Internships and Talent Allocation

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Abstract

Internships have become common at the entry to high-skilled labour markets. In this paper, I study their role in alleviating informational asymmetries between employers and graduates entering the workforce. I concentrate on a university funded program which gave randomly selected students an opportunity to do a subsidized internship during their studies. I match the program participants to an extensive university-employer-employee dataset allowing me to study the transition of students to labour markets and between jobs. I also use a unique dataset on individual cognitive skills of both program participants and their colleagues to construct a direct measure of worker-job match quality. I first find that the subsidy program gives students a chance to demonstrate their skills in internships and professional jobs in the program year. I then show that two years later, when students have entered the labour market, subsidized students are working in workplaces and occupations in which their individual skills have about a 10 percent higher return. These results suggest that internships or small public interventions may significantly reduce inefficiencies in entry-level labour markets.

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1 Introduction

Internships have become common among students aiming to enter the high skilled labour market. For example, in the United States, more than 60 percent of college students intern before graduation, and many graduates participate in multiple internships (NACE 2014).[1] On the one hand, internships may increase efficiency in entry-level labour markets by diminishing asymmetric information between employers and entering workers. Both workers and employers may learn on-the-job about the suitability of workers to particular jobs and tasks. On the other hand, internships are often suggested to increase job precariousness and inequality in the early career.[2] Rather than offering stepping stones to young workers, employers may simply benefit from lower hiring costs and substitute full-time workers with temporary, skilled labour without helping them access more stable or higher ranked positions. Even if internship experience is associated with better labour market outcomes among recent graduates, it may simply reflect the fact that well connected and more skilled students are likely to get the most useful internship positions in the first place. Indeed, so far there is relatively little credible evidence on the potential benefits of internships on early labour market success.[3]

In this paper, I study whether internships help students find the *right* job faster in the transition to high-skilled labour markets. I concentrate on an oversubscribed program at a major Finnish university which allocates internship subsidies to randomly selected students. The program provides employers a subsidy if they hire a student for at least a 2-month paid internship. In return, the employer should allow the student to work in expert duties under the supervision of a tenured employee and pay a minimum compensation. These features make the setting appealing to understand the role of internships in labour market transitions.

In the first part of the empirical analysis, I take advantage of a unique administrative dataset matching the program participants with student records and an extensive full-

[1] About one half of these internships are paid and the other half unpaid (NACE 2014). While consistent and comparable estimates on the popularity of internships do not exist (in part due to lack of common definition of an internship) a wealth of reports from individual countries and studies on hiring practices suggests that the institution is widespread at least in most European countries.

[2] See e.g., Perlin (2011).

[3] Survey results suggests that students who intern during their studies fare better in the early labour markets: they are more likely to hold a job after graduation and earn a higher salary than those who did not intern (see f.e., Taylor (1988), Gault et al. (2000) and NACE (2014)) However, since there are potentially significant differences between the students who do internships and who do not (such as their motivation, effort, ability, and existing labour market networks) the descriptive evidence is not sufficient for understanding the independent role of internships in the early career. For example, see Knouse et al. (1999) for selection to internships among business students.

population employer-employee dataset. This allows me to track the students labour market transitions between occupations and employers before and after the program. I then show that students who are assigned a subsidy are more likely to do internships and have experience working as professionals. This suggest that the subsidy program gives students a chance to demonstrate their skills, abilities and suitability to potential employers.

Next, I use a unique measure of individual cognitive skill based on the Finnish Matriculation Exam scores to construct a direct measure of worker-job match quality. These data are available to for full population of high-school graduates in Finland since 1967 allowing me to measure the skills of both the program participants and their colleagues and co-workers. I measure of match quality by estimating the return to individual skill-sets across jobs and comparing them to the market return to the same individual skill-set. I then show that subsidized students access jobs in which their individual skills have about a 10 percent higher return when compared to the control group.

Taken together, the results suggest that intenships provide students an opportunity to demonstrate their skills in tasks that are relevant to their later career. This opportunity allows students to access better jobs and workplaces in which they are likely to reap benefits later on.

The study is related to a large body of literature suggesting that imperfect information about worker productivity may generate important inefficiencies in early career labour markets.[4] In a baseline model in the literature, employers are not willing hire new workers if there is a risk that, after learning about their productivity, high productivity workers move to other firms. Hiring and experimenting with new workers is also constrained by regulation on temporary and fixed-term contracts which may not allow for sufficient flexibility from the employers side, increasing employment risk. On the other hand, new workers themselves may be unable to do unpaid work (or pay to be employed) to learn about their own productivity.[5] This may be due to credit constraints, laws prohibiting unpaid work contracts or the potential negative signals and stigma that such arrangements could cause to both parties. Social networks may alleviate these inefficiencies by allowing new workers to signal their type, but such networks only help workers with useful existing contacts and/or credible

[4]See extensive survey by Acemoglu and Pischke (1999) on investment in training programs and Terviö (2009) for a model on the inefficiencies in hiring entry level workers. There is also extensive research in the literature on employer learning and informational asymmetries at entry, see f.e., Farber and Gibbons (1996) and Altonji and Pierret (2001).

[5]Unpaid work is usually not allowed in most countries. Internships must usually be paid if employers derive any benefit from the work done by an intern. Yet, in practice these kind of arragements seem to occur, potentially biasing the institution towards favroing those who can affor to work without pay.

signals of their own type. These considerations suggest that there is potentially suboptimal level of public information on entrant productivity with potentially long lasting effects on young workers and inefficient matching in the early career hiring process. This gives rise to the potential benefits of public interventions to increase the available information.

