



Working papers in transport, tourism, information technology and microdata analysis

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Editor: Hasan Fleyeh**

Nr: 2014:07

Working papers in transport, tourism, information technology and microdata analysis
ISSN: 1650-5581
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The Program and Treatment Effect of Summer Jobs on Girls' Post-schooling Incomes

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April 23, 2014

Abstract

Public programs (of disputed effect) offering summer jobs or work while in high school to smooth the transition from school to work is commonplace. In this paper, 1447 girls in their first grade of high school between 1997-2003 and randomly allotted summer jobs via a program in Falun (Sweden) are followed 5-12 years after graduation. The program led to a substantially larger accumulation of income while in high school. The causal effect of the high school income on post-schooling incomes was substantial and statistically significant. The implied elasticity of 0.4 is however potentially inflated due to heterogeneous effects.

Keywords: experimental data, work experience, work while in school, selection bias
JEL-codes: C93, J24, J68

¹ We thank seminar participants at Dalarna and the Linnaeus Universities, The Institute for Evaluation of Labor Market and Education Policy (IFAU), and the Swedish Ministry of Finance for constructive comments that improved this work. We are also grateful to Catia Cialani, Steven Haider, Iida Häkkinen Skans, Johan Vikström, Daniel Wikström and Olof Åslund for detailed comments on an earlier draft. This research was funded by IFAU.

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1 Introduction

Is early contact with the labor market, through for instance summer jobs, economically beneficial for high school students in the long run? The answer carries important implications for labor policy makers worldwide, as it assesses whether early contact with the labor market is an advantage to high school students and therefore whether governments should consider smoothing the transition from high school to work.

Fact is that public programs promoting early labor market contacts for high school students are commonplace and they have repeatedly been advocated by the OECD. This study draws on a Swedish example, the federal Summer Youth Employment Training Program (see Leos-Urbel, 2012; Morisi, 2010) is a US example, and Parent (2006) offers an insight into the Canadian debate. Grossman (1997) reported that summer jobs were increasing in the USA as well as in many European countries, while Morisi (2010) later shows a drastic decline in summer jobs in the USA around the year 2000. In Sweden the government commenced subsidizing summer jobs in 1995. The government administers the subsidies via the municipalities which operatively, with a few exceptions, offer summer jobs to high school students.

It is widely believed that the summer job experience should be beneficial to high school students and their future labor market outcomes. Favorable arguments include that summer jobs help high school students to mature faster than otherwise; provide skills and knowledge which complement in-class education; give high school students feedback on what they have learned and offer hints on what they need to study; enhance their motivation to study; provide earnings that can alleviate poorer high school students financial constraints on future education and human capital investment; and finally, high school students may use summer jobs to smooth the transition from school to work by collecting information and establishing a social network which helps in finding their first regular job (see for example Alon, Donahoe, and Tienda, 2001; Carling and Larsson, 2005; Carr, Wright, and Brody, 1996; Geel and Backes-Gellner³, 2012; Hensvik and Nordström-Skans, 2013; Häkkinen, 2006; Ruhm, 1997).

However, the empirical foundation in favor of summer job programs is limited (Carr, Wright, and Brody, 1996; Hotz, Xu, Tienda, and Ahituv, 2002; Leos-Urbel, 2012; Parent, 2006; Ruhm, 1997; Wang, Carling, and Nääs, 2006). Furthermore, the magnitude of a summer job effect also warrants empirical assessment. On the one hand, a summer job is a

³ Geel and Backes-Gellner (2012) and Häkkinen (2006) focus on working while enrolled at university.

modest work experience and may therefore have a trivial effect on future incomes in the long run. On the other hand, in the words of Granovetter cited in Rosenbaum, DeLuca, Miller, and Roy (1999) "...early contacts may have a greater impact on later jobs than on early jobs. This effect may occur because of the accumulation of advantages that come from the initial contacts, since good initial contacts lead to more and better subsequent contacts".

Research on summer jobs or more broadly on "working while in high school", has primarily focused on school attendance, school grades, and disposable income in part emphasizing potential negative consequences of summer job experiences (see the review in Ruhm, 1997). For instance, summer jobs with heavy commitment may make students too exhausted and less fit for the new semester; the perception of "easy" money from summer jobs may detract students' from seemingly boring and unproductive in-class education; premature contacts with society may negatively affect students if they are not well protected from bad social behavior (see Lee and Orazem, 2010; Staff, Schulenberg, and Bachman, 2010; Weller, Kelder, Cooper, Basen-Engquist, and Tortolero, 2003 and references therein).

