

Müller, Dagmar

Working Paper

Is longer education a substitute for job search through social contacts?

Working Paper, No. 2021:5

Provided in Cooperation with:

IFAU - Institute for Evaluation of Labour Market and Education Policy, Uppsala

Suggested Citation: Müller, Dagmar (2021) : Is longer education a substitute for job search through social contacts?, Working Paper, No. 2021:5, Institute for Evaluation of Labour Market and Education Policy (IFAU), Uppsala

This Version is available at:

<https://hdl.handle.net/10419/246040>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Is longer education a substitute for job search through social contacts?

Dagmar Müller

The Institute for Evaluation of Labour Market and Education Policy (IFAU) is a research institute under the Swedish Ministry of Employment, situated in Uppsala.

IFAU's objective is to promote, support and carry out scientific evaluations. The assignment includes: the effects of labour market and educational policies, studies of the functioning of the labour market and the labour market effects of social insurance policies. IFAU shall also disseminate its results so that they become accessible to different interested parties in Sweden and abroad.

Papers published in the Working Paper Series should, according to the IFAU policy, have been discussed at seminars held at IFAU and at least one other academic forum, and have been read by one external and one internal referee. They need not, however, have undergone the standard scrutiny for publication in a scientific journal. The purpose of the Working Paper Series is to provide a factual basis for public policy and the public policy discussion.

More information about IFAU and the institute's publications can be found on the website www.ifau.se

ISSN 1651-1166

Is longer education a substitute for job search through social contacts?

Dagmar Müller^a

March 2021

Abstract

This paper investigates whether longer upper secondary education affects the role of parents in the job finding process. Previous research has shown that less educated workers rely more on contacts, and theory suggests that education and social connections can be substituted as signals of ability. I investigate this question by exploiting a Swedish trial that generated exogenous variation across municipalities and student cohorts in the length of vocational upper secondary education. Relying on Swedish matched employer-employee data, I estimate the effect of receiving one more year of education on the probability of being employed at the same establishment as a parent for up to 20 years after graduation. The results indicate that the average impact of a longer education is negative during the early career and non-trivial in magnitude. The overall effect is entirely driven by a large and statistically significant effect within the group of vocational students with high-educated parents. For the group of students where the use of parental ties is most prevalent, students with low-educated parents, the reliance on parental contacts appears resilient to policy-induced changes in the length of education.

Keywords: social contacts, young workers, labor market transitions, mobility

JEL-codes: J62, J24

^aIFAU, Uppsala University, IFN, UCLS and IZA, dagmar.muller@nek.uu.se.
I thank Caroline Hall, Lena Hensvik, Anna Sjögren, Oskar Nordström Skans, Helena Holmlund, Per-Anders Edin, Kristiina Huttunen, Peter Fredriksson, Francis Kramarz, Jan Sauermann and Judith Hellerstein as well as seminar audiences at the Institute for Policy Research at Northwestern University, UCLS, the IZA summer school 2019 and EALE 2019 for useful comments.

Contents

1	Introduction	3
2	Institutional background	7
2.1	The Swedish school system	7
2.2	Introduction of the trial period	8
2.2.1	Consequences of the trial	9
2.3	The Swedish recession in the 1990s	10
3	Empirical Model	10
3.1	Interpretation of effects	13
4	Data	13
4.1	Working with a parent	15
4.2	Labor Market Outcomes	16
5	Results	17
5.1	The first stage effect of trial intensity on probability of attending a longer vocational track	17
5.2	Main results	19
5.3	Heterogenous effects	21
5.3.1	Parental characteristics	21
5.3.2	Student characteristics	25
6	Conclusion	29

1 Introduction

The transition into the labor market is 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., 2018). Previous research has shown that social contacts are a widely-used channel for addressing this uncertainty since they can convey information between employers and potential hires in the matching process (Montgomery, 1991; Dustmann et al., 2016; Hensvik and Skans, 2016).¹ Social contacts seem to be particularly important for workers with lower socio-economic status and education levels as well as for blue-collar workers (see e.g. Pellizzari, 2010; Corcoran et al., 1980; Datcher, 1983; Elliot, 1999). Furthermore, theory suggests that education and social connections can be substituted as signals of ability. However, to the best of my knowledge, there exists no evidence on whether the empirical association is causal or related to confounding attributes. 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 function as substitute for social contacts.

The aim of this paper is to address this question and provide evidence on whether a longer upper secondary education can replace the need for social contacts in the job search process of Swedish graduates from vocational upper-secondary school tracks. Since young workers do not typically have a broad network of contacts when they enter the labor market, I focus on contacts in the form of the graduates' own parents. Kramarz and Skans (2014) show that parents have proven to be of particular importance in the process of securing a job when other types of connections are scarce. The main alternative would be to rely on workplace contacts acquired through summer jobs during school, but these contacts are clearly

¹There is a large empirical literature analyzing the importance of different types of social networks for job search, see for instance Glitz (2017); Hensvik et al. (2017) for labor market networks (co-workers, employers), Kramarz and Skans (2014) for family members, Dustmann et al. (2016); Munshi (2003) for ethnic networks or Bayer et al. (2008) for neighbors among others. For a general summary of the importance of social contacts, see Topa (2011) and Oyer and Schaefer (2011) for a firm-side overview of how accessing social networks can reduce uncertainty and thus hiring costs.

endogenous to the duration of studies, and I therefore focus on parental contacts.²

Relying on Swedish register data, I provide the first study of the consequences of more education on the extent to which young workers rely on informal contacts for their placement in the labor market by exploiting a large scale trial that took place in Sweden in the late 1980s and prolonged upper secondary education from two to three years. The trial created exogenous variation across municipalities and student cohorts in the extent to which longer vocational tracks were available. As in Hall (2012), I use this variation to instrument whether a student received an additional year of upper secondary education. I then analyze whether attending an additional year of upper secondary school affected the probability to simultaneously work at the same establishment as a parent for up to 20 years after starting vocational school.

