Marja-Lisa Laukkonen

Parental Job Loss and Application Decisions in Finnish Post-Secondary Education

ETLA ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY

PARENTAL JOB LOSS AND APPLICATION DECISIONS
IN FINNISH POST-SECONDARY EDUCATION

Marja-Lisa Laukkonen
ETLA – The Research Institute of the Finnish Economy
marja-lisa.laukkonen@etla.fi

Abstract

In Finland, there are no tuition or application fees for post-secondary education. However, the application and admission processes by which the educational institutions select new students may still generate inequalities between prospective applicants from different socioeconomic backgrounds. Institutions select their students based on school and program-specific entrance examinations that measure how well the applicants have mastered predetermined exam materials. Typically, preparing for the exams is time consuming and applicants focus on one entrance exam at a time.

Selectivity varies between the schools and programs, depending on the exam performance of the competing applicants. As a result, it can be difficult for students to evaluate their chances of being selected. This uncertainty together with the limited number of applications introduces a strategic component to the application decisions. Furthermore, students from low-income families may not have the resources to take preparation courses or to cover the costs of spending gap years to prepare for the exam.

To study the socioeconomic aspect of application decisions, I use information on the newly graduated Finnish general upper secondary school students between the years 2004 and 2013. First, I document differences in application behaviors between students from different family income groups. Students who have performed equally well on the Finnish language test in the national matriculation examination but come from different family income groups exhibit different application behaviors. Compared to their peers from high-income families, students from low-income families are less likely to apply to universities and more likely to apply to polytechnics, send fewer applications overall, and apply to less selective programs.

Second, by exploiting information on parental job losses due to plant closures, I investigate the causal impact of family income on the application decisions. I find that parental job losses have no impact on the likelihoods of high school graduates applying to any post-secondary institution, to at least one university or to at least one polytechnic. Instead, the affected students change their application strategies by sending fewer applications and by choosing less selective programs.

VANHEMPIEN IRTISANOMISEN VAIKUTUS UUSIEN YLIOPPILAIDEN KORKEAKOULUHAKUPÄÄTÖKSIIN

Marja-Lisa Laukkonen
ETLA – The Research Institute of the Finnish Economy
marja-lisa.laukkonen@etla.fi

Tiivistelmä

Suomessa korkeakoulutus ja korkeakouluihin hakeminen ovat ilmaisia. Nykyisenlainen opiskelijavalintajärjestelmä voi kuitenkin synnyttää eriarvoisuutta eri perhetaustoista tulevien hakijoiden välille. Korkeakoulut painottavat valinnoissaan pääsykokeita, joilla tyypillisesti mitataan hakijoiden kykyä omaksua alakohtaista valintakoekirjallisuutta. Etenkin vahvasti kilpailluilla aloilla kokeisiin valmistautuminen on työlästä ja hakijat joutuvat keskittymään yhteen pääsykokeeseen kerrallaan.

Sisäänpääsyn vaikeus riippuu kussakin kohteessa kilpailevien hakijoiden koesuorituksista. Yksittäisen hakijan voi siksi olla vaikeaa arvioida mahdollisuuksiaan tulla valituksi haluamaansa hakukohteeseen. Epävarmuus sisäänpääsyn todennäköisyydestä ja hakemusten rajallinen määrä antavat yhdessä sijaa taktikoinnille. Perheen tulotaso voi osaltaan sanella sen, onko hakijan taloudellisesti mahdollista osallistua maksulliselle valmennuskurssille taikka kattaa välivuodesta aiheutuvat kustannukset.

Tutkin vanhempien tulotason yhteyttä uusien ylioppilaiden korkeakouluhakupäätöksiin vuosien 2004 ja 2013 välillä. Vertailen ylioppilaskirjoitusten äidinkielen kokeessa yhtä hyvin suoriutuneiden, mutta eri tuloluokista lähtöisin olevien ylioppilaiden hakupäätöksiä keskenään. Tulokset osoittavat, että pienituloisten perheiden ylioppilaat hakevat vähemmän yliopistoihin ja vastaavasti enemmän ammattikorkeakouluihin kuin suurituloisten perheiden ylioppilaat. Lisäksi pienituloisten perheiden ylioppilaat lähettävät pienemmän kokonaismäärän hakemuksia ja kohdistavat ne varmemman sisäänpääsyn kohteisiin kuin ylioppilaat suurituloisista perheistä.

Perheen tulotason kausaalivaikutuksen tunnistamiseksi hyödynnän tietoa yritysten toimipaikkojen sulkeutuessa irtisanotuiksi tulleista vanhemmista ja heidän lapsistaan. Tulokset osoittavat, että vanhemman irtisanotuksi tulemisella ei ole vaikutusta ylioppilaan todennäköisyyteen hakea opiskelupaikkaa. Todennäköisyydet hakea ainakin yhteen yliopistoon tai ainakin yhteen ammattikorkeakouluun säilyvät myös ennallaan. Sen sijaan työpaikkansa menettäneiden vanhempien lapset lähettävät pienemmän kokonaismäärän hakemuksia ja kohdistavat ne varmemman sisäänpääsyn kohteisiin.

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1. Introduction

According to the existing literature, students' socioeconomic background is positively correlated with their educational choices, but less is known about the importance of family background or resources at the point when students apply to post-secondary degrees. If there are financial constraints already in the application phase, then the set of education and career alternatives may be limited for the prospective applicants from less advantageous families. In this study, I investigate the link between family income and post-secondary school application decisions in Finland.

In Finland, there are no tuition or application fees for post-secondary education. However, the application and admission processes have features that may generate inequalities between students from high and low-income families. Applicants take school and program-specific entrance examinations that measure how well they have mastered predetermined exam materials. Typically, preparing for these exams is time consuming and the applicants have to focus on one entrance exam at a time.

Selectivity varies between the schools and programs, depending on the exam performance of the competing applicants. As a result, it can be difficult for students to evaluate their chances of being selected. This uncertainty together with the limited number of applications introduces a strategic component to the application decisions. Furthermore, students from low-income families may not have the resources to take preparation courses or cover the costs of spending gap years to prepare for entrance exam.

I study the application decisions of the newly graduated Finnish general upper secondary school (i.e. high school) students in the years between 2004 and 2013. I investigate the following three forms of application behavior.

   i.   *The decision to apply to post-secondary education*
   ii. *The decision on the number of applications*
   iii. *The decision to apply to selective major programs*

I start by documenting how the application decisions differ between students from high and low-income families who perform equally well on the Finnish language test in the national matriculation examination. I find that all students are likely to apply to higher education when they finish high schools but that students in different family income groups choose different types of educational institutions. Compared to their peers from high-income families, students from low-income families apply less to universities and more to Universities of Applied Sciences (i.e. polytechnics), send fewer applications overall and choose less selective programs.

In order to isolate the causal effect of family income on application decisions I exploit information on parental job losses due to plant closures. Previous studies on job losses have documented that involuntary job displacements lead to high and persistent reductions in family income (Oreopoulos, Page and Stevens 2008; Hilger 2016; Huttunen and Kellokumpu 2016). By focusing on plant closures, I minimize the possibility that the families facing job losses would differ from other families in unobservable characteristics. After all, in the closing plants all employees – despite their work motivation – lose their jobs at the moment of closure.

I find that parental job loss neither changes the high school graduates' likelihood to apply to post-secondary education, in general, nor their likelihoods to apply to at least one university or to at least one polytechnic. However, I do find that students respond to parental job losses by changing their application strategies. In particular, the students from families impacted by plant closures send 0.17 (4%) fewer applications relative to the average 3.8 applications, which may reflect that they make more precise application decisions early on.

