Thünen-Series of Applied Economic Theory

Thünen-Reihe Angewandter Volkswirtschaftstheorie

Working Paper No. 96

Recommendation, Class Repeating, and Children's Ability: German School Tracking Experiences

von

Carsten Ochsen

Universität Rostock

Wirtschafts- und Sozialwissenschaftliche Fakultät
Institut für Volkswirtschaftslehre
2008

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Carsten Ochsen*

September 30, 2008

Abstract

While the 2006 Progress in International Reading Literacy Study assesses the average ability of German primary school students as being higher than average, the Programme for International Student Assessment studies (2000, 2003, 2006) ranks German secondary school students at a considerably lower level. Using data from the German Socio-Economic Panel, this paper examines whether a teacher's recommendation for the secondary school track and class repeating are causes for these ability differences. According to the estimates, failures as a result of teachers' recommendations given at the end of primary school are an important reason for the differences between the two types of studies. Being required to repeat a school class amplifies the inefficient management of children's abilities. In addition, we find evidence that regional economic performance at the time the recommendation is made affects the decision for the tracking path.

Keywords: education attainment, school system, educational tracking

JEL classification: I21, I28, J1

*University of Rostock; Correspondence: Carsten Ochsen, Department of Economics, University of Rostock, Ulmenstrasse 69, 18057 Rostock, Germany, e-mail: carsten.ochsen@uni-rostock.de

1 Introduction

This paper examines the effects generated by the characteristics of two German school systems on children's education attainment. There is some evidence in the literature that school quality, school resources, and educational tracking affect the educational performance of children.[1] With respect to secondary school tracking in Germany, Dustmann (2004) and Schnepf (2002) conclude that parental background is strongly related to the choice of track. This paper contributes to the literature by its focus on the two further dimensions of school system or educational tracking system quality dependent on a set of family characteristics. First, we analyze the effects of undervaluation in teacher's recommendation for children's secondary school track.[2] Second, since teachers can deny transfer into the next school year, we explore whether repeaters have, on average, a lower level of education. Both aspects received little attention in the literature.

In recent years, two different assessments of students were conducted to allow an international comparison of students' average ability and performance. According to the 2006 Progress in International Reading Literacy Study (PIRLS), which assesses the reading comprehension of children in the fourth (and in Germany, the last primary school) class, Germany ranks higher than average. In contrast, the Programme for International Student Assessment (PISA) valuates the average ability of German students in mathematics, reading comprehension, and natural sciences at age 15 in all studies (2000, 2003, 2006) at a considerably lower level. This difference has raised discussion about the school tracking system in Germany.

In Germany, compulsory school attendance begins at approximately age 6 and after four years of primary school (which is identical for all), students continue their education at a secondary school.[3] During the last school year in primary school, teachers provide recommendations for each student relative to the secondary school track (lower level of secondary school, intermediate secondary school, or upper level secondary school). That is, the instructor predicts the potential education ability of the children. In the majority of cases, parents follow this advice and send their child to the secondary school level suggested by the teacher. After this decision, it is extremely difficult to adjust upwards. This is an important difference to

[1] See, for example, Ariga and Brunello 2007, Betts 1995, Card and Krueger 1992, Card and Krueger 1996, Checchi and Flabbi 2007, Dearden et al. 2002, Dustmann et al. 2003, Epple et al. 2002, Hanushek 1986, Hanushek and Wößmann 2006, Hoxby 2000, Krueger 2003, Wößmann and West 2006.

[2] The Institute for Education and Teaching in Baden-Württemberg (state in Germany) analyzes the predictions of teachers between 1985 and 1996 and concludes that about 8% of the recommendations are misinterpretations. Schnepf (2002) concludes that this error rate is much higher.

[3] In no other country in Europe does the division of students into different secondary school tracks begin earlier. See, for example, Brunello et al. 2004 for a comparison.

school tracking systems in other countries.[4] Hence, the final education level of children is, on average, below their possible level if teachers undervalue children's education potential at the end of the primary school track.

According to the PIRLS in 2006, teachers' recommendations for the upper level secondary school are biased in favor of children with better educated parents. Given equal abilities of children, the odds for this recommendation are 2.6 times lower for children with lower educated parents.