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 worse business cycle conditions than their peers in shorter tracks. In the empirical model, I remove potential correlation with the business cycle by comparing outcomes for students in the same year after enrollment and 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.³

My results indicate that the average impact of a longer education on the use of parental job-search contacts is negative during the early career. The point estimate is non-trivial in magnitude (a 1 percentage point reduction relative to a mean of 7 percentage points) but the estimate is statistically imprecise (p-value of 0.1). The apparent reduction does not appear to arise because students move away from parents' industries in general. In fact, the converse appears to be the case: In order to assess the robustness of my estimates, I show that students

²Müller (2020) shows that Swedish high school graduates compensate the loss of employer links at the time of labor market entry by finding replacement jobs at the same establishment as a parent, while students who cannot rely on their parents to find a replacement job are more negatively affected in terms of employment.

³For 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.

become somewhat more likely to work in other establishments in their parents' industries if they attend a longer vocational track. Additionally, and in order to better understand the impact of parental contacts, I also present novel results on the overall effect of prolonged vocational tracks on employment and show that changes in employment levels cannot account for the estimated effects.⁴

Notably, the patterns diverge by parental background. Even though children of low-educated parents use parental contacts more on average, I find no negative effect of a longer education for this group. Instead, the overall effect is entirely driven by a very large and statistically significant effect within the group of vocational students with well-educated parents. The results thus suggest that parental contacts and education are substitutes for students with highly-educated parents, while youths whose parents have finished at most compulsory school seem to rely more on parents even after the reform. Hence, the results suggest that the reliance on parental ties appears to be remarkably resilient among students with low-educated parents.

The paper relates to the literature on the importance of parents for young workers' job search. For example, Kramarz and Skans (2014) show that 11.5% of Swedish graduates from upper secondary school 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. The effects are 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 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. Magruder (2010) proxies parental networks by geographic proximity of the father. He finds that

⁴Previously, Hall (2012) finds that the trial did not increase earnings, or the probability of having positive earnings. In contrast, I analyze the effects of more education on a more substantial level of stable employment. In addition, my empirical model allows me to let the effect of attending a longer education to vary with the business cycle.

when parental industries are growing, sons are more likely to be employed if their fathers live close by, indicating that fathers serve as network connections for their sons (but not daughters) in South Africa.

A conclusion of these studies is that parental contacts matter for where young workers find employment. This has implications for intergenerational 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.

The paper also contributes to a strand of literature that is concerned with how reliance on social contacts differs by demographic groups. The literature on social contacts generally agrees that networks are more important for workers with lower socio-economic status or less education even though studies generally cannot 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 suggests that education policy can enhance social mobility by reducing inequality in the access to employers through social networks, but my study is the first to provide causal evidence on this issue.

A theoretical foundation 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 the reliance on networks proves to be remarkably resilient in most cases, as indeed I find for the children of low-educated parents. As Casella and Hanaki (2008) argue, the reliance on contacts is more resilient the less precisely the signal (in this case, one more year of education) captures the skills required for the job at hand. In terms of the diverging patterns by parental background, this could reflect that more general education is a less precise and thus less informative signal for workers in industries that low-educated parents are typically employed in, but more informative in the industries of highly educated parents.

The paper is structured as follows: Section 2 gives an overview of the institu-

tional 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 education⁵ 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 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 two years long. After the parliament voted in favor of the school reform in 1991, vocational tracks were extended to three years for those starting after 1992 in an attempt to facilitate transitions from upper secondary school to higher education. The extension went hand-in-hand with a broadening of the curriculum and led to the

⁵According 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.

inclusion of more academic subjects, which granted students who graduated from those longer vocational tracks basic eligibility for university studies (see Holmlund et al., 2014). Prior to the reform, 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

Leading up to the reform in the 1990s, the decision was taken to implement an extensive nation-wide trial period during which vocational 3-year tracks were gradually introduced in a growing number of municipalities for the cohort starting upper secondary school between 1987 and 1990 (Holmlund et al., 2014). In line with the changes of 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, which was the only general academic subject in 2-year tracks, the new 3-year tracks also included English, Social Sciences and electives such as Maths.

The extended tracks were also supposed to provide more on-the-job training with regional employers during the third year. Starting with the 1988 cohort, 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.⁶ In practice, the amount of workplace training generally increased during the third year, but not all schools met the third year goal, implying that the actual share of workplace training was often considerably lower than 60% in some tracks and municipalities (National Board of Education, 1990; SOU, 1989b, 1990). The introduction of the trial coincided with one of the most turbulent periods on the Swedish labor market. The failure to offer the intended amount of workplace training was thus in part due to the worsening economic climate in 1991.