Surveys of both students and employers suggest that internships may be important in alleviating informational asymmetries in the entry-level labour markets. First, college students in the United Sates regard internships as one of the most important ways to learn about new labour market opportunities and to promote their own labour market outcomes around graduation.[6], Internships may help in revealing the suitability of students to particular occupations and establish networks that may help accessing new jobs. Second, employers report that the single most important determinant in hiring recent graduates is their internship experience.[7] Many firms also have their own internship programs through which they aim to later hire recent graduates to full-time positions. It is thus possible that internships indeed provide both parties with potentially important additional information in the hiring process. Yet, there is no guarantee that the market will, in general, provide the optimal amount of information about students skills without public intervention.

In contrast, there are only a few existing studies aiming to directly study the role of internships, or similar interventions in early career labour market outcomes for high skilled workers.[8] First, and most directly related to this study, Saniter and Siedler (2014) study the effect of mandatory internships on labour market outcomes of students by taking advantage of introduction and abolishment of internships schemes across study programs over time at German universities. Using post-graduation survey data, they find evidence that internships have a positive effect on wages. Second, Nunley et al. (2016) study the effect of internships by a resumé audit and find that fictional college graduates with past internship experience are 14 percent more likely to be called for an interview still four years later than non-interns. Consistent with the above employer survey evidence, this suggest that internships are a way to signal student talent to potential employers. Third, Cerulli-Harms (2017) uses propensity score matching and finds evidence that interns are less likely to be employed and earn less than non-interns immediately after graduation, but catch up in the following years.

[6]Surveys include Cannon and Arnold (1998), Cook et al. (2004), Coco (2000)

[7]See Chronicle of Higher Education survey at `http://www.chronicle.com/items/biz/pdf/Employers%20Survey.pdf`

[8]There exists a burgeoning empirical literature aiming to characterize the impacts of heterogeneous active labour market programs on wages and employment, but most of these studies concentrate on unemployed, disadvantaged or low-skilled workers (see Card et al. (2010)). Similarly, there exists an extensive literature on temporary-help jobs, which are also mostly targeted to low-skilled workers.

She interprets this evidence as suggesting that internship experience sends a *negative* signal to prospective employers. Finally, Pallais (2014) studies the effects of providing potential employers with additional information on workers past performance in an online workplace. She finds evidence that additional information improves subsequent labour market outcomes in the entry level job market.

This study is also related to the recently emerging empirical literature on the role matching in the labour markets. For example, Fredriksson et al. (2015) and Guvenen et al. (2018) show that idiosyncratic variation in worker-job match quality is a significant predictor of worker turnover and wage growth. However, there is still little evidence on the mechanisms through which better match quality emerges in the labour markets. I add to this emerging literature by showing studying the role of internships in decreasing mismatch in the early career.

This study adds to the emerging literature by providing the first analysis exploiting an individual level experimental design and taking advantage of extensive administrative data. In particular, the data allows to track students over time and across occupations and workplaces, which has not been possible in previous studies. This setting should allow to discriminate between alternative mechanisms proposed in the theoretical literature.

I proceed as follows. In Section 2, I describe the internships subsidy program. In Section 3, I describe the data and the methodology to measure worker-job match quality. In Section 4, I present the main empirical results. In Section 5, I conclude.

2 Institutional Background

2.1 Internships and the Subsidy Program

Similar to other developed countries, internships and summer jobs are very common among university students and recent graduates in Finland. Student surveys suggest that 74 percent of students intern before graduation and 25 percent do more than a single internship (Akava 2017). Many private companies, non-governmental organizations (NGOs) and public institutions offer internship opportunities to students in various educational fields. Majority (around 60 percent) of internships are in the public and non-profit sector (especially in the field of social sciences). Further, universities commonly promote student attachment to labour markets by giving academic credit to students who intern during their studies or by including compulsory internships in study programs. For example, in 2017, 90 percent of students could get academic credit for an internship in Finland. Importantly, most public

universities also offer direct subsidies to employers who hire their students as paid interns. In 2017, 82 percent of students could apply for a subsidy and about one third received a subsidy.

In the empirical analysis, I concentrate on the internship subsidy program at the University of Helsinki. The program is targeted to students typically enrolled in a 5-year master's program.[9] The program is often oversubscribed and participating faculties are forced to select which students to allocate the subsidies to.[10] I take advantage of the fact the Faculty of Social Sciences randomized the allocation of the subsidy between 2010 and 2013 among all the applicants, providing, in effect, a randomized controlled trial. However, the program itself has been completely administered and run by the faculty.

The internship subsidy program and the allocation procedure runs as follows. First, in November-December, students may apply for a subsidy for an internship that starts during the following calendar year. The subsidy amounts to around 3,000 euros, or about two thirds of the minimum nominal compensation, including employer contributions. Applications are submitted via a short online form on the faculty website. All enrolled students are eligible for the program, given that they do not already have academic study credit for an internship and they have not previously received a subsidy from the university.

In the second stage, the faculty randomly selects the students who get a subsidy among the applicants. The randomization takes place at the discipline level so that, conditional on the number of applicants from each discipline, every applicant has an equal chance (about one half) of receiving the subsidy.

Third, students who are assigned a subsidy search for an internship position in a firm, government institution or a non-governmental organization. Some positions are marketed online on a university administered job openings platform where employers may post ads targeted to students in specific educational fields. But students may also approach any potential employer on their own. However, if the student is not able to find a job or she declines the subsidy, the subsidy is allocated to the next person in the reserve list as determined by the initial randomization.