To study this effect ideally, it would be necessary for the German school tracking system to allow parents to change the school level during the secondary school period. By law, this can be done in the first two years of secondary school. In reality, however, this is rarely possible because parents need the support of teachers and schools, which are seldom interested in a change of the school track due solely to the potentially higher abilities of children. On the contrary, in the most cases, this possibility of tracking correction will be used by teachers to downgrade in the first two years of the secondary school track.

Our data set (German Socio-Economic Panel) includes information about variations from teacher's recommendations. According to our sample, 4.3% of the parents choose a higher education track for their children. Given the possibility that teachers can downgrade at a later date, this upgrading should have no effect on children's education attainment if the performance rating given by teachers is correct. That is, overvaluation by parents (or by the recommending teacher) seems not to be a problem because in the secondary school track, (other) teachers have the latitude to downgrade children based on their current school achievement. However, if the child successfully completes a higher education level, this indicates an undervaluation of his or her potential education ability. We use these upward deviations to assess the impact of teachers' recommendations that are below the children's potential education ability.

Another feature of the German school system is that teachers can deny their promotion into the next school year based on current school grades. The fundamental idea is that children should increase their ability during this year and this, in turn, should prevent them from downgrading to a lower school track. That is, students must repeat this class to increase their school achievement. They will be downgraded to a lower school track if they fail to increase their performance in the critical disciplines taught, at the latest after the second repeat. This is an important difference among other school systems, for example, in Sweden, Finland, or the UK. In these countries, special support is provided to help the children to catch up as opposed to downgrading them to a lower level. Hence, the possibility of

[4] Other countries are, for example, Canada, Finland, Japan, Norway, Sweden, the UK, and the US. See Hanushek and Wößmann (2006) and Ariga and Brunello (2007) for a comparison of different school systems.

repeating a class might help increase school achievement, but it might also have negative effects on children's educational attainment. For example, this could discourage the student due to a loss of familiar surroundings in the class or because of stigma effects or discrimination. According to the data used, 10.7% of the children have repeated one or two school years.

Using data from the German Socio-Economic Panel, an ordered probit estimator is used to model children's education attainment. We find that parental variations from teacher recommendations for a higher secondary school level have a sizable and significant positive effect on children's educational attainment. This finding is very robust with respect to changes in specifications. For example, the estimated effects are, in absolute value, about twice as large as the estimated average difference in education attainment between boys and girls and the university degree effect of fathers, dependent on a rich set of regressors. In addition, we find evidence that regional economic performance at the time of recommendation affects parental decisions regarding the tracking correction. With respect to the repeater, we find a significant negative impact on children's education attainment. That is, this feature of the German school system produces negative effects instead of the desired positive or non significant effects. The estimated effect is almost as large as the estimated average gender difference in educational attainment.

We argue that failures in teacher's recommendations, which are given to children at age 10, are the major cause of the differences between the PIRL and PISA studies. Repeating a school class amplifies the inefficient handling of children's abilities. In should be mentioned, however, that this is primarily a shortcoming of the school tracking system rather than the teacher. The decision about a secondary school track should be made at a later date, and repeating a class should be replaced by providing special support.

The paper is organized as follows. The next section describes the data, the econometric model and the results are provided in section 3, and the conclusion appears in Section 4.

2 Data

The data used for this study are drawn from the German Socio-Economic Panel (GSOEP), an annual panel survey of a random sample household in Germany. We considered the population of those who left school between 1984 and 2005, which yields information for almost 1,500 children. All children who have attended either lower level secondary school, intermediate secondary school or upper level secondary school were retained in the sam-

ple.[5]

For children's education attainment, we differentiate among five levels: (1) those who left school early without receiving certification (2), lower level secondary school (3), intermediate secondary school (4), upper level secondary school but not entitled to enter university, or (5) upper level secondary school and entitled to enter university. While the first group consists of dropouts without a formal certification, the fourth group contains dropouts from the upper level secondary school. They finished the 12th grade but, in contrast to the fifth group, not the 13th. Consequently, they are not allowed to study at a university, but are eligible to attend a technical college.

