–	–
Vocational training	0.142	0.009	–	–	0.159	0.013	–	–
University education	0.378	0.013	–	–	0.499	0.021	–	–
age/10	0.493	0.133	0.857	0.137	−0.182	0.207	0.574	0.213
$age^2/10^3$	−0.606	0.353	−1.470	0.364	1.158	0.561	−0.661	0.579
$age^3/10^5$	0.140	0.295	0.795	0.304	−1.391	0.477	−0.023	0.494
cohort 2	0.054	0.015	0.054	0.015	−0.065	0.026	−0.073	0.027
cohort 3	0.070	0.024	0.063	0.024	−0.019	0.040	−0.035	0.041
cohort 4	0.036	0.029	0.015	0.030	0.007	0.048	−0.012	0.050
N. Obs.	12598		12598		7738		7738	

Blue collar and white collar apprenticeships, as well as vocational school attendance lead to further increases in the expected wage, with white collar apprenticeships having the largest coefficients for both genders. University education adds substantially to after-secondary school wages for both genders.

The cohort dummies are significant for males, indicating that (compared to the first cohort) wages in cohorts 2 and 3 are slightly higher. Wages in cohort 4 are lower again, which may be due to the fact that many university graduates in this cohort have not entered the labour market yet. For females, cohort effects are mostly insignificant.

In columns 2 and 4, we present results where we regress on secondary school degrees only. The coefficients can be interpreted as the association between the respective secondary school degree and wages for an individual with expected further educational achievements, conditional on having achieved a particular secondary school degree. General school attainment (and expected further training achievements associated with general school attainment) is the reference group.

As expected, coefficients for the two school categories increase, and are slightly larger for females. Compared to a male individual with general schooling (and the associated average further training), a high school graduate (with average weighted further educational achievements) earns about 54% (calculated as $(e^{0.433}-1)$) higher wages. In the next section, we take this specification as a starting point. We investigate how parental characteristics, via their impact on secondary school attainments, affect wages of individuals.

4.5 Wages and parental background

We have illustrated in Section 4.3 that there is some convergence in educational track choice over cohorts between individuals with different parental background. We now simulate how this translates into log wages, via its effect on the secondary school choice of the individual. We predict log wages, conditional on parental background only. This corresponds to expected wages, conditional on a set of parental background information *PB*

$$\begin{aligned} \mathrm{E}(\ln w \mid PB) &= \widetilde{\alpha}_0 + \widetilde{\alpha}_1 \,\mathrm{E}(isch \mid PB) + \widetilde{\alpha}_2 \mathrm{E}(gsch \mid PB) \\ &= \widetilde{\alpha}_0 + \widetilde{\alpha}_1 \mathrm{Prob}(isch \mid PB) + \widetilde{\alpha}_2 \mathrm{Prob}(gsch \mid PB) \end{aligned}$$

Based on this specification, we predict log wages for individuals in 1987 with the same parental background, but born in different years. We eliminate the direct time and cohort effects on wages by conditioning on cohort dummies, and by de-trending wages first, as explained above. Age in 1987 influences wages in our simulations in two ways: First, by positioning individuals on their life cycle log wage-age profile. The wage-age profile is assumed to be the same for individuals with different educational background. Second, by the cohort effect on educational attainments. Individuals with the same parental background may achieve different secondary school attainments, according to their cohort, as we have illustrated in Section 4.3. This second effect affects individuals with different parental background differently, and it may thus lead to convergence or divergence of profiles.

We consider again an individual from a working class background, and an individual from an academic background, where we use the same definitions as in the previous section.

We obtain the probabilities Prob(*isch* | *PB*) and Prob(*gsch* | *PB*) from our ordered probit model. In Figs 4 and 5, we plot the predicted wage profiles for males and females, respectively. In Table 8 in the Appendix, we report the wage differences (according to parental background) for the various age groups, and the t-ratios of the differences between wages at different ages for individuals from academic and working class background.[11]

Wage differentials for individuals with different parental background are sizeable. For males who are 26 years old in 1987, the log wage differential between an individual born into an academic family and an individual born into a working class family is about 0.3, translating into a 35% differential. For females, the differential is larger at 46%.

