Educational Policy and Parental Job Search Contacts

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Abstract

This paper investigates how an expansion of upper secondary education affects the role of parents in the job finding process. I exploit a large scale trial that took place in Sweden during 1987-1990 and extended vocational upper secondary education from two to three years. The trial generated exogenous variation across municipalities and student cohorts in the availability of longer vocational tracks, which is used to identify the effects on the reliance of parents in the job finding process and related labor market outcomes. The overall impact of the reform is a substantial reduction in inactivity rates across the 18-year follow-up period, mostly explained by increased rates of studying and increased employment rates for low-SES students. For high-SES students, the reform reduced the reliance on parental job-finding contacts early in the career. Patterns for low-SES youths diverge in this dimension as these youths relied more on contacts after the reform. The probability of finding employment in the same industry sector (but not plant) as a parent fell for all groups, implying that intergenerational sectoral mobility appears to have fallen as a consequence of the reform. Overall, the results suggest that contacts and education are complements in the job-finding process of low-SES youths and substitutes for high-SES students.

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1 Introduction

The transition into the labor market is a a crucial, albeit difficult step for many young workers. Information problems are more common for this group since previous work experience is often limited and work references are few, leading to a higher degree of uncertainty about worker quality (Altonji and Pierret, 2001; Fredriksson et al., 2015). Previous research has shown that social contacts are a widely-used channel for conveying information between employers and potential hires in the matching process (for a summary of the importance of social contacts, see Topa (2011)) and as young workers do typically not have a broad network of contacts, parents have proven to be of particular importance in the process of securing a job (see Kramarz and Skans, 2014). Even though the importance of social contacts as a means to substitute for a lack of information is well known, there is only limited knowledge about the extent to which education can in turn function as substitute for social contacts. The aim of this paper is to provide evidence on the interplay between an education policy that prolonged vocational tracks for some students in Swedish upper secondary school and students' reliance on parents when entering the labor market. To my knowledge, this is the first paper to evaluate the effect of education policy on the use of social contacts during job search.

Previously, the importance of parents in the transition to the labor market has been studied by, for example, Kramarz and Skans (2014), who show that that 11.5% of Swedish high school graduates find their first stable job at a plant where their parent is employed. The authors use linked employer-employee data to show that parental ties are an important predictor of where graduates from different levels of schooling find their first stable job; an effect that is larger for youths with lower levels of education and for those with lower grades. Furthermore, graduates who find jobs through their parents find jobs faster, but at a lower entry wage, which is however made up by higher subsequent wage growth. For Canada, Corak and Piraino (2011) find that 40% of a cohort of young Canadian men have at some point worked for an employer who also employed their father. While the authors show that this is mainly due to young workers who find their first jobs at their father's employer, there are still 6% - 9% of individuals who have their main job as adults at their father's (previous) main employer.

A conclusion of these studies is that parental contacts matter for where young workers find employment. This has implications for intergenerational sectoral mobility if opportunities in the labor market for young workers from different socio-economic backgrounds are partly determined by the access to potential employers that is provided through their parents. Previous research confirms that networks are more important for workers with lower socio-economic status (SES) or less education even though studies can generally not establish a causal relationship between the two (see, for instance Pellizzari, 2010; Corcoran et al., 1980; Datcher, 1983; Elliot, 1999). However, if a higher level or different type of education can provide a reliable signal for worker ability, uncertainty might be lower for those with a longer or more specific education and thus weaken the reliance on parents or other contacts. The existence of such a relationship would have implications for social mobility since it points to the scope of policy interventions to correct for inequality in the access to potential employers through networks. A theoretical paper about this question is provided by Casella and Hanaki (2008) who develop a model to test if, and under which conditions, signals obtained in the (education) market can reduce the reliance on contacts. They predict that this is possible under certain parameter restrictions, even though networks prove to be remarkably resilient in most cases. Apart from the aforementioned studies that examine correlations between education level and use of contacts, there is, to my knowledge, no causal empirical evidence to indicate whether education policy can affect the use of social contacts.

In this paper, I provide the first study of the consequences of educational expansion on the extent to which young worker rely on parental contacts for their placement in the labor market by exploiting a large scale trial that took place in Sweden in the late 1980s. The trial prolonged upper secondary education from two to three years and increased the academic content of the curriculum. An important feature of the trial was that the share of vocational tracks that were prolonged varied by municipality and gradually increased with each year. As a result, the trial created exogenous variation across municipalities and student cohorts in the extent to which longer tracks were available which can be used as an instrument for whether a student received two or three years of upper secondary education (see Hall, 2012).

As a prelude to understanding the impact of parental contacts, I will first have a look at the effect of prolonged vocational tracks on enrollment in further education and employment before providing a detailed analysis of effects of extended education on the probability to work in the same industry or plant as either parent.[1] Notably, the trial coincided with a severe recession that started in the early 1990s and peaked by the mid-1990s, so that students who participated in the trial graduated under systematically worse business cycle conditions than their peers in shorter tracks. I remove potential correlation with the business cycle by comparing outcomes for students in the same year after enrollment. Also, I let the effect of prolonged education vary with the business cycle to allow for the possibility that benefits of more education might not materialize until after the end of the recession.[2]

I use data on all Swedish students who enrolled in upper secondary vocational education during the 3-year trial period. These data are linked with register data containing background and education characteristics of both the individuals and their parents as well as with economy-wide employment records that allow me to follow employment outcomes and educational activities and define the sector and workplace of all vocational students and their parents over a 18-year follow-up period. The data is used to estimate whether students who enrolled in a 2-year track as opposed to 3-year track are more likely to work in the same sector or firm as either parent.

The overall impact of the reform is a substantial reduction in inactivity rates across the 18-year follow-up period, mostly explained by increased rates of studying. For low-SES students, employment rates increased by on average 2 percentage points across the career whereas employment was unaffected for other students. The reform reduced the probability to find a job at a parent's plant early in the career, but sorting into the same sector (but not plant) as a parent increased as a

[1] Previously, Hall (2012) finds that the trial increased educational attainment on the upper secondary level, but did not affect university enrollment later in life. As opposed to that study, I determine whether students are studying by whether they received study grants in a given year, which also encompasses non-university education post upper secondary school.

[2] For instance, Hensvik et al. (2017) examine the relationship between business cycles and the use of social contacts for job matching of labor market entrants. They find that social contacts are more important for job matching during recessions, indicating that an effect of prolonged education on the use of parental contacts might appear with a delay.

response to the reform, indicating that overall inter-generational sectoral mobility appears to have fallen. Patterns for low-SES youths diverge also in this dimension as these youths relied more on parents after the reform. Overall, the results suggest that parental contacts and education are complements in the job-finding process of low-SES youths and substitutes for high-SES students.

The paper is structured as follows: Section 2 gives an overview of the institutional background of the Swedish upper secondary school system and describes the reform in detail, while section 3 sets up the empirical strategy. Section 4 includes a description of the data that is used, followed by the empirical results in section 5. The last section concludes.

2 Institutional Background

2.1 The Swedish school system

The Swedish upper secondary school system underwent a major reform in the 1990s that led to adjustments in the content and length of the vocational tracks, a change to a course-based program structure as well as a new grading system and curriculum. While the period of study in this paper predates the changes that came with the reform of the 1990s, I am exploiting changes in the vocational tracks during a trial period for some suggested aspects of the reform.

However, some general features of the Swedish school system were unaltered by the reform and remain unaffected over time. Following the nine years of compulsory school, students can choose to enroll in upper secondary education, which is divided into several academic and vocational tracks. Students who opt into vocational upper secondary education can apply to specific training programs such as "childcare", "construction" or "business" based on their grades from compulsory school. The vast majority of students enrolls in upper secondary education[3] with roughly half of a cohort opting for academic tracks and the other half for vocational tracks. For cohorts that started upper secondary education prior to

[3]According to Holmlund et al. (2014), during the period of study from 1986-1993, more than 90 percent of a birth cohort started upper secondary education and about 80% graduated before age 22.

the reform, academic tracks were 3 years long and could be chosen in preparation of higher education, while vocational tracks had less academic content and were only 2 years long. After the parliament voted in favor of the school reform in 1991, vocational tracks were extended to 3 years for those starting after 1992 in an attempt to increase flexibility of the upper secondary school in the transition to higher education. The extension went hand in hand with a broadening of the curriculum and led to the inclusion of more general theoretical subjects, which gave students who graduated from those longer vocational tracks eligibility to university studies. Prior, students could only attain university eligibility by graduating from academic tracks or by complementing their vocational studies with academic subjects.