Finally, if a student finds an internship position which satisfies the program requirements, the university reimburses the employer after the internship is completed. As per university

[9]Most students applying to a study program at a Finnish university are directly admitted to both the Bachelor's and Master's level degrees and courses. Most students are expected to finish with a Master's degree.

[10]Oversubscription results from the combination of fixed level of funds to run the program and a fixed and predetermined level of the subsidy paid per student.

rules, i) the employer needs to offer the student "expert duties that enable the trainee to apply and develop his or her skills to the greatest degree possible", ii) the employer needs to appoint a supervisor for the duration of the internship, iii) the internship needs to last for at least two months and iv) the employer"must pay a salary amounting to at least the minimum wage determined by the Social Insurance Institution" (Kela), which in 2017 was 1,187 euros.

3 Data and Measurement

3.1 Student Records

Considering the research design, the most important information comes from the lottery results which list the applicants to the subsidy program and those who were assigned a subsidy. I obtain this information and the student id's from the University of Helsinki Faculty of Social Sciences. Importantly, this information allows me to identify the students who were initially and randomly allocated a subsidy. If a student did not use the subsidy, someone from the reserve list may also have had an opportunity to use a subsidy, creating imperfect compliance.[11] However, based on aggregate figures released by the Faculty, at least 75 percent of students initially assigned the subsidy also used it.

Second important dataset comes from the University of Helsinki Student Registry. In particular, I use administrative data on the universe of students enrolled at the Faculty of Social Sciences between 2007 and 2016. It includes comprehensive information on student enrolment and graduation dates, field of study, courses and their instructors, grades and credits. This information is critical for the research design as it allows me to identify the application quota through which each student applied to the program. I also use this information to control for student characteristics (such as grade point average and study credits). The data also includes information about university credited internships. I use this information to study the impact of the subsidy on the frequency of internships.

3.2 Finnish Longitudinal Employer-Employee Data

To analyze student labour market outcomes, I match student registry data to the full population Finnish Longitudinal Employer-Employee Dataset (FLEED) using students' social

[11] Unfortunately, I do not have the information which students actually used the subsidy or which students in the reserve list obtained the subsidy.

security numbers. The panel data includes information on all individuals residing in Finland who are between the ages of 15 and 64 between 1988 and 2015. It includes comprehensive information on annual labour income, employment and end-of-year occupation codes. The data also includes a complete job history, including establishment ids as well as start and end dates for every job contract the worker has had. The data thus provides the main individual labour market outcomes of interest as well as measures of characteristics of workplaces in which the students work before, during and after applying to the subsidy program.

3.3 Measuring Internship Experience

The administrative work history data does not allow to directly discriminate whether a job is an internship. Thus, to measure internships, I will use two different proxies for internship experience. On the one hand, guided by the knowledge from student surveys, we know that a significant majority of students do internships in the public sector. This is especially the case for students in social sciences where many of the prestigious jobs are indeed in the public sector. Thus, our first (and preferred) measure of internship experience is to look at whether students were working in the public sector during the program year. On the other hand, we have a direct measure of student internships derived from the student registries. In particular, I take the all course records and identify credits for internships based on the course title using variants of the Finnish language word for "internship" (harjoittelu). However, not all the internship credits have a title that directly includes the word internship, and this results in measurement error and a downward bias in the empirical estimate.[12] This provides us with two alternative measures that are both imperfect, but as I will discuss later, provide consistent results.

3.4 Measuring Skill

I measure individual cognitive skills using the Finnish Matriculation Exam Scores available from the Matriculation Exam Board. The Matriculation Exam is a standardized examination at the end of academic high-school which, in practice, qualifies students to apply to universities.[13] This allows us to match the majority of the students in our sample to their

[12]There is also a possible upward bias in the internship credit measure as the incentives to register an internship with the university is likely to be biased towards the subsidized internships. In the worst case, it could be that only those who received the subsidy are willing to reger the internship. However, students also have the incentive to register other internships as they do get study credits for them.

[13]Matriculation is no longer a legal requirement to apply to universities.

exam grades, again using their social security numbers.

Now, several features of the Matriculation Exam make it a unique source of data on student's skills for the purposes of our empirical analysis. First, students have real stakes in the examination. Most importantly, universities and other educational institutions use the results to select students to their study programs.[14] This is in contrast to many survey based skill measures used in the empirical literature where individuals might not have incentives to exert significant effort. Second, matriculation exams are graded in a standardized way so that we can compare individuals across schools and over time. In particular, all students in the country take the same exam in a given biannual examination at the end high school. Exams are assessed by external evaluators who are appointed by the Exam Board and who do not know the students and thus have no incentives to artificially inflate their scores. After evaluation, tests are graded on the curve so that the final grades are determined by the relative ranking within the cohort.

The coverage of the data also makes it unique and appealing. In particular, the exam scores are available for all high-school graduates since 1967. This allows us to measure skills of the program participants, but also of the majority of working age, high-school educated population. This is important for our proposed measure of match quality, as will be detailed in the next section. Further, compared to other studies using registry-based or population level datasets, the unique feature of the dataset is that it is available for both men and women. This is important, as a significant part of the program participants are, in fact, women.

In the empirical analysis, I will concentrate on exam scores in two subjects that receive the highest weight in university applications: Finnish language and mathematics. The main benefit is that language and mathematical skills are likely to be capture complementary cognitive skills (math and verbal skills) that are rewarded in the labour markets.[15]

3.5 Descriptive Statistics

Table 1 presents pre-treatment characteristics for the students who applied to the internship subsidy program in 2010-2013. In total 921 students applied to the program of which 417

[14]Universities may also arrange their entrance examinations to complement the selection process.

