Lost Boys: Post-compulsory Education and Crime

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ABSTRACT

This paper studies the effect of post-compulsory education on crime by exploiting a regression discontinuity design generated by admission cutoffs at upper secondary schools in Finland. We combine register data on secondary school applications and enrollment with individual data on criminal convictions and follow individuals up to 10 years after the first upper secondary school application. Our results show that successful applicants near the admission cutoffs have larger probability to obtain upper secondary degree than applicants just below the cutoffs. They are also less likely to commit crimes, both in the short and medium run.

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1 Introduction

The research on the effects of educational investment has moved beyond the immediate economic returns in recent years and focused more on non-pecuniary benefits of education.[1] One of the main questions of interest in this new branch of literature is the effect of educational attainment on criminal activity. This interest is motivated by the well-known negative correlation between educational attainment and crime. It is well-documented that individuals with very low levels of attainment, often not exceeding compulsory education, are vastly over-represented among offenders. According to Harlow (2003), 68% of State prison inmates in the United States did not have a high school diploma in late 1990's. In Finland, 48 % of all 25-45 offenders, and 75 % of those sentenced to prison, had no post-compulsory degrees in year 2011, while the corresponding figure among the same age population was 15 percent.

The aim of this paper is to study whether failing to be admitted into post-compulsory education has a causal effect on criminal activity. We exploit the regression discontinuity design (RDD) generated by the assignment mechanism into secondary education in the Finnish education system. In this assignment mechanism, admission to post-compulsory secondary education is mainly determined by compulsory school grade point average (GPA). Every year approximately 5 % of the cohort fails to gain entry. The system creates programme-specific discontinuities in admissions into secondary education that we use to identify the effects of education on crime. In this paper we use individual-level application data and sentencing records to measure the effect of admissions to secondary education on criminal activity.

Economic theory suggests several mechanisms through which educational attainment can affect the propensity to criminal behaviour.[2] The mere fact of being enrolled in an educational institution may reduce the likelihood of committing crimes through incapacitation effect. Since the opportunities to engage in criminal activity are more limited in school environments, enrolled individuals should be less likely to commit crimes. On the other hand, since the school environment is also a social environment it may directly affect the probability of engaging criminal activity that is social in nature through the social interaction effect that is ambiguous in sign. Educational attainment may also affect criminal behaviour through increased human capital that increases the returns to legitimate work and makes the opportunity cost of crime higher. It also affects people's risk aversion and patience. The consensus in

[1] See Oeropoulos and Salvanes (2011) for a survey on this literature.
[2] Lochner (2011) provides a survey on the theoretical and the empirical literature on the effect of education on crime in economics.

the literature is that the net effect of education on crime should be negative through these different mechanisms.

Naturally, the negative correlation of educational attainment and crime can reflect many factors that are typically not observable in the available data. Previous empirical have tried to tackle this problem by exploiting quasi-experimental settings. An early example of this strategy is the study by Lochner and Moretti (2004) who exploit variation generated by changes in compulsory schooling laws across different states in the U.S to identify the effect of education on crime.[3] Using a combination of state-level data on the length of compulsory schooling and individual data on convictions they find evidence of negative effects of educational attainment on violent and property crime committed by adults. Since these papers typically concentrate on the effect of completed education on crime, they should be seen as identifying a combined effect of education on crime through both human capital and incapacitation channels. Similar types of identification strategies have also been used to study the effect of education on juvenile crime. Anderson (2014) as well as Beatton et al (2016) exploit regional variation in minimum drop out ages to study the effect of education on crime for 16 to 18 year olds and finds effects that are in line with the incapacitation effect of education.[4]

While these earlier studies provide evidence on the effect of the rules that govern compulsory education on crime, the effect of post-compulsory education has received relatively little attention in the literature.[5] Furthermore, since these studies typically use state-level data or cross-sectional individual level data they fail to provide evidence on the long-term effects of education on criminal careers. More recently, Landersø et al (2015) have shown that higher school starting age delays the onset of criminal trajectory and, for boys, also affects crime negatively at older ages in Denmark.[6] While the results on the effect of school starting age confound the incapacitation effect of delayed graduation remaining in school with the effect of relative age within class, these suggest that schooling may have long-term effects on crime.

Our paper complements the literature on crime and education several ways. First, we provide evidence on the causal effect of enrolling in post-compulsory education on crime. This is in contrast with most of the earlier literature that focuses on the effects of compulsory school length on criminal behavior.

[3] Machin et al (2011) and Hjalmarsson et al (2015) use a similar type of strategy with British and Swedish data, respectively.
[4] The results in Jacob and Lefgren (2003) as well as Luallen (2006) also focus on the incapacitation effects of schooling by exploiting school closure days and teacher strikes, respectively.
[5] The only existing studies that focuses on post-compulsory education, Machin et al (2012), exploits the expansion of the UK post-compulsory education system to study the effect of post-compulsory education on crime.
[6] Cook and Kang (2014) and McAdams (2016) also study the effect of school starting age on crime with the U.S data.

Second, since we can distinguish between the effect of enrollment and graduation we can disentangle the incapacitation and human capital effects of education for the same individuals. We argue that this kind of approach provides much clearer results on the mechanisms through which education affects crime. Finally, we follow individual's and record their criminal activities, education and labor market outcomes 10 years after finishing compulsory schooling, i.e. after the time they first apply for post-compulsory education. This allows us to study the effects of education on criminal careers, a topic that has not yet received attention in the literature.