The decision of the allocation of trial slots was taken by the National Board of Education.⁷ 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

⁶Since the scope of the trial was small in 1987, there was no increase in workplace training.

⁷While municipalities had to apply if they wanted to be part of the trial, all municipalities opted into participating.

variation in trial intensity. As a results, a large share of vocational tracks was extended in some municipalities, whereas other municipalities only had few prolonged tracks. Further objectives were to create variation in participating municipalities with regard to industry and demographic structure (SOU, 1989a).

The trial did not increase the total number of available slots in vocational tracks. Instead, it converted existing classes in 2-year tracks into classes in 3-year tracks. Municipalities which were part of the trial could then increase the share of available 3-year tracks and slots in the following year of the trial. Consequently, both the number of municipalities that participated as well as the intensity of participation (as measured by the share of available 3-year tracks) increased during the trial period. The scope of the trial was substantial and by the end of it, about a fifth of all slots in vocational tracks had been converted to 3-year tracks. 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. (Hall, 2012; SOU, 1989a,b, 1990).

In most municipalities, both 2- and 3-year tracks were available and, in some cases, both a 2- or 3-year version of the same type of track. Hence, some students could decide whether they wanted to attend a longer track depending on the municipality of residence and, to a lesser extent, neighboring municipalities if their own municipality did not offer vocational tracks. In many instances however, municipality participation in the trial and which tracks were affected, was decided after compulsory school leavers had to apply for upper secondary school. Hence, there was limited scope for students to actually choose the length of upper secondary school by applying to a school in a neighboring municipality (SOU, 1989a, 1990).

2.2.1 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.⁸ Likewise, Hall (2013) analyzes whether having attended the longer vocational ed-

⁸Hall (2012) also finds evidence that low-performing students were more likely to drop out of upper secondary school as a consequence of the trial, which is, however, not corroborated by Holmlund et al. (2014).

ucation reduced the risk for future unemployment during recession, but does not find any effect. 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).

2.3 The Swedish recession in the 1990s

Following a booming economy in the late 1980s, Sweden was hit by a severe recession in the early 1990s which led to a financial crisis, a sharp decline in public spending and a subsequent soaring of the unemployment rate (see Holmlund, 2003). At the peak of the recession in the second part of the 1990s, unemployment had increased to eleven percent compared to less than three percent prior to the crisis. Young workers were affected by even higher unemployment, peaking at around 25 percent in the mid-1990s. 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. Recovery set in during the end of the decade as the unemployment rate fell to around six percent in 2001. Notably, unemployment stagnated at around twice the levels prior to the recession.⁹

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 start from 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

⁹The numbers are drawn from Statistic Sweden series 1987-2004, version 2015-10-27.

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, the main outcome being a dummy for whether graduate i was employed at the same establishment as a parent in a specific year $\tau = 3, 4, \dots, 20$ after starting upper secondary school. Other outcomes include: an indicator that takes on the value one if individual i had (1) a stable job in the same 5-digit industry sector as a parent, (2) had a stable job, (3) was studying, as well as log earnings from employment in year τ after starting upper secondary school. The regression is run for each outcome year $\tau = 3, \dots, 20$ 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 (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.¹⁰ Standard errors are

¹⁰Another 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.

clustered on the level at which the instrument variation occurs, namely at the municipality \times year level.

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. 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. In this data set, I can introduce an interaction between the unemployment rate and track lengths that allows me to let the effect of track lengths vary over the business cycle. Note also the equivalence between model (1) and model (2) (before the interaction of track lengths and unemployment rate is added): both strategies yield the same parameter estimates of β_τ , but model (2) 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.

Thus, I estimate the following model:

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

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.

3.1 Interpretation of effects

Part of the prolongation of vocational high school tracks was also an increase in the amount of on-the-job training as compared to the original 2-year programs. The bulk of that increase occurred during the third year of the respective program at which point 60% of the school year was to be allocated to workplace training. In practice, this was not always achieved, and programs (such as, for instance, construction and healthcare) that already had strong ties to employers were more successful than others in providing workplace training. Unfortunately, there is no data available regarding where students received workplace training since students are not considered (and thus registered) as employed. Note also that the estimated effect of attending a longer track should be interpreted relative to the counterfactual of one year of more potential work experience (since students from the same cohort who attend a 2-year track enter the labor market one year earlier than their peers).

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.¹¹

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 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. "Compulsory" refers to those students whose parents have at most finished compulsory education, while "tertiary" refers to students who 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 1 splits up 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.2 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

¹¹The 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.

Table 1: 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
<i>Parents' highest education level:</i>				
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.

reverse is true for electrical engineering.¹²

4.1 Working with a parent

I use matched employer-employee data covering Sweden's entire working age population (aged 16-69) to determine the establishments in which graduates and their parents work for up to twenty year after starting upper secondary school. The data includes annual earnings from a specific job spell as well as information on which months the individuals are employed. Establishments are identified by a unique combination of firm and workplace, which allows me to identify the physical establishment at which individuals worked. I use the data to identify 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 minimum level of labor

¹²For 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.

market attachment and not just some small temporary job. I follow Kramarz and Skans (2014) who 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 minimum wage as defined by the 10th percentile of the wage distribution.¹³

The main outcome of interest is whether an individual had a job simultaneously at the same establishment as a parent in a given calendar year. I create a dummy taking on the value one if both the student and at least one of their parents is registered at the same establishment during year τ after enrolling in upper secondary school.