I also find that the affected students make less risky application decisions measured by two program selectivity indicators. First, they apply to programs where students have received 0.019 (4%) of a standard deviation lower scores in the Finnish language test, relative to other test takers, but the estimate is not statistically significant at standard levels. Second, they apply to programs where a higher share of applicants is admitted. In particular, impacted students apply to programs where the entry rate is 0.4 pp (5%) higher relative to the average 8% entry rate.

Since 2014, the application process has undergone various changes but the entrance examinations remain the main screening tool for selecting new post-

secondary school students. Thus, the findings of this study suggest that the existing admissions process can be improved.

Nonetheless, while the results suggest that parental job loss at the time of secondary school graduation can impact post-secondary application decisions, job losses can impact students in other ways besides reducing family income. For instance, insecurity about the future employment may lower parental self-esteem which, in turn, may have adverse effects on the home atmosphere. On the other hand, by studying parental job losses close to students' graduation, I minimize the possibility that the attitudes towards education would essentially change.

2. Literature review

This study is closely related to two themes previously addressed in the literature: the socioeconomic gradient in application strategies and the intergenerational effects of parental job losses.

In the US, Pallais (2015) studies the effect of a six-dollar reduction in application fees on college application decisions. Pallais (2015) finds that smaller fees encouraged secondary school students to send more applications to a wider range of different colleges and, hence, applicants from low-income families were also found attending more selective colleges. In another study, Hoxby and Turner (2013) investigate the impact of sending additional information about application process and application fee waivers to high-achieving students from low-income families. Analogous to Pallais' (2015) findings, Hoxby and Turner (2013) show that after the intervention, the affected applicants enrolled at colleges with higher graduation rates and with generous instructional resources.

The studies that investigate the link between socioeconomic background and application strategies in post-secondary education conclude that students from lower socioeconomic groups are more sensitive to changes in the application environment. To my knowledge, the socioeconomic aspect of application strategies has not yet been studied in the Finnish educational context but other closely related questions have already been addressed. For instance, Pekkala-Kerr et al. (2015) study the impact of providing high-school students with detailed information on the labor market prospects related to different post-secondary programs. They find that the intervention had no impact on the application decisions.

It is well documented that job displacements lead to high and persistent reductions in family income (Oreopoulos, Page and Stevens 2008; Hilger 2016; Huttunen and Kellokumpu 2016) and this variation in family income is considered exogenous when it is driven by job losses that result from either mass lay-offs or plant closures. By exploiting information on parental job losses, previous studies also find various negative effects on children's education. Using Norwegian data, Rege, Telle and Votruba (2011) find that fathers' job losses have a negative impact on students' secondary school final year grade point average but only if the displaced fathers worked in mediocre-performing job markets. Using US data, Stevens and Schaller (2011) also find that parental job losses lead to increased school retention.

If there are financial constraints in education, then parental job losses may limit the set of feasible education alternatives for children. However, the evidence on the impact of parental job losses on higher education enrollment varies between the studied contexts. Using Canadian survey data Coelli (2011) finds consistent negative effects on college enrollment when the displaced parent is the main income earner of the family. Contrarily, using information on father's lay-offs in the US, Hilger (2016) finds only minor effects.

3. Institutional setting

3.1. Finnish education system

In Finland education is free at all levels. After nine years of comprehensive schooling around 90% of the graduating cohorts continue to upper secondary schools. Roughly half of the comprehensive school graduates continue to vocational training and education, while the rest continue to academically oriented general upper secondary schools (i.e. high schools). High schools are the main track to post-secondary education.[1]

The target time to complete a high school degree is three years. During the final year, students take national matriculation examination in which they must pass at least four subjects, the Finnish language test being the only compulsory test

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[1] In 2016, 89% of the applicants held a high school degree (MEC 2016:37).

for all students.[2] In 2013, 90% of the 32 000 high school graduates finished their studies in the spring and the rest in the fall semester.[3]

The Finnish post-secondary education system consists of two main tracks: the universities and the polytechnics. Universities are academically oriented and offer both undergraduate and graduate degree programs. Polytechnics, instead, offer vocational undergraduate degree programs. In 2013 there were 14 universities and 27 polytechnics, located in the largest cities of Finland.[4] Post-secondary institutions organize student selections twice a year but a vast majority of the study places are offered particularly in the spring term application round.

3.2.   *Application and admission processes*

Post-secondary school applicants are allowed to send the maximum of 13 applications: nine of them to universities and four to polytechnics.[5] All applications are free of charge. In 2013, roughly 50% of the 147 000 applicants applied only to polytechnics, 30% only to universities and 20% to both institutions. The same year, 80 % of the 32 000 newly graduated high school students applied to post-secondary education but only 30% of them were immediately accepted.[6]

Prospective applicants apply directly to specific schools and programs. The fourth column in Table 3 indicates that in 2013, there were 460 major programs in universities and 420 in polytechnics.[7] Programs in different higher education institutions choose their own exam materials and set the exam dates.[8] Typically half of the new students are selected based on combination points from the matriculation examination and the entrance exam, whereas the rest are selected based on entrance

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[2] Students may take the exams in three consecutive semesters. The Swedish-speaking minority and Sami people may also take the exam in their mother tongues. For foreign students, there is also an alternative Finnish as a second language -test. Students who fail a compulsory test may graduate, if received enough compensation points from the tests of other subjects.

[3] The information is gathered from the webpages of the Finnish Matriculation Examination Board.

[4] Between the years 2004 and 2013, the number of universities has decreased from 20 to 14 and the number of polytechnics from 31 to 27 (OSF 2017).

[5] Between the years 2004 and 2013, universities and polytechnics had separate application systems. Polytechnics applications were put online in 2003 (MEC 2003:26) and university applications followed in the fall 2008 (HE 44/2012).

[6] The information on application statistics in 2013 is gathered from the webpages of Statistics Finland (OSF 2015).

[7] The number of major programs is conditional on the sample restrictions specified in the Descriptive evidence –section. Post-secondary institutions and the government make multiannual agreements about the student intake in each study field (MEC 2016:37).

[8] Some of the study fields, including university level business and technology, organize centralized field-specific entry examinations that allow students to apply to multiple institutions at a time.

exam performance only.[9] Nonetheless, the application period ends already before the soon-to-graduate high school students have received their matriculation grades and, thus, make application decisions without knowing if they are likely to fit the combination point quota.

Another relevant feature of the student selection system is that it rewards persistency. In many programs the entrance exam materials do not substantially change over time, but experienced exam takers still compete for admission in the same applicant pool with the first-timers. Consecutive years spent in the application process are time off work and, therefore, can make the young adults dependent on parental financial support. In the more popular programs it is also common to apply more than once.

Additionally, there are various preparatory courses that provide the applicants support in learning the exam materials and share soft information about the exam practicalities. Depending on the intensity of the course the prices range from hundreds to several thousands of Euros. The more selective the program a student applies, the higher the advantage of taking a course.

3.3.   *Unemployment benefits in Finland*

Employees may join unemployment funds that offer their members earnings-related unemployment allowance in the case of becoming involuntarily unemployed. Earnings-related allowance is offered for approximately two years. Employees who are not registered as members of the funds may still apply for the basic unemployment allowance or the labor market subsidy. The newly graduated high school students who have submitted at least two post-secondary school applications but who are eventually rejected from both alternatives are also entitled to receive unemployment benefits. [10]

4. Descriptive evidence

I use information on the newly graduated high school students who turn 19 or 20 years old the same year as they graduate. Moreover, I include only students

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[9] The number of credits and the relevant exam subjects are defined independently by each institution and study field. Also, a small minority of the students is selected based on matriculation examination grades only.
[10] The information is gathered from the webpages of KELA – The Social Insurance Institution of Finland

who graduate in the spring term and who have taken the Finnish language test in the high school matriculation examination. The first column in Table 1 provides descriptive information on sample characteristics. Six out of ten students are females and majority turn 19 when they finish high school. I provide information about the used registers in Appendix A.