The key to our analysis is the Finnish registry data that allows us to link individuals from school application registry to registers on education, crime and labor market outcomes over several years. The data contain a unique person id's that allows us to merge the data sets to other registers and follow individuals over time. We pick individuals that finished their compulsory schooling in years 1996-2002 and merge them to register data on enrollment in education, employment status, earnings, and criminal convictions over years 1991-2014. The school application registry has detailed information on preference-ranked applications to different programs, school grades and admission scores, as well as information whether individual was accepted to a given program (within the school). This allows us to use the admission scores as a running variable for each program, and investigate how being above the entry threshold affects entry and other outcomes. We focus on oversubscribed schools and compare the candidates that were just above the admission cut off to ones that just failed to be accepted. We follow individuals 10 years after the admission date to investigate the effect of school entry on crime, education and employment patterns. This allows us to distinguish between direct incapacitation effect of schooling and the effect of finishing post-compulsory degrees (human capital channel).

Our results indicate that successful candidates are more likely to obtain upper secondary school degree than non-successful candidates near the admission cut offs. We also find that exceeding the admission cut off decreases crime and increases probability to be in work or enrolled at any school during the first year after application. The difference in the crime rates remains until 10^{th} year after admission cut off. When distinguishing between different types of crimes, we find that the admission to upper secondary school mainly affects property crimes.

The remainder of the paper is organized as follows. Section II describes the school application system in Finland. Section IV present the data. Section V describes the empirical methodology. Section VI present the results. Section V concludes.

2. Upper secondary school admissions in Finland

The length of compulsory schooling is 9 years in Finland[7]. Children start school in the fall of the calendar year during which turn seven. The last year of compulsory year ends in the summer during the calendar year when the students turn 16. The students apply to upper secondary schooling this spring. The upper secondary school track can be either an academic high school track or vocational school track (leading normally to a profession, such as hair dresser, car mechanic etc.). Figure 1. Illustrates the structure of education system in Finland.

Our focus will be on students applying to upper secondary schools in Finland. The allocation to places to upper secondary schools in Finland takes place through a centralized application system maintained by the Finnish National Board of Education (FNBE). Individuals can apply to five different educational programs (either programs in different schools or different programs within schools). The allocation of places in each program is based on program-specific admission scores variable. For most schools, this score is solely based on average grades from the last (9^{th}) year of compulsory school. Some schools give extra points for experience, gender, admission tests or other preferred background variables. Weights given to different criteria vary across programs.

Student selection to each track follows a DA algorithm:
ROUND 1: Each applicant is considered for her preferred choice. Each program tentatively accepts applicants according to its selection criteria up to its capacity and rejects lower-ranking students.
ROUND k>1: Applicants rejected in the previous round are considered to their next preferred program. Each program compares these applicants and admitted applicants from previous rounds, rejecting the lowest-ranking students in excess of its capacity. The algorithm terminates when every applicant is matched to a track or every unmatched candidate is rejected by every track he had listed in his application. At the end of this automated admission stage applicants receive an offer according to the allocation result. Rejected applicants are placed on a waiting list in rank order.

Each year around 5 percent of students do not get a place in upper secondary schools in Finland, although there are more slots than compulsory school leavers. The reason for this is that older cohorts can also apply for upper secondary school places. Every year around 30-40 percent of all applicants had finished their compulsory schooling before the application year. Typically these older applicants have

[7] This holds during our study period. From beginning of 2015 the pre-school year become compulsory, extending the actual length of compulsory schooling to ten years.

been accepted in previous years but wish to switch program. Older applicants also include applicants who were rejected from all programs they applied to in previous years.

3 Data and Sample Construction

3.1 Data sources

Our primary data set is Finnish joint application registry containing information of Finnish students graduating from compulsory school. The data includes grades for all subjects (Mathematics, Finnish, History, …), grade point average, school id for the compulsory school, applications in preference ranking, program codes for programs applied to, admission scores (for each program individual applies to), whether the applicant was offered a place and whether she accepted the place. The data also contains a unique person identification code that allows us to link the data to other registers and follow individuals over time.

We focus on seven cohorts graduating from compulsory schooling in years 1996-2003 and merge these data to other registers: FLEED (Finnish linked employer employee data), data on convictions from criminal district courts ("Prosecutions, sentences and punishments") and student registry. The FLEED data cover years 1991-2014 are contains information on obtained education degrees, taxable income and earnings unemployment benefits, status (whether enrolled at school, in education or in employment) and parental benefits. The data also has rich information on demographics, such as age, marital status, cohabitation status, number of children. In addition the data has municipality, firm and plant codes that allow us to link more information from other registers.

The crime outcomes are based on convictions from criminal district courts ("Prosecutions, sentences and punishments"). These data have information on all convictions, such as the punishment (no conviction, probation (conditional imprisonment), prison sentence, fine etc. The conviction classification is at four-digit level revealing the type of crime. The data also contain information on both time of crime, and time of conviction, and the principal crime for each conviction (5-digit), and the length of possible prison sentences.

4.2. Sample

We exploit the admission cut offs to upper secondary educational programs to estimate the causal effect of school admission. For the RD set up to work we need enough observations around the

admission threshold for each program, thus we restrict the sample the following way: First, we take only applications to programs that rank their candidates on the basis of admission points. Second, we take only applications to programs that have - on both sides of admission cut off - at least five candidates, for whom this program was their best chance of getting into any upper secondary school. In practice this restriction drops many "good schools" as the applicants that are rejected from schools with high admission standards are likely to be admitted to other schools. These restrictions reduce our sample size significantly. From total 14,200 program/year -combinations we focus only on 570. These programs had around 62,000 applicants between 1996 and 2003 (13% of total 480,000 applicants). Among these 7,200 applicants out of 22,100 in the data were rejected from all tracks.