4.2 Labor Market Outcomes

Since attending an additional year of education might affect the choice of industry that students opt into, I also check whether there is evidence that an additional year of education alters the probability of working in the same sector as a parent in general. As such it is possible that a reduction in the probability to work with a parent does not reflect a reduced reliance on parental contacts, but instead that industries in which parents typically work are less attractive as a consequence of the reform. I construct a measure for working in the same industry as either parent by taking a similar approach as above. I identify the 5-digit industry in which both the graduates' as well as their parents' employer operates in. Since I want to capture whether the effects are driven by changes in the attractiveness of an industry, the measure excludes those who work at the same plant as a parent, which by default would mean working in the same industry.

In order to interpret the effects on working with a parent, I also analyze whether any changes in the probability to work with a parent simply reflect that students who were affected by the trial were also affected in terms of their probability to be employed and to pursue post-upper secondary education. I estimate whether graduates were stably employed during each of the 20 year following starting upper secondary school using the definition of a stable job above.

¹³This time series is obtained from Lönestrukturstatistiken, see http://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__AM__AM0112/TidsserieUtbniiva/table/tableViewLayout1/?rxid=28c24108-2ec1-4196-93aa-b05bc3f807c1.

Notably, Hall (2012) does not find an effect of attending an additional year of education on the probability of enrolling in university or having positive earnings. She only finds a significant negative effect on earnings during the second and third year after starting upper secondary school (i.e. a mechanical effect since students in longer tracks have typically not entered the labor market yet). However, as opposed to Hall (2012), I estimate the effects on labor market and education outcomes relying on slightly different outcomes and using model (2) and thus taking into account that potential effects might only manifest after the recession. For completeness, I also report results for the main sample on whether students are in education in the appendix.¹⁴

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 2 shows the results from the first stage regression that replicates Hall (2012). 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

¹⁴This 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.

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.

Table 2: First Stage Results

<i>Outcome</i>	Attending a 3-year track	
	(1)	(2)
Trial intensity (instrument)	0.688*** (0.0355)	0.688*** (0.0354)
Grade percentile rank		0.036*** (0.008)
Female		-0.016** (0.007)
Immigrant background		0.014 (0.012)
Parents with immigrant background		-0.004 (0.005)
<i>Parents' highest education level:</i>		
Compulsory		<i>ref.</i>
Upper secondary		0.007*** (0.002)
Post upper secondary		0.026*** (0.003)
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.

5.2 Main results

I next turn to the main results. Table 3 show the results for the main outcome "work in the same establishment as either parent" in column (1). 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.¹⁵

After discussing the main results, I will investigate whether the results could be explained by changes in industry preferences or employment that could have arisen as a consequence of attending an additional year of education. Thus, I will relate the estimated effect on the probability to work with a parent to the results in columns (2) and (3) which show the results for working in the same 5-digit industry (but not plant) as a parent and stable employment respectively.

Table 3: Main Results, full sample

<i>Outcome</i>	Same establishment as parent		Same 5-digit sector as parent		Stable job	
	(1)	(2)	(3)	(4)	(5)	(6)
	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable
Year 3	-0.023* (0.013)	0.070	-0.002 (0.006)	0.019	-0.011*** (0.033)	0.531
Year 4-9	-0.010* (0.006)	0.072	0.005* (0.003)	0.021	-0.028** (0.013)	0.596
Year 10-14	0.004 (0.006)	0.061	0.004 (.003)	0.023	0.030*** (0.009)	0.734
Year 15-20	-0.005 (0.004)	0.047	-0.001 (0.002)	0.020	0.012* (0.007)	0.785
Obs.	2078532		2078532		2078532	

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

The table shows the average effect over the time periods indicated in each row.

¹⁵In practice, I estimate parameters β_τ from model 2 for $\tau = 3, 4, \dots, 20$ and use the lincom command in Stata to estimate the mean effects over the indicated time period.

Generally, attending an additional year of education seems to have a negative short run impact on the probability to work with a parent. The negative effect in year 3 is expected since students who attend a three year track have not yet entered the labor market. The average effect during years 4-9 is weakly significant (at the ten percent level) and amounts to a one percentage point reduction in the probability of being employed at the same establishment as a parent; a sizable effect in relation to the mean outcome over the same time period. However, the estimates are not very precise. Not surprisingly, long run effects are close to zero, which is in line with the fact that we would expect parents to be most important during the early stages of a career.

A possible concern is that a decrease in the probability to work with a parent reflects that students who attend an additional year of education are less likely to sort into the same industries as their parents. In that case, the estimates in column (1) would reflect that students who are exposed to more education alter their occupational choices. In column (3), I display a set of placebo-like estimates by defining the outcome as working in the same narrow 5-digit industry, but not establishment, as a parent. If more education led to more intergenerational mobility in terms of what industries students work in, we would even expect to see a decrease in the estimates in column (3). However, there is no indication that attending a longer track has reduced the probability to sort into the same industries as parent, implying that the, albeit imprecise, effect during year 4-9 in column (1) should not be driven by changes in industry preferences away from following in a parents' footsteps. Indeed the estimated impact on other jobs in the same industry is positive (and marginally significant).