It is a rather difficult task to empirically determine the effect of a summer job experience. First, there are few datasets suitable for this purpose; information about summer jobs and their holders are rarely documented. Second, the methodology to analyze this question faces some challenges; the biggest one being the issue of selection bias. A summer job is the result of an active job-searching process, and any correlation between a summer job experience and later outcomes may be due to unobserved individual abilities rather than being a causal relationship. In principle, this problem could be overcome by the appropriate conditioning of confounding variables. However access to and knowledge about such variables is often lacking. Hotz et al (2002) illustrate the methodological challenge for observational data and conclude that appropriate accounting for selection bias is of crucial importance to obtain a robust estimation of the effect of work experience on the transition from school to work (see also Monahan, Lee, and Steinberg, 2011).

In this paper, we estimate the effect of high school girls' summer job experience on post-schooling incomes by using experimental data (cf Leos-Urbel, 2012). The data was collected in Falun, a mid-size town in central Sweden. The Falun Council randomly allocates the publicly-provided summer jobs to high school student applicants on a lottery basis since 1995. The random allocation of the applicants to summer jobs provides a unique setting in which there is a good control of the potential selection bias. Furthermore, we have register data providing detailed background information about the applicants who were offered a summer job as well as for those who were not; variables included age, grades, socio-economic status

of family and income from work which are the crucial control variables as found by Carr et al (1996).⁴

This paper is organized as follows. In section two we describe the data, the processing thereof and examine the determinants for applying to the summer job program as well as being offered as a first grader. In the third section we examine the program effect of being offered at the first grade on the post schooling incomes. We select only the first grade applicants to get rid of the problem due to students' self-selection into multiple summer job applications over their high school years. In the fourth section we take a look at the accumulated work experience while in high school and apply an IV-estimator to examine the causal effect of accumulated work experience on post-schooling incomes. The fifth concludes with a discussion of our findings and how they relate to current literature on the topic.

2 Data and the lottery

The data comes from two sources. The first source is the Falun Council from which we received data pertaining to all applicants to its summer job program during the years 1997 to 2003. To be an eligible applicant, in addition to be a high school student, the person also needed to be a resident in Falun. The data contains the name and contact address as well as civic registration number for all applicants. The random allocation of summer jobs among the applicants was in the form of an electronic lottery carried out by a Council official using an Excel spreadsheet. The data also contains information on who was offered a summer job based on the lottery as well as whether she accepted the offer. In the very rare cases the offer was rejected by a student, the summer job re-entered the lottery. The rationale for using a lottery in offering the summer jobs to applicants was claimed by the officials of the Council to be fairness.

The summer jobs were within the Council such as elderly care, gardening, cleaning, and tutoring⁵. The number of summer jobs offered each year was pre-set by the Council and the jobs were intended for a period of three weeks. The Swedish high school runs for three years and the student commences it at about the age of 16. In the following we will refer to first, second, and third graders to denote high school students in their first, second, and third year in high school. Although high schooling is voluntary, almost all teenagers are enrolled. High school programs are divided into two categories being theoretical programs targeting

⁴ Wang et al (2006) used the same experimental data but failed any sharp conclusions because of a too short follow-up period. With the progression of time, this problem is overcome.

⁵ Older students tutoring younger ones in core subjects during the summer vacation.

university studies and vocational programs aiming at a direct transition to the labor market. However, a reform prior to the study period rendered students of the vocational programs eligible for university. About one third of the high school students are later enrolled in a university. The fall semester of the high school starts in the mid of August and the spring semester ends in mid-June. Consequently, the high school students are available for summer jobs for about a 9-week period in June to August. Unlike in Australia (Patton and Smith, 2010) and America, working-while-in-school in Sweden essentially means working on school holidays of which the only extended one is the summer holiday.

The second source of data comes from Statistics Sweden (SCB).⁶ They provided data on all individuals in Sweden at the high school in the relevant period. The data contains background information such as gender, parental socioeconomic status, and school grades as well as outcome data in the form of yearly incomes⁷ up to a maximum of 31 years of age (limited by data being available up to end of 2011). The Council data was added to the SCB data by using the civic registration number as the key variable.

We restrict our focus on high school girls being first graders in one of the years 1997-2003. It was possible to apply for summer jobs in each grade of high school and in each of the years the applicants were randomized. However, the reason to focus on first graders is methodological; we thereby avoid the risk of introducing bias when addressing the difficult task of understanding and modeling the process of repeated applications to the program in the course of high school. About 80% of the employees in Falun Council, as in other Swedish councils, are females. Consequently, a high school boy's summer job at the Council is unlikely to provide work experience at a probable future employer. Given that previous studies (Geel and Backes-Gellner, 2012) points at employers requiring directly relevant work experience one would expect a substantial gender difference in program effect of summer jobs at the Council calling for separate analysis of boys and girls (additional reasons for gender differences are given in Alon et al, 2001). Indeed, boys are less likely to apply to the program and they did not benefit from it as we showed in a preceding report (Alam, Carling, and Nääs, 2013).