Table 1 presents descriptive statistics on the programs included in the estimations sample and all education programs. As one can see from upper panel (a) the sample education tracks have more applicants and more likely to be academic high school tracks than all other tracks. The minimum GPA for the admitted applicants in the sample track is also slightly higher than the one for all other tracks. Table 1 b. describes characteristics and outcomes of accepted and rejected applicants to these tracks. Applicants into sample tracks are concentrated to bigger cities. A bigger share of them also speaks another language as mother tongue than Finnish or Swedish. The rejected candidates have obviously lower GPAs, but the rejected applicants differ less from accepted applicants in our sample education tracks than in other tracks. The lower panel in table 1 b shows the means of educational outcome variables. The applicants to sample education tracks have a bigger share that have not been admitted to any track (because of construction) and enrolled to any school. There is a clear difference in these outcome variables among all and rejected applicants, as expected. Rejected applicants have much lower propensity to have any post-compulsory education degree by 10 years since application date. They have also much higher propensity to commit crime, than other applicants (21% of those rejected from sample education tracks, as compared to 11% of all applicants to sample educational tracks.) We next analyze in more detail whether the difference in outcomes remains when comparing individuals close to the admission thresholds and taking into account the selection into treatment by running variable.

4 Empirical Set Up

5.1. Running variable

In our regression discontinuity framework we use admission scores as the running variable. While GPA from compulsory schooling is the main determinant of the admission scores, different schools apply different scales, give different weights to different grades and some use other criteria in addition to GPA. To make the running variable comparable across different educational programs we rescale the admission scores to GPA units.[8] The cutoff score to each program is defined on the basis of lowest scoring candidate that was observed being offered place to this program[9]. The running variable, r_{ikt}, for applicant *i* to a track *k* in a year *t* is defined as his distance to the cutoff point in GPA units τ_{kt}.[10]

$$r_{ikt} = (c_{ikt} - \tau_{kt})$$

These program-specific running variables equal zero at the cut off point for each program in a given year. Figure 2 shows the distribution of this standardized running variables in our estimation sample. As we can see the distribution is smooth around the threshold.

5.2. Specification

To investigate how entry to upper secondary school affects individual's crime and labor market outcomes we use RD regression framework that exploits the admission cutoffs at each education tracks. The reduced form of interest is:

$$y_{ikt} = \alpha_{kt} + \rho Z_{ikt} + (1 - Z_{ikt}) f_0(r_{ikt}) + Z_{ikt} f_0(r_{ikt})$$

[8] In practice we estimate program-specific regression models where admission scores are explained with the GPA and then divide the score with the coefficient of GPA. This way one unit change in GPA has the same effect on the rescaled scores in each program.

[9] We only observe individuals who were reached after the automated admission round, and who did accept the offer at this point.

[10] Several earlier papers [add references] generate running variables based on rank distance to cut-off. In practice they measure the fraction of additional other applicants for whom an applicant could afford losing and still be accepted to a program. In a multiple cutoff case with variable number of applicants to each program this would not necessarily identify the program where the applicant has best chance of being accepted to. Our rescaled admission scores attempt to measure how much worse GPA the applicant could have had while still reaching the admission cut off. An added benefit of GPA units compared to rank distance is that in programs that relatively few applicants, GPA distance ensures that applicants on both sides of cut off are relatively close (Ichino)

where y_{ikt} is the outcome variable (e.g. enrollment, degree, propensity to commit crime) for applicant *i* to track *k* in year *t*. Z_{ikt} is a dummy variable indicating whether applicant is above the cut off to track *k* in year *t*, and r_{ikt} is the running variable that is centralized around cut off point (gets value 0 at cut off) as shown in equation 1. The effects of running variable are controlled by first or second order polynomial functions, $f_0(r_{ikt})$ and $f_1(r_{ikt})$, that differ on either side of the cut off.[11]

The idea in the RD estimation is that once we control for the effect of the running variables, the coefficient ρ captures the effect of being above the threshold on different outcome variables. In other words, ρ captures the discontinuity in the outcome variables at the threshold and there should be no other reason for this discontinuity than the fact that propensity to get an offer to education track changes at this point. The idea in RD design is that near the admission cut off the treatment status is as good as randomly designed. We do however need to have enough observations around the cut off, as in all settings random samples approach the sample averages once sample size increases (by law of large numbers).

In practice we employ nonparametric regression technique (Hahn et al, 2001) using both local linear and quadratic polynomial functions of the assignment variable as suggested in Gelman and Imbens (2014). The effect of being above the cut off is estimated as a weighted OLS fit of equation (1) where the triangular shaped edge kernel is centred at admission thresholds:

$$K_h(a_i) = 1\left\{\left|\frac{a_i}{h}\right| \leq 1\right\} * \left(1 - \left|\frac{a_i}{h}\right|\right)$$

h is the optimal bandwidth derived using the selection procedure in Calonico et. al. (2014). For the most flexible specification, we estimate the optimal bandwidth for each education track separately. Standard errors are clustered at the education track level.

