Timing of school tracking as a determinant of intergenerational transmission of education

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Abstract

This paper applies data from Switzerland to test the hypothesis that intergenerational educational mobility is affected by the time at which pupils are first segregated in attainment related tracks in secondary school. The time of tracking significantly affects intergenerational mobility. Late tracking reduces the relative advantage of children of better educated parents.

Keywords: ability tracking, streaming, segregation, intergenerational transmission of education, social mobility, educational mobility, socioeconomic gradient
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1. Introduction

Educational mobility is commonly measured as the correlation between parent and child education. International evidence shows vast differences in mobility across countries (OECD 2003) and yet we know little about its determinants. One frequently discussed mechanism is that the time at which pupils are separated based on ability in homogeneous groups or tracks affects mobility: if such a segregation[1] takes place at early ages or low grades, pupils' ability can only be measured with substantial noise and parental background and expectations may dominate the tracking decision (OECD 2003, Brunello et al. 2004, Lauer 2003, Ammermüller 2004).

To our knowledge the correlation between the timing of first tracking and the extent of social mobility have not been investigated empirically so far. OECD (2003, p.221) tabulates cross country evidence. However, due to institutional differences international data hardly allow to identify the true effect of the timing of tracking on educational mobility.

We investigate this effect based on data from a single country, Switzerland. The Swiss educational system is organized at the level of 26 cantons. The cantonal education systems differ with respect to the age of first enrollment and the grade at which students are tracked. While further minor institutional details vary across cantons (e.g. timing of language classes, class sizes) the overall institutional framework is similar. If we assume that there are no unobserved differences between cantons that are correlated with the timing of tracking we can empirically identify the causal effect of the timing of tracking on educational mobility.

2. Data and Empirical Approach

We apply cross-sectional data from the 2000 Swiss population census. The dependent variable indicates youths' type of secondary training at age 17 in categories of high (college-

[1] The terms segregation, tracking, and streaming are used in the literature as synonyms for a typically ability-based grouping of pupils in tracks of different academic requirement.

bound), medium (vocational), and low (only mandatory training) levels of secondary schooling (for details see Bauer and Riphahn 2004). We similarly categorize parental education.[2] To measure the magnitude of intergenerational education transmission we evaluate the probability that children attend high level (i.e. college-bound) secondary schooling given their parents' education.

In our sample of 62'535 Swiss born youths about one in ten children of fathers with low education attends high secondary education compared to more than six in ten children of highly educated fathers, with similar outcomes for mothers. These are substantial differences. To investigate the role of the time of tracking we use cantonal information from two sources: (1) administrative education statistics provide information on the grade of tracking as of 1995 (GRADE 1) (EDK 1995). (2) In a survey of cantonal education departments we collected information on the typical grade (GRADE 2) and age (AGE) of tracking for the period between 1994 and 1998, when the pupils in our sample made their transition to secondary schooling.

Table 1 describes the probability of high child secondary schooling given fathers' education in cantons with early and late tracking. A comparison across columns yields that the probability of high (i.e. college-bound) child education increases when fathers are of high, rather than low, education. A comparison across rows yields that this difference in the probability of high education varies depending on the separation regime in place (see columns 3 and 4). We find a decline in the absolute and relative difference across parental education if the separation is taking place later, rather than earlier, across all three indicators.

If this result can be confirmed after controlling for composition effects it provides evidence for the literature's hypothesis on social mobility. We estimated ordered probit models which regress youth educational outcome (Y) on parental education (PE) and control for a large

[2] We consider five education indicators for each parent: high, middle, low, no information provided, parent missing (i.e. single parent household).

number of household, parental, regional and individual characteristics (X), as well as for an indicator of the timing of tracking (T). The model is completed by interaction terms of parental education and the timing of tracking (PE · T):

$$Y = a + b\,PE + c_0\,X + c_1\,T + d\,(PE \cdot T) + \epsilon \quad (1)$$

$$\partial Y / \partial PE = b + d \cdot T \quad (2)$$

A jointly significant coefficient vector "d" suggests that the impact of parental education indeed varies by the timing of tracking (T). In order to evaluate the effect of the timing of tracking we use the estimation results to predict the probability of college-bound (high) secondary schooling for children of parents with high and low education, similar to Table 1. A difference-in-difference type comparison of the difference in probabilities in situations of early and late separation then indicates the relevance of the timing of tracking for educational mobility.

