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Peer Effects and Social Mobility

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Abstract

This paper analyzes peer effects at the University of St. Gallen (HSG) in Switzerland. The identification strategy relies on randomized student groups to investigate how graduates' outcomes are affected by the social composition of their peer groups. The results indicate that a 10 percentage points higher share of peers with low socio-economic status (SES) leads to a 5.08% increase in graduates' income one year after graduation. The effect is strongest on other low-SES students and functions through an adoption of job searching behavior, occupational choices and labor supply. I do not find evidence in this sample that the outcomes of low-SES students are negatively affected by high-SES peer exposure.

Keywords

peer effects, social mobility, human capital, educational mobility

JEL Classification

D64, J62, I24

1 Introduction

In most countries, a significant proportion of top-income earners graduate from a small number of universities. Typically, the access to these institutions strongly depends on children's socio-economic status (SES). In the United States, children from families in the top income percentile are 77-times as likely to attend an Ivy League School than children born to families in the bottom income quintile (Chetty et al., 2017). However, educational inequality does not necessarily stop at the access to elite institutions. Using historical data, Michelman et al. (2022) find that high-SES peer exposure at Harvard only benefits other high-SES students – with zero or even negative effects for students with lower SES. Evidence also indicates that students from less privileged backgrounds are excluded from peer networks determining the access to high-income jobs after graduation (Zimmermann, 2019). Thus, peer effects at elite universities might provide additional barriers for upwards economic mobility at the top of the income distribution.

This paper analyzes peer effects at the University of St. Gallen (HSG), one of Europe's leading business schools.[1] The average earnings of HSG graduates are the highest of all graduates in Switzerland, and its alumni belong to the top decision makers in various sectors of the Swiss economy. Of the 100 largest Swiss companies, 80% have at least one HSG graduate on their board or executive committee, 20% of CEO are HSG graduates, the highest percentage from any single university.[2] Simultaneously, the share of HSG graduates with non-academic background is the lowest in Switzerland. Therefore, peer effects are not only relevant for this institution but also for the formation of the top of the Swiss economy.

For the United States, it is well documented that students from low-income households feel socially alienated at Ivy League schools which also affects their career choices after university (Rivera, 2016; Jack, 2019; Michelman et al., 2022). Such effects could also materialize at the University of St. Gallen. An internal report indicates that students experience the social environment at the university as competitive and elitist (Egger, 2018). The report includes anonymous interviews with students from the 2016 and 2010 Assessment Year cohorts, of

[1] The University of St. Gallen is ranked as the strongest business school among German-speaking countries in the Financial Times European Busines School Ranking 2022. In Europe, HSG is at the 5th place, see `https://rankings.ft.com/rankings/2943/european-business-school-rankings-2022`.

[2] Guttmann (2020), 3.

which the latter is also part of this analysis. These interviews are selective, but they illustrate that the University of St. Gallen provides an institutional setting in which the social composition of peer groups might credibly create externalities on students' outcomes. Yet, the setting at HSG differs significantly from that in the United States. Students holding a Swiss high school degree can begin their undergraduate studies at HSG without an entry exam, leading to a majority of students originating from the neighboring rural cantons. Additionally, although student fees at HSG are above the Swiss average, they are less than half of the monthly median wage in Switzerland. A Swiss Bachelor's student pays a fee of 1,229 CHF per term, compared to a median monthly gross wage of 6'665 CHF in 2020.[3]

In general, peer effects are defined as spillover effects on students' outcomes arising from exposure to their peers' characteristics or behavior. Here, the analysis explores how students' outcomes are affected by the social composition of their HSG peer group, measured by the combined education level of students' parents. In addition to students' major choices and HSG drop-out rates, the analysis focuses on two outcomes of interest: students' academic achievements and their income one year after graduation. Both outcomes are important determinants for graduates' subsequent employment biography. Thus, peer effects occurring at the transition to the labor market affect economic outcomes also in the long run.

The identification strategy relies on a random assignment of student groups at the beginning of the undergraduate studies. These groups compete against each other in an incentivized business case. The specific design enhances social interactions within groups, and existing survey data shows that close friendships are formed between former group members (Thiemann, 2022). Consequently, the setting can be exploited to causally identify peer effects. The analysis combines administrative data from the University of St. Gallen with the Graduate Survey conducted by the Swiss Federal Statistical Office. This full survey of Swiss graduates provides rich information on students' characteristics, their socio-economic background and on early labor market outcomes.

Students influence each other when deciding on their major after the end of the first year. Overall, the results show that students' reactions to peer exposure strongly depends on students' own social background. For instance, a higher share of low-SES students reduces the probability that other low-SES students

[3]Swiss Statistical Office (2023), `https://www.unisg.ch/en/studying/programmes/costs-of-an-hsg-degree/`. Foreign students pay higher fees.

drop-out at HSG and finish their studies at a different university. This does not apply to other student types.

Looking at early labor market outcomes, I show that a 10 percentage points higher share of low-SES peers increases students' income on average by 5.08 %, which is equivalent to approximately 4,120 Swiss Francs in their annual gross income. This positive peer effect is driven by the reaction of low- and medium-SES students. It functions primarily through students adopting their job searching behavior, occupational choices, and labor supply. All students are drawn to careers in the high-paid finance and insurance sector when the share of low-SES peers increases. Additionally, higher-status students are less likely to work in education and the public sector, which relate to below-average earnings. Graduates also adjust their labor supply at the intensive margin. Medium- and high-SES students significantly increase their self-reported numbers of working hours by 6.72% and 9.66%, respectively. Conversely, I also find evidence for a small negative effect on medium-SES students' academic achievement from low-SES peer exposure. I present evidence that this negative effect is driven by low-SES students with low ability level, whereas low-SES students with high ability do not significantly affect students' final grades.

Thereby, this analysis adds to two strands on the literature: (i) the literature on peer effects in education and (ii) the literature on social mobility and elite formation.

There exists a large empirical literature analyzing how individuals react to peer exposure in education. Hereby, the causal identification of peer effects typically relies on random assignments (Feld and Zölitz, 2017), regression discontinuity designs (Dustmann et al., 2017), variation across cohorts (Bostwick and Weinberg, 2022), or instrumental variable (IV) approaches using peers-of-peers as instruments (Bramoullé et al., 2009; Mendolia et al., 2018). See Sacerdote (2011); Epple and Romano (2011) and Paloyo (2020) for reviews. Overall, the obtained results vary largely in their magnitude and direction, indicating that the magnitude and direction of existing peer effects strongly depends on the specific setting in question.

Several studies find that pairing high- and low-ability students leads to positive spillover effects, which could be related to low-ability students mimicking good study behavior or adopting more effective time management strategies (Stinebrickner and Stinebrickner, 2006; Oosterbeek and van Ewijk, 2014; Mendolia et al., 2018). Conversely, the results of Carrell et al. (2013) and Booij et al. (2017) show in experimental settings that low-ability students select low-

ability study partners within their groups, leading to a deterioration in their outcomes. It has been suggested that low-ability students may get discouraged by a high-ability environment, which leads to negative peer effects on their academic performance (Feld and Zölitz, 2017; Fischer, 2017; Thiemann, 2022). This paper builds on Thiemann (2022). As in the following analysis, the orientation week at the University of St. Gallen is used to identify heterogeneous peer effects regarding students' abilities. Thiemann (2022) shows that pairing high- and low-ability peers leads to lower performance during the first year and an increased drop-out probability for low-ability students. Furthermore, Thiemann (2022) provides friendship survey data and additional information on tutorial groups showing that former orientation week group members are significantly more likely to become close friends and repeatedly interact with each other later on. In comparison to this study, I focus on heterogeneous effects regarding students' social background rather than on their abilities. Also, I expand the scope of the analysis to students' labor market outcomes.

The existing papers on occupational preferences find gender-specific effects. For female students, being exposed to a higher share of female classmates in business schools increases the probability of pursuing careers where they work less hours and experience slower wage growth. There are no comparable effects at the labor market for male students, however, male students are more likely to choose male-dominated majors and less likely to choose female-dominated majors (Zölitz and Feld, 2021). In a similar line, Markussen and Røed (2017) show that same-sex peer exposure affects the probability of becoming an entrepreneur. Conversely, when looking at occupational preferences in general, Jones and Kofoed (2020) do not find significant peer effects in a military setting. Their survey results indicate that mentors and internships, rather than peers, shape cadets' occupational preferences. This analysis finds that peers are influential for initial career decisions. These results are also consistent with the literature indicating that peers have a greater influence on social outcomes than on academic achievements (Paloyo, 2020; Zárate, 2023).