Using the GSOEP allows us to control for personal and family characteristics. Since we are interested in the development of specific family characteristics between birth and the conclusion of school, the number of children considered is smaller than the number of children available in the sample. Table 1 depicts the number of observations available in the data set (complete sample) and available after consideration of control variables (considered sample) ordered by children's education level. The distribution does not change significantly when we consider the set of control variables.

Table 1: Distribution of children's education atainment

	complete sample		considered sample	
	frequency	% of all	frequency	% of all
1	24	1.62	6	0.73
2	339	22.91	170	20.71
3	531	35.88	298	36.30
4	94	6.35	51	6.21
5	492	33.24	296	36.05
Σ	1480	100.00	821	100.00

In cases where parents chose a higher education track for their child as recommended by the teacher, a dummy variable takes a value of one. In any other case, this variable is assigned a value of zero. An additional dummy is used to control for parental deviation from teachers' recommendations in the opposite direction. This variable is considered for two reasons. First, we want to analyze if some family characteristics are related to downgrading a teacher's recommendation. Second, neglecting this variable could induce a bias on the upgrading effect. While 4.3% of parents chose a higher tracking level for their children, 6.6% chose a lower level. This may reflect that

[5] Children visiting a so-called Gesamtschule (comprehensive school) had to be dropped since the ordering of this school type relative to the other is ambiguous.

parents, on average, are more likely to downgrade the recommendation given by a teacher. However, it is also likely that upgrading is more difficult because in some cases, parents must convince an independent committee.[6]

With respect to downgrading teachers' recommendations, we do not believe these data allow the appropriate assessment of parents' incorrect decisions for two reasons. First, we do not know if the parents might not have come to the right decision. That is, the child would not have reached a higher education level because the level would have been downgraded later in the secondary school track. Second, parental decisions could reflect the preferences of the child. For example, due to peer group effects, it is possible that the child prefers a school that leads to a lower educational level. This information allows us to conclude whether teachers and parents have made an incorrect decision in terms of children's potential ability. The data on parental deviations from teacher's recommendations do not allow a sound interpretation of the quality of parental decisions; hence, a comparison of the quantitative effects of parental and teacher's decisions is impossible.

To control for a repeated school year, we use a dummy variable, which takes a value of one if the child has repeated a school year once or twice. Among those in the sample, 10.7% of the children have repeated at least one school year. Of these, 73.86% are on the recommended track, 18.18% are downgraded, while the remaining 7.96% are upgraded.

To account for the possibility of intergenerational mobility and household background effects, we control for different family characteristics. The standard variables that have significant effects on children's educational attainment are parental education level and household income. Parental education has the same five categories as those assigned to the children. In addition, we consider a dummy variable with a value of one if the respective parent has a university degree. Household income is measured as equivalence income after taxes and government transfers in 1000 Euro, averaged over the period between birth and the time the child leaves school.[7]

To consider the quantity-quality trade-off (Becker and Lewis (1973)) and the hypothesis of sibling rivalry (Becker and Tomes (1986)), we control for the number of siblings and the order of birth. Black et al. (2005), Booth and Kee (2005), and Plug and Vijverberg (2003) have shown that the birth order effect is important in addition to the number of children. The birth order index is calculated as suggested by Booth and Kee (2005). Single parenthood is an important control variable, since the number of single parent households is increasing steadily in Germany.[8] Single parenthood

[6] The regulation of this process is under the auspices of the German states. In some cases, parents have the final say while in other cases, it is the school. In the latter case, parents can call an independent committee and, additionally, are able to send their child to an entrance examination.

[7] Equivalence income weights are calculated as suggested by Buhmann (1988).

[8] See Mahler and Winkelmann (2004) for a detailed discussion of this point and esti-

is measured by an index that is calculated by the number of years in a single parent household between birth and the time the child leaves school. Parental labor market participation is approximated by experiences with full and part-time employment and unemployment. All three variables are measured as experiences in years until the child leaves school.