In addition to our reduced form specification we estimate and IV, thus using a fuzzy RD design. We define the treatment variable for these regression, D_i, to indicate that an applicant is *observed* to receive an offer in the data. We run a weighted 2SLS estimation where we instrument D_i on Z using the same empirical strategy as above. The first and second stage regression are of the form:

$$D_{ikt} = \alpha_{kt} + \rho Z_{ikt} + (1 - Z_{ikt}) f_0(r_{ikt}) + Z_{ikt}(r_{ikt}) \quad (3)$$

$$y_{ikt} = \alpha_{kt} + \rho D_{ikt} + (1 - Z_{ikt}) f_0(r_{ikt}) + Z_{ikt}(r_{ikt}) \quad (4)$$

[11] We also estimated a specification where we the effects of running variables are allowed to differ by each track.

where the specification (3) is the first stage, indicating how being above the admission cut off increases the likelihood of getting an offer to any school, and the second stage equation (4) shows how getting an offer to any track is related to the outcome variables.

It is important to note that getting an offer to any track differs from getting an offer to cut off track, as some applicants below the threshold for a given track may still be eligible for another school. We illustrate this next section by figures.

5 Results

6.1. Graphical presentation of reduced form effects

Figure 3 plots offers to tracks as a function of the running variable, standardized admission point variables. Each plot corresponds to a mean within one-unit binwidth. In left hand side panel we plot the offer to cutoff track. As expected, there are no offers to cut off tracks below the cutoff point. At the cutoff point the share of offers jump to around .3. The reason for this share not to jump to one is that we use all applications to given education tracks. As applicants can apply to maximum 5 different tracks, many applicants may have been accepted an offer to another education track, and thus not receiving an offer to this one. The right hand side panel plots the offers to any school as a function of running variable. Now there are offers on both side of admission cut off, as many applicants may have been applied also to schools with lower or higher admission point criteria. There is however a clear discontinuity in the offer propensity, it increases from below .6 to .75. The reason why we do have some applicants that do not receive an offer to any school even though on the basis of admission point variable qualify for the cutoff school, is that we do not observe only offers that were observed being accepted at the end of automatic round. It may be that some individuals were never reached and thus not been offered a place.

Figure 4 shows offers and enrolment next to each other. Enrollment describes the enrollment information at end of the calendar year, while offer is a variable describing whether accepted an offer after the automated round in summer. As we can see, there is a clear visible discontinuity also in enrollment at admission threshold. Figure 5 shows the share completing an upper secondary degree by 3 or 10 years. There is a clear jump in the probability to obtain a degree in 3 years. This difference does not fade away, although diminishes by year 10. This indicates, that failure in upper secondary school entry does not only postpone education, but also diminishes changes of ever getting a degree.

Next figure plots the propensity to commit any crime within first school year after the admission separately for all applicants (left hand side of figure 6), and for male applicants (right hand side). The results show that there is a visible discontinuity in the crime propensity, especially in the male sample.[12] The jump in the cumulative propensity to commit crime by year 10 (figure 7) around threshold is smaller, but still clear for males.

6.1. Regression results

Next we turn to our regression framework. We start by testing the validity of our set up, and show how the admission cut off point is related to background characteristics of individuals. Table 2 reports the estimated effect of being above cut off point for a rich set of background variables. Again we run the estimations separately for all applicants and for males. Reassuringly, there seem to be no significant discontinuities in the background characteristics of the applicants at the threshold. The only significant differences are for gender in total sample, and for mother's education or father's inactivity status in male sample (that goes to opposite directions).

Table 3 report the reduced form results for schooling outcomes. As shown in figures there is around 20 percent point (21 for males) increase in probability to getting an offer to any post compulsory school when above cut off. Enrollment increases by 13 percent point, which corresponds to around 18 % increase when compared to counterfactual mean above the threshold. Finally, there is a clear increase (3 % for all, 4 % for males) in the probability of obtaining any post compulsory degree by10 years after admission cut off. This suggest that failure in obtaining an offer to upper secondary school admission, not only postpones education, but affects the propensity gain a degree.

Table 4 report the IV results using the admission cut off variable (being above the threshold) as an instrument for getting an offer to any post compulsory school. Since the first stage indicates around 20 percentage point increase in the probability to get any offer, these effects now roughly equal five times the reduced form estimates. Table 4 report that enrolment increases by 60 percentage points, which is a very big increase when compared to complier counterfactual mean of 25 percentage.[13] The propensity to obtain any degree by 10 years raises by 20 percent for all, and 25 percent for males.

Next we turn to our crime results. Table 5 report the results of the reduced form specification. Success in school entry is associated with a clear reduction in criminal activity during the first school year after

[12] The figures describing offers, enrolment, and degree were very similar to males than for all.
[13] This is the expected outcomes among compliers if they had not received an offer.

admission for all and for males. The estimates for the cumulative crime rates are also negative but imprecise. The IV results in table 6 indicate a sizeable reduction in the criminal activity as compared to a counterfactual mean in the first year.

To further investigate the pattern of criminal activity in the years following school admission, we report the effects of getting an offer on criminal activity by years since admission for males. Figure 8 shows that there is a clear reduction in criminal activity in the first two school years after admission. In the third year the effect disappears, which may be due to the timing of enrollment. The duration of upper secondary schools vary between two to three years, and it may be that some applicants that enrolled schooling in the first year may be out of the school by this year. (Figure 11 shows enrollment by years since admission). On fourth year, there is again an effect which is in line with many individuals entering labor market at this stage. Next figures report the cumulative crime outcomes for all crime types (figure 9), and by division into violent and property crime (figure 10). The reduction in criminal behavior seem to be driven by reduction in property crime, as we find no impact on violent crimes.