2.2 Introduction of the trial period with extended vocational tracks

Leading up to the reform in the 1990s, concerns about the centralized steering of the school system and its efficiency were raised that resulted in the appointment of a committee charged with putting forward suggestions to improve vocational education. Those efforts resulted in the decision to implement an extensive nationwide trial period during which vocational 3-year tracks were gradually introduced in a growing number of municipalities during school years 1987-1990 (Holmlund et al., 2014). In line with the changes made during the 1991 reform, students who enrolled in vocational tracks during the trial period were also exposed to a higher academic content and obtained eligibility for university studies. In addition to Swedish as the only general subject in 2-year tracks, the new 3-year tracks included English, Social Sciences and electives such as Maths. The extended tracks were also supposed to provide considerably more on-the-job training with regional employers during the third year. The goal was that ten percent of the education during the first two years and sixty percent during the third year should take place in workplaces. In practice, the amount of workplace training generally increased during the third year, but not all schools met the third year criteria, meaning that the actual share of workplace training was often considerably lower than 60% in some tracks and municipalities (National Board of Education, 1990; SOU, 1990).

The introduction of the trial coincided with one of the most turbulent periods on the Swedish labor market. After a long period of low unemployment, Sweden entered a major recession in the beginning of the 1990s that led to sharp increases in unemployment. At the peak of the recession during the mid-1990s, youth unemployment had increased from less than 6% to 25% and recovered only by the late 1990s.[4] As a consequence, students from the same cohort who attend a 3-year rather than a 2-year track graduated under systematically worse business cycle conditions.

2.2.1 The roll-out

The decision of the allocation of trial slots was taken by the National Board of Education.[5] The objectives of the roll-out were to ensure that each track should eventually have the same share of 3-year slots, while creating cross-municipality variation in trial intensity. Hence, in some regions, a large share of vocational tracks were extended with another year, while other regions ended up with only few prolonged tracks. Further objectives were to create variation in participating regions with regard to industry and population structures.

In practice, with each year, an increasing number of municipalities offered vocational 3-year tracks. A class in a 3-year track would always replace an existing class in a 2-year track, thus keeping the total number of available slots constant. Municipalities that already took place in the trial could only increase the number of available 3-year tracks and slots in their municipalities in the following year of the trial, implying that there was no rollback of 3-year tracks. Consequently, both the number of municipalities that participated as well as the intensity of participation (as measured by the number of available 3-year tracks) increased during the trial period. The number of available slots in 3-year tracks increased from just 500 in 1987 to 6,000 in 1988, 10,000 in 1989 and 11,200 in 1990, which corresponded to an increase in the share of 3-year slots out of all slots from just about 2 percent in 1987 to more than 27 percent in 1990 (SOU, 1989a,b, 1990).

[4]The numbers are drawn from Statistics Sweden's linked series version 2015-10-27 during 1987-2004.

[5]While municipalities had to apply if they wanted to be part of the trial, all municipalities opted into participating.

From the students' perspective this led to a situation in which they could choose between vocational tracks of different lengths and, in some cases, between the same tracks as either 2- or 3-year track. The extent to which students had this choice depended on the municipality of residence and, to a lesser extent, neighboring municipalities if their own municipality did not offer vocational upper secondary schooling. The final decision on whether municipalities participated and what tracks would be extended was usually decided after students had already applied for upper secondary school. Consequently, students faced some uncertainty at the time of their application regarding to the length of program they actually applied to (SOU, 1989a, 1990), thus limiting the possibility to influence track lengths by applying to upper secondary school in a neighboring municipality with the preferred track length.

2.2.2 Consequences of the trial

The direct effects of the trial have been studied previously. Hall (2012) examines the effects of the reform on pursuing tertiary education and finds that contrary to its intention, the reform did not increase university enrollment or graduation. Instead, it raised the probability to drop out of upper secondary school among low-performing students. Likewise, Hall (2013) analyzes whether having attended the longer vocational education reduced the risk for future unemployment during recession, but does not find any effect. In a similar set up, Grönqvist and Hall (2011) use the same trial to investigate the effects of the reform on male and female fertility rates and find that while there was no effect on male fertility rates, female rates were lower among those who attended a 3-year rather than a 2-year program. A recent study that examines the effects of the reform on crime found a reduction in property crime amongst students who attended a vocational 3-year track. (Grönqvist et al., 2015).

3 Empirical Model

In this paper, I study the effect of longer education on education and labor market outcomes such as the use of contacts in the job-search process. In order to assess the impact of extended education, I estimate the following equation:

$$Outcome_{icm} = \gamma_c + \mu_m + \beta Long\,track_{icm} + \delta X_i + \epsilon_{icm} \quad (1)$$

where the subscripts i, c and m refer to individual i from cohort c (starting upper secondary school in the same year) in municipality m. γ_c and μ_m are cohort and municipality of residence fixed effects respectively and X_i is a vector of individual controls including sex, grade percentile rank from compulsory school, immigration background of the individual and parents and parents' highest education level. $Outcome_{icm}$ measures various labor market outcomes in a specific year $\tau = 3, 4, ..., 20$ after starting upper secondary school. The main outcomes are the following: an indicator that takes on the value one if individual i (1) had a stable job, (2) was studying or (3) inactive (neither employed or studying) in year τ after starting upper secondary school or (4) had a stable job in the same 2-digit industry sector, (5) 5-digit industry sector or (6) same plant as either parent in year τ and zero otherwise. The regression is run for each outcome year $\tau = 3, ..., 20$ separately. The parameter of interest is β, which captures the effect of starting a more general 3-year vocational track as compared to a 2-year track on outcomes (1)-(6).

Since students from the same cohort who attend a 2-year track enter the labor market one year earlier than their peers in 3-year tracks, the estimated effect captures the effect of attaining more schooling relative to potentially more labor market experience. However, one might be concerned that OLS estimates may be biased if selection into 2-year vocational tracks or the more general 3-year vocational tracks is not random. To overcome this issue, I follow Hall (2009, 2012, 2013) and Grönqvist and Hall (2011) and use the introduction of the trial that was described in the previous section to identify a source of exogenous variation in the length of track that students attended. As noted before, the setup of the trial led to a situation which created variation in the extent to which 3-year tracks were available to students from different municipalities and cohorts. I will exploit

this variation in the share of available 3−year tracks (dependent on cohort and municipality of residence) as an instrument for whether an individual enrolled in a 2- or 3-year vocational track. In order to minimize the possibility that students moved to another municipality based on whether 2- or 3-year tracks were available, municipality of residence is measured as the municipality in which a student lived in the year prior to starting upper secondary education.[6] Standard errors are clustered on the level at which the instrument variation occurs, namely at the municipality × year level.[7]

One potential concern is the fact that students who attend a three year track graduate under systematically worse business cycle conditions than students who attended a shorter 2-year track due to the recession that hit Sweden in the early 1990s. For that reason, my analysis of the outcomes is based on the same year after enrollment (and not graduation) within each cohort, thus removing potential correlation with the business cycle. Nonetheless, effects may still differ with the business cycle in case that graduates only benefit from longer education in years when unemployment is low, so that an effect of more education might only materialize after the end of the recession. Thus, I assess whether the effect of attending a longer track varies with the business cycle by including an interaction of the de-meaned national unemployment rate with the dummy indicating whether a student attended a 3-year track. To be able to do this, I pool my data across year τ after starting upper secondary school, which provides me with a data set with τ observations per individual. Note that this strategy allows me to use a single regression to estimate the same 18 parameter estimates β_τ as from the 18 different regressions in model 1 (before adding an interaction term). I estimate the following model:

$$\begin{aligned} Outcome_{icm\tau} =& \gamma_{c\tau} + \mu_{m\tau} + \sum_{\tau=3}^{20} \beta_\tau Long\,track_{icm} + \sum_{\tau=3}^{20} \delta_\tau X_i \\ &+ \zeta UR_{it(=c+\tau)} \times Long\,track_{icm} + \epsilon_{icm\tau} \end{aligned} \tag{2}$$

[6] Another potential threat to identification would arise if the introduction of vocational 3-year tracks led students to enroll in academic tracks rather than vocational tracks. Hall (2012) finds however no evidence for such a pattern.