4.1. Finnish language test and family income

As a proxy for the high school graduates' preparedness to apply to selective programs, I use information on their performance on the Finnish language test in the national matriculation examination. Kupiainen (2014) shows that the Finnish language test scores predict students' post-secondary school achievements. Importantly, if students' preparedness to apply to selective programs is also correlated with their family income, then any differences in application decisions between students from high and low-income families may simply reflect these differences in their academic preparedness.

To compare student performance in the Finnish language test over time, I standardize the received points by each exam semester. As an additional measure for academic preparedness I also use information on the students' comprehensive school grade point average. In terms of family income, I use three-year average gross taxable incomes.[11] The first column of Table 1 indicates that in the studied sample the average annual family income is approximately 58 200 Euros.

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[11] The gross taxable income is the sum of earned income, capital income and it includes most of the social security transfers. All incomes are corrected using consumer price index.

Table 1. Descriptive information on students and their parents

Student charachteristics	(1) High school students		(2) Students whose parents work in stable firms		(3) Students whose parents lose their jobs	
	mean	s.d.	mean	s.d.	mean	s.d.
Age	19.12	(0.32)	19.11	(0.32)	19.12	(0.33)
Female	0.59	(0.49)	0.6	(0.49)	0.58	(0.49)
Non-Finnish speaking	0.01	(0.11)	0.01	(0.1)	0.01	(0.09)
Enroll	0.43	(0.50)	0.42	(0.49)	0.42	(0.49)
Parental characteristics						
Age	48.09	(5.15)	47.75	(4.86)	47.63	(4.97)
Female	0.42	(0.49)	0.3	(0.46)	0.28	(0.45)
Non-Finnish speaking	0.02	(0.14)	0.02	(0.14)	0.03	(0.16)
Highly educated	0.35	(0.48)	0.29	(0.45)	0.3	(0.46)
Single	0.18	(0.39)	0.13	(0.33)	0.13	(0.34)
Household size	3.93	(1.39)	4.02	(1.34)	3.96	(1.26)
Average income (€)	39 568	(40 136)	43 004	(37 271)	43 421	(26 382)
Family income (€)	58 183	(46 411)	63190	(43 471)	64 075	(34 308)
Plant size			95.46	(109.64)	70.54	(98.27)
Application decisions						
Apply to:						
University	0.64	(0.48)	0.62	(0.49)		
Polytechnic	0.59	(0.49)	0.6	(0.49)		
Any school	0.93	(0.26)	0.92	(0.27)		
Application quantity:						
University	2	(2.24)	1.94	(2.21)		
Polytechnic	1.8	(1.73)	1.83	(1.73)		
Total	3.8	(2.49)	3.77	(2.47)		
Program selectivity:						
Entry rate	0.08	(0.07)	0.08	(0.07)		
Average academic preparedness	0.67	(0.43)	0.65	(0.43)		
N	196 186		86 150		1 050	

Notes: Parental characteristics describe the parent who has the higher average income in the family.
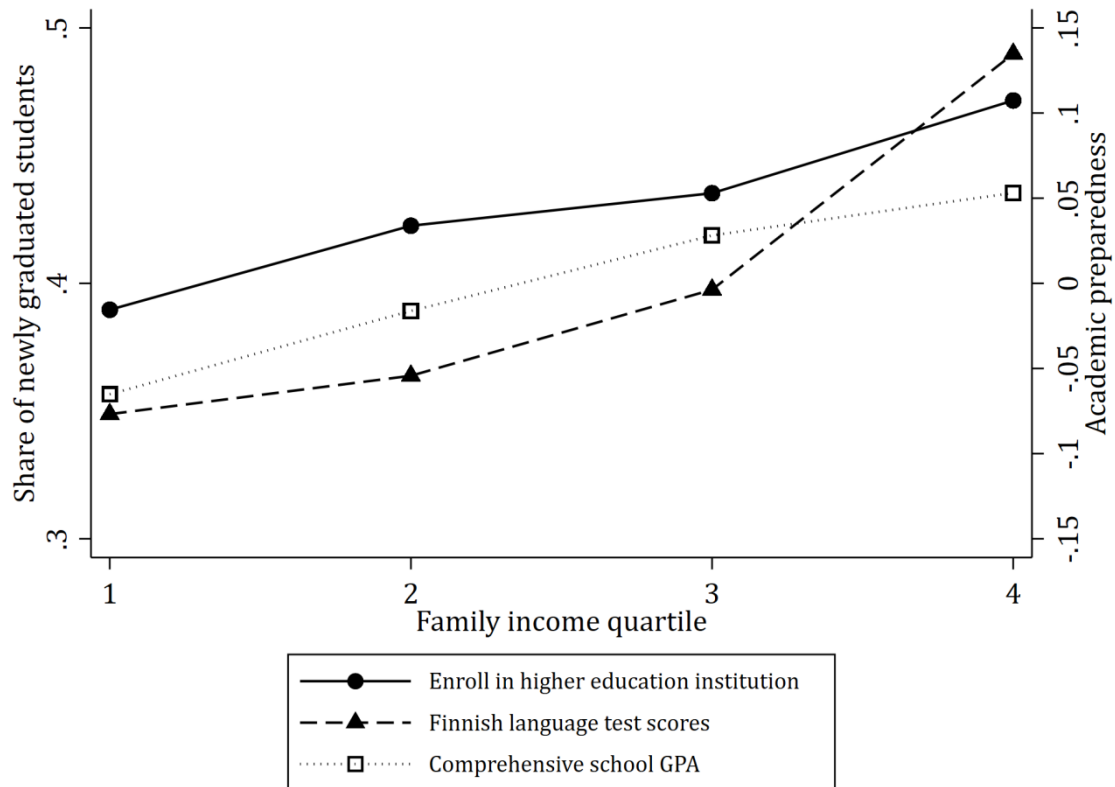
Figure 1. Academic preparedness, higher education enrollment and family income

Figure 1 illustrates the differences in academic preparedness of the high school graduates in different family income quartiles. Both the students' comprehensive school GPA and their performance in the Finnish language test improve towards the upper end of the income distribution. Moreover, Figure 1 indicates that students from higher-income families are slightly more likely to enroll in post-secondary education immediately after high school graduation than students from lower-income families. The first column in Table 1 shows that, in the studied sample, 43% of the students enroll in higher education the same year as they graduate from high schools.