Figure 11 shows the effect on probability of being without work or education (nor in military). We see that being offered a place in school reduces the probability of being without education or employment in the end of the year. While we find no effects on the next few years, there seems to be increased probability of inactivity in some later years (6 and 10) indicating that failure in school entry may have longer lasting impacts on applicant's outcomes.

6 Conclusions

While a large literature had documented that crime and education are related, we still know little about the mechanism how education influences criminal behavior. Two channels have been emphasized by previous literature: incapacitation impact of schooling, and the human capital accumulation making the opportunity cost of crime and punishments more costly. In this study we aim to understand these channels further by exploiting the admission cut offs to post compulsory schooling in Finland to estimate the long-term effects school entry on crime. Successful applicants near the admission cut offs are much more likely to obtain a post-compulsory degree. We follow these individuals several years after the admission date, to understand whether the effect of school entry on criminal behavior occur during the time when individuals are still in school, or after they have obtained formal degrees and entered labor market.

Our results show that being successful in upper secondary school admission increase likelihood of graduation in 10 years by 14 percent (compared to 74.3 % baseline). It also decreases the compliers propensity to be inactive or commit crime, both around the admission time, but also in the longer run. The stronger short term effects highlight the incapacitation channel as the main mechanism. However, the fact that we do find enduring impacts on criminal behavior suggests that part of the effect may also work through the human capital accumulation channel.'

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FIGURE 1 Distbribution of estimation sample