[7] Clustering the standard errors on the municipality level for the main analysis yields similar standard errors that are slightly larger than before, but do not change significance levels.

To mimic equation (1), all variables in this data set are fully interacted with dummies for each year τ after starting upper secondary education. In this setup, the parameter β_τ captures the effect of attending a 3-year track vs a 2-year track at average business cycle conditions (that is, the average unemployment rate). The one difference to equation (1) is that equation (2) adds an interaction between the outcome-year unemployment rate and length of education, which is instrumented by an interaction of the outcome-year unemployment rate and the share of available 3-year tracks in a given municipality. The effect of whether attending an additional year of education depends on the business cycle is thus captured by parameter ζ. If students who graduate during worse labor market conditions due to attending longer education do indeed benefit in relative terms during the recession, we would expect more persistent negative effects of attending a 3-year track during the early years and larger positive effects in the long run after accounting for the impact of the unemployment rate.

4 Data

The data used in the analysis stems from matched employer-employee data and registers from Statistics Sweden. The population of interest is defined by the Upper Secondary application register, which entails information on all students who applied for upper secondary school each year. The register allows me to identify my sample of all students below the age of 18 who apply to a vocational track directly from compulsory school. For all students, I identify the location, type and length of the program they enrolled in as well as their GPA from compulsory school and municipality of residence in the year prior to starting upper secondary school.[8]

The application register is also used to identify the type and length of available tracks in different municipalities, which makes it possible to calculate the instrument, e.g. the trial intensity as measured by the share of vocational tracks in each

[8]The municipality of residence is measured during the last year of compulsory school in order to avoid the possibility that some students move to another municipality following the completion of compulsory school in response to the type and lengths of tracks that are available in their new municipality.

municipality that are 3-years long (instead of 2 years). The instrument is calculated for all municipalities that offered vocational tracks during the trial period, which is the case for about 70 percent of the 284 municipalities at that time in Sweden. Municipalities that do not offer vocational tracks are typically small and excluded from my sample. The data from the application registers are matched with population registers containing information on individual and parental background characteristics, such as age, gender, immigrant background and highest education level of parents. Highest education level of the parents is used to measure the socio-economic status (SES) of students, where low-SES students refers to those students whose parents have at most finished compulsory education, while high-SES students have at least one parent with some tertiary education.

The final sample consists of 119,614 individuals in 193 municipalities across four enrollment cohorts. Table A.1 in the appendix shows summary statistics for the whole sample, while Table A.2 splits ups the sample by students in municipalities with below and above average shares of 3-year tracks. In both groups, students are very similar with regard to observed characteristics, even though the share of students with parents with at most compulsory schooling (low-SES students) is slightly larger in municipalities with below average share of long vocational tracks, while the share of those with tertiary-educated parents (high-SES students) is smaller.

Table A.3 shows the most common tracks separately for students with compulsory-educated parents and tertiary-educated parents. Among those with compulsory-educated parents, tracks specializing in industry and transport and vehicle engineering are more common than for those with tertiary-educated parents, while the reverse is true for electrical engineering. [9]

4.1 Labor Market and education outcomes

The matched employer-employee data cover Sweden's entire working age population (aged 16-69) and include detailed information on individuals' earnings received from employment as well as the length of each job spell. I use this data to identify

[9]For robustness, I re-estimate my main results after excluding the above-mentioned tracks. Even with this restriction, the results are very similar and, if anything, larger in magnitude.

whether and where graduates had a stable job in the 20 years following starting upper secondary school. In order to make sure that I capture a "real" job and not just some small temporary job, I follow Kramarz and Skans (2014) define a stable job as one that lasted at least four months during a calendar year and that generated total earnings of at least the equivalent of three times the monthly wage as defined by the 10th percentile of the wage distribution. Whether students are in education is assessed by whether they receive any amount of study grants, which all students can receive who are above 16 years of age and are either in school, university or any other types of further education. In order to qualify for study grants, students need to study at least half time and pass a certain amount of credits each semester. Inactivity in this context is similar to the OECD definition of NEET - young people who are neither in employment, education or training. Here it is a composite measure of the employment and education outcome that takes on the value 1 if individuals are neither employed or recorded as studying. Thus, as opposed to the OECD definition, NEET in the context of this paper is not affected by youths who are in labor market training programs unless they would qualify to receive study grants for the type of training (which is rare).

4.2 Sectoral mobility outcomes

The matched employer-employee data is also used to determine the sectoral mobility outcomes; namely if an individual is working in the same industry sector or plant as either parent in year τ after enrolling in upper secondary school. I distinguish hereby between the same broad industry category defined by a 2-digit code and the same 5-digit industry, which is more narrow. The measure for working in the same industry excludes those who work at the same plant as a parent, which by default would mean working in the same industry. I exclude those cases from the industry measures for reasons of interpretation. This ensures that the industry sector outcomes are not driven by students who are employed at a parents' plant. Also, attending an additional year of education might affect working in the same industry sector through different mechanisms than working in the same plant as a parent, so that the effects might cancel each other out.

5 Results

5.1 The first stage effect of trial intensity on probability of attending a longer vocational track

This section investigates whether the share of available 3-year tracks in a student's municipality of residence can be used as an instrument for whether students attain two or three years of vocational education on the upper secondary level.

Table 1 shows the results from the first stage regression. Both regressions include cohort and municipality of residence fixed effects. Column 1 shows estimates when a dummy for attending a 3-year vocational track is regressed on the instrument. Additionally, column (2) includes individual characteristics, such as sex, grade percentile rank from compulsory school and immigrant background as well as parental characteristics regarding their highest education level and immigration background. The coefficients on the instrument are all statistically significant at the 1 percent level and the size of the estimate is robust to the introduction of individual and parental characteristics. To be precise, a 10 percentage point increase in the share of 3-year tracks in one's municipality of residence increases the probability of attending a 3-year track with roughly 7 percentage points. The interpretation of the F-static (see last row in table) further assures that the share of available 3-year tracks is a sufficiently strong instrument and that the coefficient for the instrument is not zero for any of the specifications.

Likewise, the results show that students with higher grades and more highly educated parents are more likely to attend a longer vocational track.

5.2 IV estimation

Figure 1 shows the results of the IV estimation for the stable employment outcome for both model 1 and model 2 and for three different samples. The left-hand side shows the parameter estimates of β_τ, the probability of having a stable employment, from the different regressions of model 1 for years $\tau = 3, 4, ..., 20$ after starting upper secondary education. Note that these estimates are equivalent to the parameter estimates obtained from model 2 before including the interaction between the national unemployment rate and track length. The right-hand side

Table 1: First Stage: Effect of trial intensity on attending a 3-year track

	(1)	(2)
Trial intensity (instrument)	0.688***	0.688***
	(0.0355)	(0.0354)
Grade percentile rank		0.0364***
		(0.00823)
Female		-0.0160**
		(0.00722)
Immigrant background		0.0139
		(0.0115)
Parents with immigrant background		-0.00369
		(0.00521)
Parents' highest education level:		
Compulsory		*ref.*
Upper secondary		0.00708***
		(0.00187)
Post upper secondary		0.0260***
		(0.00338)
F-Statistic on instrument	375.15	376.12
Observations	119,614	119,614
R-squared	0.192	0.194
SE clustered on municipality*year	yes	yes
cohort FE	yes	yes
Municipality FE	yes	yes

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. */**/*** denotes significance at the 10/5/1 percent level respectively. Robust standard errors in parentheses allowing for clustering at the municipality×year level.

shows the parameter estimates β_τ from model 2 (which includes the interaction term). The upper panel shows the results for all students in vocational tracks, while panel 2 and 3 show the results for low-SES and high-SES students respectively.