Another caveat to the interpretation of the effects in column (1) would be if the additional year of education affects students' employment prospects, in which case any effects on the probability to work with a parent could be driven by overall changes in employment levels. Even though Hall (2012) does not find any significant effect on log earnings or the probability of having positive earnings after year 3, I estimate the effect of an additional year of education on stable employment (and for completeness on earnings and the probability to study in table A.3 in the appendix). The main difference as opposed to Hall (2012) is that using model (2), I measure any effects at the average unemployment rate. Another

difference is that I use the more restrictive definition of a stable job (instead of positive earnings) in order to assess the effect on employment.

The results are displayed in column (5). The negative effect in year 3 is to some extent mechanical as students attending a third year of upper secondary education should automatically less frequently employed and much more likely to be studying (as the first stage holds and as confirmed in column (1) in table A.3).

However, I find evidence for a moderate negative effect on stable employment during years 4-9 after starting upper secondary school, implying that an additional year of potential labor market experience is valued more relative to an additional year of education, while the reverse seems to be true later during the career. Attending a longer track leads to a 2.8 percentage point reduction in the probability of having a stable job during years 4-9, but a positive effect of roughly the same magnitude later on. Note that in relation to the mean, the negative effect in years 4-9 is considerably smaller than the effect on working with a parent, suggesting that changes in employment can account for around a third of the effect of interest.

5.3 Heterogenous effects

5.3.1 Parental characteristics

As I have shown in the previous section, there is, albeit imprecise, evidence that an additional year of education can reduce the reliance on parents for all vocational students. I next turn to heterogeneous results. Kramarz and Skans (2014) suggest that on the hiring side, parental characteristics are important for the productivity of the link in terms of employment. In fact, parental ties are more likely to lead to recruitment by the parents' employer for lower educated parents. This is the case regardless of the education level of the child (though effects are smaller with increasing education level), indicating that the use of parental links is persistent among this group. However, could more education (within the same education level) be a way of breaking this link?

Table 4, shows heterogenous results by education level of the parents. "Compulsory" refers to students whose parents have at most finished compulsory school, while "upper secondary" and "tertiary" refers to cases in which at least one parent has the indicated level of education. In line with the literature, we can see

that the average share of students who work together with their parents is higher when parents have at most finished upper secondary school as compared to tertiary education (see means in columns (2),(4) and (6)).

Table 4: Effect on working with a parent, by parents' highest level of education

<i>Outcome</i>	Same establishment as parent					
	Compulsory		Upper secondary		Tertiary	
	(1) Estimates, by years	(2) Mean dep. variable	(3) Estimates, by years	(4) Mean dep. variable	(5) Estimates, by years	(6) Mean dep. variable
Year 3	0.017 (0.027)	0.079	-0.031* (0.017)	0.071	-0.074*** (0.027)	0.051
Year 4-9	0.004 (0.012)	0.078	-0.011 (0.008)	0.074	-0.048*** (0.012)	0.053
Year 10-14	0.027*** (0.010)	0.065	-0.006 (0.006)	0.064	-0.010 (0.009)	0.044
Year 15-20	0.013 (0.008)	0.047	0.005 (0.005)	0.050	-0.010 (0.007)	0.038
Obs	581742		1158948		337842	

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

Evaluating differences in the impact of more education, two patterns emerge: Students with tertiary-educated parents are significantly less likely to find a job at the exact same plant as a parent during the earlier stages of their career, while there is a positive average effect for students with compulsory-educated parents during years 10-14 after starting upper secondary school. For all other students, an additional year of education does not seem to have any effect once students typically enter the labor market four years after starting upper secondary school.

For those with highly-educated parents, there is an average decrease in the probability to work with a parent of 4.8 percentage points during years 4-9 after

starting upper secondary school. During this time period, the effects are large and can explain about 90 percent of the variation in the mean outcome. During the later stages of the career, the effects disappear.

As opposed to that, students are more likely to rely on their compulsory-educated parents to find a job at the same employer despite having obtained an additional year of education. Interestingly, the effect first materializes later in the career with an average increase of 2.7 percentage points during years 10-14.

A conclusion of those results is that the use of parental contacts seems to be persistent among the group with low-educated parents regardless, while the additional year of education seems to equip students with tertiary-educated parents better to enter the labor market without their parents' help.

Table 5 shows the effects on working in the same 5-digit industry and stable employment split up by education level of the parents. For students with compulsory-educated parents, there is no evidence that more education has affected the probability to work in the parental industry (but not plant). For students with high-educated parents, 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 interpretation could be that this group of students sorts into the same industries as their parents regardless of whether they attended an additional year of education, but it affects whether jobs in the parental industry are found through the parents, thereby granting students access to a broader spectrum of potential employers in the same sector.