3. Findings

The estimation results are not presented to save space. Table 2 describes predicted probabilities based on the ordered probit estimations. For robustness checks the estimations were performed separately for each of the three indicators of the timing of separation. In all three cases the eight coefficients of the interaction terms were jointly statistically significant at the five percent level. Thus the correlation between parent and child education appears to be significantly modified by the timing of tracking.

Comparing the probabilities between each pair of rows we find that the probability of high education is always higher in situations of late versus early tracking. The absolute difference appears to be largest for the children of mid-way educated parents in column 2, where the probability of high education in late tracking scenarios exceeds that in early tracking scenarios by at least eight percentage points or about one third, e.g. 28 instead of 20.9 percent.[3]

[3] For the simulations it is assumed that both parents are in the same education category.

The last four columns of Table 2 compare the probability of high education for children of parents with different educational levels. Shifting from an early to a late tracking regime we find increasing absolute probability differences in the comparison of children of parents with high vs. low education (see col. 4), but declining absolute differences when comparing children of mid-way and highly educated parents (see col. 5). The final two columns yield across all three indicators that the relative difference in the probability of high secondary schooling across parents of different backgrounds declines when tracking takes place at later ages (see columns 6 and 7).

These findings are highly robust. We re-estimated the model for subsamples such as only natives, only the German language regions of Switzerland, or excluding one canton with very late tracking (Ticino). We looked at three different indicators for the time of tracking. We applied different specifications of our model, with and without controls for 7 geographical or 3 language regions, and we estimated the model applying the more flexible multinomial logit estimator. The results are robust to these modifications.

4. Conclusion

This is the first test of whether the timing of tracking affects educational mobility. We take advantage of a heterogeneity in educational systems across Swiss cantons. Our approach is akin to a difference-in-difference estimation and identifies the causal effect of the timing of tracking if there are no unobservable determinants of differences in social mobility between the cantons. Time of tracking has a significant effect on educational mobility. Early tracking increases the absolute benefit of having highly versus mid-way educated parents and magnifies the relative advantage of children of highly educated parents.

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Table 1 Observed probability of child high secondary education by paternal education and cantonal tracking regime

	P (high | low)	P (high | high)	Absolute Diff.	Relative Diff.
Tracking at:	1	2	3	4
Grade1 = 6	11.3	64.9	53.6	5.8
Grade1 = 9	26.8	76.1	49.3	2.8
Grade2 = 6	10.9	63.3	52.4	5.8
Grade2 = 9	31.3	77.0	45.7	2.5
Age = 11	5.7	51.5	45.8	9.0
Age = 15	31.3	77.0	45.7	2.5

Table 2 Predicted probability of child high secondary education by parental education and cantonal tracking regime

	P(high | low)	P (high | middle)	P (high | high)	Abs. Diff.		Rel. Diff.	
	1	2	3	4 = 3 - 1	5 = 3 - 2	6 = 3 / 1	7 = 3 / 2
Grade1 = 5	12.1	20.9	55.3	43.2	34.4	4.6	2.7
Grade1 = 8	13.5	28.0	58.1	44.6	30.1	4.3	2.1
Grade2 = 5	11.4	19.9	54.3	42.9	34.4	4.8	2.7
Grade2 = 8	14.8	29.9	60.3	45.5	30.4	4.1	2.0
Age = 11	11.5	19.9	54.8	43.2	34.9	4.7	2.8
Age = 14	13.9	27.5	58.1	44.2	30.6	4.2	2.1

Note: P (high | low) describes the probability that children of fathers with low education pursue the high secondary track, the other probabilities similarly condition on fathers' education. None of the cantons is observed to track at grade 8, therefore Table 1 uses grade 9 as an example for late tracking.

Source: Own calculations based on Census 2000, administrative education data for the first separation grade, and survey results for the earliest age of separation.