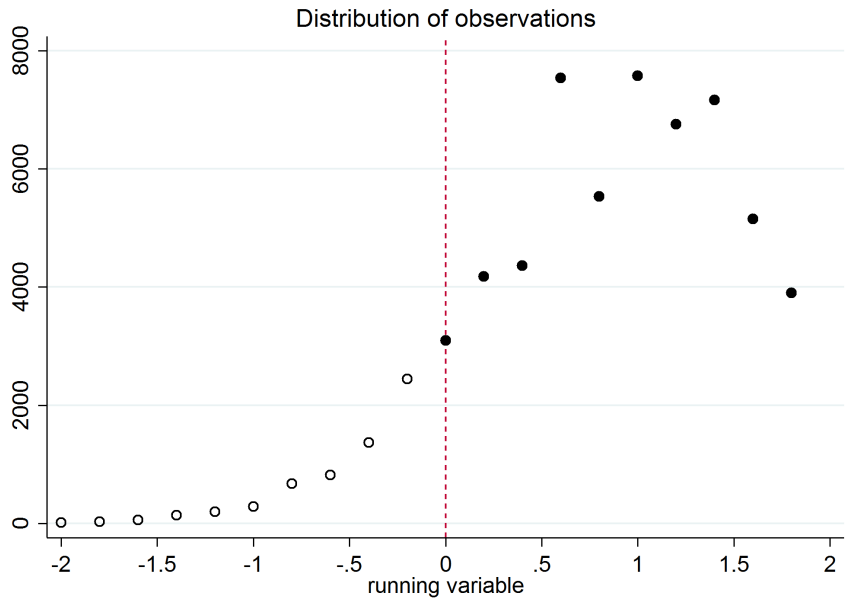

FIGURE 2 First stage and enrolment in post-compulsory education

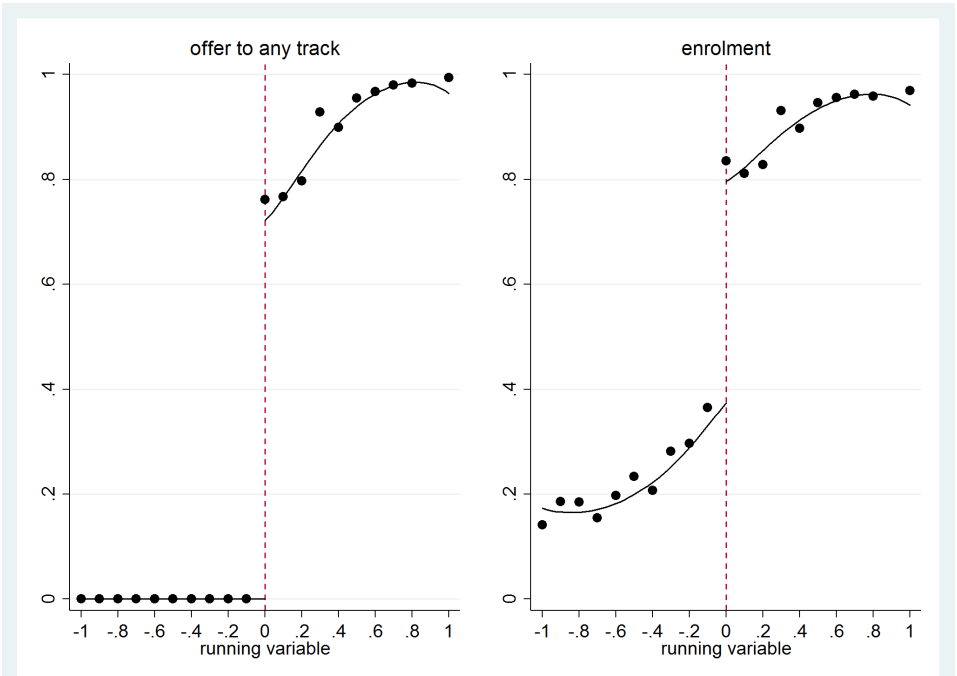

FIGURE 3 Graduation from post-compulsory education

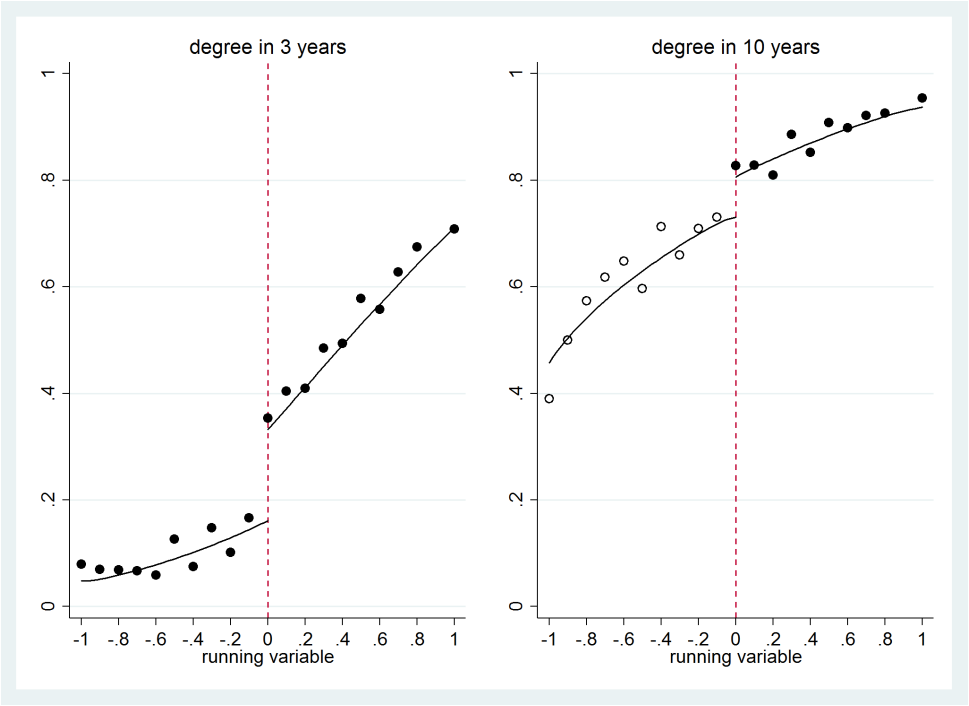

FIGURE 4 Propensity to commit crime in the first year and cumulative within 10 years