[15]The formats of these exams has also been fixed over time so that it is reasonable to assume that over time the exams measure the same type of skills. Another more practical benefit of using these exams is that up until 2005 both exams were compulsory, so that they cover most high school graduates. In 2005 it became optional to complete the mathematics exam, but still a great majority of all students complete the exam.

(45 percent) were initially assigned a subsidy. Columns (1) and (2) show the characteristics of the applicants. The applicants are on average about 26 years old and earn about 13,000 euros per year. Around 73 percent of the applicants are women. About 65 percent of the students are working at the end of the calendar year. Majority of the them are working in low ranked service sector jobs (most common job title being sales worker) or clerical jobs, but a small minority already holds professional jobs.[16] The average applicant has 164 university credits, or an equivalent of somewhat below three years of course work. This suggest that the average applicant enters master's level studies in the year of the internship and is expected to graduate in two years. Finally, only about three percent of the applicants have a credit for an "internship" as measured by the credit titles in the registry. This low level is consistent with the requirement that applicants are not eligible if they already hold academic credit for an internship.[17]

Comparison between the control and the treatment group suggest that the characteristics are balanced. More formally, Column (3) test for these differences by controlling for application quota through which the students applied to the program. None of the characteristics show any statistically significant differences between the students, as one would expect if the subsidy allocation was indeed random. This lends credibility to the initial randomization and the research design.

3.6 Measuring Matching

This section outlines our proposed approach to measure match quality using measures of individual skills both for the program participants and the whole population.

Suppose for simplicity that individual i has a skill set $S_i \in \{s_i^M, s_i^V\}$ where s_i^M is math and s_i^V is verbal skill. Define market return to these skills as

$$Y_i = S_i\beta + \epsilon_i \tag{1}$$

and, similarly, the return to skill in job j is defined as

$$Y_{i,j} = S_i\beta_j + \varepsilon_{i,j} \tag{2}$$

[16] Only about one percent of the applicants are working as social scientists, which is the most common graduate three digit occupation title for graduates from the Social Sciences Faculty.

[17] The fact that it positive and not zero is likely to result from mismeasurement due to the coding procedure. Some of the credits might not actually be counted as an official internship as per university rules.

Next, I define worker-job match quality $M_{i,j}$ as the difference between market return and return in job j

$$M_{i,j} \equiv S_i\beta_j - S_i\beta \tag{3}$$

This match quality will thus gives a measure of how well a worker is matched to a job. A negative match value suggest that a worker is earning less than the market return in the current job and a positive match value suggests that a worker is earning more than the market return to her skills. The match quality variation comes both from the variation in individual skills as well as variation in the return to these skills across jobs.

Empirically, to get an estimate of the match quality, I first estimate the market return to skills using a non-parametric specification

$$Y_i = \sum_{s\in S}\sum_{g\in G} I_i^s * I_i^{s,g}\beta^{s,g} + u_i \tag{4}$$

where Y_i is the (log) annual labour earnings, I_i^s is a dummy for skill s and $I_i^{s,g}$ is a dummy for having a level g skill of s, i.e., I regress the annual earnings on dummies for having a particular grade g in exam s.

Table 3 shows the results based on the above OLS specification for a pooled sample of workers in 2010 and 2015. The results suggest that both math and language skills have a positive labour market return. The gradient is particularly steep for high advanced math skills.[18]

Similarly, I estimate the return to skills separately for every job j

$$Y_{i,j} = \sum_{s\in S}\sum_{g\in G} I_i^s * I_i^{s,g}\beta_j^{s,g} + u_{i,j}. \tag{5}$$

Finally, using the above empirical estimates in (4) and (5), I measure match quality by the difference between predicted market return and return in job j

$$\hat{M}_{i,j} \equiv S_i\hat{\beta}_j - S_i\hat{\beta} \tag{6}$$

This provides the measure of matching that I use in the empirical analysis.

[18]There are two levels of math in high-school and I treat them as separate subject so as to keep the specification simple. An alternative specification would be to interact math skills with the level of math.

4 Results

This section presents the empirical analysis of the effects of the subsidy program. I first discuss the effects of the program on initial internship experience. I then proceed to longer run labour market outcomes and in the final section I describe the main results on the effect of the program on match quality.

4.1 Labour Market Outcomes

Figure (1) reports monthly employment based on work-history data by the assignment status. First, panel 1a shows that students assigned the subsidy are significantly more likely to work for a public sector employer during the 12 months when they may benefit from the subsidy. There is a clear spike during the summer months starting from June when students are also expected to do the majority of the internships. Given that students in social sciences mostly do internships in the public sector, this is a clear indication that the subsidy helps the assigned students to land internships during the year when assigned the subsidy. In contrast, what is also clear from the figure, is that the subsidy assignment seems not to be associated with any long-run impact on public sector employment as assigned and non-assigned students are equally likely to work in the public sector in the two years following the assignment.

Panel 1b shows the probability that the students work for any employer. The figure demonstrates two important regularities. First, in the first year during their studies students work mostly in the summer months, but increasingly start working during the whole years as their studies progress. Second, the effects of the subsidy on the probability of working for any employer appear to be small: while there is again a spike in employment during the summer months of the assignment, the difference is much smaller than for public sector employment. However, there appears to be no crowding out of private sector employment as there is no difference in private secotr employment (not shown here). This suggests that most students hold on to additional private sector jobs in addition to the internships. This is consistent with working shorter hours in service sector jobs which are common among students as show in the previous section.