4.2. Application decisions and family income

Next, I document three different types of application decisions: the decision to apply to higher education, the number of submitted applications and the decision to apply to selective programs. I compare each type of decision between the

newly graduated students who have received similar final grades in the Finnish language test but who come from different family income groups.[12]
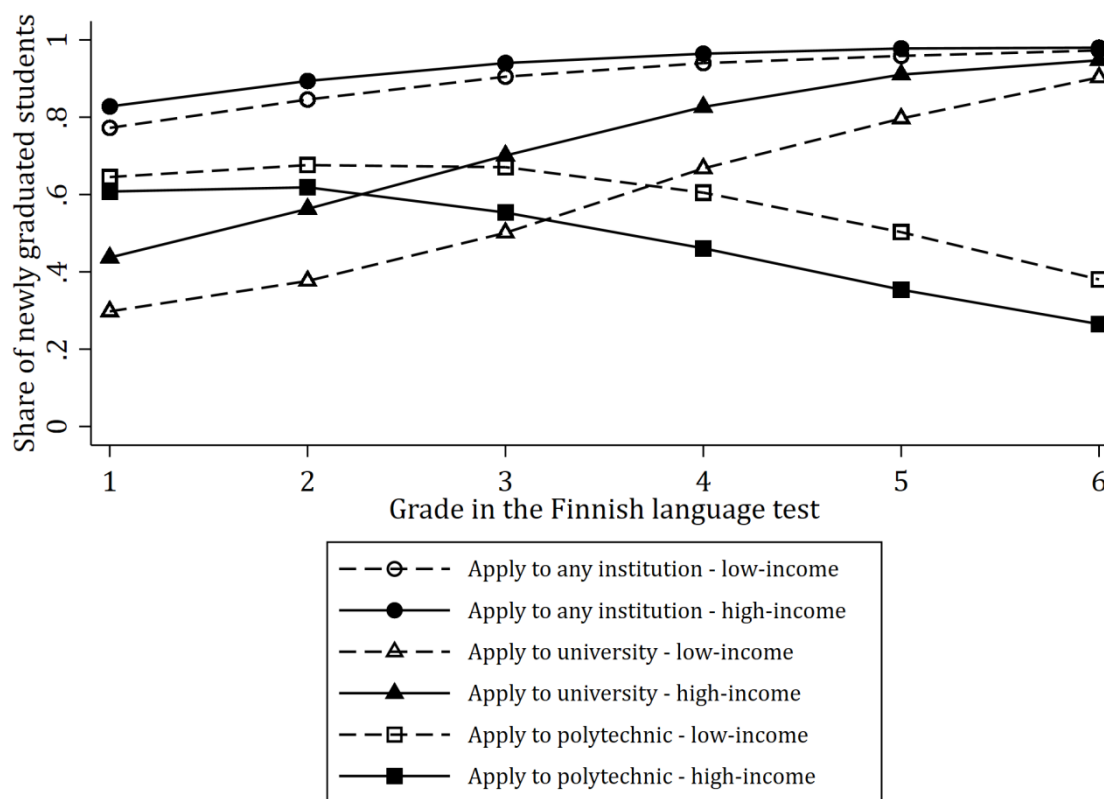
Figure 2. Decision to apply and family income

The first column of Table 1 indicates that 93% of the high-school graduates apply to higher education, 64% apply to at least one university and 59% to at least one polytechnic. Figure 2 illustrates how these likelihoods to apply differ between the top and the bottom income quartiles, conditional on the Finnish language performance. While a vast majority of students send at least one application, students from low-income families apply consistently more to polytechnics and less to universities than their peers from high-income families.

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[12] In the figures, I include only students who have passed the Finnish language test. The graphs show the final grades students have at the moment of graduation. The numeric grades from one to six refer to the following scale: 1=Approbatur, 2=Lubenter approbatur 3=Cum laude approbatur, 4=Magna cum laude approbatur, 5=Eximia cum laude approbatur 6=Laudatur. Information on the link between family income and application decisions without conditioning on the grades in Finnish language test is included in the Appendix D.
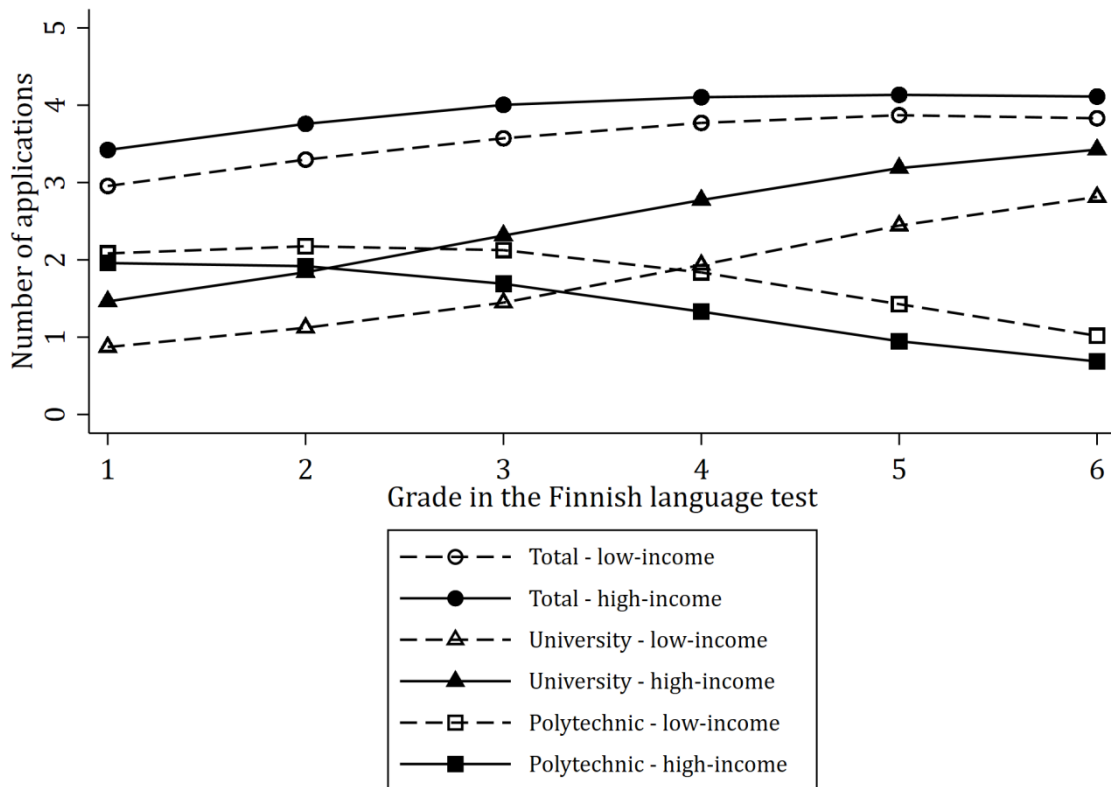
Figure 3. Number of applications and family income

In terms of application quantity, the first column in Table 1 shows that an average student submits two applications to universities and 1.8 applications to polytechnics. While the maximum number of applications is 13, an average high school graduate submits only 3.8 applications, which may reflect that students respond to exam based student selections by focusing on a small number of exams at a time.

Figure 3 illustrates how the number of sent applications differs between students from high and low-income families, conditional on their performance in the Finnish language test. While students from low-income families send fewer applications to universities than to polytechnics, students from high-income families do the exact opposite. The observed differences in application quantity correspond to the differences in the likelihood to apply.

When the competition for study places is tough, young adults spend more time preparing for the exam than if there is no competition. Therefore, it is particularly costly to apply to popular programs. To measure program selectivity, I construct two indicators. First, I study the academic preparedness as measured by the average Finnish language skills of students in a program.

Table 2. Program selectivity in universities and polytechnics

Year	(1) Entry rate		(2) Average academic preparedness in a program		(3) Number of major programs	
	University	Polytechnic	University	Polytechnic	University	Polytechnic
2004	0.2	0.18	0.53	-0.15	544	579
2005	0.21	0.14	0.54	-0.14	602	570
2006	0.23	0.18	0.54	-0.19	588	567
2007	0.22	0.19	0.54	-0.16	563	547
2008	0.23	0.19	0.56	-0.16	562	516
2009	0.18	0.19	0.61	-0.12	565	497
2010	0.17	0.17	0.62	-0.13	548	495
2011	0.16	0.16	0.62	-0.09	531	465
2012	0.16	0.15	0.61	-0.11	490	450
2013	0.15	0.13	0.65	-0.1	460	420

Notes: Average academic preparedness indicates the average standardized Finnish language test scores of students in a program.