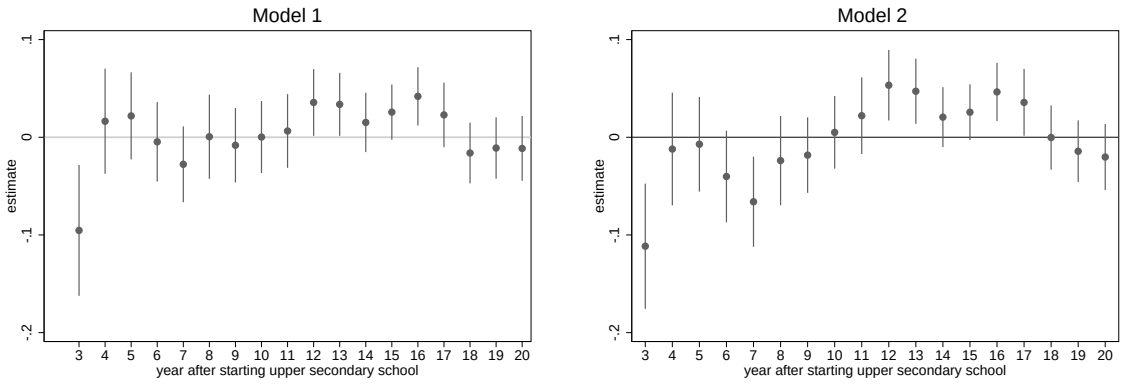
Specifically, we can see that the graphs for the entire sample and low SES

students show more persistent negative estimates for the 3-year tracks during the early years, and larger positive long-run effects, after accounting for the impact of the unemployment rate. This suggest that students who attended 3-year tracks benefit in relative terms during the economic crisis during the 1990s and the positive effects do not materialize until after the economy recovers. For high SES students, an additional year of education does not lead to a higher probability of employment during the 18-years following graduation, regardless of whether the impact of the unemployment rate is accounted for.

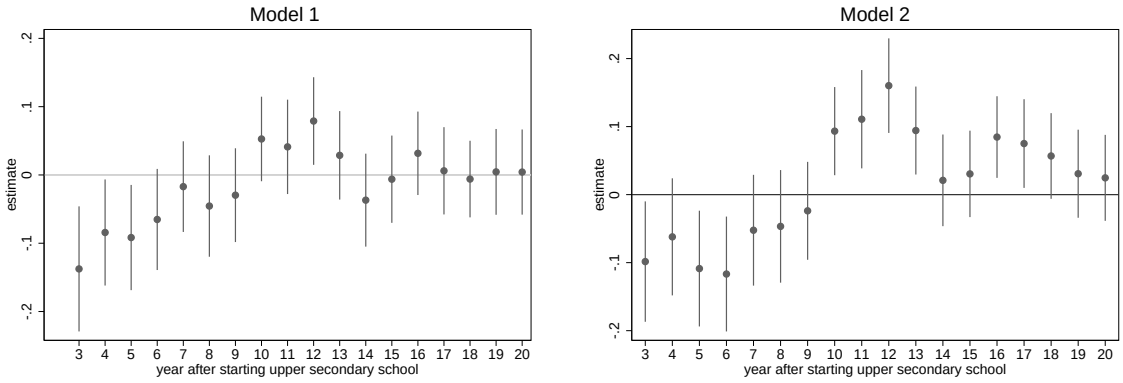
For ease of exhibition, the results of model 2 for the different outcomes will henceforth be discussed in table form displaying the average immediate (year 3), short (years 4-9), medium (years 10-14) and long term (years 15-20) effect as well as the average effect over the entire time period.[10]

[10]In practice, I estimate parameters β_τ from model 2 for $\tau = 3, 4, ...20$ and use the lincom command in Stata to estimate the mean effects over the indicated time period.

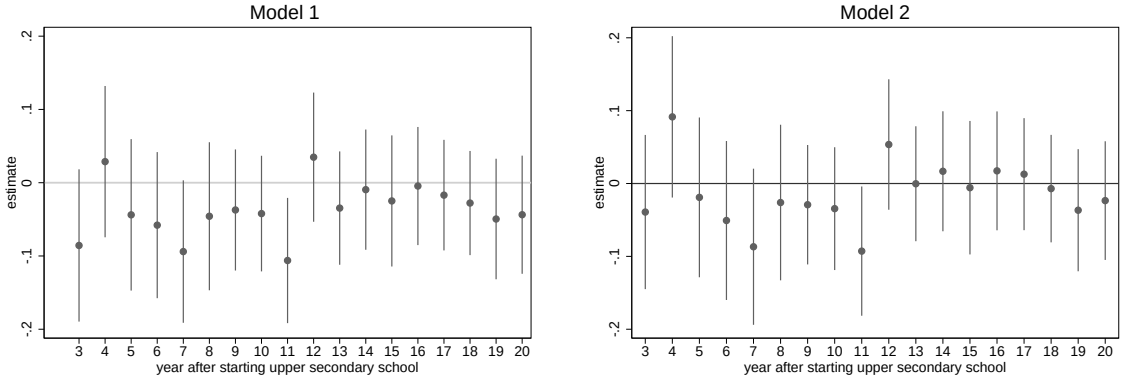
Figure 1: Effect of 3-year education on employment



(a) Sample: Full



(b) Sample: Low-SES students



(c) Sample: High-SES students

Notes: Full sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Low-SES students are defined as students whose parents have at most finished compulsory education, while high-SES students have at least one parent with some tertiary education. Left-hand figures shows the parameter estimates of β_τ from the different regressions of model 1 for years $\tau = 3, 4, ..., 20$ after starting upper secondary education. Right-hand figures shows the parameter estimates β_τ from model 2. Robust standard errors allowing for clustering at the municipality×year level are included in all regressions.

5.2.1 Education and labor market outcomes

Table 2 shows the effect of attending a 3-year vocational track on NEET (inactivity), employment and the probability to study over different time spans following the years after starting upper secondary school. The estimates correspond to the average of the β_τ from model 2 for the years indicated in each column.

Table 2: Main Results

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome	year 3	year 4-9	year 10-14	year 15-20	avg 3-20	avg 4-20
NEET	-.260	-.030	-.017	-.009	-.032	-.019
	(.024)	(.012)	(.008)	(.006)	(.005)	(.005)
Mean	.198	.286	.213	.185	.232	.234
Employed	-.111	-.028	.030	.012	-.003	.003
	(.033)	(.013)	(.009)	(.007)	(.005)	(.005)
Mean	.531	.596	.734	.785	.697	.707
Studying	.506	.094	-.027	-.003	.051	.024
	(.028)	(.011)	(.006)	(.004)	(.004)	(.004)
Mean	.381	.166	.083	.049	.104	.088

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors in parentheses allowing for clustering at the municipality×year level.

The immediate impact of an additional year of education is displayed in column (1). Not surprisingly, the effect on inactivity is negative, which is in large part due to the fact that students in longer tracks are by default still in school in year 3 after starting upper secondary school as opposed to their peers who must have either found employment or entered some other type of further training or education. Hence, the effects in year 3 are in some sense mechanical and we would, for the same reasons, expect those students to be less frequently employed and much more likely to be studying (as the first stage holds). This expectation is confirmed by the fact that students in long tracks are 11 percentage points less likely to

be employed in that year, but 51 percentage points more likely to receive study grants for being in education. About 18 percent of the sample are simultaneously in school and employed. The effects over subsequent periods are shown in columns (2)-(4), but is it useful to first discuss the overall effects in column (5) and (6) and return to the prior columns below. Column (5) shows the effect over the entire time period (that is year 3-20 after starting upper secondary school). However, since that estimate includes the mechanical effect from year 3, the average effect over the entire time period excluding year 3 is displayed in column (6) and should yield a more reliable estimate of the lifetime effect of prolonged education. I find that the lifetime effect of adding another year of education at the upper secondary level reduces inactivity on average by 1.9 percentage points (about 8 percent in relation to the mean). This reduction is explained by a shift towards studying, while employment rates are on average unaffected. To get a better picture of how the effect of another year of education develops over time, columns (2)-(4) show how the effect of more education differs in the short and long run.