Furthermore, there is evidence in the literature that girls have, on average, a higher education level, and the timing of birth has significant effects on the education level of the child. The latter is measured by mother's age at first birth. In addition, we consider regional dummy variables at the state level. Basically, this allows recognition of the differences in the formal curriculum at the state level. In the case of relocation to another state during the schooling phase, the affected child has more that one entry equal to one in the dummy vector. With respect to the nationality of the students, we differentiate between native and nonnative with a dummy. To account for parental labor market mobility, we control for the number of moves between birth and the time the child leaves school. In addition, we control for Kindergarten and child care attendance as arranged by mothers and fathers during the first year of the child's life. Finally, we use two dummies to account for divorced parents in the pre-school and primary school periods, respectively. In the appendix, we provide summary statistics for all variables.

3 Results

To analyze the effects of deviations from teacher's recommendations and class repeating on children's educational attainment, S_i, a standard ordered probit estimator is used:

$$S_{im} = \alpha_1 U_{im} + \alpha_2 D_{im} + \alpha_3 R_{im} + \sum_j \beta_j X_{jim} + \gamma_m + \epsilon_{im} \tag{1}$$

Here, i is used as an index for individuals (children), U (D) is a dummy vector for upgrading (downgrading) of the schooling track on the initiative of the parents, R is a dummy vector for children who repeat classes, X is the set of j control variables, and γ is a state level dummy for m states. In this sample, 0.73% of the children have no formal certification after leaving school, and 6.21% have finished the 12th grade but not the 13th. To ensure the results are not driven by the division of education levels into the five categories, we additionally disregard those students who leave school early (former level 1) and add the two upper secondary school levels (4 and 5) and run the regression again.

mates for Germany.

Table 2 provides the estimation results for equation (1). In regression (1), five education levels in the dependent variable are considered, while in regression (2), the dependent variable exhibits three education levels. That is, in regression (2), we do not consider dropouts explicitly. For complete regression results, see the Appendix.

According to the estimates, parental variations from teachers' recommendations have sizable and significant effects on children's educational attainment. For example, the estimated effects for upgrading are about twice as large in absolute value as the estimated average difference in education attainment between boys and girls, 0.49 in regression (1) and 0.53 in regression (2) (for comparison, see the Appendix). Hence, teachers' undervaluation of children's potential educational ability at the end of primary school has a strong negative effect on children's educational attainment. The effect of downgrading indicates that parents also avoid, on average, that children's final education level is equal to the expected potential level. As mentioned above, however, we do not know the extent to which teachers' recommendations are correct; therefore, we cannot compare the estimated effects with respect to a relative impact. A comparison of regressions (1) and (2) reveal that the effect of upgrading increases somewhat if three differences in children's education levels are considered. In contrast, the downgrading effect remains almost unchanged in regression (2), compared to regression (1). Hence, with respect to the modeling of the dependent variable, we find qualitatively robust effects for the deviations of teachers' recommendations.

Table 2: Effects on Children's Education Attainment

	Regression (1)		*Regression* (2)	
	$coef.$	se	$coef.$	se
upgrading	0.7901‡	(0.2090)	1.1880‡	(0.2455)
downgrading	-0.7052‡	(0.1182)	-0.6794‡	(0.1227)
repeater	-0.5741‡	(0.1288)	-0.5614‡	(0.1379)
pseudo R^2	0.2295		0.2661	

Dependent variable: children's education (five levels in regression (1) and three in regression (2)); Estimation method: ordered probit; number of observations: 821 in regression (1) and 815 in regression (2); robust standard error in parenthesis; ‡: significant at the 1% level; control variables: see data description.

What causes a deviation from teachers' recommendations? According to the 2006 PIRLS, not only teachers' recommend the upper level secondary school based on parental education, but also the parents themselves. With respect to the ability of a child, as opposed to parents who are less educated, more highly educated parents tend to send their children to a lower ability

level in the upper level secondary school. In addition, the 2006 PIRLS stated that university graduate parents are more successful in upgrading the educational track taken by their children. In the following regressions, we control for this by interacting the deviation dummies with the education level variables and the university degree dummy variables of the parents. Additionally, we want to test for gender differences in the deviation from teachers' recommendations, and if the parents of a single child differ from parents with more children.[9]