Furthermore, this paper relates to the literature on elite formation at universities (Arcidiacono, 2005; Bertrand et al., 2010; Rivera, 2016; Chetty et al., 2017; Zimmermann, 2019; Barrios Fernández et al., 2021). In general, universities contribute to upwards economic mobility in the long run. For the United States, Chetty et al. (2017) show that within elite institutions, the earning gradient between graduates from low- and high-income families is 76% smaller than the national average. Mid-trier public institutions are often more successful in pro-

viding access to low-income students while their graduates also reach the top income quintile if not the top 1% percentile. There is also evidence that peer interactions and social networks at elite institutions affect the access to top-income jobs, and how graduates perform in these jobs. Zimmermann (2019) finds that the admission to elite business degree programs in Chile raises the probability of belonging to the top 0.1% income percentile by 51% - but only for male graduates from private high schools. He provides supportive evidence that this result is driven by peer networks to which female graduates and male graduates from public high school have no access to. Marmaros and Sacerdote (2002) explore the use of peer ties and social networks for job searches of Darthmouth College graduates, finding significant peer effects on graduates' salaries. They also show that students networking with fraternity members and alumni are most likely to obtain high-income jobs. Once high-income positions are obtained, peer effects continue to influence managerial behavior and decision making (Useem and Karabel, 1986; Shue, 2013; Fracassi and Tate, 2012; Fracassi, 2016). Here, I show how peers effects contribute to elite formation by influencing choices students make at the transition to the labor market, thus affecting their initial income level after graduation.

This analysis relates most closely to Michelman et al. (2022). They show that high-status peer exposure leads to large positive effects for former private school students, but to zero or negative effects for other social groups. Michelman et al. (2022) rely on randomized housing assignments and historical data on Harvard students matched with census records from 1910 to 1940. Michelman et al. (2022) estimate causal effects with historical data on Harvard students matched with census records from 1910 to 1940. Here, I provide causal effects for current cohorts. Also, I can show that even a short-term intervention induces long-term effects influencing students' behavior at the transition to the labor market.

This paper is the first to show that even a short-term peer intervention is sufficient to produce lasting causal effects contributing to upwards economic mobility. In general, the existence of peer effects creates a lever for policymakers when attempting to improve upwards mobility after university entry. This particularly applies to Switzerland, as a child's chances of entering the university strongly depends on the economic background of the parents (Chuard and Grassi, 2020). Consequently, understanding the causal mechanisms that affect the outcomes of graduates from less privileged households represents an important policy target.

The remainder of the paper is structured as follows. Section 2 describes the institutional background and the setting in which peer effects are identified.

Then, Section 3 and Section 4 introduce the data set and the empirical strategy. The main results are presented in Section 5. Section 6 explores underlying mechanisms. Alternative specifications and robustness checks are evaluated in Section 7. Section 8 discusses the results and concludes.

2 Institutional Background

2.1 The University of St. Gallen (HSG)

The University of St. Gallen (HSG) is a public university in the German-speaking part of Switzerland. It offers undergraduate programs in business administration, economics, law, law and economics, and international affairs. As decreed by the Canton of St. Gallen, the governing body, access to HSG is restricted for students without a Swiss high school diploma ('Bildungsausländer'). These are required to take an entrance exam lasting 4.5 hours and pay higher fees. Additionally, the share of foreign students must not exceed 25% of enrollments.

On average, HSG graduates achieve the highest earnings among all Swiss university graduates. Five years after graduation, former HSG students can expect an annual gross income of 106,682 Swiss Francs (CHF), which is approximately equivalent to 113,456 USD and more than 40% above the average of 75,171 CHF across all graduates in Switzerland.[4]

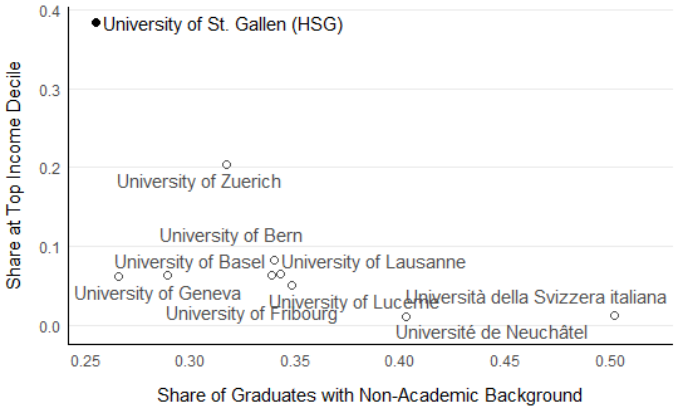
Consequently, graduates from the University of St. Gallen constitute a significant portion of those in the top income decile. More specifically, they represent 38.4% of graduates in the top income decile when looking at a separate income distribution of Swiss graduates in Economics, Business Administration, Law, and Political Sciences, i.e., the offered undergraduate studies at HSG.[5]

Simultaneously, the access for students from non-academic households is comparatively low. Figure 1 visualizes the social composition of the top income decile within the specialized income distribution. The vertical axes show the share of top income earners by tertiary institution. This can be interpreted as measure for an institution's success in terms of graduates' economic outcomes. The horizontal axes give the share of graduates where no parent has a tertiary degree, thereby indicating access levels among children from non-

[4] See table A.1.1 in the appendix for further information on Swiss graduates' income.

[5] Hereby, they constitute 17.35% of the graduates in these fields. In comparison, graduates of the University of Zurich account for 16.18% in the field and contribute 20.36% to the top income decile of the subject-specific distribution.

Figure 1: The composition of graduates' top income decile (B.A., Economics, Law, Pol. Scienc.)



Note: The figure illustrates that 38.4% of graduates in the top income decile studied at HSG, representing the highest share among all universities (as shown on the vertical axis). Simultaneously, the share of graduates without academic background in the parent generation is the lowest across public universities (horizontal axis). The figure is based on a sample including all graduates born between 1980 and 1990 who studied Economics, Business Administration, Law, or Political Sciences at a Swiss higher education institution. The income is measured as annual gross income in constant 2020 CHF and is obtained five years after graduation, with sample weights applied (n=5,816).

academic backgrounds. Hereby, the HSG has the lowest share across all Swiss universities. Overall, this implies that the University of St. Gallen can be described as an institution with high economic success, but comparatively low access for students from non-academic backgrounds. Consequently, peer effects influencing students across different social groups are not only relevant at this institution, but also for the formation of Switzerland's high-income earners in general.

2.2 The Orientation Week

The first undergraduate year at the University of St. Gallen is called "Assessment Year". All students follow exactly the same curriculum and take the same classes. The identification strategy used in this paper relies on one specific feature of the Assessment Year, the mandatory orientation week ('Startwoche'). This takes place in week 1 of the Assessment Year. All students are allocated to fixed student groups. Every cohort comprises approximately 60 to 65 groups, each having an average of 16 students. The main task during this week is to solve an incentivized business case. After working on this case for 60 hours,

student groups compete in front of a jury to provide the best solution and to win the annual prize. Hence, the orientation week aims to enhance within-group social ties rather than between-group social ties.

Student allocation to groups is randomized conditional on gender and the entry exam. First, the organization team divides all first-year students into four groups, depending on their gender and on whether they have taken the mandatory entrance exam for students without a Swiss high-school diploma. This distribution results in four strata: (female / entry test), (female / no entry test), (male / entry test), (male / no entry test). Second, within each stratum, students are sorted alphabetically by surname. Third, students are distributed to the available groups. Starting with the first stratum, student 1 is allocated to group 1, student 2 goes to group 2, etc., until the first stratum is emptied. This procedure is performed for all strata, such that students with similar surnames are less likely to end-up in the same group.[6]

The HSG distribution mechanism implies that for students, the group allocation is exogenous. They are not allowed to pick specific groups or to switch groups once the orientation week has started. Thus, the conditionally randomized allocation provides a quasi-experimental setting that enables identifying peer effects.

Group members are significantly more likely to become close friends after the orientation week than non-group members. Thiemann (2022)'s friendship survey and the additional data on bachelor's tutorial groups further show that group members repeatedly interact with each other. Former group members are overrepresented in students' five best friends and among members of tutorial groups in which students select themselves. Thus, while the orientation week is merely a short-term peer intervention, it is meaningful for the formation of peer groups at the university. Therefore, potential peer effects not only derive from the intervention itself, but are likely to be mitigated by repeated peer interactions over time.

[6]Students' final grades are compared to test for 'alphabetical discrimination' (Einav and Yariv, 2006). No significant difference in academic performance exists between the first 15 groups and the last 15 groups in the cohorts.