The estimates during year 4-9 after starting upper secondary school show the same patterns as during year 3. As expected, the magnitude of the estimates on all outcomes are smaller than before when the results were mainly mechanical due to students in the longer tracks still being in school. Inactivity is reduced by 3 percentage points for students attending a longer vocational track, a sizable effect of about 10 percent in relation to the mean, and is caused by an increase in the probability of studying during that time period which amounts to 9.4 percentage points. The effect on employment remains negative, but is reduced to -0.028, implying that students who attended a shorter track and thus had the possibility to acquire more labor market experience are more likely to have a job in the short run.

In year 10-14 (column 3), students in longer tracks continue to have a lowered probability of being inactive as compared to their peers in shorter tracks, however, now the signs of the effects on employment and studying are reversed and the decrease in inactivity during that time period can be attributed to an increase in the probability of employment. The effect on studying turns negative during that time period and suggests that it is in part the timing of studying that is affected by the extension of vocational programs. Students who attended a longer track

have a higher probability of studying in the years after completing high school, but are less likely to attain further education later in life. In the long run (years 15-20 after enrolling, see column 4), the effects on all outcomes level off and cease to be significant, suggesting that the time period up to 20 years after enrolling is indeed sufficient to estimate lifetime effects.

Table 3 shows the effects on the same outcomes split up by parents' highest educational background, which is used to measure students' SES. The three panels include the sample of students whose parents have finished at most compulsory schooling (Panel A), upper secondary (B) or those who have at least one parent with tertiary education (C). Most strikingly, the lifetime effect in column (6) suggests that low-SES students gain most from the prolonged tracks in terms of increased employment and reduced inactivity. While there is no effect of one more year of education on lifetime inactivity for students whose parents have at least upper secondary education or more, low-SES students are considerably less likely to have spells of inactivity over their lifetime if they attended a long track. The cause for this drop in inactivity is that this group benefits from more education in terms of lifetime employment. As opposed to that, the lifetime effect on studying is not significantly different across SES groups.

A closer look at how these effects differ over time shows that the results for all groups follow the same patterns (if not magnitude) as discussed before during year 3 and 4-9. Notably, the share of students who work and study simultaneously is about twice as high among students whose parents have tertiary education as compared to those with compulsory school-educated parents. The latter group also experiences the largest decrease in the probability to be employed in year 4-9 as well as the largest increase in the probability to study relative to the mean of the dependent variable (0.65=0.079/0.122).

Table 3: IV estimates by students' socio-economic status

Outcome	(1) year 3	(2) year 4-9	(3) year 10-14	(4) year 15-20	(5) avg 3-20	(6) avg 4-20
			A. Low-SES students (28% of sample)			
NEET	-.318	.020	-.108	-.049	-.057	-.042
	(.035)	(.020)	(.015)	(.012)	(.009)	(.009)
Mean	.213	.303	.225	.193	.245	.246
Employed	-.098	-.068	.096	.050	.015	.022
	(.045)	(.021)	(.016)	(.013)	(.009)	(.009)
Mean	.571	.611	.735	.781	.702	.710
Studying	.582	.079	.006	-.003	.059	.028
	(.042)	(.016)	(.010)	(.007)	(.006)	(.006)
Mean	.311	.122	.062	.043	.079	.065
			B. Medium-SES students (56% of sample)			
NEET	-.225	-.036	.018	.001	-.019	-.007
	(.028)	(.015)	(.011)	(.008)	(.006)	(.006)
Mean	.197	.287	.212	.183	.232	.234
Employed	-.145	-.021	.007	-.001	-.013	-.006
	(.038)	(.017)	(.012)	(.009)	(.007)	(.007)
Mean	.527	.598	.737	.788	.700	.710
Studying	.496	.096	-.042	.002	.049	.022
	(.032)	(.012)	(.007)	(.005)	(.004)	(.004)
Mean	.387	.163	.08	.049	.102	.085
			C. High-SES students (16% of sample)			
NEET	-.298	-.062	.012	.028	-.025	-.009
	(.039)	(.022)	(.018)	(.016)	(.010)	(.010)
Mean	.174	.253	.194	.180	.212	.214
Employed	-.039	-.020	-.011	-.007	-.014	-.013
	(.054)	(.026)	(.020)	(.017)	(.011)	(.011)
Mean	.477	.564	.723	.784	.681	.693
Studying	.449	.115	-.014	-.027	.050	.027
	(.046)	(.021)	(.015)	(.009)	(.008)	(.008)
Mean	.476	.253	.130	.059	.154	.135

Notes: Sample includes vocational students enrolled in municipalities that participated in the trial between 1987-1990. Low-SES students are defined as students whose parents have at most finished compulsory education, medium-SES students as students whose parents have obtained at least some upper secondary education (but no tertiary education) and high-SES students have at least one parent with some tertiary education. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors allow for clustering at the municipality×year level.

The differences between socio-economic groups become visible during years 10-14 and 15-20. For low-SES students, there is a large negative effect on the probability to be inactive, while the effects are small and insignificant for those with higher educated parents. This implies that the negative effect on inactivity in the medium and long run in the full sample is mainly driven by students whose parents finished at most compulsory schooling. The decrease in the estimated effect on inactivity in the medium and long run for this group is large in magnitude (-.108 and -.049 respectively) and seems to be mainly caused by the increase in the probability to be employed for those in longer vocational tracks. The effect on the probability of studying vanishes in the medium and long run. The fact that the employment effects follow the same pattern as before, but are larger in magnitude, suggests that work experience is valued more relative to an additional year of education in the short run, but not in the long run.

In contrast to the results in panel A, panel C shows that enrolling in a longer track appears to slightly increase the probability of being inactive in the long run for high-SES students, even though the estimates are noisy. The positive effect in years 10-14 seems to be mainly due to a negative effect of an additional year of education on the probability of studying during that time period that is not compensated for by an increase in employment. While the long run probability of studying was not much affected for low-SES students, there is again evidence that high-SES students start pursuing further education earlier after finishing upper secondary school if they attended a 3-year track. Hence, attending a 3-year track seems to affect the timing of further education leading to an increase in the probability of studying in the early years and a decrease in the later years.[11]

Table 4 shows the effect of attending a third year of upper secondary school on log annual labor earnings. Panel A shows the results for the entire population. There is no significant effect on earnings over the entire time period (regardless of whether year 3 is included or not). Generally, the pattern is in line with that

[11]The fact that high-SES students cannot compensate the negative effect on studying with increased employment could be due to that this group is prone to delay fertility, which could explain why there is actually a small negative, albeit insignificant, long-run effect on employment for this group. Note also that the lifetime effect on studying in column (6) shows that timing alone cannot account for the positive effect on studying in the short run and suggests that the extent of studying is affected as well.