All in all high school girls in the first grade amount to 3220 of which 1447 applied for a summer job via the program and the remaining 1773 renounced applying. Presumably, the girls considered the summer job program offered by the Council as just one of many

⁶ All the data analysis is conducted by using the SAS software through SCB's remote data access and analysis facility called Micro data Online Access (MONA).

⁷ Post-schooling incomes throughout the study are deflated by CPI to the price level of 2009.

opportunities for finding work. Why 55% of the girls did not bother to apply for the jobs with the Council is unknown to us. There are however three explanations being put forward to us from the Council. Firstly, in the early years, there was some anecdotal evidence that the knowledge of the existence of the program was limited among students. Secondly, some girls had limited interest in the categories of work offered by the Council. Thirdly, Falun is geographically extensive with some communities being more than 40 km from the town center; this resulted in students from rural areas applying proportionally less than other students. Unfortunately, the geo-coding of the students was deleted for confidentiality reasons by Statistics Sweden.

Figure 1 depicts the girls into subgroups of applicants and non-applicants in the course of their high school studies. For instance, there are 1447 girls applying in the first grade. They divide, in their second grade, into 566 re-applying, 572 not re-applying, and 309 for whom data is missing. In the third grade, the 566 re-applicants are divided into 18 re-re-applicants, 450 not applying in the third grade and 98 for whom data is missing in the third grade only. Data is missing primarily for those who were in the first grade in 2003 (or 2002) thereby not observed in the second (third) grade as that occurred outside the Council’s data window of 1997-2003, a secondary reason is that some girls moved from Falun. Note however that we still have post-schooling income (and other variables) for them retrieved from the second data source.

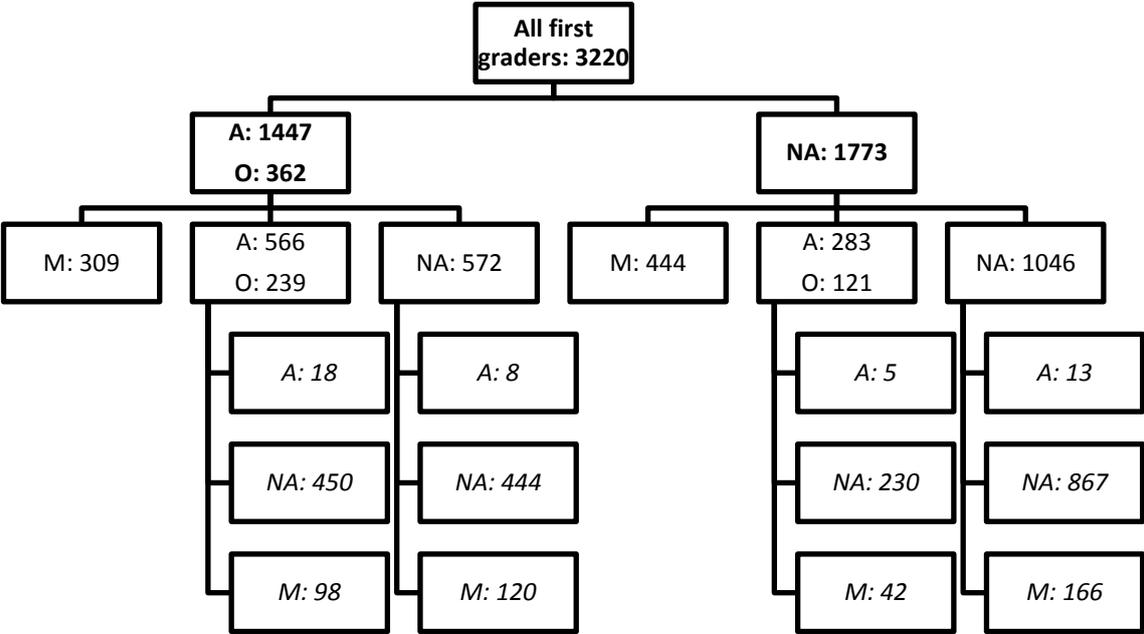


Figure 1: Applications to the summer job program of girls in the first grade in the years 1997-2003. Applicants (A), Non-applicant (NA), Offered (O), and Missing (M) at first grade (top level, in bold), second grade (middle level) and third grade (bottom level, in italics).

The first interesting point to notice in Figure 1 is that applications in the third grade are very unusual. There are 44 applications in the third grade which makes up only some 2% of all the 2340 applications submitted of the high school girls. Consequently, the program seems of no interest to the girls having reached the third grade. The 1773 non-applicants in the first grade are rather unlikely to be applicants later in high school, only 283 applied in their second grade. An applicant in the first grade is however likely to re-apply in the second grade. Hence, the program involves primarily high school girls who apply already in the first grade. This is yet another reason for us to focus the analysis on the 1447 applicants in the first grade noting that they are the ones most affected by the existence of the program.