3 Data

3.1 Data Sources

The analysis combines two data sets: (i) administrative data from the University of St. Gallen and (ii) the Graduate Survey of the Swiss Federal Statistical Office. The Graduate Survey is conducted every second year as a full survey among all graduates from higher education institutions in Switzerland. The first data collection took place in 1977 and electronic files are available for graduates from 2002 onwards. Graduates are contacted twice, that is, one and five years after their graduation. The average response rates is 60% for the first wave and of those, 65% for the second wave. The first wave of the Graduate Survey offers detailed information on students' characteristics, their university outcomes such as final grades, and on their transition to the labor market. This also includes job searching strategies and students' beliefs and preferences regarding potential jobs. Additionally, graduates' occupations and income one year after graduation are available. The second wave focuses on the subsequent employment biography. This paper addresses university outcomes and students' transition to the labor market. Therefore, the analysis relies on variables from the first data collection one year after graduation for the 2007, 2009, 2011, 2013, 2015, 2017, and 2019 data collection.

The University of St. Gallen provides the second data source. This data covers students enrolled in the assessment year between 2002 and 2014 and includes the allocation of student to groups and major choices. Students select their major only after they have passed the assessment year and choose between Business Administration, Economics, Law and Economics, Law, and International Affairs.

The two data sources can be combined via students' matriculation numbers. Once enrolled, students keep their matriculation number also when they switch their studies or transfer to a different university. The gross sample contains 5,300 students. I restrict the sample to groups where at least 9 out of 15 students are present. This reduces the main sample to 1,230 student observations. Additionally, the included questions vary across survey waves which affects the number of observations for labor market variables, e.g. for job searching strategies.

3.2 Sample Statistics

Students' Socioeconomic Status (SES)

The main analysis uses the combination of mother and father education as measure for students' socio-economic status (SES). Hereby, I distinguish between three cases. Students whose parents both have tertiary degrees are categorized as students with high SES, which applies to 22.7% of the students in the sample. Students where no parent has a tertiary degree are categorized as low-SES student (12.4%). All other combinations are categorized as medium SES. With a share of 64.9%, this is the largest group in the sample and used as reference group in all regressions.

Correspondingly, I rely on the share of high- and low-SES peers to describe students' peer group composition. These fractions are calculated as leave-own-out means, that is, they exclude the student him- or herself. Consequently, the mean share of low- and high-SES students in each group are 12.5% and 23.5%, respectively.

Outcomes

Students' major choices are the first set of university outcomes. In the sample, 48.8% of students chose business administration as their major, 10.1% Economics, 10.2% International Affairs, and 10.7% Law, indicated by dummy variables. Here, law also covers students studying "Law and Economics", as the become fully qualified lawyers. Additional 12.0% of the students are HSG dropouts who finished their degree at a different university. These shares closely resemble the original enrollment data provided by the University of St. Gallen . The full enrollment data includes 12,386 assessment students. Among those, 48.9% studied Business Administration, 9.3% Economics, 9.1% International Affairs, and 9.4% Law.

Two important outcomes of interest are the Bachelor's final grades and their income one year after graduation. The final grade is standardized between 0 and 1, which results in an average final grade of 0.536. One year after graduation from their Master's, former students achieve an average income of 81,096.81 Swiss Francs per year. The income is measured in constant 2020 Swiss Francs (CHF). This corresponds to a log income of 11.240 and includes gross earnings at the labor market, bonuses, and overtime payments.

Table 1: Descriptive Statistics

	Mean	N		Mean	N
Low SES	0.124 (0.330.)	1,230	Share of Low-SES peers	0.125 (0.143)	1,230
Medium SES	0.649 (0.478)	1,230	Share of High-SES peers	0.235 (0.167)	1,230
High SES	0.227 (0.419)	1,230	Final Grade	0.494 (0.159)	622
Entry Exam	0.086 (0.281)	1,230	Income	81,096.81 (23,077.04)	459
Female Share	0.350 (0.477)	1,230	Log income	11.240 (0.427)	459
Age	26.385 (2.400)	1,230	Business Administration	0.488 (0.500)	1,230
Non-German Speaker	0.196 (0.397)	1,230	Economics	0.100 (0.300)	1,230
Urban Area	0.577 (0.494)	1,230	International Affairs	0.102 (0.302)	1,230
Group Size	10.433 (1.562)	1,230	Law	0.107 (0.310)	1,230
Working Hours	40.008 (7.277)	382	HSG Drop Out	0.120 (0.325)	1,230
log Working Hours	3.650 (0.372)	382	Use unsolicited applications	0.502 (0.501)	341
Use university contacts	0.331 (0.471)	341	Use personal contacts	0.402 (0.491)	341

Note: This table shows sample means, standard deviations in parentheses. Graduate income is measured in constant 2020 Swiss Francs (CHF).

Student Characteristics

Gender and participation in the entry exam are the two stratification variables in the allocation process. The share of female students in the sample is 35.0%, which is consistent with the actual share of female students at the University of St. Gallen. A total of 8.6% of the students participated in the entry exam, indicating a high school diploma obtained abroad. Therefore, the share is noticeable below the imposed foreigner quota and points towards one sample limitation: It includes only students who respond to the Graduate Survey and therefore only those living in Switzerland after their graduation. Students who participated in the entry exam are more likely than the average to leave Switzerland after their graduation. Thus, they are underrepresented in the sample, which is a limitation of this analysis.

Additionally, I observe a set of pre-treatment characteristics. This includes dummy variables indicating whether a student originates from an urban area, whether German is not their mother tongue, as well as age, and students' group sizes. The average sample group includes 10.4 students. Overall, 19.6% of students have a different language than German as their first language, reflecting Switzerland's multilingual character. Students are on average 26.3 years old when they participate in the Graduate Survey and 57.7% lived in an urban area before attending the university.

Additional Information on Labor Market Outcomes

To find a job, students apply different search strategies after graduating. Binary dummy variables indicate that 14.8% of students responded to traditional job advertisements, and 31.6% used personal connections which they established during their studies. Additionally, 40.4% of students indicate that they relied on family and friends, i.e., on personal contacts.

After their graduation, students are employed in 17 different industries, following the Swiss NOGA-1 classification. The employment shares are provided in Table A.2.2 in the appendix. In total, 29.6% of graduates work in "Professional, Scientific and Technical Activities", which also includes corporate consulting. This is followed by the finance and insurance industry with 21.8%. In all other industries, the employment shares are smaller than 10%.

Furthermore, graduates are asked for their average number of working hours per week. These range between 1 to 65 hours per week, with a mean of 39.80 hours. Hereby, this information relates to the actual number of working hours rather than to the contracted number of hours.

4 Empirical Strategy

4.1 The Estimation of Peer Effects

The interest of this paper is to estimate the causal impact of peers' social background on the outcomes of interest, that is, on their major choice, HSG drop-out, final grade and on their income one year after graduation. First, peer effects are estimated in a conventional linear-in-means model:

$$Y_{igc} = \alpha + \gamma_1 \text{low}_{igc} + \gamma_2 \text{high}_{igc} + \lambda_1 \text{SL}\_{igc} + \lambda_2 \text{SH}\_{igc} + \eta s_{gc} + \delta D_{igc} + \omega W_c + \epsilon_{igc} \tag{1}$$

Where Y_{igc} is the outcome of interest for student i in group g and cohort c. The two dummy variables *low* and *high* indicate whether a student is categorized as having a low educational background or high educational background. This makes students with medium status the baseline category. SL_{igc} and SH_{igc} denote the share of low-SES students and high-SES students in each group, excluding student i. Therefore, λ_1 and λ_2 denote the coefficients of interest.
The vector D provides a set of control variables, including age, whether German is the first language, whether the student originates from an urban area, and the two stratification variables gender and participation at the HSG entry exam. Furthermore, s_{gc} controls for the group sizes in each cohort, and W_c denotes a vector of cohort dummies. All standard errors are clustered at the group-year level.
The linear-in-means model implicitly assumes that all students are equally affected by the social background of their peers. However, for potential regrouping policies, it is relevant whether peer effects are heterogeneous and depend on students own social background. Otherwise, any regrouping would have a symmetric impact. To account for heterogeneous effects, interaction terms between students' own social background and the social background of their peers are included:

$$\begin{aligned} Y_{igc} = {} & \alpha + \gamma_1 \text{low}_{igc} + \gamma_2 \text{high}_{igc} + \lambda_{1L} \text{low}_{igc} \text{SL}\_{igc} + \lambda_{1H} \text{low}_{igc} \text{SH}\_{igc} \\ & + \lambda_{2L} \text{medium}_{igc} \text{SL}\_{igc} + \lambda_{2H} \text{medium}_{igc} \text{SH}\_{igc} + \lambda_{3L} \text{high}_{igc} \text{SL}\_{igc} \\ & + \lambda_{3H} \text{low}_{igc} SH\_{igc} + \eta s_{gc} + \delta D_{igc} + \omega W_c + \epsilon_{igc} \end{aligned} \tag{2}$$