Table 4: Effects on annual wage earnings

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome	year 3	year 4-9	year 10-14	year 15-20	avg 3-20	avg 4-20
			A. Sample: All			
ln(earnings)	-.312	-.041	.065	.030	-.003	.015
	(.087)	(.035)	(.024)	(.017)	(.014)	(.013)
Mean	10.63	11.058	11.71	12.075	11.592	11.647
			B. Sample: Low-SES students			
ln(earnings)	-.255	-.065	.082	.038	.000	.015
	(.125)	(.060)	(.043)	(.034)	(.024)	(.024)
Mean	10.732	11.104	11.706	12.05	11.599	11.649
			C. Sample: High-SES students			
ln(earnings)	-.218	.009	.017	-.032	-.015	-.003
	(.165)	(.075)	(.054)	(.038)	(.030)	(.030)
Mean	10.49	10.961	11.701	12.107	11.564	11.625

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Low-SES students are defined as students whose parents have at most finished compulsory education, while high-SES students have at least one parent with some tertiary education. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean annual wage earnings are displayed for the indicated years. Robust standard errors allow for clustering at the municipality×year level.

of the employment effect; indicating a negative effect up to year 9 and a positive earnings effect in the long run that fades out. Furthermore, there is no evidence that either students with compulsory- or tertiary-educated parents gain in terms of annual wage earnings over the entire follow-up period, even though students with compulsory-educated parents appear to benefit during year 10-14 after starting upper secondary education.[12]

[12]Hall (2012) does not find any effect on earnings over a 16-year follow-up period, but does not allow the effect of prolonged education to vary with the business cycle.

5.2.2 Job search contacts and sectoral mobility

I next turn to the effects of an additional year of upper secondary school on intergenerational sectoral mobility. Table 5 show the results for the outcome "working in the same 2-digit sector/5-digit sector/same plant as either parent" respectively. Each outcome is a dummy taking on the value 1 if student i is recorded as employed in the same sector as a parent (but at a different establishment) or as employed at the same plant as either parent in year τ after starting upper secondary school. The table shows the average effect over the time periods indicated in each column. The average effects in column (6) show a small positive estimate of the probability to work in either parent's 2-digit sector and an even smaller positive effect on working in the same 5-digit sector. Contrary to expectations, this suggests that intergenerational sectoral mobility fell as a consequence of the reform (excluding students sorting into a parent's plant). The overall reliance on parental contacts, as measured by the lifetime effect on working at the same plant as a parent, is unaffected by the reform.

Table 5: Mobility, full sample

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome	year 3	year 4-9	year 10-14	year 15-20	avg 3-20	avg 4-20
Same 2-digit sector	.012	.021	.008	.005	.011	.011
	(.013)	(.006)	(.005)	(.004)	(.003)	(.003)
Mean	.070	.073	.080	.073	.075	.075
Same 5-digit sector	-.002	.005	.004	-.001	.003	.003
	(.006)	(.003)	(.003)	(.002)	(.001)	(.001)
Mean	.019	.021	.023	.020	.021	.021
Same plant	-.023	-.010	.004	.005	-.002	.000
	(.013)	(.006)	(.005)	(.004)	(.003)	(.003)
Mean	.070	.072	.061	.047	.061	.060

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors allow for clustering at the municipality×year level.

A more detailed look at how the impact of the reform on mobility outcomes changed over time shows that the positive overall effect on working in the same 2-digit and same 5-digit sector is due to a positive estimated effect during year 4-9. In contrast, the reliance on parental contacts is reduced during the same time period as the probability to work with either parent is reduced by 1 percentage point. In the medium (year 10-14) and long run (year 15-20), all effects level off and are insignificant, suggesting that any impact on mobility cedes after the first years on the labor market.

However, different patterns emerge when the sample is split up by SES (see table 6). As a general pattern we can see that regardless of SES, around 14 percent of the students sort into the same sector as one of their parents upon graduation. The notable difference is that among students in the same sector, low-SES students are more likely to work with their parents while medium- and high-SES students are more likely to end up in the same sector but in a different plant.

Evaluating differences in the impact of the reform, two patterns emerge: Across their career, low-SES students are more likely to rely on their parents to find a job at the same employer despite having obtained an additional year of education, while high-SES students are more likely to sort into the same 5-digit sector as their parents, but are less likely to end up at the exact same plant. The effects are large relative to the mean of the outcome and these patterns suggest that parental contacts and education are complements in the case of low-SES students, but substitutes for high-SES students. For the majority of students, that is those with parents with upper secondary education in panel B, an additional year of education increases the probability of working in the same 2-digit sector across their career, but does not appear to matter for the other outcomes.

A closer look at the timing of the effect of an additional school year shows that the positive effect on working in the same 2-digit sector for low-SES students appears during the early career, but does not persist in the later years. Instead, low SES students who attend a 3-year as opposed to a 2-year track are more likely to work in the same plant as a parent in the medium and long run. Also, this pattern cannot be accounted for by the positive effect on employment of an additional year of education as the size of the effect relative to the mean is larger

for the mobility outcome than for employment.[13]

In contrast to the effects of attending a 3-year versus a 2-year track for low-SES students, among high-SES students, an additional year of education leads to a 7.4 (year 3) and 4.8 (year 4-9) percentage point reduction in the probability to find employment in the same plant as a parent during the first years on the labor market, but this effect levels off in the long run. The pattern that emerges in the long run indicates that this group of students is more likely to work in the same 5-digit industry sector as their parents (even after excluding those who work in a parent's plant) even up to 20 years after they started upper secondary school. Note that if the outcome working in the same 5-digit sector also includes jobs found at either parent's plant, the effects are close to zero. An implication is that high-SES students sort into the same industries as their parents regardless of whether they attended an additional year of education. Yet, this additional year of schooling enables students to replace parental contacts by gaining access to different firms in the same sector directly, thereby granting them access to a broader spectrum of potential employers.

[13]Compare for instance in column 3 of table 3: $0.027/0.065 = 0.42$ to the employment effect relative to the outcome mean: $0.096/0.735 = 0.13$.

Table 6: Mobility by students' socio-economic status

Outcome	(1) year 3	(2) year 4-9	(3) year 10-14	(4) year 15-20	(5) avg 3-20	(6) avg 4-20
			A. Low-SES students			
Same 2-digit sector	.022	.025	-.001	.009	.013	.012
	(.017)	(.010)	(.009)	(.007)	(.004)	(.005)
Mean	.062	.062	.066	.055	.061	.061
Same 5-digit sector	.004	.007	.003	.001	.004	.004
	(.010)	(.005)	(.005)	(.004)	(.003)	(.003)
Mean	.017	.019	.020	.016	.018	.018
Same plant	.017	.004	.027	.013	.014	.014
	(.027)	(.012)	(.010)	(.008)	(.005)	(.005)
Mean	.079	.078	.065	.047	.064	.063
			B. Medium-SES students			
Same 2-digit sector	.009	.030	.013	-.006	.012	.012
	(.017)	(.008)	(.007)	(.006)	(.004)	(.004)
Mean	.072	.075	.082	.076	.077	.078
Same 5-digit sector	-.003	.004	-.005	-.009	-.003	-.003
	(.008)	(.004)	(.004)	(.003)	(.002)	(.002)
Mean	.019	.021	.023	.020	.021	.022
Same plant	-.031	-.011	-.006	.005	-.005	-.003
	(.017)	(.008)	(.006)	(.005)	(.003)	(.003)
Mean	.071	.074	.064	.050	.063	.063
			C. High-SES students			
Same 2-digit sector	.006	-.021	-.006	.024	.000	-.001
	(.031)	(.015)	(.014)	(.013)	(.007)	(.007)
Mean	.077	.084	.098	.094	.091	.092
Same 5-digit sector	-.007	.001	.031	.025	.017	.018
	(.015)	(.008)	(.008)	(.007)	(.004)	(.004)
Mean	.020	.024	.027	.024	.025	.025
Same plant	-.074	-.048	-.010	-.010	-.026	-.023
	(.027)	(.012)	(.009)	(.007)	(.005)	(.005)
Mean	.051	.053	.044	.038	.045	.045

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Low-SES students are defined as students whose parents have at most finished compulsory education, medium-SES students as students whose parents have obtained at least some upper secondary education (but no tertiary education) and high-SES students have at least one parent with some tertiary education. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors allow for clustering at the municipality×year level.