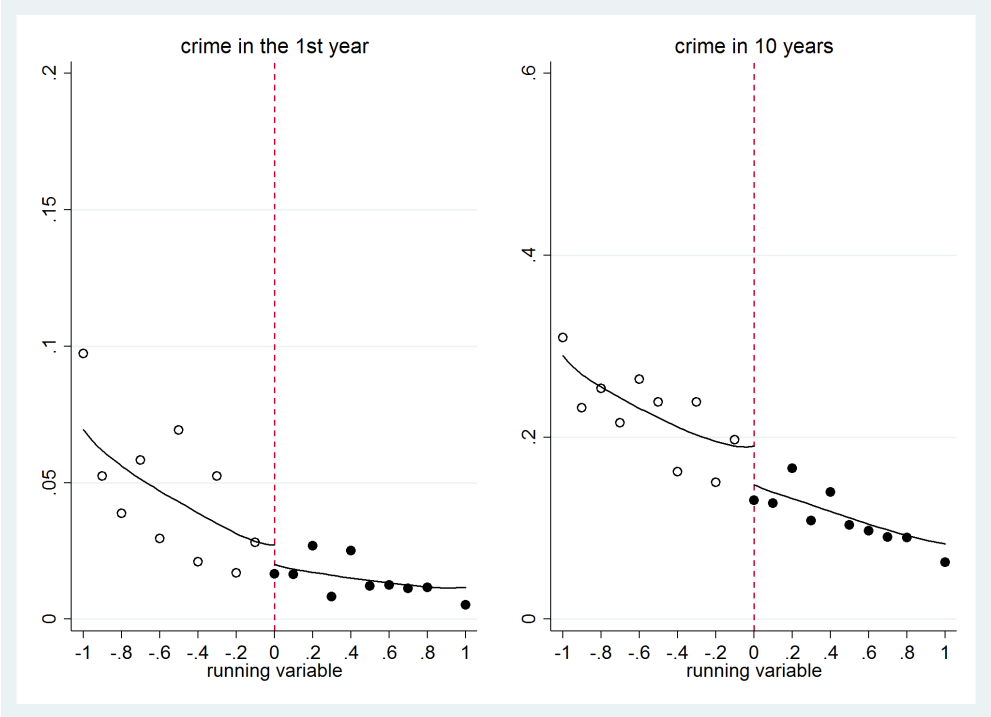

FIGURE 5 Fuzzy RDD estimates of the effect of admission on NEET status

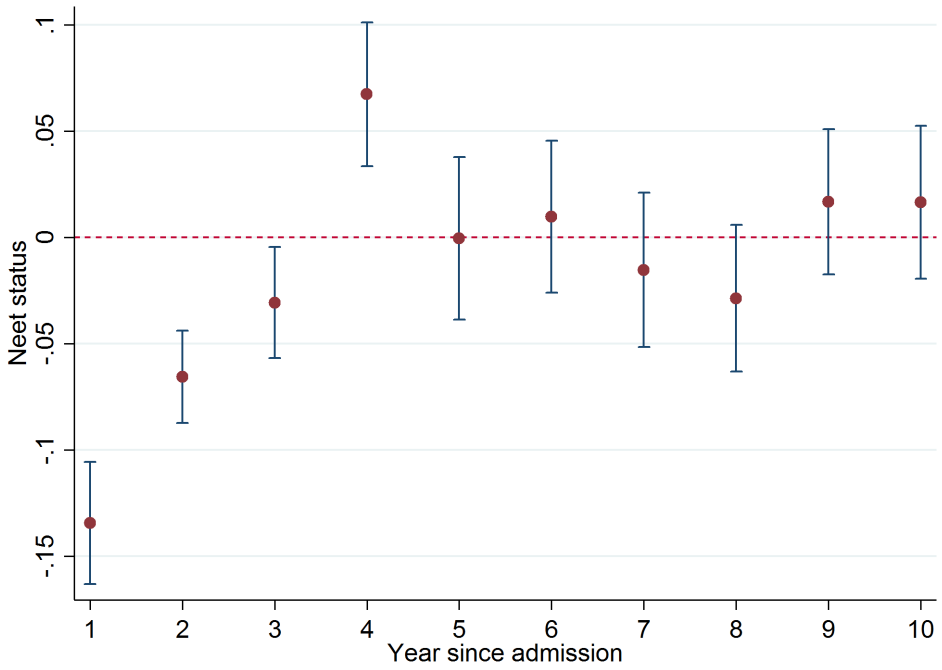

FIGURE 6 Fuzzy RDD estimates of the effect of admission on annual crime

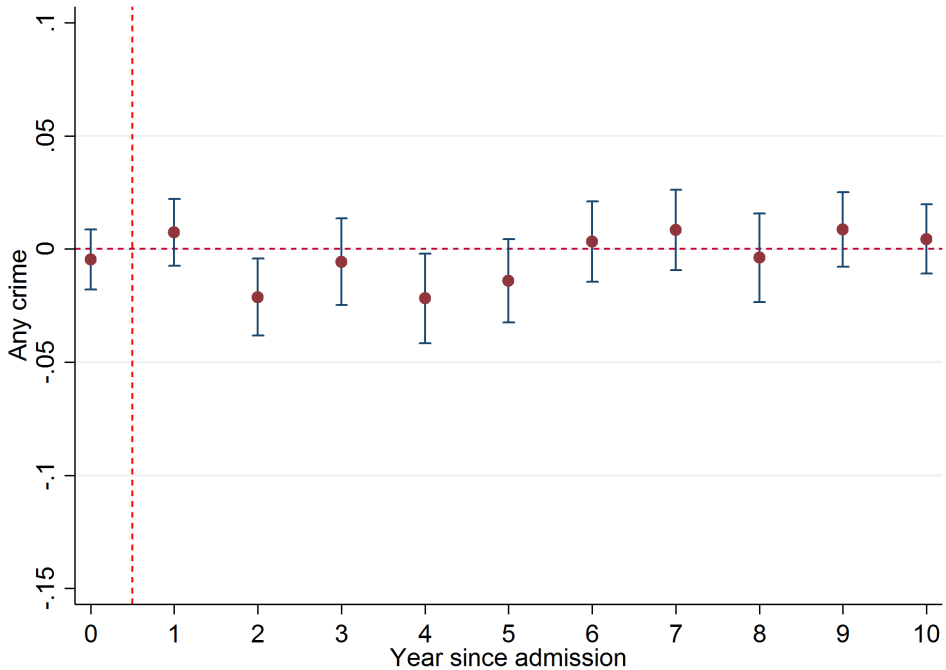

FIGURE 7 Fuzzy RDD estimates of the effect of admission on cumulative crime

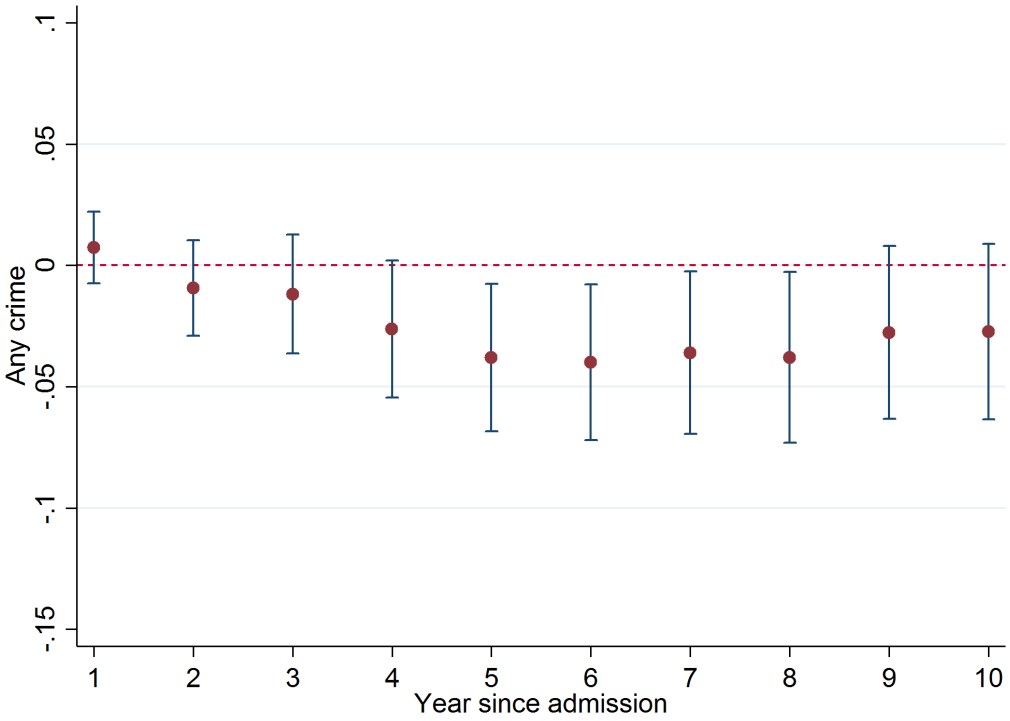

TABLE 1 Sample

	All tracks	Threshold definable	Critical thresholds	Sample
Individuals	476,476	309,196	183,713	61,564
Rejected applicants	22,090	16,814	15,332	7,217
Share rejected (%)	4.6	5.4	8.4	11.7
No of tracks	17,047	11,953	3,983	569