Table 1: Descriptive statistics of the girls of the Falun Council in their first grade of high school in the years 1997-2003. For continuous variables means are given and standard deviations are in parentheses.

Variable	Non-applicants	Applicants		
		All	Offered	Not offered
Offered (%)	--	25.0	--	--
Grades ^a	-0.1 (1.0)	0.1 (0.9)	0.1 (1.0)	0.2 (0.9)
Parental income ^b	3.9 (2.4)	4.1 (2.1)	3.8 (2.1)	4.2 (2.1)
Summer jobs (%) ^c	54.2	66.4	94.8	57.0
Income in first grade ^d	9.2 (14.9)	8.5 (10.1)	10.0 (7.6)	8.0 (11.7)
Birth cohort (%):				
1980	17.8	7.7	5.8	8.3
1981	13.6	12.4	11.0	12.9
1982	12.2	15.0	16.9	14.4
1983	9.5	13.5	16.3	12.6
1984	10.8	15.4	19.9	13.9
1985	11.4	14.6	15.5	14.3
1986	10.8	11.7	10.2	12.3
1987	13.9	9.6	4.4	11.3
No.	1773	1447	362	1085

Note: (a) Original grades from compulsory school are in different scales before and after 1998 so we used the z-scores to enable a comparison over the years. (b) Parents' income when student was in the first grade (in SEK '00,000). (c) Income exceeding 2,500 SEK (about one week of fulltime work) is required. (d) SEK '000.

Table 1 shows descriptive statistics of the first graders. We have included two important variables being school grade of compulsory schooling (final grade usually at the age of 15 years) and parents' income calculated as father's income from work plus mother's income from work in SEK '00,000. The parental income is taken at the year the student was in first grade since the variable mostly varies between families rather than over time. Both variables presumably affect both the propensity of applying, obtaining a summer job and work experience while in high school as well as post-schooling income (cf Carr et al, 1996).

A few things are worth noting. Firstly, there seems to be no major difference between applicants and non-applicants as well as offered and non-offered with regard to background variables. Secondly, the proportion of girls with some experience of a summer job in the first grade is rather high – about 55% for non-applicants and non-offered and (unsurprisingly) almost 100% for girls offered a summer job by Falun Council. The high uptake of summer jobs amongst the offered girls also results in a somewhat higher average income compared to non-offered girls of about 25%. Thirdly, about a quarter of the applicants are offered a summer job however there is a variation between cohorts and years: the number of available slots (for both boys and girls) each year starting with 1997 was 84, 342, 240, 158, 269, 156 and 176 in 2003 as decided beforehand by the Council. This variation in the yearly number of offers points at a need for controlling for cohort effects in the analysis.

Table 2: Estimated logistic model for the (re-)application and offered probabilities.

	Prob. of Applying	Prob. of Re-applying	Prob. of Offer
Intercept	-0.46 (0.24)	-0.25 (0.40)	-1.09* (0.56)
Grades	0.23* (0.11)	0.11 (0.18)	-0.04 (0.25)
Parental income	-0.01 (0.01)	0.02* (0.01)	-0.02 (0.02)
Income 1 st grade	--	-0.07* (0.01)	--
Offered 1 st grade	--	0.31* (0.15)	--
Birth quarter dummies	Yes	Yes*	Yes
Cohort dummies	Yes*	Yes*	Yes
- Interacted with grades	Yes	Yes	Yes
- Interacted with parental income	Yes	Yes	Yes
No. obs.	3220	1138	1447

Note: Standard errors in parentheses. * indicates significant at 5% level.

Table 2 shows the estimated logistic model for the probability of applying both in the first grade and then re-applying in the second grade. Grades and parental income are occasionally statistically significant, but the magnitude of their effect is modest. It seems that the time of birth in the calendar year has little effect on the decision to apply, whereas the propensity of applying varies between years. Moreover, accumulated work experience lowers the propensity of re-applying, possibly because the student acquires a greater network of employers as the work experience accumulates. However, the girls offered in the first grade are more likely to re-apply in the second grade, which might follow from the offered student wishing to return to the same work place or a superstitious belief of the student as being lucky when it comes to this lottery. Table 2 also shows the estimated logistic model for the

probability of being offered a summer job by the Council in the first grade upon having applied. As expected in a random allocation of the summer job slots, none of the included variables affect the outcome.