Table 2 provides information about program selectivity in universities and polytechnics between the years 2004 and 2013. The second column in Table 2 indicates that in 2013 an average university program selected students who performed 0.65 standard deviations better in the Finnish language test relative to other test takers. Over the studied period, the average Finnish language skills have been higher in university programs than in polytechnic programs.

To complement the academic preparedness indicator, I study entry rates as the share of applicants accepted to a program.[13] As indicated in the first column of Table 2, in 2013 the average entry rate was 15% in universities and 13% in polytechnics. In both universities and polytechnics, the share of accepted applicants has decreased during the studied period. However, a potential disadvantage of using entry rates as a proxy for selectivity is that students may send multiple applications

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[13] The share of accepted students is based on all applications sent to a program. In practice, students may not participate in the exams of all programs they initially applied. Therefore, the entry rates may be downward biased. The information on exam participation is not available for the full sample.

but never take all the entry exams. The third column indicates that the number of programs has remained stable over time.

In the remaining of this study, I focus on the most selective program included in each student's application portfolio. The first column in Table 1 indicates that, on average, these selective programs choose students who have performed 0.67 standard deviations better in the Finnish language test relative to other test takers. Table 1 also indicates that selective programs choose 8% of their applicants.
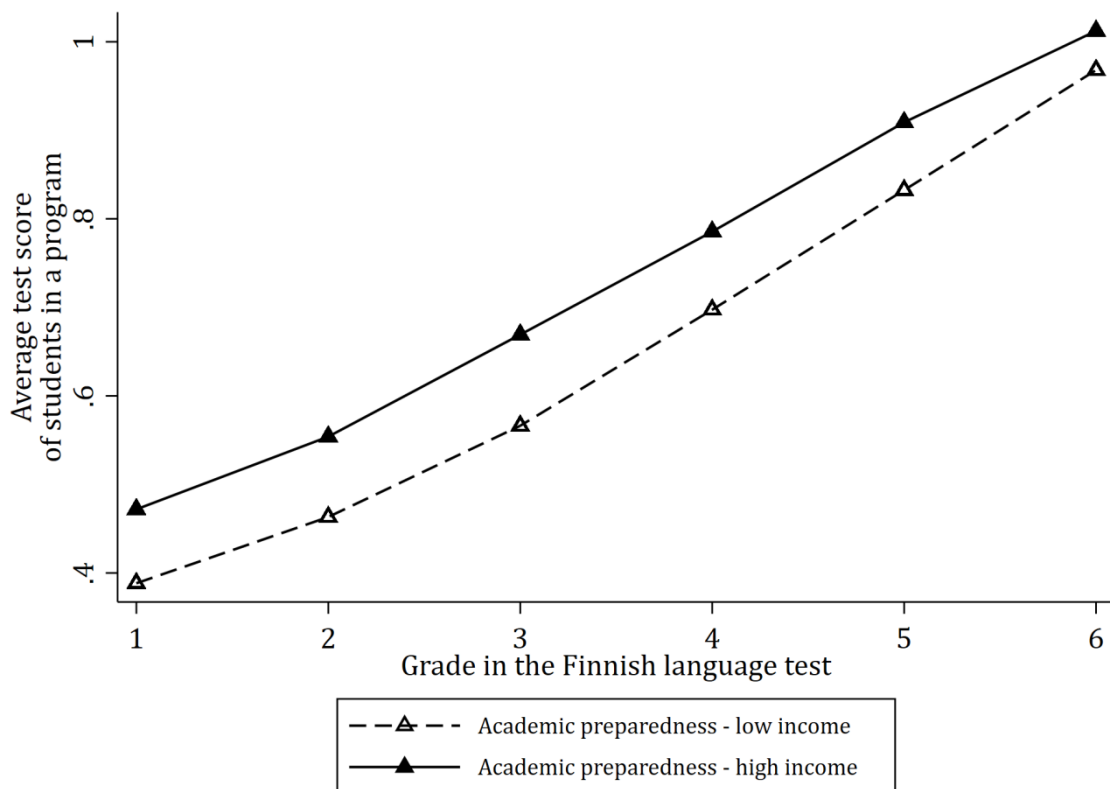
Figure 4. Decision to apply to selective programs and family income

Figure 4 illustrates differences in the decision to apply to selective programs between students from high and low-income families. As measured by average academic preparedness in a program, students from low-income families apply to less selective programs, even if they performed equally well on the Finnish language test as their peers from high-income families. I provide additional information on program selectivity in Appendix C and supplementary figures in Appendix D.

The findings presented in this section are descriptive and, thus, do not explain the cause-effect relationship between family income and high school graduates' application decisions. To broaden the analysis, I will next present an identification strategy that allows me to isolate the causal impact of family income on the high school graduates' application decisions.

5. Causal effect of job loss on application decisions

To identify exogenous variation in family income, I exploit information on parental job losses due to plant closures. I compare the application decisions of the newly graduated high school students from families impacted by plant closures relative to students whose parents work in stable plants. The identifying assumption is that plant closures are exogenous events and not correlated with unobserved parental or child characteristics.

I study job losses of the main income earners, defined as the parents who have higher pre-displacement taxable income in the families. I estimate the following linear equation.

$$y_{i,t} = b_1 Z_{i,t-1} + \boldsymbol{X}_{i,t} b_2 + \boldsymbol{D}_{i,t-2} b_3 + \mu_t + e_i$$
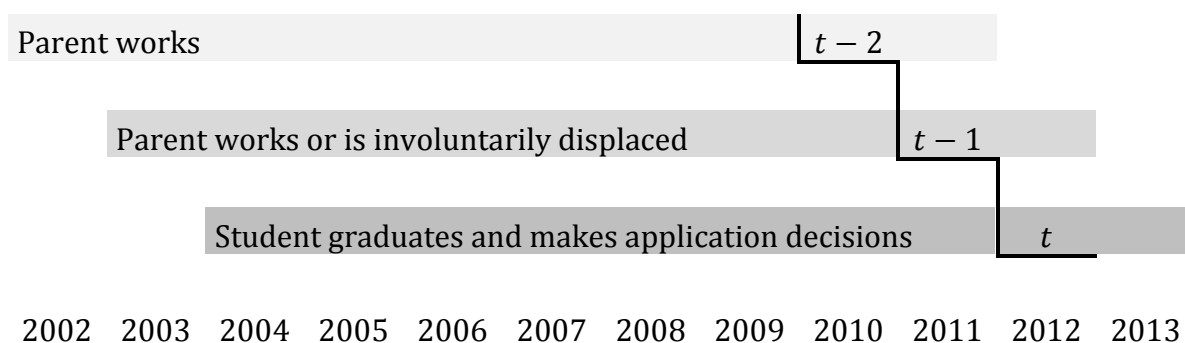
The outcome variable y_{it} denotes the application behavior of the individual i in year t by (i) the decision to apply (ii) the number of applications and (iii) the decision to apply to selective programs. $Z_{i,t-1}$ is an indicator that takes the value 1 if the parent lost their job in $t-1$ and b_1 is the main coefficient of interest. $\boldsymbol{X}_{i,t}$ is a vector of student characteristics including gender, Finnish language test score and high school fixed effects. $\boldsymbol{D}_{i,t-2}$ is a vector of parental characteristics including family income, level of education, municipality and plant size as determined by the number of employees.[14] μ_t denotes year fixed effects.