Table 5: Robustness, by parents' highest level of education

<i>Outcome</i> <i>Parental ed.</i>	Same 5-digit sector				Stable job			
	Compulsory		Tertiary		Compulsory		Tertiary	
	(1) Estimates, by years	(2) Mean dep. variable	(3) Estimates, by years	(4) Mean dep. variable	(5) Estimates, by years	(6) Mean dep. variable	(7) Estimates, by years	(8) Mean dep. variable
Year 3	0.004 (0.010)	0.017	-0.007 (0.015)	0.020	-0.098** (0.045)	0.571	-0.039 (0.054)	0.477
Year 4-9	0.007 (0.005)	0.019	0.001 (0.008)	0.024	-0.068*** (0.021)	0.611	-0.020 (0.026)	0.564
Year 10-14	0.003 (0.005)	0.020	0.031*** (0.008)	0.027	0.096*** (0.016)	0.735	-0.011 (0.020)	0.723
Year 15-20	0.001 (0.004)	0.016	0.025*** (0.007)	0.024	0.050*** (0.013)	0.781	-0.007 (0.017)	0.784
Obs	581742		337842		581742		337842	

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

On the other hand, an additional year of education does not seem to affect the probability of having a stable job for students with academic parents (column 7). Students with low-educated parents are on average less likely to have a stable job during years 4-9 after starting upper secondary school. In the following time period (years 10-14), positive effects in terms of stable employment materialize for this group of students, indicating that experience is valued more relative to more education in the beginning of the career. A look at how studying is affected for this group (see additional results in table A.5) shows that they enter the labor market later after spending more time in education (both from and after upper secondary school).¹⁶

5.3.2 Student characteristics

On the supply side, workers with a weak position (lower education, low-paying occupations) tend to rely more on social contacts during job search (Elliot, 1999; Pellizzari, 2010). Kramarz and Skans (2014) find that this is even the case for labor market entrants with lower grades. As a consequence, academically weak students might benefit relatively more if attending a longer track provides a more accurate signal of ability for this group.

In table 6, I test whether there are heterogenous effects by grade quartiles from compulsory school. As opposed to the results for parental level of education, the results show no clear gradient.¹⁷ Instead, both students in the top and the bottom are less likely to work with their parents as a response of attending a 3-year track, while there is an increase for students in the middle of the grade distribution in the long run. The negative average effects for bottom and top students during years 4-9 are substantial in size and explain 33 and 38 percent respectively of the variation in the outcome mean, suggesting that labor market entry is less reliant

¹⁶Attending a longer track leads to higher employment rates later in life for those with low-educated parents. Delayed labor market entry also points to a potential explanation to why the increase in the probability to work with a parent occurs first during years 10-14 after starting upper secondary school and can also account for part (but not all) of the increase in the probability to find a job with a parent. Compare the effect relative to the mean outcome $0.027/0.065 = 0.42$ to the employment effect relative to the outcome mean: $0.096/0.735 = 0.13$.

¹⁷Note also that there is only partial overlap between students with compulsory-educated parents 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 students with low-educated parents.

Table 6: Effect on working with a parent, by grade quartile

<i>Outcome</i>	Same establishment as parent					
	Lowest GQ		Middle GQ		Highest GQ	
	(1)	(2)	(3)	(4)	(5)	(6)
	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable
Year 3	-0.033 (0.025)	0.073	-0.014 (0.016)	0.072	-0.039* (0.022)	0.062
Year 4-9	-0.045*** (0.012)	0.075	0.013 (0.009)	0.075	-0.030*** (0.011)	0.060
Year 10-14	-0.015 (0.010)	0.066	0.018** (0.007)	0.064	-0.003 (0.009)	0.049
Year 15-20	-0.002 (0.003)	0.049	0.007*** (0.002)	0.050	-0.007*** (0.002)	0.038
Obs						

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. Sample includes all vocational students enrolled in municipalities that participated in the trial between 1987-1990. Grade quartiles are defined by cohort. 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 \times year level.

on their parents.

The results in table 7 confirm again that the results are not due to the fact that students are less likely to sort into parental industries per se. However, a small part of the negative effect for low-grade students can be accounted for by lower employment rates in the short run. Note also that Hall (2012) found that students with a low GPA from compulsory school, and to a lesser extent low-educated parents, had a higher probability of dropping out of upper secondary school if they enrolled in a prolonged vocational track. Even so, the first stage holds for even for those groups, implying that the monotonicity assumption should still hold.

Table 7: Robustness, by lowest and highest grade quartiles

<i>Outcome</i> <i>Grade quartile</i>	Same 5-digit sector				Stable job			
	Lowest		Highest		Lowest		Highest	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable
Year 3	-0.011 (0.009)	0.014	-0.010 (0.013)	0.023	-0.106** (0.043)	0.500	-0.048 (0.049)	0.552
Year 4-9	-0.002 (0.005)	0.017	0.007 (0.007)	0.025	-0.063*** (0.022)	0.544	-0.012 (0.024)	0.628
Year 10-14	0.001 (0.005)	0.020	0.014** (0.006)	0.026	0.067*** (0.018)	0.709	0.045*** (0.017)	0.742
Year 15-20	0.001 (0.001)	0.018	0.002 (0.002)	0.023	0.012** (0.005)	0.750	0.000 (0.005)	0.804
Obs	581742		337842		581742		337842	

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

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.

However, the results in table 8 show no evidence of gender differences with regard to working in the same plant as a parent. Instead, the results mirror the average effects found for the full sample in table 3.¹⁸

Table 8: Effect on working with a parent, by gender

<i>Outcome</i>	Same establishment as parent			
	Women		Men	
	(1)	(2)	(3)	(4)
	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable
Year 3	-0.023 (0.019)	0.058	-0.023 (0.017)	0.078
Year 4-9	-0.010 (0.010)	0.050	-0.010 (0.007)	0.087
Year 10-14	0.006 (0.007)	0.037	-0.006 (0.007)	0.077
Year 15-20	0.001 (0.005)	0.030	0.009* (0.005)	0.059
Obs				

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

¹⁸Results for working in the same industry as a parent and stable employment are displayed in table 6 in the appendix.