3 Program effect of being offered in the first grade

Our main interest is not about the work experience and income while in the first grade of high school, but if the early contact with the labor market accumulates into a stronger future position on the labor market manifested by e.g. higher post-schooling incomes. However, we begin by examining how the income from work while in high school accumulates over the grades. Table 3 shows the girls' evolution of income while in high school.

Table 3: The accumulation of work experience while in high school (Income in SEK '000).

	Non-applicants	Applicants		Difference (%)
		Offered	Non-offered	
1 st grade				
Mean	9.2	10.0	8.0	25
Q1	0.0	5.4	0.0	--
Median	3.8	7.4	4.5	64
Q3	12.4	12.4	11.8	5
2 nd grade				
Mean	23.0	29.4	24.2	21
Q1	3.1	12.9	3.2	303
Median	14.5	25.4	17.8	43
Q3	32.1	39.2	34.1	15
3 rd grade				
Mean	57.9	78.9	65.0	21
Q1	13.3	38.4	29.0	32
Median	44.5	72.3	54.9	32
Q3	85.7	111.8	91.3	22
No.	1773	362	1085	362/1085

The first thing to notice is that most of the work experience comes in the later part of schooling, but that the majority of the girls start acquire some experience already at the beginning of their schooling. We do not know the wages for non-applicants and non-offered applicants, however Falun Council pays SEK 2,500 per week for full-time work to the offered students and this value provides a rough indication of the wages paid to girls doing other summer jobs. The income while in high school is similar between non-applicants and non-offered, whereas offered girls consistently have a higher income than non-offered – judging from the statistically strongly significant difference in mean income, offered girls have some 20-25% higher incomes than non-offered depending on which grade is being considered.

The offered girls benefitted from the summer job program. The offered in first grade maintain a difference of 3 weeks⁸ more work experience compared with the non-offered. The gap between offered and non-offered is further accentuated upon graduation when the difference in work experience has grown to 6 weeks (32 versus 26 weeks). Hence, Granovetter’s thought of an early contact gradually accumulating in the course of time seems relevant for these students.⁹ In conclusion, the program appears to have induced a persistent increase in work experience of some 25%.

The summer job opportunity is open to every high school student in Falun and it is therefore reasonable to focus on the average program effect of being offered a summer job while in first grade high school. Because the council’s summer job allocation is made via a lottery, we may estimate the effect as:

$$(1) \Delta_t = E[Y_t^O] - E[Y_t^{\bar{O}}]$$

and $E[Y_t^S]$ is the expected post-schooling income (Y) after t years from high school graduation in either of the cases having had the experience of council summer job ($S = O$) or not ($S = \bar{O}$). Considering the positive skewness of the distribution of post-schooling income, we estimate the program effect on log-income meaning that the estimated program effect is the relative difference in post-schooling income.

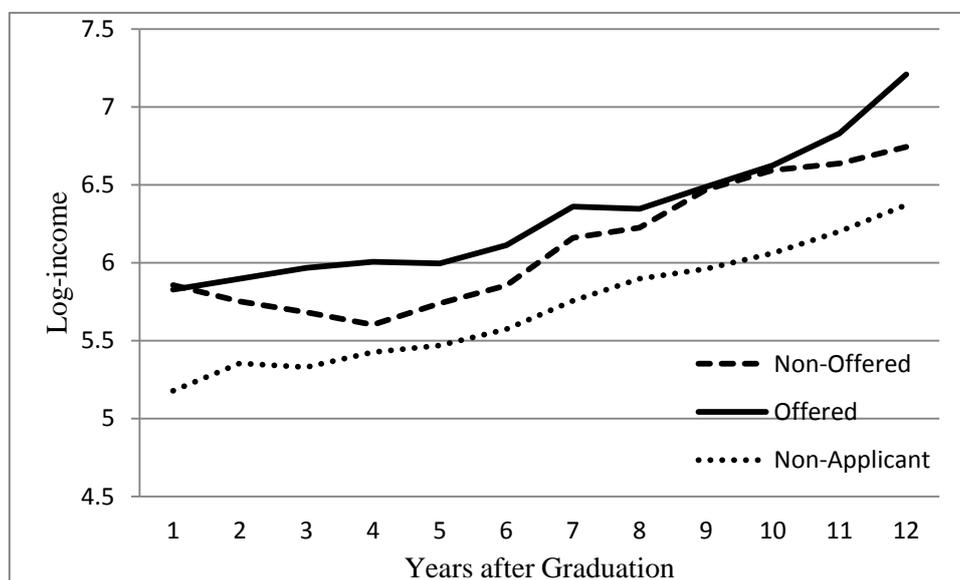


Figure 2: Trend of yearly mean (log) post-schooling income for offered, non-offered and non-applicants in the first grade of high school.

⁸ Number of full-time weeks are calculated as income divided by SEK 2,500.