The main coefficients of interested are λ_{1L} - λ_{3H}, providing the estimated peer effects. In the interaction terms, all three dummy variables for students' social background are included, that is, $\text{low}_{igc}, \text{medium}_{igc}$ and high_{igc}, highlighting the role of peer effects also for students with medium-level background. There is no multicollinearity problem because the interaction term with the share of medium-status students is excluded. The coefficients of the interaction terms show how different student types react to changes in the group composition.
A change in the group composition arises when the share of high-SES students increases marginally while keeping the share of low-SES students constant. Therefore, the share of students in the reference group adjusts. This implies that in an existing student group, students with medium status (the reference group) are replaced by students with high status. The coefficients $\lambda_{1H}, \lambda_{2H}$ and λ_{3H} indicate how this affects the outcomes of a student, depending on whether he himself has low-, medium-, or high educational background. Correspondingly, the group composition can also be changed by increasing the share of low-SES students. Then, medium-SES students are replaced by low-SES students, and the coefficients $\lambda_{1L}, \lambda_{2L}$ and λ_{3L} capture the outcome change for low-, medium-, and high-SES students. In all specifications, peer effects are estimated using an OLS regression model for continuous out-comes. Meanwhile, binary outcomes are analyzed within a logit framework and evaluated at the means.

4.2 Identification

The causal identification of peer effects is affected by four potential issues: (i) the selection problem, (ii) the reflection problem, (iii) common shocks, and (iv) measurement problems.
The selection problem states that that in general, peer groups are self-selected and hence, they are formed endogenously. Consequently, it is difficult to separate peer effects from selection effects. However, several publications show that random assignments of students to groups allow to identify peer effects without selection bias (Lyle, 2007; Carrell et al., 2009; Duflo et al., 2011; Carrell et al., 2013). As HSG students are randomly allocated to their groups, the selection problem does consequently not affect the the identification. Also, it is not possible for students to bypass the allocation mechanism as they are prohibited to switch their groups.
The reflection problem describes that individuals mutually influence each other simultaneously (Manski, 1993). In most cases, this makes it impossible to dis-

tinguish between the influence of peers on the student and, vice versa, the influence of the student on his peers.[7] Therefore, empirically estimated coefficients encompass an exogenous and endogenous peer effect. The exogenous part captures how students' outcomes change in response to peer exposure. This effect is either strengthened or weakened by mutual peer interactions, the endogenous part. Therefore, the obtained results from Equation 1 and 2 identify such combined peer effects.

The common shock problem is also discussed by Manski (1993). He argues that even in the absence of true peer effects, group members' outcomes are always correlated when they are exposed to the same unobserved factors, that is, to common shocks. In this analysis, I look at different student groups within one university. I cluster all standard errors at the group-year level to adjust for potential correlations in the outcomes of students within each group. A common shock problem would still arise when students' input varies at the group level. At HSG, group supervisors are strictly instructed to give exactly the same information and input to each group. Consequently, common shocks do not impair the estimation strategy.

Finally, Angrist (2014) describes how measurement errors lead to an overestimation of peer effects. The intuition behind this result is as follows. Angrist (2014) and previous work by Acemoglu and Angrist (2000) show that the peer effect estimator can approximately be expressed by the difference between an IV estimator and an OLS estimator, that is $\beta_{peer} = \beta_{IV} - \beta_{OLS}$. A measurement error leads to a downwards bias in both estimators but the OLS estimator decreases to a larger extent than the IV estimator. Consequently, the size of the estimated peer effect coefficient increases and thus overestimates the true peer effect. However, more recent work by Feld and Zölitz (2017) shows that the direction and magnitude of this bias depends on the assignment mechanism. Under random assignment, the estimated peer effects are biased downwards when measurement errors exist, which also apply to this analysis. Here, I express students' social status by the educational background of their parents, as parental income is not available. Parental education is an imperfect proxy for social status and therefore very likely to be affected by measurement error. Consequently, the obtained results should be interpreted as lower bounds of the true peer effects regarding students' social status.

[7] It is possible to identify the exogenous peer effect separately when the group influences individual behavior with a time lag, as it is the case in directed social network models. See Bramoullé et al. (2020) for a review of this literature.

4.3 Randomization

Table 2: Test for random assignment

Dependent Variable	AME Share Low	AME Share High	R^2	N
Low SES	0.102	0.028	0.138	1.230
	(0.076)	(0.060)		
Medium SES	−0.209	−0.153	0.028	1.230
	(0.127)	(0.098)		
High SES	0.066	0.121	0.059	1.230
	(0.100)	(0.085)		
Age	0.828	0.085	0.560	1.230
	(0.647)	(0.556)		
Non-German Speaker	0.101	−0.032	0.014	1.230
	(0.106)	(0.084)		
Urban Area	0.056	0.007	0.001	1.230
	(0.125)	(0.100)		

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. This table presents average marginal effects (AMEs) from regressing student characteristics on the share of low- and high SES peers. Each row shows the results of a single regression, controlling for the stratifying variables (gender, entry test) and cohort dummies. To control for the mechanical relation between students' own SES and their peers, I include the leave-me-out share of high- and low SES peers at the cohort level, which is where the randomization takes place.

The allocation process described in Section 2.2 indicates that the assignment of students to group is random, conditional on students' gender and their participation in the entry exam. In this case, the peer characteristics should not be significantly related to a student's own characteristics. In particular, a student's own educational background should be independent of his peer's social background. However, there exists a mechanical relation, as a student cannot be his own peer. Guryan et al. (2009) demonstrate that it is possible to account for this relation by including the leave-me-out mean of the peer characteristic at the level where randomization takes place. Consequently, I regress the students' characteristics on the share of low- and high-SES students, controlling for the stratification variables, cohort fixed effects, and the leave-me-out share of peers with high- and low-SES at the cohort level. In all specifications, presented in Table 2, the share of low- and high-SES peers is not significantly related to students' own characteristics. This confirms the assumption of a conditional random assignment of students to groups.

5 Results

5.1 Major Choice and HSG Drop-Out

For baseline results, Table 3 presents average marginal effects on students' major choice and on the drop-out at HSG. These show the average student's reaction to a change in the social composition of his peer group, induced either by a higher share of low SES peers, or by a higher share of high-SES peers.

Peers significantly affect the probability of choosing Economics as a major. On average, a 10 percent-age points (pp) increase in the share of low SES peers increases the probability of choosing Economics by 1.63 percentage points, given that overall, 10% of the students in the sample decided for Economics as a major. At the mean, I do not find significant peer effect on other major choices.

Furthermore, a higher share of low SES students in their peer group decreases the probability that students finish their studies at a different university than HSG. Hereby, a 10-pp increase is approximately equal to replacing 1 out of 6 medium SES students by one low SES student. This adjustment decreases the probability of changing the university by 1.7 percentage points. This adoption is relevant in size, as overall, 12.0% of students in the sample finish their studies at a different university than HSG. Therefore, the estimated coefficient implies an increase of 14.2% of the baseline.

Table 3: Linear peer effects on major choice

	Business Administration	Economics Economics	International Affairs	Law Law	University Drop-out
Low SES	−0.004	−0.021	0.031	0.009	−0.013
	(0.042)	(0.027)	(0.028)	(0.034)	(0.028)
High SES	0.004	−0.023	0.040	−0.011	0.018
	(0.037)	(0.023)	(0.026)	(0.024)	(0.022)
Share of low SES students	−0.009	0.163**	0.042	−0.126	−0.170*
	(0.161)	(0.080)	(0.082)	(0.092)	(0.093)
Share of high SES students	0.009	0.049	−0.081	0.025	0.022
	(0.106)	(0.060)	(0.072)	(0.075)	(0.059)
N	1,230	1,230	1,230	1,230	1,230

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. All specifications include group size, age, gender, entry exam participation, mother tongue, urban area, and cohort effects.