[11] To compute the standard errors, we take account of the fact that the parameters in the wage equation, as well as the parameters in the ordered probit model (used to form the predictions of secondary school attendance) are random variables. Computation of the standard errors is based on simulations.

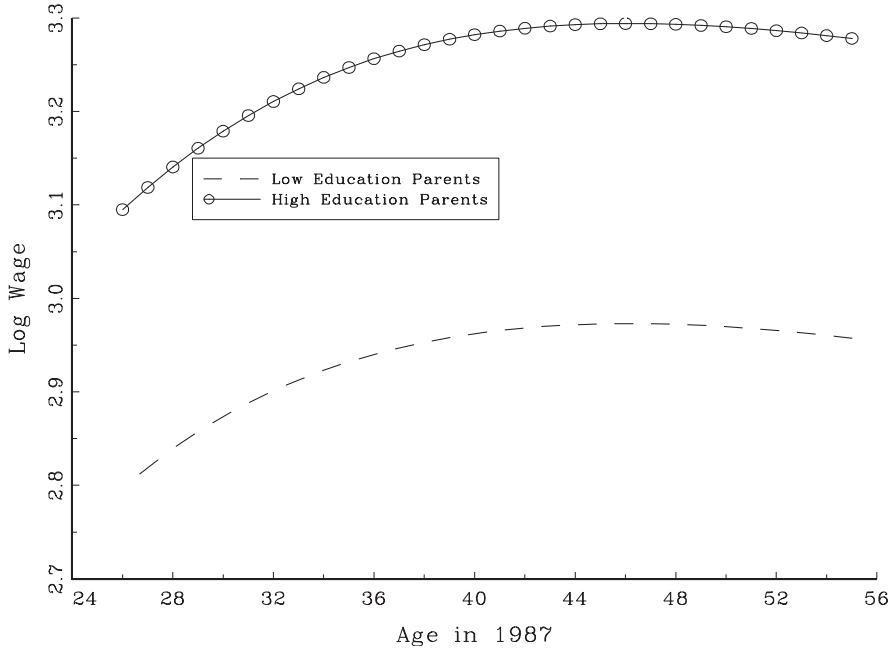

Fig. 4. Wage profiles, males

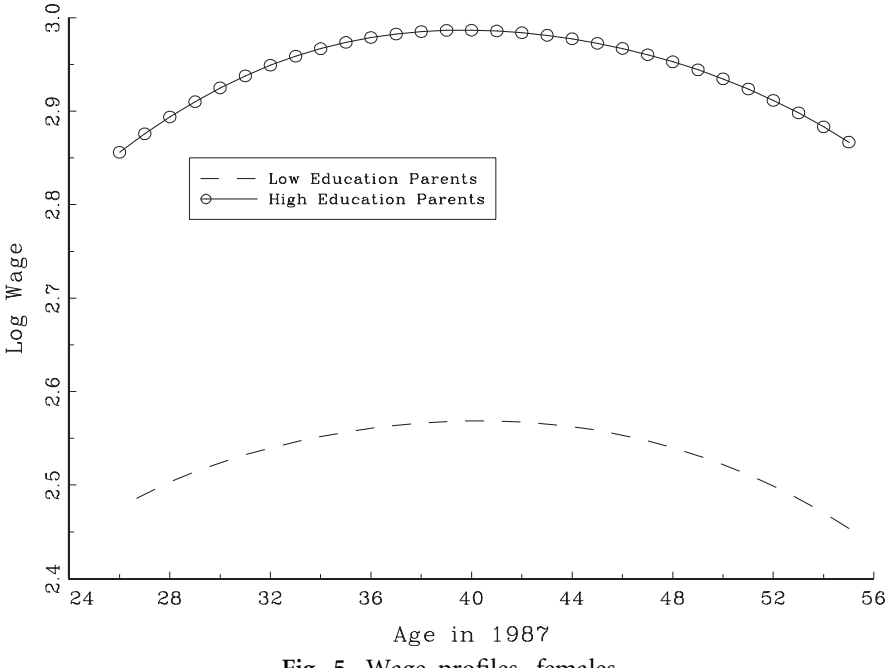

Fig. 5. Wage profiles, females

The figures indicate only a slight convergence in wage profiles of individuals in younger cohorts, relative to older cohorts, due to convergence in educational achievements of individuals with different parental background. On average, male individuals from a working class background and born in 1961 obtain wages which are about 35% lower than those of individuals from an academic background; this difference increases by only 2.3% for individuals born in 1932. The increase is due to the larger relative disadvantage in acquiring higher track education for individuals from working class background who were born in 1932, compared to those born in 1961. Thus, the slight convergence we observe in terms of secondary track education between individuals of different background translates in a small convergence in wages.

Again, notice that our analysis does not identify causal effects. There are many reasons why later earnings capacity may be linked to parental background. Parental background may be correlated with individuals' unobserved ability in the educational outcome equation. It may also be correlated with unobservables in the wage equation, either via ability, or via network effects or personal contacts. Our estimates refer to the composite of all these effects.

5. Conclusion and discussion

In this paper, we argue that an important factor for explaining intergenerational mobility of income status and education is the influence parents may have on early school track decisions of the child. This, in turn, is related to institutional features of the education system, in particular the age at which the secondary school track choice has to be taken. In Germany, primary, secondary, and post-school education is state provided, tuition-free, and there are no large differences in quality across schools of a given track. Despite that, we document a substantial immobility of educational achievement across generations. We also find that differences in parental background translate, via their association with secondary track school choice, into sizeable wage differences.