6 Conclusion

In this article, I examine whether a longer upper secondary education replaces the need for informal contacts in the job search process. I investigate this question by focusing on parental contacts which have proven to be important for where young workers find their first job. The overall reliance on these contacts is particularly strong among children of low-educated parents. While theory suggests that education and social connections could be substituted as signals of ability, little is known about whether education policy can be designed so as to offer an alternative to the reliance on contacts.

Exploiting a policy pilot that prolonged upper secondary education, I find that students who receive an additional year of education are less likely to find employment with their parents during the beginning of their career. I find the reverse impact regarding employment in other jobs in the same sector as the parent, suggesting that the results are unlikely to be driven by more general sectoral employment patterns.

The patterns diverge by the background of the students: Students with tertiary-school educated parents respond to a longer track by forcefully reducing the reliance on their parents. The opposite is the case for students with low-educated parents who do not appear to respond at all in this dimension. Thus, more education appears to function as a substitute for informal contacts for some groups, but use of family ties among students from lower-educated backgrounds where these contact are used the most, appear very resilient to policy-induced variations in the length of education.

References

- Altonji, Joseph G. and Charles R. Pierret**, “Employer Learning and Statistical Discrimination,” *The Quarterly Journal of Economics*, 2001, 116 (1), 313–350.
- Bayer, P., S. Ross, and G. Topa**, “Place of Work and Place of Residence: Informal Hiring Networks and Labor Market Outcomes,” *Journal of Political Economy*, 2008, 116 (6), 1150–1196.
- Casella, Alessandra and Nobuyuki Hanaki**, “Information channels in labor markets: On the resilience of referral hiring,” *Journal of Economic Behavior Organization*, 2008, 66 (3), 492 – 513.
- Corak, Miles and Patrizio Piraino**, “The Intergenerational Transmission of Employers,” *Journal of Labor Economics*, 2011, 29 (1), 37–68.
- Corcoran, M, L. Datcher, and G. Duncan**, “Information and Influence Networks in Labor Markets,” in G. Duncan and J. Morgan, eds., *Five Thousand American Families: Patterns of Economic Progress.*, Ann Arbor: Institute For Social Research, 1980, pp. 1–37.
- Datcher, Linda**, “The Impact of Informal Networks on Quit Behavior,” *The Review of Economics and Statistics*, 1983, 65 (3), 491–495.
- Dustmann, Christian, Albrecht Glitz, Uta Schönberg, and Herbert Brücker**, “Referral-based Job Search Networks,” *Review of Economic Studies*, 2016, 83 (2), 514–546.
- Elliot, James R.**, “Social Isolation and Labor Market Insulation: Network and Neighborhood Effects on Less-Educated Urban Workers,” *The Sociological Quarterly*, 1999, 40 (2), 199–216.
- Fredriksson, Peter, Lena Hensvik, and Oskar Nordström Skans**, “Mismatch of Talent: Evidence on Match Quality, Entry Wages, and Job Mobility,” *American Economic Review*, 2018, 108 (11), 3303–38.

- Glitz, Albrecht**, “Coworker networks in the labour market,” *Labour Economics*, 2017, *44*, 218 – 230.
- Grönqvist, Hans and Caroline Hall**, “Education Policy and Early Fertility: Lessons from an Expansion of Upper Secondary Schooling,” IFAU Working Paper 2011:24 2011.
- , – , **Jonas Vlachos, and Olof Åslund**, “Education and criminal behavior: Insights from an expansion of upper secondary school,” IFAU Working Paper 2015:15 2015.
- Hall, Caroline**, “The Effects of Reducing Tracking in Upper Secondary School: Evidence from a Large-Scale Pilot Scheme,” *Journal of Human Resources*, 2012, *47* (1), 237–269.
- , “Does more general education reduce the risk of future unemployment? Evidence from labor market experiences during the Great Recession,” IFAU Working Paper 2013:17 2013.
- Hensvik, Lena, Dagmar Müller, and Oskar Nordström Skans**, “Connecting the Young: High School Graduates’ Matching to First Jobs in Booms and Great Recessions,” IFAU Working Paper 2017:2 2017.
- Hensvik, Lena and Oskar Nordström Skans**, “Social Networks, Employee Selection and Labor Market Outcomes,” *Journal of Labor Economics*, 2016, *34* (4), 825–867.
- Holmlund, Bertil**, “The Rise and Fall of Swedish Unemployment,” CESifo Working Paper No. 918 2003.
- Holmlund, Helena, Josefin Häggblom, Erica Lindahl, Sara Martinson, Anna Sjögren, Ulrika Vikman, and Björn Öckert**, “Decentralisering, skolval och fristående skolor: resultat och likvärdighet i svensk skola,” IFAU Rapport 2014:25 2014.
- Kramarz, Francis and Oskar Nordström Skans**, “When Strong Ties are Strong: Networks and Youth Labour Market Entry,” *Review of Economic Studies*, 2014, *81* (3), 1164–1200.