Table 4: Heterogeneous peer effects on major choice

	Business Administration	Economics Economics	International Affairs	Law Law	University Drop-out
Total low SES peer effect on low SES students ($\gamma_1 + \lambda_{1L}$)	−0.183	−0.079	−0.046	−0.222	0.115
	(0.269)	(0.157)	(0.187)	(0.171)	(0.087)
Total low SES peer effect on medium SES students (λ_{2L})	0.087	0.216**	0.020	−0.114	−0.222***
	(0.178)	(0.088)	(0.081)	(0.091)	(0.084)
Total low SES peer effect on high SES students ($\gamma_2 + \lambda_{3L}$)	−0.184	0.092	0.190	0.008	−0.148
	(0.279)	(0.130)	(0.159)	(0.133)	(0.150)
Total high SES peer effect on low SES students ($\gamma_1 + \lambda_{1H}$)	0.527*	−0.187	−0.322**	0.120	−0.046
	(0.270)	(0.141)	(0.188)	(0.157)	(0.074)
Total high SES peer effect on medium SES students (λ_{2H})	−0.073	0.062	−0.023	−0.005	0.008
	(0.130)	(0.072)	(0.060)	(0.082)	(0.059)
Total high SES peer effect on high SES students ($\gamma_2 + \lambda_{3H}$)	0.044	0.123	−0.116	0.076	0.099
	(0.215)	(0.097)	(0.171)	(0.112)	(0.114)
Controls	Yes	Yes	Yes	Yes	Yes
N	1,230	1,230	1,230	1,230	1,230

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. All specifications include group size, students' own background, age, gender, entry exam participation, mother tongue, urban area, and cohort effects.

To check whether the peer effect at the mean covers heterogeneity between student types, I estimate heterogeneous peer effects following Equation 2 in Section 4. Table 4 reports the results for major choice and drop-out. They confirm that peer effects vary across groups and depend on students' own educational background.

Here, effects deriving from high-SES peer exposure are obtained. A 10-pp increase in the share of high-SES students increase the probability that low-SES students choose Business Administration as their major by 5.27%, whereas they become significantly less likely to study International Affairs (-3.22%).

For Economics, the average peer effect is primarily determined by the behavior of medium-SES students. As the largest group in the sample, their likelihood of studying Economics significantly increases by 2.16%, which accounts for the average effect of 1.63%. This student type also drives the peer effect on HSG drop-outs. For them, the probability of changing the university decreases by 2.22% when the share of low-SES peers increases by 10 percentage points.

In general, it is well documented that students from non-academic backgrounds and low-income families are more likely to drop their studies (see Aina et al., 2022 for a review of the economic and sociological literature). Here, the obtained results imply that a socially more diverse group composition induces students

Table 5: Linear peer effects on final grade and income

	Final Grade	Income
Low SES	−0.015	0.027
	(0.017)	(0.061)
High SES	0.014	0.022
	(0.016)	(0.043)
Share of low SES students	−0.129***	0.508***
	(0.047)	(0.183)
Share of high SES students	−0.033	−0.173
	(0.044)	(0.154)
Controls	Yes	Yes
N	622	382

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. All specifications include group size, age, gender, entry exam participation, mother tongue, urban area, and cohort effects.

without an entirely academic background to stay and complete their studies at the University of St. Gallen. This result is highly relevant for potential regrouping policies if the university wants to reduce their attrition rates for students from non-academic backgrounds.

5.2 Academic Achievement and Income after Graduation

The results for students' final grade and their income one year after graduation are reported in Table 5. In general, students' own educational background is not significantly associated with either outcomes. Having a low-SES does not significantly relate to graduate income. For upwards social mobility, this implies that the university successfully equalizes students' economic outcomes, at least at the beginning of their employment biography. Also, the correlation between final grade and graduates' initial income is not significant in this sample. Thus, other factors than academic achievement determine students' transition to the labor market. The results reported in Table 5 imply that peers play an important role in this process.

The obtained peer effects indicate significant and disparate peer effects on students' final grades and their income one year after graduation. More specifically, a 10-pp higher share of low SES peers decreases the final grade on average by 0.012 on the standardized 0 to 1 scale. Therefore, the obtained peer effect is

Table 6: Heterogeneous peer effects on final grade and income

	Final Grade	Income
Low SES	−0.027	−0.056
	(0.040)	(0.122)
High SES	−0.028	−0.037
	(0.035)	(0.096)
Share low SES peers x low SES students	−0.086	0.707**
	(0.097)	(0.342)
Share low SES peers x medium SES students	−0.178***	0.541***
	(0.056)	(0.204)
Share low SES peers x high SES students	−0.035	0.247
	(0.084)	(0.288)
Share high SES peers x low SES students	−0.063	−0.053
	(0.107)	(0.298)
Share high SES peers x medium SES students	−0.054	−0.272
	(0.052)	(0.199)
Share high SES peers x high SES students	0.048	0.140
	(0.080)	(0.185)
Controls	Yes	Yes
N	622	382

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. The table displays heterogeneous peer effects conditional on students' own type. All specifications include students' own SES, group size, age, gender, entry exam participation, mother tongue, urban area, and cohort effects.

significant but of small size.

The negative peer effect at the mean is driven by medium-SES students. The estimated coefficient suggests that a 10-pp larger share of low-SES peers decreases the final grades of medium SES students by 0.0178. The final grades of other student types are not affected (Table 6). There are no significant peer effects on other student types.

Contrary, I find a positive peer effect on the income one year after graduation. The results indicate that a 10-pp higher exposure to low SES peers increases the income by 5.08% at the mean. This is equivalent to an increase of 4,120 CHF, given the mean annual gross income in the sample. Com-pared to the peer effect on students' final grades, the estimated peer effect on income is meaningful in its magnitude.

The significant peer effect on income at the mean derives from other low-SES and

medium-SES students. This is shown by the significant results for heterogeneous peer effects in Table 6. Hereby, the size of the effect is largest for low-SES students, who benefit in particular from a stronger presence of other low-SES peers in terms of their income one year after graduation. Their income increases on average by 7.07% for a 10-pp increase in the share of low-SES peers in their group. For medium-status students, this effect equals 5.41%.

6 Related Mechanisms

The main results show that a higher share of low-SES peers affect the outcomes of their fellow students. Furthermore, the peer effects on students' final grades and their income are disparate: There is a negative peer effect of low-SES students on academic achievement, but a positive peer effect on income. The next section explores ability effects as a potential mechanism for this findings and provides further evidence for the channels underlying positive peer effects on income.

6.1 Social Background versus Ability

An important question is whether students' social background creates the negative peer effect on students' final grades. An alternative explanation is provided by the bad-apple model of peer effects, arguing that the presence of less disciplined students leads to negative peer effects because they distract or encourage bad behavior (Sacerdote, 2011; Wennberg and Norgren, 2021). In this line, Lavy et al. (2012) find that students' performance is negatively affected by low achieving peers. A higher share of low-achieving peers deteriorates teacher quality, weakens teacher-pupil relationships, and increases classroom disruptions.
The sample does not include information on students' high school grades or other pre-university ability measures. Consequently, I rely on in-sample predicted final grades as ability measure, following Carrell et al. (2013) amongst others. To predict the ability measure for students in a given cohort, I use the gross data on all other cohorts of the Graduate Survey to regress final grades on a set of student characteristics (n = 89,175). This set includes students' age, gender, mother tongue, region, degree, area, and university. Then, the estimated coefficients are used to predict the final grades in the cohort of interest. This is repeated for all cohorts. The resulting ability measure is standardized to a zero mean and a standard deviation of one for the core sample. In this sample, the

Table 7: Low-SES peers with high and low ability levels and their impact on students' final grades

	(1)	(2)
Peers with low SES and low ability		
Share of students with low SES and low ability x low SES students	−0.114	
	(0.120)	
Share of students with low SES and low ability x medium SES students	−0.207***	
	(0.058)	
Share of students with low SES and low ability x high SES students	0.062	
	(0.113)	
Peers with low SES and high ability		
Share of students with low SES and high ability x low SES students		0.153*
		(0.089)
Share of students with low SES and high ability x medium SES students		−0.042
		(0.065)
Share of students with low SES and high ability x high SES students		−0.082
		(0.115)
High SES peers x low SES students	−0.059	−0.030
	(0.103)	(0.095)
High SES peers x medium SES students	−0.045	−0.052
	(0.050)	(0.053)
High SES peers x high SES students	0.013	0.013
	(0.077)	(0.078)
Controls	Yes	Yes
N	619	619

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. The table reports effects arising from exposure to low SES peers with high and low ability level. The results indicate that low-SES peers negatively affect students' final grades when they also have a low ability level. The coefficient of low-SES peers with high ability level is not significant. The set of control variables includes students' age, gender, mother tongue, urban area, entry exam, group size, and cohort effects.

predicted ability level of low SES students is on average lower than that of high SES students, with mean values of 0.001 and 0.160, respectively. Therefore, the negative spillover effect on medium-SES students' final grade might arise from low-SES students with a low ability level.
Consequently, I re-estimate peer effects on students' final grades and distinguish low-SES students with high and low ability. Following the bad apple model of peer effects, low-SES students with high ability should not negatively affect students' academic achievements. I separate students with low-SES and ability in the top 25% and those in the bottom 25% of the ability distribution in the sample. Table 7 shows the estimates for heterogeneous peer effects deriving from a higher exposure to these groups. They confirm that peers with low-SES and high ability do not significantly affect students' final grade. Conversely, the estimator of low-SES students with low-ability level is significant for medium-SES students. A 10 percentage points higher share in students with low ability and low SES reduces medium-SES students' final grades by 0.0207 units, which equals a 2.07% decrease on the standardized scale.
Furthermore, the obtained results show a positive effect arising from the exposure to low-SES peers with high ability on the final grade of other low-SES students. In general, positive spillover effects from high-ability peers might arise due to students sharing their knowledge and learning from each other (Oosterbeek and van Ewijk, 2014). Here, the results indicate that ability-based spillover effects interact with students' social background.