Another explanation is the regional economic condition. There are significant differences in economic growth and unemployment at the state level in Germany. It is possible that parents deviate more from teachers recommendations in times or regions of poor economic performance. The effects of this condition can be both positive and negative. The latter indicates that parents may want to shorten the schooling phase since, for example, their children could earn their own wages or move out of the family home earlier to reduce household costs. An alternative explanation would be that parents want to discourage the child from studying because they fear the corresponding costs. A positive deviation from the teacher's decision could be attributed to the desire that the child might be better off and possibly have better career opportunities by leaving the region. To control for regional economic conditions as causes for upgrading or downgrading, we use the average regional GDP growth rate and average regional unemployment rate in effect at the children's age from 9 to 10; that is, the regional (state level) economic conditions current at the end of the children's primary school period. These variables interact with the deviation dummies.

The effects for repeaters in table 2 are significantly negative and robust concerning the two different specifications of the dependent variable. This intent of the German school system is to improve the performance of needy children in terms of their school achievement. The results, however, provide strong evidence that the exact opposite is the case. That is, those children who must repeat at lest one class exhibit a higher probability for downgrading or leaving school early within the secondary school track.

One might argue that this is, to some extent, a type of self-selection. That is, these students are overstrained in the long-run. However, even if this is the case, who is best able to recommend the appropriate level of school, the teacher or the parents? As mentioned in the previous section, almost three-fourths of the children in the sample are on the recommended track. The school system element "class repeating" would cast a damning light

[9] There are other possible explanations at the family level that could induce deviations but are not considered due to data availability. For example, the state of health of a family member, death in the family, peer group effects, borrowing constraints, and so on. Acemoglu and Pischke (2001) consider the possibility of borrowing constraints in a theoretical model. However, Keane and Wolpin (2001), Cameron and Heckman (1998, 2001) and Cameron and Taber (2004) find no significant effect.

on teachers, if parental deviations from teacher's recommendation are not related significantly to this effect. To analyze this, we will add interactions of tracking deviations and the repeater dummy to the specification.

Table 3 provides the results for the deviation dummies, the repeater dummy, and the interaction terms for both education specifications (5 levels and 3 levels).[10] The effect of upgrading has increased and remains significant, while downgrading has no such significant effect on children's education attainment. For both education specifications, we find that the regional GDP growth rate interacts in a significantly negative fashion with upgrading and downgrading, while the regional unemployment rate interacts with both in a significantly positive manner. From this, it follows that GDP growth rate and unemployment rate affect parental decisions qualitatively in the same way. Parents more often make use of the upgrading option in recessions and in times of high unemployment. Hence, the effects on upgrading are in line with the assumption that children should be better off or should have better career opportunities. With respect to downgrading, the effects of regional economic interaction on children's educational attainment can be interpreted such that in times of poor regional economic performance, parents tend less often to deviate downwards from teachers' recommendations. That is, even if parents thought the teacher overestimated the abilities of the child, they are less likely to disagree with the teacher about that recommendation.

This interpretation implies, however, that teachers' recommendations are independent of regional economic developments. It is possible that they feel more responsible for the future of students in times or in regions with poor economic conditions. Relative to the interaction with upgrading, this would cause a positive bias on the interaction with the regional GDP growth rate and a negative bias on interaction with the regional unemployment rate. Hence, the argument of better career opportunities is possibly more important than the results reveal. In case of downgrading interactions, the parameters in table 3 would be overestimated.

Parental deviations from teachers' recommendations are not significantly different for girls and boys. Hence, one can conclude that there is no gender discrimination. Where upgrading is concerned, parents who have only one child differ significantly from families with more children. The negative parameter reflects the absence of the need to deviate upwards. Given the significant negative effects of the number of siblings and the birth order index (not shown here), children without siblings are, on average, recommended for a higher school track.

[10] In contrast to the specifications in table 2, the average regional GDP growth rate and average regional unemployment rate at the children's age of 9 to 10 are also considered as control variables. The GDP growth rate has a positive effect, while the effect of the unemployment rate is negative. Both effects are significant at the 1% level. Complete results are available upon request.