⁹ Knabe and Plum (2013) find low-paid jobs to be a springboard to better paid jobs, particularly for low-skilled workers. One may speculate that summer jobs might be comparable to low-paid jobs.

Figure 2 shows the trend of average yearly income (in log) up to 12 years after graduation for offered, non-offered and non-applicant in the first grade¹⁰. The visual impression of Figure 2, that the summer job program affected the girls positively, is supported by a regression model and formal statistical testing. We regressed post-schooling incomes on an indicator variable for offered or not, including a variable which represents years after graduation. In using the SAS procedure GENMOD, we gave due account in the regression analysis to having repeated measures of post-schooling incomes of the applicants (Liang and Zeger, 1986 and Littell, Milliken, Stroup, and Wolfinger, 1996). The estimated program effect on post-schooling income is 0.19 (standard error of 0.10) with a p-value of 0.03 for a one-sided test. To conclude, it seems that the summer job program induced some 25% increase in work experience while in high school. In addition, it seems that the offered girls had an increase in post-schooling income of 19% compared to the non-offered. Hence, the program appears to have been both of a short-term and a long-term benefit to the girls.

4 Estimation of the treatment effect

Offered or not, and indirectly, summer job or not is a crude measure of work experience. The post-schooling effect is presumably more related to the quantity of the work experience as discussed by Carr et al (1996) and Ruhm (1997) who used hours/week as a measure of work experience. The program offered 3 weeks of work experience of 40 hours a week, but the offered girls received on average 4 weeks of work experience. Further, the girls not offered still received work experience since about a half of them had a summer job in their first grade (cf Tables 1 and 3). Consequently, a comparison between offered and non-offered is a comparison between two groups which differs in the magnitude in work experience. In this section treatment is considered the total work experience measured as the accumulated income while in high school.

We accumulate incomes up to the first semester of the third grade, since we cannot distinguish¹¹ between income within the third grade and a possible ensuing regular work in the fall after graduation. However, Table 3 showed that the relative difference in mean income between offered and non-offered was constant over the high school years suggesting this choice to be inconsequential. Given that the offered had 43% higher work experience (median value in Table 3) and an estimated increase in post-schooling income of 19% we

¹⁰ We have post-schooling income for all the 3220 girls to five years after graduation, thereafter about a seventh of the girls' income are lost each year. The proportion of students without post-schooling income is substantial directly after graduation as many of them entered at a tertiary schooling.

¹¹ Income from work is reported as a yearly total.

expect to find an elasticity somewhere about 0.5. Table 4 shows the results when regressing the logarithm of post-schooling income on the treatment variable, after accounting for the repeated observations as explained in relation to Figure 2. The model is

$$(4) \ln(Y_{it}) = \alpha + \gamma \ln(Dose_i) + \delta t_i + \beta_1 x_1 + \dots + \beta_k x_k + \epsilon_{it},$$

where t_i is the years after graduation for the i :th girl and $Dose_i = \sum_{t=-2}^{-1} Y_{it}$ is her accumulated income while in high school. We first estimate the model using all the 3220 girls of first grade using their accumulated income in high school as the treatment. The (statistically significant) elasticity is estimated as 0.34. This estimation corresponds to the conventional observational analysis of the effect of work experience while in high school as conducted before by e.g. Carr et al (1996) and Ruhm (1997).

Table 4: Estimated model (4) by means of Generalized Estimating Equations (GEE).

Variable	All first grade girls	First grade applicants	
		IV(a)	IV(b)
Intercept	3.96* (0.16)	3.90* (0.89)	3.93* (0.87)
Accumulated income in High school (<i>in log</i>)	0.34* (0.02)	--	--
Predicted accumulated income In High school (<i>in log</i>)	--	0.37* (0.18)	0.41* (0.20)
Grades	0.12* (0.04)	0.10 (0.06)	0.02 (0.06)
Parents income	0.01 (0.02)	-0.02 (0.02)	-0.03 (-0.02)
Years after graduation (t)	0.09* (0.01)	0.08* (0.01)	0.08* (0.01)
Birth quarter dummies	Yes	Yes	Yes
Cohort dummies	Yes*	Yes	Yes
No. girls	3220	1447	1447
No. (repeated) obs.	27666	12222	12222

Note: Standard errors in parentheses. * indicates significant at 5% level.

The observational estimator is susceptible to selection bias. It comes natural to expect that the estimator would over-estimate the effect because some unobserved “ability” or “skill” was not accounted for. However, it is also possible that girls believing to have good academic prospects as well as good labor market prospects prefer to focus on their studies while in high school, in which case the observational estimator might under-estimate the effect. To exploit the experimental characteristics of the data, we use an Instrumental Variable (IV) approach in line with the two-stage framework proposed by Angrist and Kruger (1991). We first estimate

$$(5) \ln(Dose_i) = \mu + \lambda z_i + \omega_i,$$

where z_i is the instrument in this case being the offer or not upon applying in the first grade. Thereafter the predicted Dose from (5) replaces the observed Dose in model (4).