One reason for this may be the relatively young age at which the secondary track decision has to be taken, giving a high weight to parental preferences. This particular feature of the German education system has been mostly overlooked, with researchers focussing on post secondary education, and first transitions into the labour market.

A key question has not been addressed so far. In the absence of tuition fees for secondary schools (at least for recent cohorts), and no selective entry tests, why do not all parents send their children to upper track schools? And if there is differential allocation, why should it be related to educational background of the parent? There are various possible explanations. Although it is the parent who ultimately decides about the child's secondary track, there are, as we point out above, recommendations by the primary school teacher. Parents with weaker educational background may be less confident, and consider these recommendations as more binding

than parents with higher educational background. Furthermore, at so low an age children may not yet have fully revealed their academic potential. Better educated parents may be in a stronger position to extract information about this potential, and decide for higher track schools despite a negative recommendation of the teacher. Also, better educated parents may feel that they have more resources (both financially and in terms of academic advice) to support their child at a higher track secondary school than parents with poorer educational background. Peer pressure may be another explanation for education-dependent parental decisions.

Finally, professional traditions may play an important role. These traditions are strongly developed in Germany, in particular in the craft sector. Parents' own education and professional class may shape their taste and perception of what is an appropriate educational and professional career for the child. Even in the absence of financial constraints, working class parents may consider a lower track education and an early labour market entry the best option for their child. In addition, knowledge transmission may contribute to occupational persistence across generations, in particular in the craft sector. Lentz and Laband (1989) and Laband and Lentz (1992) among others provide evidence for occupational inheritance.

We have not tested these explanations—this is left for future research. We believe however that the way parents take part in educational choices of their children is crucial for our understanding of intergenerational mobility. In this paper we emphasise the age of secondary track choice as a possible key factor, and provide evidence of strong intergenerational immobility of educational achievements in a country where this decision is taken very early on.