5.2.3 Results by gender and grades

5.2.4 By gender

I next turn to discussing the results by gender of the students. Typically, the Swedish labor market for men and women is quite segregated, which is already reflected in different track choices during upper secondary school. Hence, the importance of contacts, and to which extent they can be affected by prolonged education, may differ by gender. Table A.4 (see appendix) shows the labor market and education results from table 2 separately for girls and boys. The effect on inactivity is generally similar in size for boys and girls, however, in relation to the mean of the dependent variable, the effects are larger for girls who are about twice as likely to be inactive in the medium and long run as compared to their male peers. A notable difference is that the immediate effect on the probability to be employed in year 3 is about half as large in magnitude for girls as compared to boys, even though the effect is not statistically significant. This seems to imply that boys react relatively more to an additional year of education as they are less likely to work while still being in school. However, girls appear slightly less likely to take up further education in the medium and long run as compared to boys. The mobility outcomes are displayed separately by gender in table A.5. Most notably, girls who enrolled in longer vocational tracks are much more likely to end up working in the same 2-digit sector as one of their parents, while this relationship does not exist for boys. On the other hand, there are no gender differences with regard to working in the same 5-digit sector or plant as a parent.

5.2.5 By grade quartiles

Hall (2012) found that students with a low GPA from compulsory school had a higher probability of dropping out of upper secondary school if they enrolled in a prolonged vocational track. Consequently, I might not capture the effect of extended education for this groups and the results might differ as compared to students in the highest and middle grade quartiles. Table A.6 (see appendix) shows the estimates separately for the highest, lowest and the two middle grade quartiles. Across all grade quartiles, students who attended 3-year tracks benefited from a decrease in inactivity rates over the 20-year follow-up period. The effect

relative to the mean is around 10 percent for all groups. While the lifetime effect on employment is insignificant for all groups, there is a positive lifetime effect on studying for all grade quartiles which is most pronounced for those in the lowest grade quartile (relative to the mean of the outcome).

A closer look over the different time periods shows that patterns differ between those in the highest and lowest quartiles. For those with lowest grades, the reduction in inactivity rates stems from a decrease in inactivity rates during years 10-20 after starting upper secondary school, which in turn is due to a positive estimated effect on employment during that same time span. The increase in employment during years 10-20 for this group is in line with increased participation rates for those with lowest SES as discussed in table 3. Again, the value of additional education that is acquired either at the upper secondary level and/or during the first years after graduation cancels out with the benefit of entering the labor market one year earlier in terms of lifetime employment. In contrast, the decrease in lifetime inactivity for those in the highest grade quartiles is driven by increased rates of studying up to year 10. Generally, those in the highest grade quartile seem to benefit relatively less from an additional year of education as there is only a small positive effect on employment during years 10-14. Also, the lifetime effect on studying is comparatively smaller and the time patterns indicate that the overall effect is not as large as for students in other grade quartiles. Instead, attending a third year of upper secondary school appears to have a greater impact on the timing of studying rather than the quantity; which is again in line with the pattern for high-SES students.

In terms of mobility (see table A.7), both students in the lowest and highest grade quartiles are less likely to work with their parents as a response of attending a 3-year track over the 20-year span after starting upper secondary school. The effects are substantial in size and explain 33 and 38 percent respectively of the variation in the outcome mean. However, students in the lowest grade quartile are more likely to work in the same 2-digit sector as their parents, but any effect on working in the same 5-digit sector is entirely driven by working in the exact same plant as either parent (thus, the lifetime effect of working in the same 5-digit sector excluding plants where a parent works is zero). For students in the highest grade quartile, this pattern is reversed. That is, they are more likely to work

in the same 5-digit sector as a parent, but not 2-digit sector. An implication of this pattern is that an additional year of education does not lead to more sectoral mobility. Instead, both groups find their jobs in the same sectors as their parents (with students in the highest grade quartiles follow their parents' occupation even more closely), but without having to rely on their parents as job contacts to the same extent and thus opening up the pool of potential employers.

Note also that there is only partial overlap between low-SES and low-grade students. Thus, the pattern for low-grade students in terms of employment in a parent's plant is not in line with that for low-SES students. While parental contacts and education were substitutes for the former group, they were complements for the low-SES students. However, a closer look at the middle grade quartiles shows that parental contacts and education are complements, which is in line with the fact that low-SES students are to a greater extent students in the middle of the grade distribution.

6 Conclusion

Previous research has shown that parents are an important channel in the job-finding process and an important predictor of the industry and actual employer where young workers find their first job. This empirical regularity has implications for equality in opportunity. For instance, students who have to rely on their parents to find a job will be more likely to end up finding employment in the same sector as their parent and making it more difficult for other youths to enter those industries if they do not have contacts that they can rely on, thus limiting intergenerational sectoral mobility. Little is known whether education policy can be designed so as to offer an alternative to the reliance on contacts.

In this paper, I provide evidence on this question by exploiting a large scale trial that took place in Sweden from 1987-1990 and during which vocational upper secondary education was extended from two to three years. While prior research suggests that the trial did not meet its goal of increased university enrollment (see Hall, 2012), my results provide evidence that the timing for entering further studies was affected and that low-SES students who attended a longer track were more likely to attain further education outside university. This points to the existence

of more positive effects of the reform than previously found, which are probably due to the fact that I measure studying by whether students received study grants, which also encompasses non-university education post upper secondary school.

While low-SES students also benefited in terms of employment rates, there is no evidence for an increase in intergenerational sectoral mobility. Instead, education and contacts appear to be complements for low-SES students, but substitutes for high-SES students. However, even high-SES students appear to end up in the same industry as their parents if they attend an additional year of education. Yet, rather than sorting into the same plant as a parent, they tend to enter employment in the same 2-digit sector but not at a parent's plant, thus opening up the pool of potential employers in the parental industry.

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Table A1: Descriptives
Students enrolled in upper secondary education 1987-1990 (vocational)

	mean	sd	min	max
Enrolled in 3-year track	0.137	0.344	0	1
Avg share of 3-year tracks	0.158	0.181	0	1
Grade percentile rank	0.469	0.286	0	1
GPA from compulsory school	2.865	0.521	1	5
Female	0.397	0.489	0	1
Immigrant background	0.013	0.113	0	1
Parents with immigrant background	0.034	0.181	0	1
Parents' highest education level:				
Compulsory	0.281	0.449	0	1
Upper secondary	0.557	0.497	0	1
Post upper secondary	0.162	0.369	0	1
Observations	119614			

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990.

Table A2: Descriptives: Students in upper secondary education 1987-1990 by municipal share of prolonged vocational tracks

	Share of 3-year tracks in municipality			
	Low		High	
	mean	sd	mean	sd
Enrolled in 3-year track	0.053	0.225	0.262	0.440
Avg share of 3-year tracks	0.047	0.055	0.322	0.179
Grade percentile rank	0.469	0.286	0.468	0.285
GPA from compulsory school	2.867	0.524	2.862	0.517
Female	0.398	0.489	0.396	0.489
Immigrant background	0.012	0.107	0.015	0.122
Parents with immigrant background	0.031	0.174	0.038	0.191
Parents' highest education level:				
Compulsory	0.298	0.457	0.255	0.436
Upper secondary	0.549	0.498	0.569	0.495
Post upper secondary	0.153	0.360	0.176	0.381
Observations	71567		48047	

Notes: Municipalities are defined as having a high share of 3-year tracks if the share of prolonged tracks is above the average of 0.15. The sample includes all students who applied for vocational tracks directly after finishing compulsory school in all municipalities that offered vocational tracks.

Table A.3: Tracks by SES (parents' highest education level)

	(1) Low-SES students			(2) High-SES students		
	Obs	pct	cumpct	Obs	pct	cumpct
Construction	3937	11.06	11.06	1928	9.79	9.79
Electrical engineering	3823	10.74	21.80	3311	16.82	26.61
Transport & Vehicle engineering	3970	11.15	32.96	1452	7.38	33.99
Business & Services	6998	19.66	52.62	3664	18.61	52.60
Industry	5278	14.83	67.45	1781	9.05	61.64
Food manufacturing & restaurant	2242	6.30	73.75	1545	7.85	69.49
Use of natural resources	1423	4.00	77.74	979	4.97	74.47
Health care and caring services	6415	18.02	95.77	4189	21.28	95.74
Process technology	452	1.27	97.04	185	0.94	96.68
Textile & clothing manufacturing	426	1.20	98.24	285	1.45	98.13
Wood technology	628	1.76	100.00	368	1.87	100.00
Total	35592	100.00		19687	100.00	

Notes: Sample includes low- and high-SES vocational students enrolled in municipalities that participated in the trial between 1987-1990. Low-SES students are defined as students whose parents have at most compulsory schooling, while high-SES students have at least one parent with tertiary education. Only vocational tracks that existed both as 2- and 3-year tracks are included.