6.2 Career Choices

The main results indicate a significant and positive effect of low-SES peer exposure on students' income. One potential explanation for this result is that low-SES students shape their fellow students' career choices, e.g., due to peer conformity and job networks. Below, I therefore assess whether students affect each other's job searching strategies and initial occupational choices, using information on students whose income is observable as well. These include the industry graduates start working in and their labor supply.

6.2.1 Job Searching Strategies

Job networks are important for labor market outcomes. In general, evidence indicates that more than 1/3 of employees obtained their jobs through social networks and informal referrals (Granovetter, 1973, 1995; Addison and Portugal,

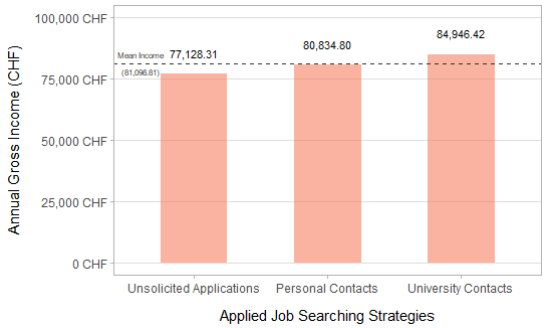
Table 8: Heterogeneous peer effects on graduates' job searching strategies

	Unsolicited Application	University Contacts	Personal Contacts
Low SES	−0.007	−0.240***	−0.204**
	(0.115)	(0.060)	(0.083)
High SES	0.126*	0.062	0.139**
	(0.071)	(0.064)	(0.069)
Total low SES peer effect on low SES students ($\gamma_1 + \lambda_{1L}$)	0.328	0.506**	0.012
	(0.621)	(0.216)	(0.398)
Total low SES peer effect on medium SES students (λ_{2L})	−0.505*	0.223	−0.141
	(0.278)	(0.247)	(0.242)
Total low SES peer effect on high SES students ($\gamma_2 + \lambda_{3L}$)	0.643	0.487	0.352
	(0.487)	(0.480)	(0.441)
Total high SES peer effect on low SES students ($\gamma_1 + \lambda_{1H}$)	0.917	−0.002	−0.364
	(0.584)	(0.255)	(0.358)
Total high SES peer effect on medium SES students (λ_{2H})	0.176	0.253	−0.019
	(0.195)	(0.186)	(0.193)
Total high SES peer effect on high SES students ($\gamma_2 + \lambda_{3H}$)	0.557	−0.036	0.019
	(0.429)	(0.443)	(0.329)
Controls	Yes	Yes	Yes
N	357	357	357

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. The table reports heterogeneous peer effects on students' job searching behavior, estimated in a logit regression framework. When the share of low-SES peers increases by 10 pp, other low-SES students are 5.06 pp more likely to rely on contacts they have acquired during their studies to obtain their first job after graduation. The set of control variables includes students' age, gender, mother tongue, urban area, entry exam, group size, and cohort effects.

2002; Ioannides and Loury, 2004; Dustmann et al., 2016). At the transition to the labor market, students might therefore share their access to networks or other valuable information with their peers, e.g., where to search and how to successfully apply for a job. This could lead to a positive peer effect on their initial income after graduation. For instance, Marmaros and Sacerdote (2002) show that students who actively network are more likely to obtain highly paid jobs. Here, I have information on whether graduates used social networks either in the form of family and friends, or of personal contacts acquired during

Figure 2: Graduates' average income by job searching strategy



Note: The figure shows graduates' mean income conditional on applied job searching strategies. Mean earnings are significantly higher when students have relied on university contacts instead of using their family and friends. Other income gaps are not significant.

their studies to find a job. Furthermore, approximately half of students sent unsolicited job applications to potential employers.

Furthermore, there is a significant association between a student's socio-economic background and his job searching strategies. Having a high SES increases the probability of using personal contacts (i.e., family and friends) compared to a medium SES, as well as sending unsolicited job applications. Contrary, a low SES is associated with a decrease in the probability of using university or personal contacts. However, the probability of low-SES students using social networks increases when other low-SES peers are present in their peer group. A 10-pp. higher exposure to low SES peers increases the probability of low-SES student using personal contacts by 5.06 percentage points. There is also a significant effect on medium-SES students, who are 5.06 pp. less likely to send unsolicited applications.

Therefore, the presence of low-SES peers influences the job searching behavior of students without high SES. This is relevant, given that using university contacts for job search typically relates to higher earnings later. This is visualized in Figure 2, displaying the mean income conditional on their job searching strategy. The differences across groups are statistically significant. Therefore, low-SES peer exposure increases the probability that other low-SES students use a job searching strategy that is associated to higher income, whereas medium-level students are less likely to use a strategy related to below-average income.

Table 9: Heterogeneous peer effects on graduates' industry

	Finance and Insurance	Public Sector	Education
Total low SES peer effect on low SES students ($\gamma_1 + \lambda_{1L}$)	1.223^{***} (0.443)	-0.474 (0.490)	-0.356 (0.282)
Total low SES peer effect on medium SES students (λ_{2L})	0.653^{**} (0.258)	-0.321^{*} (0.184)	-0.162 (0.099)
Total low SES peer effect on high SES students ($\gamma_2 + \lambda_{3L}$)	0.859^{***} (0.318)	-0.266 (0.301)	-0.416^{***} (0.150)
Total high SES peer effect on low SES students ($\gamma_1 + \lambda_{1H}$)	0.429 (0.475)	-0.187 (0.435)	-0.141 (0.313)
Total high SES peer effect on medium SES students (λ_{2H})	0.173 (0.147)	0.006 (0.143)	-0.063 (0.094)
Total high SES peer effect on high SES students ($\gamma_2 + \lambda_{3H}$)	0.307 (0.259)	0.249 (0.185)	-0.188 (0.182)
Controls	Yes	Yes	Yes
N	382	382	382

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. The table summarizes heterogeneous peer effects on students' industry choices, obtained from logit regressions and evaluated at mean values. The set of control variables includes students' age, gender, mother tongue, entry exam, group size, and cohort effects. Exposure to low-SES peers affect the probability of working in finance and insurance across all student types. Only specific types adopt their decision to work in the public sector or in education.

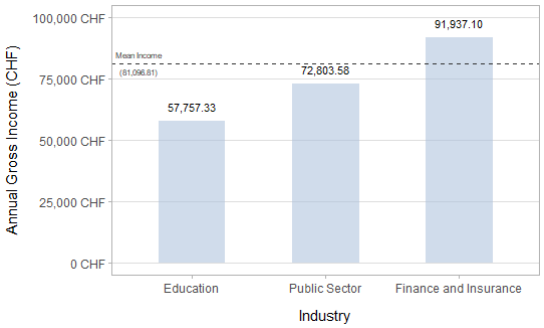
6.2.2 Industry Choices

Peers affect not only how students are search for jobs, but also in which industry. At graduation, the average HSG student in the sample has 1.8 job offers, ranging from 0 to 10 in this sample. Therefore, HSG graduates can at least to some extent choose their industry and job.

In the following, I explore whether peers affect the probability of students working in selected industries. Graduates are dispersed across industries, and this paper therefore focuses on three selected industries: (i) Finance and Insurance, (ii) Education, and (iii) the Public Sector in general.[8] Table 9 presents average

[8]Table A.3.4 provides additional results on peer effects for graduates' probability of working in trade and professional, scientific and technical activities. Peer effects are not significant for these industries. Together with Table 9, this table provides results on all industries where

Figure 3: Average income in selected industries



Note: The figure displays differences in graduates' mean income across selected industries. The average income of graduates working in finance and insurance is above the sample mean. Conversely, earnings in the public sector and in education are comparatively low.

marginal effects, estimated from logit regressions and evaluated at mean values. Students are strongly influenced by their peers regarding the industry in which they are working in. There is a positive effect from low-SES peer exposure on the probability of working in finance and insurance, affecting all student types. The reaction of other low-SES students is particularly pro-nounced: a 10-pp increase in the share of other low-SES peers changes the probability by 12.23 pp. In comparison, the decision (not) to work in the public sector derives exclusively from high-SES students. These are 4.16% less likely to work in the public sector when the share of low SES peers in their group increases by 10 pp. Additionally, a significant negative peer effect is evident regarding the likelihood of medium-SES students to work in education (-3.21 p.p.).