A plant is considered closed in year $t-1$ if the plant ID no longer appears in the data in t or later. A parent is defined as displaced if he leaves the plant the same year as the plant closes. Hence, in t displaced parents are either identified

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[14] The characteristics of the spouses are also included.

working in new firms[15] or, for instance, they could be registered as unemployed. I include only plants than have at least 5 and less than 500 employees in the beginning of a calendar year. I do not specify mergers and acquisitions and, thus, some of the identified plant closures may not be actual closures. I provide detailed information about the sample characteristics in Appendix B.

Parent works	$t-2$	
Parent works or is involuntarily displaced	$t-1$	
Student graduates and makes application decisions	t	

2002   2003   2004   2005   2006   2007   2008   2009   2010   2011   2012   2013

Figure 5. Identification timeline

Figure 5 shows the identification timeline. The high school students graduate and make application decisions in t. I include only students whose parents work in plants of the specified size in $t-2$. Importantly, I focus only on job losses that occur no earlier than one calendar year before the student's graduation. Therefore, in $t-1$ a parent is either observed working in a stable firm or losing a job due to plant closure. A black line is an example of a single observation, where a student graduates and makes application decisions in 2012.

The second column of Table 1 provides descriptive information on students whose parents work in stable companies and the third column on students whose parents lose their jobs. The final sample consists of 87 200 high school graduates, of whom 1050 individuals are affected by parental job losses. Job losses occur evenly over the studied period.

As indicated by the characteristics in Table 1, families impacted by parental job losses are similar to families where parents work in stable plants. In particular, the annual family income is convincingly similar between the studied groups, averaging close to 63 000 Euros. The main income earners of the family have

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[15] Parents who after losing their jobs are found working in other plants of the same firm are not defined as displaced.

an average salary of 43 000 Euros and one third of them are highly educated. Moreover, in both groups an average main income earner parent is a 48 years old father who speaks Finnish as a mother tongue, lives with three other household members and has a spouse. However, the largest difference in the sample characteristics is the employer's plant size. Measured by the number of employees, the closing plants are smaller than the stable ones. This is in line with Huttunen & Kellokumpu (2016) who study job losses that occurred in Finland in the 1990's and also find that smaller plants close more frequently.

6. Findings

6.1. Job loss effect on family income

Before looking at the impact of parental job losses on high school graduates' application decisions, I show its impact on annual family incomes. If parental job losses affected the students' application decisions particularly through the income channel, I would expect family income to drop after a job loss occurs. Table 3 shows the impact of job losses that occur in $t-1$ on annual family income at different points in time. As expected, I find that job losses lead to a significant drop in family income.

Table 3. Job loss effect on annual family income

	$t-4$	$t-3$	$t-2$	$t-1$	t	$t+1$
Job loss	0.003	-0.002	-0.002	-0.02***	-0.044***	-0.046***
	(0.005)	(0.004)	(0.003)	(0.008)	(0.008)	(0.012)
N	87 004	87 004	87 004	87 004	87 004	87 004

Notes: The displacements occur in t-1 and t is the year of the students' graduation. I estimate log-transformed annual family incomes conditional on a full set of controls, including parental characteristics, student characteristics and year fixed effects. Each column represents the estimate of a different regression.
3 *'s denote statistical significance at 1% level. Standard errors are indicated in the parentheses.

6.2. *Job loss effect on performance in the Finnish language test*

If job losses also affect students' performance in the Finnish language test, then any changes in application patterns may simply reflect these changes in secondary school performance. However, as shown in Table 4, the obtained estimates are small and statistically insignificant. The findings imply that after a job loss any changes in application behavior may be driven by reductions in family income but not by changes in student's secondary school performance.

Table 4. Job loss effect on performance in the Finnish language test

	Points (std)	Grade at the moment of graduation
Job loss	0.002	-0.004
	(0.026)	(0.034)
N	87 200	87 200

Notes: Both columns represent the estimate of a different regression. I condition the estimations on a full set of controls, including parental characteristics, student characteristics and year fixed effects. The estimates are not statistically significant at 10% level. Standard errors are indicated in the parentheses.

6.3. *Job loss effect on application decisions*

Next, I move to the main results of the causal section of this study. I find that parental job loss has no effect on the likelihood to apply to higher education. Moreover, I find no change in the likelihoods to apply to at least one university or to at least one polytechnic. The fourth column in Table 5 indicates that after conditioning on the full set of student and parental characteristics, the estimates are small and statistically insignificant.

Table 5. Job loss effect on application decisions

Likelihood to apply to:	(1)	(2)	(3)	(4)
University	0.006	0.006	0.004	0.008
	(0.015)	(0.015)	(0.014)	(0.014)
Polytechnic	-0.034**	-0.041***	-0.022	-0.018
	(0.015)	(0.015)	(0.014)	(0.015)
Any school	-0.007	-0.011	-0.006	-0.003
	(0.009)	(0.009)	(0.008)	(0.009)
Application quantity:				
University	-0.074	-0.059	-0.049	-0.055
	(0.067)	(0.066)	(0.062)	(0.063)
Polytechnic	-0.152***	-0.185***	-0.125**	-0.111**
	(0.053)	(0.052)	(0.049)	(0.05)
Total	-0.226***	-0.244***	-0.174**	-0.166**
	(0.075)	(0.075)	(0.074)	(0.074)
Major program selectivity:				
Academic preparedness	-0.022	-0.017	-0.023*	-0.019
	(0.014)	(0.014)	(0.013)	(0.013)
Entry rate	0.005**	0.004**	0.005**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
N	87 200	87 200	87 200	87 200
Year fixed effects		X	X	X
Student characteristics			X	X
Parental characteristics				X

Notes: Each column represents the estimate of a different estimation. 1, 2 and 3 *'s denote statistical significance at 10%, 5% and 1% levels. Standard errors are indicated in the parentheses.

Nonetheless, I find that students respond to parental job losses by changing their application strategies. The fourth column in Table 5 indicates that students in displacement families send 0.17 (4%) fewer applications, relative to the average 3.8 applications. The drop in application quantity may imply that after parental job loss students make more precise application decisions. The fewer applications the students send the more preparation time they have for each exam. Any further analysis on the decisions related to application quantity would require information on entrance exam participation.

Finally, I also find that the students in families impacted by job losses apply to less selective major programs than their peers. The fourth column in Table 5 indicates that the affected students apply to programs where students have received 0.019 (4%) of a standard deviation lower scores in the Finnish language test, relative to other test takers, but the estimate is not statistically significant at standard levels. Affected students also apply to programs where a higher share of applicants is admitted. In particular, they choose programs where the entry rate is 0.4 pp (5%) higher relative to the average 8% entry rate.

6.4. Robustness checks

To test the sensitivity of the findings to the timing of the job loss, I study if the students' application decisions are affected by job losses already before the job losses even occur. In practice, if students are anticipating the changes in their parents' labor status, then the exogeneity assumption of the setting does not hold.

Table 6. Job loss placebo

Likelihood to apply to:	$t-1$	t	$t+1$
University	0.008	-0.005	0.006
	(0.014)	(0.015)	(0.015)
Polytechnic	-0.018	-0.002	-0.023
	(0.015)	(0.016)	(0.016)
Any school	-0.003	-0.001	0.004
	(0.009)	(0.009)	(0.009)
Application quantity:			
University	-0.055	-0.081	0.022
	(0.063)	(0.068)	(0.072)
Polytechnic	-0.111**	0.017	-0.073
	(0.05)	(0.054)	(0.055)
Any school	-0.166**	-0.063	-0.051
	(0.074)	(0.079)	(0.082)
Major program selectivity:			
Average academic preparedness	-0.019	-0.009	0.013
	(0.013)	(0.014)	(0.014)
Entry rate	0.004**	0.003	0.001
	(0.002)	(0.002)	(0.002)
N	87 200	87 200	87 200

Notes are indicated on page 20.