TABLE 2 Background characteristics

Variables	Mean below	Mean above	Discontinuity	
Crime year 0	.030	.006	0.007	(0.007)
Individual characteristics				
Male	0.541	0.453	0.020	(0.027)
GPA	6.5	8.2	0.013	(0.008)
Native language Finnish	.932	.956	0.004	(0.010)
Native other than Finnish or Swedish	.046	.0173	0.003	(0.010)
Age at the time of graduation	16.1	16.0	0.014	(0.013)
Lives in the 15 largest city	.371	.356	-0.022*	(0.011)
Parents				
Information on mother	.980	.989	0.001	(0.008)
Information on father	.924	.953	-0.000	(0.012)
Information on both parents	.907	.943	0.008	(0.013)
Father's income	33379	41603	1685.396	(4234.518)
Father in neet	.281	.182	0.011	(0.025)
Father has post-compulsory degree	.600	.730	-0.021	(0.026)
Father has HE	.144	.271	-0.036	(0.028)
Mother's income	23070	26277	1071.859	(711.922)
Mother in neet	.235	.148	-0.018	(0.022)
Mother has post-compulsory degree	.674	.781	-0.013	(0.017)
Mother has HE	.101	.200	0.016	(0.019)
No of observations	6102	65639	-282	(258)

TABLE 3 Education outcomes

	Enrolled 1st year	Degree in 3 years	Degree in 9 years	Degree in 10 years
1st stage	0.689***	0.711***	0.762***	0.788***
	(0.015)	(0.012)	(0.013)	(0.012)
Reduced form	0.382***	0.177***	0.061***	0.053***
	(0.022)	(0.019)	(0.021)	(0.019)
LATE	0.553***	0.249***	0.079***	0.067***
	(0.029)	(0.026)	(0.027)	(0.025)
Potential outcome for compliers	0.391***	0.156***	0.722***	0.758***
	(0.027)	(0.019)	(0.023)	(0.021)
N	8365	12145	9221	10668
Median optimal bw	0.49	0.69	0.57	0.66

TABLE 4 Inactivity and crime during the first 2 years

	Neet status 1st year	Neet status 2nd year	Crime during 1st year	Crime during 2nd year
1st stage	0.725***	0.749***	0.713***	0.743***
	(0.016)	(0.015)	(0.016)	(0.013)
Reduced form	-0.080***	-0.043***	0.004	-0.011
	(0.019)	(0.013)	(0.009)	(0.009)
LATE	-0.110***	-0.058***	0.006	-0.015
	(0.025)	(0.017)	(0.012)	(0.012)
Potential outcome for compliers	0.145***	0.101***	0.016	0.049***
	(0.024)	(0.016)	(0.011)	(0.010)
N	7074	7496	7947	10679
Median optimal bw	0.51	0.76	1.2	1.0

TABLE 5 Cumulative crime by year 10

	Convictions by year 10		
	At least once	**At least twice**	**At least 3 times**
1st stage	0.735***	0.750***	0.758***
	(0.016)	(0.014)	(0.015)
Reduced form	-0.037*	-0.003	-0.006
	(0.021)	(0.014)	(0.012)
LATE	-0.051*	-0.005	-0.008
	(0.028)	(0.018)	(0.015)
Potential outcome for compliers	0.236***	0.090***	0.059***
	(0.023)	(0.015)	(0.012)
N	6938	8790	7955
Median optimal bw	0.39	0.78	0.56

TABLE 6 Complier characteristics

Variables	**Mean rejected**	**Mean admitted**	**Complier characteristics**	
Crime year 0	.042	.013	0.020***	(0.006)
Individual characteristics				
Male	0.515	0.506	0.624***	(0.024)
GPA	6.3	7.7	6.888***	(0.029)
Native language Finnish	.931	.937	0.953***	(0.007)
Native other than Finnish or Swedish	.047	.0133	0.036***	(0.008)
Age at the time of graduation	16.2	16.1	16.077***	(0.012)
Lives in the 15 largest city	.304	.213	0.420***	(0.017)
Parents				
Information on mother	.979	.987	0.978***	(0.007)
Information on father	.913	.950	0.939***	(0.010)
Information on both parents	.9896	.940	0.936***	(0.010)
Father in neet	.310	.207	0.262***	(0.022)
Father has post-compulsory degree	.575	.675	0.611***	(0.024)
Father has HE	.103	.161	0.164***	(0.017)
Mother's income	23070	26277	22985.413***	(662.074)
Mother in neet	.235	.148	0.191***	(0.018)
Mother has post-compulsory degree	.674	.781	0.706***	(0.023)
Mother has HE	.101	.200	0.091***	(0.013)
No of observations	22 090	454 386		