More formally, to test the effects of the subsidy on employment, I estimate

$$Y_{it} = \alpha + \sum_{s=-12}^{36} (\tau_s + \beta_s * Assigned_i)\mathbf{1}\{S_{j(i)t} = s\} + X_i\gamma + \varepsilon_{it} \tag{7}$$

where $S_{j(i)t}$ is the time to subsidy application and $\mathbf{1}\{S_{j(i)t} = s\}$ is a set of dummies for student i having been assigned the subsidy s months ago, $Assigned_i$ is a dummy for students who were assigned a subsidy at $t-1$ and X_i includes student characteristics and application quota fixed effects. My main interests lies in the coefficients β_s which will identify the difference between the students who were assigned a subsidy compared to workers that were not assigned a subsidy at time s.

The panels (c) and (d) in Figure 1 show the results from estimating 7 and confirm that students assigned a subsidy are about 15 percentage points more likely to work in the public sector in the assignment year. This represents about a 50 percent increase in public sector employment. In contrast, the effect on total employment is only about 5 percentage points, or about a 6 percent increase.

Another way to see if the subsidy program affected internship take-up is to look directly at the university records. Figure 2 shows the differences between assigned and non-assigned students on a dummy of whether they have earned a study credit for an internship from the university. Indeed, it shows that assigned students are about 15 percentage points more likely to get a credit for an internship than the non assigned students in the assignment year. In the following year the initially not assigned students catch up, but the difference remains close to 10 percentage points. One caveat to this measure of internships is that it includes significant measurement error. From the records of the Faculty, we know that more than 75 percent of students in the assigned group actually did do an internship, while the information from the study credits suggest the prevalence is about one half of that.[19] However, as the measurement error is likely to be random, this should not affect the conclusion that the subsidy assignment had a significant positive effect on student internships.

Table 2 shows the effects of the subsidy assignment on occupational status of the students in the four main occupational groups: professionals, semi-professionals, clerical workers and service sector workers.[20] Importantly, the results in the first row on column (1) show that assigned students are about 7 percentage points (or 40 percent) more likely to work as professionals in the assignment year than those who were not. In contrast, the subsidy has a negative effect on the probability of working in routine oriented clerical occupations (see Column (3)).

Next, the results in rows two and three in Table 2 show the effects on occupational status

[19]This is due to the fact that I only pick the university credits in which the credit record contains a clear phrase "internship" or some simple variant of it.

[20]Occupational status is only available for the end-of-the-year employment contract and this these effects are estimated annually.

in the two years following the subsidy assignment. The effects of the subsidy on occupational status are small in the year following the subsidy assignment when the students are still expected to conduct their studies. However, by two years after the assignment, when a majority of the students are expected to graduate, the assigned students are significantly more likely to work as professionals and less likely to work in routin oriented clerical jobs in the office. This is first evidence to suggest that the subsidy assignment improves the matching of students to jobs in which their skills are expected to have a higher return.

To sum up the intial results on employment, the evidence suggests that the subsidy assignment primarily affects the *quality of work* rather than the *quantity of work* that students engage in during the assignment period. This is not surprising in the sense that university students are expected to be highly skilled and, in contrast to low-skille workers, are not very likely to be close to the margin of unemployment even during the summer months. However, this evidence is consistent with the program target to allow students to work in tasks which allow them to better demonstrate their skills to prospective employers.

Figure 3 shows how the workplace characteristics of assigned students compare to those who were not assigned. This is potentially intersting for two reasons, first, co-workers are a proxy for the potential earnings the student may achieve in a given workplace is she was having a full-time job. Second, it also gives a measure of the quality of the job and the peers the student is exposed to. First, 3a shows that assigned students work in workplaces where earnings are higher. This effect is not restricted to the initial assignment year, but is persistent increasing in the two following years. Further, 3b shows that. Again, these results are confirmed in an event-study specification controlling for the application quota and student characteristics. Taken together, these results suggests that the subsidy helps students access more prestigous and professional workplaces.

4.2 Matching

The previous section shows evidence that internships subsidies promote early career labour market outcomes of students by allowing them to work in occupations that allow them to demonstrate their skills and later access more prestiguous workplaces. In this section, the aim is to go a step deeper and aim to understand whether students are actually better matched to the jobs they acquire in the early career and hence could expect to experience persistent gains in wage growth and employment as suggested by some of the recent literature (see Fredriksson et al. 2015).

Figure (4) shows the distribution of match quality before and after the subsidy assign-

ment. First, the left hand side figure in panel (a) shows that most students are not well matched to workplaces at the time of the application to the program. There is significant heterogeneity in the match and the average match quality negative. Thus, students are working in workplaces where the return to their skills is lower than the market return to the same skills. Similarly, the left hand side of figure in panel (b) shows a similar pattern for matches based on the returns within 3 digit occupations.

Figures on the right hand side, on the other hand, show that there is a dramatic change in the quality of matches in the years following the subsidy assignment and during the years when the transition formally to the labour markets. First, based on these two match quality measures, the variance of the match quality shrinks considerably. Second, the mean match quality comes closer to zero. Both of these patterns suggest that students become better matches in the first years of their early career.

Next, taking a closer look at the distributions shows that the students who were initially assigned a subsidy are become better matched than the non-assigned students. While the distributions look quite indistinguishable in the year before the assignment, both the variance of the match quality and the mismatch shrink more for those who were initially assigned a subsidy.

These match quality results are also formally confirmed in the comparison of match quality between assigned and non-assigned students in Table 4. Column (1) shows that students assigned the subsidy are employed in workplaces where their skills have a 12.5 percent higher return than the non-assigned students. Similarly, Column (2) shows that students assigned the subsidy are working in occupations where their skills have a 9 percent higher return than the non-assigned students. Both measures thus suggest that the subsidy program improves matching of students to jobs in the early career.