Notes: Each column represents the estimate of a different estimation. I condition the estimations on a full set of controls, including parental characteristics, student characteristics and year fixed effects. 2 and 3 *'s denote statistical significance at 5% and 1% levels. Standard errors are indicated in the parentheses.

Table 6 indicates the impact of parental job loss on application decision if the job loss occurred in $t-1$, t or in $t+1$, where t is the year of students' high school graduation. As indicated in Table 6, significant impact on application decisions is found only in $t-1$. The results imply that students do not anticipate parental job losses. In another robustness check, I also control for the students' performance in all the subjects they take in matriculation examination but the results do not change.

7. Conclusion

In this study I investigate the link between family income, parental job loss and Finnish high school graduates' application decisions. I find that students who have performed equally well on the Finnish language test in the national matriculation examination but who come from different family income groups exhibit different application behaviors. Compared to peers from higher income families, students from low-income families are less likely to apply to universities and more likely to apply to polytechnics. The students from low-income families also send fewer applications overall, and choose less selective programs than their peers from higher-income families.

Moreover, I exploit information on parental job losses and find that the job losses neither change the students' likelihood to apply, in general, nor their likelihoods to apply to at least one university or to at least one polytechnic. However, I find that the affected students change their application strategies by sending fewer applications and by choosing less selective programs.

After the period observed in this study, multiple changes in the student selection system have been implemented but the entrance examinations remain the main screening tool when post-secondary institutions select their new students and, thus, there is still room for strategic application behavior. A report by the Ministry of Education and Culture documents that, in 2016, 70% of the new students were selected to programs of their first order preference and, as addressed in the report,

the numbers may imply that majority of the applicants can only apply to one major program at a time.

As a result, students who are not accepted to the programs of their first order preference are likely to spend a gap year, preparing for the entrance exams. Considering the costs associated with spending gap years, the findings of this study underline that particularly students from low-income families may have to choose programs with high admission probability over the programs of their interest. Furthermore, if the findings of this study are driven particularly by family income, then there is also evidence that financial constraints can limit the set of education alternatives already in the application phase. These limitations may later affect career opportunities and earnings prospects.

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APPENDICES

APPENDIX A: Data description

I use the following registers.

i.   The Secondary School Application Register includes information on the comprehensive school grade point average.

ii.   The Matriculation Examination Register includes information on the points and final grades received in each exam subject.

iii.   The Register of Degrees includes information on the timing of high school graduation.

iv.   The University Application Registers (HAREK) and The Polytechnic Application Registers (AMKOREK) include detailed information on the post-secondary institutions, the study fields and the received applications.

v.   The Finnish Longitudinal Employer-Employee Register (FLEED) includes information on the full population, aged 15-74.

vi.   The Employee mobility register includes information on the number of employees in a plant.

APPENDIX B: Sample details and included control variables

<u>Parents</u>

I match information on students to their parents using mothers' identity codes. In each family the main income earner is either the student's birth mother, birth father or, in blended families, the stepfather. I include only private sector employees, aged between 35 and 74. All incomes are corrected using consumer price index.

In the estimations, I include the following controls: female, age, non-Finnish speaking, registered as a parent, highly educated, single, household size, three-year average family income, municipality of residence, county of residence, number of employees in a plant and working industry. Spousal characteristics are also included.

<u>Prospective applicants</u>

I exclude all students that are missing information on comprehensive school performance and who have not taken the Finnish language test in high school matriculation examination. Majority of the excluded students have taken the test in Swedish language. As the Swedish-speaking students have separate quotas in higher education, their application decisions are not comparable to the decisions of other students.

In the estimations, I include the following controls: female, age, non-Finnish speaking, high school fixed effects, academic preparedness as measured by comprehensive school GPA performance in the Finnish language test (standardized points and the final grade), matriculation exam semester (spring/fall).

APPENDIX C: Academic preparedness and program selectivity

<u>Matriculation examination and academic preparedness</u>

To measure academic preparedness I use information Finnish language test scores in high school matriculation examination. I exclude all exam retakes. While the exam is standard across Finland, its structure has changed over time and, therefore, I standardize the exam scores by each exam semester. As a supplementary control variable, I include the Finnish language grade a student is awarded at the moment of graduation. The final grade defines the number of extra credits a prospective applicant receives if evaluated in the combination point quota.

<u>Major programs and selectivity</u>

To identify major programs that are unique to each location of every polytechnic, I use a combination of the following variables: municipality, polytechnic id and standard national major code. In university application registers, information on major programs is readily available.

To measure the entry rates, I use information on applications from the same year as the student applies. Information about entry exam participation is not available for the full sample and, thus, I use information on all sent applications.

In terms of average academic preparedness measure, I use information on the Finnish language test scores of the students who eventually enroll in a

program. All programs are likely to select some students who underperformed in the national matriculation examination but who did well in the entrance exams. This motivates measuring program selectivity as the average performance of students in the Finnish language test.

Changes in statistical practices

Major programs that fail to fill all the available student places in the spring term selection round may take part in a supplementary application process. However, in the 2004 polytechnics application register there is no information about such supplementary rounds. This may reflect that either the applications sent in the supplementary rounds are not included in the register, or that these applications are included but left unspecified. From 2005 onwards I exclude all applications received in the supplementary application rounds.

Until 2008, all university applications were filled in by hand. This may explain the large number of duplicate observations in the university application registers, which I exclude from the sample. Also, I exclude all students who have sent more applications than the allowed maximum.

APPENDIX D: Application decision and family income

Entry rate and family income, conditional on the performance in the Finnish language test
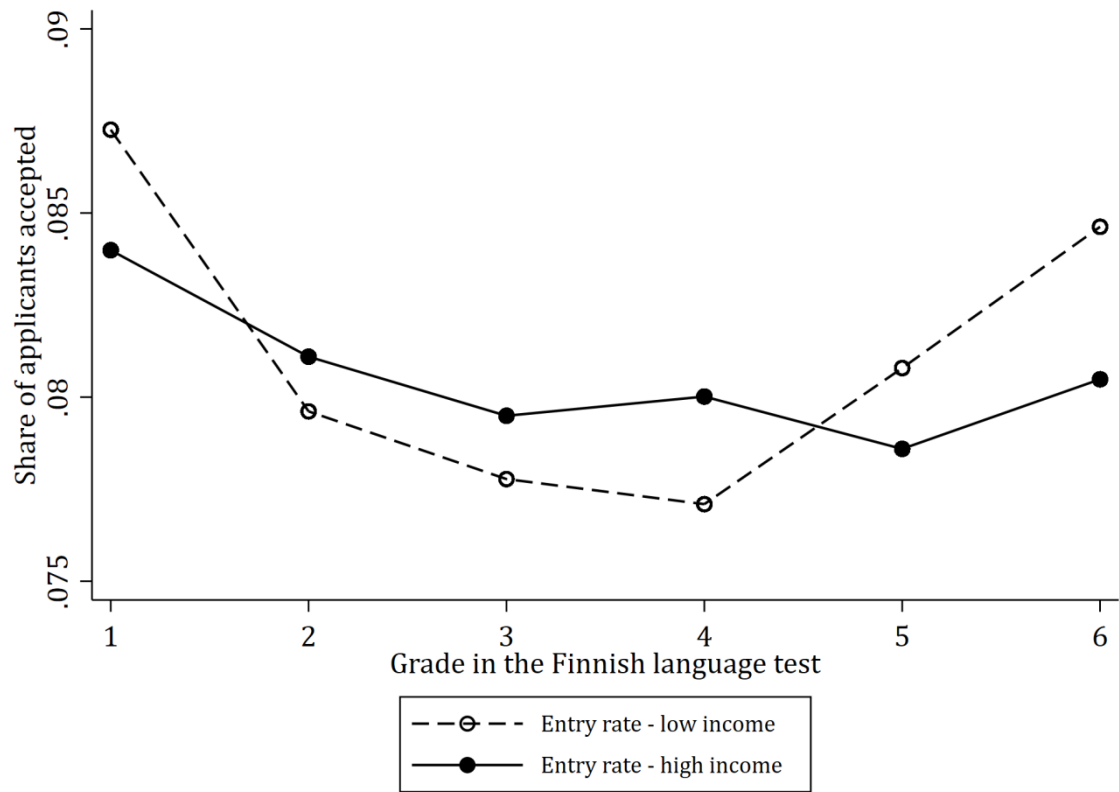
In the following I show descriptive information on the application decisions of students in income quartiles, without conditioning on Finnish language test scores.