- Magruder, Jeremy R.**, “Intergenerational Networks, Unemployment, and Persistent Inequality in South Africa,” *American Economic Journal: Applied Economics*, January 2010, 2 (1), 62–85.
- Montgomery, James D.**, “Social networks and Labor-market Outcomes: Toward an Economic Analysis,” *The American Economic Review*, 1991, 81 (5), 1408–1418.
- Müller, Dagmar**, “Lost Opportunities: Market Work, Establishment Closures and the Impact on Career Prospects,” mimeo 2020.
- Munshi, Kaivan**, “Networks in the Modern Economy: Mexican Migrants in the U.S. Labor Market,” *The Quarterly Journal of Economics*, 2003, 118 (2), 549–599.
- National Board of Education**, “Rapport om försöks- och utvecklingsarbetet i gymnasieskolan 1988/89,” Report No 90:3 1990.
- Oyer, Paul and Scott Schaefer**, “Personnel Economics: Hiring and Incentives,” in Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 4b, Elsevier, 2011, chapter 20.
- Pellizzari, Michele**, “Do Friends and Relatives Help in Getting a Good Job?,” *Industrial and Labor Relations Review*, 2010, 63 (3), 494–510.
- SOU**, “Sextusen platser och tiotusen platser för försök i gymnasieskolan - hur, var och varför,” Report 1989:106, UGY 1989.
- , “Utvärdering av försöksverksamheten med 3-årig yrkesinriktad utbildning i gymnasieskolan första året,” Report 1, 1989:90, UGY 1989.
- , “Utvärdering av försöksverksamheten med 3-årig yrkesinriktad utbildning i gymnasieskolan,” Report 2, 1990:75, UGY 1990.
- Topa, Giorgio**, “Labor Markets and Referrals,” in Jess Benhabib, Alberto Bisin, and Matthew O. Jackson, eds., *Handbook of Social Economics, Volume 1B*, Amsterdam: Elsevier Science, 2011, pp. 1193–1221.

Table A.1: Descriptive Statistics, full sample

	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
<i>Parents' highest education level:</i>				
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 A.2: Tracks by parents' highest education level

	(1)			(2)		
	Compulsory			Tertiary		
	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.3: Effect on log earnings and studying, full sample

<i>Outcome</i>	Log earnings		Studying	
	(1) Estimates, by years	(2) Mean dep. variable	(3) Estimates, by years	(4) Mean dep. variable
Year 3	-0.312*** (0.087)	10.63	0.506*** (0.028)	0.381
Year 4-9	-0.041 (0.035)	11.058	0.094*** (0.011)	0.166
Year 10-14	0.065*** (0.024)	11.71	-0.027*** (0.006)	0.083
Year 15-20	0.030* (0.017)	12.08	-0.003 (0.004)	0.049
Obs.	2078532		2078532	

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

Table 4: Robustness, parents with upper secondary education

<i>Outcome</i>	Same 5-digit sector		Stable job	
	(1) Estimates, by years variable	(2) Mean dep. variable by years	(3) Estimates, by years variable	(4) Mean dep. variable
Year 3	-0.003 (0.008)	0.019	-0.145*** (0.038)	0.527
Year 4-9	0.004 (0.004)	0.021	-0.021 (0.017)	0.598
Year 10-14	-0.005 (0.004)	0.023	0.007 (0.012)	0.737
Year 15-20	-0.009*** (0.003)	0.020	-0.001 (0.009)	0.788
Obs	1158948		1158948	

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

Table A.5: Effect on log earnings and studying, by parents' level of education

<i>Parental ed.</i> <i>Outcome</i>	Log earnings				Studying			
	Compulsory		Tertiary		Compulsory		Tertiary	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable
Year 3	-0.255** (0.125)	10.73	-0.218 (0.165)	10.49	0.582*** (0.042)	0.311	0.449*** (0.046)	0.476
Year 4-9	-0.065 (0.060)	11.10	0.009 (0.075)	10.96	0.079*** (0.016)	0.122	0.115*** (0.021)	0.253
Year 10-14	0.082* (0.043)	11.71	0.017 (0.054)	11.70	0.006 (0.010)	0.062	0.014 (0.015)	0.130
Year 15-20	0.038 (0.034)	12.05	-0.032 (0.038)	12.11	-0.003 (0.007)	0.043	-0.027*** (0.009)	0.059
Obs.								

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.

Table 6: Robustness, by gender

<i>Outcome</i> <i>Gender</i>	Same 5-digit sector				Stable job			
	Women		Men		Women		Men	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable	Estimates, by years	Mean dep. variable
Year 3	-0.003 (0.011)	0.023	-0.002 (0.006)	0.016	-.056 (0.052)	0.545	-.143*** (0.032)	0.522
Year 4-9	0.005 (0.007)	0.026	0.005 (0.003)	0.018	-.024 (0.023)	0.556	-0.030** (0.014)	0.623
Year 10-14	0.014** (0.009)	0.026	-0.001 (0.003)	0.020	.044** (0.018)	0.626	0.025*** (0.017)	0.807
Year 15-20	0.017** (0.004)	0.023	-0.005** (0.002)	0.018	0.008 (0.014)	0.695	0.000 (0.007)	0.846
Obs								

Notes: */**/** denotes significance at the 10/5/1 percent level respectively. 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 \times year level.