Table A.4: By gender

Outcome	(1) year 3	(2) year 4-9	(3) year 10-14	(4) year 15-20	(5) avg 3-20	(6) avg 4-20
			Girls			
NEET	-.271	-.036	-.025	.006	-.032	-.018
	(.041)	(.021)	(.016)	(.013)	(.009)	(.009)
Mean	.2	.313	.304	.256	.291	.297
Employed	-.056	-.024	.044	.008	.004	.007
	(.052)	(.023)	(.018)	(.014)	(.010)	(.009)
Mean	.545	.556	.626	.695	.622	.626
Studying	.520	.095	-.048	-.016	.042	.014
	(.038)	(.018)	(.011)	(.008)	(.007)	(.006)
Mean	.368	.19	.107	.08	.13	.116
			Boys			
NEET	-.253	-.028	-.016	-.019	-.034	-.021
	(.023)	(.013)	(.008)	(.007)	(.005)	(.005)
Mean	.196	.268	.151	.138	.192	.192
Employed	-.143	-.030	.025	.017	-.005	.003
	(.032)	(.014)	(.009)	(.007)	(.005)	(.005)
Mean	.522	.623	.807	.846	.749	.762
Studying	.501	.097	-.018	.002	.056	.030
	(.035)	(.012)	(.007)	(.004)	(.004)	(.004)
Mean	.389	.15	.067	.028	.086	.068

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors in parentheses allowing for clustering at the municipality×year level.

Table A.5: Mobility by gender

Outcome	(1) year 3	(2) year 4-9	(3) year 10-14	(4) year 15-20	(5) avg 3-20	(6) avg 4-20
			Girls			
Same 2-digit sector	.023	.027	.035	.047	.036	.037
	(.025)	(.013)	(.011)	(.009)	(.006)	(.006)
Mean	.099	.102	.102	.09	.098	.098
Same 5-digit sector	-.003	.005	.014	.007	.008	.009
	(.011)	(.007)	(.006)	(.004)	(.003)	(.003)
Mean	.023	.026	.026	.023	.025	.025
Same plant	-.023	-.010	.006	.001	-.003	-.001
	(.019)	(.010)	(.007)	(.005)	(.004)	(.004)
Mean	.058	.05	.037	.03	.04	.039
			Boys			
Same 2-digit sector	.005	.019	-.006	-.017	-.001	-.001
	(.012)	(.006)	(.005)	(.005)	(.003)	(.003)
Mean	.051	.054	.065	.062	.06	.06
Same 5-digit sector	-.002	.005	-.001	-.005	.000	.000
	(.006)	(.003)	(.003)	(.002)	(.002)	(.002)
Mean	.016	.018	.02	.018	.019	.019
Same plant	-.023	-.010	.006	.009	.000	.001
	(.017)	(.007)	(.006)	(.005)	(.003)	(.003)
Mean	.078	.087	.077	.059	.075	.075

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors allow for clustering at the municipality×year level.

Table A.6: By grade quartiles (per cohort)

Outcome	(1) year 3	(2) year 4-9	(3) year 10-14	(4) year 15-20	(5) avg 3-20	(6) avg 4-20
			A. Lowest grade quartile			
NEET	-.304	.009	-.064	-.011	-.043	-.027
	(.039)	(.022)	.(018)	(.005)	(.010)	(.010)
Mean	.264	.368	.256	.227	.29	.292
Employed	-.106	-.063	.067	.012	.004	.010
	(.043)	(.022)	(.018)	(.005)	(.010)	(.010)
Mean	.5	.544	.709	.75	.659	.668
Studying	.467	.071	-.014	-.004	.041	.016
	(.040)	(.015)	(.009)	(.002)	(.005)	(.005)
Mean	.307	.114	.049	.035	.07	.056
			B. Middle grade quartiles			
NEET	-.238	-.042	-.001	-.003	-.030	-.018
	(.029)	(.015)	(.010)	(.003)	(.006)	(.006)
Mean	.192	.278	.204	.175	.223	.225
Employed	-.146	-.009	.011	.003	-.005	.003
	(.039)	(.016)	(.011)	(.003)	(.006)	(.006)
Mean	.538	.607	.743	.794	.707	.717
Studying	.528	.100	-.020	.002	.059	.032
	(.034)	(.014)	(.009)	(.002)	(.005)	(.005)
Mean	.382	.161	.083	.051	.103	.086
			C. Highest grade quartile			
NEET	-.252	-.057	-.017	.002	-.035	-.023
	(.034)	(.020)	(.016)	(.005)	(.009)	(.009)
Mean	.135	.213	.184	.162	.188	.191
Employed	-.048	-.012	.045	.000	.006	.009
	(.049)	(.024)	(.017)	(.005)	(.010)	(.010)
Mean	.552	.628	.742	.804	.718	.728
Studying	.484	.095	-.060	-.005	.037	.011
	(.042)	(.019)	(.013)	(.003)	(.007)	(.007)
Mean	.459	.234	.12	.06	.145	.126

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors allow for clustering at the municipality×year level.

Table A.7: Mobility by grade quartiles (per cohort)

Outcome	(1) year 3	(2) year 4-9	(3) year 10-14	(4) year 15-20	(5) avg 3-20	(6) avg 4-20
			A. Lowest grade quartile			
Same 2-digit sector	.020	.025	.021	.008	.023	.023
	(.020)	(.010)	(.010)	(.003)	(.005)	(.005)
Mean	.055	.054	.066	.061	.06	.06
Same 5-digit sector	-.011	-.002	.001	.001	.000	.000
	(.009)	(.005)	(.005)	(.001)	(.003)	(.003)
Mean	.014	.017	.02	.018	.018	.018
Same plant	-.033	-.045	-.015	-.002	-.022	-.022
	(.025)	(.012)	(.010)	(.003)	(.005)	(.005)
Mean	.073	.075	.066	.049	.064	.064
			B. Middle grade quartiles			
Same 2-digit sector	.014	.026	.004	-.001	.010	.009
	(.016)	(.008)	(.007)	(.002)	(.004)	(.004)
Mean	.07	.073	.079	.073	.074	.075
Same 5-digit sector	.007	.009	.002	-.001	.003	.002
	(.008)	(.004)	(.004)	(.001)	(.002)	(.002)
Mean	.019	.021	.023	.02	.021	.021
Same plant	-.014	.013	.018	.007	.015	.017
	(.016)	(.009)	(.007)	(.002)	(.004)	(.004)
Mean	.072	.075	.064	.05	.064	.063
			C. Highest grade quartile			
Same 2-digit sector	.004	.015	.005	.002	.008	.009
	(.025)	(.015)	(.014)	(.003)	(.007)	(.007)
Mean	.088	.095	.099	.088	.094	.094
Same 5-digit sector	-.010	.007	.014	.002	.007	.008
	(.013)	(.007)	(.006)	(.002)	(.003)	(.003)
Mean	.023	.025	.026	.023	.025	.025
Same plant	-.039	-.030	-.003	-.007	-.020	-.019
	(.022)	(.011)	(.009)	(.002)	(.005)	(.005)
Mean	.062	.06	.049	.038	.05	.049

Notes: Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Estimates and standard errors are calculated with lincom as average effects of the IV estimates β_τ of model 2 for the indicated years. Mean of the outcome variables is displayed for the indicated years. Robust standard errors in parentheses allowing for clustering at the municipality×year level.