Likelihood to apply and family income
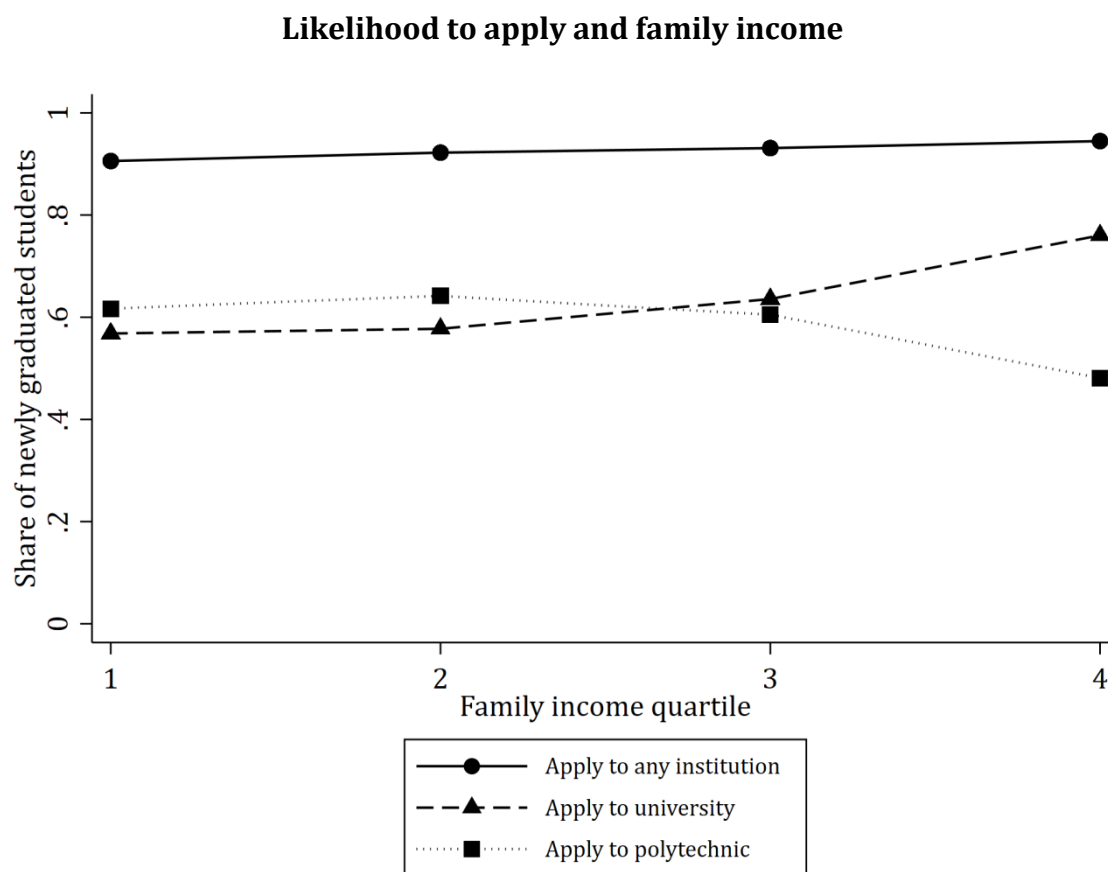
Number of applications and family income
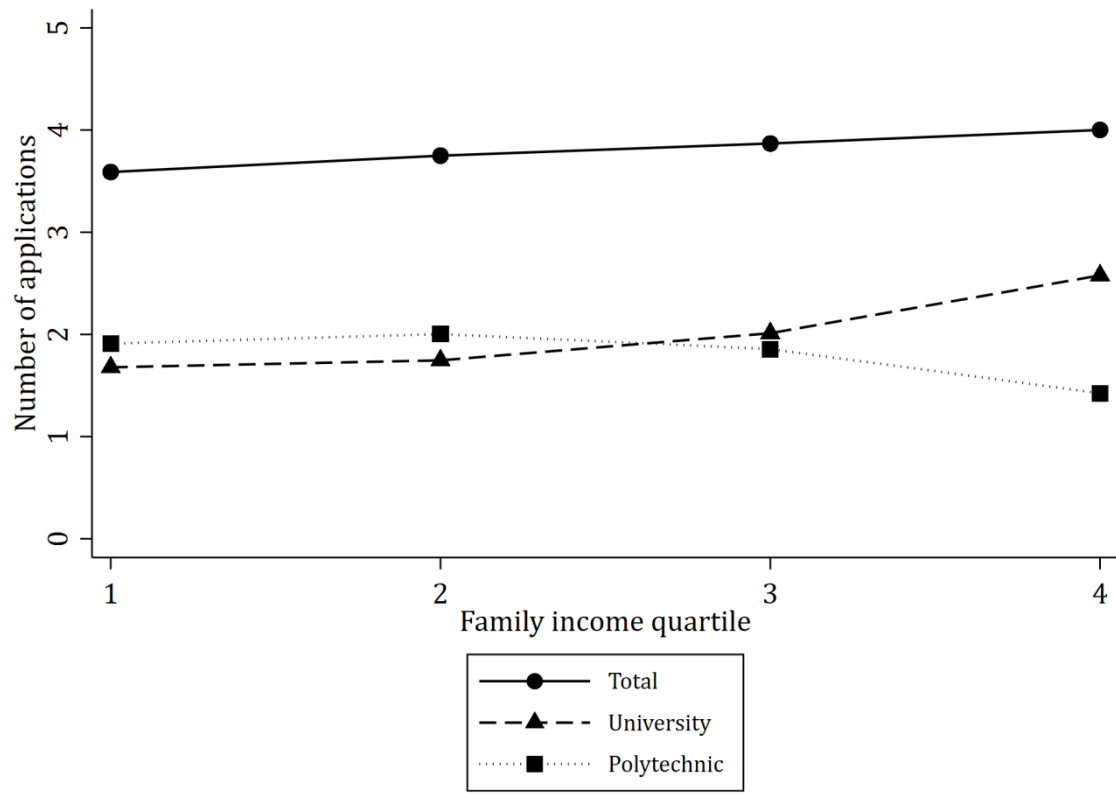
Major program selectivity and family income