Figure 3 compares graduates' mean income in finance and insurance, where graduates achieve above-average earnings, with education and the public sector, where incomes are comparatively low. This implies that a higher exposure to low SES peers increases the probability of all graduates starting their careers in a very well-paid industry and pushes medium- and high-SES students away from industries where earnings are comparatively low. The heterogeneous responses also match the peer effects on graduates' income. The positive effect is highest on the income of low-SES students, whose probability of working in the highly paid finance and insurance sector increases the most.

Importantly, I do not find evidence that students' initial career choices are affected by social alienation. At Harvard, Michelman et al. (2022) show that

employment shares are higher than 8%.

lower-status students shrink away from a career in finance due to high-status peer exposure. Here, all students are more likely to work in finance and insurance. Several of the proposed mechanisms are consistent with this observation, including peer conformity, peer learning, and job networks.

6.2.3 Intensive Labor Supply

Furthermore, the positive peer effect on graduates' income might be related to peer conformity. When individuals care about social status, they tend to act in conformity with their peers, also when their preferences deviate (Bernheim, 1994; Akerlof and Kranton, 2000). Furthermore, they might adopt their career goals to fit to perceived social norms.

To evaluate whether students adopt their labor supply at the beginning of their careers due to peer exposure at HSG, I use the number of self-reported working hours per week. The results are summarized in Table 10. The results indicate that exposure to low SES-peers significantly increase the labor supply of medium- and high-SES students at the intensive margin. More specifically, a 10-pp. increase in the share of low-SES peers leads to a 6.72% increase in the average working hours of medium-SES students, and to a 9.66% increase for high-SES students. Here, I do not find that the labor supply of low-SES students is affected.

For medium-SES students, this result is in line with the positive peer effect on their income: When exposed to a higher share of low SES peers, students choose to increase their intensive labor supply after graduation, which in turn might increase their income, especially if they enter a highly paid industry such as finance and insurance. These findings are consistent with prior research indicating that peer pressure and norm compliance are important for labor supply (see e.g., Falk and Ichino, 2006; Mas and Moretti, 2009; Fu et al., 2019). However, it is unclear whether overtime hours are paid or unpaid. Therefore, peer exposure might influence working attitudes rather than the actual outcome (i.e., income). This could be the case for high-SES students, where I observe a positive low-SES peer effect on their working hours, but not on their income.

Table 10: Heterogeneous peer effects on intensive labor supply

	log Working Hours
Total low SES peer effect on low SES students ($\gamma_1 + \lambda_{1L}$)	−0.012
	(0.307)
Total low SES peer effect on medium SES students (λ_{2L})	0.672***
	(0.190)
Total low SES peer effect on high SES students ($\gamma_2 + \lambda_{3L}$)	0.966***
	(0.260)
Total high SES peer effect on low SES students ($\gamma_1 + \lambda_{1H}$)	−0.253
	(0.220)
Total high SES peer effect on medium SES students (λ_{2H})	−0.025
	(0.160)
Total high SES peer effect on high SES students ($\gamma_2 + \lambda_{3H}$)	0.034
	(0.174)
N	382

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on group-year level. The table summarizes heterogeneous peer effects conditional on students' own type. The coefficients are estimated in a logit framework and evaluated at mean values. The set of control variables includes students' age, gender, mother tongue, entry exam, group size, and cohort effects.

7 Alternative Specifications and Robustness

7.1 Standardized Income

The previous section implies that changes in labor supply contributed to the estimated peer effects on graduates' income level. Below, I use the standardized income as alternative income measure to abstract from these variations in weekly working hours. The standardized income is provided by the Swiss Federal Statistical Office and defines the annual gross income, calculated based on full-time employment. Table 11 summarizes the results.

The estimated effects of low-SES peer exposure decrease slightly in size. For low-SES students, a marginal increase in the share of low-SES peers leads to an income increase of 5.03%, compared to 7.07% in the main specification. This suggests that for low-SES students, approximately 30% of the peer effect on income is driven by the adjustment of labor supply, and 70% by other chan-

Table 11: Peer effects on standardized students' income

	Standardized Income
Total low SES peer effect on low SES students ($\gamma_1 + \lambda_{1L}$)	0.503^{**}
	(0.230)
Total low SES peer effect on medium SES students (λ_{2L})	0.226^{*}
	(0.133)
Total low SES peer effect on high SES students ($\gamma_2 + \lambda_{3L}$)	-0.154
	(0.288)
Total high SES peer effect on low SES students ($\gamma_1 + \lambda_{1H}$)	-0.101
	(0.265)
Total high SES peer effect on medium SES students (λ_{2H})	-0.115
	(0.110)
Total high SES peer effect on high SES students ($\gamma_2 + \lambda_{3H}$)	0.068
	(0.202)
Controls	Yes
N	382

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. The table reports peer effects on graduates' income, which is standardized to full-time employment. The set of control variables includes students' age, gender, mother tongue, urban area, entry exam, group size, and cohort effects.

nels such as graduates' industry choice. For medium-SES students, the increase amounts to 2.26%, which amounts to 42% of the coefficient in the main specification. Thus, an important share of the ob-served peer effect on income can be attributed to the adoption of labor supply.

7.2 Group Selection Rules

The main sample includes observations on student groups where at least 9 out of 15 students are part of the sample. To test whether results are robust to different cut-off rules, I calculate results when at least 11 or 12 observations of each group are available. Table 12 presents the results.
In general, the peer effect estimators are robust to higher restrictions on group size. All results remain qualitatively the same, although the coefficient increases moderately, indicating the impact of low SES peer exposure on students' final grade when the cut-of is set to 12 students per group. Looking at the peer effects on students' income level, the precision of the estimator decreases due to the considerable reduction in sample size. When n=143, the magnitude of the coefficient remains stable, but for medium-SES students, it is not significant anymore.

7.3 Alternative SES Measure

The main specification uses the combination of paternal and maternal education as measure for students' SES. Here, I explore how the obtained results change when the education level of only one parent is used to describe the peer group composition. Consequently, I first use (i) the fraction of students with fathers having a low- or high educational background, and (ii) the fraction of students with mothers having a low- or high educational background as peer measure. Students' own SES is defined correspondingly.
In general, the results can be expected to differ due to the varying combinations of parental education. For instance, assume a students' father has a tertiary degree, whereas the mother has obtained compulsory education only. The baseline specification would categorize this student as member of the reference group, that is, as having a medium SES. However, he ranks in the high-SES category when considering only father education, in the low-SES category when considering only the mother's education.
In general, the results can be expected to differ due to the varying combinations of parental education. For instance, assume a students' father has a tertiary de-

Table 12: Alternative Group Selection Rule

Group Size	Final Grade		Income	
	at least 11 observations	at least 12 observations	at least 11 observations	at least 12 observations
Total low SES peer effect on low SES students ($\gamma_1 + \lambda_{1L}$)	−0.115	−0.187	0.734**	0.901*
	(0.168)	(0.203)	(0.310)	(0.473)
Total low SES peer effect on medium SES students (λ_{2L})	−0.166**	−0.364***	0.330*	0.256
	(0.077)	(0.063)	(0.185)	(0.262)
Total low SES peer effect on high SES students ($\gamma_2 + \lambda_{3L}$)	0.042	0.024	−0.125	0.360
	(0.121)	(0.122)	(0.418)	(0.324)
Total high SES peer effect on low SES students ($\gamma_1 + \lambda_{1H}$)	−0.057	0.053	0.234	0.213
	(0.161)	(0.172)	(0.282)	(0.234)
Total high SES peer effect on medium SES students (λ_{2H})	−0.091	−0.100	−0.280	−0.300
	(0.072)	(0.072)	(0.224)	(0.246)
Total high SES peer effect on high SES students ($\gamma_2 + \lambda_{3H}$)	−0.026	−0.191	−0.058	0.010
	(0.111)	(0.135)	(0.212)	(0.211)
Controls	Yes	Yes	Yes	Yes
N	403	228	240	143

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. The table summarizes results when alternative sample selection rules are applied. Then, at least 11 or 12 observations of one student group must be available. The set of control variables includes students' own social background, age, gender, mother tongue, entry exam, group size, urban area, and cohort effects.

gree, whereas the mother has obtained compulsory education only. The baseline specification would categorize this student as member of the reference group, that is, as having a medium SES. However, he ranks in the high-SES category when considering only father education, in the low-SES category when considering only the mother's education level. Furthermore, I expect that the results resemble the main results more closely when using the mother's education level to measure SES due to assortative mating. Females tend to have partners with equal or higher education levels.[9] Therefore, well-educated mothers are comparatively likely to have well-educated spouses, while a still significant share of low-educated mothers have low-educated spouses. Consequently, this definition leads to similar categories for describing a student's SES as in the main specification. Conversely, for higher-educated fathers, the variation in mothers' education increases, and thus diverges more strongly from the main specification.