5 Conclusion

This paper studies the impact of internship subsidies on early career outcomes of university students in Finland using a unique administrative dataset, an experimental research design. The results suggests that the internship subsidy program improved students labour market attachment by promoting access them to higher ranked occupations, jobs in their own field and jobs in more prestigious workplaces as measured by co-worker characteristics. Further, by using a new measure of worker-job match quality based on individual skill measures, I show that the subsidy assignment improves the matching of students to jobs in which the

students have a higher return.

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Table 1: Pre-Treatment Characteristics by Assignment Status

	(1) Not Assigned	(2) Assigned	(3) Diff.
Age	25.717	25.640	0.077
	(2.603)	(2.468)	(0.174)
Woman	0.733	0.718	-0.005
	(0.443)	(0.451)	(0.029)
Income	12888.229	13140.019	-163.181
	(7520.485)	(8208.881)	(538.823)
Employed	0.647	0.652	0.002
	(0.478)	(0.477)	(0.032)
Prof.	0.091	0.110	0.014
	(0.287)	(0.314)	(0.020)
Semi-Prof.	0.098	0.091	-0.006
	(0.298)	(0.288)	(0.020)
Clerical	0.136	0.125	-0.011
	(0.343)	(0.331)	(0.023)
Service	0.181	0.187	-0.000
	(0.385)	(0.390)	(0.026)
GPA	3.627	3.662	0.043
	(0.504)	(0.526)	(0.035)
Credits	163.928	165.251	-1.942
	(77.368)	(85.022)	(5.375)
Internship	0.031	0.034	-0.000
	(0.175)	(0.180)	(0.012)
Observations	508	417	921
Quota FE			Yes

Note: *Income* is the annual labour income, *Employed* is a dummy for working at the end of the year, *Prof.*, *Semi-prof.*, *Clerical* and *Service* are dummies for working in one of the four most common 1-digit occupational groups in the sample, *GPA* is the credit-weighted Grade Point Average (1 to 5 scale), *Credits* is the total study credits and *Internship* is a dummy for having a study credit for internship.

Table 2: The Effect of Subsidy Assignment on Occupational Status

	(1) Professional	(2) Semi-Prof	(3) Clerical	(4) Service
assigned (t=0)	0.069**	0.014	-0.031	-0.002
	(0.034)	(0.029)	(0.029)	(0.025)
assigned (t=1)	0.003	0.025	-0.023	0.015
	(0.036)	(0.032)	(0.028)	(0.023)
assigned (t=2)	0.102***	0.001	-0.052**	0.022
	(0.037)	(0.030)	(0.025)	(0.018)
Controls	Yes	Yes	Yes	Yes
Quota FEs	Yes	Yes	Yes	Yes

Note: *Prof.*, *Semi-prof.*, *Clerical* and *Service* are dummies for working in one of the four most common 1-digit occupational groups in the sample. Quota fixed effects are formed by the interaction between study department and the year of application. Controls include gender, age, age square, and pre-treatment GPA. Clustered standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 3: Language and Math Skills Have a Positive Labour Market Return

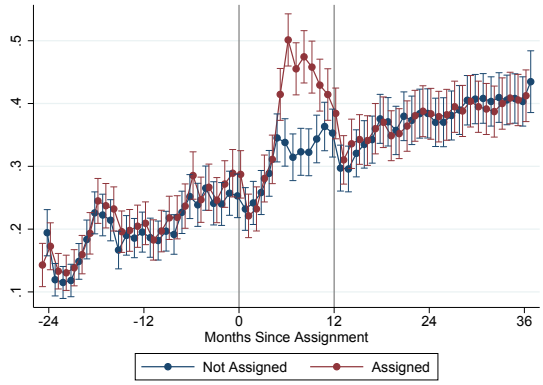
		(1) Wage	
Language:	I	-0.258***	(0.009)
	A	-0.036***	(0.002)
	B	0.000	(0.001)
	C	0.040***	(0.001)
	M	0.059***	(0.001)
	L	0.067***	(0.001)
Adv. Math:	I	0.087***	(0.003)
	A	0.208***	(0.002)
	B	0.212***	(0.002)
	C	0.279***	(0.002)
	M	0.361***	(0.002)
	L	0.451***	(0.002)
Basic Math:	I	0.127***	(0.002)
	A	0.056***	(0.002)
	B	0.033***	(0.002)
	C	0.025***	(0.002)
	M	0.072***	(0.002)
	L	0.075***	(0.002)
Constant		9.999***	(0.000)
Observations		10,895,054	
R-squared		0.019	

Note: Robust standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

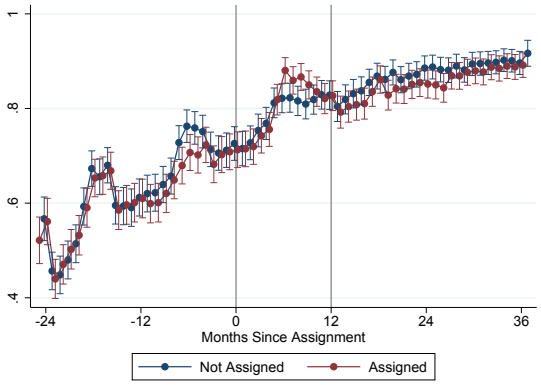
Table 4: Subsidy Assignment Improves Match Quality

	(1) Workplace Match	(2) Occupation Match
assigned	0.125*	0.090**
	(0.071)	(0.044)
Observations	586	657
R-squared	0.013	0.039
Controls	Yes	Yes
Quota FEs	Yes	Yes
Mean	-0.238	-0.151