In further versions of the model (not considered in this paper), we have estimated the separate impacts of the parental education levels. The upgrade effect of mothers was not significant and the downgrade effect was similar to the effect estimated for fathers. The significance level, however, was very low for both due to the high correlation of these variables. Therefore, we have decided to employ the stronger effect, which is that of fathers. Regarding upgrading, this effect has a significantly negative interaction. This means that the inclination to deviate from teachers' opinions decreases with parental education. Teachers' recommendations for the upper level secondary school are biased positively by parental education, as discussed above. Therefore, our results reflect the absence of the need to act and are therefore in line with the findings of the PIRL 2006 study.

The significant positive interaction of upgrading with the dummy for parents with at least one university degree confirms the presumption in the PIRL 2006 study, which held that university graduate parents are more successful in upgrading. In addition, the effect declines if we pool the upper secondary school categories 4 and 5. According to our data, nearly all upgrading decisions made by parents who have a university degree are in favor of the upper secondary school. Among these children, there are no high school dropouts. Hence, a careful conclusion is that not only are parents with at least one university degree more successful in upgrading, but their children are successful as well in terms of their level of education.

As table 3 displays, the effect of repeating a class on educational attainment is significantly negative when we consider the interaction with parental deviations from the recommendation. The parameter decreases only slightly compared to the estimates provided in table 2.

The interaction effects with parental deviations are positive and mostly significant, yet different explanations are possible. It is possible that parents' assessments of their children's abilities are, on average, better than the assessments of teachers. Another interpretation is that parents who deviate from teachers' recommendations, on average, are particularly interested in taking care of the schooling performance of their children. With respect to downgrading, one could also argue that this indicates the undervaluation of downgraded students by the parents. Since all explanations are not mutually exclusive, we must expect that they are all relevant to a certain extent. However, most important is that the number of students who repeat a grade is reduced and, hence, parental deviations from teachers' recommendations reduce the negative effects of repeating and possibly the likelihood of repeating a school year.

In contrast, the estimated negative effects for children that follow the recommended track (Reg (B) and (D)) suggest that teacher's misinterpret the potential ability of children more often than parents. Put differently, the negative consequence of class repeating finds its cause in the recommending teacher or the teacher who denies the transfer to the next school year, and

not in parental deviations from the recommended school track.

A comparison of regressions (A) and (B) with regressions (C) and (D) reveals that the results of downgrading are quite similar. The differences for the interactions with upgrading can only result from the combination of education levels 4 and 5. With respect to the significant family level interactions with upgrading, we find that they are all decreased. Hence, they seem to be more important for upper level secondary school dropouts (level 4). While 19% of the level 4 dropouts are upgraded, only 5% of the level 5 students are upgraded.[11] Based on these disproportionate shares of upgraded upper level dropouts, a careful conclusion could be that parents tend to overestimate the potential ability of their children when they decide to upgrade their educational tracks. Given that upgraded students have a non significant positive interaction effect with the dummy for repeaters in regression (C), the causes for this do not seem to lie in the school system. According to the findings in Ochsen (2008), level 4 children have, on average, less educated parents compared to level 5 children. This can indicate more social conflict or less support at the family level.

4 Conclusions

In this study, we have identified two important reasons why the 2006 PIRL study evaluated the average ability of German students as being higher than average, while the PISA studies (2000, 2003, 2006) rank German students at a considerably lower level. Using data from the German Socio-Economic Panel, we analyze how the quality of recommendations for the secondary school track and class repeating affect children's education attainment. We argue that these are two important characteristics of the German educational tracking system. According to our results, parental upgrading of teachers' recommendations for the secondary school track has a sizable and significant positive effect on children's education attainment. This finding is very robust with respect to changes in specifications. Based on further regressions with several interaction effects, we conclude that regional economic conditions affect parents' decisions to deviate from teachers' recommendations. With respect to upgrading teachers' recommendations for the secondary school track, we find significant interactions with parental education and only-child families. On average, we find for class repeating negative effects on children's educational attainment. According to additional interaction affects, we conclude that teachers' tracking decisions, as opposed to those made by parents are negatively related to class repeating.