[9] Table A.2.3 shows the relation between the father's and mother's education in the sample.

Table 13: Alternative SES Measure

SES Measure	Final Grade		Income	
	Father Education	Mother Education	Father Education	Mother Education
Low SES	−0.007	0.017	−0.080	−0.019
	(0.017)	(0.015)	(0.065)	(0.051)
High SES	0.007	0.031*	−0.053	0.010
	(0.016)	(0.017)	(0.058)	(0.059)
Share of low SES students	−0.095*	−0.128***	0.548***	0.328***
	(0.052)	(0.043)	(0.202)	(0.121)
Share of high SES students	−0.024	−0.051	−0.013	−0.045
	(0.044)	(0.044)	(0.108)	(0.118)
Controls	Yes	Yes	Yes	Yes
N	603	603	348	348

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on the group-year level. The table summarizes estimation results when either father's or mother's education are used as alternative measures for students' socio-economic status. The set of control variables includes students' own education, age, gender, mother tongue, entry exam, group size, urban area and cohort effects.

Table 13 presents the results. Qualitatively, the results remain unchanged. There is small negative effect from low-SES peer exposure on students' final grades, and a positive effect on the income one year after graduation. However, the size of the coefficients varies moderately across specifications. For academic achievements, the magnitude of the effect resembles the main results more closely when using the mother's education level to measure SES. This is not the case for peer effects on graduates' income. Using both education levels as in the main specification prevents arbitrarily ranking either the mother's or the father's education as more influential to define social back-ground.

8 Conclusion

This paper analyzes how the social composition of students' peer groups affect their academic and early labor market outcomes. The identification strategy relies on a short-term peer intervention with randomized student groups at the University of St. Gallen (HSG) in Switzerland. On average, students' income

after graduation increases when they are exposed to a higher share of peers with low socio-economic status (SES), measured by the education level of their parents. The effect is highest on other low-SES students, as they adopt their job searching behavior, increase their intensive labor supply and become more likely to work in finance and insurance, an industry relating to above-average earnings. Consequently, a 10-percentage point higher share of low-SES peers in other low-SES students' groups leads to a 7.07% increase in their gross income one year after graduation. The positive effect of low-SES peer exposure on income is also observable for medium-SES students, although to a smaller extent. As low-SES students, they are more likely to work in finance and insurance, which also applied to high-SES students. Additionally, the probability of them working in the public sector and in education decreases.

Regarding academic outcomes, I find peers less influential than with initial occupational choices. Furthermore, low-SES peer exposure has a small yet significant negative peer effect on medium-SES students. I present evidence that this result is driven by low-SES students with low ability levels.

One key result of this paper is that peer effects arise primarily from exposure to low-SES students rather than from high-SES students. Higher exposure to high-SES peers increases the probability that low-SES students choose Business Administration as a major, but without significantly affecting income or other outcomes. Therefore, I do not find evidence in this sample that social alienation negatively affects the outcomes of low-SES students, which would be an obstacle for social mobility after university entrance. Compositional effects might partly contribute to this. The sample used here only includes students who successfully graduated from university but not ones who dropped their studies due to high-SES peer exposure and who instead chose a different career path. Furthermore, students' SES is proxied by parents' combined education level as family income is not available, making further research with additional information on drop-outs and students' income background desirable.

Overall, the results indicate that the university is successful in equalizing students' economic outcomes. There is no earning gap between different student types which are not conditional on their ability level. This paper has observed graduates' occupational choices only shortly after students transitioned from university to the labor market. However, for social mobility, these initial choices are important, because this is where the paths are laid for children's subsequent careers and therefore for upwards economic mobility in the long run. Students' peers are very influential at this stage. In comparison, students' own abilities

play no role or only a minor one for selecting the industry in which students start their professional careers. In this sense, peers shape social mobility after university entrance.

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Appendix

A.1 Graduate Income in Switzerland

Table A.1.1: Mean gross income of Swiss university graduates

	Mean	N
University of Basel	82,593.32	1,805
	(34,466.65)	
University of Bern	83,839.34	2,576
	(31,008.38)	
University of Fribourg	77,525.48	1,529
	(29,321.38)	
University of Geneva	76,879.63	1,887
	(33,272.05)	
University of Lausanne	78,374.68	1,811
	(28,351.55)	
University of Lucerne	86,852.03	420
	(32,646.72)	
Université de Neuchâtel	71,603.13	669
	(28,735.05)	
University of St. Gallen (HSG)	106,681.50	1,042
	(33,092.22)	
University of Zuerich	86,053.26	3,493
	(36,208.96)	
Università della Svizzera italiana	67,789.17	472
	(29,858.43)	
ETH Lausanne	82,914.88	1,270
	(31,897.46)	
ETH Zurich	86,401.17	2,939
	(29140.84)	
All institutions	79,571.21	35,661
	(31,309.25)	

Note: This table shows graduates' mean income by university. Hereby, sample weights are applied and income is measured in gross annual earnings five year after graduation in the 1980-1990 birth cohort (n=33,321). Standard deviation in parentheses. All amounts are measured in constant 2020 Swiss Francs (CHF). The mean income across all institutions includes universities and applied universities which are not displayed in this table. Data Source: Swiss Graduate Survey, Second Waves 2007 - 2019.

A.2 Supplementary Descriptive Statistics

Table A.2.2: Students' industry of employment one year after graduation

Industry	Mean
Manufacturing	0.050
	(0.218)
Electricity, gas, steam and air-conditioning supply	0.007
	(0.081)
Construction	0.004
	(0.066)
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.083
	(0.276)
Transportation and storage	0.020
	(0.139)
Accommodation and food service activities	0.011
	(0.104)
Information and communication	0.063
	(0.244)
Financial and insurance activities	0.218
	(0.413)
Real estate activities	0.007
	(0.081)
Professional, scientific and technical activities	0.296
	(0.457)
Administrative and support service activities	0.011
	(0.104)
Public administration and defence; compulsory social security	0.083
	(0.276)
Education	0.096
	(0.295)
Human health and social work activities	0.028
	(0.166)
Arts, entertainment and recreation	0.002
	(0.047)
Other service activities	0.017
	(0.131)
Activities of extraterritorial organisations and bodies	0.004
	(0.066)
N	459

Note: This table shows employment shares in different industries, standard deviations in parentheses. Hereby, industries are classified according to the Swiss NOGA-1 classification system.

Table A.2.3: Parental Education

		Mother		
		Non-tertiary degrees	Tert. non-ac. education	Academic degrees
Father	Non-tertiary	49.50%	34.13%	11.93%
	Tert. non-ac. degrees	7.04%	45.81%	2.75%
	Academic degrees	43.46%	20.06%	85.32%

Note: This table shows the relation between mothers' and fathers' education levels. Swiss higher vocational training ("Höhere Berufsbildung") are tertiary non-academic degrees. The columns add up to 100%. Thus, 85.32% of mothers with academic degrees have partners who have academic degrees as well.

A.3 Peer Effects on Graduates' Industry Choices

Table A.3.4: Additional results for peer effects on industry choices

	Wholesale and Retail Trade	Professional, Scientific and Technical Activities
Low SES	−0.049	−0.071
	(0.025)	(0.078)
High SES	−0.002	0.006
	(0.028)	(0.059)
Share of low SES students	−0.036	−0.139
	(0.089)	(0.232)
Share of high SES students	0.014	0.147
	(0.054)	(0.134)
Controls	Yes	Yes
N	382	382

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors in parentheses, clustered on group-year level. Students' industries are categorized according to the NOGA-1 classification. This table reports additional results on peer effects on students' industry choices. There is no evidence for significant peer effects on students' decision to start their career in trade and professional, scientific, and technical activities. The set of control variables includes students' age, gender, mother tongue, entry exam, group size, and cohort effects.