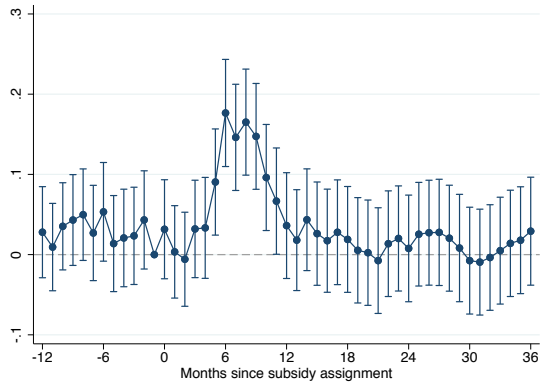
Note: Controls include gender, age, age square, and pre-treatment GPA. Clustered standard errors in parentheses: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.



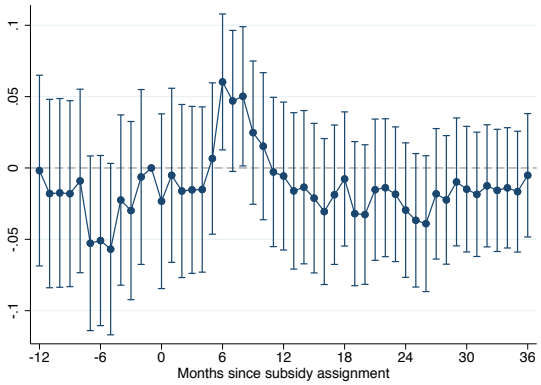
(a) Works in Public Sector



(b) Has a job



(c) Works in Public Sector

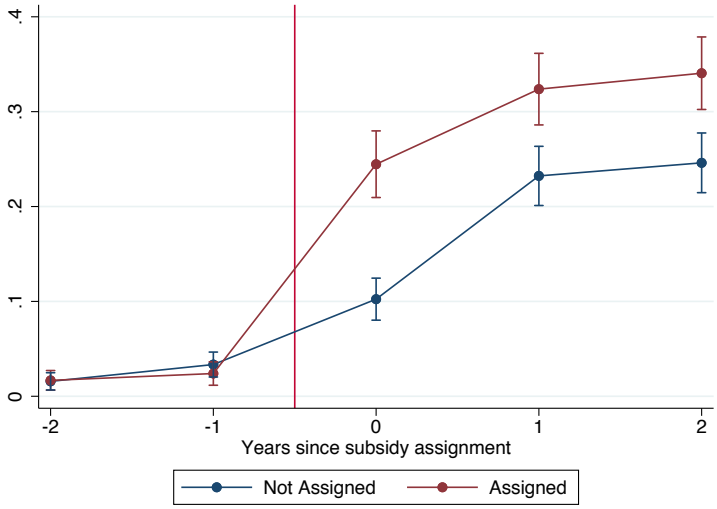


(d) Has a job

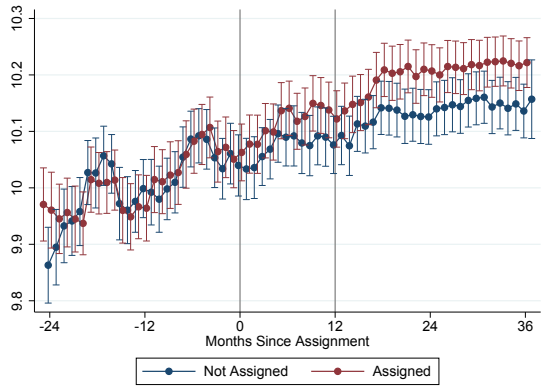
Figure 1: The Effect of Assignment on Initial Work Experience

Note: (a) shows the probability of working in the public sector by assignment status, (b) shows the probability of working in any job by assignment status and (c)-(d) show differences between assigned and non-assigned estimated from equation (7). Capped spikes show the 90 percent confidence intervals.

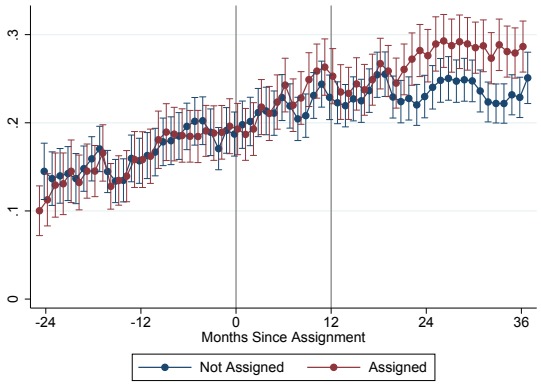
Figure 2: Assigned students are more likely to have a credit for an internship



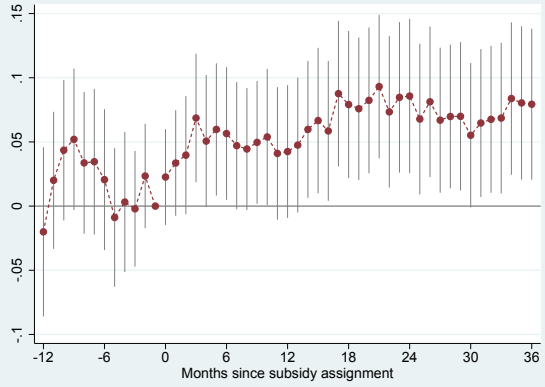
Note: Figure shows the probability of having a credit for an internship in the student records. Capped spikes show the 90 percent confidence intervals.