We argue that failures in teachers' recommendations, which are given when children reach the age of 10, are the major cause for differences that

[11] In the sample with 1,480 observations, the shares are 16.6% for level 4 and 3.1% for level 5.

exist between the PIRL and PISA studies. Being required to repeat a school class amplifies the inefficient handling of children's abilities. In should be mentioned, however, that this is primarily a shortcoming of the school tracking system as opposed to individual teachers.

Based on the results, it appears important to analyze further the causes of parental decisions. In addition, given that the share of undergraduates in Germany is below that of many other countries in the European Union, it seems important to improve the decision-making process for the secondary school track or to reform the school system itself.[12] For example, the decision about a secondary school track should be made at a later date and the requirement to repeat a class should be replaced by the provision of special support. Given that the decline in fertility rates has reduced the percentage of "renewable resources" on the labor market, the average education level of future generations is of major importance for growth and international competitiveness. From this perspective, the results enrich the debate about the quality of educational tracking systems.

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[12] The population share of people with a university degree is 18.6% in Germany in 2003. Countries with a higher share in the EU are, for example, Belgium (23.1%), Denmark (25.2%), Finland (25.3%), Ireland (22.0%), Netherlands (23.7%), Sweden (20.4%), Spain (20.2%), and the UK (20.3%).

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6 Appendix

Table 3: Interaction Effects on Children's Education Attainment

	five education levels				three education levels			
	$Reg(A)$		$Reg(B)$		$Reg(C)$		$Reg(D)$	
	$coef.$	se	$coef.$	se	$coef.$	se	$coef.$	se
upgrading	2.920‡	(0.418)	2.939‡	(0.420)	2.579‡	(0.555)	2.559‡	(0.536)
×gdpgr	-0.102‡	(0.026)	-0.100‡	(0.027)	-0.134‡	(0.050)	-0.137‡	(0.044)
×urate	0.062‡	(0.021)	0.062‡	(0.019)	0.093‡	(0.030)	0.090‡	(0.031)
×edufather	-0.815‡	(0.108)	-0.816‡	(0.112)	-0.586‡	(0.194)	-0.595‡	(0.173)
×uniparents	1.475‡	(0.388)	1.466‡	(0.380)	0.531	(0.388)	0.580$^{\sharp}$	(0.344)
×boy	-0.376	(0.357)	-0.392	(0.352)	-0.137	(0.457)	-0.099	(0.403)
×no sibling	-2.307‡	(0.320)	-2.290‡	(0.322)	-2.104‡	(0.704)	-2.160‡	(0.729)
downgrading	-0.247	(0.253)	-0.247	(0.252)	-0.298	(0.377)	-0.299	(0.380)
×gdpgr	-0.156‡	(0.042)	-0.157‡	(0.041)	-0.101‡	(0.034)	-0.100‡	(0.035)
×urate	0.061‡	(0.015)	0.061‡	(0.015)	0.055‡	(0.015)	0.055‡	(0.015)
×edufather	-0.138	(0.095)	-0.140	(0.096)	-0.146	(0.130)	-0.142	(0.134)
×uniparents	-0.323	(0.254)	-0.319	(0.259)	-0.259	(0.265)	-0.268	(0.264)
×boy	-0.171	(0.158)	-0.182	(0.151)	-0.162	(0.184)	-0.142	(0.182)
×no sibling	0.816	(0.518)	0.815	(0.520)	0.539†	(0.264)	0.546†	(0.264)
repeater	-0.623‡	(0.111)	-0.126	(0.179)	-0.603‡	(0.147)	-0.182	(0.232)
×upgrading	0.580†	(0.280)			0.237	(0.478)		
×downgrading	0.461†	(0.197)			0.488†	(0.203)		
×recom.			-0.496‡	(0.173)			-0.421†	(0.208)
pseudo R^2	0.248		0.248		0.280		0.280	

Dependent variable: children's education (five levels in Reg (A) and (B), three levels in Reg (C) and (D)); estimation method: ordered probit; standard errors (robust and corrected for clustering) are in parenthesis; number of observations: 821 in Reg (A) and (B), 815 in Reg (C) and (D); ‡: significant at the 1% level; †: significant at the 5% level; $^{\sharp}$: significant at the 10% level; for the set of control variables see section 3; in addition to the interaction effects we control for the direct effect of average GDP growth rate and average unemployment rate in the respective federal state at children's age 9 to 10.