We consider two competing specifications of model (5). The instrument is the binary variable offered or not in the first grade which should induce truly an exogenous variation in dose because of the lottery (IV(a) in Table 4). The binary characteristic of the instrument is potentially a shortcoming of it (see e.g. Gelman and Hill, 2007, p. 224). We therefore also consider a specification in which all background variables are included (IV(b) in Table 4). Table 5 gives the estimates of model (5). As could be anticipated from Table 3, the instrumental variable Offered works well with a F -statistic of 38.4. An offer leads to higher expected accumulated income while in high school (i.e. a higher dose). Including the background variables into model (5) has little effect on the estimate of Offer, but reduces substantially the F -statistic due to the loss of degrees of freedom.

Table 5: Estimated model (5) for applicants in the first grade.

Variable	Specification	
	a	b
Intercept	4.74* (0.05)	4.22* (0.17)
Offered in first grade	0.59* (0.10)	0.53* (0.09)
All X variables from Model (4)	No	Yes*
F -statistics	38.4	11.0
No. Obs.	1447	1447

Note: Standard errors in parentheses. * indicates significant at 5% level.

Table 4 gives the estimated model (4) for the two choices of predicted dose given in Table 5. The model is estimated using Generalized Estimating Equations (GEE) in order to appropriately account for the repeated measures of post-schooling income for the students (see Liang and Zeger, 1986).

Since the estimates of the treatment effect are similar for the two specifications, we focus on the estimated model of specification IV(b). The background variables are generally not significant. As expected, the post-schooling income increases by years after graduation with a point-estimate of 8% per year. Of most interest for this study, the treatment is significant with a point-estimate of 0.41 suggesting that a one per cent increase in accumulated income while in high school causes a 0.41% higher post-schooling income. One may wonder whether the dose-effect wears off by time. To check that we re-estimated the model (4) including an interaction of dose and years after graduation (t), the statistically insignificant point estimate was -0.01 with a standard error of 0.02. Hence, the effect of work experience in high school seems to be strong and persistent later in the working life.

The estimation of model (4) required us to make a number of arbitrary assumptions, which we afterwards have checked with sensitivity analysis. First, we assumed a linear growth in logged post-schooling income, but the estimated elasticity was unchanged when we included a quadratic term to model IV(b). Second, the dataset was incomplete as we did not have a 12-years follow-up after graduation for all the applicants. A re-estimation of IV(b) using only a 5-years follow up resulted in an estimated elasticity (standard error in parenthesis here and below) of 0.40 (0.20). Third, the cohorts may have experienced different quality of treatment. Using only the cohorts of 1980-1983 we estimated the elasticity to be 0.30 (0.23). Fourth, directly after graduation many girls had no or a low income presumably because of university studies. We re-estimated the model using only post-schooling income five years and on after graduation and found an elasticity of 0.46 (0.24). We also checked the elasticity for the subset of girls with parents' income below the average and found an elasticity of 0.43 (0.27). Fifth, the repeated observations on post-schooling income called for a sophisticated estimation method. We also used OLS on model (4) and found the elasticity to be 0.40 (0.09). Moreover, we estimated the model for post-schooling income of 2, 5, and 8 years after graduation with estimated elasticities of 0.31 (0.26), 0.48 (0.27), and 0.38 (0.36).¹²

The sensitivity analysis also indicated some potential misspecifications of model (4). The first concerns the necessary assumption of a homogenous effect with regard to the girls' academic performance: it is not permissible to introduce an interaction between dose and other factors in the two-stage framework. However, Table 6 shows income while in high school as well as post-schooling income for subsets of girls of varying academic achievements.

Table 6: Treatment effect and academic performance.

	No. of Offered / Non-offered	Effect estimate of Model IV(b)	Mean-difference of logged income for Offered vs Non-offered		
			In high school	Years after graduation	
Subset: Girls with...				5	7
Grades in Z-score < 0	159/413	0.82 (0.31)*	0.90	0.42	0.51
Grade in Z-score in (-1,1)	256/710	0.45 (0.22)*	0.47	0.25	0.19
Grades in Z-score > 0	203/672	0.09 (0.23)	0.39	0.13	0.02

Note: Standard errors in parentheses. * indicates significant at 5% level.