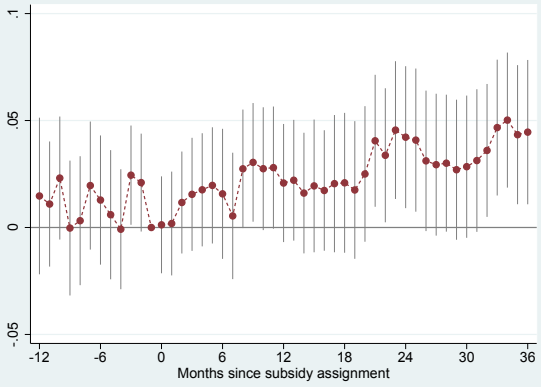
(a) Annual Earnings at the Workplace



(b) Professionals at the Workplace



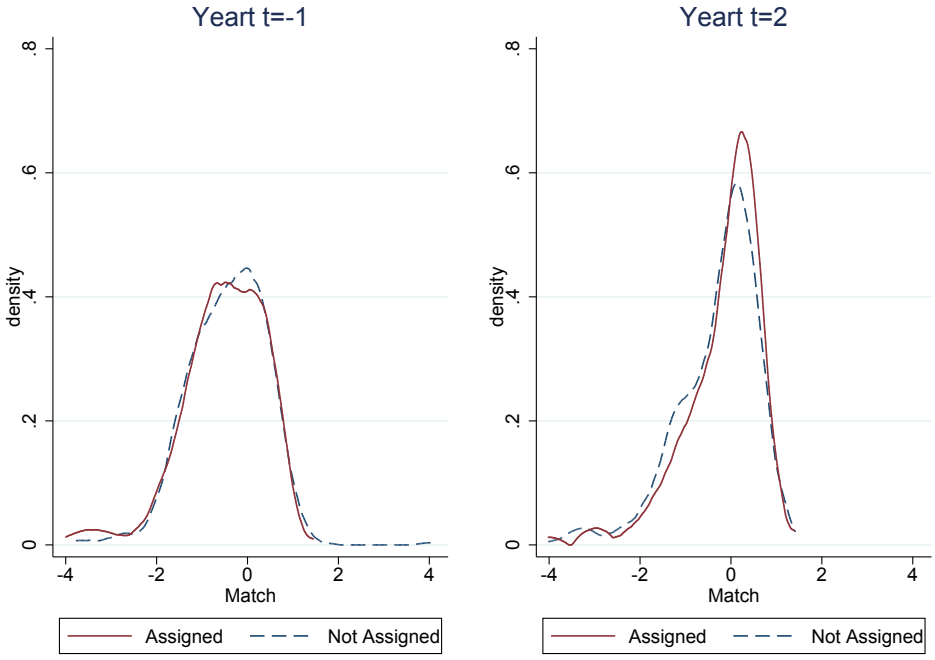
(c) Annual Earnings at the Workplace



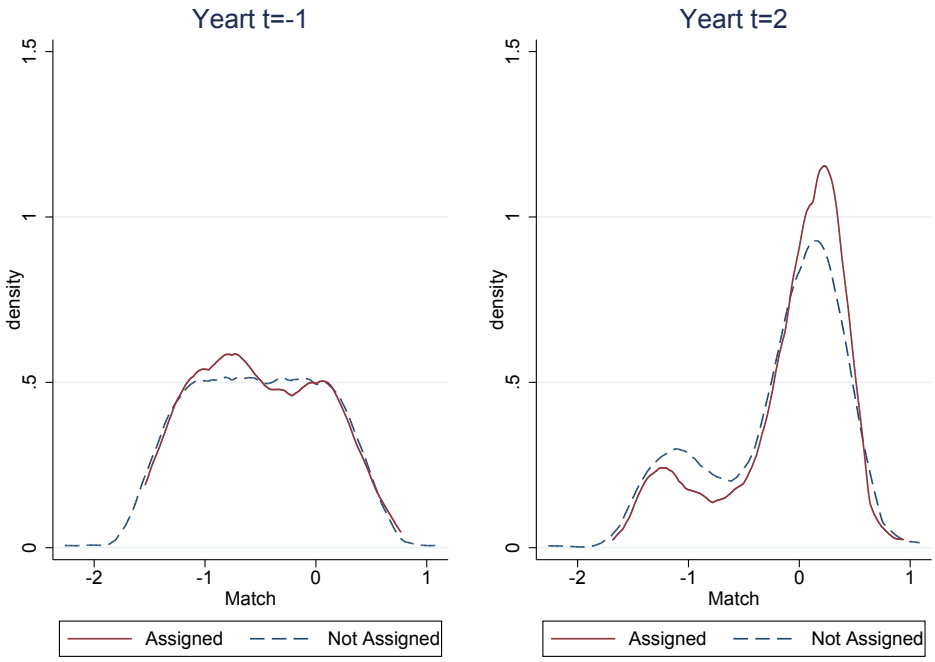
(d) Professionals at the Workplace

Figure 3: The Effect of Assignment on Workplace Characteristics

Note: (a) shows the average co-worker earnings in the workplace, (b) shows the share of professional co-workers in the workplace and (c)-(d) show differences between assigned and non-assigned estimated using from (7). Capped spikes show the 90 percent confidence intervals.



(a) Workplace Match Quality



(b) Occupation Match Quality

Figure 4: Match Quality Before and After Subsidy Assignment

Note: (a) shows distribution of match quality before and after the subsidy assignment based on comparing returns skill at the workplace to the market return, (b) shows distribution of match quality before and after the subsidy assignment based on comparing individual returns to skill in the occupation to the market return.