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Appendix

Table 6 Transitions secondary–after secondary education, males

Secondary education	Cohort	No after-sec. education	Blue collar	Vocational school	White collar	University	Other	No. Obs.
General	Cohort 1	18.04	53.92	12.94	11.37	1.18	2.55	510
secondary	Cohort 2	14.79	53.45	13.21	14.40	0.99	3.16	507
school	Cohort 3	10.92	53.50	18.21	15.13	0.28	1.96	357
	All	14.99	53.64	14.41	13.46	0.87	2.62	1374
Intermediate	Cohort 1	5.45	17.27	43.64	20.00	7.27	6.36	110
secondary	Cohort 2	1.75	27.19	43.86	14.91	8.77	3.51	114
school	Cohort 3	0.81	23.39	41.13	25.81	7.26	1.61	124
	All	2.59	22.70	42.82	20.40	7.76	3.74	348
High	Cohort 1	0.00	4.35	15.65	9.57	66.96	3.48	115
school	Cohort 2	0.78	3.10	3.10	9.30	80.62	3.10	129
	Cohort 3	6.29	2.80	6.29	6.29	77.62	0.70	143
	All	2.58	3.36	8.01	8.27	75.45	2.33	387

Note: The column entries refer to percentages of respective after-secondary school education for the different secondary attainments. We distinguish between no further education, blue collar apprenticeship, vocational school, white collar apprenticeship, and university. For each cohort the numbers in a row add up to 100.

Table 7 Transitions secondary–after secondary education, females

Secondary education	Cohort	No after-sec. education	Blue collar	Vocational school	White collar	University	Other	No. Obs.
General secondary school	Cohort 1	62.43	11.09	17.60	6.95	0.00	1.92	676
	Cohort 2	44.22	15.11	29.10	8.96	0.19	2.43	536
	Cohort 3	29.76	15.95	45.48	6.90	0.24	1.67	420
	All	48.04	13.66	28.55	7.60	0.12	2.02	1632
Intermediate secondary school	Cohort 1	28.37	9.22	36.17	17.73	3.55	4.96	141
	Cohort 2	10.14	2.03	54.73	24.32	2.70	6.08	148
	Cohort 3	11.93	6.25	44.32	28.98	2.27	6.25	176
	All	16.34	5.81	45.16	24.09	2.80	5.81	465
High school	Cohort 1	7.14	5.36	10.71	19.64	51.79	5.36	56
	Cohort 2	6.25	2.08	6.25	18.75	64.58	2.08	48
	Cohort 3	7.45	1.06	7.45	13.83	69.15	1.06	94
	All	7.07	2.53	8.08	16.67	63.13	2.53	198

Note: The column entries refer to percentages of respective after-secondary school education for the different secondary attainments. We distinguish between no further education, blue collar apprenticeship, vocational school, white collar apprenticeship, and university. For each cohort the numbers in a row add up to 100.

Table 8 Wage differentials high/low educational background

	Males		Females	
Age	$\Delta \ln w$	t-ratio	$\Delta \ln w$	t-ratio
26	0.297	17.63	0.379	13.80
27	0.299	19.32	0.385	15.20
28	0.301	21.19	0.390	16.75
29	0.302	23.27	0.395	18.49
30	0.305	25.60	0.400	20.43
31	0.307	28.17	0.405	22.59
32	0.309	30.91	0.409	24.92
33	0.311	33.58	0.412	27.24
34	0.313	35.77	0.414	29.21
35	0.314	36.93	0.416	30.30
36	0.316	36.61	0.418	30.11
37	0.317	34.86	0.418	28.60
38	0.318	32.15	0.418	26.25
39	0.319	29.10	0.418	23.58
40	0.319	26.11	0.418	21.02
41	0.320	23.42	0.417	18.73
42	0.320	21.08	0.416	16.76
43	0.320	19.08	0.415	15.10
44	0.320	17.40	0.414	13.72
45	0.320	15.97	0.414	12.56
46	0.320	14.77	0.413	11.58
47	0.320	13.75	0.413	10.76
48	0.320	12.88	0.412	10.06
49	0.320	12.14	0.412	9.465
50	0.320	11.50	0.412	8.946
51	0.320	10.95	0.412	8.490
52	0.320	10.48	0.412	8.084
53	0.320	10.06	0.412	7.715
54	0.320	9.699	0.413	7.372
55	0.320	9.369	0.413	7.046