The work experience in high school induced by the offer varies from an increase of about 90% for the academically weaker girls to about 40% for the girls with above average grades

¹² To account for the uncertainty in dose induced by model 5, the standard errors of OLS ought to be inflated by about 10% (Gelman and Hill, 2007, p. 223-224). Appropriate inflation of the standard errors of GEE is substantially more challenging and not done here. However, the inflation of OLS can be taken as a rough approximation for GEE.

(Table 6). Following up on the girls five and seven years after graduation, the offered girls have higher incomes than those not offered (ranging from 2% to 51%). However, the difference is most pronounced for the academically weaker girls. Re-estimating model IV(b) for the three subsets we find the estimated elasticity to range from 0.09 to 0.82. The analysis is informal, but it suggests that the program and the work experience while in high school was particularly beneficial to the academically weaker girls who one would expect to fare worse on the labor market later in life. Knabe and Plum (2013) found less-skilled persons to benefit the most from low-paid work experience (cf also Hensvik and Nordström-Skans, 2013). Another concern arising from the sensitivity analysis is whether the elasticity remains constant irrespective of the magnitude of work experience while in high school. We re-estimated model IV(b) for those with low and high predicted treatment and found the estimated elasticity to be 0.60 and 0.03 respectively suggesting that the elasticity depends on the magnitude of work experience of high school girls.

As a consequence of the potential heterogeneity in program and treatment effect as well as the fact that application to the summer job program was voluntary, the interpretation of the elasticity for a wider group of Swedish high school students needs to be done with some caution.

5 Conclusion

In this paper we addressed whether early contacts with the labor market, in the form of summer jobs for high school students, improved the transition from schooling to work. This issue is important since high youth unemployment rates prevail and policies of this kind have been proposed and targeted to high school students in many countries. The empirical evidence on the issue is hard to find, particularly because the few existing studies are plagued by potential selection bias.

We studied the program effect of summer jobs offered by a Swedish Council – Falun – under the umbrella of a national summer job program. There were no indications that Falun differed from the many other councils in Sweden that take part in the national summer job program except for the fact that Falu Council both allotted the summer jobs amongst the applicants by means of a lottery and kept a historical record over applicants. In the program the students performed low-skilled work related to elderly care, gardening, cleaning, and tutoring of kids which are tasks routinely run by the councils. The duration of the summer job

was set to 3 weeks during the 9 weeks of school holidays (Swedish high school students' work experience predominantly occurs during the summer holiday).

What was the impact of the Council's summer job program? Minor we would say. We have previously studied boys in the program and we found them less likely than girls to apply to the program and if they did apply they did not benefit of it (Alam et al, 2013). Furthermore, half of the girls did not apply to the program and the ones applying only had a 25 percent chance of being offered a summer job by the Council. Consequently only 5 percent of high school students in Falun benefited directly from the program with 19 percent higher post-schooling incomes. In our search for literature on general summer job programs for high school students, we found no previous study and therefore we cannot determine whether our results are typical for summer jobs programs. However, our conjecture is that Falun and its students is representative of Swedish councils in general.

Yet, this far, the Council (or the government) has not considered targeting the program to subgroups of students. As discussed before, an explanation to why girls and particularly academically weak benefitted from the program is presumably that the summer jobs of the program were in the public sector which primarily attracts female workers, and some of the girls in the program thereby acquired experience directly relevant for their future work tasks.

The outcome of the lottery affected the girls' accumulated work experience while in high school. We used the lottery induced exogenous variation to examine the causal effect of accumulated income while in high school on post-schooling incomes up to at the most twelve years after graduation. We found an elasticity of 0.41. As a result this contradicts the recent findings of Hotz et al (2002) and Parent (2006) in US and Canadian settings, while the result is more in line with a relatively old non-experimental study (see Ruhm, 1997). His use of senior year and another definition of dose render the comparison a bit difficult. However, the non-offered girls had on average worked corresponding to 26 weeks fulltime (SEK 65,000) by the year of graduation (see Table 3). Say that Ruhm's 20 hours/week of work experience in the last year of high school amounts to adding 20 weeks of fulltime work experience to the existing 26, we then get an increase in dose of some 77% that would cause 31% higher post-schooling incomes (assuming a linear dose-effect). Hence, our findings suggest a slightly stronger effect of work experience than Ruhm's. The effect also seems to be persistent as we followed the girls to at the most the age of 32 and there was no indication of the effect to vanish over time.

Interpreting our results as a general assessment of the importance of work experience while in high school should however be done with some care. In an attempt to check for

heterogeneous effects, we found indications for the effect to be substantially higher for the girls with the weakest academic performance, thereby suggesting that the estimated elasticity of 0.4 overestimates the average elasticity for high school students overall. The exogenous variation induced by the lottery primarily came from the girls with the weakest academic performance who are likely to directly opt for the labor market (of the public sector) upon graduation.

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