Table 4: Summary statistics

variables	mean	std. dev.	min	max
education children	3.562	1.195	1	5
education mothers	2.878	0.969	1	5
university degree mothers	0.195	0.396	0	1
education fathers	2.998	1.147	1	5
university degree fathers	0.266	0.442	0	1
mother's age at 1. birth	24.022	4.037	15	41
index single parent	0.007	0.049	0	0.667
average equivalence income	1.320	0.569	0.421	6.631
boy	0.546	0.498	0	1
number of siblings	1.396	0.959	0	9
birth order index	0.990	0.351	0.286	1.778
mother's unemployment exp.	0.692	1.557	0	13
father's unemployment exp.	0.465	1.369	0	13.9
mother's full time exp.	10.426	7.619	0	40
father's full time exp.	24.002	6.381	0.8	45
mother's part time exp.	5.267	5.863	0	36
father's part time exp.	0.214	0.840	0	11
regional GDP growth rate	3.281	5.506	-0.725	28.893
regional unemployment rate	4.983	5.941	0	21.7
nationality	0.968	0.175	0	1
move	0.575	0.969	0	8
divorce at age 0-6	0.010	0.098	0	1
divorce at age 6-10	0.023	0.150	0	1
kindergarten	0.395	0.489	0	1
child care mother	0.217	0.412	0	1
child care mother	0.026	0.158	0	1
upgrading of recommend.	0.043	0.202	0	1
downgrading of recommend.	0.066	0.248	0	1
repeater	0.107	0.310	0	1

Notes: Observations = 821

Table 5: Children's Education Attainment - complete results

	Regression (1)		*Regression* (2)	
	coef.	*se*	*coef.*	*se*
upgrading	0.790´‡	(0.209)	1.188‡	(0.246)
downgrading	-0.705‡	(0.118)	-0.679‡	(0.123)
class repeating	-0.574‡	(0.129)	-0.561‡	(0.138)
education *mother*	0.230‡	(0.066)	0.236‡	(0.071)
university degree mother	0.188	(0.140)	0.129	(0.149)
education father	0.218‡	(0.066)	0.233‡	(0.070)
university degree father	0.517‡	(0.150)	0.482‡	(0.160)
mother's age at 1. birth	-0.016	(0.016)	-0.024	(0.016)
single parents index	-0.067	(0.933)	0.107	(1.069)
average equivalence income	0.233†	(0.117)	-0.242†	(0.125)
boy	-0.494‡	(0.087)	-0.537‡	(0.092)
number of siblings	-0.162‡	(0.051)	-0.171‡	(0.053)
birth order index	-0.776‡	(0.143)	-0.800‡	(0.152)
mother's full-time exp.	0.018†	(0.008)	0.025‡	(0.009)
mother's part-time exp.	0.037‡	(0.008)	0.040‡	(0.009)
mothers's unemployment ex.	0.030	(0.027)	0.020	(0.029)
father's full-time exp.	0.059‡	(0.010)	0.064‡	(0.010)
father's part-time exp.	0.094♯	(0.052)	0.083♯	(0.051)
father's unemployment ex.	-0.011	(0.030)	0.011	(0.036)
native	0.068	(0.355)	-0.170	(0.348)
move	-0.141‡	(0.050)	-0.161‡	(0.056)
divorce at children's age 0-6	-0.482	(0.510)	-0.183	(0.580)
divorce at children's age 6-10	-0.143	(0.306)	-0.049	(0.357)
kindergarten	0.037	(0.108)	0.021	(0.113)
mother's care in the first year	0.079	(0.141)	0.058	(0.151)
father's care in the first year	-0.084	(0.265)	-0.127	(0.304)
pseudo R^2	0.2295		0.2661	

Dependent variable: children's education (five levels in regression (1) and three in regression (2)); number of observations: 821 in regression (1) and 815 in regression (2); estimation method: ordered probit; regressions include federal state fixed effects; robust standard errors in parenthesis; ‡: significant at the 1% level; †: significant at the 5% level; ♯: significant at the 10% level.